

Lucent Technologies
Bell Labs Innovations



**DDM-2000 FiberReach Multiplexer
Wideband/ Narrowband Shelf
Release 2.2**

User/Service Manual

363-206-301
Issue 3
April 1998

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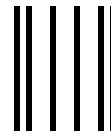
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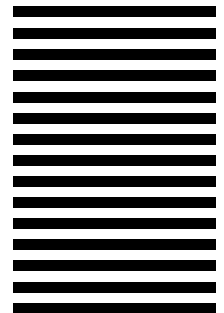
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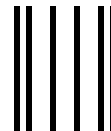
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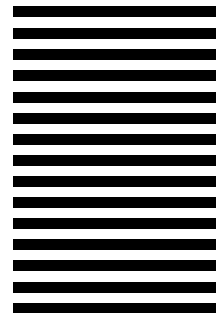
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TOP	Operation and Maintenance (TOP) Wideband Shelf

Operation and Maintenance (TOP) Narrowband Shelf

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About This Document

Purpose

This *DDM-2000 FiberReach Multiplexer User/Service Manual* covers Release 2.2 and provides the following:

- Information concerning SLC Release 4.4.
- Detailed descriptive information to circuit pack level
- Description of possible application arrangements using the DDM-2000 FiberReach multiplexer with other members of the 2000 Product Family
- Technical specifications
- Commands and reports descriptions
- Operation and maintenance (O&M) task oriented practice (TOP) supporting acceptance, turnup, and maintenance tasks.

Intended Audiences

This manual is primarily intended for use by training and by the end users responsible for installing, operating, and maintaining the DDM-2000 FiberReach Multiplexer. It may be used by anyone desiring specific information about the DDM-2000 FiberReach Multiplexer operation and maintenance.

For information on releases using Target ID Address Resolution Protocol (TARP), refer to *DDM-2000 FiberReach Multiplexer Wideband/Narrowband Shelf TARP Release 3 User/Service Manual* (363-206-305).

Reason For Issue

This document, Issue 3, replaces *the DDM-2000 FiberReach Multiplexer Wideband Shelf User/Shelf Manual*, Issue 2. Descriptive, application, and engineering information has been updated to include Software Release 2.2 information.

Significant changes to this document are noted by change bars (|) in the margin.

How to Use This Manual

This user/service manual is organized as follows:

- About This Document
This chapter defines the purpose, scope, and intended audience for this document, provides introductory and support information on this document, lists related documentation and training courses, and tells how to obtain technical support on the system.
- Chapter 1, System Introduction
This chapter introduces and provides a brief description of the DDM-2000 FiberReach Multiplexer.
- Chapter 2, Applications
This chapter describes the network arrangement possibilities available when the DDM-2000 FiberReach Multiplexer is combined with other members of the Lucent 2000 Product Family.
- Chapter 3, Shelf Descriptions and Configurations
This chapter contains a physical description of the DDM-2000 FiberReach Multiplexer shelf components and illustrates typical shelf configurations.
- Chapter 4, Power
This chapter describes power distribution in the DDM-2000 FiberReach Multiplexer shelf.
- Chapter 5, Transmission and Synchronization Interfaces
This chapter describes the low-speed and high-speed transmission interfaces along with the various synchronization timing options.
- Chapter 6, Operations Interfaces

This chapter describes the operations interfaces that support technician and provisioning access and alarm/status reporting.

- Chapter 7, Circuit Pack Descriptions
This chapter provides a detailed functional description of the DDM-2000 FiberReach Multiplexer circuit packs.
- Chapter 8, Administration and Provisioning
This chapter describes the administration and provisioning features of the DDM-2000 FiberReach Multiplexer.
- Chapter 9, Maintenance Description
This chapter defines the maintenance philosophy that outlines the features available to monitor and maintain the DDM-2000 FiberReach Multiplexer.
- Chapter 10, Technical Specifications
This chapter contains the technical specifications for the DDM-2000 FiberReach Multiplexer.
- Chapter 11, Commands and Reports
This chapter provides a detailed description of the commands and reports that can be entered and received, respectively, at the ASCII terminal interface of the DDM-2000 FiberReach Multiplexer.
- Chapter 12, Operation and Maintenance TOP
This chapter provides detailed procedures to support acceptance, turnup, operation, and maintenance of the DDM-2000 FiberReach Multiplexer. This chapter is divided into two sections - Wideband Shelf procedures and Narrowband Shelf procedures.
- Appendix A, SONET Overview
This appendix provides a brief description of the Synchronous Optical Network (SONET).
- Glossary
The glossary provides a brief definition of the abbreviations, acronyms, and certain terms found in this manual.
- Index
The index provides an alphabetical listing of selected items and their corresponding page numbers.

Safety Instructions

Product Safety Labels

Important safety instructions are included in various sections of this manual. In addition to these instructions, there are other general safety instructions you must follow. These instructions involve lasers, lightwave optical cable and connectors, and precautions when handling circuit packs to prevent damage from electrostatic discharge. This manual also contains admonishments in the form of **DANGERS**, **WARNINGS**, and **CAUTIONS** which must be followed at all times.

These admonishments have the following definitions:

- **DANGER** indicates the presence of a hazard that *will* cause death or severe personal injury if the hazard is not avoided.
- **WARNING** indicates the presence of a hazard that *can* cause death or severe personal injury if the hazard is not avoided.
- **CAUTION** indicates the presence of a hazard that *will* or *can* cause minor personal injury or property damage if the hazard is not avoided. The caution is also used for property-damage-only accidents. This includes equipment damage, loss of software, or service interruption.

Other important safety instructions that you should read are in the "Operation and Maintenance TOP" section of this manual. Only trained personnel should perform the procedures in that section.

The alert symbol • appears throughout this product and in this manual to alert the user to the presence of important operating and maintenance (servicing) instructions for the DDM-2000 FiberReach Multiplexer.

Lightwave Safety Guidelines

General Laser Information

Lightwave/lightguide systems, their associated test sets, and similar operating systems use semiconductor laser transmitters that emit light at wavelengths between approximately 800 nanometers and 1600 nanometers. The emitted light is above the red end of the visible spectrum, which is normally not visible to the human eye. Although radiant energy at near-infrared wavelengths is officially designated invisible, some people can see the shorter wavelength energy even at power levels several orders of magnitude below any that have been shown to cause injury to the eye.

Conventional lasers can produce an intense beam of monochromatic light. The term monochromaticity means a single wavelength output of pure color that may be visible or invisible to the eye. A conventional laser produces a small-size beam of light, and because the beam size is small the power density (also called irradiance) is very high. Consequently, lasers and laser products are subject to federal and applicable state regulations as well as international standards for their safe operation.

A conventional laser beam expands very little over distance, or is said to be very well collimated. Thus, conventional laser irradiance remains relatively constant over distance. However, lasers used in lightwave systems have a large beam divergence, typically 10 to 20 degrees. Here, irradiance obeys the inverse square law (doubling the distance reduces the irradiance by a factor of 4) and rapidly decreases over distance.

Lasers and Eye Damage

Light energy emitted by laser and high-radiance LEDs in the 400-1400nm range may cause eye damage if absorbed by the retina. When a beam of light enters the eye, the eye magnifies and focuses the energy, magnifying the irradiance. The irradiance of energy that reaches the retina is approximately 10^5 or 100,000 times that at the cornea, and if sufficiently intense, may cause a retinal burn.

The damage mechanism at the wavelengths used in telecommunications is thermal in origin (that is, damage caused by heating). Therefore, a specific amount of energy is required for a definite time to heat an area of retinal tissue. Damage is not instantaneous. It occurs only when one looks at the light sufficiently long that the product of the retinal irradiance and the viewing time exceeds the damage threshold. Light energies above 1400 nm would cause surface and skin burns and do not affect the retinal area.

Classification of Lasers

Manufacturers of lasers and laser products in the U.S. are regulated by the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) under 21 CFR 1040. These regulations require manufacturers to certify each laser or laser product as belonging to one of four major Classes — Class I, II, IIa, IIIa, IIIb, or IV. Lasers are classified according to the accessible emission limits and their potential for causing injury. Lightwave systems are generally classified as Class I, because, under normal operation conditions, all energized laser transmitting circuit packs are terminated on optical fibers which enclose the laser energy with fiber sheath, forming a protective housing. Also, covers are in place over the circuit pack shelves.

Lightwave Safety Precautions

In its normal operating mode, a lightwave system is totally enclosed and presents no risk of eye injury. It is a Class I system under the FDA/CDRH scheme.

The lightguide cables that interconnect various components of a lightwave system can disconnect or break, and may expose people to lightwave emission. Also, certain measures and maintenance procedures may expose the technician to emission from the semiconductor laser during installation and servicing. Unlike more familiar laser devices, such as solid-state and gas lasers, the emission pattern of a semiconductor laser results in a highly divergent beam. In a divergent beam, the irradiance (power intensity) decreases rapidly with distance. The greater the distance, the less energy will enter the eye, and the less potential risk for eye injury.

Inadvertently viewing an unterminated fiber or damaged fiber with the unaided eye at distances greater than 5 to 6 inches normally will not cause eye injury provided the power in the fiber is less than a few mW at the shorter wavelengths and higher at the longer wavelengths. However, damage may occur if an optical instrument such as a microscope, magnifying glass, or eye loupe is used to stare at the energized fiber end.



CAUTION:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Safety Precautions for Enclosed Systems

Under normal operating conditions, lightwave transmission systems are completely enclosed; nonetheless, the following precautions should be observed:

1. Because of the potential for eye damage, technicians should neither disconnect any lightwave cable nor splice and stare into the optical connectors terminating the cables.
2. Under no circumstances shall lightwave/lightguide operations be performed by a technician before satisfactorily completing an approved training course.
3. Since viewing lightwave emission directly with an optical instrument such as an eye loupe greatly increases the risk of eye damage, an appropriate safety label (Figure 1) must appear in plain view on the front of the main frame or lightguide termination/interconnection equipment. The label shall read as follows:

NOTICE: UNTERMINATED OPTICAL CONNECTORS MAY EMIT LASER RADIATION. AVOID DIRECT EXPOSURE TO THE BEAM. DO NOT VIEW THIS BEAM WITH OPICAL INSTRUMENTS.

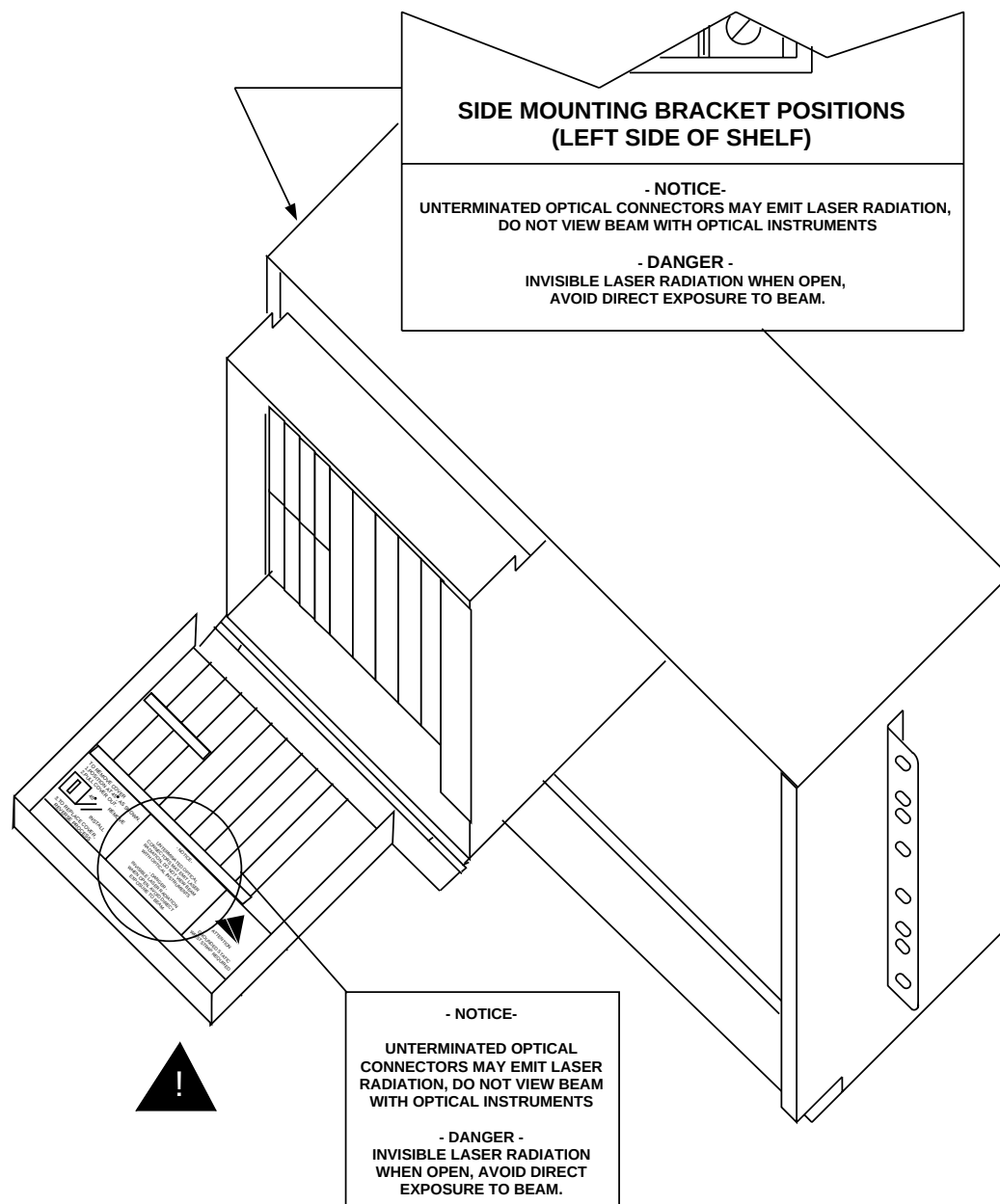


Figure 1. Safety Label Position on FiberReach Shelf

Safety Precautions for Unenclosed Systems

During service, maintenance, or restoration, a lightwave transmission system is considered unenclosed. Under these conditions, follow these practices:

1. Only authorized, trained personnel shall be permitted to do service, maintenance, and restoration. Avoid exposing the eye to emissions from unterminated, energized optical connectors at close distances. Connectors associated with lightwave regenerators are recessed, which limits exposure distance. However, technicians removing or replacing regenerators should not stare or look directly into the vacant regenerator slot with optical instruments or magnifying lenses. (Normal eye wear or indirect viewing instruments such as a FIND-R-SCOPE* are not considered magnifying lenses or optical instruments.)
2. Only authorized, trained personnel shall use the lightwave test equipment during installation or servicing since this equipment contains semiconductor lasers. (Some examples of lightguide test equipment are OTDR's, Hand-Held Loss Test Sets, and Feature Finders.)
3. Under no circumstances shall any personnel scan a fiber with an optical test set without verifying that all lightwave sources on the fiber are turned off.
4. All unauthorized personnel shall be excluded from the immediate area of lightwave transmission systems during installation and service.

Consult *ANSI*[†] Z136.1 American National Standard for Safe Use of Lasers for guidance on the safe use of lasers in the workplace.

* Registered trademark of F. J. W. Industries, Inc.

† Registered trademark of American Standards Institute, Inc.

DDM-2000 FiberReach T1EXT Lightening and Surge Protection Shelf, Model ED8C783-30

Important Safety Instructions

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

When using your telecommunications equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to people, including the following:

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.
3. This product must be installed and serviced only by qualified service technicians.
4. CAUTION: This equipment is for installation with the DDM-2000 FiberReach Wideband Shelf only.
5. CAUTION: For continued protection against risk of fire, all fuses used in this product must be replaced with the same type and rating.
6. WARNING: Installation must include an independent frame ground drop to building ground.

SAVE THESE INSTRUCTIONS

Electrostatic Discharge (ESD) Considerations



CAUTION:

Industry experience has shown that all integrated circuit packs can be damaged by static electricity that builds up on work surfaces and personnel. The static charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

The following precautions should be observed when handling circuit packs in order to prevent damage by electrostatic discharge:

- Assume all circuit packs contain solid state electronic components that can be damaged by ESD. Use only Lucent manufactured **UL**^{*} recognized circuit packs in this system.
- When handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane, always wear a grounded wrist strap or wear a heel strap and stand on a grounded, static-dissipating floor mat. If a static-dissipating floor mat is used, be sure that it is clean.
- Handle all circuit packs by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.
- Observe warning labels on bags and cartons. Whenever possible, do not remove circuit packs from antistatic packaging until ready to insert them into slots.
- If possible, open all circuit packs at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats. If a static-dissipating table mat is used, be sure that it is clean.
- Always store and transport circuit packs in static-safe packaging. Shielding is not required unless specified.
- Keep all static-generating materials such as food wrappers, plastics, and Styrofoam[†] containers away from all circuit packs. Upon removal from the bay, immediately put circuit packs into static-safe packages.
- Whenever possible, maintain relative humidity above 20 percent.

To reduce the possibility of ESD damage, shelves are equipped with grounding jacks to enable personnel to ground themselves using wrist straps (Figure 2) while handling circuit packs or working on a shelf(s). The jacks for connection of wrist straps are located at the lower right-hand corner of each shelf and are labeled. When grounding jacks are not provided, an alligator clip adapter enables connection to bay frame ground.

* Registered trademark of Underwriters Laboratories, Inc.

† Registered trademark of The Dow Chemical Company.

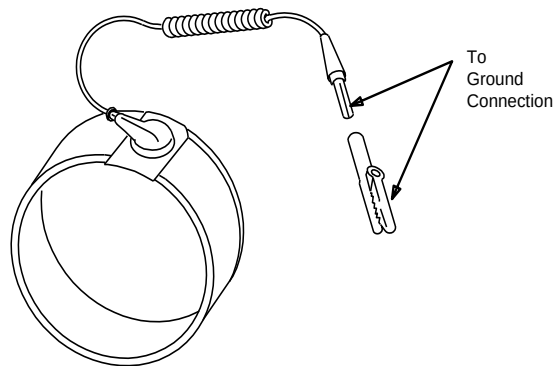


Figure 2. Static Control Wrist Strap

IMPORTANT SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.
3. Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.
4. Slots and openings in this product's back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided.
5. This product should be operated only from the type of power source indicated on the marking label. For information on proper electrical distribution and power requirements, refer to the "Power" and "Technical Specifications" sections of this user/service manual.
6. Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.
7. To reduce the risk of electrical shock, do not disassemble this product. Service should be performed by trained personnel only. Opening or removing covers and/or circuit packs may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.
8. ***Caution: Disconnect three(3) power connections when removing power from the system.***
9. Use only Lucent manufactured *UL* recognized circuit packs in this system. Recognized circuit packs are listed in this user/service manual.

SAVE THESE INSTRUCTIONS.

IMPORTANT INSTALLATION SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Installation and maintenance procedures must be followed and performed by trained personnel only.
3. All DS1 and T1 extension interfaces should not leave the building premises unless connected to telecommunication devices providing primary or secondary protection, as applicable.
4. For information on proper mounting instructions, consult LTP 363-206-310, *DDM-2000 OC-3 FiberReach Installation Manual*.
5. Never install telecommunication wiring during a lightning storm.
6. Never install telecommunication connections in wet locations.
7. Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the DS1 interface.
8. Use caution when installing or modifying telecommunication lines.

SAVE THESE INSTRUCTIONS.

Related Documentation

The following documents provide additional information about the DDM-2000 Multiplexers:

- Number: 363-206-200
Title: *DDM-2000 Multiplexer Applications, Planning, and Ordering Guide*
Audience: Network planners, equipment engineers, and sales teams
Content: Features, applications, high-level description, operations, administration, maintenance, planning, ordering, product support, reliability information, technical specifications, and a synchronous optical network (SONET) overview
- Number: 363-206-201
Title: *DDM-2000 OC-3 Multiplexer, System Commands Quick Reference*
Audience: Maintenance personnel
Content: Abbreviated list of system commands and parameters
- Number: 363-206-202
Title: *DDM-2000 OC-3 Multiplexer User/Service Manual, Volumes I and II*
Audience: Maintenance personnel
Content: Detailed description, technical specifications, commands and reports (Volume I); operations and maintenance procedures (Volume II). This manual covers information on Software Releases 2 through 7.2.
- Number: 363-206-204
Title: *DDM-2000 OC-3 Multiplexer Installation Manual*
Audience: Customers planning to install the equipment
Content: Customer installation instructions
- Number: 363-206-206
Title: *DDM-2000 OC-12 Multiplexer — System Commands Quick Reference*
Audience: Maintenance personnel
Content: Abbreviated list of system commands and parameters
- Number: 363-206-207
Title: *DDM-2000 OC-12 Multiplexer User/Service Manual*
Audience: Maintenance personnel
Content: Detailed description, technical specifications, commands and reports, and operations and maintenance procedures. This manual covers information pertaining to OC-12 Software Releases 1.0 through 3.2.

- Number: 363-206-208
Title: *DDM-2000 OC-12 Multiplexer Installation Manual*
Audience: Customers planning to install the equipment
Content: Customer installation instructions
- Number: 363-206-220
Title: *DDM-2000 OC-3/OC-12 Multiplexer Circuit Pack Options Job Aid*
Audience: Maintenance personnel
Content: List of circuit pack options
- Number: 363-206-222
Title: *DDM-2000 OC-3/OC-12 Multiplexer Acceptance Task List Job Aid*
Audience: Maintenance personnel
Content: Check list of acceptance and turnup procedures
- Number: 363-206-223
Title: *DDM-2000 OC-12 Regenerator — System Commands Quick Reference*
Audience: Maintenance personnel
Content: Abbreviated list of system commands and parameters
- Number: 363-206-285
Title: *DDM-2000 OC-3 Multiplexer User/Service Manual, Volumes I and II*
Audience: Maintenance personnel
Content: Detailed description, technical specifications, commands and reports (Volume I); operations and maintenance procedures (Volume II). This manual covers information pertaining to OC-3 Software Releases 13.0 and later.
- Number: 363-206-290
Title: *DDM-2000 OC-12 Multiplexer User/Service Manual, Volumes I and II*
Audience: Maintenance personnel
Content: Detailed description, technical specifications, commands and reports (Volume I); operations and maintenance procedures (Volume II). This manual covers information pertaining to OC-12 Software Releases 5.0 and later.

- Number: 363-206-295
Title: *DDM-2000 OC-12 Multiplexer User/Service Manual, Volumes I and II*
Audience: Maintenance personnel
Content: Detailed description, technical specifications, commands and reports (Volume I); operations and maintenance procedures (Volume II). This manual covers information pertaining to OC-12 Software Releases 7.0 and later.
- Number: 363-206-305
Title: *DDM-2000 FiberReach Multiplexer Wideband/Narrowband Shelf TARP Release 3 User/Service Manual*
Audience: Maintenance personnel
Content: System overview, system description, introduction to each system interface, administration and provisioning, operations and maintenance procedures (in TOP format), and maintenance support information (alarm tables, etc.).
- Number: 363-206-310
Title: *DDM-2000 FiberReach Multiplexer Installation Manual*
Audience: Installation and maintenance personnel
Content: Customer installation instructions
- Number: 824-102-151
Title: *DDM-2000 Multiplexers Operations Systems Engineering Guide*
Audience: Engineers
Content: Operations systems engineering information for the DDM-2000 OC-3, OC-12, and FiberReach Multiplexers

The following documents provide additional information about CPro-2000:

- Number: 365-576-130 (User Manual only)
Number: 365-576-131 (User Manual & Software)

Title: *CPro-2000 User Manual*, Release 7.0
Audience: Customers, Engineers, Maintenance Personnel
Content: Operations information for the CPro-2000 software tool to provision and maintain networks.

The following documents provide additional information about ITM SNC:

- Number: C107564270

Title: *ITM SNC Users Guide*

Audience: Operations Personnel

Content: Integrated Transport Management Subnetwork Controller Information.

The following documents provide additional information about Operations Interworking :

- Number: 824-102-144
Title: *Lucent Technologies 2000 Product Family Multi-Vendor Operations Interworking Guide*
Audience: System Planners and Engineers
Content: Operations interworking information for the Lucent Technologies Product Family 2000 systems, including DDM-2000 Multiplexers and FT-2000 OC-48 Lightwave Systems in multi-vendor subnetworks.
- Number: 824-102-147
Title: *Lucent Technologies 2000 Product Family Operations Interworking Guide*
Audience: System Planners and Engineers
Content: Operations interworking information for the Lucent Technologies Product Family 2000 systems, including DDM-2000 Multiplexers and FT-2000 OC-48 Lightwave Systems.

The following documents provide additional information about the SLC[®]-2000 Access System:

- Number: 363-205-004
Title: *SLC-2000 Multi-Services Distant Terminal (MSDT) Feature, User/Service and Ordering Manual*
Audience: Engineers, installers, administrators, operation and maintenance personnel, and technical support
Content: Applications, physical and functional description, administration, powering, technical specifications, construction and installation, and operation and maintenance [in task-oriented practice (TOP format)]. This document also contains ordering information for the MSDT.
- Number: 363-208-000
Title: *SLC-2000 Access System, Applications, Planning, and Ordering Guide*
Audience: Network planners, equipment engineers, and sales teams
Content: Features, applications, high-level description, operations, administration, maintenance, planning, ordering, product support, reliability information, technical specifications, and a synchronous optical network (SONET) overview
- Number: 363-208-001

Title: *SLC-2000 Access System, User/Service Manual*

Audience: Installers, technicians, engineers, and troubleshooters

Content: System overview, system description, introduction to system interface, administration and provisioning, operations and maintenance, and maintenance support procedures (in TOP format), and maintenance support information (alarm tables, etc.).

■ Number: 363-208-003

Title: *SLC-2000 Access System, Command and Message/Service Manual*

Audience: Installers, technicians, engineers, and troubleshooters

Content: A tutorial on system commands and messages, as well as detailed information about system commands in manual-page format. The document pages are organized by user interface panel (UIP) commands and craft interface terminal (CIT) commands.

■ Number: 363-208-010

Title: *SLC-2000 Access System, Customer Assembly Manual for RT Frames*

Audience: Customers that plan to install the equipment

Content: Configuration drawings and detailed instructions for ordering, installing, assembling, and connecting the equipment in a remote terminal (RT) frame arrangement. This document also includes installation procedures, cabling and wiring diagrams, application schematic diagrams (SDs), parts lists, and supporting information. Shelf assembly, cable routing, and frame installation are provided.

■ Number: 363-208-011

Title: *SLC-2000 Access System, Customer Assembly Manual for COT Frames*

Audience: Customers that plan to install the equipment

Content: Configuration drawings and detailed instructions for ordering, installing, assembling, and connecting the equipment in a Central Office Terminal (COT) frame arrangement. This document also includes installation procedures, cabling and wiring diagrams, the application schematic diagrams (SDs), a parts list, and supporting information. Shelf assembly, cable routing, and frame installation are provided.

■ Number: 363-208-025

Title: *SLC-2000 Access System, Software Release Description - Release 4.03.00: Issue 1.*

Audience: Installers, technicians, engineers, and troubleshooters

Content: Provides information about the software release and procedures for implementation. Describes the features and capabilities provided in the release. Lists operating issues from the previous release that have been resolved, the operating issues in this release, and work-arounds.

- Number: 363-208-026

Title: *SLC-2000 Access System, Software Release Description - Release 4.04.00: Issue 1.*

Audience: Installers, technicians, engineers, and troubleshooters

Content: Provides information about the software release and procedures for implementation. Describes the features and capabilities provided in the release. Lists operating issues from the previous release that have been resolved, the operating issues in this release, and any work-arounds.

- DDM-2000 FiberReach Drawings:

ED-8C762-20 DDM-2000 FiberReach Cable Assemblies
ED-8C762-30 DDM-2000 FiberReach Wideband Shelf
ED-8C778-30 DDM-2000 FiberReach Narrowband Shelf (Omaha)
ED-8C843-30 DDM-2000 FiberReach Wideband Shelf Assembly
equipped with 1 or 2 Wideband shelves
ED-8C785-30 DDM-2000 FiberReach Narrowband Shelf
ED-8C843-31 DDM-2000 FiberReach Wall DT Unit
ED-8C843-32 DDM-2000 FiberReach LGX Panel
ED-8C843-33 DDM-2000 FiberReach Release 1 Software
ED-8C843-34 DDM-2000 FiberReach Release 2 Software
ED-8C852-30 DDM-2000 DS1 Interconnect Panel
SD-7C516-01 Application Schematic

- DDM-2000 OC-3 Drawings:

ED-8C724-10 OC-3 and OC-3/OC-12 Combined Bay Arrangements
ED-8C724-15 Cabling Plan (Rear Access)
ED-8C724-16 Cabling Plan (Front Access)
ED-8C724-20 Cable Assemblies
ED-8C724-21 Cable Assemblies
ED-8C724-30 DDM-2000 Shelf Assembly

ED-8C724-10	OC-3 and OC-3/OC-12 Combined Bay Arrangements
ED-8C724-31	User Panel Assembly
ED-8C724-34	Releases 2 and 3 Software Ordering
ED-8C724-36	Release 5 Software Ordering
ED-8C724-37	Release 6 Software Ordering
ED-8C724-38	Release 7 Software Ordering
ED-8C724-39	Release 8 Software Ordering
ED-8C724-40	Release 9 Software Ordering
ED-8C733-30	Fan, Filter, and Baffle Assemblies
SD-7C510-01	Application Schematic
T7C510-31	Interconnect Wiring (Rear Access)
T7C510-32	Interconnect Wiring (Front Access)
801-525-168	Floor Plan Data Sheets

DDM-2000 equipment is also available in traditional loop enclosure arrangements, descriptions of which may be found in the following Lucent Technologies practices:

- Number: 363-205-000
Title: *SLC Series 5 Carrier System Ordering Guide — Loop Transmission Systems* (to be replaced by 363-205-010)
- Number: 363-205-010
Title: *SLC Series 5 System Applications and Planning Guide*
- Number: 626-500-128
Title: *51A-type Cabinets Ordering Information and Lettering Guide* — for DDM-2000 FiberReach Wideband Shelves and **SLC Series 5 Carrier Systems**
- Number: 640-250-289
Title: *51A-type Cabinets Ordering Information and Lettering Guide* — for DDM-2000 FiberReach Wideband Shelves and DDM Plus
- Number: 640-030-205
Title: *61B-type Cabinets Ordering Information and Lettering Guide* — for DDM-2000 FiberReach Wideband and Narrowband Shelves
- Number: 626-500-105
Title: *80-type Cabinets Ordering Information and Lettering Guide*

- Number: 626-500-115

Title: *90-type Cabinets Coding and Ordering Information*

The following document provides additional information about related equipment:

- Number: 636-299-120

Title: **LGX®** *Distribution System, Planning, Engineering, Installation, and Operation System Reference Guide.*

Customer Technical Support (CTS)

CTS is available through a toll-free technical assistance number. Lucent maintains a highly-skilled, multi-tier support structure consisting of regional engineers, product specialists, and system designers to support your network equipment. All levels of technical expertise may be called upon to solve the customer problem (refer to Figure 3).

The CTS organization provides remote, diagnostic support. On-site assistance is available on a billable contract or time and material basis. Support services may include the following activities:

- Responding to all requests for assistance
- Tracking and maintaining visible ownership of all reported problems, from inception through resolution
- Analyzing and diagnosing reported problems
- Providing restoration and recovery service
- Providing preventive and/or circumvention measures
- Communicating the actions, plans, and problem status to the reporting customer
- Initiating action to establish Modification Requests (MRs) for design issues
- Writing and distributing technical bulletins (Urgent Problem Notification).

CTS services are available on a contract basis in three levels to meet varying customer needs: Preferred, Standard, and Basic Agreements. The Preferred level of support guarantees 24 x 7 (24 hour, 7 day-a-week) coverage of the customer's network. Guaranteed performance commitments for response, service restoration, and problem resolution times are validated by published Service Performance Reports. The Standard level of support guarantees 8 x 5 (8 hour, 5 day-a-week) coverage. Performance commitments are also validated by Service Performance Reports. Out-of-hours support is available for an additional fee. The Basic level of support guarantees 8 x 5 coverage with hourly billing for each support call. Out-of-hours coverage is available with additional fees.

When the customer experiences a problem, the initial point of contact within Lucent is the Regional Technical Assistance Center (RTAC). RTAC is divided into three regions covering North America: region East (includes Canada), region South, and region West. They can be reached by calling 1-800-CAL-RTAC (1-800-225-7822). Lucent works with the customer to define the problem and determine its severity. Problems are worked during the customer's contracted coverage period. By prior agreement, service-affecting problems are worked immediately regardless of contracted coverage with billing reconciliation if required. Acting as a single point of contact with the customer, the RTAC engineer will involve all necessary tiers of support to solve the customer problem.

The CTS organization has also established a dial-up technical support medium called COACH. COACH is a system of on-line support tools aimed at providing product news and bulletins, diagnostic services, compatibility information, and on-line documents. COACH tools provide you with the most up-to-date product information so that problems are either prevented or quickly resolved. Many Lucent Technologies' transmission products, including DDM-2000 Multiplexers, are supported by COACH.

Once logged into COACH, the user specifies which product to access and COACH grants the appropriate combination of tools and commands. The user reaches each one of these tools and commands through a centralized, menu-driven computer program. Every screen provides help in making appropriate menu selections. COACH users will achieve proficiency quickly because of the consistency of menu selections among products.

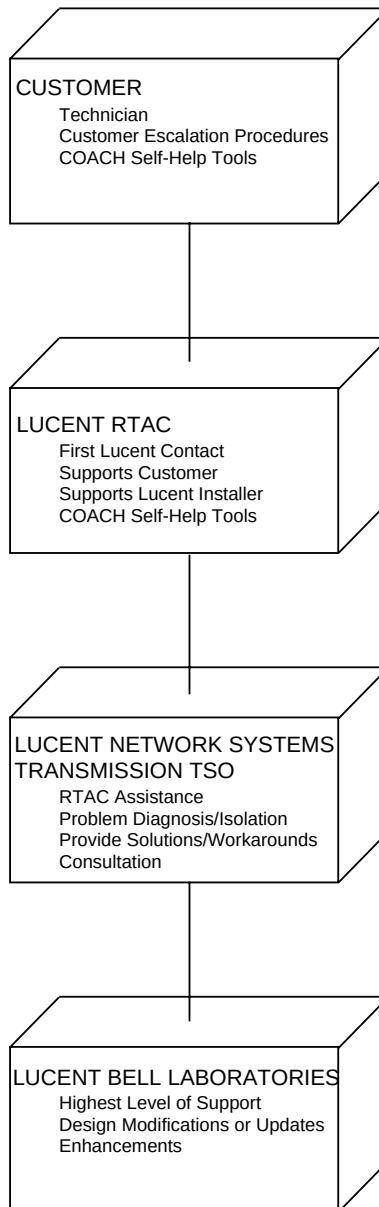


Figure 3. Product Support

The following COACH tools are available to the user:

- Diagnostic Dictionary

The diagnostic dictionary contains histories of previously encountered problems and descriptions of the solutions or workarounds. Your support staff can use this tool when published documentation or standard diagnostic procedures fail to address a problem.

- News and Bulletins

Immediately after a user logs into COACH, the News and Bulletins tool displays bulletins containing urgent information related to the user's products. All users are automatically notified about urgent matters, such as problems with scheduled releases, recalls of hardware or software, or scheduled maintenance for computer support. Less urgent messages are distributed through news items that can be sent to individuals or categories of users. Notification of news appears on the screen immediately following current bulletins.

- Compatibility Data

Occasionally, hardware/software configuration problems arise when new software releases are issued. The Compatibility Data tools permit users to view the correct hardware configuration associated with a specific software release. The user simply enters the appropriate software release number and COACH responds with page-formatted lists of circuit packs compatible with the selected software release. This tool also contains the latest issue numbers of the customer documentation.

- COACH User's Guide

COACH supplies an on-line version of its User's Guide. The COACH User's Guide includes instructions on using the customer support tools and documents any changes to the previous version of the guide.

For information on obtaining a COACH login, contact:

COACH Software Development
Lucent Technologies
1600 Osgood St.
North Andover, MA. 01845

Telephone: **1-800-238-4021**

The RTAC and CTS organization strive to provide proactive and responsive technical customer support for all its products. Through the combined efforts of the individual customer support groups and through COACH tools, the RTAC and CTS organization provide the best possible customer support.

Engineering and Installation Services

The Lucent Technologies Customer Support and Operations (CS&O) organization provides customers with quality product support services. Whether you need assistance in engineering, installation, normal system maintenance, or disaster recovery, the support staff provides you with the quality technical support you need to get your job done. Each segment of the CS&O organization regards the customer as its highest priority and understands your obligation to maintain quality service for your customer.

Within the CS&O organization, the Engineering and Installation Services group provides a highly skilled force of support personnel to provide customers with quality engineering and installation services. These engineering and installation specialists use state-of-the-art technology, equipment, and procedures to provide customers with highly competent, rapid response services. These services include analyzing your equipment request, preparing a detailed specification for manufacturing and installation, creating and maintaining job records, installing the equipment, and testing and turning over a working system.

When the CS&O organization provides job records and installs the equipment, operationally affective changes to the system are automatically identified and applied to the system at no additional cost.

The Engineering and Installation Services group provides the customer with an individually tailored, quality-tested job that meets our published high standards and the customer's operational requirements. The group ensures that the customer's system order is integrated into a complete working system tailored to office conditions and preferences. This process provides for the customer's complete needs. It includes provisions for cabling, lighting, power equipment, and ancillary connections to local and/or remote alarm systems. The group will also respond to any customer changes that occur during installation.

All equipment engineered and installed by Lucent Technologies is thoroughly tested and integrated into a reliable system at cutover. Once approved by Lucent's Quality Assurance Test group, the system is turned over to the customer.

The group also provides any specialized engineering and installation services required for unusual or highly individualized applications. These services may include engineering consultations and database preparation. Your local Account Executive can provide more information about these services.

Customer Technical Support Enhanced Services

The goal of Lucent Technologies' Customer Technical Support Enhanced Services is to keep Lucent Transmission Systems products operating at maximum performance and to prevent problems from interrupting service to customers.

Typical Enhanced Services include:

- Network design, growth planning, and performance analysis
- Multivendor troubleshooting
- Network Integration
- Preventive and remedial maintenance
- Hardware and software upgrade services
- On-site maintenance programs.
- Customized MOP (Method of Procedure) development.

For more information on Lucent's Customer Technical Support Services, contact your Lucent Technologies' Account Executive.

Documentation Support

The Lucent Technologies Customer Training and Information Products organization provides a contact to report errors or to ask questions about information in this document. The document support telephone number is **1-888-LTINFO6 (1-888-584-6366)** (Monday through Friday, 8:00 a.m. to 4:00 p.m. EST).

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RBOC/BOC	Process through your Company Documentation Coordinator	

* For commercial customers, a check, money order, purchase order number, or charge card number is required with all orders. Make checks payable to Lucent Technologies. Lucent Technologies entities should use Form IND 1-80.80 FA, available through the Customer Information Center.

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Customer Training and Information Products
2400 Reynolda Road
Winston-Salem, NC 27106

You may also report errors or request changes to this document by calling the toll free number, **1-888-LTINFO6 (1-888-584-6366)** and giving the 9-digit document number.

Electronic Documentation

Documentation for the DDM-2000 FiberReach Multiplexer is now available in electronic form, on compact disk, read-only memory (CD-ROM). CD-ROM has many advantages over traditional paper documentation, including cost savings, search and retrieve capability, and the assurance of the most current documentation.

CD-ROM is available by annual subscription (on standing order).

- To order, call your Technical Information Resource Manager, your Lucent Technologies Account Executive, or the Lucent Technologies Customer Information Center at **1-888-LUCENT8 (1-888-582-3688)**.
- For pricing information, contact your Lucent Technologies Network Systems Account Executive or the Lucent Technologies Customer Information Center **1-888-LUCENT8 (1-888-582-3688)**
- For technical information, call Lucent Technologies Documentation Support **1-888-LTINFO6 (1-888-584-6366)**.

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System Introduction

1

Overview

This chapter introduces the Lucent 2000 Product Family and briefly describes the DDM-2000 FiberReach product.

Lucent 2000 Product Family

Lucent is focused on a carefully planned and growing product family designed to provide total network solutions. The 2000 Product Family complies with the synchronous optical network (SONET) standard and builds on features and capabilities that customers have found to be useful and successful in networks such as single-ended maintenance features and product upgrade capabilities. These upgrade capabilities allow a graceful evolution from today's asynchronous networks to the world-class intelligent networks of the future. The 2000 Product Family provides the significant elements of the Lucent Service Net-2000 Architecture.

Lucent's Service Net-2000 Architecture starts with the network as it exists today and provides real-world solutions to build upon your existing base. It also allows a graceful evolution from rigid wire centers to a network of flexible nodes. This network distributes intelligence to where it functions best.

The Service Net-2000 Architecture offers access bandwidth, service on demand, and self-healing network applications. Access bandwidth offers increased capacity, giving end users the ability to access any desired service. This

increased access bandwidth, provided over fiber, offers superior network reliability while opening up new revenue opportunities.

Service on demand offers high-capacity services implemented in short intervals. This application gives local exchange carriers the opportunity to generate new revenue faster by provisioning new services at a competitive "fast start" pace. At the same time, they help maintain the existing revenue base by increasing customer satisfaction. Service on demand also reduces start-up costs, thereby improving capital management.

The self-healing network application involves careful planning and provisioning of cross-product capabilities with the 2000 Product Family. At the core of this network is DACS III-2000 and DACS IV-2000 Cross-Connect Systems, the nerve center of interoffice transmission. The intelligent DACS III-2000 and DACS IV-2000 Cross-Connect Systems, working with the *ITM SNC* Controller, can identify failed connections and reroute signals according to a preestablished recovery plan. The DDM-2000 Multiplexers offer self-healing networks based on highly reliable path-switched rings.

The Lucent 2000 Product Family includes the:

- DDM-2000 OC-3 Multiplexer
- DDM-2000 OC-12 Multiplexer
- DDM-2000 FiberReach Multiplexer
- FT-2000 OC-48 Lightwave System
- DACS III-2000 Cross-Connect System
- DACS IV-2000 Cross-Connect System
- *ITM SNC* Controller
- *SLC*[®]-2000 Access System
- Business Remote Terminal-2000 (BRT-2000)
- ITM SNC Subnetwork Controller
- CPro-2000 System

The Year 2000

DDM-2000 Multiplexers store dates relative to a non-zero default of January 1, 1970. The last year that can be provisioned using the **set-date** command is 2069. Therefore, DDM-2000 Multiplexers will not be affected by the arrival of the year 2000.

Basic Description of the *SLC-2000* Access System

The *SLC-2000* Access System is the Lucent Technologies real-world digital loop carrier (DLC) solution that builds upon our proven digital loop carrier system experience. It is based on standard interfaces, network element commonality, and operational ease. This service-ready platform provides cost-effective deployment options and full-service capabilities that dramatically enhance the revenue generating capability and competitive positioning of your company.

The *SLC-2000* Access System builds upon many of the administrative and operational features of the industry standard *SLC* Series 5 Carrier System and the *SLC 96* Carrier System. The *SLC-2000* Access System offers better ways of providing services and supports the standard digital interfaces for universal and integrated systems. It provides a synchronous optical network (SONET) OC-3 feeder interface, a DSX-1 metallic feeder interface, and enhanced operations, administration, maintenance, and provisioning (OAM&P) capabilities. The *SLC-2000* Access System offers increased system flexibility to serve a wide variety of network applications.

The *SLC-2000* Access System is a software-driven DLC system with a built-in SONET multiplexer. The system provides up to 768 subscriber lines and 28 subscriber DS1s, and has an option to equip a built-in loop test system test head [the integral test head (ITH)]. The system supports the following:

- Basic telephone service
- A full complement of special services Integrated Services Digital Network (ISDN)
- ONUs using both Fiber in the Loop (FITL) and DSX-1 metallic distribution
- Metallic distribution
- TR-08 standard interface
- TR-303 interface.

Basic Description of the *DDM-2000* FiberReach Multiplexer

The *DDM-2000* FiberReach Multiplexer is a full-service access product designed to support business carrier access, fiber-in-the-loop, and private network applications. *DDM-2000* FiberReach has been designed to serve a multitude of services through a very modular architecture based on extensive reuse. The architecture consists of two types of shelves:

- narrowband shelf

- which can be used together or separately in a variety of configurations. The narrowband shelf supports all of the services that are currently supported by Lucent's *SLC-2000* Multi-Services Distant Terminal (MSDT) product but has four times the capacity to serve customers by requiring a concentration of special services at a single site. The channel units housed in the narrowband module are the *SLC-2000* channel units.
 - which can be used for telephony applications, complete remote operations, such as channel unit provisioning and integrated testing, are available through the *SLC-2000* host. The *SLC-2000* host also creates the link into the *5ESS*[®] electronic switch for TR08 or TR303 communications.
- wideband shelf
- provides the optics for the narrowband shelf, as well as a complete DS1 to OC-1 solution. Eight low-speed slots are available, optionally provisioned for up to sixteen 1x1 protected or unprotected DS1s, or up to twenty-eight 1x7 protected or unprotected DS1s. These low-speed slots may also be used to house T1 extension circuit packs. Two function slots are also available, offering shelf space for future 1x1 protected DS3, EC-1, or moving picture experts group (MPEG) II video interfaces.
 - As part of the 2000 Family of Products, the DDM-2000 FiberReach Multiplexer supplies complete operations, administration, maintenance, and provisioning (OAM&P) features with a look and feel that matches the DDM-2000 OC-3 and OC-12 Multiplexers. The DDM-2000 FiberReach Multiplexer fits into the already existing SONET networks and interworks with the existing OSs. Remote operations are via the International Standards Organization (ISO) standard 7-layer open systems interconnection (OSI) protocol, while a user panel and craft interface terminal (CIT) port support local operations needs. Complete performance-monitoring features, including DS1 path performance monitoring, permit the service provider to verify the quality of service based on key tariffs.

Together, the wideband and narrowband shelves can be deployed in outside plant or customer premises enclosures (including wall mounted) or can be rack-mounted.

The DDM-2000 FiberReach Multiplexer has a phased release plan. This manual covers Release 2.2 of the DDM-2000 FiberReach Multiplexer. The manual will be updated to cover additional releases as they become available.

The DDM-2000 FiberReach Multiplexer is a full-service access product, combining a 48-line optical network unit with a complete DS1 interface product. DDM-2000 FiberReach is a synchronous optical network (SONET) product that is

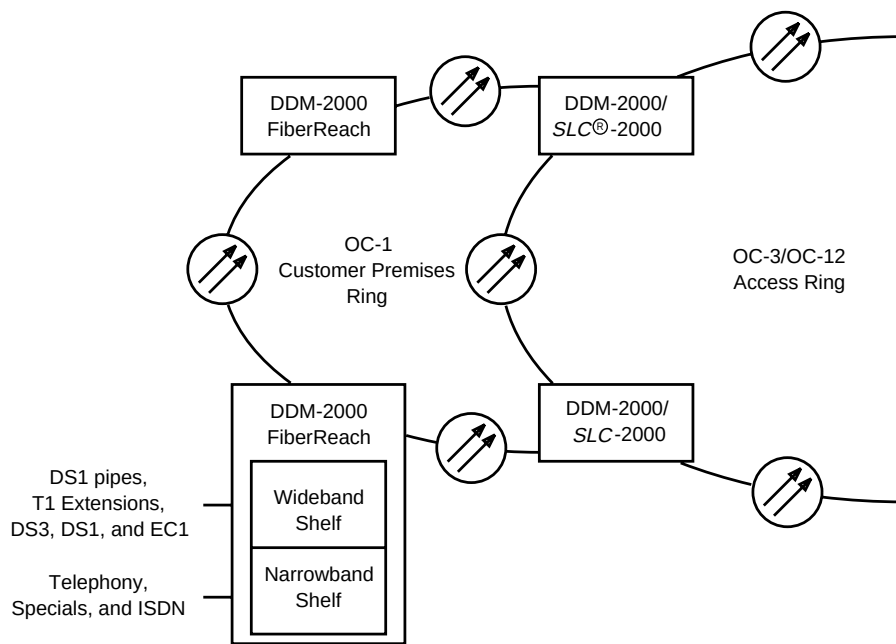
"hosted" by either a DDM-2000 OC-3 or a *SLC*-2000 Access System. The extension from the host node is an OC-1 signal in a ring topology.

The DDM-2000 FiberReach Multiplexer architecture consists of two shelves: narrowband and wideband. The wideband shelf provides the DS1 to STS-1 multiplexing function and the optics for the fiber connection to the host system, as well as the broadband service slots. The wideband shelf has been designed to be similar in physical design with the DDM-2000 OC-3 and OC-12 Multiplexers. This includes the design of the user panel and reuse of circuit packs, as well as the operations, maintenance, administration, and provisioning (OAM&P) functions of the system.

The narrowband shelf provides POTS, POTS-like special, or integrated services digital network (ISDN) basic rate interface (BRI) services, and is used in conjunction with the wideband shelf. All of the services that are currently supported by the *SLC*-2000 Multi-Services Distant Terminal (MSDT) product are now supported with the narrowband shelf and at four times the capacity of the *SLC*-2000 MSDT. The channel units housed in the narrowband shelf are the same as those used in the *SLC*-2000 MSDT.

The wideband shelf and narrowband shelf communicate with each other via standard DS1 interfaces.

Figure 1-1 shows an example of how the DDM-2000 FiberReach Multiplexer fits into existing networks. Other examples are shown in the FiberReach APOG (Applications, Planning, and Ordering Guide).



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Figure 1-1. Example of DDM-2000 FiberReach Multiplexer in the Network

DDM-2000 FiberReach Releases

Release Descriptions

The following paragraphs provide brief descriptions of the DDM-2000 FiberReach Multiplexer releases.

Release 2.1 replaces Releases 1.0 and 2.0 via a Class A change to Release 2.1. It provides additional channel units for more narrowband shelf flexibility and offers all the services of the *SLC-2000* MSDT. (Refer to Table 4-2 in Chapter 4 for additional information on channel units.) The companion *SLC-2000* Software Release 4.4 also provides the ability to mix FiberReach and MSDT services on one *SLC-2000* host. Release 4.4 allows the NBS to operate in the following modes:

- Quad Mode: Optimized for up to 48 POTS and special service lines
- Octet mode: Optimized for up to 40 IDSN lines

In the wideband shelf, DDM-2000 FiberReach Release 2.1 and later offer a new 15-minute bin option for DS1 performance monitoring, as well as a new fourth level of security for maintenance users only. Enhanced routing applications are also available starting with Release 2.1, DDM-2000 OC-3 Release 9.1, or DDM-2000 OC-3 Release 11.0. In addition, DDM-2000 FiberReach can be configured in a 50-node network containing FiberReach, DDM-2000 OC-3 and OC-12, and FT-2000.

Release 2.2 provides the following:

- a new OC-3 OLIU (28G-U) for the FiberReach shelf. The 28G-U OLIU provides an OC-3 SONET compliant long reach interface for the DDM-2000 FiberReach shelf, providing an OC-3 VT path switched ring interface. The 28G-U OLIU provides visibility to the full STS-3 bandwidth and allows for selection of any 28 VT1.5s within the 3 STS-1s 1s on the OC-3 ring for drop at the FiberReach shelf. The remaining traffic can be passed-through on the OC-3 ring.
- The HDSL circuit pack (BBF8) provides for HDSL interface capability on the DDM-2000 FiberReach shelf. It allows the transport of DS1 rate payloads, for up to 12,000 feet, over two metallic 24 AWG twisted-pair lines. Data is transported over each pair bidirectionally using echo cancellation techniques. **Note:** This capability is provided when the OC-3 shelf is equipped with a 28G-U OLIU in the main slots.
- New Secured-Area Telecommunication Applications Cabinet (STAC) System — FRC 2000. This small, integrated modular indoor cabinet offering enables the provisioning of electronic controls, terminals, and instruments quickly at the point of need with minimal investment and real

estate. The enclosure optimizes equipment density, heat transfer, environmental protection, and ease of installation and maintenance. It is designed to maximize public and installation safety

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Overview

The DDM-2000 FiberReach Multiplexer can support a range of applications with maximum economy and efficiency. This chapter highlights the ways the DDM-2000 FiberReach Multiplexer, along with other members of the 2000 Product Family, meets these diverse network needs.

DDM-2000 FiberReach Applications Summary

Lucent Technologies' 2000 Product Family has set the standard for networking flexibility. The newest member of this family, the DDM-2000 FiberReach Multiplexer, extends the benefits of the DDM-2000 Multiplexer and *SLC*[®]-2000 Access System to end users whose capacity needs may be small but still demand the cutting edge services and support of the larger customers. Targeting the diverse needs of business carrier access, residential fiber-in-the-loop, and private network applications, DDM-2000 FiberReach will deliver a full range of services using the Narrowband and Wideband shelf as follows:

- Narrowband Shelf
 - telephony,
 - DS0 specials
 - Integrated Services Digital Network (ISDN).

- Wideband Shelf
 - DS1 services (via DSX-1 or T1 carrier access)
 - video transport.

DDM-2000 FiberReach interworks with DDM-2000 OC-3/OC-12 and *SLC*-2000 Access System hosts via an exceptional variety of networking options, including single-homed OC-1 path-switched ring extensions and fully survivable dual-homing topologies. In every application, DDM-2000 FiberReach offers a thorough set of operations features with a look and feel that matches the other acclaimed DDM-2000 Multiplexer systems. Remote operation is via the data communications channel (DCC), while a user panel and craft interface terminal port support local operations needs. Complete performance-monitoring (PM) features, including DS1 path PM, permit the service provider to verify the quality-of-service terms of key tariffs.

DDM-2000 FiberReach will extend the service provider's investment in Synchronous Optical NETWORK (SONET) networks by supporting broadband capabilities such as two-way moving picture experts group (MPEG 2) videoconferencing transport within standard SONET signal formats. Thus, new broadband services can be created by pairing the bandwidth of DDM-2000 FiberReach with the network survivability and resultant revenue-generating potential of path protection switching and dual wire center architectures.

Three types of DDM-2000 FiberReach applications are offered:

- **Business Carrier Access:** Premium-tariffed telecommunications services (via DS1 or T1 carrier extensions) supplied by public network providers to business customers
- **Fiber in the Loop:** Cost-effective basic telephony, as well as emerging video and data services
- **Private Networks:** Privately held networks that supply the internal communication needs of large corporations, organizations, and institutions.

While DDM-2000 FiberReach applications are quite flexible and easy to use, aspects like bandwidth, facility management, and operations subnetwork design require some more detailed consideration. Where appropriate, this section will provide a high-level overview and refer you to Section 6, "System Planning and Engineering," for further details.

Ring Topologies

The need to prevent service outage caused by network failure has created a new class of applications. The 2000 Product Family offers a wide range of self-healing network features that automatically protect against service outage caused by cable cuts and equipment failures, which in turn protect customers and generate increased revenue. These self-healing features include flexible DACS-based restoration with the *ITM XM* controller, *SLC*[®]-2000 two- and four-fiber rings,

DDM-2000 OC-3 and OC-12 virtual tributary 1.5 (VT1.5) and STS-1 path switched rings, *SLC*-2000 Access System path switched rings, and DDM-2000 FiberReach VT1.5 path-switched rings.

DDM-2000 FiberReach, DDM-2000 OC-3, DDM-2000 OC-12, and *SLC*-2000 Access System self-healing rings offer the performance and administrative benefits demonstrated by the successful Lucent FT Series G Ring Diversity Switch. Since the DDM-2000 FiberReach, OC-3, OC-12, and FT-2000 path switched rings operate in an integrated, single-ended fashion, complex network-level coordination is not necessary to restore traffic. This means restoration is faster and more reliable. Furthermore, bandwidth administration and network reconfigurations (for example, adding or deleting nodes) can be easier.

The DDM-2000 FiberReach, OC-3, and OC-12, and *SLC*-2000 path-switched rings operate as shown in Figure 2-1(a). Traffic entering a path switched ring node is sent onto both rotations of the ring. At the receiving node, the signal having the highest integrity (based on SONET path information) is selected and dropped as outgoing traffic. At intermediate nodes, the traffic is "passed-through" without changing the SONET path information. The DDM-2000 time slot interchange (TSI) capabilities make the provisioning of add/drop and pass-through traffic quick and easy.

The self-healing nature of the path switched ring is shown in Figure 2-1(b). In this case, the fiber failure between nodes B and C causes node B to switch from the counterclockwise ring to the clockwise ring, thus maintaining service between nodes A and C.

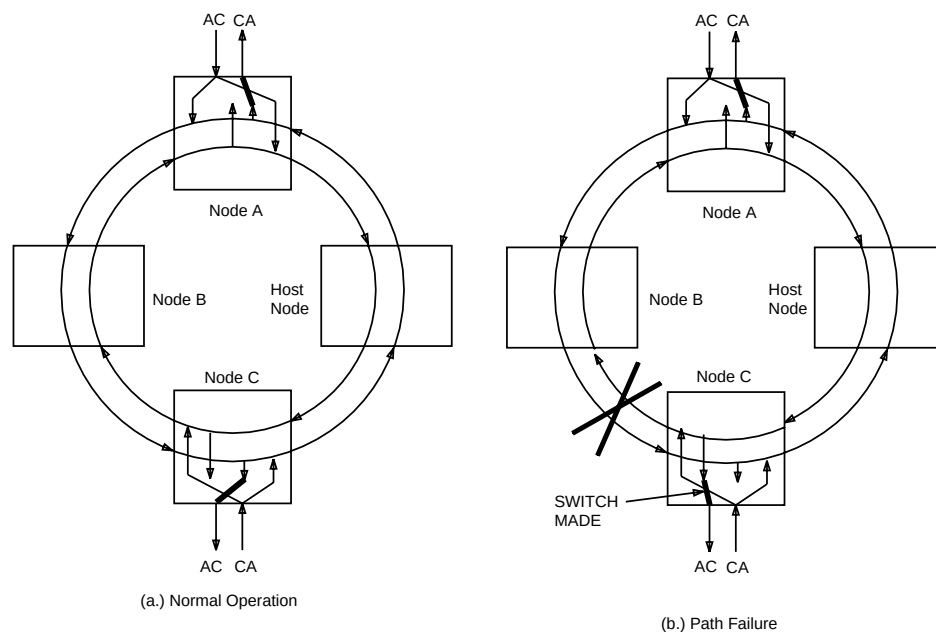


Figure 2-1. Path Switched Ring

A network which requires the bulk of its traffic to be dropped at a single node is an ideal application for path switched rings. A typical loop feeder network, where most traffic is between the subscriber loop to a central office (CO), fits this mold. Such an application calls for the delivery of protected DS1 and DS3 service to customer locations. In many cases, where the network serves only voice traffic and DS1s, a DDM-2000 FiberReach/OC-3/*SLC*-2000 path switched ring is a perfect fit. If DS3 service or a mixture of DS1 and DS3 service is needed, one or more OC-3 rings may be necessary. Cost, fiber availability, and bandwidth flexibility all play a part in determining whether a single OC-1 or OC-3 ring, multiple OC-1 or OC-3 rings, or an OC-12 ring will be the best network solution.

DDM-2000 FiberReach Network Topologies

Business Carrier Access is one of today's fastest growing network applications. To supply the advanced communications services demanded by many business customers, local exchange carriers and competitive access providers are dedicating access networks between these customers and their wire centers. Long-distance voice and data services (for example, 1-800 reservations and customer support lines) are delivered from interexchange carrier (IXC) points of presence (POP) to the access networks along with any intra-LATA services needed by the customer. Network survivability, leading edge services, and quick response to changing end user demands are cornerstones of this market.

Small businesses and branch offices are increasingly sophisticated telecommunications users, demanding the advanced services, survivability, and network performance traditionally afforded only the large business locations. While many locations may get by today with a DS1 and a few voice lines, video conferencing, and other data and image applications require an access network of great flexibility. With the DDM-2000 FiberReach system, network providers have an unsurpassed opportunity to expand and compete in this critical market.

Where services are at the DS1 rate and above, DDM-2000 networks supply all the host functions a DDM-2000 FiberReach needs. However, switched service network providers require a forward-looking access network that handles DS0, specials, ISDN, and telephony with DS1 high-capacity services in an integrated offering. Where telephony, DS0, and ISDN services are needed, the *SLC-2000* Access System host supplies powerful bandwidth management and operations for DS0 level channel units, testing, and TR08/TR303 integrated switch interfaces.

DDM-2000 FiberReach is typically placed at customer locations, in telecommunications equipment rooms and closets, and often connects to an OC-3 backbone feeder ring at a nearby cabinet, controlled environment vault (CEV), or other remote terminal location. Alternatively, customer sites near a wire center can be served by OC-1 facilities directly from the wire center, without a backbone feeder ring.

DS1 and T1 Services

The examples in this section provide DS1/T1 services only. If the NBS and DS0 level services are needed, a FiberReach Wideband Shelf must be co-located with *SLC-2000* systems on the OC-3/OC-12 rings to provide DS1 connections from the *SLC-2000* MDS shelves to the FiberReach OC-1 ring.

Single-Homed Access via Backbone Ring

Figure 2-2 and Figure 2-3 illustrate how single-homed OC-1 extensions can satisfy a growing access network. Single-homing applications connect both rotations of the OC-1 extension to a single DDM-2000 OC-3 or *SLC*-2000 Access System host. The DDM-2000 FiberReach is located at the customer's location, such as in a telecommunications equipment closet on each floor of a high-rise office complex, and delivers protected DS1 channels to the business customer.

The OC-1 ring capability allows multiple DDM-2000 FiberReach systems to be connected to the backbone network via a single facility. Compared to other optical extension products that are limited to a single remote node per extension, the ring-based DDM-2000 FiberReach solution uses far less fiber and host optics for typical serving areas with multiple business locations. Network growth is as easy as adding another DDM-2000 FiberReach node on the ring; no additional fiber or host circuit packs are required.

With the dual OC-1 capability of the 27G-U optical line interface unit (OLIU), a DDM-2000 OC-3 ring node supports up to six single-homed OC-1 extensions; a *SLC*-2000 Access System access resource module (ARM) shelf can supply up to two single-homed OC-1 extensions. Thus, competing businesses in the same serving area can receive a dedicated access facility into the backbone ring, alleviating any privacy concerns.

The DDM-2000 FiberReach remote system employs standard path protection switching for a highly reliable network that guarantees 60 millisecond recovery from any single facility or equipment failure. Path protection switching occurs when a channel is dropped from the ring to a low-speed interface. For example, in Figure 2-2 the remote DDM-2000 FiberReach nodes and the DDM-2000 OC-3 in the wire center supply the path switching function for a survivable end-to-end transport between the customer and wire center. Channels pass between the OC-1 and OC-3 rings at the host DDM-2000 OC-3 and *SLC*-2000 systems with a ring (0x1) low-speed interface. This arrangement supports full time slot interchange (TSI) assignment between low-speed and high-speed time slots while preserving independent service and protection paths between the host and extension rings.

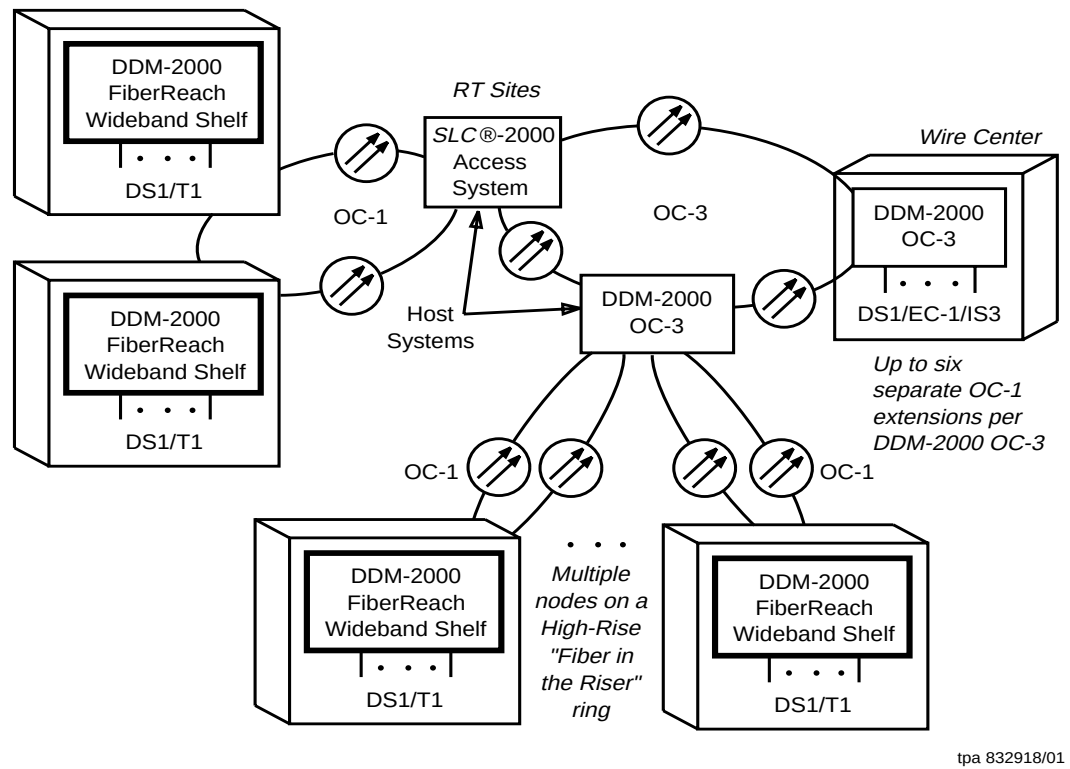


Figure 2-2. DDM-2000 FiberReach Rings Single Homing to a DDM-2000 OC-3 Ring

DDM-2000 FiberReach can also be extended from an OC-12/virtual tributary (VT) path-switched ring as shown in Figure 2-3. The DDM-2000 OC-3 system at the host node grooms and packs VT1.5 channels from the OC-1 extension rings for maximum utilization of the OC-12 backbone ring. Both the host OC-3 and OC-12 systems use the ring (0x1) low-speed interfaces, with 60 millisecond path protection switching, performed at the remote DDM-2000 FiberReach and wire center DDM-2000 OC-3 endpoints.

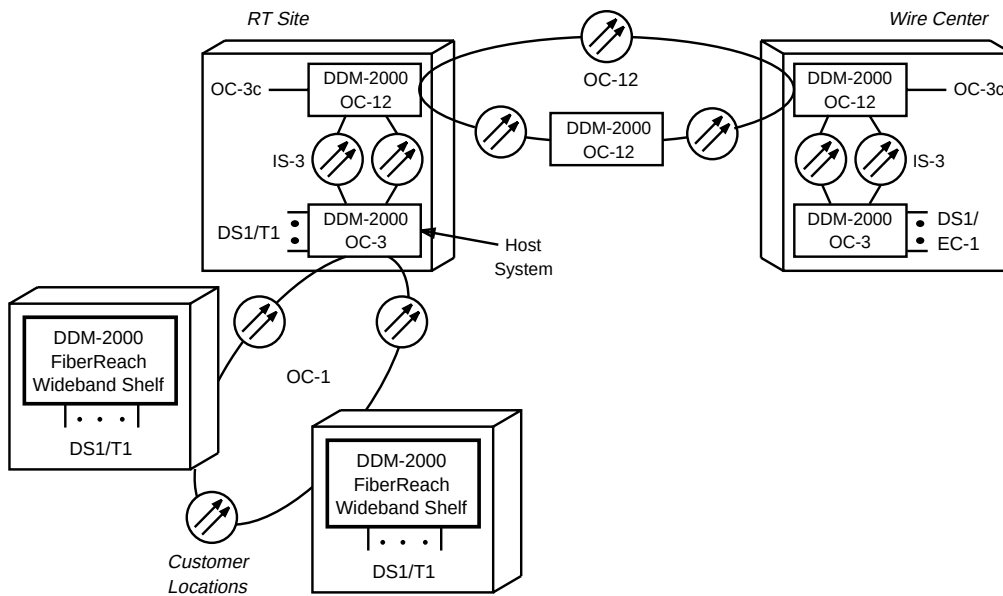
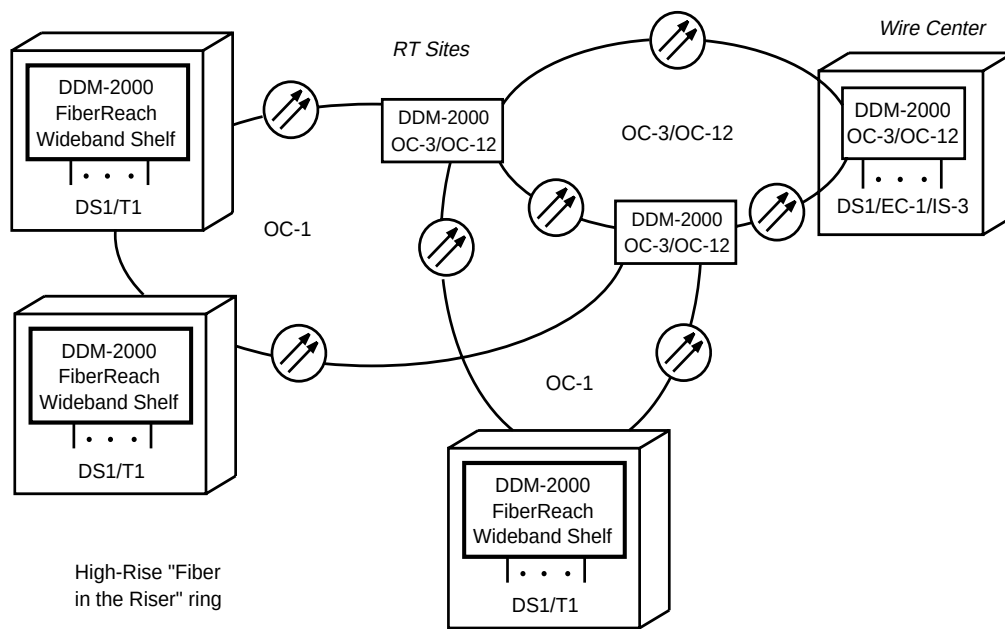


Figure 2-3. DDM-2000 FiberReach Rings Single Homing to a DDM-2000 OC-12 Ring

Dual-Homed Access via a Backbone Ring

Dual homing offers even more survivability than a single-homed network. Even the catastrophic failure of a host node can be protected. Figure 2-4 illustrates a dual-homed OC-1 extension from two remote nodes on an OC-3 access ring. The host nodes can be two DDM-2000 OC-3 or OC-12 Multiplexers, two *SLC*-2000 Access Systems, or one DDM-2000 OC-3 Multiplexer and one *SLC*-2000 Access System.

Path protection switching is employed for dual-homed applications, just like in single-homed applications. That is, 60 millisecond path switching is supplied by the remote DDM-2000 FiberReach nodes and the DDM-2000 OC-3 systems in the wire center. However, the OC-3 host node configuration is different from single homing. Since an OC-3 host node terminates only one leg of the OC-1 extension, it employs a 0x1 low-speed interface to the OC-1 ring extension, which permits optimum networking flexibility by fully utilizing the host system's slot capacity. Since the dual OC-1 circuit pack is unprotected in a dual-homed application, a DDM-2000 OC-3 ring node supports multiple dual-homed OC-1 extensions. Dual- and single-homed extensions can also be mixed at a host node, allowing the access network to be tailored efficiently to different groups of customers.



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Figure 2-4. DDM-2000 FiberReach Dual Homing to a DDM-2000 OC-3/OC-12 Ring

Integration with Dual Wire Center Applications

The survivability and networking benefits of Lucent's dual ring interworking (DRI) solution are cost-effectively extended to smaller locations via DDM-2000 FiberReach dual-homing capabilities. Figure 2-5 shows an OC-3 feeder ring from duplicated wire centers, with dual-homed DDM-2000 FiberReach extensions from selected feeder ring remote sites.

The host nodes and remote DDM-2000 FiberReach systems are configured just like the previously described dual-homing configuration with single 0x1 cross-connections (ring 0x1 low speed interface) employed by the host. In the dual wire center architecture, the access network is also protected from a catastrophic failure of one wire center, because the access and interoffice networks have duplicate points of interworking. The DDM-2000 OC-3 systems in the two wire centers employ the drop and continue cross-connection. (For more details on the dual wire center application, see LTP 363-206-200, *DDM-2000 Multiplexer Applications, Planning, and Ordering Guide*.)

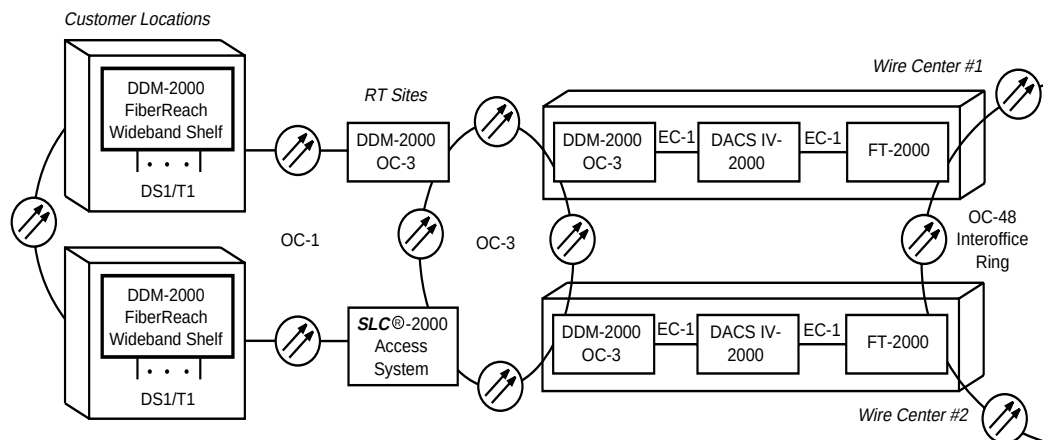


Figure 2-5. DDM-2000 FiberReach Ring Dual Homing to a DDM-2000 OC-3 Ring in a Dual Wire Center Applications

Dual-homing applications can also be upgraded to an OC-12 backbone ring as shown in Figure 2-6. As with the single-homing application, the DDM-2000 OC-3 host system supplies the VT1.5 grooming necessary for optimum backbone utilization.

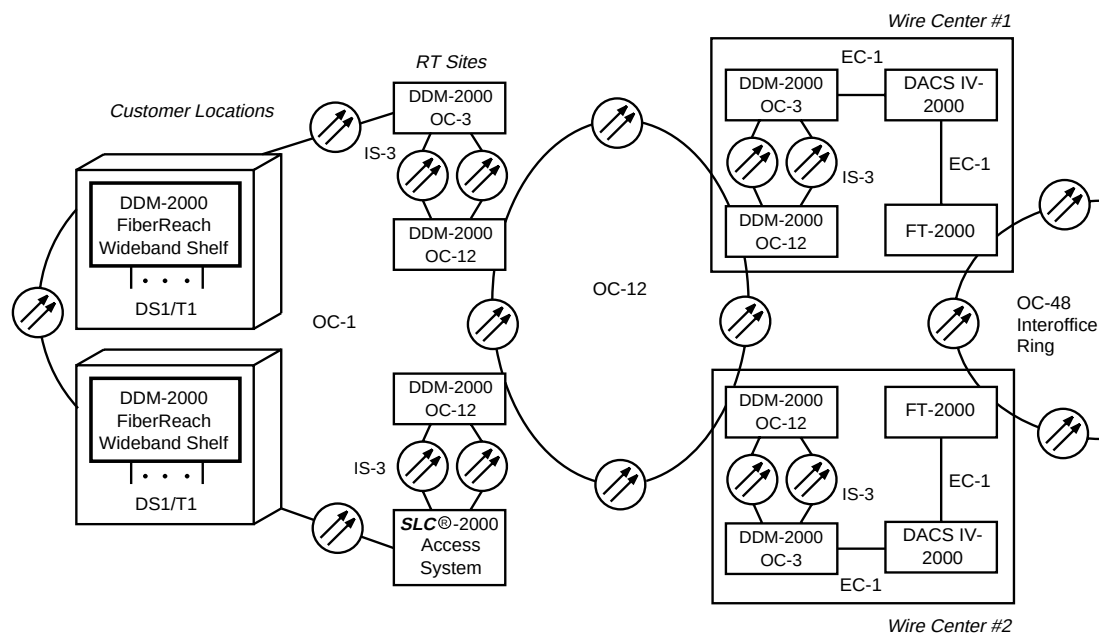


Figure 2-6. DDM-2000 FiberReach Ring Dual Homing to a DDM-2000 OC-12 Ring in a Dual Wire Center Application

Single Homing to Linear DDM-2000 OC-3 Networks

In business applications where the DDM-2000 OC-3 host is a node on a linear topology, two single-homed OC-1 ring extensions can be provided to multiple DDM-2000 FiberReach Multiplexers (see Figure 2-7). In this tapered linear application configuration, function slot "C" of the DDM-2000 OC-3 host is used for incoming traffic, and the "A" and "B" slots are used for downstream traffic or local terminations. The host DDM-2000 OC-3 Multiplexer must be using software Release 9.0 or later. The other DDM-2000 OC-3 Multiplexers in the linear application must be using Release 8.0 software.

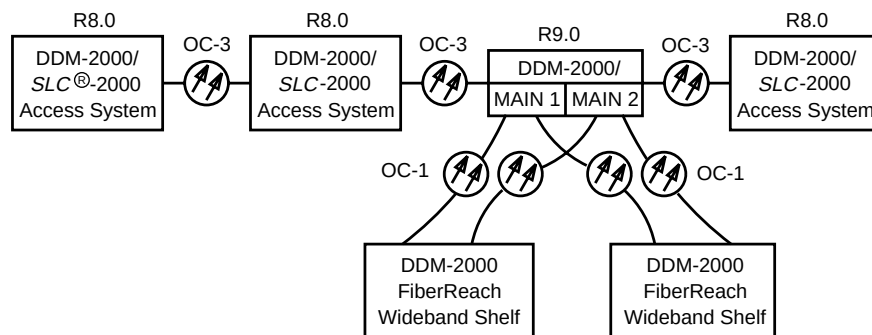


Figure 2-7. Single-Homed OC-1 Ring to a DDM-2000 OC-3 Linear Application

Stand-Alone OC-1 Ring/Hub Networks

In applications such as campus or other self-contained environments where an OC-3 backbone ring is not needed or practical, DDM-2000 FiberReach can be deployed in a stand-alone OC-1 ring. One or two OC-1 ring extensions can be configured directly from a DDM-2000/*SLC*-2000 shelf with 27G-U OLIU circuit packs in the main slots. DS1 traffic from remote DDM-2000 FiberReach nodes can be flexibly groomed and dropped at the host to a mix of DS1, T1, EC-1, and OC-3 interfaces, as shown in Figure 2-8. Channels can be established directly between two DDM-2000 FiberReach remotes on the same OC-1 ring. This configuration is very effective for customers within a short radius of the wire center, or for isolated demand at a distant location where there is no appropriate access network yet in place.

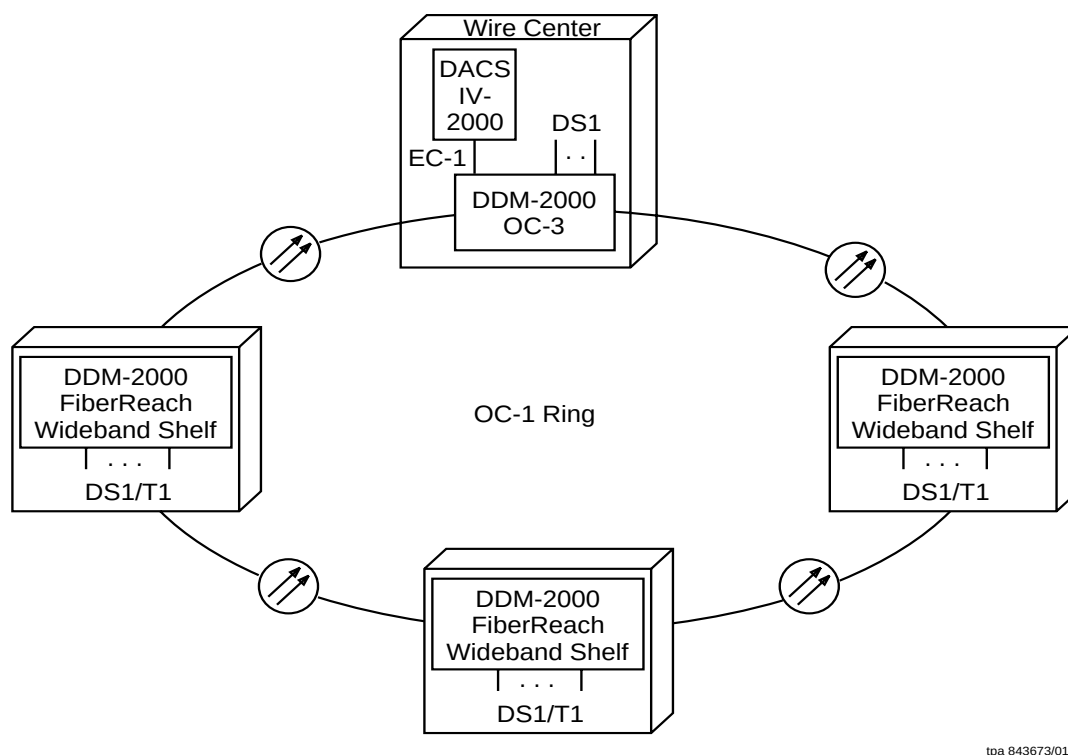


Figure 2-8. DDM-2000 FiberReach Stand-Alone OC-1 Ring

This application can be further expanded to hub up to two OC-1 rings from a stand-alone DDM-2000/SLC-2000 host system, as shown in Figure 2-9.

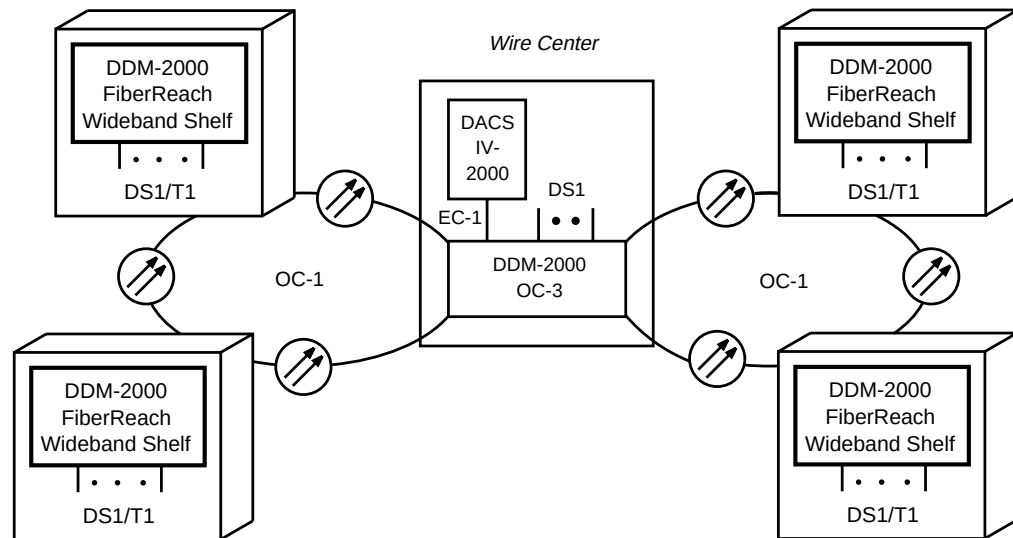


Figure 2-9. DDM-2000 FiberReach Single Homing to a Stand-Alone OC-1 Hub Host

Basic Narrowband Shelf Configurations

The *SLC-2000* system can host a DDM-2000 FiberReach Narrowband shelf (NBS) optical network unit (ONU) through an OC-1 ring using DDM-2000 FiberReach Wideband shelves (WBSs). Figure 2-10 and Figure 2-11 show the following typical applications:

- ***WBS Collocated with the SLC-2000 system (Figure 2-10):*** In this configuration, the collocated WBS is part of an OC-1 ring. This configuration requires a DDM-2000 OC-3 shelf or a *SLC-2000* ARM shelf to be part of the ring and host the WBSs. I.
- ***SLC-2000 J1C265AA-1, L4 ARM Shelf with 26G2-U OLIUs (Figure 2-11):*** In this configuration, the J1C265AA-1, L4 ARM shelf contains 26G2-U OLIUs in Function Group C as part of the OC-1 ring. The *SLC-2000* system must contain SONET subsystem Software Release R13 or later and the WBSs in the ring must contain FiberReach software R3.0 or later. This configuration eliminates the need for a collocated WBS and a DDM-2000 OC-3 shelf to host the WBSs in the OC-1 ring. In this configuration, the 28 DS1 pipes are not accessible from the DS1 low-speed slots in Function Group C of the ARM shelf. However, as shown in Figure 2-12, DS1 pipes are accessible from any of the WBSs on the ring if the bandwidth to support them is available on the OC-1 ring.

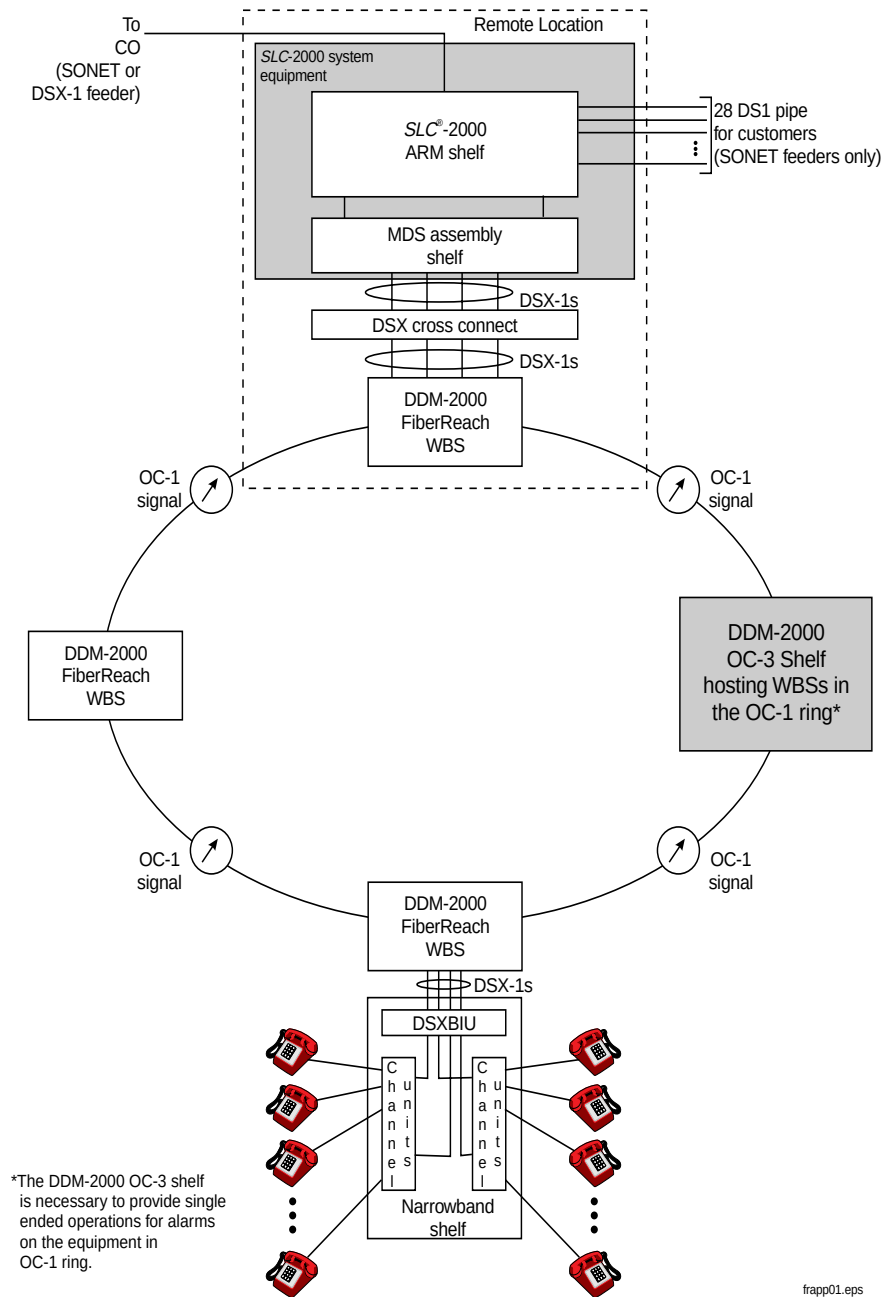


Figure 2-10. SLC-2000 System Hosting a FiberReach NBS Through a Collocated WBS

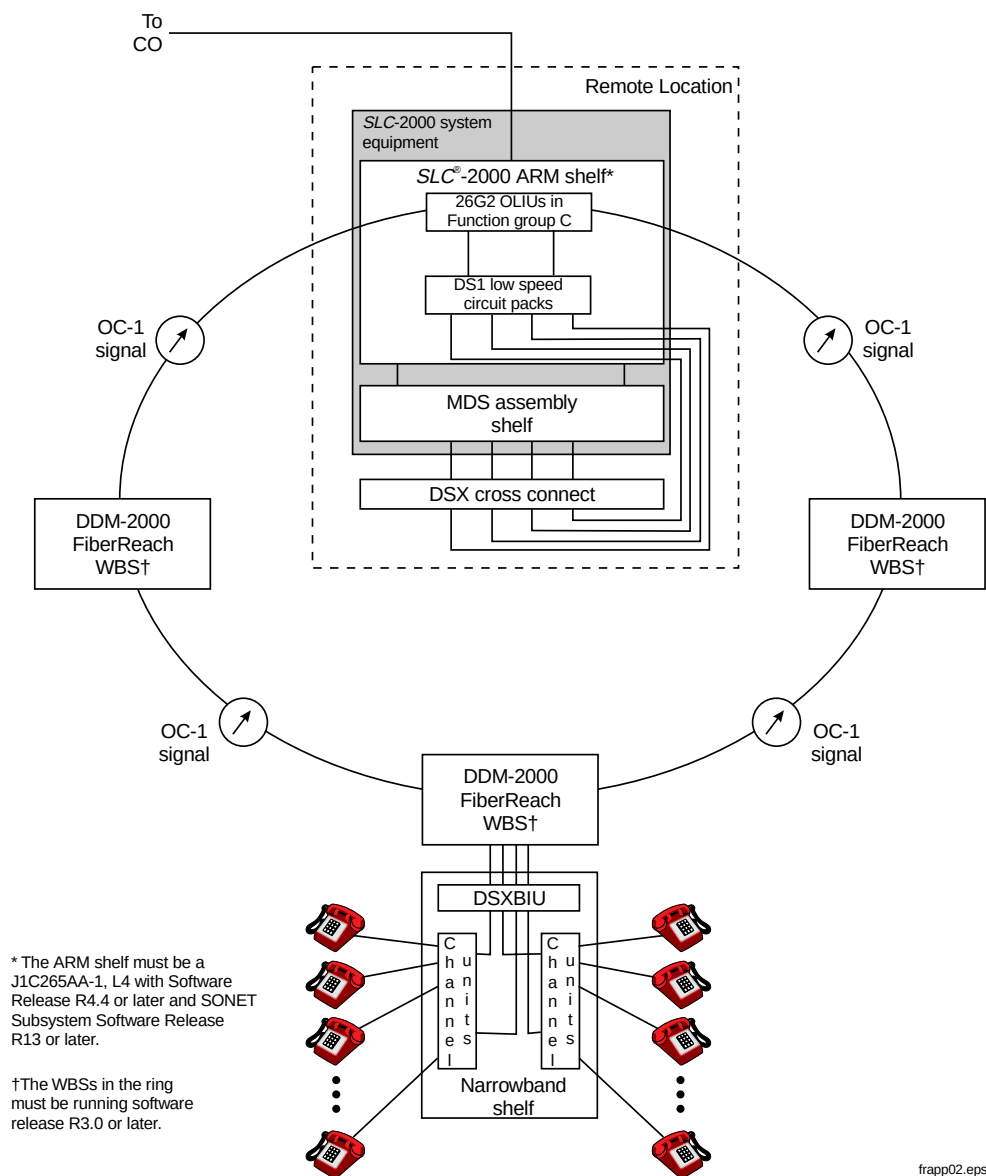


Figure 2-11. SLC-2000 System Hosting a FiberReach NBS using 26G2-U OLIUs and a J1C265AA-1, L4 ARM Shelf

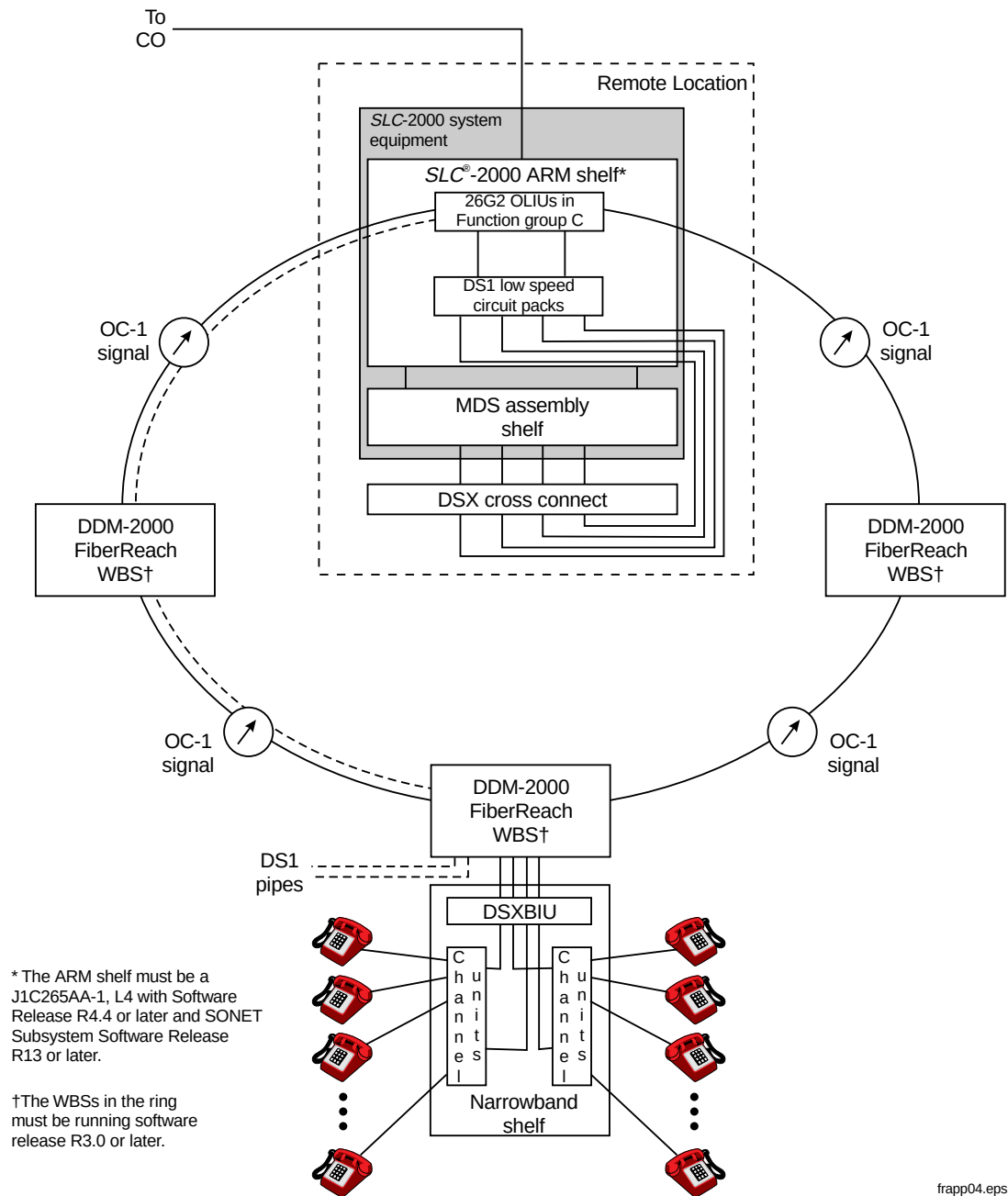


Figure 2-12. SLC-2000 System Hosting a FiberReach NBS using 26G2-U OLIUs and a J1C265AA-1, L4 ARM Shelf Provisioning DS1 Pipes Through a WBS

As stated earlier, the WBSs on the OC-1 ring must be hosted by either a DDM-2000 OC-3 shelf or the ARM shelf of a *SLC-2000* system. Figure 2-13 shows the configuration of a collocated WBS hosted by a *SLC-2000* ARM shelf. This configuration eliminates the need for a separate DDM-2000 OC-3 shelf. However, the 28 DS1 pipes are not accessible from the DS1 low-speed slots in Function Group C of the ARM shelf.

For detailed applications connecting the *SLC-2000* Access System to the DDM-2000 FiberReach NBS ONU, see 363-206-300, *DDM-2000 FiberReach Applications, Planning, and Ordering Guide*.

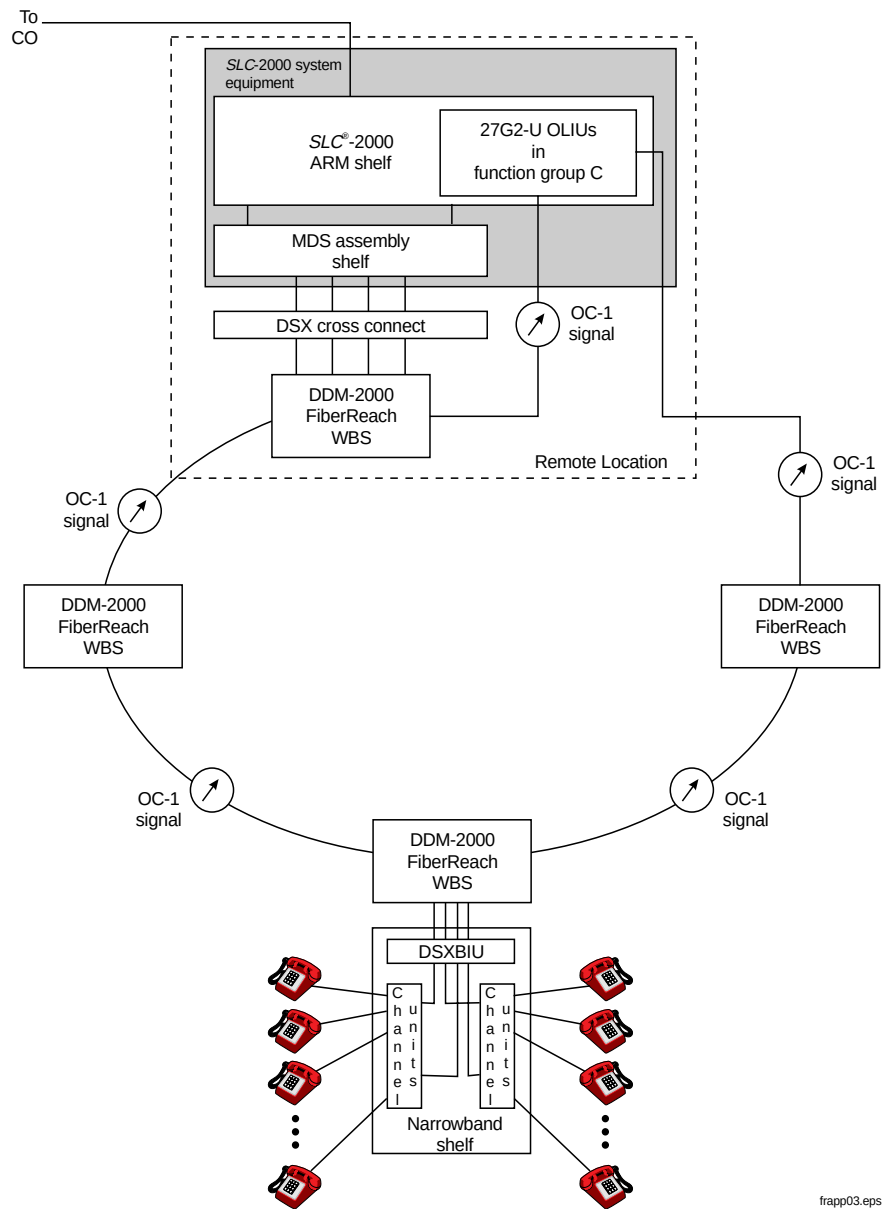


Figure 2-13. SLC-2000 ARM Shelf Hosting DDM-2000 FiberReach WBSs

DS1, T1, and DS0 Services

Integrated Narrowband Business Carrier Access

Figure 2-14 shows a business narrowband application using the DDM-2000 FiberReach Multiplexer on an OC-1 path-switched ring. This application provides protected plain old telephone service (POTS), Integrated Services Digital network (ISDN), and special services, as well as DS1 services on a protected OC-1 fiber. This ring host is an OC-3/OC-12 path-switched ring via a *SLC*-2000 Access Resource Module (ARM) or a DDM-2000 Multiplexer. The FiberReach product in this application contains both the wideband and narrowband shelves. The narrowband shelf has the capacity to provide telephony services, such as POTS and POTS-like special services or basic rate ISDN service, while the wideband shelf provides DS1 rate services. The narrowband shelf contains 12 slots for service cards that provide up to 48 lines of POTS service.

At the wire center, the DS0 services are groomed by the *SLC*-2000 remote terminal and sent either to the 5ESS[®] switch for locally switched traffic or to the DACS II Cross-Connect System for non-locally switched traffic. The DS1 traffic goes directly to a DACS-IV 2000 Cross-Connect System

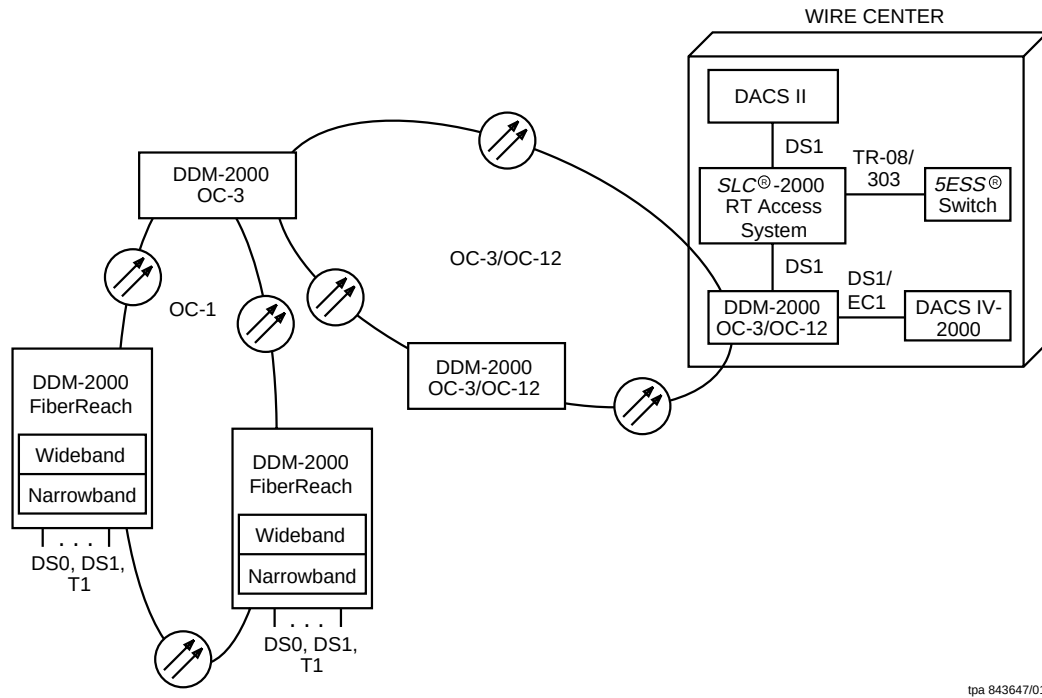
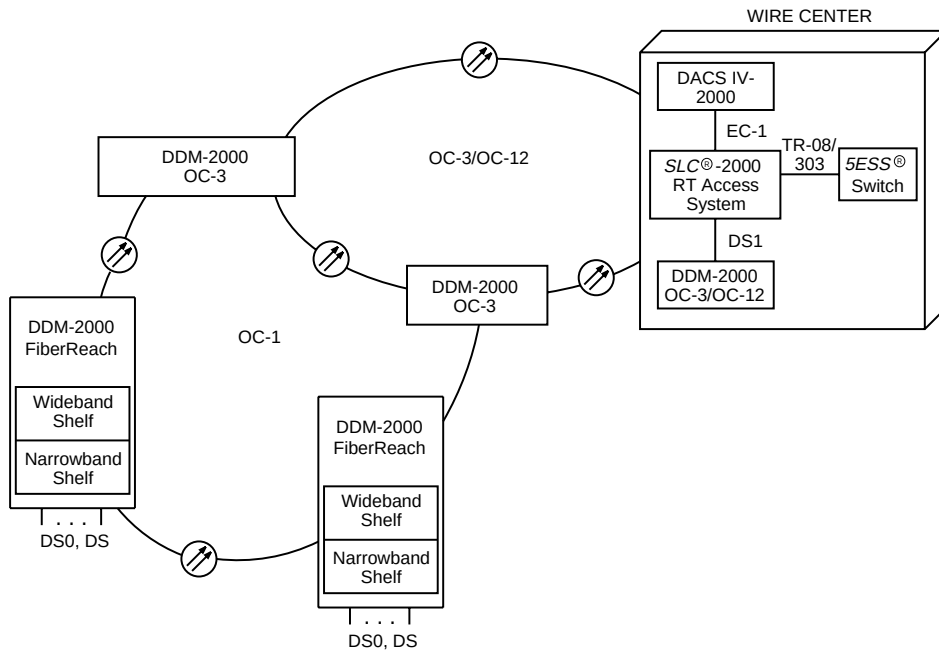


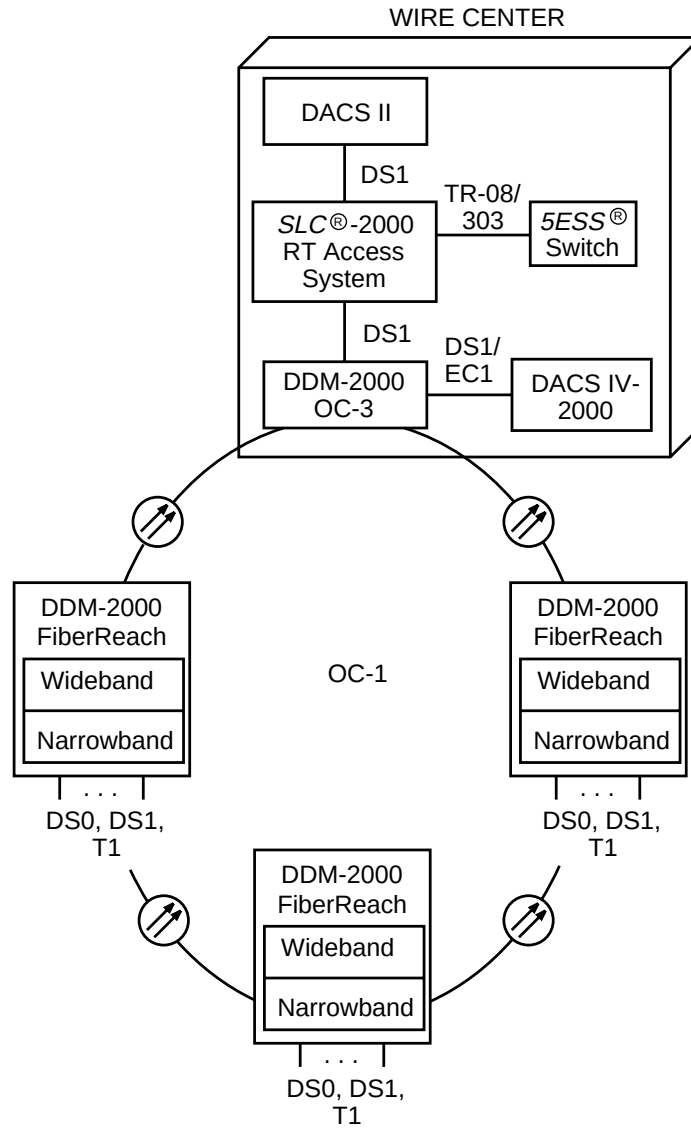
Figure 2-14. DDM-2000 FiberReach Multiplexer Business Narrowband Application

Figure 2-15 shows a dual-homed integrated application. Figure 2-16 shows stand-alone applications.



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Figure 2-15. DDM-2000 FiberReach Multiplexer Dual-Homed Integrated Application



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Figure 2-16. DDM-2000 FiberReach Multiplexer Stand-Alone Integrated Application

Another integrated narrowband business carrier access application option for the DDM-2000 FiberReach narrowband shelf is to colocate it with the DDM-2000 OC-3/OC-12 shelf. Since the narrowband shelf's high-speed interface is a DS1, a DDM-2000 OC-3/OC-12 Multiplexer can serve as the ring vehicle for carrying the DS0 traffic. This application is shown in Figure 2-17.

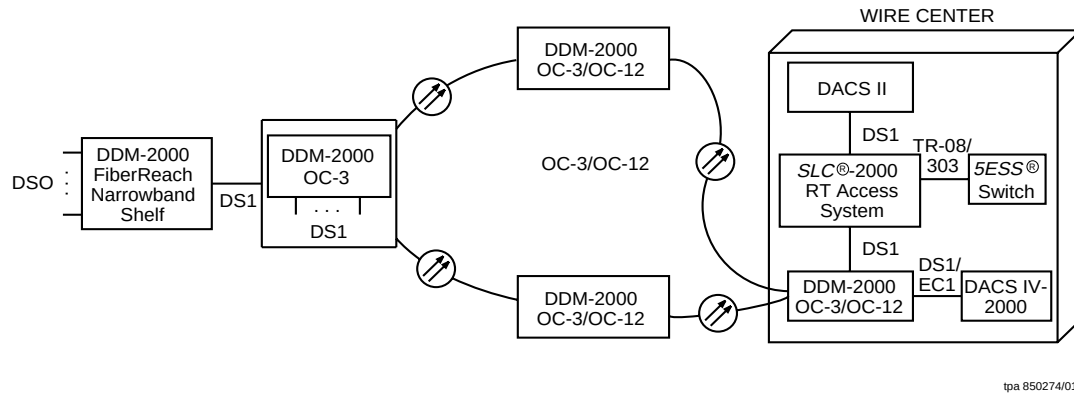


Figure 2-17. DDM-2000 FiberReach Multiplexer Low-Speed Traffic Application

Enhanced Routing

The DDM-2000 hosts can support a collection of enhanced routing features, as shown in Figure 2-18, Figure 2-19, and Figure 2-21. These features support cross-connections within and across function units without using bandwidth on the main OC-3 or OC-12 rings. This allows even greater networking flexibility and efficiency. While the high-speed OC-3 interface can carry up to 84 VT1.5 channels, each of the 3 function units has a 2-OC1 capacity, or up to an additional 168 VT1.5 channels. For example, a DDM-2000 OC-3 system with 22-type OLIUs in the main slots and 27G2-U dual OC-1 OLIUs in each function unit supports up to 168 VT1.5 channels: 84 between high-speed OC-3 and low-speed OC-1 and another 84 channels that pass directly between this host's remote FiberReach systems.



NOTE:

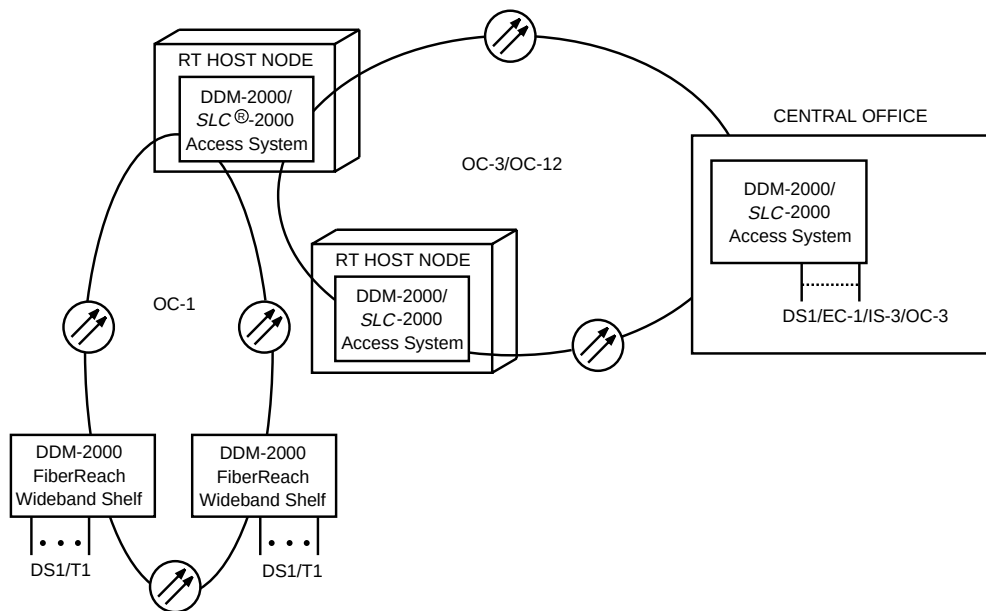
SLC-2000 has only two function groups (A and C) rather than three in DDM-2000.

The OC-1 ring interconnection enhanced routing options utilize 0x1 or pass-through cross-connections at the DDM-2000 host. Path protection switching is performed at the DDM-2000 FiberReach system at the path endpoints. The local drop enhanced routing option employs path protection switching in the OC-3 host's function unit in order to drop to local EC-1, DS1, or OC-3 ports.

OC-1 Ring Pass-Through

This enhanced routing option establishes pass-through cross-connections for channels on an OC-1 ring terminating on a pair of 27G2-U OLIUs in a function unit. (See Figure 2-18.) These cross-connections are just like the pass-through cross-connections that can be provisioned for rings terminating on main slots. This allows traffic to be routed from one FiberReach node to another FiberReach node on the same OC-1 ring without using bandwidth on the OC-3/OC-12 ring.

⇒ **NOTE:**
For more detailed information on how to provision this application, refer to Figure 8-8.



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Figure 2-18. OC-1 Ring Pass-Through in a Function Unit

OC-1 Ring Hairpin Routing, Single-Homed

This routing option establishes cross-connections between channels on two separate OC-1 facilities that terminate on 27G2-U OLIU circuit packs in either the same or different function units (see Figure 2-19). In the single-homed configuration, both rotations of each of the two OC-1 rings terminate on a pair of 27G2-U OLIUs. There may be a single pair of 27G2-U OLIUs that terminates both rings, or one pair of 27G2-U OLIUs in each of two function units that terminate the rings. Each rotation of one ring is cross-connected to the corresponding rotation of the other ring. This allows traffic to be routed from one FiberReach node on one OC-1 ring to any other FiberReach node on another OC-1 ring without using bandwidth on the OC-3/OC-12 ring.



NOTE:

For more detailed information on how to provision this application, refer to Figure 8-9.

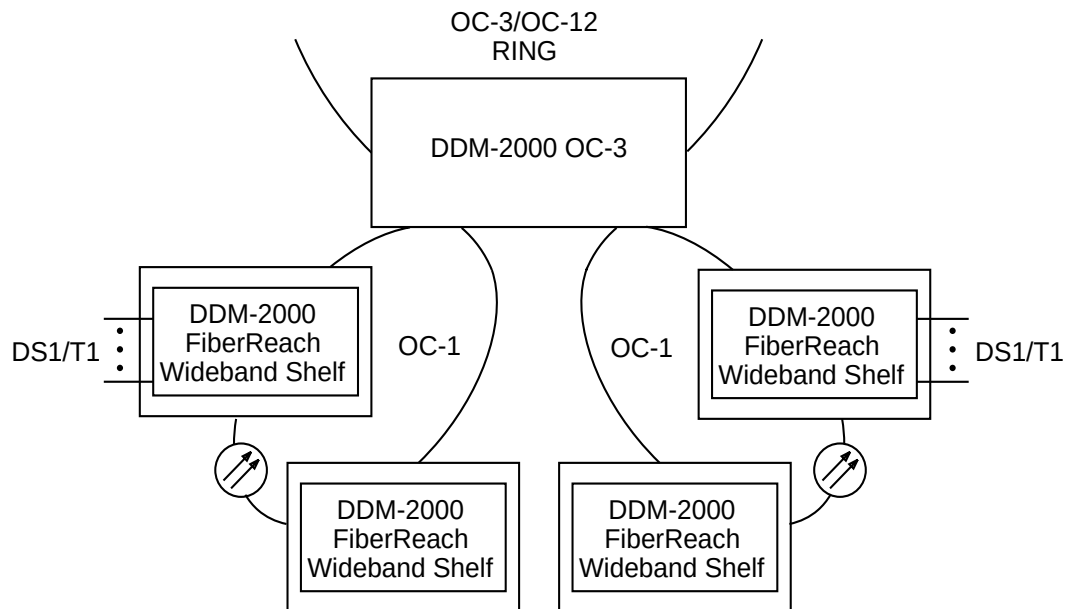


Figure 2-19. Single-Homed Hairpin Routing

OC-1 Ring Hairpin Routing, Dual-Homed

This routing option establishes cross-connections between channels on two separate OC-1 facilities that terminate on 27G2-U OLIU circuit packs in either the same or different function units. (See Figure 2-20.) In the dual-homed arrangement, only one rotation of each of the two OC-1 rings terminates on a single OC-3 shelf. At the OC-3 shelf, there may be a single 27G2-U OLIU that terminates both rings or a 27G2-U OLIU in each of two function units that terminate the rings. The other rotation of each ring terminates on a different OC-3 shelf. This allows traffic to be routed from one FiberReach node on one OC-1 ring to any other FiberReach node on another OC-1 ring without using bandwidth on the OC-3/OC-12 ring.

⇒ **NOTE:**
For more detailed information on how to provision this application, refer to Figure 8-10.

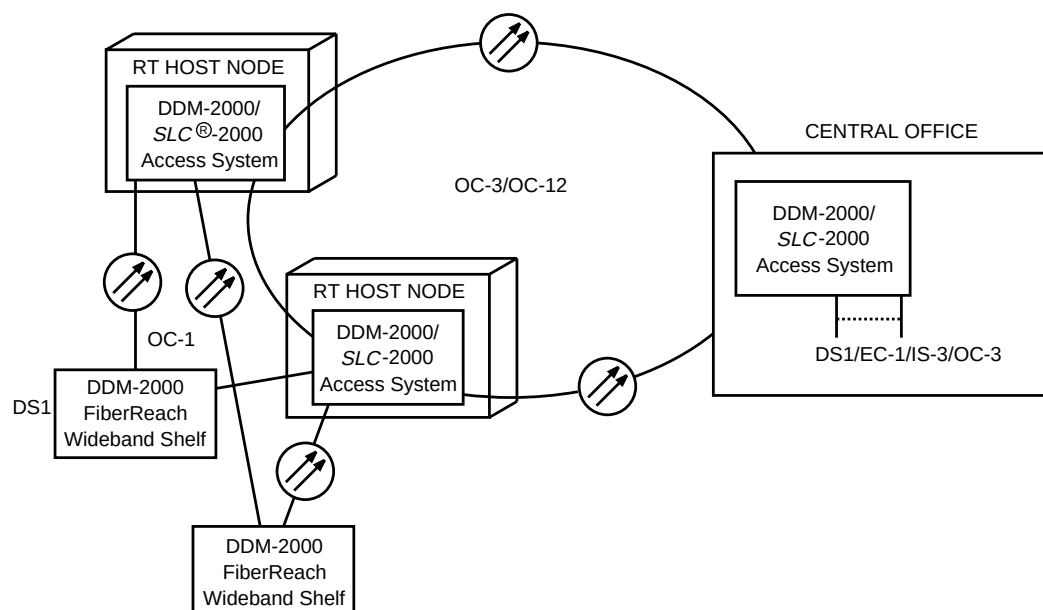


Figure 2-20. Dual-Homed Hairpin Routing

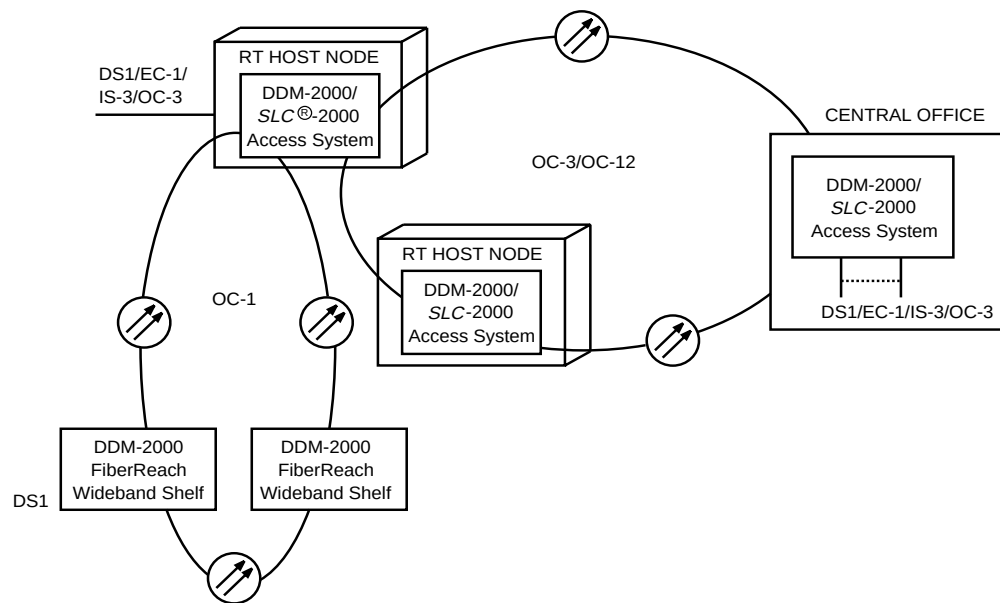
Hairpin Local Drop Routing

This routing option establishes path-protection switched drop cross-connections between channels on an OC-1 ring and ports/channels on DS1/EC1/OC-3 circuit packs. (See Figure 2-21.) The OC-1 facility terminates on a pair of 27G2-U OLIU circuit packs in a function unit. These connections are just like the drop cross-connections that can be established between channels on a ring terminating on the main slots and port or channels in a function unit. This allows traffic to be routed from a FiberReach node on an OC-1 ring to a local drop without using bandwidth on the OC-3/OC-12 ring.



NOTE:

For more detailed information on how to provision this application, refer to Figure 8-11.



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Figure 2-21. Hairpin Local Drop Routing

DDM-2000 FiberReach Service Applications

This section describes specific service applications. In addition to traditional telephony, DS1, and T1 extension services, the following are examples of specific service applications utilizing DDM-2000 FiberReach Multiplexers.

High Data-rate Subscriber Line (HDSL) Application

The HDSL circuit pack (BBF8) provides HDSL interface capability on the DDM-2000 OC-3 shelf to compatible *PairGain*^{*} equipment at the customer premises. It allows the transport of DS1 rate payloads, for up to 12,000 feet, over two metallic 24 AWG twisted-pair lines. Figure 2-22 shows examples of HDSL circuit packs providing this capability in both the DDM-2000 OC-3 and the DDM-2000 FiberReach shelves. Application for business customers, the private network, cell sites, PBXs, customer premises equipment (CPE), and other applications are supported.

The BBF8 circuit pack fits into the low-speed slots and provides two, four-wire HDSL interfaces. Each interface provides a full DS1 rate payload capacity mapped to a SONET VT1.5 and then VT cross-connected into an STS-1. Once in SONET, DS1 rate payload is treated as a normal DS1.

* PairGain is a registered trademark of PairGain Technologies, Inc.

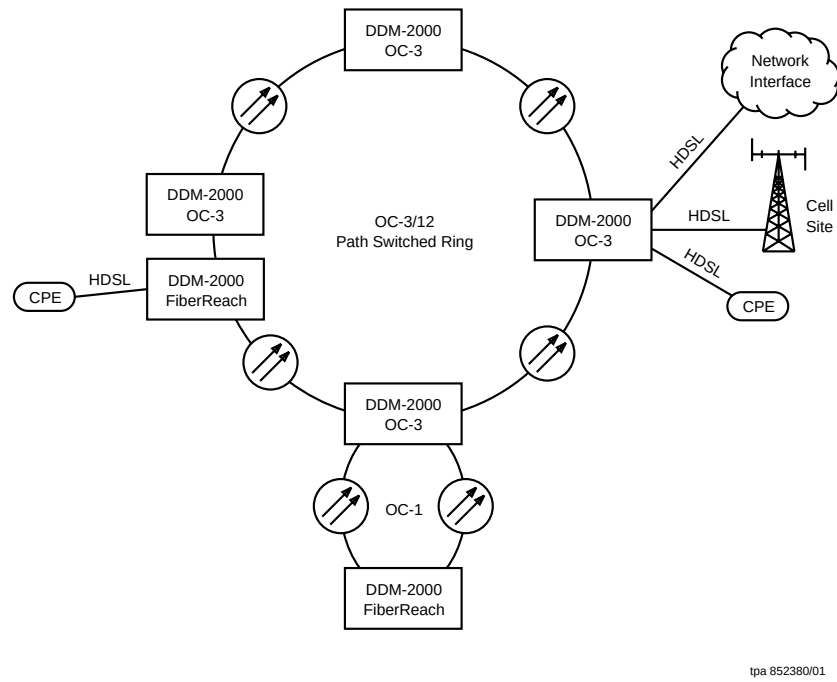
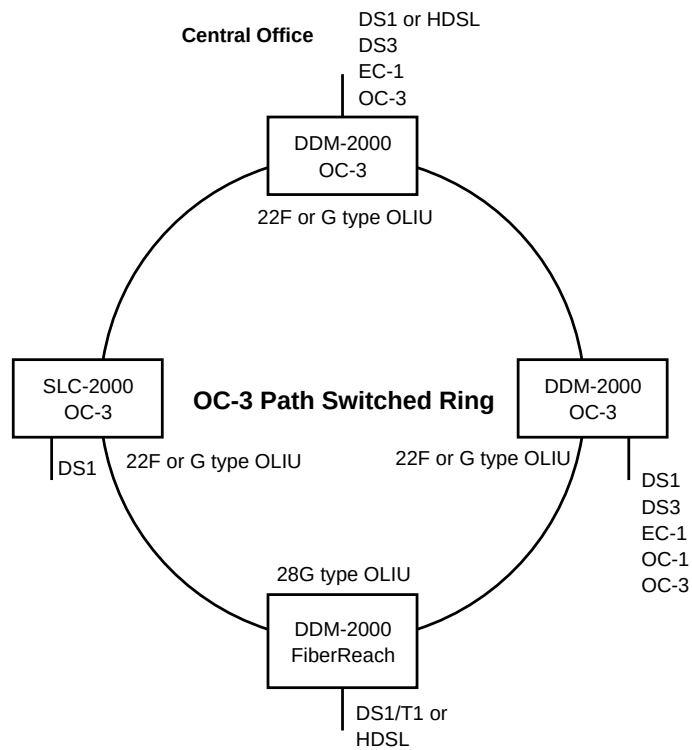


Figure 2-22. HDSL Application

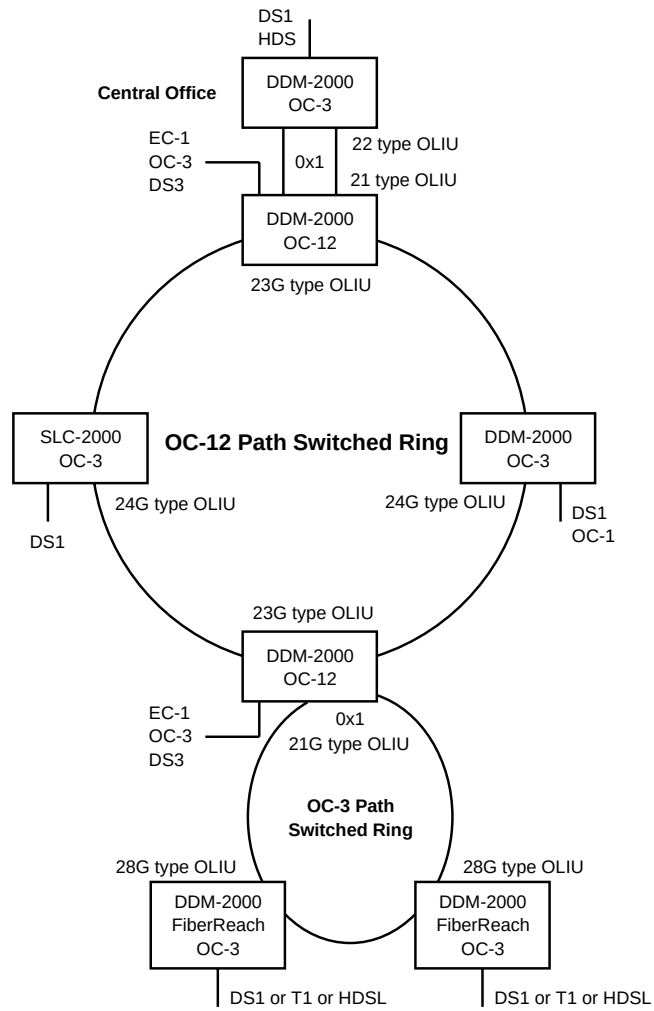
DDM-2000 FiberReach Service Applications Using the 28G-Type OLIU

The following figures show service applications of the DDM-2000 FiberReach Multiplexer using the 28G-type OLIU.



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Figure 2-23. OC-3 Ring Mixed Application



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Figure 2-24. OC-3 FiberReach Extension (Single-Homed) on OC-12 Ring Application

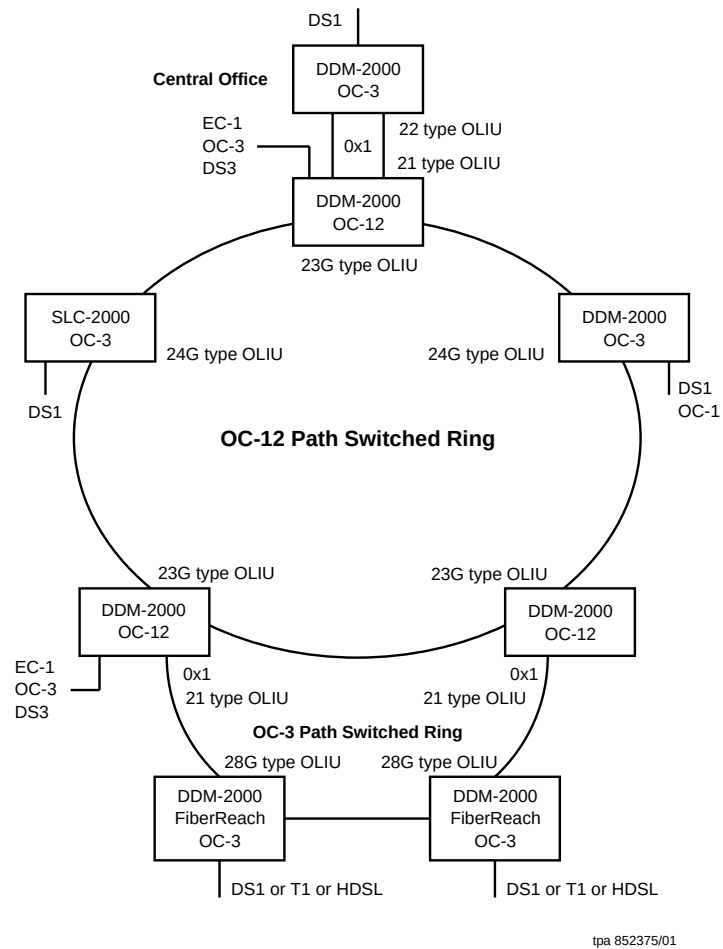
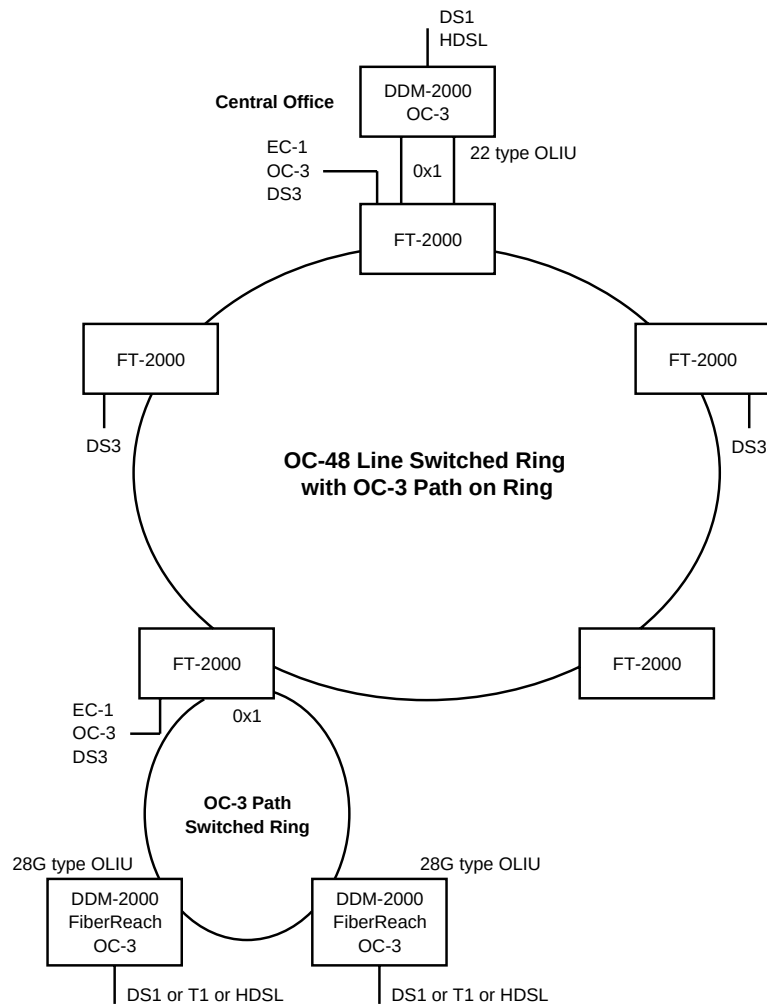
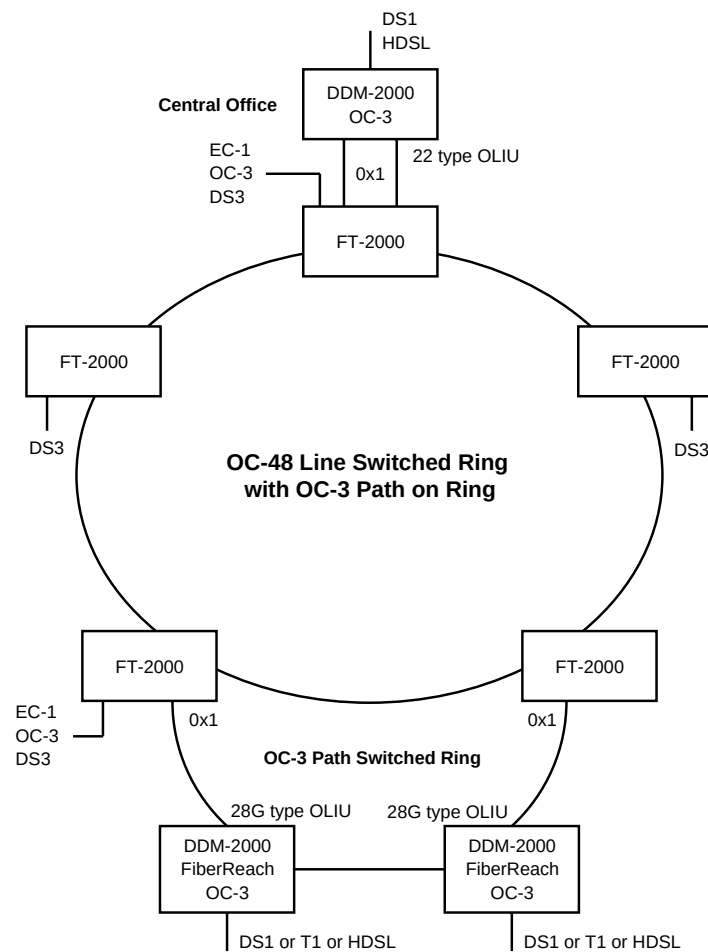


Figure 2-25. FiberReach Extension (Dual Homed) on OC-12 Ring Application



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Figure 2-26. OC-3 FiberReach Extension (Single-Homed) on OC-48 Ring Application



tpa 852376/01

Figure 2-27. OC-3 FiberReach Extension (Dual-Homed) on OC-48 Ring Application

Shelf Descriptions and Configurations

3

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Shelf Descriptions and Configurations

3

Overview

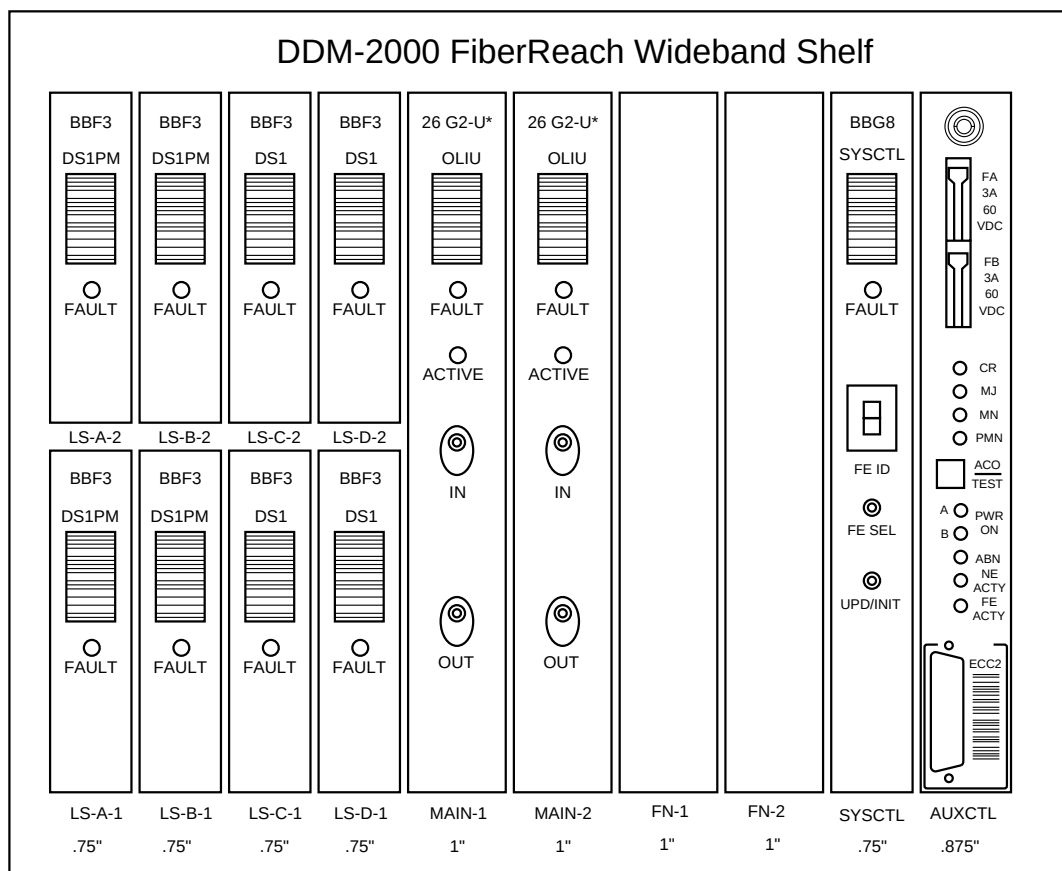
This chapter provides the physical description of the DDM-2000 FiberReach Multiplexer shelf and equipage for Wideband shelf and Narrowband shelf.

DDM-2000 FiberReach Wideband Shelf

The DDM-2000 FiberReach wideband shelf is shown in Figure 3-1 and Figure 3-2. The shelf measures approximately 9 inches high by 9.3 inches wide by 13.4 inches deep. Each wideband shelf is a stand-alone entity with its own fiber cabling and interfaces to DSX-1 office power and operations interfaces. The default configuration provides rear access cabling. Front access is also an option. Front-access optical connectors interconnect to optical fiber facilities and facilitate shelf loopback. The optical connectors are mounted on the optical line interface unit (OLIU) circuit pack faceplate.

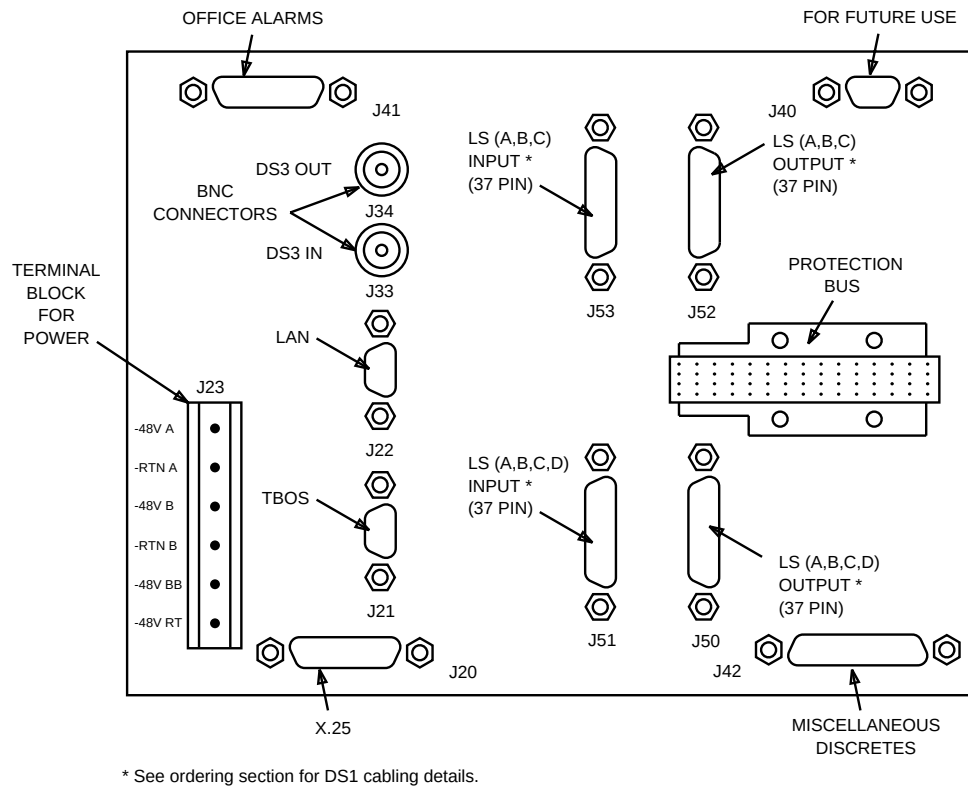
A DDM-2000 FiberReach Multiplexer wideband shelf consists of the following:

- Fourteen circuit pack slots
 - Eight 4-inch slots
 - Six 8-inch slots, including a user panel
- Fully connectorized backplane
- Front cover.



* 28G-U for OC-3

Figure 3-1. DDM-2000 FiberReach Multiplexer Wideband Shelf — Front View



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Figure 3-2. DDM-2000 FiberReach Multiplexer Wideband Shelf — Rear View

As shown in Figure 3-1, starting at the far left, eight 4-inch slots are reserved for service and protection low speed interfaces. The DS1 and DS1 PM low speed interface circuit packs can be configured as 1x1 protected or unprotected.

The next two 8-inch slots are reserved for service and protection main OLIU circuit packs.

The following two 8-inch slots are for the function units. The function unit slots can be equipped as 1x1 protected. These slots are reserved for future broadband services (such as DS3 or EC-1).

The next section of the shelf consists of one 8-inch slot reserved for the system controller (SYSCTL) circuit pack, and one 8-inch slot, labeled AUXCTL, for the user panel.

Accidental insertion of same-size circuit packs in incorrect slots is prevented through circuit pack keying. Three keying combinations are provided. The key mechanism is located on the faceplate latch, with an interference mechanism on the shelf.

The front of the shelf is covered with an electromagnetic compatibility (EMC) cover, as shown in Figure 3-3. If the shelf needs to be accessed for maintenance activities, the cover is hinged to drop down 180 degrees. The cover can be removed by tapping the door in, when it is open and held horizontally outward, until the hinge pops out of the hinge plate. The hinge pin can then be lifted up and the door removed. The rear cover is a cover over the DS1 1x1 and 1x7 protection optioning plug. All covers are necessary to meet the EMC guidelines set by the Federal Communications Commission (FCC).

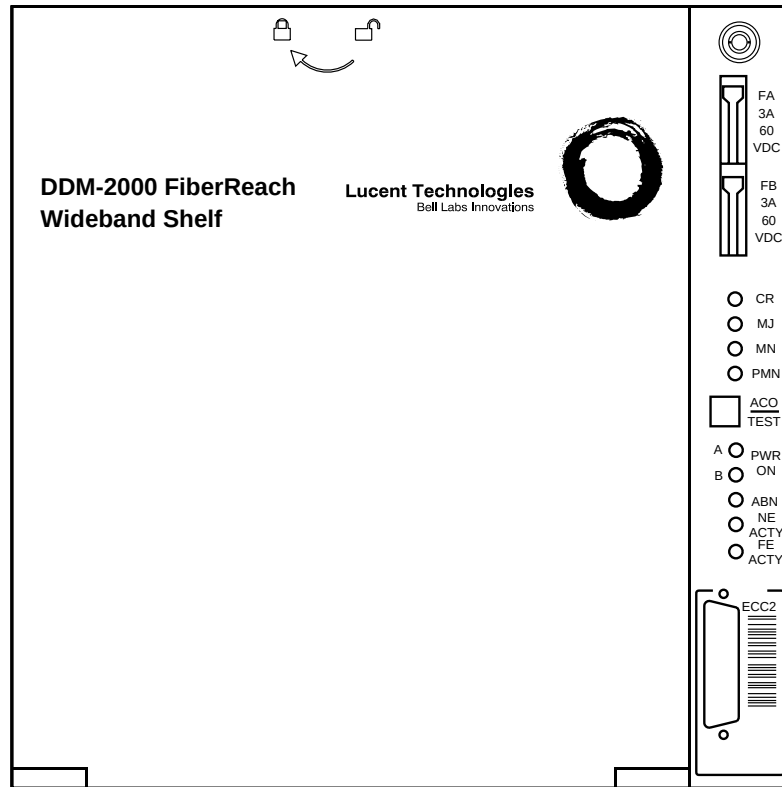
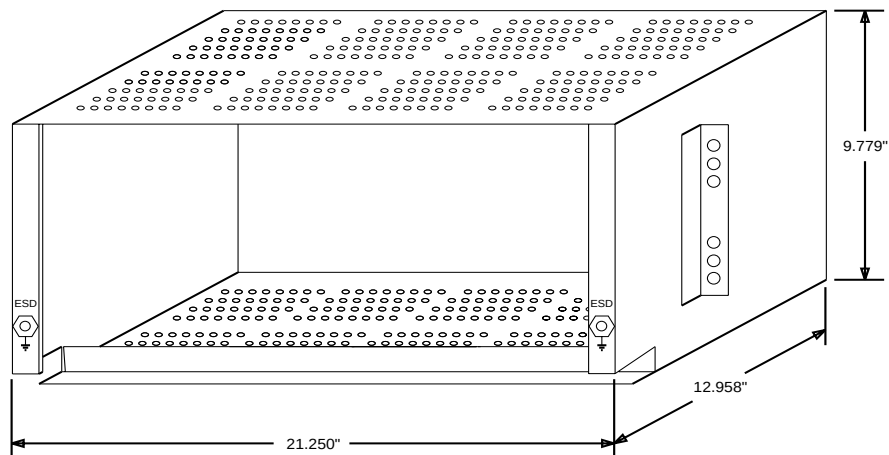


Figure 3-3. DDM-2000 FiberReach Multiplexer Wideband Shelf — Front Cover

DDM-2000 FiberReach Multiplexer Carrier Assembly

For rack-mounted applications the DDM-2000 FiberReach Multiplexer is available in a carrier assembly, as shown in Figure 3-4. This assembly provides space for up to two wideband shelves, or one wideband and one narrowband shelf, or two narrowband shelves. Two electrostatic discharge (ESD) jacks are mounted on the carrier frame.

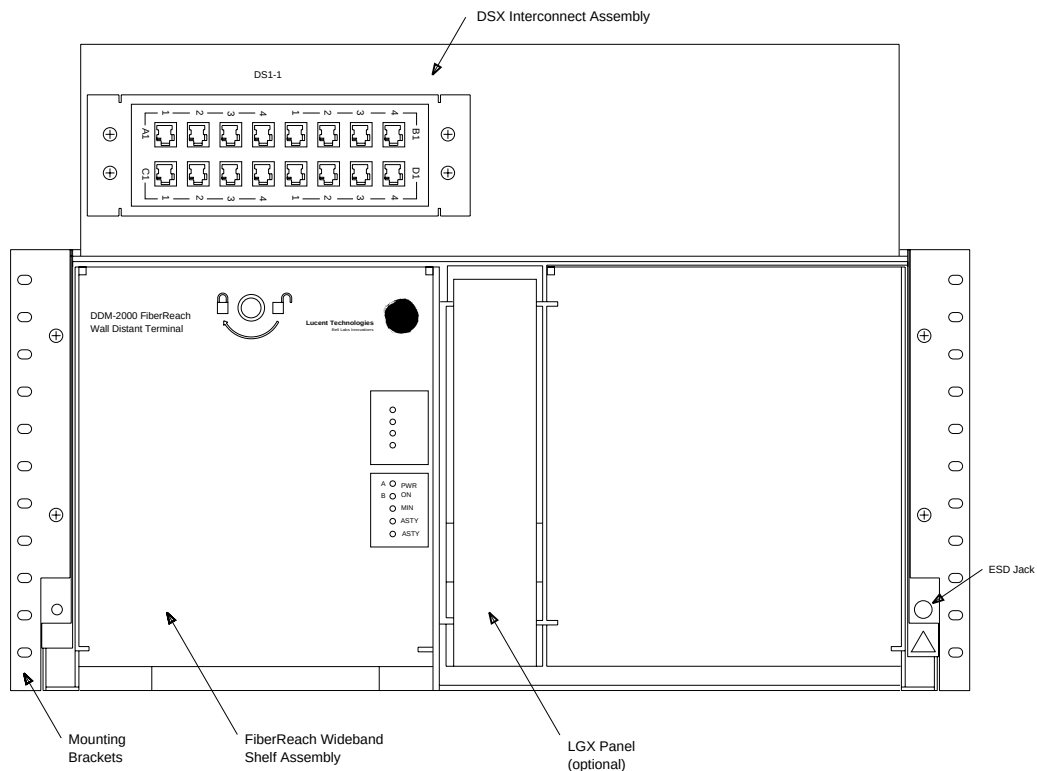


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Figure 3-4. DDM-2000 FiberReach Multiplexer Carrier Assembly

DDM-2000 FiberReach Wall-Mount Distant Terminal

The wall-mount distant terminal for the DDM-2000 FiberReach, shown in Figure 3-5, offers an alternative to rack-mounting applications. This compact wall enclosure is approximately 23 inches wide by 11 inches high by 13.4 inches deep and will accommodate a single DDM-2000 FiberReach wideband shelf in a carrier assembly. The wall-mount distant terminal provides front access to the DS1 interfaces via the DS1 panels, and can be pulled out and rotated down to gain access to the backplane. An optional LGX panel is available for performing optical loopbacks.



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Figure 3-5. DDM-2000 FiberReach Multiplexer Wall-Mount Distant Terminal (1 Wideband Shelf)

Figure 3-6 shows a wall-distant terminal containing both a Wideband shelf and a Narrowband Shelf. The enclosure is approximately 23 inches wide by 11 inches high by 13.4 inches deep.

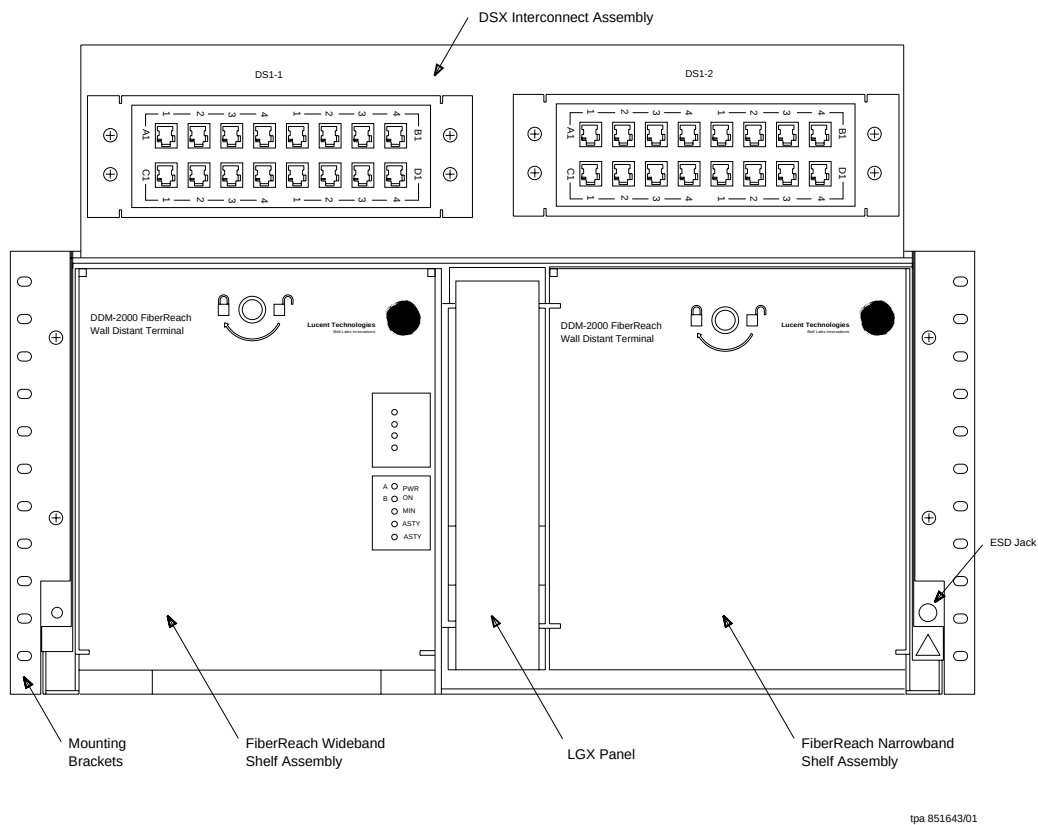


Figure 3-6. DDM-2000 FiberReach Multiplexer Wall-Mount Distant Terminal (1 Wideband Shelf and 1 Narrowband Shelf)

DDM-2000 FiberReach Multiplexer Plug-Ins (Wideband Shelf)

Table 3-1 lists the plug-ins available for Release 2.2 of the DDM-2000 FiberReach Multiplexer (wideband shelf).

Table 3-1. DDM-2000 FiberReach Wideband Shelf Plug-Ins

Product Code	Functional Name	Functional Designation
BBF1B	DS1 Low-Speed Interface	DS1
BBF3	DS1 Performance Monitoring	DS1PM
BBG8/BBG8B	System Controller	SYSCTL
26G2-U	OC-1 OLIU with TSI	OLIU
28G-U	OC-3 OLIU with TSI	OLIU
ECC2	User Panel	USPNL
BBF6	T1 Extension Pack	T1EXT (See Caution below)
BBF8	HDSL Interface	HDSL (See Caution below)
177A	Apparatus Blank	

Lightning and Surge Secondary Protection Assembly for T1 Extensions and HDSL



CAUTION:

In addition to primary lightning protection, an external Lightning and Surge Secondary Protection Assembly (ED-8C783-30 or equivalent) is required for circuit packs used in outside plant applications.

T1 digital lines in the outside plant environments may be exposed to high voltages due to lightning surges and power crosses due to fallen power lines. In order to protect a DDM-2000 shelf with T1EXT and HDSL circuit packs from such occurrences, an external assembly that houses a secondary surge protection is required.

The lightning and surge protection assembly, shown in Figure 3-7, is approximately 17.5 inches wide, 3.45 inches high, and 5.65 inches deep and can be installed in 23-inch racks. It can be equipped with two small backplanes. Each backplane has seven edge connectors and can support up to seven T1 extension channels. The two backplanes together have enough capacity to support 14 T1

extension channels in a FiberReach shelf (the maximum capacity). A small circuit board with fuses, current limiting resistors, and thermal cutoff devices for both the tip and ring conductors is installed in the edge connector whenever the DDM-2000 FiberReach shelf is equipped with a T1EXT and HDSL circuit packs. The small circuit board provides for secondary surge and power cross protection for each line. Requires two for each circuit pack.

The lightning and surge protection assembly does not include any primary surge protectors. The tip and ring conductors must have gas tubes (Lucent Technologies protector unit 4B3EW or equivalent) installed at the point of entry into a cabinet or building.

The lightning and surge protection assembly meets the requirements specified in Section 4 of the Bellcore GR-1089-CORE, Issue 1, November 94, as well as *UL*^{*} 1459.

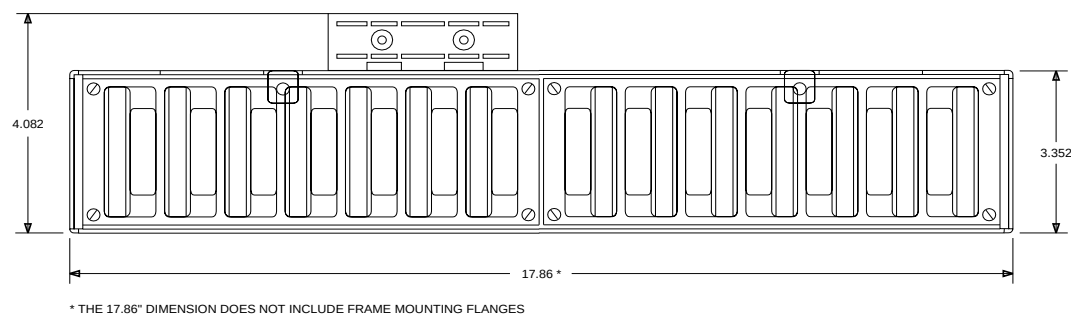


Figure 3-7. T1 Lightning and Surge Protection Assembly

* Registered trademark of Underwriter's Laboratories Inc.

DDM-2000 FiberReach Narrowband Shelf

The DDM-2000 FiberReach Narrowband Shelf (NBS) is similar to the DDM-2000 FiberReach Wideband Shelf (WBS). Both are approximately 9.5 inches high by 8 inches wide. Either shelf may be mounted in the DDM-2000 FiberReach Multiplex Carrier Assembly, the Wall DT Assembly, and the 61B cabinet. The carrier assembly provides space for up to two wideband shelves, two narrowband shelves, or one wideband shelf and one narrowband shelf plus up to two DS1 jack panel assemblies and one LGX panel assembly. The 61B cabinet provides space for up to two wideband shelves, two narrowband shelves, or one wideband shelf and one narrowband shelf.

The operation of the narrowband shelf requires DLC Release 4.4 or higher in the *SLC*[®]-2000 Host Digital Terminal (HDT).

There can be up to sixteen circuit packs installed in the NBS. The four common units are always required and they are:

FHB2	DSXBIU	Provides the electrical connection to the Wideband Shelf
AUA413	RGU	Provides ringing voltage
AUA421	CDTU	Provides channel drop test capability
AUA432	PCU	Provides DC voltages from 48 volt battery voltage

There are twelve channel unit positions that can be used for up to 48 VF lines with Release 4.4. Refer to Table 3-2 for the channel units that are supported by DDM-2000 FiberReach Release 2.0 or higher (SLC-2000, Release 4.4).

The SLC-2000 HDT has a SPQ809 MSDT Server in the metallic distribution shelf (MDS) that sends a DSX-1 signal to the collocated WBS. The WBS multiplexes the DSX-1 electrical signals into an OC-1 optical signal and transmits it to the optical network unit (ONU). Another WBS in the ONU demultiplexes the OC-1 optical signal back into the DSX-1 electrical signals and sends them to the DSXBIU in the NBS. In Release 4.4 in the quad mode, the DSXBIU conditions the signals so that one DSX-1 signal is sent to the first six channel unit slots. A second server is required in the HDT to provide the second DSX-1 signal for VF circuits 13 through 24.

DLC Release 4.4 or higher introduces the octet mode which allows up to four DSX-1 signals to be sent to the ONU which the DSXBIU will condition and send to four sets of three channel unit slots. Each set may be used for up to 24 VF circuits or 10 ISDN lines for a total capacity of 48 VF circuits or 40 ISDN lines. Four servers are required in the HDT to provide the four DSX-1 signals for VF circuits 1 through 48.

A T1 metallic facility can also be used to connect the HDT server to the DSXBIU. The number of T1 lines and the release of the HDT DLC software will determine the capacity of the NBS.

The DDM-2000 FiberReach narrowband shelf is shown in Figure 3-8 and Figure 3-9.

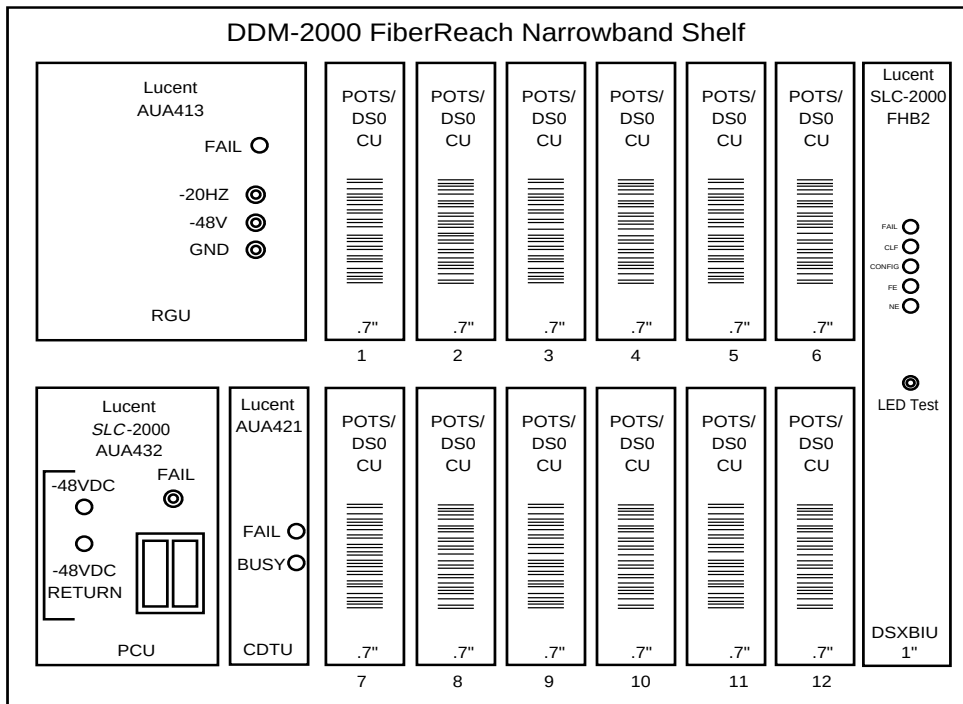


Figure 3-8. DDM-2000 FiberReach Multiplexer Narrowband Shelf — Front View

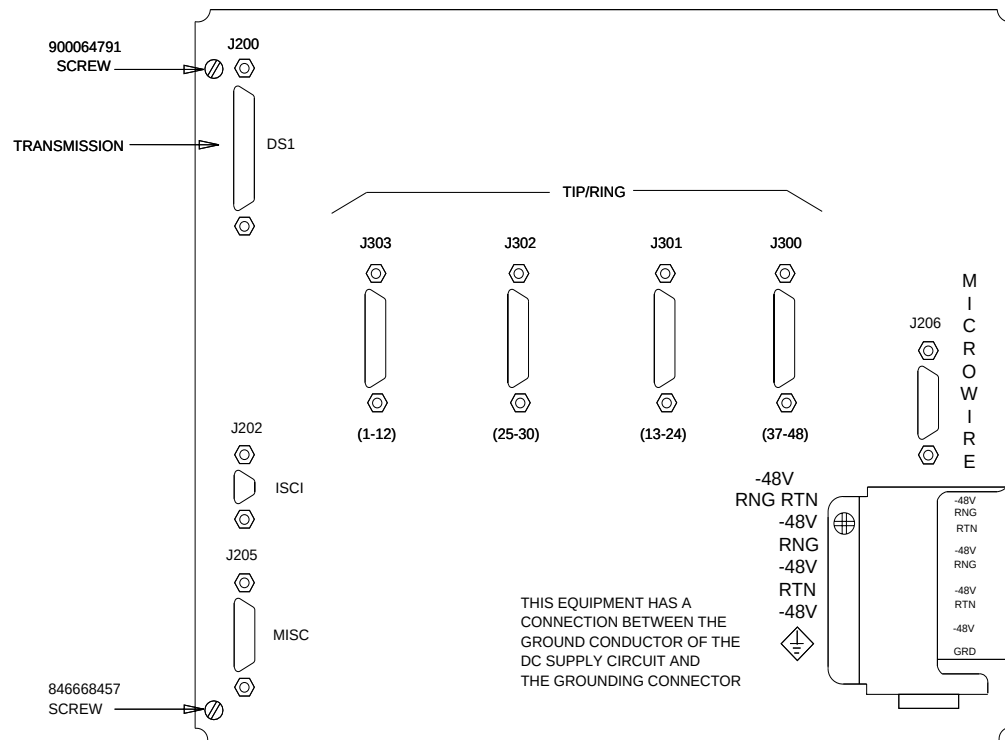


Figure 3-9. DDM-2000 FiberReach Multiplexer Narrowband Shelf — Rear View

Table 3-2 lists the circuit packs that can be housed in the 12-channel unit slots of the narrowband shelf. All circuit packs within the DDM-2000 FiberReach narrowband shelf are unprotected. These channel units are the same as those used in the *SLC*[®]-2000 Access System Multi-Services Distant Terminal (MSDT). Table 3-2 also indicates which circuit packs are available with each *SLC*-2000 software release.

Table 3-2. DDM-2000 FiberReach Narrowband Shelf Channel Unit Plug-Ins

Product Code	Functional Name	Available With SLC®-2000 Release
AUA39	SPOTS CS + OHT + CLASS	4.4 or higher
AUA45B	Ringing Repeater (Manual Ringdown)	4.4 or higher
AUA44B	4W CF Inventory Ready, TR57 Iss. 2 Compliant	4.4 or higher
AUA53B	Coin CF	4.4 or higher
AUA56B	DID/DPT (SPOTS with DPO, COT)	4.4 or higher
AUA158C	ALC SPOTS CF + OHT/CLASS	4.4 or higher
AUA159C	ALC SPOTS/SPOTS CF + OHT/CLASS (mod. OHT Loss)	4.4 or higher
AUA178	ALC C-POTS (2db loss max.)	4.4 or higher
AUA179	ALIC5 (based on AUA159B)	4.4 or higher
AUA41B	4W VF CF, inventory ready	4.4 or higher
AUA42B	DUAL E SPOTS CF, w.43 series (CU at COT)	4.4 or higher
AUA42B	DUAL E SPOTS CF, w.42 and 43 series (CU at COT)	4.4 or higher
AUA44	4W VF CS (with TDM signaling)	4.4 or higher
AUA52B	OCU Dataport, all-rate	4.4 or higher
AUA54	4W VF Types I and II E&M	4.4 or higher
AUA90	ISDN T-BRITE, single	4.4 or higher
AUA94	Dual ISDN, ANSI U, TR303 4-to-1, TDM	4.4 or higher
SPQ340	Quad SLC-2000 SPOTS CS + OHT + CLSS + CLASS	4.4 or higher
SPQ909	Quad ALC POTS + OHT + CLASS CF, TR909 compliant	4.4 or higher
SPQ442	Quad SLC-2000 E SPOTS CS + OHT + CLSS + CLASS	4.4 or higher
MCU5205	DC alarm CU	4.4 or higher
AUA200	SW 56 2W CU, DDS	4.4 or higher
AUA232	RS-232 CU, DD	4.4 or higher
AUA25B*	POTS/M SPOTS CF (2 dB fixed loss)	4.4 or higher

Table 3-2. DDM-2000 FiberReach Narrowband Shelf Channel Unit Plug-Ins

Product Code	Functional Name	Available With SLC®-2000 Release
AUA27*	POTS CF + OHT + CLASS	4.4 or higher
AUA58C*	POTS CF + OHT + CLASS	4.4 or higher
AUA75*	Private Line Auto Ring (PLAR)	4.4 or higher
AUA150*	POTS/SPOTS CF + OHT + CLASS	4.4 or higher
AUA53	Coin CF	4.4 or higher
AUA55	Multiparty CF	4.4 or higher
AUA56	DID/DPT	4.4 or higher
AUA57	FSR CF	4.4 or higher
AUA58B	POTS CF + OHT + CLASS	4.4 or higher
AUA59	POTS/SPOTS CF	4.4 or higher
AUA158B	ALC POTS CF + OHT + CLASS (ALC inventory ready)	4.4 or higher
AUA150C	POTS/SPOTS CF + OHT + CLASS (ALC inventory ready)	4.4 or higher
AUA159B	ALC POTS/SPOTS CF + OHT/CLASS (modified OHT loss)	4.4 or higher
AUA41	4W VF CF	4.4 or higher
AUA54B	4W VF Types I and II E+M	4.4 or higher
AUA93	ISDN BRITE II, ANSI U, Single	4.4 or higher
SPQ452	Dual SLC-2000 OCU Dataport (Allrate)	4.4 or higher
SPQ456	Quad DID-DPT	4.4 or higher
SPQ429	Quad P Phone (Universal only)	4.4 or higher
SPQ453	Dual Coin Full Feature CF	4.4 or higher
SPQ419	Quad Coin Full Feature	4.4 or higher
SPQ440	Quad SLC-2000 ALC POTS/SPOTS CF + OHT + CLASS + CLSS	4.4 or higher
SPQ478	Quad SLC-2000 ALC POTS CF + OHT + CLASS (BellSouth)	4.4 or higher
SPQ400*	Quad SLC-2000 ALC POTS CF + OHT/CLASS	4.4 or higher

Table 3-2. DDM-2000 FiberReach Narrowband Shelf Channel Unit Plug-Ins

Product Code	Functional Name	Available With <i>SLC</i>[®]-2000 Release
SPQ440C*	Quad Extended Range SPOTS	4.4 or higher
SPQ443*	Quad <i>SLC</i> -2000 E SPOTS CF + OHT+ CLASS + CLSS	4.4 or higher
SPQ494*	Quad ISDN (octet mode only)	4.4 or higher

* Some engineering restrictions (for example, power limitations) must be considered when using this channel unit. Refer to Section 6, "System Planning and Engineering," for additional information.

Secured-Area Telecommunication Applications Cabinet (STAC) System

The DDM-2000 Fiber Reach Narrowband and Wideband Multiplexers are available in the new modular indoor cabinet. The STAC System targets the needs of the local access market with a flexible and affordable configuration.

Each cabinet is assembled and can be completely wired and system tested at the factory to assure the highest standard of quality and quick trouble free installation.

There are two modules available:

- the FRC-2000 module (26" W x 15" D x 12" H)
- the pedestal battery module (26" W x 15" D x 24" H)

Features of the 12" module include:

- wall mountable
- floor mountable with spacer
- spacer that allows the user to stack modules on top of each other
- holds a combination of two FiberReach shelves
 - 1 wideband shelf and 1 narrowband shelf
 - 2 narrowband shelves
- holds up to two rectifiers
 - Lucent Technologies RSO 400 Series
 - 400 watts each
- fiber administration shelf
- tilts down for easy access to back of equipment
- allows access to rear of module to facilitate cable administration

Features of the pedestal battery module include:

- floor mountable
- front door removable and provisioned for padlock
- spacer that allows electronic module to be stacked on top
- holds up to 2 string of batteries
 - Lucent Technologies' HR Series Battery
- provides up to 8 hours of battery backup
- includes low voltage disconnect and fusing unit.

Figure 3-10 and Figure 3-11 illustrate two possible mounting configurations. Refer to Cabinet Practice 640-030-206 for more information.

Construction

This space efficient modular cabinet is manufactured with corrosion resistant materials. Aluminum is used for the cabinet body and the majority of the cabinet components. The electronics modules are equipped with power and battery alarms which can be connected to a monitoring system, at a central location to notify the user in the event of equipment trouble.

Reliability

The cabinet has undergone extensive system testing and qualification by Bell Laboratories based on expected worst case conditions to ensure high reliability and trouble free field performance. These test results are correlated with actual field data to validate cabinet performance. This extensive testing provides assurance that Lucent Technologies cabinet solutions meet specific application and performance needs of the customer.

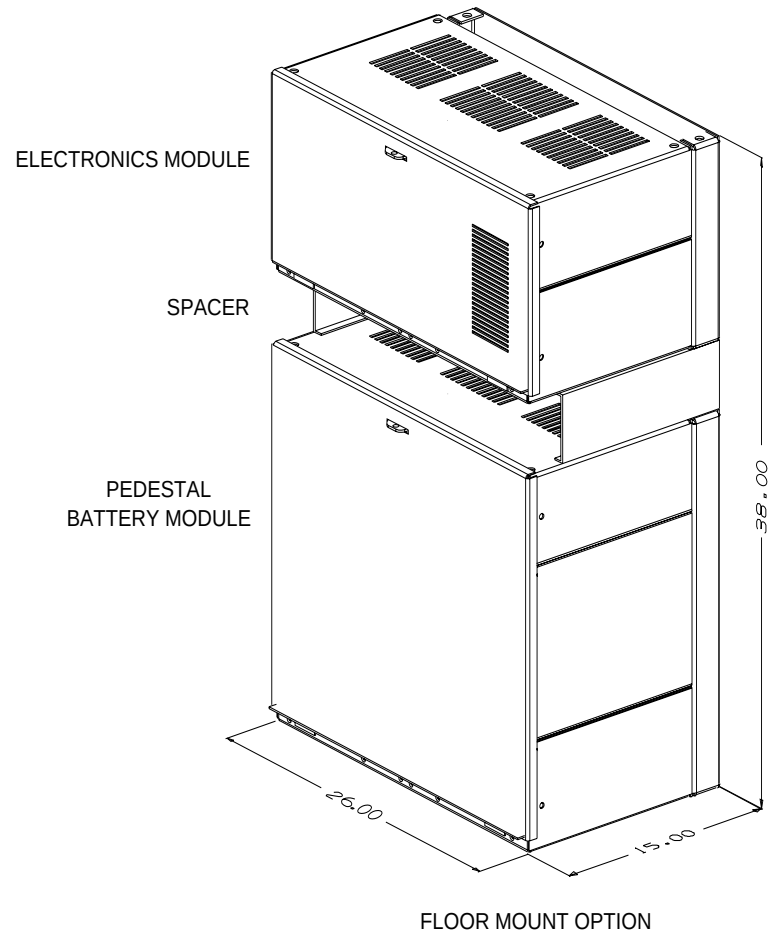


Figure 3-10. STAC System, FRC-2000 Module with Pedestal Battery Base

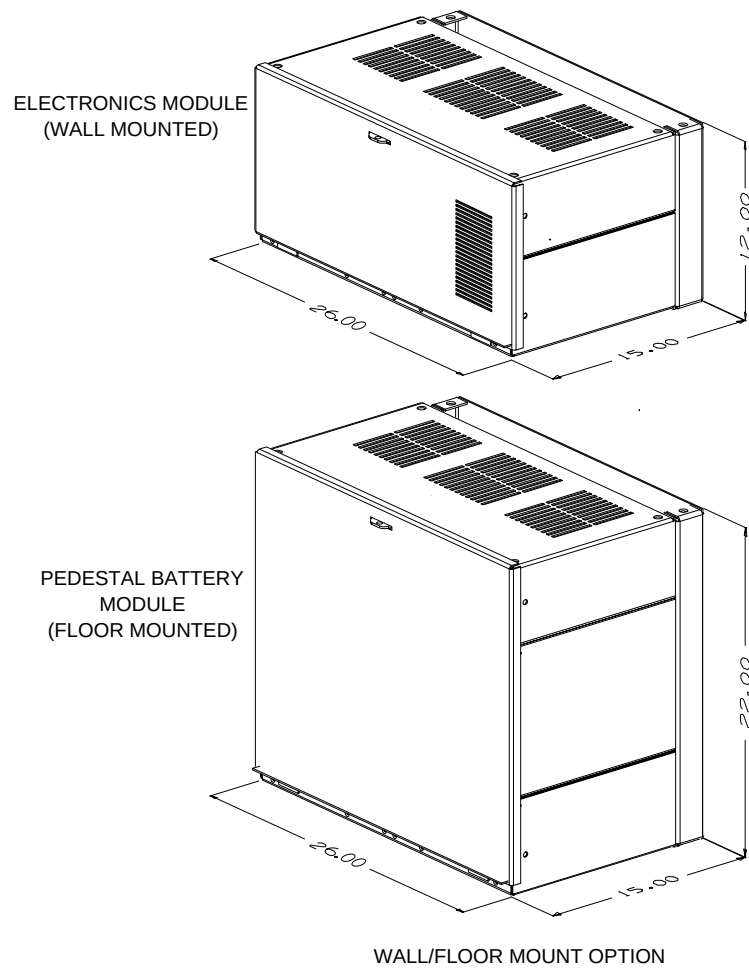


Figure 3-11. STAC System, FRC 2000 Module Wall Mount Option with Separate Pedestal Battery Module

Shelf Configuration

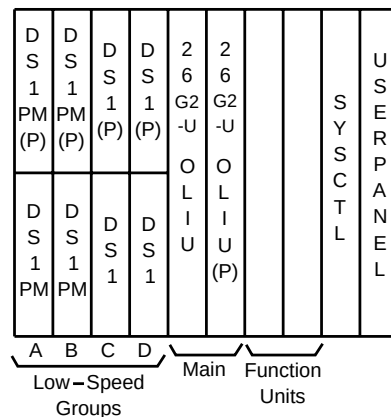
This section summarizes descriptive information used with applications information to plan procurement and deployment of the DDM-2000 FiberReach Multiplexers. There are several considerations that should be remembered when planning the DDM-2000 FiberReach Multiplexers' role in the network. Projected customer requirements will determine the initial capacity needed, as well as evolution to higher capacities. The advanced networking capabilities of the DDM-2000 FiberReach Multiplexers offers many economic and planning benefits, and certain guidelines should be followed to maximize these benefits. Physical installation considerations will be guided by the installation location (central office, uncontrolled, or customer locations). Initial network configuration will determine synchronization requirements. Synchronization should be planned on a network basis, considering items like topology, reliability, internetwork connectivity, and service evolution.

The DDM-2000 FiberReach Multiplexer provides multiplexing and transport for one STS-1 signal in a ring configuration. This capacity may be utilized in many combinations of low-speed inputs. The following shelf configurations represent some examples of the low-speed input combinations.

DS1 Services

Figure 3-12 and Figure 3-13 show examples of the DDM-2000 FiberReach in a wideband application providing DS1 services. The wideband shelf uses the two main optical line interface unit (OLIU) slots to interface an OC-1 line to the low-speed group(s). The OLIU circuit packs are equipped in pairs. Low-speed interface growth proceeds in four DS1 increments by equipping the low-speed slots with DS1 or DS1PM circuit packs. The SYSCTL and user panel are always required in this application.

Figure 3-12 shows a 1x1 low-speed protection configuration with four low-speed groups (A, B, C, D) for a maximum of four service and four protection units per multiplexer.



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Figure 3-12. DDM-2000 FiberReach — 16 1x1 Protected DS1 Services

A similar configuration would also be used for unprotected DS1s, as shown in Figure 3-13. The low speed interface growth proceeds in four DS1 increments by equipping the low speed slots with DS1 or DS1PM circuit packs for a maximum of four service units per multiplexer.

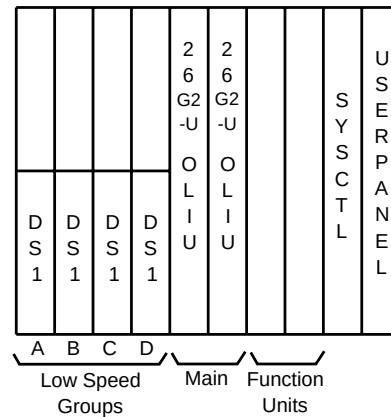


Figure 3-13. DDM-2000 FiberReach — 16 Unprotected DS1 Services

A configuration for 1x7 protected services is shown in Figure 3-14. Only the circuit packs of the type in slot D2(P) are protected.



NOTE:

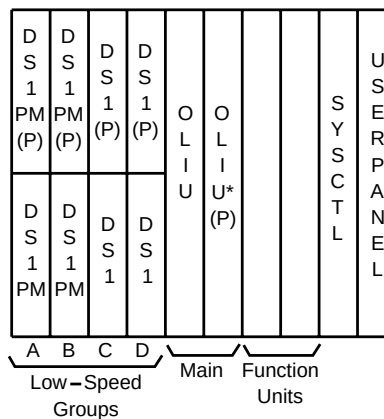
A BBF3 (DS1PM) circuit can protect a BBF1B (DS1) circuit pack.

D S 1	D S 1	D S 1 PM	D S 1 PM (P)	2 6 G2 -U O L I U	2 6 G2 -U O L I U			S Y S T E M	U S E R P A N E L
D S 1	D S 1	D S 1 PM	D S 1 PM						
A1	B1	C1	D1						

Figure 3-14. DDM-2000 FiberReach — 1x7 Protected Services

Figure 3-15 shows an example of the DDM-2000 FiberReach in a wideband application providing DS1 services. The wideband shelf with an 26G-type or an OC-3 line with a 28G-U uses the two main optical line interface unit (OLIU) slots to interface an OC-1 line to the low-speed group(s). The OLIU circuit packs are equipped in pairs. Low-speed interface growth proceeds in four DS1 increments by equipping the low-speed slots with DS1 or DS1PM circuit packs. The SYSCTL and user panel are always required in this application.

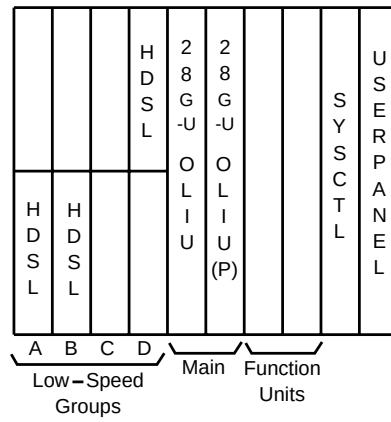
Figure 3-15 shows a 1x1 low-speed protection configuration with four low-speed groups (A, B, C, D) for a maximum of four service and four protection units per multiplexer.



* Application may be either a 26G2-U or a 28G-U.

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Figure 3-15. DDM-2000 FiberReach — 1x1 Protected Services



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Figure 3-17. DDM-2000 FiberReach — 1x2 Protected HDSL Services

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Overview

This chapter describes the powering options for the DDM-2000 FiberReach Multiplexer.

Introduction

The DDM-2000 FiberReach Multiplexer can be powered from a variety of power sources. The most common powering method is the nominal –48 V DC power available in telecommunication facilities. The system can be configured to operate with a +48 V or –48 V input, without the use of bulk converters.

Depending on the application, power sources other than –48 V DC can be used with DDM-2000 FiberReach. These include 60 V AC and 120 V AC (commercially available) power converters, which are miscellaneously mounted.

Wideband Shelf –48 V Battery Powering

The DDM-2000 FiberReach Multiplexer wideband shelf uses on-board power conversion, eliminating the need for slots for bulk power converters. Two independent –48 volt office power feeders (A and B) enter the shelf through dangle cables (cables that come from the rear of the cabinet and “dangle” to provide front access to rear connectors), fused at the user panel, and distributed to the circuit packs. Power conversion is performed through modular power converters located on the circuit packs. In each circuit pack, the two feeders are

diode ORed, fused, filtered, and regulated by the board-mounted power modules. This provides the required redundancy in case of the loss of one feeder or one fuse. Figure 4-1 shows the distribution schematic. The power converter located on the OLIU circuit pack provides power to the DS1 circuit packs. T1EXT circuit packs use -48 volts from the backplane to provide line powering with 60mA constant current source. Total power requirements for the wideband shelf is 40 watts for a typical configuration with a 1x7 protected DS1 interface. Total power requirements for the wideband shelf is 65 watts for a typical configuration with a 1x7 protected T1EXT circuit packs.

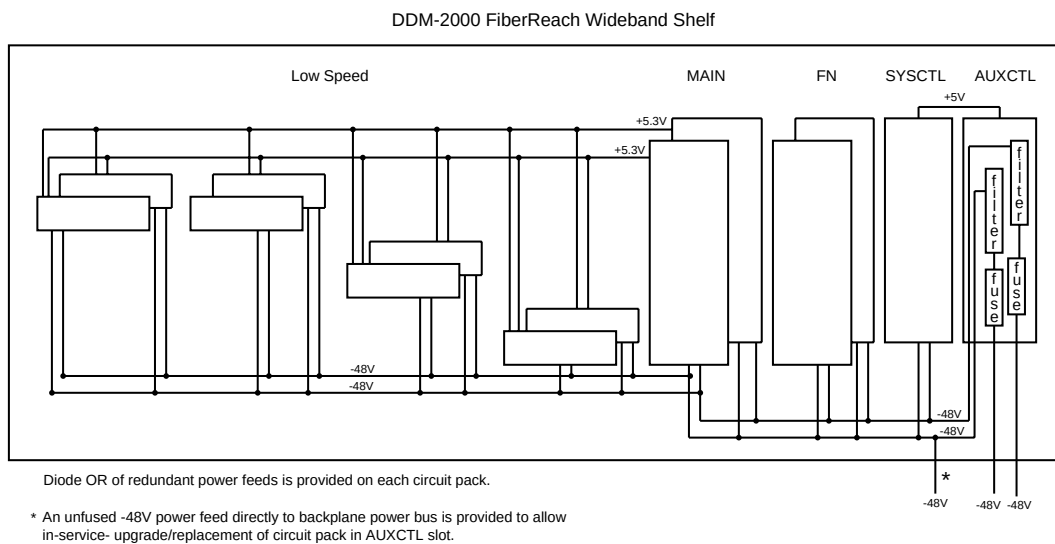


Figure 4-1. DDM-2000 FiberReach Multiplexer Wideband Shelf Power Architecture

Narrowband Shelf –48 V Battery Powering

The PCU in the DDM-2000 FiberReach narrowband shelf provides fusing and converts a –48 V DC input power feed to voltages required for the other circuit packs in the narrowband shelf. Figure 4-2 shows the power distribution. The narrowband shelf can draw up to 84 watts of power and meets all performance requirements when the DC input voltage varies between –42.5 V and –56.5 V, as specified in TR-499

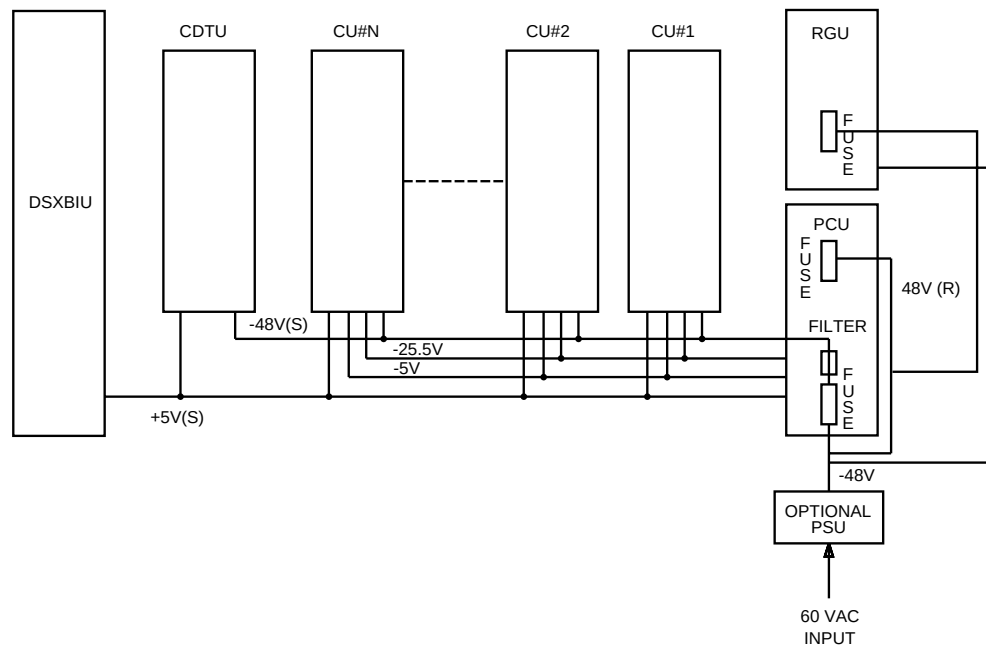


Figure 4-2. DDM-2000 FiberReach Multiplexer Narrowband Shelf Power Architecture

Other Power Options

The DDM-2000 FiberReach Multiplexer uses miscellaneous mounted power converters to support powering from 60 V AC or 120 V AC sources. These converter supplies –48 V to the FiberReach shelf. Customer premise locations usually have 120 V AC commercial power from utilities. The converters are equipped with necessary lightning protection for outside plant applications. See Figure 4-3.

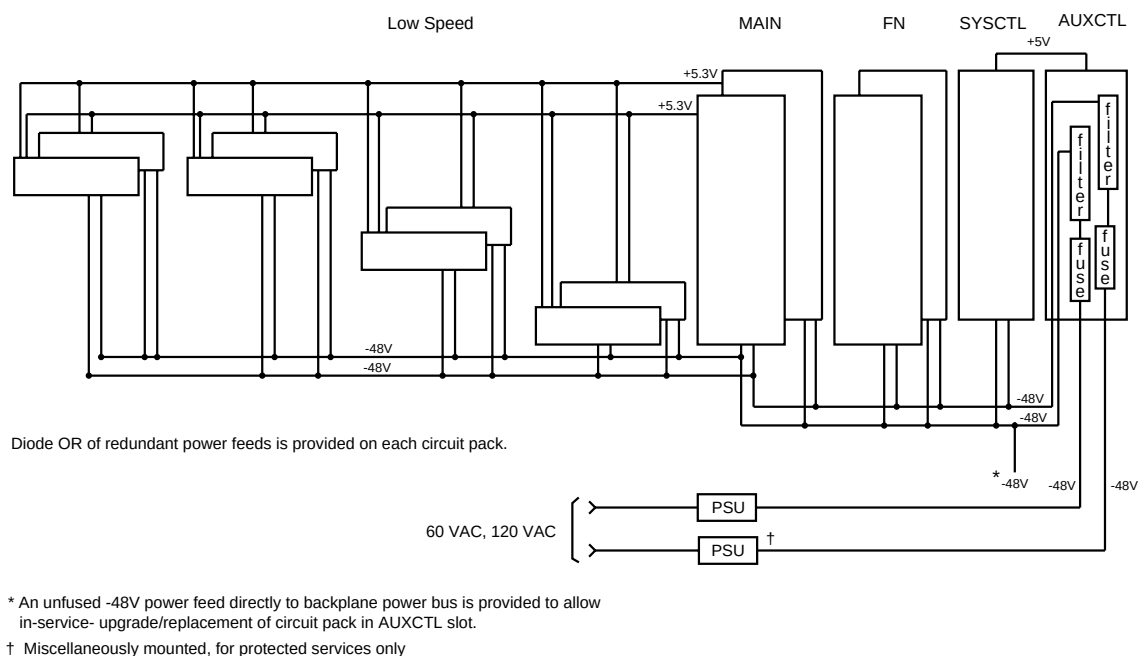
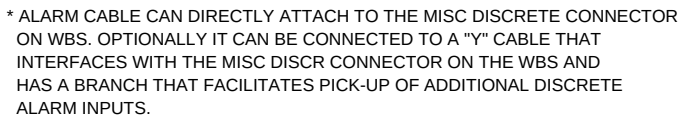
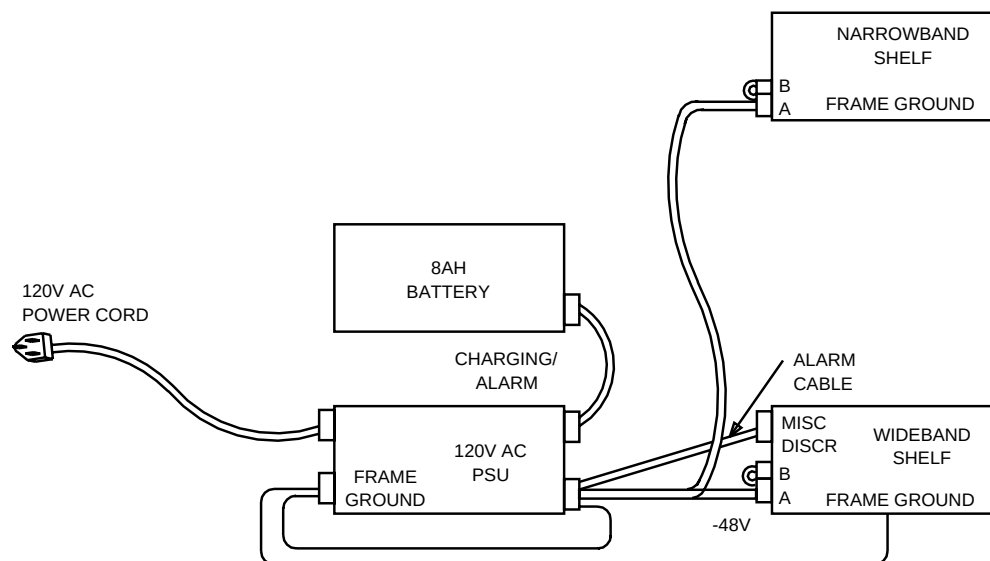


Figure 4-3. DDM-2000 FiberReach Multiplexer — Other Power Options

Narrowband shelf services are supported by *SLC-2000* Release 4.4 or higher. For Release 4.4, the *SLC-2000* host must be equipped with the SPQ810 MSDT server unit circuit pack to support both quad and octet mode services. See LTP 363-030-000, ***SLC-2000 Access System Application, Planning, and Ordering Guide*** for additional information.





NOTE: Alarming for this arrangement can be from the wideband shelf (cable ED8C852-20 G7) or from the narrowband shelf (cable ED8C785-20 G9). Optionally it can be connected to a "Y" cable (ED8C852-20 G12) that interfaces with the MISC DISCR connector on the wideband shelf only and has a branch that facilitates pick-up of additional discrete alarm inputs.

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Figure 4-5. Wall DT Powering (Single Power Supply for both WB & NB)

Wideband Shelf Transmission Circuit Packs

OLIU Circuit Packs

The OLIU circuit packs are powered by two DC-to-DC converters located on the circuit packs. The backplane power feeders supply A and B –48 volts to these converters via diode ORed circuits and are fuse-mounted on each of the circuit packs. One converter supplies +5 volts and the other supplies –5.2 volts

DS1/DS1PM Circuit Packs

The DS1/DS1PM circuit packs receive +5 volt power via backplane connections from the both OLIU 26G-U circuit packs. Power selector circuits (diode ORed) and fuses for the +5 volts are located on the DS1/DS1PM circuit packs. The fuses on the DS1/DS1PM circuit packs protect the backplane and prevent DS1/DS1PM unit failures from affecting service in the other DS1 units

T1 Extension (BBF6 T1EXT)

The T1 Carrier Extension (T1EXT) circuit pack provides an interface to two T1 carrier signals. In the transmit direction, the T1EXT circuit pack accepts two T1 signals from a patch panel (or equivalent). The T1 signals can have AMI or B8ZS line coding. The line coding is assigned on a per-T1 basis. The two incoming T1 signals are mapped into a standard, floating mode, asynchronous VT1.5 signal with VT path overhead. The two VT1.5 signals are then multiplexed into one VT-G signal that is sent to the OLIU circuit pack.

In the receive direction, a VT-G signal is received from the OLIU circuit pack and demultiplexed into two VT1.5 signals. Each VT1.5 signal is passed through circuitry to interpret VT pointers and access path overhead. The DS1 payload is then extracted from VT1.5 signal and transmitted to T1 carrier.

Each T1 carrier loop is also supplied with simplex power with a 60 mA constant current. The T1EXT circuit pack performs DS1 path performance monitoring on each T1. Near-end performance data is collected from incoming T1 signals (arriving from T1 loop) in either extended super frame (ESF) or superframe (SF) formats. For ESF-formatted T1s, the circuit pack also reads the embedded ESF data link to collect far-end performance information. A T1EXT circuit pack can be configured for either 1X1 or 1X7 protection, provided that the protection slot is equipped with an identical circuit pack. An external lightning and surge protection assembly is required with the T1 configuration for outside plant applications. For each BBF6 circuit pack used in an outside plan application, a LPROT lightning protection card should be used in the lightning and surge protection assembly.

High Data Rate Digital Subscriber Line (HDSL)

The HDSL circuit pack (BBF8) provides for HDSL capability on the DDM-2000 FiberReach shelf. It allows the transport of DS1 rate payloads, for up to 12,000 feet, over two metallic 24 AWG twisted-pair lines. Data is transported over each pair bidirectionally using echo cancellation techniques.

A maximum of three BBF8 HDSL circuit packs, including a protection circuit pack, can be installed in one FiberReach if 28G-type OLIUs are used.

In the transmit direction, the HDSL circuit pack performs an inverse multiplexing function which splits the DS1 rate payload into two 784 kb/s data streams. These signals are then transmitted over two twisted-pair line using a 2B1Q line code. At the receiving end an interface compatible with *PairGain*^{*} HDSL equipment[†] will combine the two data streams to reconstruct the original DS1 rate payload.

In the receive direction, the HDSL circuit pack combines the two 784 Kb/s data streams back into the original DS1. The signal is then sent through normal multiplexing operations to the SONET level.

The BBF8 fits into the low-speed slot and provides two, four-wire HDSL interfaces. Each interface provides a full DS1 rate payload capacity mapped to a SONET VT1.5. As with the DS1 circuit packs, an 28G-type must be used to perform VT cross-connect function into an STS-1. Once in SONET, the DS1 rate payload is treated as a normal DS1.

The HDSL circuit pack supports both the HDSL and DDM-2000 management domain. DDM-2000 management can perform DS1 loopback functions, tests and alarm reporting through the SONET DCC or DDM-2000 CIT access. The HDSL management domain, available only through a BBF8 faceplate RS-232 port, can perform all these functions plus provide performance monitoring and history reporting.

Control Circuit Packs

The SYSCTL circuit pack is powered by a –48 volt to +5 volt DC-to-DC converter located on the pack. The backplane power feeders supply A and B –48 volts to these converters via diode ORed circuits and fuses mounted on the circuit packs.

* PairGain is a registered trademark of PairGain Technologies, Inc.

† For more information, contact:
PairGain Technologies
14402 Franklin Avenue
Tustin, CA 92780-7013
Customer Service # 1-800-638-0031

Narrowband Shelf Transmission Circuit Packs

Digital Signal Cross-Connect Backplane Interface Unit (DSXBIU)

The DSXBIU is a narrowband shelf circuit pack that operates as the local controller for the narrowband shelf and multiplexes the DS0 signals from the channel units to DS1 interfaces. The DS1 interface is fed from the DSXBIU to a DS1 circuit pack on the wideband shelf. Software for the DSXBIU may be downloaded from the *SLC-2000* host digital terminal.

The DSXBIU interfaces to the 12 channel units on the narrowband shelf, providing provisioning and inventory information, as well as clock generation and synchronization. The DSXBIU communicates with the common units via a serial protocol microwire link. A separate microwire RS-422 interface connects with the power supply unit. A bank control link on the DSXBIU is used to communicate with the channel units.

The CDTU also contains a drop test circuit to determine the health of the metallic drop beyond the local DDM-2000 FiberReach shelf. The CDTU can detect the following:

- Hazardous voltage
- Foreign voltage
- Metallic leakage
- Receiver off-hook
- Lack of continuity to the station set.

The circuit pack contains a red fail LED to indicate an internal failure in the CDTU circuit pack and a green busy LED to indicate that a test session is active.

AUA432 Power Converter Unit (PCU), BGW1 Power Supply Unit (PSU)

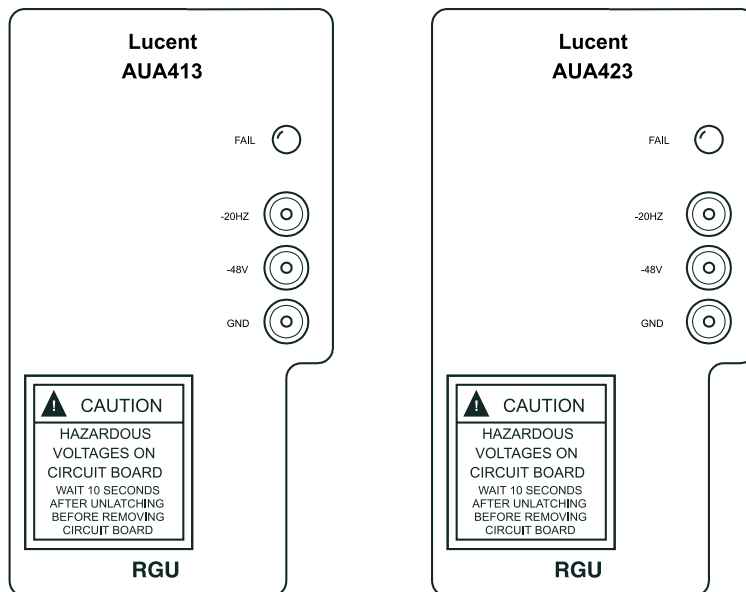
The AUA432 PCU is located in the narrowband shelf and accepts –48 V DC power. The PCU converts incoming –48 V DC to +5 and –5 V DC, as well as –25.5 V DC for use by various channel units that may be in the narrowband service card slots. The PCU provides power to all the circuit packs on the narrowband shelf by converting incoming –48 V DC power to voltages required for the various circuit packs.

The BGW1 PSU, miscellaneously mounted with the DDM-2000 FiberReach shelf, terminates a 60 V AC from a network-provided source (for example, centralized power). The PSU converts incoming 60 V AC to –48 V DC for use by the wideband and narrowband shelves. In applications where –48 V DC is readily available, the PSU is not required. Other powering options will be available with future releases of the PSU.

Ring Generator Units (RGU)

The AUA413 and AUA423 RGUs are used in the *SLC-2000* MSDT as well as the *DDM-2000* FiberReach narrowband shelf. The AUA413 provides 20-Hz negative-superimposed ringing current to satisfy loop applications for 0 to 132 ohms and AUA423 should be placed in a NBS where any channel units are used whose range exceeds 132 ohms. (See Figure 4-6). The AUA413 and AUA423 RGUs receive an input voltage in the -42 to -60 V DC range from the power converter unit (PCU) and supply a ringing voltage of 20 Hz, 80 or 100 V rms sine wave, respectively, superimposed on the negative input voltage. Both can ring up to three lines simultaneously. Each line may have a maximum load of the five ringer equivalent numbers (RENS). The AUA423 RGU satisfies the ringing requirements for the longer loop applications where the loop impedance exceeds 130 ohms. Each of the faceplate contains an LED indicator (FAIL) and three test points **-20HZ**, **-48V**, and **GND**).

An output alarm monitor circuit on the RGU monitors the output ringing voltage for an over- or under-voltage condition and activates a red fail LED when either condition occurs. This circuit pack is protected from lightning and power surges by the output surge protection circuit.



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Figure 4-6. AUA413 and AUA423 Ringing Generator Units

AUA421 Channel and Drop Test Unit (CDTU)

The CDTU circuit pack is used in the SLC-2000 MSDT as well as the DDM-2000 FiberReach narrowband shelf. This circuit pack provides the remote end terminations and detectors required to support end-to-end channel testing of two-wire locally-switched services, such as POTS, coin, and multiparty services. When a channel test request is received on the narrowband shelf, the DSXBIU instructs the channel unit associated with the channel under test to operate its test relay. The DSXBIU then informs the CDTU that a test is occurring, and the CDTU then performs a drop test and reports the results back to the DSXBIU. The CDTU provides channel test terminations in sequence based on results from the channel test detectors and instructions from the DSXBIU.

LEDs

Two green power on (PWR ON) indicators on the user panel show that the shelf is receiving fused –48 volt power from each of two services. The indicator remains illuminated as long as the associated –48 volt feeder is supplying power to the shelf.

Normally the FAULT LED on the circuit pack faceplates is operated via the controller which provides a ground return for current generated by the on-board converter. In the event of a DC-to-DC converter failure, the LED will be operated via the –48 volt power leads. The –48 volt power leads are supplied through an electronic gate or relay contact normally held open by the converter. The power, fusing, and LED circuits shown in Figure 4-7 are used on all circuit packs with on-board DC-to-DC converters.

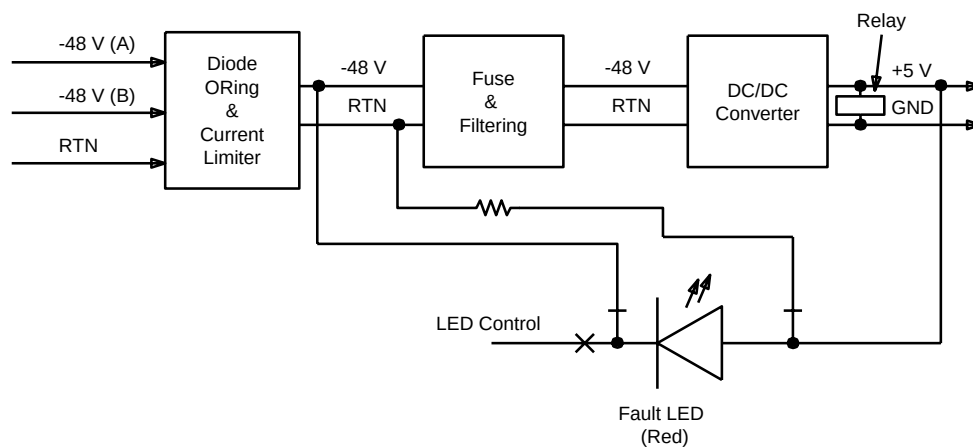


Figure 4-7. Circuit Pack Power and LED Control

Power Minor Alarm

A yellow power minor (PMN) alarm LED is provided on the user panel to indicate an AC power failure at the remote terminal. The power minor alarm can be provisioned at the central office (CO) to be either an office minor (MN) or office major (MJ) alarm.

Power Distribution

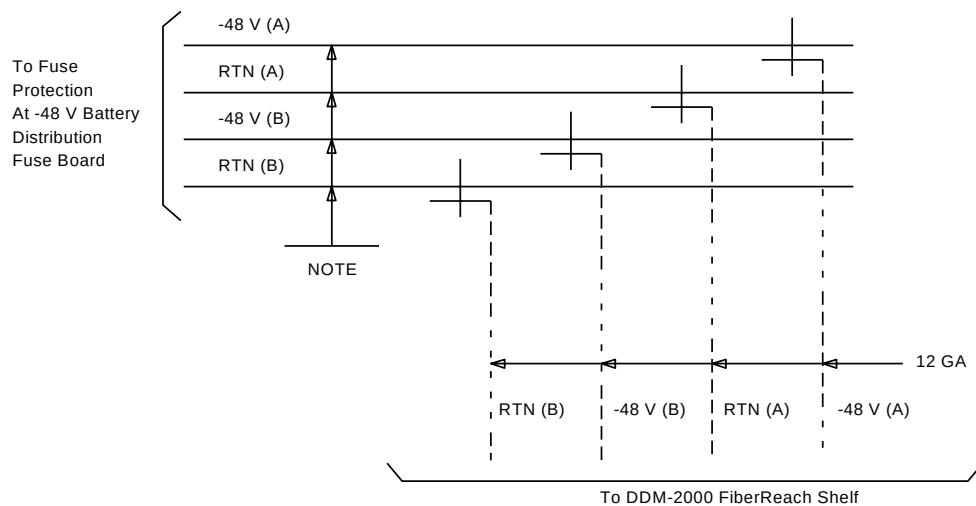
See "Power Requirements" in Chapter 10, "Technical Specifications" for power dissipation values.

Figure 4-8 shows a typical battery feeder interface for a single shelf.



CAUTION:

This information is for a typical application only. Consult 801-525-168, DDM-2000 Floor Plan Data Sheets and T-82046-30, Power Systems DC Distribution Circuit for Digital Transmission System for proper engineering of battery plant and feeders.



NOTE: Feeder size is selected per T82046-30 and EIM 90MV001, Issue 5.

Figure 4-8. Typical -48 Volt Power Supply for DDM-2000 FiberReach Multiplexer Single Shelf

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Overview

This chapter describes the transmission and synchronization interfaces for the DDM-2000 FiberReach Multiplexer.

Transmission Interfaces

DS1 Transmission Interface

The DDM-2000 FiberReach wideband shelf supports DS1 interfaces. The DS1 interface accepts any DSX-1 compatible signal (clear channel interfaces).

OC-1 Transmission Interface

The DDM-2000 FiberReach wideband shelf supports an OC-1 interface. This is a 51.84 mb/s SONET OC-1 interface.

T1 Transmission Interface

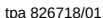
The DDM-2000 FiberReach wideband shelf supports a T1 interface. The interface accepts two T1 signals. The two signals are mapped into a standard VT1.5 signal, and then multiplexed into one VT-G signal.

Transmission and Architecture

Wideband Shelf Interfaces and Multiplexing

Figure 5-1 is an overall block diagram of the DDM-2000 FiberReach Multiplexer. Internally, the OC-1 Multiplexer uses synchronous optical network (SONET) standard multiplexing. (Refer to Appendix A for additional information on SONET.) On the low-speed side, asynchronous DS1 signals map into floating mode VT1.5 signals. The VT1.5 signals are combined into virtual tributary groups (VTGs) and then multiplexed to one STS-1 signal, and then converted to an optical OC-1 signal.

In the opposite direction, a received OC-1 signal is converted back to an electrical STS-1 signal. The STS-1 signal is demultiplexed to VT groups and then to VT1.5 signals. VT1.5 path protection switching and cross-connections are performed, and finally the VT1.5 signals are converted to DS1 signals.



* The architecture supports mapping of seven VT-Gs maximum into an STS-1 signal.

Figure 5-1. DDM-2000 FiberReach Wideband Shelf Block Diagram

Refer to Chapter 9, "Maintenance," for additional details on equipment and path protection switching.

Wideband Shelf Protection Architectures

The eight low-speed interface slots of the DDM-2000 FiberReach wideband shelf can be configured in two protection architectures: 1x1 protected or 1x7 protected. In a 1x1 protection configuration, the eight slots are divided into four low-speed groups (A, B, C, and D). The bottom four slots are the service A, B, C, and D slots and the top four slots are the associated protection A, B, C, and D slots. This configuration is most appropriate for applications with a mixture of low-speed service needs (for example, DS1 and T1 carrier extensions).

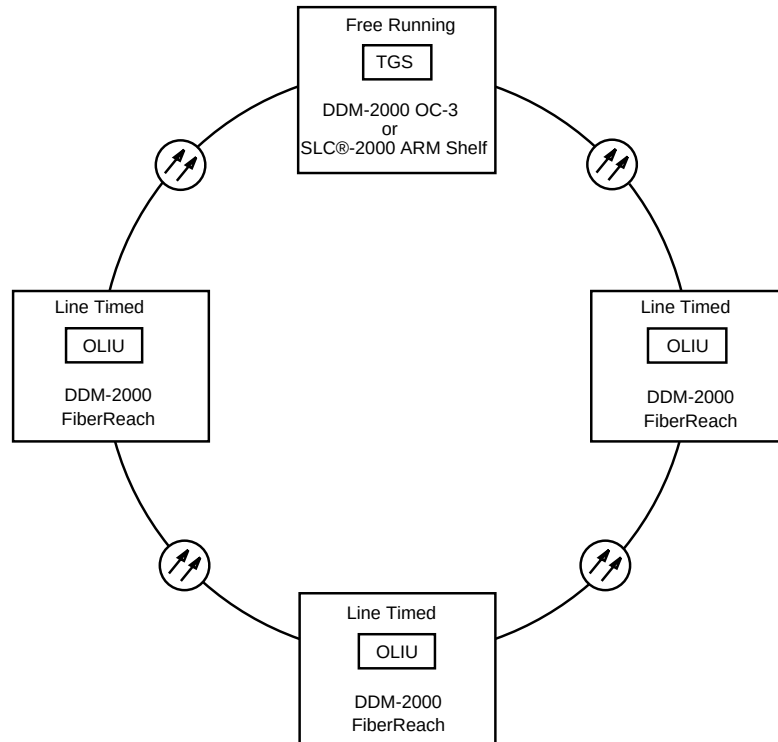
In a 1x7 protection configuration, the eight slots are provisioned as a single low-speed group with seven service slots and one protection slot. This arrangement is intended for applications where only one type of low-speed service is needed. Multiple types of low-speed services can be supported at one time; however only one type will be protected, determined by the type of circuit pack in the protection slot. In both 1x1 and 1x7 protection architectures, the protection slot(s) can be left unequipped, leaving the low-speed service unprotected. The protection architecture can be changed between 1x1 and 1x7 but must be done out of service.

Narrowband Shelf Interfaces and Multiplexing

The DDM-2000 FiberReach narrowband shelf shares the same channel units as the SLC-2000 MSDT. However, the narrowband shelf can offer up to 12 slots with a two-DS1 capacity for DS0 services and twice the ISDN services, versus only 6 slots and single DS1 capacity in the MSDT. This provides more flexibility for special services, such as integrated services digital network (ISDN).

The main controller and interface for the narrowband shelf is the digital signal cross-connect backplane interface unit (DSXBIU), which interfaces to the 12 channel units via TPCM and RCPM lines for pulse code modulation and the bank control link (BCL) for provisioning and inventory. See Figure 5-2. Clock generation and synchronization are controlled by the DSXBIU. A ringing generator unit (RGU) sends the ringing signal to all of the channel unit slots. A channel and drop test unit (CDTU) provides the channel and drop testing capability for the narrowband shelf. The power converter unit (PCU) delivers power to the narrowband shelf. The DSXBIU communicates with the common units via a serial protocol link called the microwire link. This link is a serial three-wire clock, transmit, and receive protocol. For the PSU, the DSXBIU has an additional microwire interface operating at RS-422 levels.

The backplane for the narrowband shelf can be configured in either quad or octet modes. In the quad mode, the 6 channel units in the upper subshelf and the 6 channel units in the lower subshelf provide up to 24 DS0s of service each on a 1-DS1 capacity per subshelf (2 DS1s total). Four DS0 time slots are provided to each physical channel unit slot. In the octet mode, two DS1 links are provided to the 6 channel unit slots in the upper subshelf and two DS1 links are provided to the 6 channel unit slots in the lower subshelf for a total capacity of 96 DS0 or 4 DS1 lines. Eight DS0 time slots are provided to each physical channel unit slot. One DS1 link is provided for each group of three channel unit slots.



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Figure 5-2. DDM-2000 FiberReach Multiplexer Narrowband Architecture

Wideband and Narrowband Shelf Integration

The wideband and narrowband shelves communicate with each other via a standard DS1 transmission interface. The electrical interface is compatible with DSX-1 requirements. No control communication exists between the wideband and narrowband shelves.

Synchronization

Each DDM-2000 FiberReach wideband shelf is provisioned to be line-timed from an incoming high-speed interface. In line timing mode, the OLIU circuit pack derives local shelf timing from the incoming OC-1 high-speed signal in the Main slot. The OLIU digital phase-locked loop (DPLL) also serves to remove any timing transients for improved network jitter performance. If one of the OC-N references is corrupted or unavailable, the OLIU will make a nonrevertive protection switch to the other reference without causing timing degradations. If both OC-N signals are lost (for example, due to a cable cut), the OLIU circuit pack will switch to holdover mode. The OLIU will normally switch back to the line timing mode when a reference is no longer corrupted, but it can be provisioned to require a manual switch.

Manual Timing Pack Switch

This capability adds the ability to manually switch which main OLIU is supplying timing to the shelf. In this way, the switch can be effected remotely. In addition, timing may be switched off of a main OLIU prior to removing it for maintenance. Using this software switch creates a slightly smaller transmission hit. This feature also causes an "active-fn" OLIU pack equipment switch which will be reflected in the rtrv-state-eqpt report.

Subnetwork Configurations

The DDM-2000 host can be free running, externally timed, or line-timed. The DDM-2000 FiberReach is always line-timed from the host node.

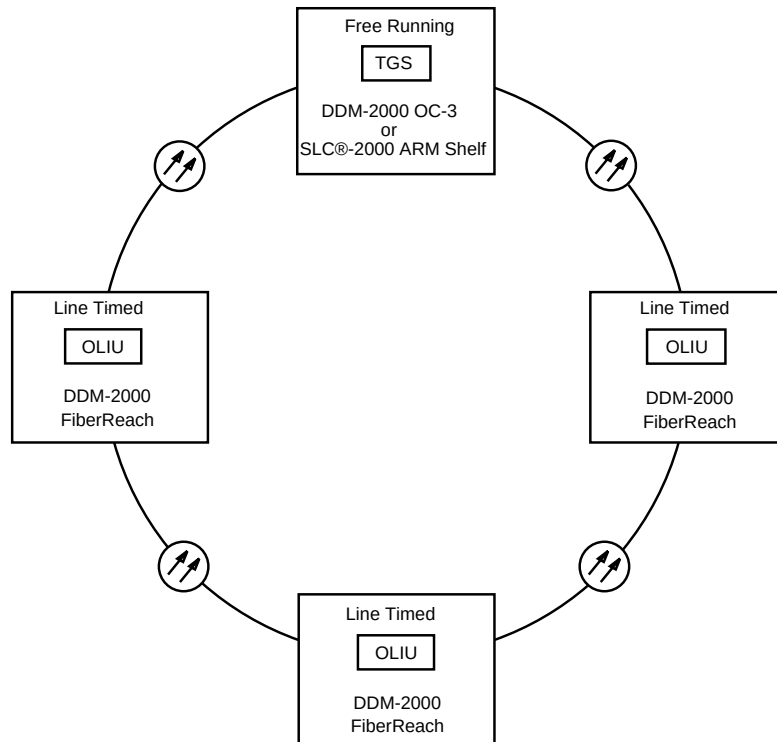
Free Running/Line Timing

For initial SONET deployment with a DS1 low-speed interface, minimum first cost may be a primary concern. The free-running/line timing network can operate without an external clock source, so the expense of connecting to one is eliminated. This configuration may be useful for initial loop feeder and customer location applications, and it also meets the needs of an end-office trunk facility. This configuration should not be used to provide OC-N timing distribution or where SONET interconnections to other SONET subnetworks are needed. The host DDM-2000 OC-3 Multiplexer times its transmitted signals at the low- and high-speed interfaces from the internal oscillator. The remote DDM-2000 FiberReach Multiplexer recovers timing from the incoming OC-N signal and uses this timing for its transmitted signals.

Because the free-running/line timed DDM-2000 network is asynchronous to the DS1 services carried over it, additional jitter will be experienced on the demultiplexed DS1s. Certain interconnected equipment may be sensitive to such

jitter, and this configuration should not be used in cases where it would cause a problem for that equipment. In particular, downstream equipment containing Stratum 3 or better clocks could be sensitive to this jitter.

Figure 5-3 shows a DDM-2000 FiberReach Multiplexer ring application. The intermediate nodes in this subnetwork perform line timing, whereby both transmitted OC-N lines are timed from an incoming OC-N. In the ring topology, synchronization messaging allows automatic synchronization reconfiguration in the event of a fiber or equipment failure.



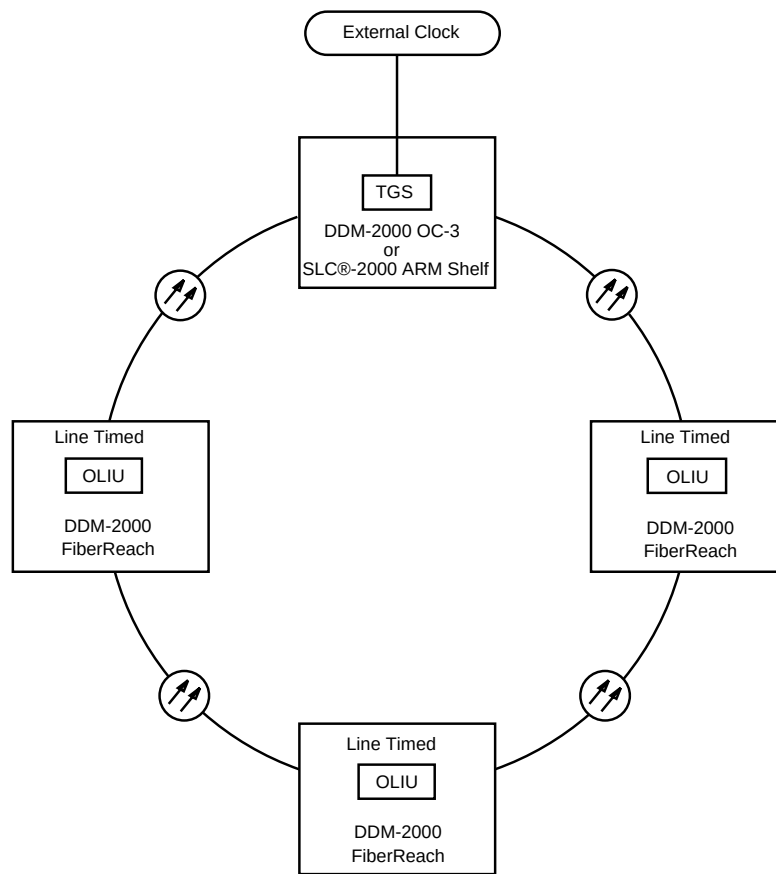
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Figure 5-3. Free Running/Line Timing Synchronization in a Ring Configuration

External Timing/Line Timing Configuration

The external timing/line timing configuration (shown in Figure 5-4) integrates loop feeder and customer location networks into the digital synchronization network as required by the SONET standard. This application is ideal for networks where only one location has a building integrated timing supply (BITS); for example, a loop feeder. The network is synchronized to a local central office clock via DS1 references. The local office clock should be Stratum 3 or better, with timing traceable to a primary reference source. The local DDM-2000 multiplexer times its transmitted signals at the low- and high-speed interfaces from the internal oscillator that is locked on the external reference. The remote DDM-2000 FiberReach Multiplexer recovers timing from the incoming OC-N signal and unidirectional timing path and uses this timing for its transmitted signals.

This timing configuration is also recommended for multispan topologies. Line timing can be extended to many DDM-2000 sites without any degradation of timing quality. In the ring topology, synchronization messaging allows automatic synchronization reconfiguration in the event of a fiber or equipment failure.



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Figure 5-4. External Timing in a Ring Configuration

Line Timing/Line Timing Configuration

The line timing/line timing configuration (shown in Figure 5-5) provides an alternate timing arrangement that integrates loop feeder and customer location networks into the digital synchronization network as required by the SONET standard. This application is used when a synchronization source is not available locally to the DDM-2000 host. The network is synchronized to a remote clock via the SONET connection. The remote clock source should be traceable to a primary reference source that is Stratum 3 or better. The local DDM-2000 multiplexer times its transmitted signals at the low- and high-speed interfaces from the internal oscillator that is locked on the SONET connection. The remote DDM-2000 FiberReach Multiplexer recovers timing from the incoming OC-1 signal and unidirectional timing path and uses this timing for its transmitted signals.

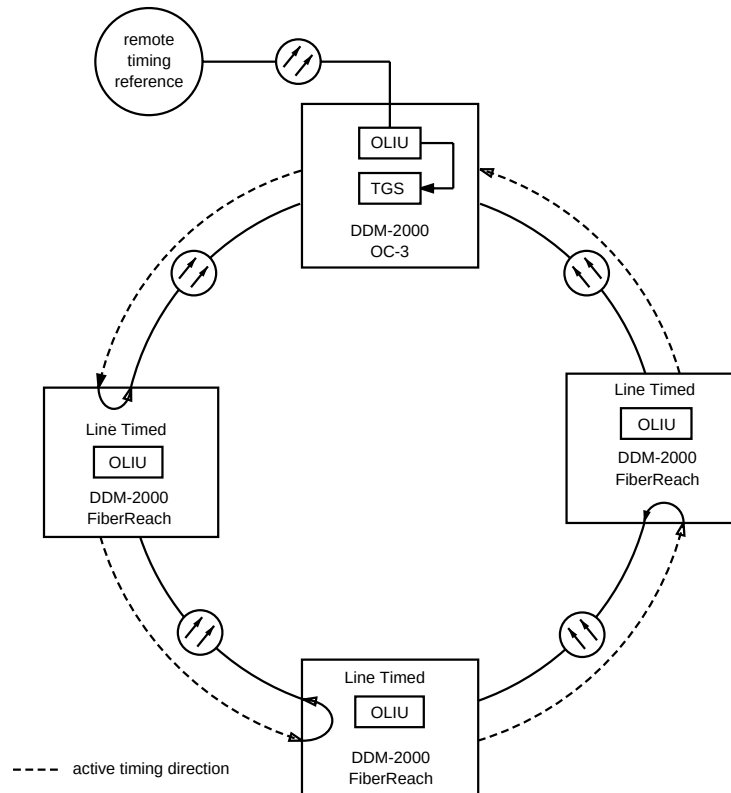


Figure 5-5. Line Timing in a Ring Configuration

Timing Distribution

In many applications, all elements in a SONET network are directly traceable to a single master clock via line-timing (for example, loop access networks, outside trunks, private networks). In this environment, the high-performance desynchronizer design of the DDM-2000 FiberReach Multiplexer allows a DS1 timing reference to be carried as a multiplexed DS1 payload* to a customer premises. * It is recommended that, where possible, the DS1 sources (switch, PBX, or other equipment) be traceable to the same timing source used to time the DDM-2000 SONET network. Multiplexed DS1 reference transport is also consistent with current planning and administration methods. Applications include passing synchronization from the public switched network to a PBX-based private network (Figure 5-6). Network timing failures are identified by a DS1 alarm indication signal (AIS) and will cause selection of an alternate timing source.

* Synchronous operation via line timing eliminates the generation of VT pointer adjustments, thus maintaining the phase stability needed for a high-quality DS1 timing reference. Cross-connecting at the STS-1 level also eliminates the VT pointer adjustments. While the design of the DDM-2000 OC-3 Multiplexer maintains jitter/wander within standard DS1 interface requirements, even in the presence of VT pointer adjustments, and while the DS1 is likely to be stable enough for most equipment to use as a timing reference, some equipment may have more stringent stability requirements for its timing references.

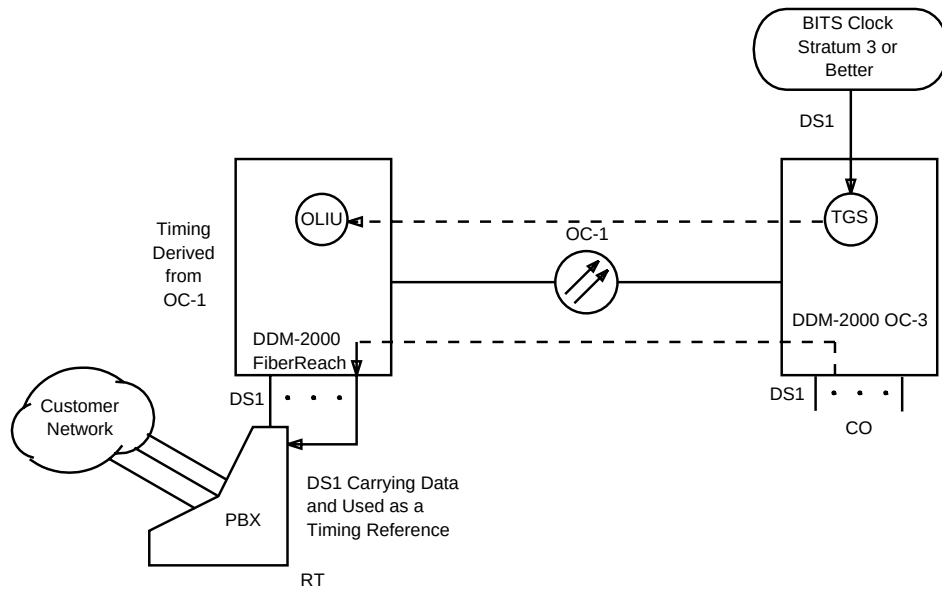


Figure 5-6. Timing from a Multiplexed DS1

Synchronization Messaging

The DDM-2000 FiberReach Multiplexers provide a synchronization messaging feature to ensure the integrity of network synchronization during both normal and abnormal conditions. With synchronization messaging, the current quality of the timing source can be conveyed from one DDM-2000 FiberReach Multiplexer to the next. This capability allows the DDM-2000 FiberReach Multiplexers to automatically change their timing reference in order to always maintain the highest quality timing available.

Applications

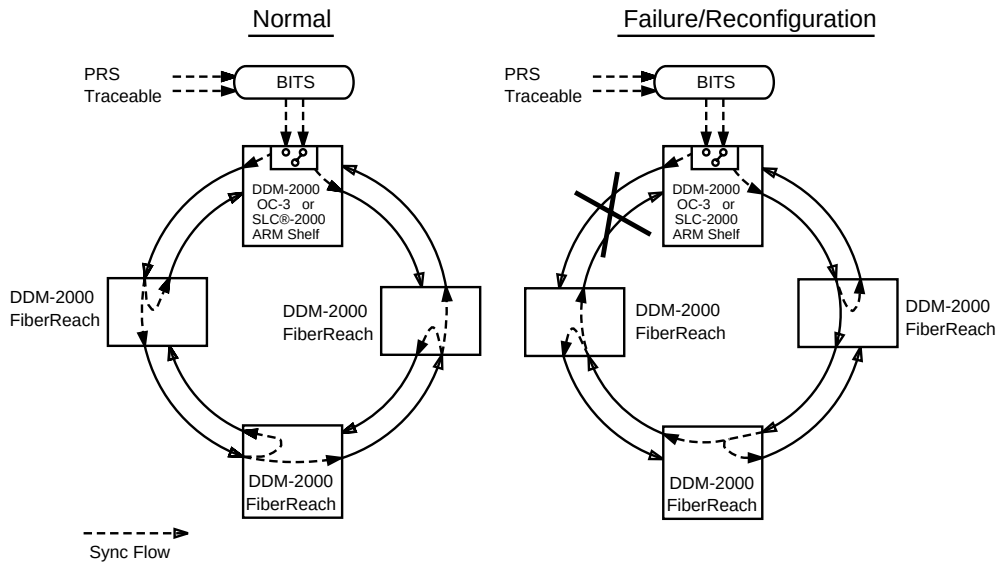
The applications that are currently supported with the synchronization messaging feature can be divided into two categories:

1. Automatic synchronization reconfiguration
2. Synchronization provisioning integrity.

Automatic Synchronization Reconfiguration

SONET was designed to operate optimally in a synchronous environment. Although plesiosynchronous and asynchronous operation can be supported by pointer adjustments, transmission quality is affected by the generation of additional jitter and wander due to pointer adjustments. Because of this, it is desirable to maintain synchronous operation whenever possible. With synchronization messages, the quality of the different timing references can be made available at each DDM-2000 FiberReach Multiplexer. The DDM-2000 FiberReach Multiplexer shelf can always determine the best timing reference available to it and switch to that reference. Through this mechanism, the synchronous operation of the subnetwork can be maintained. The switching of timing references is hitless, and the synchronization messages also allow it to be done without creating timing loops in the process.

Consider the access ring network in Figure 5-7. Under normal operation, the ring has one DDM-2000 Multiplexer externally timed and the other FiberReach multiplexers line-timed in the counterclockwise direction. If a fiber failure occurs between the host DDM-2000 and the DDM-2000 FiberReach Multiplexers, the synchronization autoreconfiguration feature will cause the DDM-2000 FiberReach Multiplexers to change their line timing directions to clockwise. The result is that the ring is again operating synchronously. The ring already provides self-healing of the traffic; so it is especially important to maintain synchronous operation during this type of failure to prevent service degradation due to increased jitter and wander.



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Figure 5-7. Synchronization Failure and Reconfiguration

Synchronization Provisioning Integrity

A welcome byproduct of synchronization messaging is the prevention of provisioning errors. Provisioned timing loops on the DDM-2000 FiberReach Multiplexers will be quickly detected through the synchronization messaging algorithm and prevented by forcing a shelf into holdover. The system can then be reprovisioned correctly.

Feature Details and Options

As mentioned previously, SONET synchronization messaging is used to communicate the quality of the subnetwork timing throughout the subnetwork. This is done using bits 1 through 3 of the K2 byte found in the SONET overhead. If a DDM-2000 FiberReach system is deriving timing from a given OC-*N* interface and synchronization messaging is enabled on that interface (Kbyte messages are enabled using the **set-ocn** user interface command or **ent-rr** TL1 command), the system interprets the received message to determine its internal timing status. The DDM-2000 FiberReach system also transmits over the particular OC-*N* interface, and all other OC-*N* interfaces that are enabled for synchronization messaging, the appropriate message indicating the quality of its timing and its active timing mode. Table 5-1 lists the associated internal timing status that is associated with synchronization messages received from the OC-*N* interface when synchronization messaging is enabled. The table lists the messages from low to high quality.

Table 5-1. Synchronization Messages Using K2 Byte

Received Message	Active Timing Mode
Don't Use	Holdover
Timing Looped Back (TLB)	Holdover
Stratum 4*	Holdover
Internal Clock (IC)	OK to use
Stratum 3*	OK to use
Stratum 2*	OK to use
Sync Quality Unknown (SQU)	OK to use
Stratum 1*	OK to use

* Presently, DDM Multiplexers cannot generate these messages, but they could be transmitted and supported for auto-reconfiguration if any of these are received by DDM-2000 Multiplexer.

The "Don't use" message is sent when the system determines that its timing is not suitable for synchronization; for example, due to failure.

When the DDM-2000 FiberReach system is in holdover mode, the Internal Clock message will be sent on all OC-1 interfaces.

When the DDM-2000 FiberReach system is configured for line timing, the Timing Looped Back message will be sent on the OC-N interfaces towards the network element from which the timing is being derived. The message received on the OC-N interface will be sent on all other OC-N interfaces where synchronization messaging is enabled.

With automatic synchronization reconfiguration, the DDM-2000 FiberReach Multiplexer systems use and compare the incoming synchronization messages on the OC-1 interfaces available for line timing to select the highest quality synchronization reference available. If the received quality levels are the same on the references available for timing, the existing line timing reference takes precedence. This feature guarantees the nonrevertive operation of reconfiguration. The line timing reference is provisioned by the **set -sync** command.

The existence of automatic synchronization reconfiguration does not change the system's behavior on traditional line failures; for example, loss of frame (LOF), loss of pointer (LOP), loss of signal (LOS), and others.

Examples

In this section, some detailed examples are given to show specifically how the synchronization messages propagate through the DDM-2000 FiberReach network and assist in the recovery from a fiber failure. Through these examples, one can extend the same concept to any other network that may include different topologies, number of sites, failure locations, and number of BITS clocks.

Table 5-2. Synchronization Messages using S1 Byte *

Received Message	Active Timing Mode†
Don't Use	Holdover
Traceable SONET Clock	OK to use
Traceable Stratum 3‡	OK to use
Traceable Stratum 2‡	OK to use
Sync Trace Unknown	OK to use
PRS Traceable‡	OK to use

* This table is applicable when an OC-3 OLIU is in the main slots.

† This column applies only when provisioned for line timing mode.

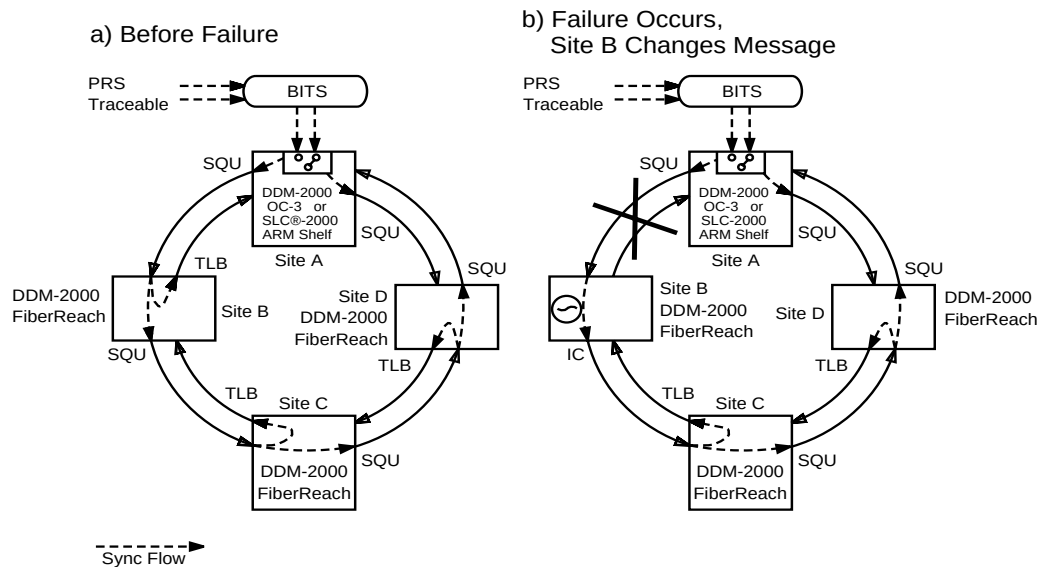
‡ Presently, DDM-2000 FiberReach Multiplexers cannot generate these messages, but they could be transmitted and supported for autoreconfiguration if any of these are received by DDM-2000 FiberReach Multiplexer.

Synchronization messaging using the SONET K2 byte and S1 byte can be disabled on a per OC-N interface using the **set -ocn** command. (See Table 5-2.) Zeros will be transmitted on bits 1-3 of the K2 byte if this is done; all ones will be transmitted on bits 5-8 of the S1 byte if this is done. The timing and synchronization status of a shelf can be determined using the **rtrv-sync** command.

Synchronization Reconfiguration in an Access Ring

Figure 5-8a shows the access ring operating in its normal configuration. The DDM-2000 Multiplexer at the central office (CO) is externally timed, and each of the other DDM-2000 FiberReach Multiplexers are line-timed in a counterclockwise direction. The sync quality unknown (SQU) message is sent to indicate where timing is traceable to an external BITS and where it is valid to be used. The timing looped back (TLB) message is sent on the interface that is being used as the line timing reference and, thus, where using that timing would create a timing loop.

In Figure 5-8b, a fiber has been cut between sites A and B. Immediately, the DDM-2000 FiberReach Multiplexer at site B enters holdover and sends out the internal clock (IC) message to site C. The DDM-2000 FiberReach Multiplexer at site B cannot switch to line time from site C because it is receiving the TLB message on that interface.

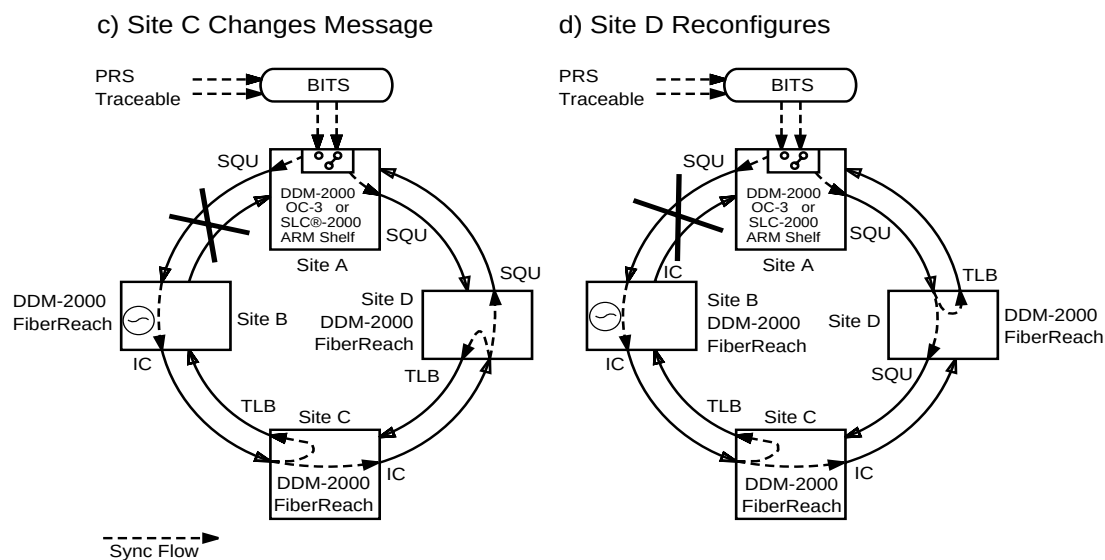


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Figure 5-8. Synchronization Reconfiguration — Access Ring (Sheet 1 of 3)

In Figure 5-8c, the DDM-2000 FiberReach Multiplexer at site C detects the incoming IC message and sends out the IC message to site D. The DDM-2000 FiberReach Multiplexer at site C cannot switch to line time from the other rotation because it is receiving the TLB message on that interface.

In Figure 5-8d, the DDM-2000 FiberReach Multiplexer at site D detects the incoming IC message. Because this DDM-2000 FiberReach Multiplexer is receiving the SQU message from site A, it will switch to line time from site A because SQU is higher quality than IC. After the switch occurs, the TLB message is sent back to site A and the SQU message is retransmitted to site C.

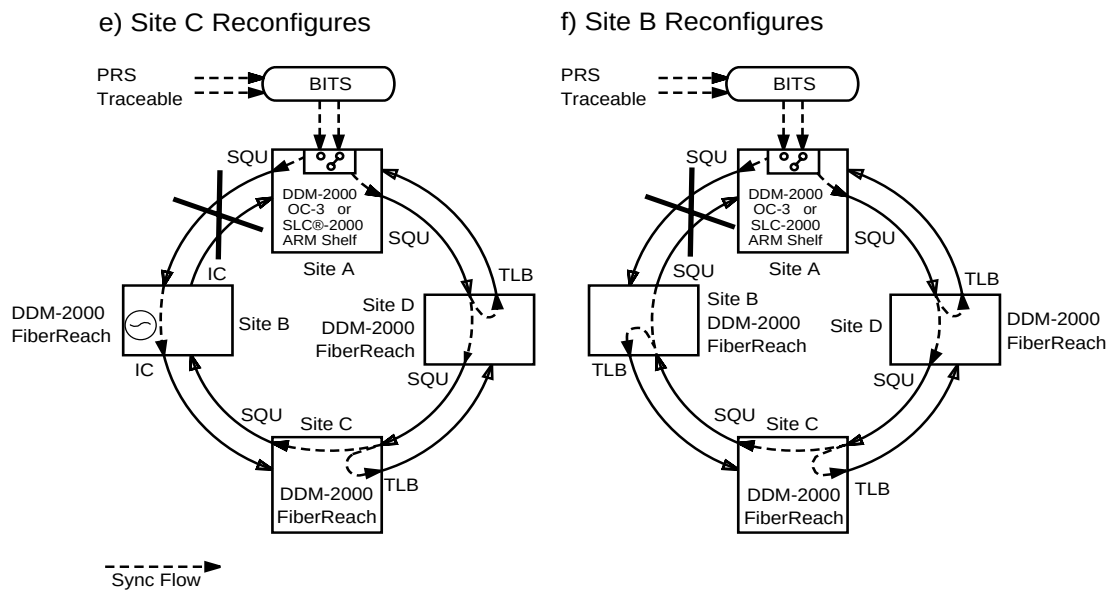


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Figure 5-8. Synchronization Reconfiguration — Access Ring (Sheet 2 of 3)

In Figure 5-8e, the DDM-2000 FiberReach Multiplexer at site C detects the incoming SQU message from site D. The SQU message is a better quality message than the IC message being received from site B, so the DDM-2000 FiberReach Multiplexer at site C switches to line time from site D. After the switch occurs, the TLB message is sent back to site D, and the SQU message is retransmitted to site B.

In Figure 5-8f, the DDM-2000 FiberReach Multiplexer at site B detects the incoming SQU message from site C. The SQU message is a better quality message than the internal holdover capability, so the DDM-2000 FiberReach Multiplexer at site B switches to line time from site C. After the switch occurs, the TLB message is sent back to site C, and the SQU message is forwarded to site A. When the failure clears, the synchronization remains in the new configuration unless it is manually switched back.



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Figure 5-8. Synchronization Reconfiguration — Access Ring (Sheet 3 of 3)

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Overview

This chapter presents the operations interfaces that enable local and remote access to the DDM-2000 FiberReach Multiplexer for its management.

Operations interfaces include:

- EIA-232-D craft interface terminal (CIT) interface
- User panel controls and indicators
- Equipment status indicators
- Office alarms
- TL1/X.25 interface (via the host system) to an alarm surveillance operations system such as Bellcore's Network Monitoring and Analysis (NMA) and Operations Systems/Intelligent Network Elements (OPS/INE) operations systems and Lucent Operations Systems
- Serial telemetry (TBOS)
- User definable miscellaneous discrete environmental alarms and controls.

Complete detailed information on the operations system interfaces is provided in 824-102-148, *2000 Family of Products Operations Systems Engineering Guide*.

Interface to Narrow Band Shelf is through *SLC-2000*. See the Operator Manual for *SLC-2000* for Interfaces.

Craft Interface Terminals

The DDM-2000 FiberReach Multiplexer supports a user friendly text-based interface called the craft interface. A simple industry standard VT-100 computer terminal or a personal computer (PC) or a computer emulating a VT-100 computer terminal is all that is needed for the craft interface. The computer terminal or the PC may be connected to the DDM-2000 FiberReach Multiplexer either via the front CIT port or to the front or rear CIT of another network element in the same OSI domain. In the latter case, the SONET data communications channel (DCC) will also serve as the connection between the computer terminal and the target DDM-2000 FiberReach Multiplexer. These access mechanisms are explained further in the following sections.

CIT Access

Figure 6-1 shows the system has one EIA-232-D compatible interface for a CIT. The front access interface is configured as data communications equipment (DCE) for direct CIT access (CIT 1). Figure 6-2 shows how a null modem and a modem can be connected to the CIT interface. The data rate of the DDM-2000 FiberReach Multiplexer is automatically set to match the data rate of the terminal (autobaud).

For the wall DT, the front cover must be open to connect the modem.

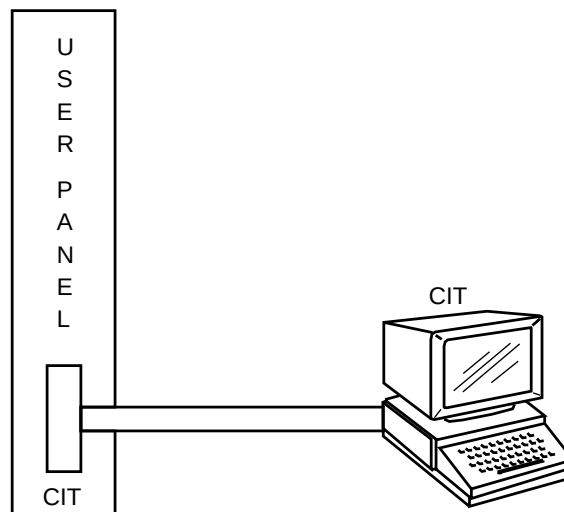


Figure 6-1. CIT Connectors (Direct Interface to CIT)

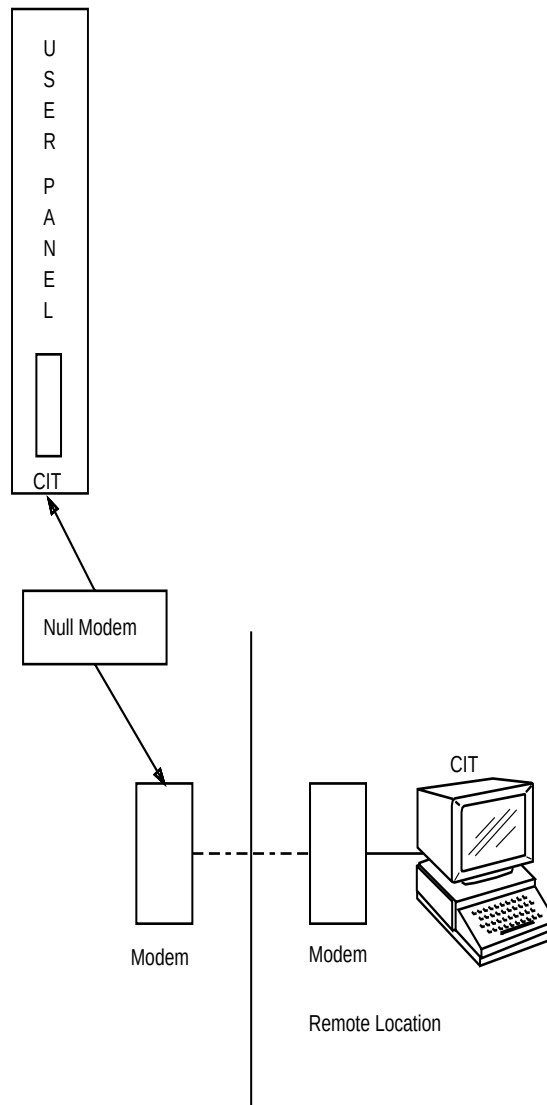


Figure 6-2. CIT Connectors (Modem Interface to CIT)

The terminal sessions over the CIT port and over the DCC are independent of one another. Two simultaneous login sessions (one CIT and one DCC) can be supported at any given time. See Figure 6-3

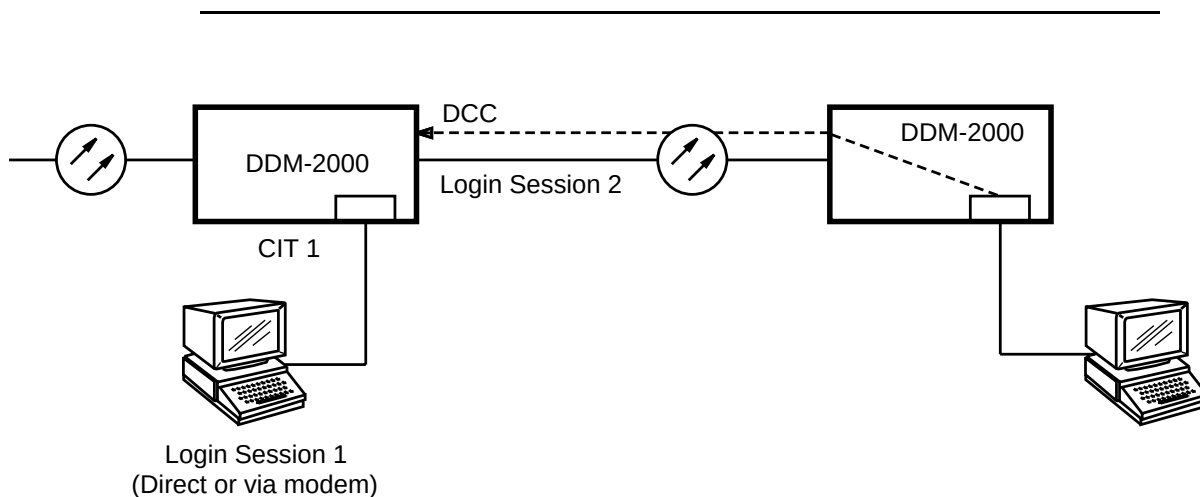


Figure 6-3. CIT Login Sessions

The DDM-2000 FiberReach CIT interface is based on the Bellcore TL1 language and provides prompt and command modes of operation. On-line context sensitive help is always available to help the technician through command execution. The output messages and reports are presented in easy-to-read sentences and tables. The following functions are provided via the CIT interfaces for the local and remote DDM-2000 FiberReach Multiplexer shelves:

- Loopbacks and testing
- Protection switching
- Performance monitoring
- Provisioning
- Fault management
- Software downloading
- Security management.

Detailed specifications of the CIT interface are provided in Chapter 10, "Technical Specifications."

Using a PC as a CIT

In addition to CIT functions, a PC is required for software downloads and facilitates software program updates. Any *MS-DOS** PC can be used to emulate a traditional CIT through a variety of low-cost terminal emulator software packages; thus, an *MS-DOS* PC can serve DDM-2000 FiberReach Multiplexer needs very efficiently. In addition, the DDM-2000 FiberReach Multiplexer user interface can be accessed from within *MS-Windows** (Version 3.0 or later) on an *MS-DOS* PC.

The DDM-2000 FiberReach Multiplexer uses flash erasable program memory (EPROM) devices that can be upgraded through direct download from an *MS-DOS* PC. Upgrades are made available through the distribution of floppy disks compatible with the recommended PCs.



NOTE:

The DDM-2000 FiberReach Multiplexer CIT interface supports data rates up to 19,200 baud but does not provide flow control. Some terminals and PCs when set for higher data rates will not work properly at these rates with equipment like the DDM-2000 FiberReach Multiplexer that does not provide flow control. The system may appear to stop working when reports or long prompts are displayed. If this happens, try setting the terminal to a lower data rate. The data rate of the DDM-2000 FiberReach Multiplexer is automatically set to match the data rate of the terminal (autobaud).



NOTE:

For the Narrow Band shelf, all operations are through the *SLC-2000*.

Remote Access Using the Data Communications Channel (DCC)

The DDM-2000 FiberReach supports CIT remote access from the local terminal to a remote system using the data communications channel (DCC). The DDM-2000 FiberReach supports one incoming remote login session and one outgoing login session over the DCC at a time. For example, a local user can gain remote access to a remote system in their subnetwork at the same time as a remote user at another system in the subnetwork can gain remote access to the local system.

* MS-DOS is a registered trademark and Windows is a Trademark of Microsoft Corporation.

CPro Graphical User Interface and Provisioning Tool

The CPro Graphical User Interface and Provisioning Tool is a *Microsoft** Windows based user interface that can optionally be used with the DDM-2000 FiberReach Multiplexer. The tool simplifies and mechanizes administration, maintenance, and provisioning operations. With the tool a user can:

- Display and control cross-connections at each NE in a ring and the entire ring.
- Obtain and display graphical images of the ring configuration, equipment, and cross-connections.
- Perform an analysis of the ring to detect provisioning errors.
- Retrieve and store data about a selected NE.
- Back up and restore all provisioning information.

In response to a user, the tool automatically compiles and sends all the necessary commands to perform a task. If the user is provisioning cross-connections, for example, the tool automatically prevents provisioning errors by comparing the new provisioning information with the ring inventory. For more information, see the on-line documentation provided with the tool or 365-576-130 (CPro-2000 User Manual, Release 7.0.) See Chapter 10, "Technical Specifications" for PC requirements to use the tool.

* Microsoft is a registered trademark of Microsoft Corporation.

User Panel

The user panel, shown in Figure 6-4, provides system-level and subnetwork level information and control functions, while the ACTIVE and FAULT LED on each faceplate provide circuit pack level information. These features allow many operations tasks (for example, fault isolation or circuit pack replacement) to be performed when a CIT or external test equipment is not available.

The user panel is a circuit pack mounted on the right side of the shelf. Additional LEDs and controls are mounted on the SYSCTL faceplate to support basic operations, administration, and maintenance functions without a CIT.

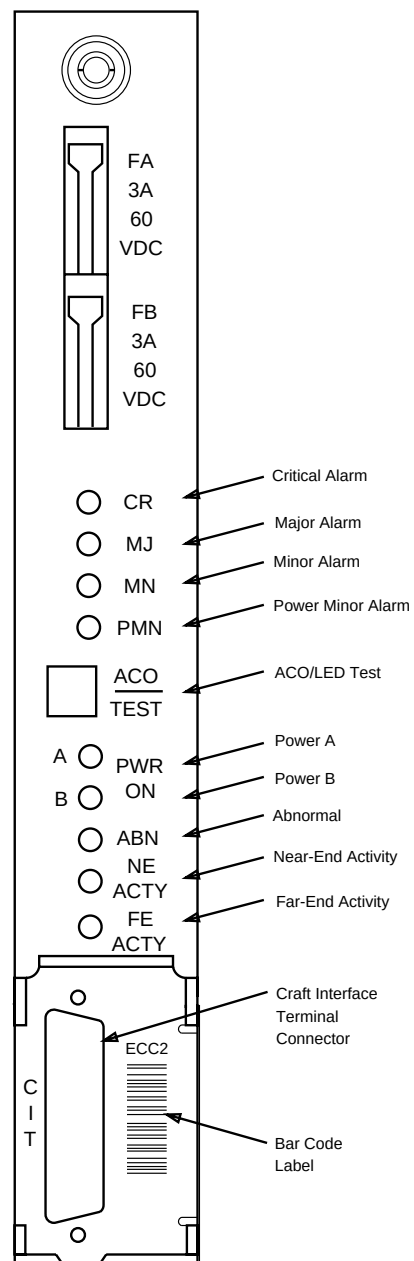


Figure 6-4. FiberReach Multiplexer User Panel

User Panel LEDs

The user panel LEDs are used to display a summary of the DDM-2000 shelves in an alarm group. The terms near-end, far-end, local, and remote are used to differentiate between the shelf the user is working at (referred to as near-end or local shelf) and another shelf in the same alarm group connected through the SONET DCC (referred to as far-end or remote shelf).

The user panel normally shows a composite of all alarms and status conditions in the subnetwork. The composite is defined as follows:

- The highest level alarm LED (CR, MJ, PMN, or MN) of all alarms at the local and any other shelf in the same alarm group is illuminated. (At most, one alarm LED will be illuminated at any time.)
- The ABN LED is illuminated if an abnormal condition exists on this shelf or any other shelf in the same alarm group.
- The ACO LED is illuminated if the alarm cutoff (ACO) function is active on this shelf.
- Each PWR ON LED is illuminated if the local shelf is receiving –48 V power from its power feeders.
- The NE ACTY LED is illuminated if any alarm, abnormal, or "activity" condition exists on this shelf.
- The FE ACTY LED is illuminated if any alarm, abnormal, or "activity" condition exists on any other shelf in the same alarm group.

When this composite information is being displayed on the user panel, the 7-segment FE ID on the SYSCTL is blank.

FE SEL Pushbutton

The FE SEL pushbutton, located on the SYSCTL, allows technicians to see far-end DDM-2000 conditions from the local shelf. When the FE SEL pushbutton is pushed for the first time, the FE ID display shows "L" and the user panel LEDs show the conditions of the local shelf only.

If the FE SEL pushbutton is pushed again within 15 seconds, the FE ID display shows the local shelf SITE address (with the decimal point). The user panel LEDs show a composite of the alarm and status condition of all shelves at this site.

In OC-3 applications, there will normally be only one shelf at each site within the same alarm group, and the set of LEDs illuminated will be the same for the first and second button pushes.

The first button push allows display of alarm and status conditions of a single shelf at the local site. Subsequent button pushes allow display of alarm and status conditions at the local site or one of the remote sites.

Each time the FE SEL button is pushed again within 15 seconds, the FE ID display increments to display the next highest SITE address in the same alarm group. The user panel LEDs show the composite alarm and status condition of the shelves in the same alarm group at that site. If the local DDM-2000 FiberReach Multiplexer cannot communicate with another site due to a failure, then all LEDs on the user panel will be illuminated when the FE ID display shows that site number. After cycling through the sites, "L." and the conditions of the local shelf are again displayed.

When the FE SEL is released and not pushed again for 15 seconds, or if the ACO button is pushed, the 7-segment FE ID display will go blank, and the user panel will return to the composite display.

The FE SEL button is useful for small numbers (8 or less shelves) in an alarm group. For large alarm groups (8 or more shelves), where the site number is more than 8, a "dash" (-) is displayed in the 7-segment display and a composite alarm and status for these shelves is displayed.

ACO/TST Pushbutton

The ACO/TST pushbutton on the user panel tests all the LEDs on the shelf. All LEDs on the shelf will be illuminated while the pushbutton is pressed. If the ACO pushbutton is pressed and held for more than 2 seconds, the three digits of the software release number are displayed in the 7-segment FE ID display. If there are any active alarms when the ACO pushbutton is pressed, the audible office alarms will be silenced, all parallel telemetry outputs except system identification (SID) status and ACO will be turned off, the parallel telemetry ACO output will be turned on, and the ACO LED (part of the pushbutton) on the user panel will be illuminated.

UPD/INIT Pushbutton

This pushbutton, located on the SYSCTL, is used to initialize a controller when it is first installed in a shelf, to update the system's internal equipment inventory when signals or equipment are removed from the shelf and when circuit pack options are changed. The system automatically detects new equipment or signals added to the shelf. In these cases, it is not necessary to push the UPD/INIT pushbutton.

Pushbutton Combinations

The three pushbuttons described previously are used in combinations to perform six functions. Table 6-1 lists the functions. These functions are used as part of the procedures described in the TOP section of this manual.

Table 6-1. DDM-2000 FiberReach Pushbutton Combinations

Function	Pushbutton		
	ACO/TST	UPD/INIT	FE SEL
1. Update	—	Press	—
2. Initialize SYSCTL command *	—	Press	—
3. Software version	Hold	—	—
4. LED test	Hold	—	—
5. Alarm cutoff	Press	—	—
6. Software download†	—	Hold	Hold

* **init-sys:sysctl**. Used after a SYSCTL is replaced on an in-service system. Press pushbutton within 10 seconds of the processor startup sequence while the CR LED on the user panel is flashing.

† See TOP section of this manual for detailed procedures.

Equipment Indicators

FAULT Indicators

Red FAULT indicators are provided on all circuit packs. The circuit pack FAULT indicator is illuminated whenever a failure has been isolated to that pack.

Common failures (for example, power, synchronization, control, etc.) do not cause the FAULT indicators on all circuit packs affected by the failure to be illuminated; only the FAULT indicator on the failed pack is illuminated.

FAULT indicators on high- and low-speed transmission interface and timing circuit packs are flashed when a failure of the incoming signal is detected. For example,

loss of signal, loss of frame, loss of pointer, or crossing of the signal fail or signal degrade threshold.

The FAULT LED on the SYSCTL flashes when a failure of the DCC from a far-end shelf is detected.

ACTIVE Indicators

A green ACTIVE indicator is provided on each OLIU circuit pack. It indicates which circuit packs are active (carrying service) at any given time. Since both OLIUs are active in a ring configuration, both ACTIVE indicators will always be illuminated.

Although there is no ACTIVE LED on each low-speed circuit pack to indicate it is carrying service, the status of the circuit packs can normally be deduced without the CIT. If a service DS1 circuit pack FAULT LED is illuminated and the DS1 protection circuit pack FAULT LED is not illuminated, then the protection circuit pack is carrying service and the failed circuit pack can be removed. The exception to this rule is if a manual protection switch has been executed. In this case, the ABN LED on the user panel will be illuminated and the user will have to use a CIT to check the status of the system.

Office Alarms

The DDM-2000 FiberReach Multiplexer provides relay contacts for wiring to the office audible and visual alarms. The following contacts are provided for each alarm condition:

- CR (critical)
- MJ (major)
- MN (minor).

The DDM-2000 FiberReach Multiplexer is provisionable to activate the office MJ or the office MN alarms when a power minor (PMN) alarm condition is detected at a remote site in the same alarm group. For loop applications, alarm conditions detected at the remote site in the same alarm group cause the appropriate central office audible and visual alarms to be activated.

The MJ and CR contact closures are designed to allow these office alarms to be ORed together and reported as an office MJ alarm.

The CR alarms are fail-safed against power failures. They are activated even if the shelf loses both power feeders.

The audible office alarms for a given site are silenced through activation of the ACO function at any shelf at that site within the same alarm group. Visual alarms are not extinguished by the ACO function.

An alarm hold-off delay is provided, to prevent transient failures from causing unnecessary maintenance activity. The office alarms will not be activated unless a condition of greater duration than the alarm hold-off delay occurs. When a failure clears, an alarm clear delay prevents premature clearing of the alarm.

As with the user panel indicators, when multiple alarms are active, the highest level office alarm (audible and visual) is activated. When the highest level alarm clears, the office alarm "bumps down" to the next highest level active alarm.

If the ACO function has been activated to silence all active audible alarms, then when a "bump down" occurs the audible alarms remain silent. (That is, the lower level visual alarm is activated, but the corresponding audible alarm is not re-activated.) If another alarm occurs while the ACO is active, the highest level audible alarm is activated even if the new alarm is a lower level condition. (For example, if a MJ and MN alarm were active and silenced via the ACO and another MN alarm occurred, the MJ audible alarm would sound.)

TL1 Interface

The DDM-2000 FiberReach Multiplexer supports a TL1 interface via its host system over the DCC on the OC-1 interface to control and report alarm and status conditions and performance-monitoring data to an alarm surveillance operations system such as Bellcore's Network Monitoring and Analysis (NMA) operations system. The TL1 interface of the DDM-2000 FiberReach Multiplexer provides significantly more detailed information (such as identifying specific circuit packs and facilities) than the parallel telemetry or telemetry byte-oriented serial (TBOS) interfaces.

The DDM-2000 FiberReach Multiplexer supports remote and automated provisioning from a provisioning operations system such as Bellcore's Operations System/Intelligent Network Element (OPS/INE) operations system. The DDM-2000 FiberReach Multiplexer provides enhanced security. See 824-102-148, *2000 Family of Products Operations Systems Engineering Guide*, for more information.

The TL1 maintenance messages of the DDM-2000 FiberReach Multiplexer are based on Bellcore's TR-NWT-000833, Issue 3, Rev. 1, Issue 4, Supplement 1, and Issue 5, Rev. 1. The TL1 provisioning messages of the DDM-2000 FiberReach Multiplexer are based on Bellcore's TR-NWT-000199, Issue 2, and TA-NWT-000199, Issue 6, Supplement 1.

Autonomous and command/response messages are supported. Chapter 10, "Technical Specifications" provides detailed specifications for the X.25 interface.

Detailed information about the input and output parameters for TL1 messages is provided in 824-102-148, *2000 Family of Products Operations Systems Engineering Guide*.

ITM SNC

ITM SNC is an element management system (EMS) that supports SONET NEs such as the Lucent Technologies' DDM-2000, FT-2000, *SLC*®-2000, and the Fujitsu® Lightwave Multiplexer (FLM). ITM SNC provides fault, provisioning, configuration, and security management functions via a Graphical User Interface (GUI). Through these functions, ITM SNC is able to support TL1/X.25 communication multiplexing or concentration, to provide network security, and to record all database changes. ITM SNC also provides a cut-through capability, allowing the ITM SNC user to access an NE through its native (TL1) command set.

ITM SNC operates as an enhanced graphical tool and as a general configuration management aid. It provides NE, port, cross-connection, and path provisioning, as well as flow through from provisioning OSs to NEs. ITM SNC also provides fault management through subnetwork alarm and event pre-processing prior to sending fault information to a network surveillance system such as Bellcore's Network Monitoring and Analysis-Facility (NMA-F).

Serial Telemetry (TBOS)

Telemetry byte-oriented serial (TBOS) is a protocol that defines one physical interface for direct connection between the telemetry remote and the monitored equipment. The system provides a TBOS link to remote detailed alarm, status, and control information to/from an operations system (OS). The TBOS link is provided through a rear access RS-422 interface port. Data transmission is at 2400 baud. A TBOS display contains 63 alarm/status points to carry information from the DDM-2000 FiberReach Multiplexer to the OS and 64 control points to carry commands from the OS to the DDM-2000 FiberReach system. Each DDM-2000 FiberReach Multiplexer shelf uses one TBOS display. The number of the display assigned to each shelf is determined by user provisioning from the CIT. A TBOS link can support up to eight displays in an alarm group. Large subnetworks can have more than one TBOS link if they are provisioned for multiple alarm groups. However, each alarm group can only have one TBOS link.

Two types of TBOS displays are provided: one for central office (CO) systems and one for remote terminal (RT) systems. The type of display used for each shelf is determined by the CO/RT user provisioning from the CIT.

The sending and receiving of TBOS information via the DCC can be enabled or disabled by user provisioning from the CIT. See the **set -ne** command in Chapter 11, "Commands and Reports."

The alarm/status portion of the TBOS displays contains system alarm and status indications. Each TBOS point is defined as a status or alarm point. Alarm points are designated either as a service-affecting (SA) or non-service-affecting (NSA) indication.

The alarm hold-off and clear delays set for office alarms apply to the TBOS interface as well. In addition, alarm and status indications on the TBOS interface are held for a minimum of 20 seconds to ensure that they can be received by the OS.

The TBOS control displays for both CO and RT systems have protection switching, alarm cutoff, and processor reset control points. The TBOS control displays for RT systems also have control points to turn the miscellaneous discrete environmental controls on and off.

TBOS Display Tables

Tables 6-2 and 6-3 define the meaning of each point in the alarm and status displays and in the control displays for the DDM-2000 FiberReach Multiplexer. For more information on the TBOS interface and provisioning, refer to LTP 824-102-148, *2000 Family of Products Operations Systems Engineering Guide*.

TBOS Alarm and Status Points

Table 6-2 summarizes the DDM-2000 FiberReach Multiplexer TBOS alarm and status display.

Table 6-2. DDM-2000 FiberReach TBOS Alarm and Status Points

Point	Type (Note)	Central Office Condition	Type (Note)	Remote Terminal Condition
1	SA	Incoming DS1 Signal Failure (LOS+SF/SD*)		
2	Alarm	Reserved for Future Alarm Use		
3	NSA	Incoming OC3 Signal Failure (LOS, LOF, BER) (Release 2.2)		
4	SA	Incoming OC3 Signal Failure (LOS, LOF, BER, Line AIS) (Release 2.2)		
5	SA	Incoming STS1 LOP (on OC1, OC3) (Release 2.2)		
6	SA	Incoming VT Path AIS/LOP/Path Signal Degrade		
7	NSA	Incoming OC-3 Signal Degrade (Release 2.2)		
8	SA	Incoming OC-3 Signal Degrade (Release 2.2)		
9	NSA	Incoming OC1 Signal Failure (LOS+LOF+SF+STS1 LOP)		
10	SA	Incoming OC1 Signal Failure (LOS+LOF+SF+AIS)		
11	NSA	Incoming OC1 Signal Degrade		
12	SA	Incoming OC1 Signal Degrade, STS Path AIS/Signal Failure/Degrade		
13	NSA	Fuse/Power Circuit Failure		
14	NSA	Controller Failure/Provisioning Error		
15	NSA	OC3 Terminating Equipment Failure (Release 2.2)		
16	SA			
17	NSA	DS1 Terminating Equipment Failure		
18	SA			
19	NSA	OC1 Terminating Equipment Failure		
20	SA			
21	NSA	Section Data Comm. Channel (DCC) Failure/Provisioning Error		
22	Alarm	Reserved for Future Alarm Use		
23	NSA	DS1 Terminating Equipment APS - Automatic Lockout		
24	Alarm	Reserved for Future Alarm Use		
25	Alarm	Reserved for Future Alarm Use		
26	Alarm	Reserved for Future Alarm Use		
27	NSA	PM Summary TCA		
28	NSA	Invalid TBOS Command Received		

Table 6-2. DDM-2000 FiberReach TBOS Alarm and Status Points

Point	Type (Note)	Central Office Condition	Type (Note)	Remote Terminal Condition
29	NSA	Incoming OC1 Line AIS (OC-3 in Release 2.2 and later)		
30	NSA	Incoming VT Path AIS/LOP/Path Signal Degrade		
31	NSA	Incoming STS Path AIS/Signal Failure/Degrade		
32	SA	Excessive Sync. Holdover		
33	NSA	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 1
34	NSA	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 2
35	NSA	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 3
36	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 4
37	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 5
38	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 6
39	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 7
40	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 8
41	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 9
42	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 10
43	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 11
44	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 12
45	Alarm	Reserved for Future Alarm Use	NSA	Misc. Discrete Env. Alarm/ Status 13
46	NSA	Fan Shelf Failure	NSA	Misc. Discrete Env. Alarm/ Status 14
47	Alarm	Reserved for Future Alarm Use	NSA	External Minor
48	Alarm	Reserved for Future Alarm Use	NSA	Fan Control Relay Failure

Table 6-2. DDM-2000 FiberReach TBOS Alarm and Status Points

Point	Type (Note)	Central Office Condition	Type (Note)	Remote Terminal Condition
49	Status	Reserved for Future Use		
50	Status	Reserved for Future Use		
51	Status	Holdover Mode Active		
52	Status	Incoming OC1 Line FERF		
53	Status	Incoming OC3 FERF (Release 2.2 and later)		
54	Status	Manual Forced/Inhibit/Lockout Function Unit Equipment Prot. Switching		
55	Status	Manual DS1 Terminating Equipment Protection Switch		
56	Status	Manual Forced/Lockout DS1 Terminating Equipment Prot. Switching		
57	Status	Abnormal Condition		
58	Status	Valid TBOS Command Received		
59	Status	Communication Failure		
60	Status	Incoming STS Path Yellow		
61	Status	Incoming VT Path Yellow		
62	Status	Reserved for Future Use		
63	Status	Reserved for Future Use		
64	-	TBOS Telemetry Link Failure		

Note: Each TBOS point is identified as either an alarm or status point. Alarm points are further distinguished as either service affecting (SA) or non-service affecting (NSA). Status points are always understood to be NSA.

The alarm/status distinction specified in this table is for telemetry remote polling purposes. Alarm points are assured of being communicated to the OS, whereas status points may not be communicated to the OS when alarm or hybrid polling is used. It is recommended that the telemetry remote station constants assign attributes to the DDM-2000 OC-3 TBOS points as follows:

Points 1 - 48 = alarms

Points 49 - 63 = status.

LOF = Loss of Frame, LOP = Loss of Pointer, LOS = Loss of Signal
SD = Signal Degrade Bit Error Ratio, SF = Signal Fail Bit Error Ratio
TCA = Threshold Crossing Alert

* Signal Failure/Signal Degrade (SF/SD) BER.

DDM-2000 FiberReach TBOS Control Points

Table 6-3 lists the TBOS control points for DDM-2000 FiberReach Multiplexer.

Table 6-3. DDM-2000 FiberReach TBOS Control Points

Control Point	CO and RT Verification Status Point (Note)	CO and RT Control Function (Equivalent CIT Command)
1	55&57&58	Manual LS Switch to Protection - LS-A (switch-ls:ls-a-1:pri>manual) (1x1 or 1x7)
2	55&57&58	Manual LS Switch to Protection - LS-B (switch-ls:ls-a-2:pri>manual) (1x1 or 1x7)
3	55&57&58	Manual LS Switch to Protection - LS-C (switch-ls:ls-a-3:pri>manual) (1x1 or 1x7)
4	55&57&58	Manual LS Switch to Protection - LS-D (switch-ls:ls-a-4:pri>manual) (1x1 or 1x7)
5	55&57&58	Manual LS Switch to Protection - LS-D (switch-ls:ls-a-4:pri>manual) (1x7 only)
6	55&57&58	Manual LS Switch to Protection - LS-D (switch-ls:ls-a-4:pri>manual) (1x7 only)
7	55&57&58	Manual LS Switch to Protection - LS-D (switch-ls:ls-a-4:pri>manual) (1x7 only)
8	58	Reserved for Future Control Use
9	58	Reserved for Future Control Use
10	58	Reserved for Future Control Use
11	58	Reserved for Future Control Use
12	58	Reserved for Future Control Use
14	58	Reserved for Future Control Use
15	58	Reserved for Future Control Use
16	58	Reserved for Future Control Use
17	58	Reserved for Future Control Use
18	58	Reserved for Future Control Use
19	58	Reserved for Future Control Use
20	58	Reserved for Future Control Use
21	56&57&58	Lockout Switching - LS-C (switch-ls:ls-c-all:pri=lockout) (1x7 only)

Table 6-3. DDM-2000 FiberReach TBOS Control Points

Control Point	CO and RT Verification Status Point (Note)	CO and RT Control Function (Equivalent CIT Command)
22	56&57&58	Lockout Switching - LS-A (switch-ls:ls-a-all:pri=lockout) (1x1 only)
23	56&57&58	Lockout Switching - LS-B (switch-ls:ls-b-all:pri=lockout) (1x1 only)
24	56&57&58	Lockout Switching - LS-C (switch-ls:ls-c-all:pri=lockout)(1x1 only)
25	56&57&58	Lockout Switching - LS-D (switch-ls:ls-d-all:pri=lockout)(1x1 only)
26	56&57 clear & 58	Reset Switching - LS-A (switch-ls:ls-a-all:pri=reset) (1x1 only)
27	56&57 clear & 58	Reset Switching - LS-B (switch-ls:ls-b-all:pri=reset) (1x1 only)
28	56&57 clear & 58	Reset Switching - LS-C (switch-ls:ls-c-all:pri=reset) (1x1 only)
29	56&57 clear & 58	Reset Switching - LS-D switch-ls:ls-c-all:pri=reset) (1x1 only)
30	56&57 clear & 58	Reset Switching - LS-D switch-ls:ls-c-all:pri=reset) (1x7 only)
31	58	Reserved for Future Control Use
32	58	Reserved for Future Control Use
33	58	Reserved for Future Control Use
34	58	Reserved for Future Control Use
35	58	Reserved for Future Control Use
36	58	Reserved for Future Control Use
37	58	Reserved for Future Control Use
38	58	Reserved for Future Control Use
39	58	Reserved for Future Control Use
40	58	Reserved for Future Control Use
41	58	Reserved for Future Control Use
42	58	Reserved for Future Control Use
43	58	Reserved for Future Control Use
44	58	Reserved for Future Control Use
45	58	Reserved for Future Control Use
46	58	Reserved for Future Control Use

Table 6-3. DDM-2000 FiberReach TBOS Control Points

Control Point	CO and RT Verification Status Point (Note)	CO and RT Control Function (Equivalent CIT Command)
47	58	Reserved for Future Control Use
48	58	Reserved for Future Control Use
49	58	Reserved for Future Control Use
50	58	Reserved for Future Control Use
51	58	Reserved for Future Control Use
52	58	Reserved for Future Control Use
53	58	Reserved for Future Control Use
54	58	Reserved for Future Control Use
55	58	Reserved for Future Control Use
56	CO28 or RT58	Reserved for Future Control Use
57	CO28 or RT58	Reserved for Future Control Use
58	CO28 or RT58	Reserved for Future Control Use
59	CO28 or RT58	Reserved for Future Control Use
60	CO28 or RT58	Reserved for Future Control Use
61	CO28 or RT58	Reserved for Future Control Use
62	58	Alarm Cut Off (opr - aco)
63	58	Processor Reset (reset)
64	28	Reserved For Future Control Use

Note: The verification status points identified as clearing in response to controls will be cleared *if* the verification status point was set prior to the TBOS control, and in the case of status point 57, abnormal condition; no other abnormal conditions exist.

User-Definable Miscellaneous Discretes - Environmental Alarms and Controls

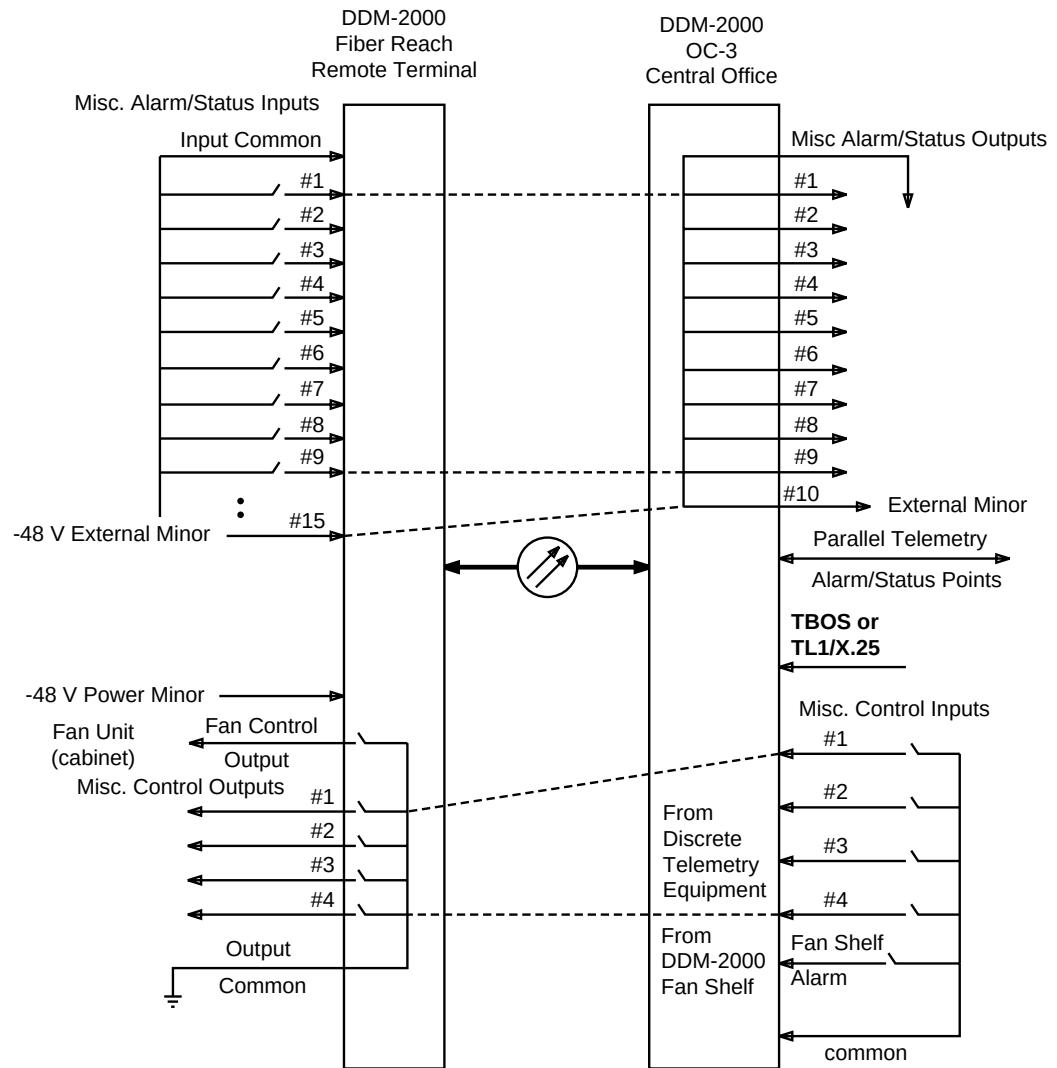
To allow monitoring and control of equipment colocated with a DDM-2000 FiberReach Multiplexer in a remote site, a set of user-definable miscellaneous discrete environmental alarms and controls is provided.

Fifteen miscellaneous discrete alarm/status points are provided to monitor environmental conditions at remote terminal sites (open door, high temperature, etc.). The first 14 points are activated by contact closures. The fifteenth point (External Minor) is for monitoring of remote structure power and fan apparatus (for example, DC power shelf failure); this point is activated by a -48 volt input.

Four control points are provided to control equipment (pumps, generators, etc.) at remote terminal sites. When activated, the control points provide a contact closure between the control point output and ground.

Miscellaneous discrete alarms/statuses and controls are transmitted between the remote DDM-2000 FiberReach Multiplexers and the DDM-2000 OC-3 Multiplexer host via the SONET section DCC. OS access to all miscellaneous discretes alarm/status points (1 through 15) is provided via TL1/X.25 and access to input point 1 through 15 is available through TBOS. OS access to inputs 1 through 9 and point 15 is provided through a parallel telemetry output interface at the CO. Input point 15 is sent to parallel output point 10 to provide External Minor. Figure 6-5 shows OS access to miscellaneous discretes through the DDM-2000 Multiplexer at the CO. Access to all miscellaneous discrete alarm/status points is also provided through the CIT. The state of the control points can be reported but not controlled through the CIT.

The names and alarm levels of the 15 alarm/status points and the names of the 4 control points can be provisioned through the CIT in remote terminal systems. Refer to the **set-attr-env**, **set-attr-cont**, **rtrv-attr-env**, and **rtrv-attr-cont** commands in Chapter 11, "Commands and Reports."



Miscellaneous alarm input #14 is typically wired to fan shelf alarm in controlled environment remote terminal applications where the fan shelf is required. If the BBG8/BBG8B circuit pack is used at the CO, the fan alarm can be wired to misc discrete 1-9 at the remote site if a parallel telemetry output at the CO is required.

Figure 6-5. Miscellaneous Discretes

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Overview

The first part of this chapter provides a detailed functional description of the DDM-2000 FiberReach Multiplexer circuit packs for the wideband shelf. The second part of this chapter provides a detailed functional description of the DDM-2000 FiberReach Multiplexer circuit packs for the narrowband shelf.

Wideband Shelf - Introduction

The circuit packs in the DDM-2000 FiberReach Multiplexer are divided into two main categories:

- Control circuit packs
 - BBG8/BBG8B system controller (SYSCTL)
 - ECC2 user panel (USPNL)
- Transmission circuit packs
 - BBF1B DS1 low-speed interface (DS1)
 - BBF3 DS1 performance monitoring (DS1PM)
 - 26G2-U OC-1 optical line interface unit (OLIU)
 - BBF6 T1 extension
 - BBF8 high data-rate digital subscriber line

Control

The DDM-2000 FiberReach Multiplexer uses one main control circuit pack for the SYSCTL. The user panel on DDM-2000 FiberReach provides the physical CIT interface and the alarm and status LEDs. The control system provides user interfaces to the system and controls, monitors, and reports the status of the signal transmission through the DDM-2000 FiberReach Multiplexer. All system features are implemented or supported through the control system. However, transmission is unaffected by control system failure. If a controller does fail, protection switches are not done. Therefore, if there is another circuit pack failure requiring a protection switch along with the controller failure, service may be affected depending on the function of the failed circuit pack. The control system continuously monitors the equipment to determine if a protection switch is necessary and to provide equipment performance information.

The control system in each DDM-2000 FiberReach in a subnetwork can communicate with the control system of other FiberReach NEs in that subnetwork via the SONET section data communications channel (DCC). This allows a user at one point in the subnetwork to control the shelves throughout the subnetwork.

BBG8/BBG8B SYSCTL Circuit Pack Description

Purpose of Circuit

The BBG8/BBG8B SYSCTL circuit pack is the system controller for the FiberReach Multiplexer. It has control over all shelf functions and provides all user interfaces into the system.

BBG8/BBG8B SYSCTL Faceplate Controls and Indicators

The BBG8/BBG8B SYSCTL circuit pack faceplate controls and indicators are shown in Figure 7-1. The SYSCTL has a red FAULT LED and a 7-segment numeric LED display, as well as the FE SEL and UPD/INIT pushbuttons on its faceplate. The red FAULT LED lights on detection of a circuit pack failure. These controls and indicators are discussed in more detail under "User Panel" in Chapter 6, "Operations Interfaces".

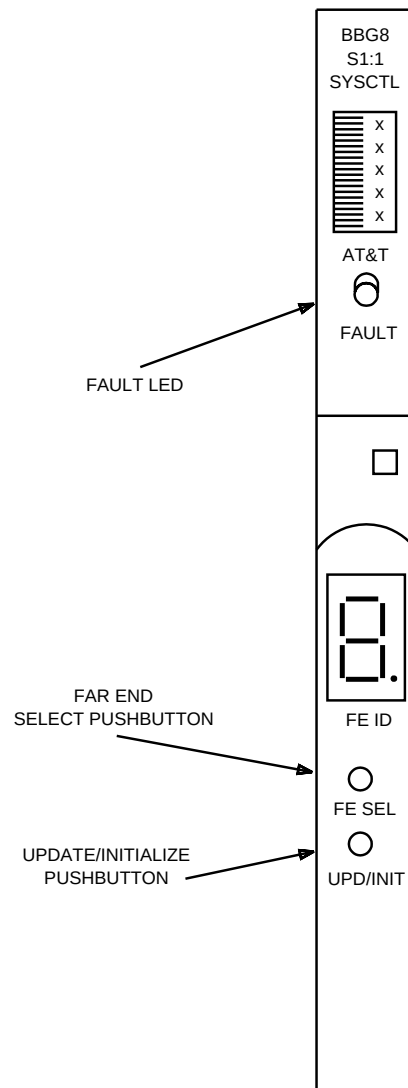


Figure 7-1. BBG8/BBG8B SYSCTL Circuit Pack

General Description of Operation

The SYSCTL circuit pack provides the control functions on the shelf. These include circuit pack monitoring, performance monitoring, protection switching, and user interfaces.

The SYSCTL, which contains a microprocessor, controls links to all other circuit packs in the system and links to user interfaces. The processor also provides link access procedure (LAPD) and link access procedure packet data processing to support SONET section DCC.

Detailed Description of Operation

Control Circuitry

Processor . Figure 7-2 provides an overall block diagram of the SYSCTL circuit pack. This processor is the highest level processor in the system.

Memory

Program Flash-EPROM . The main program is stored in the flash-EPROM, which combines the nonvolatility of EPROM with the in-circuit reprogramming ability of electrically erasable programmable read-only memory (EEPROM). electrically erasable programmable read-only memory (FEEPROM) allows in-service software upgrades to be performed locally or remotely without replacing the SYSCTL circuit pack. Program upgrades of remote systems can also be done via the DCC. Of course, software upgrades may also be accomplished by replacing circuit packs with packs that have already had software upgrades.

RAM . The main processor's random access memory (RAM) is used to store all volatile information such as system alarms, performance-monitoring information, and parameters for the main processor's operating system.

EEPROM . All nonvolatile parameters such as provisioning are stored in the EEPROM, which maintains its data indefinitely during a power loss.

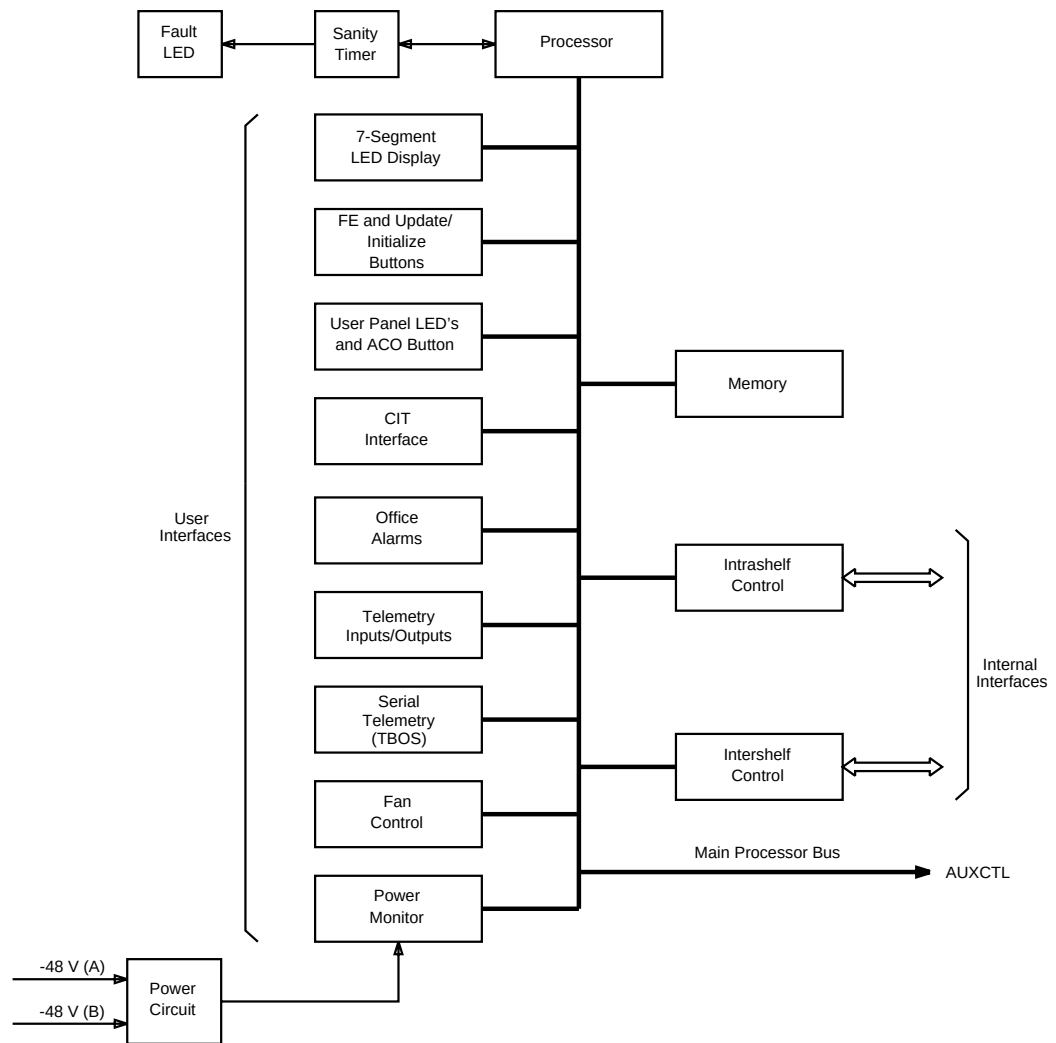


Figure 7-2. BBG8/BBG8B SYSCTL Circuit Pack Block Diagram

Transmission/Timing Circuit Pack Interfaces

The main processor can read and write parameters on the transmission circuit packs through a custom serial interface called the intrashelf control bus. These circuit packs have a built-in serial link receiver which provides an address map into the device. Through this interface, the processor accesses the custom devices and circuit pack parameters, as well as a small EEPROM which stores each circuit pack's inventory information (*CLEI** code, date of manufacture, etc.). Through this link, the main processor can also light the faceplate LEDs on the circuit packs. *

Redundancy has been built into this bus to allow a pack to be switched out of service in the event of a failure within a circuit pack.

Operation Interfaces

The SYSCTL supports all of the operations interfaces described in Chapter 6, "Operations Interfaces."

OC-1 Transport Overhead Channel

The SYSCTL terminates an overhead channel from each Main slot in the shelf. The overhead channel terminates the 192 kb/s section DCC.

Power Monitoring and Fan Control

The SYSCTL monitors the two –48 volt feeders and generates an alarm if one fails. It also monitors AC power in a remote terminal application via a power minor alarm input closure and can control the external fan, based on an on-board temperature sensor. The system also monitors the fan control relay for contact failure.

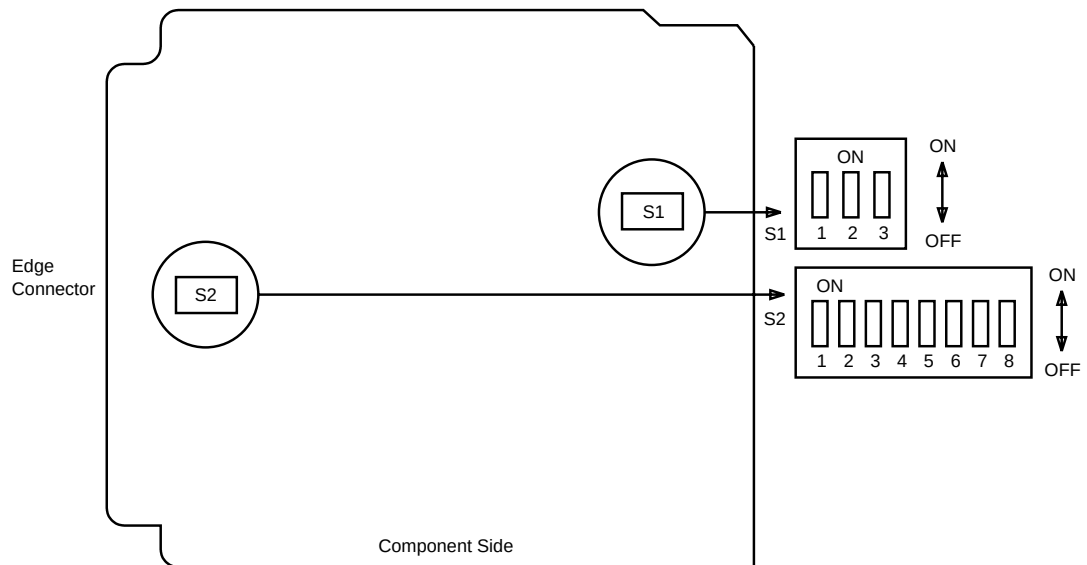
Power Circuitry

The SYSCTL receives two sources of –48 volts which are diode ORed, fused, and filtered prior to conversion to a +5 volt source to power the rest of the circuit pack. A failure of the fuse or converter causes the red FAULT LED to light.

* COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

BBG8/BBG8B SYSCCTL Hardware Setting

The BBG8/BBG8B circuit pack has two hardware switches. Switch 1 (S1) is for product identification and Switch 2 (S2) for the DDM-2000 FiberReach DCC channel. See Figure 7-3.



Note: The switch is set by moving the slide toward the desired position. For DDM-2000 FiberReach, all three S1 switches should be in the OFF position. All S2 switches should be ON, with the exception of Switch S2-2, which should be set to OFF.

Figure 7-3. BBG8/BBG8B SYSCCTL Option Switches

BBG8/BBG8B SYSCTL Quick Reference Summary

Interface Functions

Intrashelf interface functions performed by the SYSCTL are as follows:

- a. Direct control of other circuit packs via a serial control link and intrashelf control bus
- b. Control of circuit pack and user panel LEDs
- c. Detecting the presence of, and identifying, circuit packs installed in the system
- d. SONET DCC overhead channel interface to OLIU circuit packs.

Craft Interface:

- a. A craft interface automatically provisioned to 300, 1200, 2400, 4800, 9600, or 19,200 baud
- b. Provides interface for all advanced provisioning, performance monitoring, administration, and maintenance activities.

User Panel

- a. Alarm and status indicators
- b. ACO and LED Test Controls.

Miscellaneous Discrete Functions

Miscellaneous discrete functions provided by the SYSCTL are as follows:

- a. Miscellaneous discrete environmental alarms and controls.

Maintenance Functions

Maintenance functions provided by the SYSCTL are as follows:

- a. Automatic reset on power up
- b. Fault detection, isolation, and reporting
- c. Protection switching control of other circuit packs
- d. Inventory information (*CLEI* code, date of manufacture, etc.).

ECC2 User Panel Circuit Pack Description

Purpose of Circuit

The ECC2 User Panel (USPNL) for the DDM-2000 FiberReach wideband shelf provides system-level information and control functions, as well as LEDS.

Faceplate Controls and Indicators

The ECC2 USPNL is shown in Figure 7-4. LEDs provide system-level information and control functions.

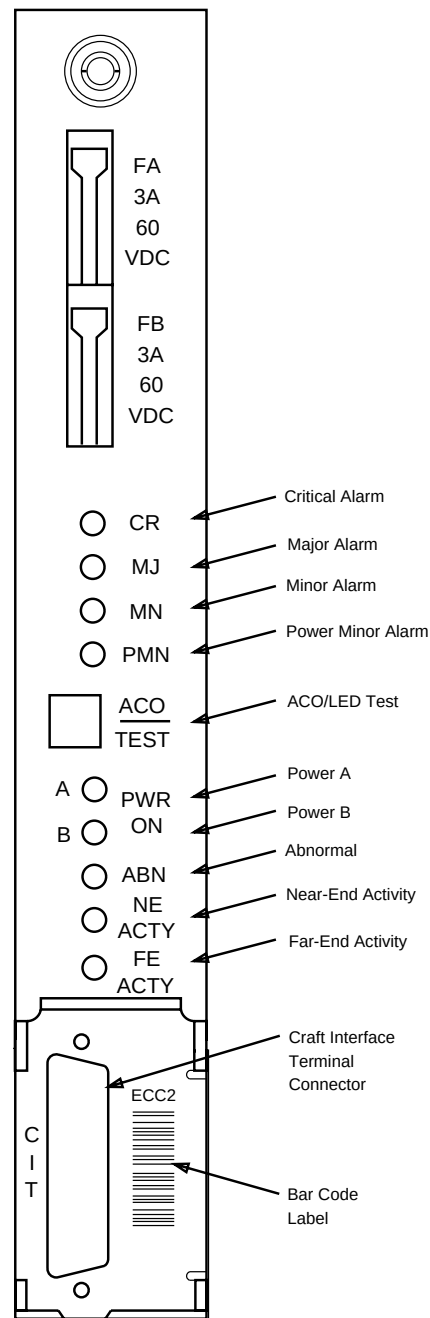


Figure 7-4. DDM-2000 FiberReach Multiplexer User Panel

Detailed Description of Operation

The ECC2 USPNL provides the following interfaces for the DDM-2000 FiberReach wideband shelf:

- Alarm and Status LEDs:
 - Critical Alarm
 - Major Alarm
 - Minor Alarm
 - Power Minor Alarm
 - Alarm Cutoff
 - Abnormal
 - Power On - A
 - Power On -B
 - Near-End Activity
 - Far-End Activity

Each Power On LED on the ECC2 user panel is driven directly by one of the –48 V power feeds. All other LEDs are controlled by the SYSCTL.

- ACO/LED Test Button:
 - The ACO/LED test button is monitored by the SYSCTL.
- Power Interfaces:
 - The ECC2 user panel contains filters and replaceable fuses for two –48 V power feeds.
- CIT Interface
 - The ECC2 user panel has a CIT interface which provides a connection between the CIT and the SYSCTL.

Figure 7-5 provides an overall block diagram of the ECC2 user panel.

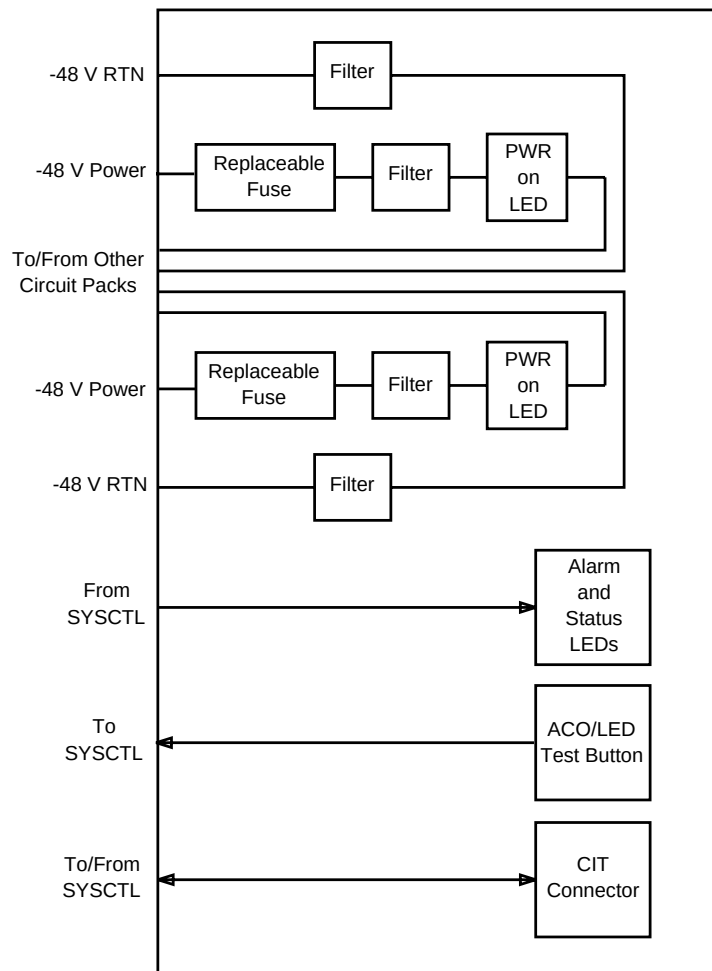


Figure 7-5. ECC2 User Panel Block Diagram

Wideband Shelf - Transmission

BBF1B DS1 Circuit Pack Description

Purpose of Circuit

The DS1 circuit pack provides a low-speed interface between asynchronous DS1 rate signals and SONET virtual tributary group (VT-G) signals.

DS1 Faceplate Indicator

The DS1 circuit pack FAULT indicator is shown in Figure 7-6. This red FAULT LED is lighted by the SYSCTL on detection of a DS1 circuit pack failure. In the event of an incoming signal failure, this LED flashes on and off.

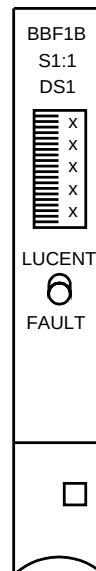


Figure 7-6. BBF1B DS1 Circuit Pack

General Description of Operation

The DS1 circuit pack terminates four bidirectional DS1 lines complying with standard DSX-1 signal specifications. The DS1 circuit pack interfaces to the OLIU circuit pack at the VT-G rate (6.912 MHz) and to the SYSCTL.

Detailed Description of Operation

Transmission Circuitry

Transmit Direction . Figure 7-7 provides an overall block diagram of the DS1 circuit pack. The transmit direction points towards the VT-G, and the receive direction points toward the DS1s. In the transmit direction, the DS1 receives four balanced DS1 bipolar signals. Each of these signals passes through a relay to a DS1 interface circuit that converts it to unipolar nonreturn to zero (NRZ) format, recovers its clock, and sends it to the multiplexer (MUX) circuit. The MUX circuit converts each DS1 rate input into a 1.728 Mb/s VT1.5 signal, and then byte interleaves the four VT1.5s to create a VT-G signal that it sends to the OLIU pack using the frame sync and clock received from the OLIU.

Receive Direction . The DS1 receives a VT-G with clock and frame information from the OLIU and demultiplexes the VT-G into four unique VT1.5 signals. Each VT1.5 passes through circuitry that performs pointer interpretation, removes the VT path overhead bits, the fixed stuff bits, and the overhead communications channel bits, and desynchronizes the embedded DS1. The DS1 rate signal is AMI or B8ZS encoded, preequalized with a selectable line build out (LBO). It is then sent as a balanced signal to a DSX-1 that may be located up to 655 feet from the system, or to a DS1 termination located up to 1310 feet from the system.

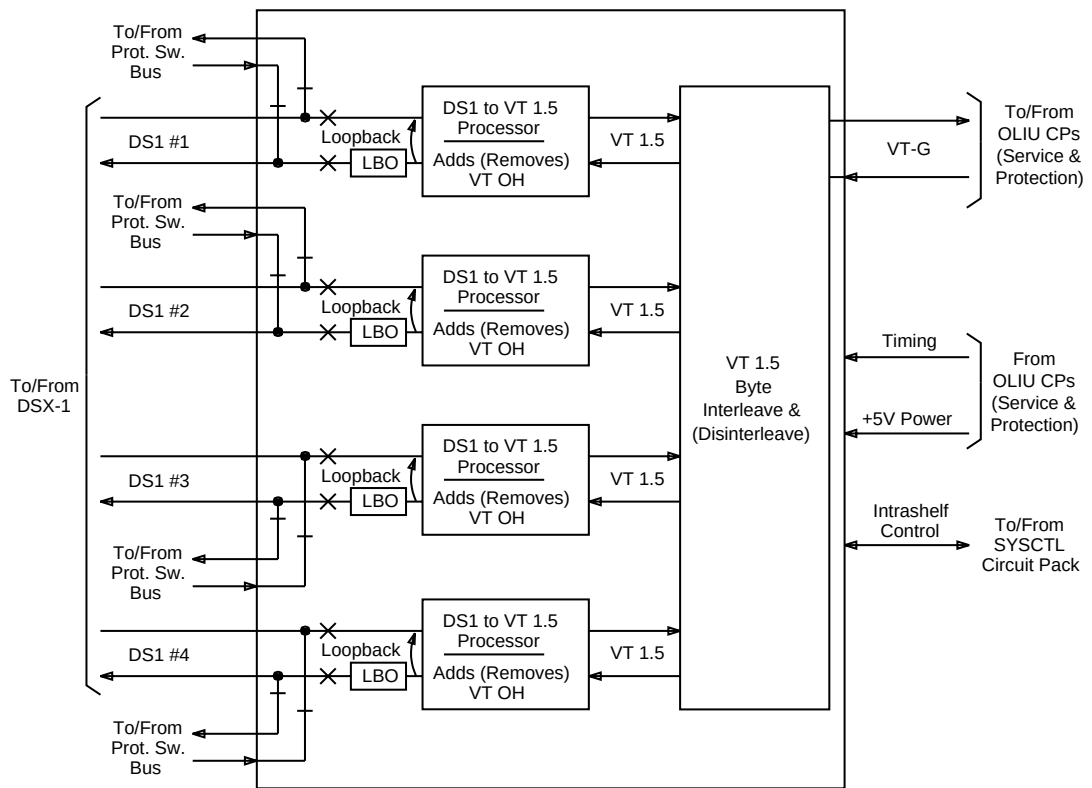


Figure 7-7. BBF1B DS1 Circuit Pack Block Diagram

Control Circuitry

The DS1 circuit pack interfaces with the SYSCTL via the intrashelf control bus. Redundancy in the intrashelf control bus assures the level of control required to perform protection switching and alarming of a faulty circuit pack. The DS1 provides maintenance elements for reporting the status of the circuit pack and the incoming VT1.5 and DS1 signals, as well as the circuit pack inventory information (*CLEI* code, date of manufacture, etc.). These maintenance elements are used by the SYSCTL for fault detection and isolation. The DS1 responds to control signals from the SYSCTL for functions including protection switching and FAULT light-emitting diode (LED) control.

Timing Circuitry

The timing distribution to the DS1 contains ten timing signals: two high-speed clocks (one active and one standby), four VT-G clocks (two active and two standby), and four frame sync signals (two active and two standby).

The DS1 receives from the OLIU a synchronous transport signal (STS-1) rate high-speed clock that provides the frequency reference for the desynchronizing phase-locked loop (PLL). This high-speed reference clock is also used to synthesize the DS1 rate AIS clock source for the DS1 devices and to provide a DS1 test signal.

The DS1 uses the VT-G clocks (6.912 MHz) and the frame sync signals it receives from the OLIU to clock VT-G data to/from the OLIU.

Protection Circuitry

Optional DS1 circuit pack protection is provided with on-board relays on the DSX-1 side and with logic selectors at the VT-G level on the OLIU circuit pack. The SYSCTL controls these relays through two serial interfaces so that a failure of one serial interface to the DS1 does not prevent control of the relays. If +5 V power on the DS1 fails, the relays default to the protection state. If the SYSCTL is removed, the relays remain in their current state.

When a DS1 circuit pack is inserted, the relays are in the protection state until the SYSCTL determines that the circuit pack is good. Shorting contacts are provided in the backplane connectors so that when the circuit pack is removed, the DSX-1 cable pairs short through to the protection bus.

The BBF3 DS1PM circuit pack can be mixed with the BBF1B. If mixed, the protection circuit pack must be a BBF3 DS1PM.

Fault Detection Circuitry

The DS1 circuit pack has in-service and out-of-service built-in test capability. In-service testing is continuous and errors are reported when they occur to the SYSCTL via the intrashelf control bus. An out-of-service test is performed whenever the DS1 circuit pack is inserted or recovers from a transient failure. The incoming DS1 signal is monitored for bipolar threshold crossings in excess of 10^{-3} , 10^{-6} , 10^{-7} or 10^{-8} . Incoming VT1.5 signals are monitored for VT AIS, VT LOP, and yellow.

Loopbacks

The DS1 circuit pack provides a terminal loopback for testing. The terminal loopback is provided on the DS1 circuit pack for each DS1 low-speed interface. The loopback is implemented inside the MUX/DEMUX/DESYNC device and bridges the desynchronizer output signal (transmitted towards the DSX-1) back into the DS1 synchronizer input. When the loopback is operated, the DS1 interface device forces AIS towards the DSX.

Performance Monitoring

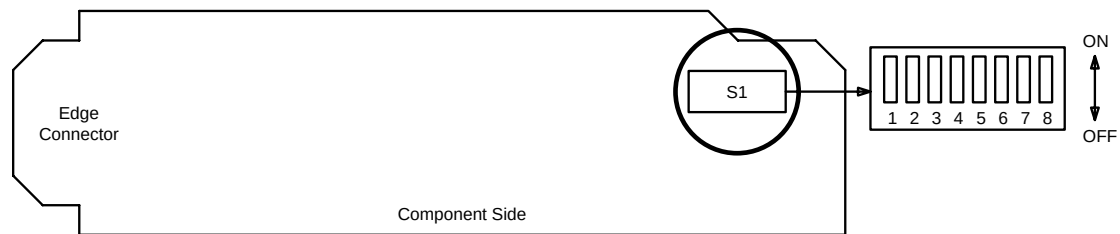
The DS1 circuit pack monitors VT path parameters derived from the V5 coding violations.

Power Circuitry

The OLIU circuit packs supply +5 V power to the DS1 circuit packs. These two inputs are diode ORed and the output is fused and then filtered before it is used to power the rest of the circuit pack. A failure of the fuse causes the red FAULT LED to light.

DS1 Hardware Settings

The line coding and line build out (LBO) are switch settable. (Other parameters are provisioned through the software.) The locations of the DS1 circuit pack option switches are shown in Figure 7-8 and Tables 7-1 and 7-2.



Note: The switches are set by moving the slide toward the desired position.

Figure 7-8. BBF1B DS1 Option Switches

Table 7-1. DS1 Cable LBO Settings (Note)

613C (608C) Cable Length to DSX-1 (feet)	1249C Cable Length to DSX-1 (feet)	Other Cable dB Loss to DSX-1 at 772 KHz	DIP Switch Settings		
			S1-1	S1-2	S1-3
0 to 133*	0 to 90*	0 to 0.6	OFF	OFF	OFF
>133 to 267	>90 to 180	>0.6 to 1.2	OFF	OFF	ON
>267 to 400	>180 to 270	>1.2 to 1.8	OFF	ON	OFF
>400 to 533	>270 to 360	>1.8 to 2.4	OFF	ON	ON
>533 to 655	>360 to 450	>2.4 to 2.8	ON	OFF	OFF

Note: Distances specified are to the DSX-1 interconnect only. For direct connection to DS1 terminating equipment, these distances can be doubled.

* Minimum of 30 feet required to meet EMI requirements. Unless specified, cables with filtered connectors are used.

Table 7-2. DS1 Line Code Settings (Notes)

Line Code Format	DIP Switch Settings			
	S1-4 (Port 1)	S1-5 (Port 2)	S1-6 (Port 3)	S1-7 (Port 4)
B8Zs	OFF	OFF	OFF	OFF
AMI	ON	ON	ON	ON

Notes:

1. Switch section 8 (S1-8) is unused and ignored by the system.
2. Line code is software overrideable.

DS1 Quick Reference Summary

Transmit Functions

Major transmit functions of the DS1 circuit pack are as follows:

- a. Receives four AMI or B8ZS encoded DS1 signals from a DSX-1
- b. Recovers DS1 clock and NRZ data from each DS1 signal
- c. Synchronizes and maps each data signal to a VT1.5 synchronous payload envelope (SPE)
- d. Inserts VT path overhead
- e. Multiplexes four VT1.5 SPEs to a byte-interleaved VT-G signal
- f. Provides the VT-G signal to an OLIU circuit pack.

Receive Functions

Major receive functions of the DS1 circuit pack are as follows:

- a. Receives a SONET VT-G clock and frame synchronizing signals from its associated OLIU
- b. Demultiplexes the VT-G into four VT1.5 signals
- c. Terminates VT path and the embedded DS1 signal from each VT1.5 SPE
- d. Desynchronizes the DS1 signals
- e. Encodes each DS1 signal into either AMI or B8ZS format
- f. Preequalizes (with line build out) each DS1 and provides them to a DSX-1 as bipolar signals.

Control Functions

The major control functions of the DS1 circuit pack are as follows:

- a. Protection switching for OLIU circuit pack protection
- b. VT path overhead processing
- c. Internal fault detection
- d. Inventory information (*CLEI* code, date of manufacture, etc.).

Maintenance Signal Functions

The major maintenance signal functions are as follows:

- a. Detects VT path AIS
- b. Inserts DS1 AIS toward fiber and toward DSX-1
- c. Inserts and detects VT path yellow signal.

BBF3 DS1PM Circuit Pack Description

Purpose of Circuit

The DS1PM circuit pack provides all of the functions of a BBF1B circuit pack and also provides performance monitoring (PM) of SF and ESF signals to allow for T1 tariff verification. For PM, the DS1 signals from the DSX are monitored. Performance monitoring data from the opposite direction is provided by accessing the ESF data link.

DS1PM Faceplate Indicator

The DS1PM circuit pack FAULT indicator is shown in Figure 7-9. This red FAULT LED is lighted by the SYSCtl on detection of a DS1PM circuit pack failure. In the event of an incoming signal failure, this LED flashes on and off.



Figure 7-9. BBF3 DS1PM Circuit Pack

General Description of Operation

The DS1PM circuit pack terminates four bidirectional DS1 lines complying with standard DSX-1 signal specifications. The DS1PM circuit pack interfaces to the OLIU circuit pack at the VT-G rate (6.912 MHz) and to the SYSCTL.

The DS1 and DS1PM circuit packs are, with respect to transmission, functionally equivalent. In addition to performing all of the functions of the DS1 circuit pack, the DS1PM circuit pack provides performance monitoring for the DS1 rate transmit signals.

Detailed Description of Operation

Transmission Circuitry

Transmit Direction . Figure 7-10 provides an overall block diagram of the DS1PM circuit pack. The transmit direction points towards the VT-G and the receive direction points toward the DS1s. In the transmit direction, the DS1PM receives four balanced DS1 bipolar signals. Each of these signals passes through a relay to a DS1 interface circuit that converts it to unipolar nonreturn to zero (NRZ) format, recovers its clock, and sends it to the multiplexer (MUX) and framing (framer) circuits. The MUX circuit converts each DS1 rate input into a 1.728 Mb/s VT1.5 signal and then byte-interleaves the four VT1.5s to create a VT-G signal that it sends to the OLIU circuit pack, using the frame sync and clock received from the OLIU.

Receive Direction . The DS1PM receives a VT-G with clock and frame information from the OLIU and demultiplexes the VT-G into four unique VT1.5 signals. Each VT1.5 passes through circuitry that performs pointer interpretation, removes the VT path overhead bits, the fixed stuff bits, and the overhead communications channel bits, and desynchronizes the embedded DS1. The DS1 rate signal is AMI or B8ZS encoded, preequalized with a selectable line build out (LBO), and then sent as a balanced signal to Alternate Mark Inversion a DSX-1 that may be located up to 655 feet from the system.

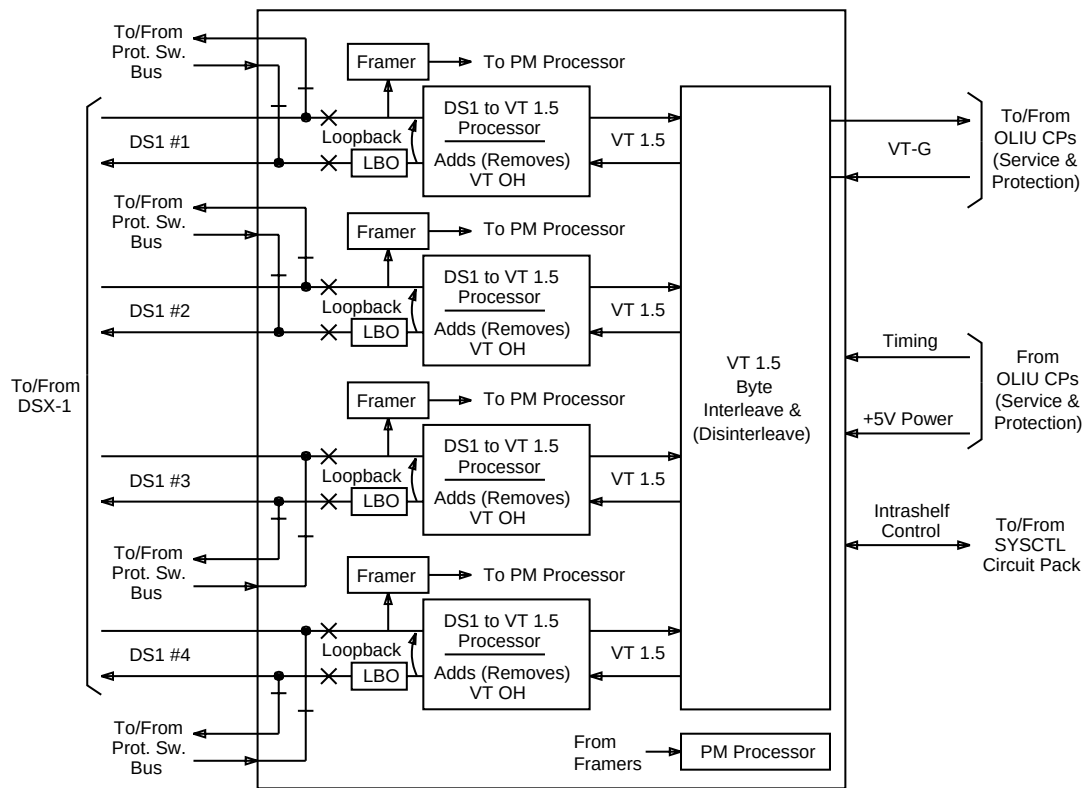


Figure 7-10. DS1PM Circuit Pack Block Diagram

Control Circuitry

The DS1PM circuit pack interfaces with the SYSCTL over the intrashelf control bus. Redundancy in the intrashelf control bus assures the level of control required to perform protection switching and alarming of a faulty circuit pack. The DS1PM provides maintenance elements for reporting the status of the circuit pack and the incoming VT1.5 and DS1 signals, as well as the circuit pack inventory information (*CLEI* code, date of manufacture, etc.). These maintenance elements are used by the SYSCTL for fault detection and isolation. The DS1PM responds to control signals from the SYSCTL for functions including protection switching. The framer circuit acquires frame information (either SF or ESF) from the DS1 signal and sends the information to the PM processor. The PM processor collects information from the framing circuitry and generates near-end and far-end (ESF only) DS1 PM parameters. When provisioned for DS1 clear channel, no PM path parameters are generated.

Timing Circuitry

The timing distribution to the DS1PM contains ten timing signals:

- 2 high-speed clocks (one active and one standby)
- 4 VT-G clocks (two active and two standby)
- 4 frame sync signals (two active and two standby).

The DS1PM receives from the OLIU a synchronous transport signal (STS-1) rate high-speed clock that provides the frequency reference for the desynchronizing phase-locked loop (PLL). This high-speed reference clock is also used to synthesize the DS1 rate AIS clock source for the DS1 devices and to provide a DS1 test signal.

The DS1PM uses the VT-G clocks (6.912 MHz) and the frame sync signals it receives from the OLIU to clock VT-G data to/from the OLIU.

Protection Circuitry

Optional revertive DS1PM circuit pack protection is provided with on-board relays on the DSX-1 side and with logic selectors at the VT-G level on the OLIU circuit packs. The SYSCTL controls these relays through two serial interfaces so that a failure of one serial interface to the DS1PM does not prevent control of the relays. If +5 V power on the DS1PM fails, the relays default to the protection state. If the SYSCTL is removed, the relays remain in their current state.

Shorting contacts are provided in the backplane connectors so that when the circuit pack is removed, the DSX-1 cable pairs short through to the protection bus.

When a DS1PM circuit pack is inserted, the relays are in the protection state until the SYSCtl determines that the circuit pack is good.

The BBF3 DS1PM circuit pack can be mixed with the BBF1/1B. If mixed, the protection circuit pack must be a BBF3 DS1PM circuit pack.

Fault Detection Circuitry

The DS1PM circuit pack has in-service and out-of-service built-in test capability. In-service testing is continuous and errors are reported when they occur to the SYSCtl via the intrashelf control bus. An out-of-service test is performed whenever the DS1PM circuit pack is inserted or recovers from a transient failure. The incoming DS1 signal is monitored for bipolar threshold crossings in excess of 10^{-3} , 10^{-6} , 10^{-7} , or 10^{-8} . Incoming VT1.5 signals are monitored for VT AIS, VT LOP, and yellow.

Loopbacks

The DS1PM circuit pack provides a terminal loopback for testing. The terminal loopback is provided on the DS1PM circuit pack for each DS1 low-speed interface. The loopback is implemented inside the MUX/DEMUX/DESYNC device and bridges the desynchronizer output signal (transmitted towards the DSX-1) back into the DS1 synchronizer input. When the loopback is operated, the DS1 interface device forces AIS towards the DSX.

Performance Monitoring

The DS1PM circuit pack provides PM circuitry for the following performance parameters:

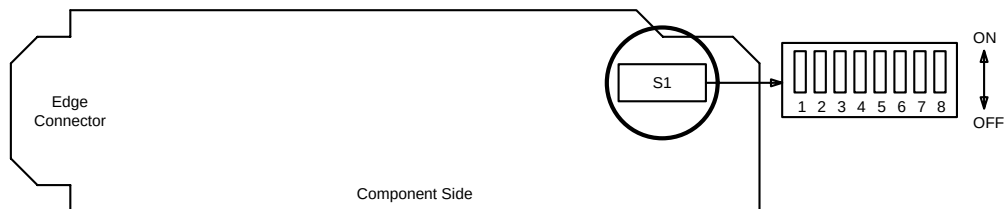
- VT path parameters derived from V5 coding violations
- DS1 PM derived from SF/ESF frame format depending on provisioning.

Power Circuitry

The OLIU circuit packs supply +5 V power to the DS1PM circuit packs. These inputs are diode ORed and the output is fused and then filtered before it is used to power the rest of the circuit pack. A failure of the fuse causes the red FAULT LED to light.

DS1PM Hardware Settings

The line coding and line build out (LBO) are switch settable. Other parameters are provisionable through the software. The locations of the DS1PM circuit pack option switches are shown in Figure 7-11 and Tables 7-3 and 7-4.



Note: The switches are set by moving the slide toward the desired position.

Figure 7-11. BBF3 DS1PM Option Switches

Table 7-3. DS1PM Cable LBO Settings (Note)

613C (608C) Cable Length to DSX-1 (feet)	1249C Cable Length to DSX-1 (feet)	Other Cable dB Loss to DSX-1 at 772 KHz	DIP Switch Settings		
			S1-1	S1-2	S1-3
0 to 133*	0 to 90*	0 to 0.6*	OFF	OFF	OFF
>133 to 267	>90 to 180	>0.6 to 1.2	OFF	OFF	ON
>267 to 400	>180 to 270	>1.2 to 1.8	OFF	ON	OFF
>400 to 533	>270 to 360	>1.8 to 2.4	OFF	ON	ON
>533 to 655	>360 to 450	>2.4 to 2.8	ON	OFF	OFF

Note: Distances specified are to the DSX-1 interconnect only. For direct connection to DS1 terminating equipment, these distances can be doubled.

* Minimum of 30 feet required to meet EMI requirements. Unless specified, cables with filtered connectors are used.

Table 7-4. DS1PM Line Code Settings (Notes)

Line Code Format	DIP Switch Settings			
	S1-4 (Port 1)	S1-5 (Port 2)	S1-6 (Port 3)	S1-7 (Port 4)
B8ZS	OFF	OFF	OFF	OFF
AMI	ON	ON	ON	ON

Notes:

1. Switch section 8 (S1-8) is unused and must be off.
2. Line code is software overrideable.

DS1PM Quick Reference Summary

Transmit Functions

Major transmit functions of the DS1PM circuit pack are as follows:

- a. Receives four AMI or B8ZS encoded DS1 signals from a DSX-1
- b. Recovers DS1 clock and NRZ data from each DS1 signal
- c. Synchronizes and maps each data signal to a VT1.5 synchronous payload envelope (SPE)
- d. Inserts VT path overhead
- e. Multiplexes four VT1.5 SPEs to a byte-interleaved VT-G signal
- f. Provides the VT-G signal to an OLIU circuit pack.

Receive Functions

Major receive functions of the DS1PM circuit pack are as follows:

- a. Receives a SONET VT-G clock and frame synchronizing signals from its associated OLIU
- b. Demultiplexes the VT-G into four VT1.5 signals
- c. Terminates VT path and the embedded DS1 signal from each VT1.5 SPE
- d. Desynchronizes the DS1 signals
- e. Encodes each DS1 signal into either AMI or B8ZS format
- f. Preequalizes (with line build out) each DS1 and provides them to a DSX-1 as bipolar signals.

Control Functions

The major control functions of the DS1PM circuit pack are as follows:

- a. Protection switching for OLIU circuit pack protection
- b. VT path overhead processing
- c. Internal fault detection
- d. Inventory information (*CLEI* code, date of manufacture, etc.)
- e. Monitors a DS1 signal with SF or ESF frame format and generates PM data.

Maintenance Signal Functions

The major maintenance signal functions are as follows:

- a. Monitors DS1 signal for near-end and far-end performance
- b. Detects VT path AIS
- c. Inserts DS1 AIS toward fiber and toward DSX-1
- d. Inserts and detects VT path yellow signal.

BBF8 High Data-Rate Digital Subscriber Line (HDSL)

Purpose of Circuit

The HDSL circuit pack (BBF8) provides HDSL interface capability on the DDM-2000 FiberReach shelf to compatible PairGain* equipment at the customer premises. It allows the transport of T1 payloads, for up to 12,000 feet, over two metallic 24 AWG twisted-pair lines.



NOTE:

This capability is provided when the FiberReach shelf is equipped with a 28G-U OLIU in the main slots.

The BBF8 circuit pack fits into the low-speed slots and provides two, four-wire HDSL interfaces. Each interface provides a full DS1 payload capacity mapped to a SONET VT1.5 and then VT cross-connected into an STS-1. Once in SONET, the DS1 payload is treated as a normal DS1.



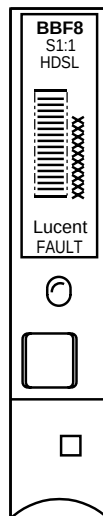
NOTE:

A maximum of three BBF8 HDSL circuit packs, including a protection circuit pack, can be installed in one FiberReach shelf if 28G-type OLIUs are used.

HDSL Faceplate Indicator

The HDSL circuit pack FAULT indicator is shown in Figure 7-12. This red FAULT LED is lit by the SYSCTL on detection of an HDSL circuit pack failure. In the event of an incoming signal failure, this LED flashes on and off.

* PairGain is a registered trademark of PairGain Technologies, Inc.



tpa 852341/01

Figure 7-12. BBF8 HDSL Circuit Pack

General Description of Operation

Figure 7-13 provides an overall block diagram of the HDSL circuit pack. The BBF8 circuit pack provides an HDSL interface capability on the DDM-2000 FiberReach Multiplexer. HDSL is an access technology that allows the transport of DS1 payloads over metallic twisted pairs. This technology performs an inverse multiplexing function which splits the DS1 payload into two 784 Kb/s data streams. These two data streams are combined at the far-end to reconstruct the original DS1 payload. Both directions of transmission are carried on each twisted pair.

HDSL is a point-to-point transmission technology between two nodes. One of the nodes (master) is responsible for establishing communications over the *PairGain* proprietary embedded operations channel (EOC). The EOC is required for synchronizing the two HDSL data streams as well as providing OAM&P between the two nodes. The other node (slave) may only retrieve or view these parameters. In each pair of HDSL nodes there must be one master and one slave.

The HDSL signal format used by the BBF8 is compatible with *PairGain* HDSL equipment. Since the BBF8 circuit pack does not provide line powering, the far-end *PairGain* HDSL equipment must be externally powered.

Detailed Description of Operation

Transmission Circuitry

The BBF8 fits into a low-speed slot and provides two, four-wire (2 pair) HDSL interfaces. These interfaces are compatible with *PairGain* HDSL equipment which may be located up to 12,000 feet away. A 2B1Q line code is used on each transmission pair. Each interface provides a full DS1 payload capacity which is mapped to a SONET VT1.5. The HDSL overhead is in a *PairGain* proprietary format and can only be terminated by equipment capable of processing this information. As with the BBF1B (Quad DS1) circuit pack, an 28G-U must be used in the DDM-2000 FiberReach shelf to perform a VT cross-connect function. Once in SONET, the DS1 payload is treated as a normal DS1.

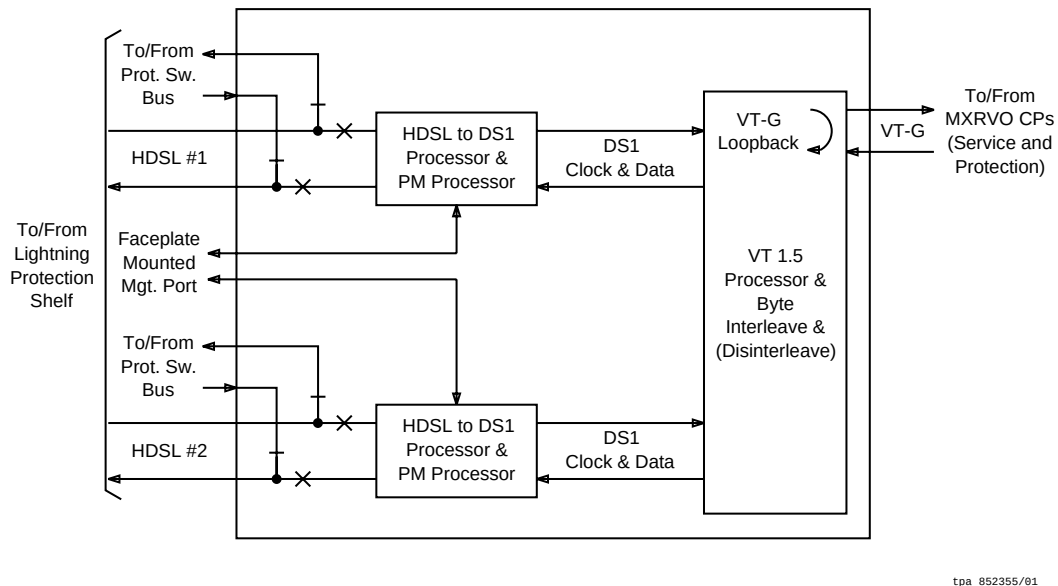


Figure 7-13. HDSL Circuit Pack Block Diagram

The distance limitations for HDSL are based on a maximum signal attenuation of 35 dB. Since signal attenuation decreases as the cable gauge (number) decreases, the lower the gauge the greater the length the HDSL can be extended. Table 7-1 identifies and lists these distances, as well as indicates the loss on the line, in dB per feet, at 196 kHz.

Due to the increased power needs of the BBF8, only three BBF8 circuit packs (including Protection) may be used in a function group. Powering for these packs is provided by the 28G-U in the FiberReach shelf. Pack mixing with Quad DS1/T1 EXT circuit packs is not recommended. The HDSL interfaces do not support line powering. The BBF8 is compatible with DDM-2000 FiberReach Release 2.2 and later.

Table 7-1. HDSL Line Specifications

Cable Gauge	Loss at 196 kHz dB/ft.	Ohms per kft	Maximum Loop for 35 dB Loss	Ohms at Maximum Length
26/0.40 mm	3.880	83.3	9.0 kft/2.75 km/1.7 mi	750
24/0.51 mm	2.841	51.9	12.3 kft/3.75 km/2.3 mi	638
22/0.61 mm	2.177	32.4	16.1 kft/4.9 km/3.0 mi	520
19/0.91 mm	1.535	16.1	22.8 kft/6.95 km/4.3 mi	367

Control Circuitry

The HDSL circuit pack interfaces with the SYSCCTL over the intra-shelf control bus. Redundancy in the intra-shelf control bus assures the level of control required to perform protection switching and alarming of a faulty circuit pack. The HDSL provides maintenance elements for reporting the status of the circuit pack and the incoming VT1.5 and HDSL signals, as well as the circuit pack inventory information (*CLEI* code, date of manufacture, etc.). These maintenance elements are used by the SYSCCTL for fault detection and isolation. Conversely, the HDSL responds to control signals from the SYSCCTL (such as FAULT LED control). The PM processor collects information from the framing circuitry and generates DS1 PM parameters which are stored in the HDSL pack. Access to the PM information is via a faceplate-mounted connector. Each connector supports two RS-232 interfaces (one for each HDSL port). The port is accessed by using a cable supplied with the circuit pack.

Timing Circuitry

The timing distribution to the HDSL contains ten timing signals: two high-speed clocks (active and standby), four VT-G clocks (two active and two standby), and four frame sync signals (two active and two standby).

The HDSL receives from the 28G-U an STS-1 rate high-speed clock that provides the frequency reference for the desynchronizing phase-locked loop. This high-speed reference clock is also used to synthesize the DS1 rate AIS clock source for the DS1 devices and to provide a DS1 test signal.

The HDSL uses the VT-G clocks (6.912 MHz) and the frame sync signals it receives from the 28G-U to clock VT-G data to/from the 28G-U.

Protection Circuitry

Optional 1xN revertive HDSL circuit pack protection is provided, and this protection is independent of the 28G-U circuit pack. The HDSL protection switch points are implemented with on-board relays on the HDSL side and with logic selectors at the VT-G level on the active and standby 28G-U circuit pack. The SYSCTL controls these relays through two serial interfaces so that a failure of one serial interface to the HDSL does not prevent control of the relays. If +5V power on the HDSL fails, the relays default to the protection state.

Shorting contacts are provided in the HDSL backplane connector so that when the circuit pack is removed, the HDSL cable pairs short through to the protection bus.



CAUTION:

Unused low-speed interface slots within a partially equipped group must be equipped with 177A Retainer cards if HDSL protection is used. Failure to do so may result in corrupted transmission. The HDSL circuit pack is not recommended to be mixed with the BBF1/1B/3Bs.

When a HDSL circuit pack is inserted, the relays are in the protection state until the SYSCTL determines that the circuit pack is good.

Fault Detection Circuitry

The HDSL circuit pack has in-service and out-of-service built-in test capability. In-service testing is continuous and errors are reported when they occur to the SYSCTL via the intra-shelf control bus. An out-of-service test is performed whenever the HDSL circuit pack is inserted or recovers from a transient failure. The incoming HDSL signal is monitored for HDSL synchronization errors. Incoming VT1.5 signals are monitored for VT AIS, VT LOP, and yellow.

Loopbacks

The HDSL circuit pack has two types of loopback, terminal and facility. Both types are controlled by the SYSCTL via the intra-shelf control bus. The two loopbacks must be done independently.

The terminal loopback is provided on the HDSL circuit pack for each HDSL interface. The loopback is done inside the VT1.5 processor device and bridges the desynchronizer output signal (transmitted towards the far-end HDSL equipment) back to the DS1 synchronizer input. When the loopback is operated, the DS1 interface device forces AIS towards the far-end HDSL equipment.

The facility loopback is provided for both HDSL signals on the circuit pack. When this loopback is completed, all DS1 clock and data signals received from the VT1.5 processor are simultaneously looped back toward the far-end HDSL

equipment. The loopback is a bridge, so the transmitted DS1 signals (towards the high-speed interface) are not affected.

Optional HDSL Settings

All system settings are stored in NVRAM at the unit designated as the system Master. Access to these settings is through the RS-232 faceplate port only. These settings are downloaded to the slave unit at system synchronization and at regular intervals during operation to keep the slave unit updated. The NVRAM is guaranteed to have a capability of 1,000 write cycles. The current state of loopbacks is not considered a system setting, and an active loopback becomes inactive during system resynchronization. Provisioning is not available at either the slave unit or doubler units. The following system settings are available:

- Smartjack Loopback Code Detection: ENABLE or DISABLE
- Special Loopback Code Detection: A1LB, A2LB, A3LB, A4LB, or A5LB
- Errored Second Threshold: NONE, 17, or 170 per 24 hours
- Loopback Time-out: NONE, 20, 60, 120 minutes
- Alarm Notification: ENABLE or DISABLE
- Allocation of DS0 time slots on HDSL loop: ALTERNATE or CONTIGUOUS
- Margin Alarm Threshold: 0-15 dB, 1 dB increments
- DS0 blocking: individually (T1, FT1)
- Fast Loss of Sync Word (LOSW): ENABLE or DISABLE

Performance Monitoring

From any unit in a system, HDSL performance data may be accessed for each HDSL span in the circuit, including up to two HDSL doublers (three total HDSL spans). Access to all PM data is through the faceplate RS-232 port only. Any unit provides access to the following:

- HDSL Span Current Status:
 - Alarms
 - Loopbacks
 - Margins
 - HDSL Pulse Attenuation
 - HDSL clock offset (PPM)
 - 24-hour HDSL Errored Seconds
 - 24-hour HDSL Unavailable Seconds
- HDSL Span History:
 - 15-min, 24-hour, 7-day HDSL Errored Seconds
 - 15-min, 24-hour, 7-day HDSL Unavailable Seconds

- HDSL Alarm History

- LOSW, HDSL1 - Loss of Sync on Loop 1
- LOSW, HDSL2 - Loss of Sync on Loop 2
- ES, HDSL1 - Exceeded ES Threshold on Loop 1
- ES, HDSL2 - Exceeded ES Threshold on Loop 2
- Margin, HDSL1 - Exceeded Threshold on Loop 1
- Margin, HDSL2 - Exceeded Threshold on Loop 2

Power Circuitry

The 28G-U circuit packs supply +5V power to the HDSL circuit packs in the corresponding DS1PM circuit pack groups. These inputs are diode ORed and the output is fused and then filtered before it is used to power the rest of the circuit pack. A failure of the fuse or converter causes the red FAULT LED to light.



CAUTION:

For power reliability, when a muldem is equipped with HDSL circuit packs, the associated function unit must be equipped with two 28G-U circuit packs.

Figure 7-14 shows HDSL options selectable via S1.

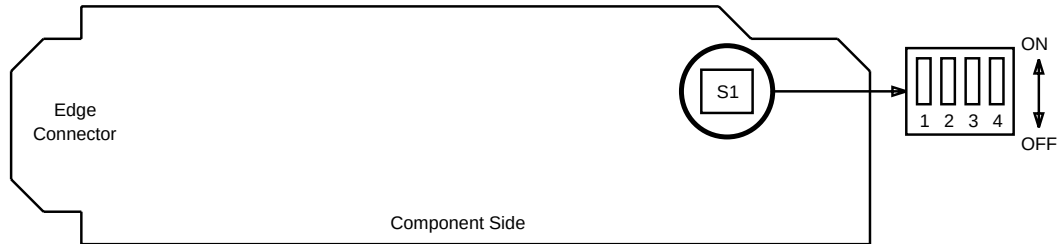


Figure 7-14. HDSL DIP Switch Settings

HDSL Options		DIP Switch Settings			
		HDSL Port #1		HDSL Port #2	
		S1-1	S1-2	S1-3	S1-4
HDSL START-UP	Master	—	OFF	—	OFF
	Slave	—	ON	—	ON
HDSL MANAGEMENT	Local	OFF	—	OFF	—
	Through	ON	—	ON	—

HDSL Quick Reference Summary

Communication Functions

Major transmit (Xmit) and receive (Rcv) functions of the HDSL circuit pack are as follows:

- Multiplexes four VT1.5 SPEs to a byte-interleaved VT-G signal (Xmit)
- Provides the VT-G signal to a 28G-U circuit pack (Xmit)
- Inserts VT path overhead (Xmit)
- Receives up to two HDSL formatted signals (Xmit)
- Provides HDSL to VT1.5 mapping (Xmit)
- Recovers DS1 clock and NRZ data from each HDSL payload (Xmit)
- Synchronizes and maps each data signal to a VT1.5 SPE (Xmit)
- *PairGain* compatible, 4-wire HDSL
- Bi-directional transmission port of 1.544 Mb/s over twisted pair
- Loopback options
- Receives a SONET VT-G clock and frame synchronizing signals from its associated 28G-U
- Demultiplexes the VT-G into four VT1.5 signals (Rcv)
- Terminates VT path and the embedded DS1 signal from each VT1.5 SPE (Rcv)
- Desynchronizes the DS1 signals and maps directly into *PairGain* HDSL (Rcv).

Control Functions

The major control functions of the HDSL circuit pack are as follows:

- Protection switching for 28G-U circuit packs
- VT path overhead processing
- Internal fault detection
- Inventory information (*CLEI* code, date of manufacture, etc.).

Maintenance Signal Functions

The major maintenance signal functions are as follows:

- Monitors a DS1 signal with SF or ESF frame format and generates PM data
- Monitors DS1 signal for near-end and far-end performance
- Detects VT path AIS
- Inserts DS1 AIS toward fiber and far-end HDSL equipment
- Inserts and detects VT path yellow signal.

26G2-U OLIU Circuit Pack Description

Purpose of Circuit

The 26G2-U OLIU circuit pack interfaces with a 1310 nm optical line in the transmit and receive directions. It provides an interface between the OC-1 optical line and the electrical STS-1 and VT-G signals. The fiber is accessed via a pair of universal optical connectors on the 26G2-U faceplate that supports *ST*[®], SC, and FC type optical connectors. Both single mode and multi mode facilities are supported.

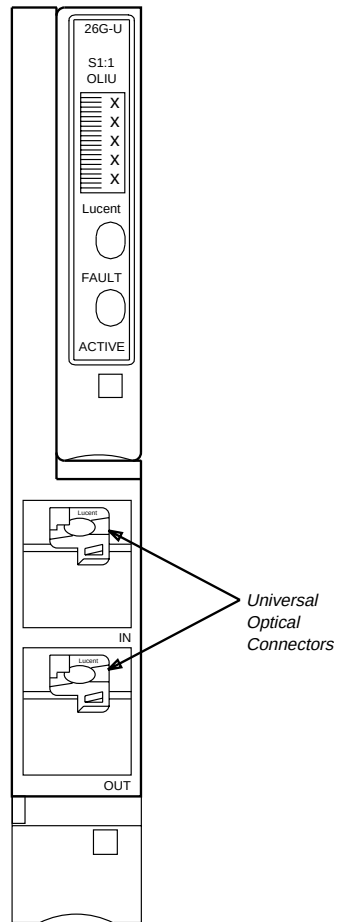
The 26G2-U OLIU circuit pack also has the following functions:

- Active VT timeslot interchanging in the main slot
- Access to low speed slots from the main slot

The 26G2-U OLIU may be used in the main slots of the DDM-2000 FiberReach wideband shelf or the Function Unit slots of the DDM-2000 OC-3 shelf (Group 4 or later).

26G2-U OLIU Faceplate Indicators

The 26G2-U OLIU circuit pack faceplate indicators are shown in Figure 7-16. The red FAULT LED lights on detection of circuit pack hardware failure. In the event of an incoming OC-1 signal failure, this LED will flash on and off. The green ACTIVE LED lights when the circuit pack is active (carrying service).



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Figure 7-15. 26G2-U OLIU Circuit Pack

A faceplate-mounted universal optical connector allows the 26G2-U OLIU to accept fiber terminated with *ST*, *SC*, or *FC* connectors. The 26G2-U OLIU comes with a 0 dB *ST* buildout. A 10 dB attenuator is required for loopback testing. The 26G2-U OLIU operates over single mode fiber. Various combinations of buildout attenuators and connectors are also available. See Chapter 10, "Technical Specifications" for a list of universal buildout attenuators.

General Description of Operation

The 26G2-U circuit pack accepts eight VT-G signals from the DS1 circuit packs, performs protection switch selections, combines the selected signals to form an STS-1 signal, inserts STS-1 path overhead, inserts SONET transport overhead bytes (line and section) and STS path overhead bytes, and scrambles the resulting signal which drives a separate laser transmitter to create an OC-1 output.

The 26G2-U circuit pack converts a received OC-1 signal back to an electrical STS-1, descrambles and demultiplexes it, and processes the transport overhead. It sends some of the overhead (for example, section data communications channel) via serial data links to the control packs, and processes other bytes (for example framing, parity check) on board. It performs STS-1 pointer processing to guarantee STS-1 frame alignment to the local system clock and STS-1 path overhead and VT1.5 pointer processing. The 26G2-U then performs VT1.5 TSI, multiplexes four VT1.5 signals to VT-Gs, and sends the VT-Gs to the low-speed slots.

Detailed Description of Operation

Figure 7-16 is a block diagram of the 26G2-U OLIU circuit pack.

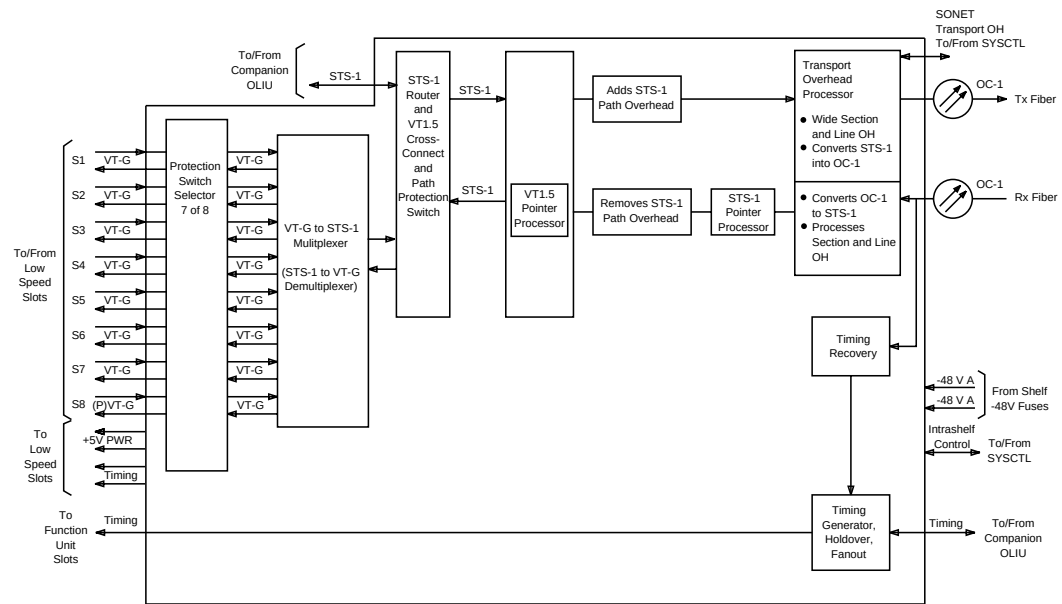


Figure 7-16. 26G2-U OLIU Circuit Pack Block Diagram

Transmission Circuitry

STS-1 Router and VT1.5 Cross-Connect. The STS-1 router is used to select STS-1s for both the transmit and receive directions. All incoming STS-1s are fed to the VT1.5 cross-connect. The outgoing STS-1 may be sourced by this VT1.5 cross-connect or sourced directly by an STS-1 input.

Transmit Direction. In the transmit direction (from the low-speed slots toward the optical interface), the VT-G signals from the low-speed slots are combined into an STS-1 signal. This STS-1 signal may originate from either main OLIU. SONET path overhead is then added to STS-1 sourced by the VT1.5 cross-connect before the signals are sent to the transport overhead processor. The transport overhead processor takes the STS-1 signal, adds SONET transport overhead, then scrambles the signal with a frame synchronous scrambler. The output from the transport overhead processor is in the SONET STS-1 format and is used to modulate the amplitude of the laser transmitter, converting the electrical signal to an NRZ-encoded SONET compatible OC-1 optical signal.

In the OC-3 shelf, the 26G2-U OLIU provides an interface between the STS-1 optical signal and electrical VT-G signals. Three STS-1 paths will be brought out to the backplane for STS-1 routing throughout the OC-3 shelf. The 26G2-U also provides an STS-1 electrical interface to a companion 26G2-U OLIU which allows the two OLIUs to be cross coupled.

Receive Direction . In the receive direction, the optical receiver converts the light pulses from an NRZ-encoded OC-1 signal to equivalent electrical pulses. The output from the optical receiver goes into a timing recovery device. The device recovers received clock and uses it to retime the received data. The transport overhead processor circuit accepts the retimed STS-1 bit stream, frames on the incoming signal, descrambles it, and processes OC-1 transport overhead. The overhead information is sent to the SYSCTL circuit pack.

The STS-1 output from the transport overhead processor and STS-1 path overhead monitoring is sent to the STS-1 pointer processor which performs pointer interpretation. The STS-1 is sent to the VT1.5 pointer processor for column alignment and VT path overhead monitoring. STS-1 path overhead and VT1.5 pointer processing is performed. STS-1s that do not require VT1.5 cross-connections are passed through without VT1.5 pointer processing or STS-1 path overhead termination. The output from the VT1.5 pointer processor is sent to the STS-1/VT1.5 router. The router cross-connects the appropriate VT1.5 tributaries and sends two STS-1 signals to the appropriate Main or Function Unit (MFU) slots and up to 8 VT-Gs to the low-speed slots.

The 26G2-U terminates an STS-1 optical signal, converts it to an electrical signal, frames on and descrambles the signal, and processes the Transport Overhead (TO).

Control Circuitry

The 26G2-U OLIU circuit pack interfaces with the BBG8/BBG8B system controller (SYSCTL) via the intershell control interface. The 26G2-U OLIU provides maintenance elements for reporting the status of the circuit pack, status of the incoming optical and electrical signals, as well as inventory information (*CLEI* code, date of manufacture, etc.). These maintenance elements are used by the SYSCTL for fault detection and isolation. Conversely, the 26G2-U OLIU responds to control signals from the SYSCTL such as STS-1 routing, VT1.5 routing, protection switching, and LED control commands.

The 26G2-U OLIU accesses the SONET transport overhead and routes it to and from the SYSCTL circuit pack.

Timing Circuitry

The 26G2-U OLIU recovers timing from the incoming OC-1 signal and distributes timing to all other circuit packs in the shelf. The 26G2-U OLIU selects either the timing signals recovered from its own incoming OC-1 or those from the companion

26G2-U OLIU for local timing functions. The 26G2-U also has on-board timing capability to support holdover mode. The SYSCTL controls the timing source.

Protection Circuitry

STS-1 and VT1.5 path protection switching, compliant with SONET specifications, is provided. The 26G2-U OLIU is protection switched by the SYSCTL in response to an external command, incoming optical signal failure, or internal equipment fault. The 26G2-U OLIU circuit pack is protection switched by the SYSCTL when the SYSCTL detects a fault on the active 26G2-U OLIU, and the companion 26G2-U OLIU is good.

The 26G2-U OLIU interfaces via VT-G signals with circuit packs in the low-speed slots and via STS-1 signals with the circuit packs in the Main and Function Unit slots. It selects the signals from the service or protection slot of each pair as directed by the SYSCTL.

Fault Detection Circuitry

The 26G2-U OLIU circuit pack has in-service and out-of-service built-in test capability. In-service testing is continuous, and errors are reported when they occur to the SYSCTL via the *intrashelf control bus*. An out-of-service test is performed whenever the OLIU circuit pack is inserted or recovers from a transient failure.

The 26G2-U OLIU has STS-1 and VT1.5 signal degrade protection switching and STS signal degrade protection switching capabilities.

Performance Monitoring

The 26G2-U OLIU provides PM circuitry for the following performance parameters:

- STS-1 section severely errored frame seconds (B1 SEFS) count
- Line coding violation counts (B2 parity)
- Line errored seconds
- STS-1 path coding violation counts (B3 parity)
- STS-1 path errored seconds
- VT path coding violation counts (V5 parity)
- VT path errored seconds.

Power Circuitry

Power for the 26G2-U OLIU circuit pack is provided by two DC-to-DC converters located on the 26G2-U OLIU circuit pack. The converters supply +5 volts. Both A and B –48 volt backplane busses supply power to the converters through diode ORed circuit pack-mounted power select circuits and a circuit pack-mounted fuse.

The 26G2-U provides +5V power to the low-speed slots. Failure of the fuse or converters causes the red FAULT LED to light.

26G2-U OLIU Quick Reference Summary

Transmit Functions

Major transmit functions of the 26G2-U OLIU circuit pack are as follows:

- a. Selects and multiplexes VT-Gs into one STS-1 synchronous payload envelope (SPE).
- b. Adds SONET and STS-1 path transport overhead
- c. Scrambles the STS-1 signal to prepare for optical conversion
- d. Uses a laser transmitter to produce a SONET standard OC-1 optical signal.

Receive Functions

The following are major receive functions of the 26G2-U OLIU circuit pack:

- a. Receives one SONET standard OC-1 optical signal and converts it to an electrical STS-1 signal
- b. Extracts transport and STS-1 path overhead
- c. Processes the STS-1 pointer and frame-synchronizes the STS-1 signals
- d. Processes the VT1.5 pointers and frame-synchronizes the VT1.5 signal
- e. Provides path protection switching
- f. Provides VT1.5/STS-1 signal cross-connections
- g. Sends VT-Gs to the DS1 circuit packs
- h. Processes the received clock and provides a reference clock for the system.

Control Functions

The major control functions are as follows:

- a. Processes transport and path overhead
- b. Stores inventory information (*CLEI* code, date of manufacture, etc.)
- c. Supports VT and OC-1 signal degrade protection switching.
- d. Supports protection switching of circuit packs in the low-speed slots.

Maintenance Signal Functions

The major maintenance signal functions are as follows:

- a. Inserts and detects OC-1 line and STS-1 and VT1.5 path AIS
- b. Inserts STS-1 and VT1.5 path unequipped signal
- c. Inserts and detects line far-end-receive failure (FERF)
- d. Inserts and detects STS-1 path yellow.

28G-U Optical Line Interface (28G-U OLIU)

The 28G-U OLIU circuit pack used in the FiberReach shelf interfaces with a 1310nm OC-3 optical line in the transmit and receive directions. The functionality of the 28G-U is similar to the 26G-type OLIU circuit packs, with add/drop and ring configurations with its VT1.5 and STS-1 TSI capabilities, but supports OC-3 long reach applications.

The distributed feedback laser supplies a NRZ-coded signal. Optical transmit power is automatically adjusted by the laser diode bias current to maintain a constant average optical power output. This mechanism corrects any power variations due to laser aging or environmental conditions.

Fiber access is via a pair of ST, SC, or PC lightguide connectors on the 28G-U OLIU faceplate.

The primary functions of the 28G-U OLIU are to multiplex up to 7 VT-G signals and 2 STS-1 signals, or 3 STS-1 signals into a single OC-3 optical signal in the transmit direction, to demultiplex an OC-3 signal into 3 STS-1 signals or 2 STS-1 signals and up to 7 VT-G signals in the receive direction; to provide for cross-connections among the 3 STS-1s and all VT1.5 signals that may be embedded within any of the STS-1s and provide system clock and frame.

The 28G-U provides timing for the entire wideband shelf. Two modes will be provided, line-timed and holdover. A interconnect cable assembly is required in the FiberReach shelf in order to allow each 28G-U access to the recovered input clock of its companion OLIU. This recovered clock signal is fed to the "on-board" phase lock loop to be used for timing reference switching.

Circuit Pack Overview

The 28G-U is used in the main slots of the DDM-2000 FiberReach Wideband Shelf in a unidirectional path protection switched OC-3 ring configuration. The 28G-U OLIU can only be used in pairs.

28G-U OLIU Faceplate Indicators

The 28G-U provides access to transport overhead bytes in the transmit/receive OC-3 signal.

The red FAULT LED lights on detection of circuit pack hardware failure. In the event of an incoming signal failure, this LED flashes on and off.

The green ACTIVE LED lights when the circuit pack is active (carrying service).

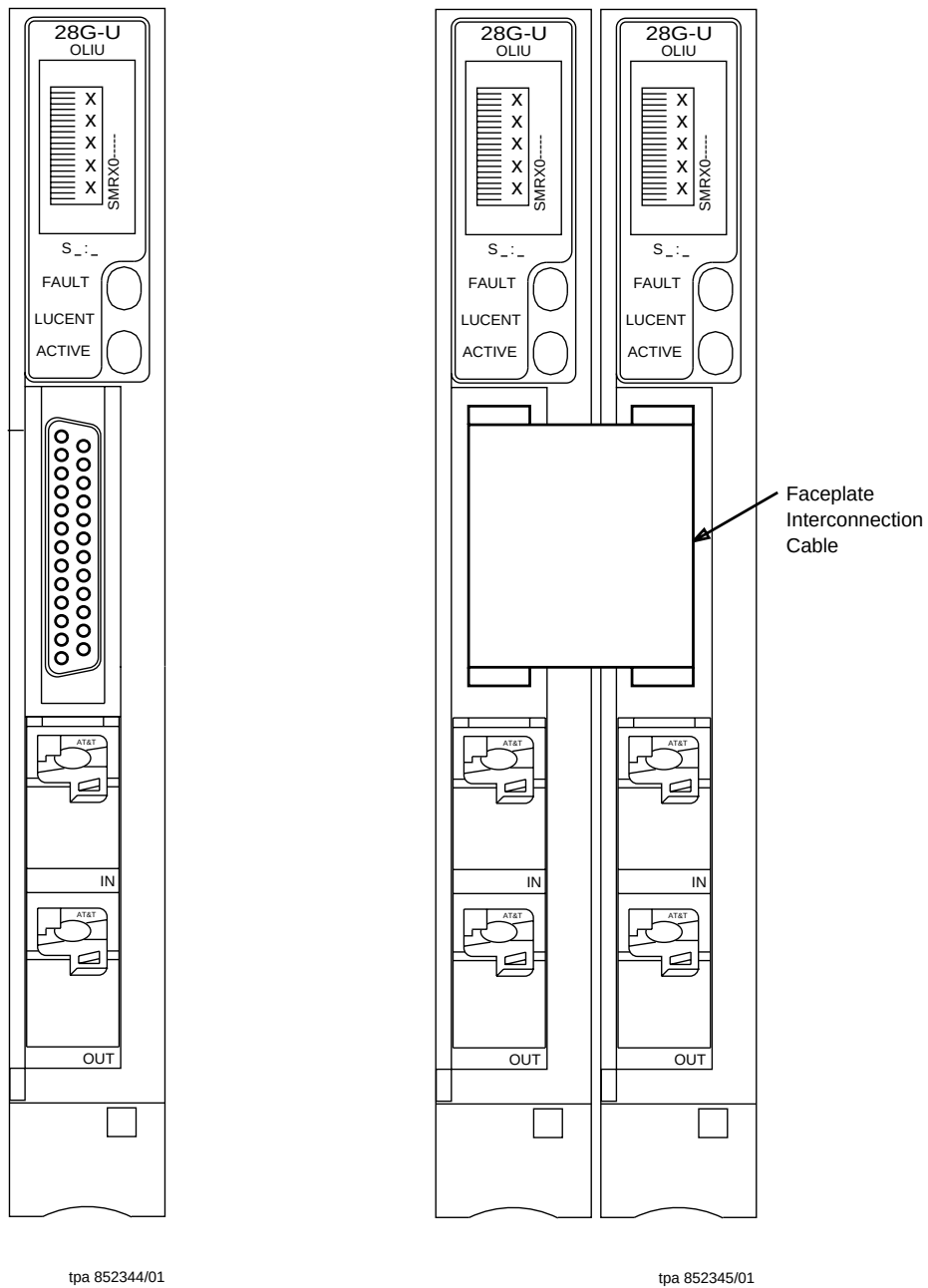


Figure 7-17. 28G-U OLIU Circuit Pack -- 28G-U Pair with Interconnect Cable Assembly

Interfaces

Each 28G-U OLIU has the following interfaces via its backplane connector:

- Nine STS-1 data inputs and nine STS-1 data outputs: Three of each with a companion in adjacent slot
- Eight VTG data inputs and eight VTG data outputs, one of each to each of 8 associated low-speed slots
- Four clock and four frame signals associated with the VTG interfaces, two of each for each direction of transmission
- Two 51.84 MHz clock inputs and two 2/8kHz composite frame sync inputs
- Four 51.84 MHz clock outputs and four 2/8kHz composite frame sync outputs
- Two -48V power interface from the user panel.
- +5V power interfaces to the associated low-speed slots
- Two serial control interfaces with the SYSCTL
- One control interface with the SYSTCL which carries the 192 Kb/s DCC.

Each 28G-U OLIU has the following interfaces via its faceplate:

- Two LEDs
- One OC-3 input
- One OC-3 output
- 64 KHz timing reference input and output (for connection to companion pack via the Interconnection cable).

28G-U OLIU Quick Reference Summary

Transmit Functions

Major transmit functions of the 28G-U OLIU circuit pack are as follows:

- Provides VT1.5/STS-1 signal cross-connections
- Byte-interleaves and scrambles up to three STS-1 signals and the signal is converted to an OC-3 optical signal and output on a single mode optical fiber
- Adds SONET transport overhead and, for up to three VT1.5 cross-connected STS-1s, adds STS-1 path overhead.

Receive Functions

The following are major receive functions of the 28G-U OLIU circuit pack:

- Receives an OC-3 signal and converts it to an electrical STS-3 signal.
- Demultiplexes the STS-3 signal into 3 STS-1s signals

Narrowband Shelf - Introduction

The DDM-2000 FiberReach narrowband shelf is used in conjunction with the wideband shelf to provide sub-DS1 rate services with protected or unprotected DS1 or higher rate services. The narrowband shelf has its own power conversion.

An arrangement of the narrowband shelf is shown in Figure 7-18

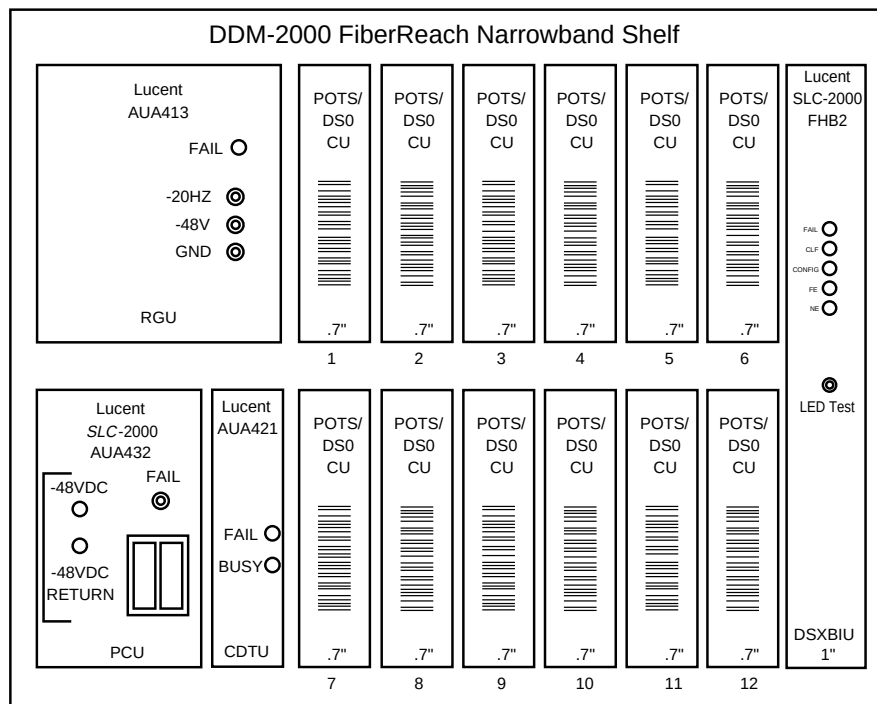


Figure 7-18. Narrowband Shelf

Circuit Packs in the Narrowband Shelf

The circuit packs in the Narrowband shelf are as follows:

- AUA413 ringing generator unit (RGU)
- AUA432 power conversion unit (PCU)
- AUA421 channel and drop test unit (CDTU)
- FHB2 digital signal cross-connect backplane interface unit (DSXBIU)

RGU Circuit Pack Description

This circuit pack provides 20 Hz negative superimposed ringing voltage to satisfy loop applications up to 132 ohms. The RGU receives an input voltage from the power converter unit (PCS) and supplies ringing voltage to three lines simultaneously. Each line may have a maximum load of five ringer equivalent numbers (RENS). An output alarm monitor circuit on the RGU monitors the output ringing for an over- or under-voltage condition and activates a red fail LED when either condition occurs. The circuit pack is protected from lightning and power surges by the output surge protection circuit.



NOTE:

The AUA423 is available to be placed in a Narrowband Shelf where any channel units are used whose range exceeds 132 ohms.

RGU Faceplate Controls and Indicators

The RGU circuit pack faceplate controls and indicators are shown in Figure 7-19

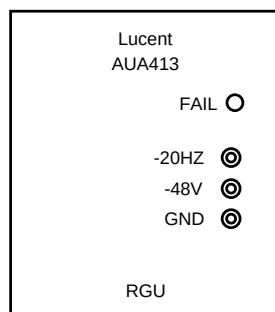


Figure 7-19. AUA413 RGU Circuit Pack

PCU Circuit Pack Description

This circuit pack is located on the Narrowband shelf and accepts -48V DC power. It converts -48V DC to +5 and -5V DC, as well as -25.5V DC for use by various channel units that may be in the Narrowband service card slots. The PCU provides power to all the circuit packs on the Narrowband shelf by converting incoming -48V DC power to voltages required for the various circuit packs.

The BGW1 PSU, miscellaneously mounted with the DDM-2000 FiberReach shelf, terminates a 60V AC from a network-provided source (for example, centralized power). The PSU converts incoming 60V AC to -48V DC for use by the Wideband and Narrowband shelves. In applications where -48V DC is readily available, The PSU is not required.

PCU Faceplate Controls and Indicators

The PCU circuit pack faceplate controls and indicators are shown in Figure 7-20.

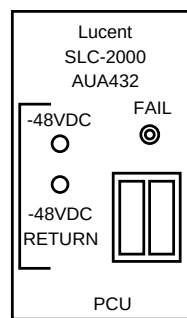


Figure 7-20. AUA432 PCU Circuit Pack

CDTU Circuit Pack Description

The Channel and Drop Test Unit (CDTU) circuit pack provides the remote end terminations and detectors required to support end-to-end channel testing of two-wire locally-switched services, such as POTS, coin, and multiparty services. When a channel unit test request is received on the narrowband shelf, the DSXBIU instructs the channel unit associated with the channel under test to operate its test relay. The DSXBIU then instructs the CDTU that a test is occurring, and the CDTU then performs a drop test and reports the results back to the DSXBIU. The CDTU provides channel test terminations in sequence based on results from the channel test detectors and instructions from the DSXBIU.

- Hazardous voltage
- Foreign voltage
- Metallic leakage
- Receiver off-hook
- Lack of continuity to the station set

The circuit pack contains a red fail LED to indicate an internal failure in the CDTU circuit pack and a green busy LED to indicate that a test session is active.

CDTU Faceplate Controls and Indicators

The CDTU circuit pack faceplate controls and indicators are shown in Figure 7-21.

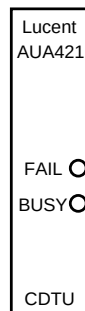


Figure 7-21. AUA421 CDTU Circuit Pack

DSXBIU Circuit Pack Description

The Digital Signal Cross-Connect Backplane Interface Unit (DSXBIU) is a Narrowband shelf circuit pack that operates as the local controller for the Narrowband Shelf and multiplexes the DS0 signals from the channel units to DS1 interfaces. The DS1 interface is fed from the DSXBIU to a DS1 circuit pack on the Wideband shelf. Software for the DSXBIU may be downloaded from the SLC-2000 host digital terminal.

The DSXBIU interfaces to the 12 channel units on the Narrowband shelf, providing provisioning and inventory information, as well as clock generation and synchronization. The DSXBIU communicates with the common units via a serial protocol microwire link. A separate microwire RS-422 interface connects with the power supply unit. A bank control link on the DSXBIU is used to communicate with the channel units.

DSXBIU Faceplate Controls and Indicators

The DSXBIU circuit pack faceplate controls and indicators are shown in Figure 7-22.

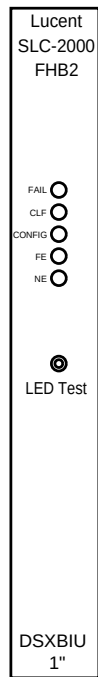


Figure 7-22. FHB2 DSXBIU Circuit Pack

Channel Units in the Narrowband Shelves

Channel Unit Circuit Pack Descriptions

Table 7-1 lists the circuit packs that can be housed in the 12-channel unit slots of the narrowband shelf. All circuit packs within the DDM-2000 FiberReach narrowband shelf are unprotected. These channel units are the same as those used in the *SLC*[®]-2000 Access System Multi-Services Distant Terminal (MSDT). Table 7-1 also indicates which circuit packs are available with each *SLC*[®]-2000 software release.

Table 7-2. DDM-2000 FiberReach Narrowband Shelf Channel Unit Plug-Ins

Product Code	Functional Name	Available With SLC-2000 Release
AUA25B*	POTS/M SPOTS CU CF (Discontinued Availability)	4.4 or higher
AUA27*	POTS CF + OHT (VerSus feature not available)	4.4 or higher
AUA39	POTS/SPOTS CU CS + OHT/CLASS	4.4 or higher
AUA41	4W VF CF	4.4 or higher
AUA41B	4-Wire CF, (FXS/ETO/DX)	4.4 or higher
AUA42*	E SPOTS CU at COT (Discontinued Availability)	4.4 or higher
AUA42B	E SPOTS CU at COT	4.4 or higher
AUA43B	E SPOTS CU CF	4.4 or higher
AUA44*	4-Wire VF CS (Includes TDM Signaling) (Discontinued Availability)	4.4 or higher
AUA44B	4W VF CS I (Includes TDM Signaling)	4.4 or higher
AUA45B	Dual Ringing Repeater (Manual Ring)	4.4 or higher
AUA52	OCU Dataport (Discontinued Availability)	4.4 or higher
AUA52B	OCU Dataport, All-rate	4.4 or higher
AUA53	Coin CF	4.4 or higher
AUA53B	Single Coin CF	4.4 or higher
AUA54	4W VF Types I and II E&M (Discontinued Availability)	4.4 or higher
AUA54B	4W VF Types I and II E+M/PLR	4.4 or higher
AUA55	Multiparty CF	4.4 or higher
AUA55B	Multiparty CF (Discontinued Availability)	4.4 or higher
AUA56	DID/DPT (Discontinued Availability)	4.4 or higher
AUA56B	Dual DID/DPT	4.4 or higher
AUA57	FSR CF	4.4 or higher
AUA59	SPOTS CU CF + OHT/CLASS (Discontinued Availability)	4.4 or higher

* Some engineering restrictions (for example, power limitations) must be considered when using this channel unit. Refer to Section 6, "System Planning and Engineering," for more information.

Table 7-2. DDM-2000 FiberReach Narrowband Shelf Channel Unit Plug-Ins (Contd.)

Product Code	Functional Name	Available With SLC-2000 Release
AUA75*	Private Line Automatic Ring (PLAR)	4.4 or higher
AUA93	ISDN BRITE II, ANSI-U*	4.4 or higher
AUA94	ISDN Dual ANSI-U	4.4 or higher
AUA150*	POTS/SPOTS CU CF + OHT/CLASS	4.4 or higher
AUA150C	Dual POTS/SPOTS CF + OHT/CLASS + ALC	4.4 or higher
AUA152 [†]	OCU Dataport (TR-08/INA VRTs) (Discontinued Availability)	4.4 or higher
AUA158B	ALC POTS CF + OHT/ CLASS (Discontinued Availability)	4.4 or higher
AUA158C	ALC POTS CF + OHT/CLASS	4.4 or higher
AUA159B	ALC POTS/SPOTS CF + OHT/CLASS (modified OHT loss)	4.4 or higher
AUA159C	ALC POTS/SPOTS CU + OHT/CLASS	4.4 or higher
AUA178	ALC C-POTS CF OHT/CLASS	4.4 or higher
AUA179	ALC POTS/SPOTS CU + ALIC5 + OHT/CLASS	4.4 or higher
AUA200	2-wire switched 56-kb/s DPX	4.4 or higher
AUA232	RS-232 DSU Dataport	4.4 or higher
AUA252	OCU Dataport w/SW56 (Discontinued Availability)	4.4 or higher
AUA293	ISDN BRITE III, ANSI-U	4.4 or higher
MCU [‡] 5205	Metallic Channel Unit (Tollgate)	4.4 or higher
SPQ®300	POTS CS + OHT/CLASS + LSAS	4.4 or higher
SPQ340	SLC®-2000 ALC POTS/SPOTS® CU CS + OHT/CLASS + LSAS	4.4 or higher
SPQ400*	SLC-2000 ALC POTS CF + OHT/CLASS	4.4 or higher
xSPQ400*	SLC-2000 ALC POTS CF + OHT/CLASS	4.4 or higher
SPQ400*B	ALC POTS CF + OHT/CLASS	4.4 or higher
SPQ401*	SLC-2000 ALC POTS CF + OHT/CLASS	4.4 or higher
SPQ401B	SLC-2000 POTS/SPOTS CU CS+DHT/CLSS + LSAS VFDE	4.4 or higher
SPQ419	Quad Coin CF	4.4 or higher
SPQ429	Quad EBS P-Phone	4.4 or higher
SPQ440	Quad SLC-2000 ALC POTS/SPOTS CU (CF + OHT + CLASS + CLSS	4.4 or higher
SPQ440B	Quad POTS/SPOTS ALC, CF + OHT + CLASS + CLSS	4.4 or higher
SPQ440C*	Quad Extended Range SPOTS	4.4 or higher

Table 7-2. DDM-2000 FiberReach Narrowband Shelf Channel Unit Plug-Ins (Contd.)

Product Code	Functional Name	Available With SLC-2000 Release
SPQ440D*	Extended Range SPOTS; VFDE	4.6 (available by 2Q98)
SPQ442	SLC-2000 E SPOTS CU CS	4.4 or higher
SPQ443*	SLC-2000 E SPOTS CU CF	4.4 or higher
SPQ450	ALC POTS/SPOTS CU CF + OHT/CLASS ALIC5 + LSAS	4.4 or higher
SPQ452	SLC-2000 OCU Dataport	4.4 or higher
SPQ453	Dual Coin CF	4.4 or higher
SPQ456	Quad DID	4.4 or higher
SPQ478	SLC-2000 ALC C- POTS CF OHT/CLASS	4.4 or higher
SPQ494*	Quad ISDN ANSI-U	4.4 or higher
SPQ909	Lower-power POTS CF + OHT/CLASS	4.4 or higher

* Registered trademark of American National Standards Institute, Inc.

† GTE only

‡ Trademark of Tollgate Communications, Inc.

Universal Optical Connector

Circuit packs with optical interfaces have a universal optical connector. This connector, shown in Figure 7-23, is a two-part connector consisting of a faceplate-mounted block and an optical buildout. The faceplate block optionally supports an *ST*, *SC*, or *FC*-type optical buildout.

A 0 dB *ST*-type connector is shipped as standard. Optional *SC*, or *FC* 0 dB, or attenuated buildouts can be ordered separately. See Chapter 10, "Technical Specifications" for a list of universal buildout attenuators.

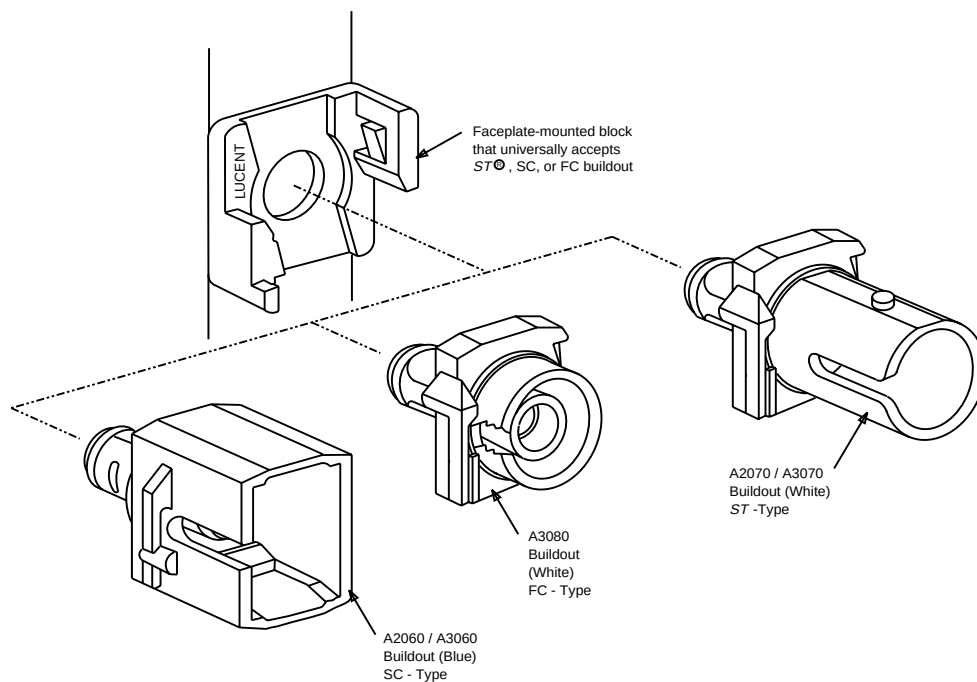


Figure 7-23. Universal Optical Connector

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Overview

This chapter describes the administration and provisioning features of the DDM-2000 FiberReach Multiplexer narrowband shelf and wideband shelf. The following topics are described in addition to the administration and provisioning features:

- Multiplexing and mapping
- Cross-connection provisioning
- Listing of provisionable parameters with their ranges and default values.

Administration

Version Recognition

The DDM-2000 FiberReach Multiplexer provides automatic version recognition of all hardware, firmware, and software installed in the system. Each circuit pack *CLEI*^{*} code, equipment catalog item (ECI) code, apparatus code and series number, and serial number is stored on the circuit pack and is accessible by the system controller via the craft interface terminal (CIT). The system controller also

* COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

reports the software version for the system. Refer to the **rtrv-eqpt** command in Chapter 11, "Commands and Reports."

Software Upgrades

The DDM-2000 FiberReach wideband shelves provide an in-service software installation capability to update the generic program in local and remote systems. In-service software installation is done via the CIT port on local systems and via the host on remote systems. Upgrades are distributed on *MS-DOS* formatted diskettes, containing the new software and an installation program. These software upgrades are the primary mechanism to add new feature enhancements to the in-service DDM-2000 FiberReach network. All software upgrades are in service and do not affect any provisionable parameters. For example, cross-connections are left unchanged by the software upgrade.

The software upgrade can be performed locally via the CIT port on the local FiberReach wideband shelf or remotely via the SONET DCC. In either case, the procedure is straight forward. The technician connects an *MS-DOS* personal computer serial port to the CIT port on the DDM-2000 Fiber Reach (for local upgrades) or to the CIT port of another DDM-2000 in the subnetwork (for remote upgrades), starts the installation program, and is prompted with a few safety questions before the upgrade installation actually begins. After the technician confirms to proceed, the PC takes over the process and completes the installation. When finished, the DDM-2000 FiberReach shelf automatically restarts with the new software.

On command, the new software may be copied from the upgraded system to other systems over the DCC, allowing software version changes without having to dispatch technicians to any remote site.

Remote Software Download and Copy

System software can be downloaded using a PC through the EIA-232-D interface on the user panel to another system connected to the local system via the SONET DCC. The DDM-200 FiberReach Multiplexer can upgrade the system software while in-service. DDM-2000 FiberReach Multiplexers use flash erasable programmable read-only memory (flash EPROM) chips to provide this capability. Software can be downloaded from a PC to a remote NE even when the local shelf is a different member of the DDM-2000 product family or *SLC-2000* from the remote shelf (for example, a DDM-2000 OC-12 at the CO and a DM-2000 FiberReach at the RT site). Remote software download and copy is also supported in multi-vendor subnetworks, but only between DDM-2000 Multiplexers.

Data Base Backup and Restoral

The DDM-2000 FiberReach data bases can be backed up and restored from a file using CPro-2000 to protect valuable system information after a catastrophic failure. Catastrophic failures may include:

- Shelf destruction by fire, hurricane, flood, or other natural event or intentional damage
- Cabinet housing the shelf damaged by a vehicle
- Manual errors during provisioning or maintenance.

The backup can be done using CPro-2000 through the CIT port on any shelf in the subnetwork to all DDM-2000 FiberReach shelves in the same subnetwork or from the host. The information that can be backed up and restored includes:

- Major NE provisionable parameters on the circuit packs and line ports
- Cross-connections
- Performance monitoring (PM) threshold parameters.

In addition, the following information is backed up for reference only, and will not be restored by CPro-2000:

- Target identifier (TID)
- Software version
- System equipage
- Software readable hardware switch settings
- User names.

These parameters are either not settable or should be set manually before or after restoration by CPro-2000.

The data base backup and restoral capability of CPro-2000 can be used to significantly simplify the installation of several shelves having similar or identical configurations. See 365-576-130, CPro-2000 User Manual for more information.

ITM SNC

All the backup and restore features are also available with the Integrated Transport Management Subnetwork Controller (ITM SNC), Release 6.0. Refer to 107-564-270, *Integrated Transport Management (ITM) SubNetwork Controller (SNC), User Guide*, for additional information.

Security

DDM-2000 FiberReach Multiplexers provide security capabilities to protect against unauthorized access to the system through the CIT and data communications channel (DCC). When security is enabled (default is disabled for

the CIT and DCC), four types of users are allowed access to the system with a valid login and password:

- **Privileged Users:** These users have access to all commands, including restricted commands. Privileged users may set system security and assign login and password pairs to general and reports-only users. A maximum of three privileged user logins are allowed.



NOTE:

A maximum of 100 non-privileged user logins are available. The types of non-privileged logins are listed below.

- **General Users:** These users have access to all commands, except restricted commands.
- **Maintenance Users:** These users have access to basic commands and maintenance commands only (for example, loopbacks and forced switches) but cannot execute any provisioning commands or restricted commands.
- **Reports-Only Users:** These users may only obtain reports and execute several basic commands.

A provisionable inactive timeout is available for each CIT and DCC access port. This enables automatic termination of inactive or unattended sessions. An additional lockout feature is available that prohibits access to all users except privileged users.

Each user has an individual login and password, and each user selects and maintains his/her own password.

The TL1 interfaces to operations systems provides a security option feature which allows the administrator to control access by general users (for provisioning and retrieval) and retrieve-only users.

When the system is first initialized, three default logins and passwords are provided which must be changed by a privileged user before security is enabled. At initialization, privileged users are those users who use the default logins and passwords. Replacement of the SYSCtl circuit pack causes the system to default back to the default logins and passwords. Up to 100 logins and passwords can be added, deleted, and changed by three authorized privileged users. Login and password security can be enabled or disabled. Timeouts can be provisioned independently for the CIT interface and the synchronous optical network (SONET) section DCC. For more information on provisioning, see System Turnup/Circuit Order in the TOP section of this manual.

Authorized privileged users can establish general user and reports-only user logins using the **set - lgn** command.

The following commands are restricted to privileged users over the CIT and DCC interfaces. See 824-102-147, *Lucent 2000 Family of Products Operations Interworking Guide* for TL1/X.25 command access privileges.

- **init-sys**—Initialize System
- **rstr-passwd**—Restore login and password file
- **rtrv-lgn**—Retrieve Login
- **rtrv-passwd**—Retrieve login and password file
- **set-feat**—Set Features
- **set-fecom**—Set Far-End Communications
- **set-lgn**—Set Login
- **set-secu**—Set Security

When security is enabled, the following commands become restricted to privileged users only:

- **ent-ulsdcc**—Enter Upper Layer Section DCC
- **init-pm**—Initialize Performance Monitoring
- **ins-prog**—Install Program
- **cpy-prog**—Copy Program
- **reset**—System Reset
- **set-date**—Set network element (NE) Date and time
- **set-ne**—Set NE name.

Reports-only users can execute the following commands: **? (help)**, **logout**, **rlgn**, **set-passwd** (their own), **toggle**, and all **rtrv** commands except, **rtrv-lgn**, and **rtrv-passwd**.

For details on these and other commands, see Chapter 11, "Commands and Reports."

Software Compatibility

All DDM-2000 FiberReach Multiplexers connected in the same maintenance subnetwork must be running compatible software. For more information on software compatibility, refer to the software compatibility tables in this chapter.

Narrowband Shelf Administration

Software Downloads and Upgrades

Software is downloaded into the narrowband shelf DSXBIU from the *SLC-2000* Host via the ESF datalink of the DS1 signals that carry the narrowband services. Upgrades to the software are distributed on *MS-DOS* formatted diskettes that contain the new software and an installation program for installing the software. These software upgrades are the mechanism to upgrade from one system software release to the next. All software upgrades maintain the provisionable parameters of the previous software generic (for example, cross-connections are left unchanged by the software upgrade).

The **ins-prog** command supports software installation from a personal computer and the **cpy-prog** command supports software installation from one FiberReach shelf to another FiberReach shelf.

Software can be downloaded locally or remotely from an *MS-DOS* PC using the CIT port on a *SLC-2000* Access System or *DDM-2000* Multiplexer. The software is first loaded into the *SLC-2000* host which, in turn, downloads to the narrowband DSXBIU circuit pack. After the DSXBIU software is installed, the DSXBIU resets and all MSDT calls are dropped.

Security

The narrowband shelf OAM&P functions are provided by the *SLC-2000* host, which are supported through several interfaces including the user interface panel, the CIT, and the TL1 interface to operations systems. In addition to these interfaces, remote access is available via the SONET DCC to provide control to the *DDM-2000* OC-3 Multiplexer network, and an embedded operations channel (EOC) interface is available to provide control to the local digital switch for TR303 functions.

The *SLC-2000* Access System offers security against unauthorized access via its CIT port or through a remote operations port. The use of security is provisionable via the front CIT port, the rear CIT (modem) port, and through the SONET DCC. Three user levels are supported:

- Privileged Users: These users have full read/write access to all information on the system, including passwords.
- Standard Users: These users have read/write access to system provisioning and maintenance information.
- Reports-Only Users: These users have read access to system information but no ability to change provisioning or maintenance parameters.

Controller Maintenance and Memory Administration

Controller Maintenance

The system controller (SYSCTL) provides control functions for the DDM-2000 FiberReach Multiplexer. The SYSCTL circuit pack provides CIT interfaces and telemetry byte-oriented serial (TBOS) interfaces and coordinates protection switching, as well as all shelf maintenance and provisioning activities. The SYSCTL also provides a communications interface to remote shelves via the DCC bytes in the OC-1 section overhead. The SYSCTL has a processor with volatile random access memory (RAM), and nonvolatile memory.

The DDM-2000 FiberReach Multiplexer is designed so that SYSCTL failures do not affect transmission. That is, no hits or errors will occur on any traffic as a result of a SYSCTL circuit pack failure. A SYSCTL failure does result in the loss of automatic protection switching. However, if a transmission circuit pack fails before a SYSCTL failure, the protection switch will remain effective during the SYSCTL failure and service is preserved. This means that if an active transmission circuit pack should fail while the SYSCTL is failed, a protection switch cannot be done and service carried by the failed circuit pack will be affected.

Memory Administration

All transmission affecting parameters that are set by software, such as bipolar 8-zero substitution/alternate mark inversion (B8ZS/AMI) encoding on DS1 interfaces and cross-connect assignments, are stored in nonvolatile memory on the SYSCTL circuit pack and on the appropriate transmission circuit packs. When the shelf is powered up or the SYSCTL circuit pack is replaced, the shelf's transmission values are automatically uploaded to the SYSCTL. When a transmission circuit pack is replaced, provisioning data stored on the SYSCTL is automatically downloaded to the replacement circuit pack. Manual action is not required to maintain system provisioning after a circuit pack is replaced.

Certain non-service-affecting provisioned data, such as alarm delay, is stored only on the SYSCTL circuit pack. This means that when a SYSCTL circuit pack is replaced, the new SYSTCL circuit pack should be initialized by pressing the INIT button during the 10-second interval while the CR alarm LED is flashing after the SYSCTL circuit pack is inserted. This action is the same as entering the **init-sys:sysctl** command which sets the SYSCTL circuit pack parameters to their default values. Refer to the **init-sys** command in Chapter 11, "Commands and Reports" and to "Install or Replace SYSCTL" in the TOP section of this manual. If parameters other than the default values are needed, the values must be entered using the CIT. If the INIT function is not performed, whatever values that are stored in nonvolatile memory on the new SYSCTL circuit pack are used. Failure to follow the proper procedure may not cause transmission errors or

loss of service but could affect maintenance. For example, an incorrect TID could produce confusing TL1 reports to the operations system (OS).

Service Affecting Actions

Although the DDM-2000 FiberReach Multiplexer is designed to minimize loss of service due to equipment failure or human action, there are certain controller related actions that can cause a loss of provisioning data and possibly loss of service. These actions include:

- Replacing a transmission circuit pack when the SYSCTL is failed or removed can result in a loss of provisioning data and loss of service
- Replacing a transmission circuit pack in a shelf without power can result in a loss of provisioning data. Loss of service may continue on channels associated with the replaced circuit pack after the shelf is powered up.
- Executing the command **init-sys:all** sets all provisioning data, including cross-connect provisioning to default values. This causes loss of service on any channel connected with non-default cross-connections.
- Failing to disable the SYSCTL circuit pack before it is removed in accordance with TOP procedures could result in unexpected events; however, no loss of service occurs. Refer to the "Install BBG8/BBG8B SYSCTL New Shelf" and "Replace Circuit Pack" procedures in the TOP section of this manual.
- Provisioning data is maintained through a software download to the SYSCTL. Replacing the SYSCTL circuit pack with incompatible software and intentionally overriding the software check could result in a loss of data.

DS-1/T1 Multiplexing and Mapping

The DDM-2000 FiberReach Multiplexer uses the floating virtual tributary (VT) mode, asynchronous mapping for clear channel DS1 transport. Each DS1 signal is mapped to a VT1.5 signal; four VT1.5s are byte-interleaved to form a VT-G signal; and seven VT-Gs are multiplexed to a VT-structured STS-1 signal. The **ent-crs-vt1** command is used to enter cross-connections between VT1.5 channels in the OC-1 interface and DS1/T1 ports. There are no default cross-connections. See Chapter 11, "Commands and Reports" for more information on this command.

In the opposite direction, a received OC-1 signal is converted back to the electrical STS-1 signal. The STS-1 is demultiplexed to seven VT-Gs; each VT-G is separated into four VT1.5s; and a DS1 signal is extracted from each VT1.5.

The mapping of a DS-1 to an OC-1 signal requires the port address being connected with a time slot in the optical line interface unit (OLIU) circuit pack. Optical time slots are identified in three parts: — STS-1 in the OC-1*, VT-G in the STS-1, and VT1.5 in the VT-G. *

Provisioning

Wideband Shelf Provisioning

The DDM-2000 FiberReach Multiplexer allows the user to customize many system characteristics through its provisioning features. Provisioning parameters are set by a combination of on-board switches and software control.

Parameters are likely to vary from installation to installation and parameters that will not change in service (for example, DS1 line buildouts) are set with on-board switches. Other parameters that require a wide range of options or in-service changes are set under software control. For example, performance-monitoring thresholds can be customized for each installation using the CIT.

Default Provisioning

Installation provisioning is minimized with default values set in the factory. Each parameter is given a default. The defaults for software parameters are maintained in the SYSCTL circuit pack. All provisioning data is stored in nonvolatile memory to prevent data loss during power failures.

* For the OC-1 interface, the STS-1 number is always 1.

Remote Provisioning

Software control of many provisioning parameters allows remote provisioning of the DDM-2000 FiberReach Multiplexer. This feature is provided especially for parameters likely to change in service, in support of centralized operations practices.

Automatic Provisioning on Circuit Pack Replacement

Replacement of a failed circuit pack is simplified by automatic provisioning of the current circuit pack values. The SYSCTL circuit pack maintains a provisioning map of the entire shelf, so when a transmission circuit pack is replaced, the SYSCTL circuit pack automatically downloads values to the new circuit pack. If the SYSCTL circuit pack is ever replaced, provisioning data, except for the line buildout (LBO) settings, from every other circuit pack in the shelf is automatically uploaded to the nonvolatile memory of the new SYSCTL circuit pack.

Feature Packaging Provisioning

Certain software features are available only through a special licensing agreement with Lucent. Currently VT performance monitoring and DS1 performance monitoring are available for the DDM-2000 FiberReach Multiplexer. These features are enabled by privileged user logins according to the licensing agreement, using the **set-feat** command and can be reviewed using the **rtrv-feat** command. These features are optional and may not be active on all systems. For details on these and other commands, refer to Chapter 11, "Commands and Reports."

Open Systems Interconnection (OSI) Provisioning

DDM-2000 FiberReach supports OSI interworking between DDM-2000 FiberReach, OC-3, and OC-12 Multiplexers. In a given subnetwork, the network elements (NEs) on each side of an optical span must have their "userside/networkside" (OSI terminology) parameters provisioned to opposite values. These values are set using the **set-fecom** command on the DDM-2000 shelves. Local procedures should determine the "user" and "network" side of a span. For example, the CO terminal can be designated the network side and the RT site the user side. It does not matter as long as the two sides are opposite values. See the **set-fecom** command page in Chapter 11 for more details.

The network service access point (NSAP) is a multiple part address that uniquely identifies a NE for OSI interworking purposes. A unique NSAP is programmed into the FiberReach BBG8 SYSCTL circuit pack at the factory. This default NSAP value is adequate to operate current networks. NSAP provisioning, using the

ent-ulsdcc command, will be used as part of future upgrade procedures. See the **ent-ulsdcc** command in Chapter 11, "Commands and Reports" for more information on NSAP provisioning.

When a NE is removed from a subnetwork, either by physically removing it or disabling the SONET DCC, the **dlt-tadrmap** command should be used on the NE that is the directory services network element (DSNE)* for the network to remove the NE from the subnetwork database so alarms can be cleared.

DCC Provisioning

The data communications channel (DCC) uses the SONET overhead to communicate between network elements. There is one DCC for the "m1" interface and another DCC for the "m2" interface.

Port State Provisioning

Port state provisioning is a feature provided on DDM-2000 Multiplexers that suppresses alarm reporting and performance monitoring by supporting multiple states (automatic, in-service, and not-monitored) for low speed (DS1/T1) ports.

Ports without signals (undriven) are in the automatic (AUTO) state until changed to the in-service (IS) state when a signal is present. The **set-state-t1** command allows a user to change the state of a port to the not monitored (NMON) state or from the NMON state to the AUTO state. The **rtrv-state-eqpt** and **rtrv-t1** commands allow a user to retrieve current port states. The **upd** command allows a user to change the port state of all undriven ports from IS to AUTO.

Channel State Provisioning

Channel state provisioning is a feature provided on DDM-2000 Multiplexers that suppresses reporting of alarms and events for VT1.5 and STS-1 channels during provisioning by supporting multiple states at the OC-1 ports (automatic, in-service, and not-monitored) for these channels. The **rtrv-state-vt1** and **rtrv-state-sts1** commands allow a user to retrieve current channel states.

While an end-to-end circuit is being set up, particularly during cross-connection provisioning, transient maintenance signals may result. Without automatic channel state provisioning, these are reported as alarms or events. The technicians are expected to ignore these transient alarms and initiate corrective action only if the alarms persist after the provisioning is completed. To avoid the confusion created by this, DDM-2000 Multiplexers provide automatic channel state provisioning.

* The DSNE for the network may be a DDM-2000 OC-3 or OC-12 Multiplexer or an FT-2000 OC-48 Lightwave System Terminal.

A VT1.5 or STS-1 channel stays in the default automatic (AUTO) state until a valid signal (a framed non-AIS or non-LOP signal) is received on that channel. While in AUTO state, no alarms or events are reported on the channel by the DDM-2000 Multiplexer. On receiving a valid signal, which occurs when the end-to-end circuit is completely provisioned, the channel automatically changes to the IS state, and normal alarm and event reporting starts. An additional state, NMON, is also supported in which alarm and event reporting is suppressed regardless of the validity of the signal being received on the channel. Like the port state provisioning capability provided for DS1 ports, the user can use CIT or TL1 commands to manually change a channel from IS or AUTO to NMON, and from NMON to AUTO. A direct change from NMON to IS is not allowed. See the **set-state-sts1**, **set-state-vt1**, **rtrv-state-sts1**, **rtrv-state-vt1** and **upd** commands.

Line State Provisioning

For DDM-2000 FiberReach, OC-1 ring interfaces can be set manually to NMON or IS.

AIS or Unequipped Provisioning

In DDM-2000 FiberReach the shelf can be optioned to send an "STS/VT-path unequipped" signal instead of path AIS when a DS1 pack is removed or when a cross-connection is removed.

Software Compatibility

Table 8-1 lists the SONET software compatibility within a subnetwork for the Lucent 2000 Product Family systems. The table lists all possible software combinations. Combinations not listed are not supported.

Table 8-1. Software Compatibility

Release	FiberReach Release 2.2 with 26G-U	FiberReach Release 2.2 with 28G-U
OC-3, R7.2	X*	X
OC-3, R8.0	X*	X*
OC-3, R8.1	X*	X*
OC-3, R9.1	X	X
OC-3, R11.0	X	X
OC-3, R11.1	X	X
OC-12, R5.1	X*	X
OC-12, R5.2	X*	X
FT-2000, R7.2	X*	X
ITM SNC, 6.0	X	X
CPro-2000, R6.0	X	X
CPro-2000, R6.1	X	X

* FiberReach shelf is not directly connected.

Narrowband Shelf Provisioning

Channel Unit Provisioning

The FiberReach narrowband shelf consists of upper and lower subshelves for channel units. Each subshelf can contain up to 6 channel units each, for a total of 12 channel units per narrowband shelf. Each channel unit in the Narrowband Shelf requires the following DS0 timeslots depending on the type of service provided by the channel units.

- POTS or Special Services: up to 4 DS0 time slots per channel unit
- ISDN services:(2B&D): up to 9 DS0 time slots per channel unit

Refer to 363-208-001, *SLC®-2000 Access System User/Service Manual*, for additional details on channel unit provisioning.

DDM-2000 FiberReach Narrowband Shelf ONU (Release 4.4 and Later)

Using the CIT, you can provision each DSX-1 signal feeding a *V-DT* in the NBS to any one of the following two modes:

- **Quad Mode:** In this state, the DSXBIU continuously attempts to find or frame-up on the DSX-1 input, establish the message link, alarm any DSX-1 faults, and provide service to a set of six-channel unit slots in the NBS. You can also provision the quad mode for 12-line service.
- **Octet Mode:** In this state, the DSXBIU continuously attempts to find or frame-up on the DSX-1 input, establish the message link, alarm any DSX-1 faults and provide service to a set of three channel unit slots in the NBS. In the octet mode, each channel unit slot can support eight DS0s instead of the four DS0s supported in the quad mode. The octet mode allows the use of the maximum number of ten ISDN lines in the NBS when using the *SPQ494* quad ISDN channel units along with the *AUA94* dual ISDN channel units. You can provision the octet mode for 24-line service only.



NOTE:

See Chapter 2 in the *SLC-2000 Access System Applications, Planning and Ordering Guide* for a description of V-MSDT or V-DT.

Figure 8-1 shows a basic configuration with the *SLC-2000* HDT hosting an NBS in the octet mode.

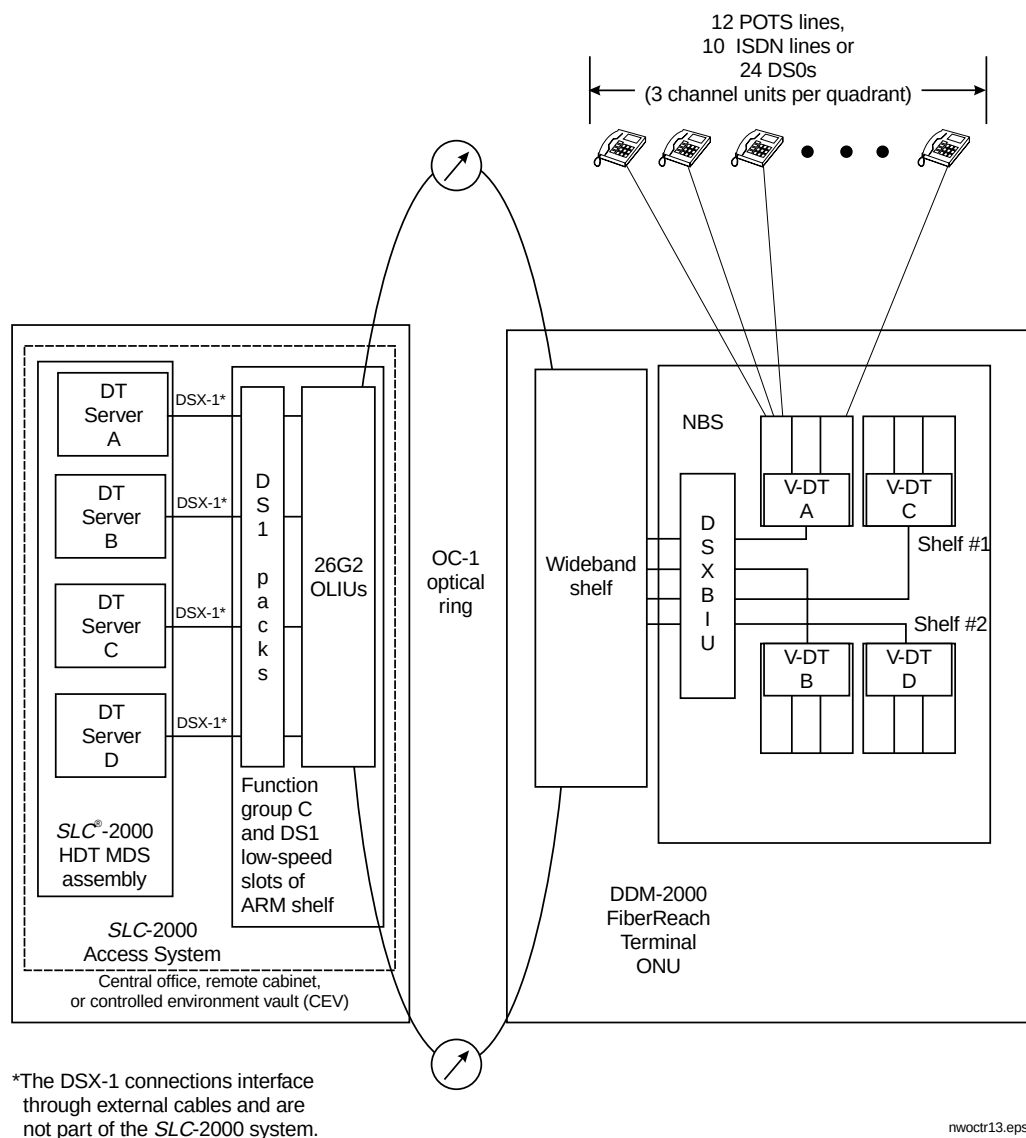


Figure 8-1. Basic Octet Mode Configuration

When in the octet mode, each of the four three-slot V-DTs can contain *SPQ494* quad ISDN channel units in the first two slots. The third slot can contain an *AUA94* dual ISDN channel. This will allow the V-DT to support a total of ten ISDN lines with each line offering 2B+D service. The third slot can also contain any of

the other channel units available for the NBS. This allows the V-DT to offer a combination of services, depending on the channel units installed. Therefore, an NBS with all quadrants in octet mode can provide 40 ISDN lines.

To provide ISDN 2B+D service in the octet mode, you must manually provision the cross-connections using the SLC-2000 HDT CIT. Figure 8-2 shows the following process of how the V-DT uses the 24 time slots of its DSX-1 feeder signal to support two *SPQ494* quad ISDN channel units and an *AUA94* dual ISDN channel unit. This combination can produce ten ISDN lines providing 2B+D service:



NOTE:

The time slot representation shown in Figure 8-2 is used to explain the concept of how the system uses the 24 time slots of a DSX-1 signal to build the 2B+D ISDN lines. The actual time slots are assigned by the system and vary according to system requirements. However, the concept for building the 2B+D ISDN lines is the same as described below.

- The ISDN lines providing 2B+D service are *built* as follows:
 - A “B” data channel equates to a 64-kb/s DS0 signal that can be used for voice connections or equipment connections such as a computer. As shown in Figure 8-2, each “B” channel uses 1 time slot of the 24 time slots in the DSX-1 signal (therefore, “2B” uses 2 time slots). In Figure 8-2, the first ISDN line uses time slots 1 and 2 for its “B” channels.
 - A “D” signaling channel equates to a 16-kbs signal that is used to carry signaling and overhead data. As shown in Figure 8-2, each “D” channel uses one-fourth of a time slot. In Figure 8-2, the first ISDN line uses one-fourth of time slot 22 for its “D” channel.
 - Added together, each 2B+D ISDN line takes $2\frac{1}{4}$ time slots of the 24 time slots in the DSX-1 feeder signal.
- As shown in Figure 8-2, each *SPQ494* quad ISDN channel unit provides four 2B+D ISDN lines. These four lines use a total of 9 time slots of the 24 time slots in the DSX-1 feeder signal (8 time slots for the 8 “B” channels and 1 time slot for the 4 “D” channels). This allows the V-DT to contain two *SPQ494* channel units using 18 time slots.
- As shown in Figure 8-2, the V-DT can also contain an *AUA94* dual ISDN channel unit. This unit provides two 2B+D ISDN lines using a total of $4\frac{1}{2}$ time slots (four time slots for the four “B” channels and one-half time slot for the two “D” channels).
- Therefore, a V-DT provisioned for the octet mode can provide ten ISDN lines with each line offering 2B+D service. These ten lines use a total of $22\frac{1}{2}$ of the 24 time slots provided by the DSX-1 feeder.

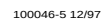


Figure 8-2. Building an ISDN 2B+D Line from a DSX-1 Signal in the NBS (Octet Mode)

For these time slots to be correctly associated with the actual channel unit slots in the MDS assembly, the system uses a *virtual channel unit slot* concept. You must use the SLC-2000 host digital terminal CIT to cross-connect the real and virtual time slots to the appropriate VRTs. Figure 8-3 shows the actual NBS configuration with its four DSX-1 feeder signals.

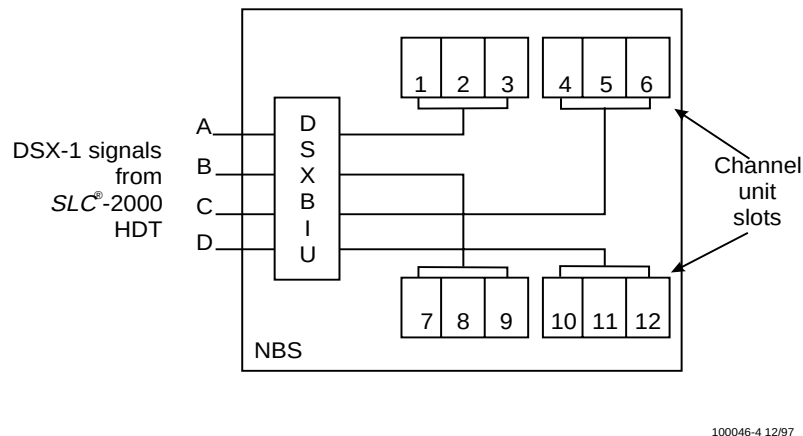


Figure 8-3. Actual NBS V-DT Configuration (Octet Mode)

Using the *virtual* concept as shown in Figure 8-4, the SLC-2000 HDT software, when provisioning ISDN circuits, “thinks it sees” a six-slot V-DT instead of a three-slot V-DT. As Figure 8-4 shows, slots 4, 5, and 6 of the V-DT are *not* physically present. However, they are present in the software and are called *virtual slots*, actually representing the third and fourth lines on the SPQ494 ISDN channel units.

When installing and cross-connecting ISDN circuits in an NBS with DSX-1 feeders provisioned for the octet mode, you must understand the relationships between the NBS, octet mode, and actual or virtual slots. Refer to Figure 8-4 to understand these concepts.

- **Addressing the NBS Quadrant.** You must address each quadrant of the octet NBS using its DT Servers address in the MDS assembly at the SLC-2000 HDT (MDS shelf number, MDS shelf slot number).
- **Addressing the Slots in the NBS Quadrant.** Each quadrant's slots (both real and virtual) are numbered the same for provisioning (Figure 8-4). For example, the physical slots fed by DSX-1 signal D are numbered 10, 11, and 12 in the NBS. But when provisioning with the software from the SLC-2000 host digital terminal CIT, they are numbered 1, 2, and 3 (plus 4, 5, and 6 virtual slots).



NOTE:

Virtual slot 6 is *never* addressed for ISDN line provisioning.

SPQ494 Channel Unit Drop Identifications. The four ISDN 2B+D drops are identified in the software as follows:

— ***SPQ494 channel unit in slot 1 of the quadrant:***

- drop 1 = slot 1, line 1
- drop 2 = slot 1, line 2
- drop 3 = slot 4, line 1 (virtual slot 4)
- drop 4 = slot 4, line 2 (virtual slot 4)

— ***SPQ494 channel unit in slot 2 of the quadrant:***

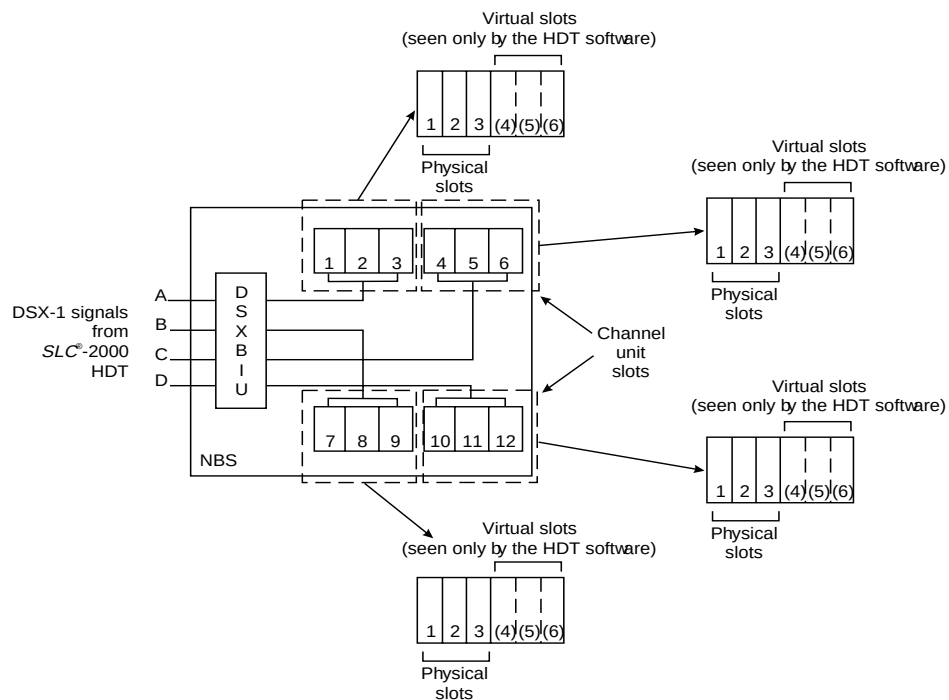
- drop 1 = slot 2, line 1
- drop 2 = slot 2, line 2
- drop 3 = slot 5, line 1 (virtual slot 5)
- drop 4 = slot 5, line 2 (virtual slot 5)

- ***AUA94 Channel Unit Drop Identifications.*** The drops for the AUA94 in slot 3 do not need virtual slots. The two ISDN 2B+D drops in slot 3 are identified in the software as follows:

- drop 1 = slot 3, line 1
- drop 2 = slot 3, line 2

- ***POTS and Special Service Channel Units.*** Other channel units do not use virtual slots. For example, the four drops from a POTS quad channel unit in physical slot 8 of the NBS are identified in the software as follows:

- drop 1 = slot 2, line 1
- drop 2 = slot 2, line 2
- drop 3 = slot 2, line 3
- drop 4 = slot 2, line 4



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Figure 8-4. Virtual Slot Concept (Octet Mode)



NOTE:

For the specific procedure and software commands to perform this function, see the following documents:

- 363-208-001, *SLC-2000 Access System, User/Service Manual*
- 363-208-003, *SLC-2000 Access System, Commands and Messages* (see the **ent-crs-t0** command).

Table 8-2 shows the possible combinations of channel units for a three-slot octet V-DT.

Table 8-2. Channel Unit Slot Restriction When Using an *SPQ494* in a Three-Slot V-DT

Slot 1 can contain ...	Slot 2 can contain ...	Slot 3 can contain ...
• <i>SPQ494</i> - or • <i>AUA94</i> - or • Any other channel unit supported by the NBS	• <i>SPQ494</i> - or • <i>AUA94</i> - or • Any other channel unit supported by the NBS	• <i>AUA94</i> - or • Any other channel unit supported by the NBS (except the <i>SPQ494</i> channel unit)

Provisioning channel units other than the *SPQ494* channel unit in the NBS is done the same way as provisioning channel units at the *SLC-2000* RT/HDT. Once you provision the shelves in the HDT for fiber distribution (via the *SLC-2000* CIT or UIP) and you set the number of lines hosted by each DT Server (via the CIT), provisioning of individual channels in the ONU follows the service order flows described for the RT/HDT.

 **NOTE:**
See 363-208-001, *SLC-2000 Access System User/Service Manual*, and 363-205-004, *SLC-2000 MSDT User/Service and Ordering Manual*, for details on provisioning the MSDT or DT Server.

Through the OSMINE process, *SLC-2000* AIDs are supported in FACS and OPS/INE. In addition, *TIRKS* OS and *NMA* OS organizations provide OSIA and methods to inventory and assign *SLC-2000* FITL facilities and equipment.

Operations Interworking

Operations interworking provides the capability to access, operate, provision, and administer remote Lucent SONET network elements (NEs) from any location in a SONET subnetwork or from a centralized operations system. Operations interworking is provided directly between DDM-2000 FiberReach DDM-2000 OC-3 systems, and *SLC-2000* Access Systems. Operations interworking is provided indirectly between DDM-2000 FiberReach and other Lucent SONET products via DDM-2000 OC-3 systems.

Operations interworking is available among Lucent 2000 Product Family systems connected through the SONET DCC including:

- FT-2000 OC-48 OC-48 Lightwave System (Release 6.0 and later)
- DDM-2000 OC-3 Multiplexer (Release 7.2 and later)

- DDM-2000 OC-12 Multiplexer (Release 5.0 and later).

The FT-2000 OC-48 Lightwave System equipped with Release 6.0.0 software supports operations interworking applications with DDM-2000 Multiplexers.

Messages carried on the SONET section data communications channel (DCC) support the following interworking applications:

- Remote login
- Gateway network element (GNE) operation
- Remote network element status
- Remote software download and copy.
- **Remote login:** A user logged in locally to an FT-2000 OC-48 Lightwave System can remotely log in to a DDM-2000 FiberReach Multiplexer via the SONET DCC. However, a user logged in locally to a DDM-2000 FiberReach Multiplexer can not remotely log in to an FT-2000 OC-48 Lightwave System. A user logged in locally to a DDM-2000 FiberReach Multiplexer can remotely log in to another DDM-2000 FiberReach Multiplexer through an FT-2000 OC-48 Lightwave System subnetwork.
- **Gateway network element operation:** One or more FT-2000 OC-48 Lightwave Systems can serve as an interface to the local X.25 message-based operations system for the DDM-2000 FiberReach Multiplexers through the SONET DCC. The gateway network element also serves as a single interface for all FT-2000 OC-48 Lightwave Systems in the same ring network and in the same subnetwork. In mixed networks, the GNE(s) must be FT-2000 OC-48 Lightwave System GNE(s). In DDM-2000 only networks, multiple GNEs are supported.
- **Remote network element status:** The FT-2000 OC-48 Lightwave System can receive and transport alarm and status information from other FT-2000 OC-48 Lightwave System nodes and DDM-2000 Multiplexers that are in the same subnetwork. Within a subnetwork, network elements in the same alarm group (provisionable) exchange alarm and status information through at least one alarm gateway network element (AGNE). When an AGNE receives alarm and status information, it rebroadcasts the information to all the other network elements in the alarm group. An alarm group supports up to 32 network elements.

The alarm and status information is reported using remote office alarms, far-end parallel telemetry, a far-end activity LED, and a network alarms report.
- **Remote software download and copy:** An FT-2000 OC-48 Lightwave System can download (copy) software to remote FT-2000 OC-48 Lightwave Systems in the same network and across a DDM-2000 network to another FT-2000 OC-48 Lightwave System in the same subnetwork. Similarly, a

DDM-2000 FiberReach Multiplexer can download (copy) to another DDM-2000 FiberReach Multiplexer through a DDM-2000, and an FT-2000 OC-48 Lightwave System subnetwork.

Alarm Groups

Every NE broadcast its network status to all other NEs in the same alarm group. This status information includes:

- Alarm/status level
- User panel condition
- ACO status
- TBOS status
- Parallel telemetry status
- Miscellaneous discrete information.

An alarm group is a set of NEs that share status information between themselves. Alarm groups can be nodes in an OC-1 ring, or any other logical grouping such as a maintenance group or geographical group. All NEs are defaulted into an alarm group (number 255). Users provision NEs into alarm groups by assigning each member an alarm group number to support operations interworking, large networks, and to avoid sending unnecessary information to every NE. For example, 24 NEs could be provisioned into three alarm groups each with eight NEs that share a community of interest.

All members of the same alarm group share NE status information but do not share information with other alarm groups. See the **set -ne** command in Chapter 11, "Commands and Reports" for information on provisioning alarm groups.

Depending on provisioning, a member of an alarm group can:

- Know the alarm/status of all members of the same alarm group and, if the NE is at the CO, activate audible office alarms for the alarm group.
- List a report of the alarm or status condition of other NEs in the group.
- Display composites of other member's user panel information. If the site identification of a remote NE is from 1 to 8, display the user panel status at the site instead of a composite display. As a feature, the same site/NE identification can appear more than once in a subnetwork, as long as, it is in different alarm groups. This supports creating large networks by interconnecting several small subnetworks without having to change the site/NE identification.
- Relay other members' parallel telemetry alarm/status closure states to the OS.

- Send and receive miscellaneous discrete alarm/status closure states to and from alarm group members at a CO.
- Send and receive ACO requests to and from members of the same alarm group with the same site number. This supports the ability for a user to activate ACO for a group of NEs having the same site number and subnetwork connectivity to another member NE in the group.

By default, all NEs belong to alarm group number "255" and, if not changed, NE status is sent to all NEs in the network. Those NEs provisioned to be at the CO can perform alarm activation functions.

Alarm Gateway Network Element

One NE in an alarm group must be provisioned as an alarm gateway network element (AGNE). The AGNE broadcasts NE status information to members of its alarm group. Considerations for choosing an NE as an AGNE include being central to the group to minimize communications links and being easily accessible for maintenance purposes. A backup AGNE can be provisioned and "shadow" the primary AGNE by sending duplicate status reports to members of the group. The disadvantage of a backup AGNE is in the costs associated with increased message traffic within the alarm group.

For subnetworks having more than 16 NEs, the AGNE, GNE, and DSNEs should be separate NEs. The AGNE is a "collection point" and does not have to be an NE in a CO, for example.



NOTE:
DDM-2000 FiberReach Multiplexer can serve as an AGNE for alarm groups containing 15 NEs or less.

Operations Interworking Restrictions

The following summarizes the operations interworking restrictions:

- Maximum number of NEs per subnetwork — 50
- Range of values for Alarm Group number — 1 to 255
- Maximum number of NEs per Alarm Group — 32
- Maximum number of Directory Services NE per subnetwork — 1

Cross-Connection Provisioning

For every DS1 transported through a ring network, a cross-connection is needed in every NE (node) on the ring. The time slot interchange (TSI) feature of DDM-

2000 FiberReach Multiplexers offers users flexibility in directing traffic in and out of these systems to support a wide variety and range of customer applications.

In a hairpin application, no cross-connection using high speed interfaces are needed on the node in the hosting ring because no signal is transported through the high-speed interfaces in the host ring.

For the DDM-2000 Multiplexers, cross-connections of both ring paths are entered with a single command entry per shelf. This minimizes the possibility of provisioning a circuit without a protection channel. A DDM-2000 OC-1 ring has 28 VT1.5 channels. The ring channels are always carried within the 26G2-U OLIU circuit packs in the main 1 and main 2 slots. Cross-connections in DDM-2000 Multiplexers are made by specifying the SONET rate (VT1.5), the end point addresses (access identifiers), the cross-connection type (two way, locked, etc.) and, in some cases, the ring direction (ring=m1, ring=m2, etc.). In DDM-2000 Multiplexers, each single cross-connection command establishes a bidirectional cross-connection. There is no need to identify ring channels in Main 1 as different from Main 2 because both rings are always provisioned with the same information.

Table 8-3. Ring Manual STS-1 Cross-Connections (Pass-Through) for the 26G-U

From *		To	"To" CP Type (Note)	CIT Command
m-1	<-->	m-1	OLIU	ent-crs-sts1:m-1,m-1

Notes:

Address on the left side MUST BE identical to the address on the right side. There is no interchange function for "pass-through" signals.

Table 8-4. Ring Manual STS-1 Cross-Connections (Pass-Through) for the 28G-U

From *		To	"To" CP Type (Note)	CIT Command
m-1	<-->	m-1	OLIU	ent-crs-sts1:m-1,m-1
m-2	<-->	m-2	OLIU	ent-crs-sts1:m-2,m-2
m-3	<-->	m-3	OLIU	ent-crs-sts1:m-3,m-3

Notes:

Address on the left side MUST BE identical to the address on the right side. There is no interchange function for "pass-through" signals.

- * Whenever 28G-U OLIUs are installed in main the range of STS-1s will be from 1 to 3.

Cross-Connection Types

There are three different VT1.5 cross-connection types for the DDM-2000 FiberReach Multiplexer: termination/drop, pass-through, and locked.

Termination/Drop Cross-Connection

The termination/drop cross-connection is used in all path-switched ring applications for DDM-2000 FiberReach, where DS1 low-speed signals are cross-connected to VT1.5 channels in both rotations of the rings terminating on the high-speed interfaces. With this cross-connection, all added signals are bridged on to both rotations of the ring; the better of the two signals received from the two rotations of the ring is dropped.

As shown in Table 8-5 and Table 8-6, at the entry and exit points, the VT channels are cross-connected to the low-speed ports (for example, **{ls group}-{slot#}-{port# on slot}, a-1-4**). These are called "drop" connections. For example, the command **ent-crs-vt1:m-1-3-4,b-1-4** connects the fourth low-speed port associated with slot 1 of low-speed group B to the fourth VT1.5 within the third VT group within the first (and only) STS-1 of both OC-1 rings.

Table 8-5. DDM-2000 FiberReach Manual VT1.5 Cross Connections (Termination/Drop) in a 1 x 1 Configuration

	From*		To	"To" CP Type	Example Commands
1x1	m-1-{1-7}-{1-4}	<-->	a-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-1-1,a-1-1
	m-1-{1-7}-{1-4}	<-->	b-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-4,b-1-4
	m-1-{1-7}-{1-4}	<-->	c-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-3,c-1-3
	m-1-{1-7}-{1-4}	<-->	d-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-3,d-1-3
	m-1-{1-7}-{1-4}	<-->	a-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-1-1,a-1-2
	m-1-{1-7}-{1-4}	<-->	b-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-4,b-1-2
	m-1-{1-7}-{1-4}	<-->	c-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-3,c-1-1
	m-1-{1-7}-{1-4}	<-->	d-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-3,d-1-1

* Whenever 28G-U OLIUs are installed in the Main slot, the range of STS-1s will be from 1 to 3.

**Table 8-6. DDM-2000 FiberReach Manual VT1.5 Cross Connections (Termination/
Drop) in a 1 x7 Configuration**

	From *		To	"To" CP Type	Example Commands
1x7	m-1-{1-7}-{1-4}	<-->	a-{1-2}-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-1-1,a-2-1
	m-1-{1-7}-{1-4}	<-->	b-{1-2}-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-4,b-2-4
	m-1-{1-7}-{1-4}	<-->	c-{1-2}-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-3,c-2-3
	m-1-{1-7}-{1-4}	<-->	d-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-3,d-2-3
	m-1-{1-7}-{1-4}	<-->	a-{1-2}-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-1-1,a-2-2
	m-1-{1-7}-{1-4}	<-->	b-{1-2}-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-4,b-2-2
	m-1-{1-7}-{1-4}	<-->	c-{1-2}-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-3,c-2-1
	m-1-{1-7}-{1-4}	<-->	d-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-3,d-2-1

* Whenever 28G-U OLIUs are installed in the Main slot, the range of STS-1s will be from 1 to 3

Pass-Through Cross-Connection

Another type of cross-connection allows a high-speed VT1.5 or STS-1 channel to be "passed-through" between two high-speed ring interfaces. This is used in all path-switched ring applications at nodes where traffic is not dropped. The high-speed time slot entering must be the same leaving in this type of cross-connection. In path switched rings, pass-through grooming (passing a signal on a ring time slot that is different from the ring time slot on which it was received) is not supported.

As shown in Table 8-7, pass through cross-connections are designated by using the same VT ring channel twice in the cross-connect address. For example, the single command **ent-crs-vt1:m-1-5-3:m-1-5-3** connects a pass through cross-connection both to and from the third VT1.5 within the fifth VT group within the first and only STS-1 (for 26G type only, 28G-U has three) of both the service and protection ring.

Table 8-7. DDM-2000 FiberReach Manual VT1.5 Cross Connections (Pass-Through)

	From		To	"To" CP Type (Note)	Example Commands
26G2-U	m-1-{1-7}-{1-4}	<-->	m-1-{1-7}-{1-4}	OLIU	ent-crs-vt1:m-1-1-2,m-ent-crs-vt1:m-1-3-4,m
28G-U	m-1-{1-7}-{1-4}	<-->	m-1-{1-7}-{1-4}	OLIU	ent-crs-vt1:m-1-1-2,m
	m-2-{1-7}-{1-4}	<-->	m-2-{1-7}-{1-4}	OLIU	ent-crs-vt1:m-2-3-4,m
	m-3-{1-7}-{1-4}	<-->	m-3-{1-7}-{1-4}	OLIU	ent-crs-vt1:m-3-5-3,m

Note: Address on the left side *must be* identical to the address on the right side. There is no interchange function for "pass through" signals.

Depending on local practice, work orders will normally identify the low-speed port designations at the entry and exit points in the network and the target identifiers (TIDs) of the NEs at these points. The work order may also designate the VT1.5 ring channel which will be used for this service. If the work order does not designate a ring channel to use, use the command **rtrv-crs-vt1**; to identify all the ring channels that are currently unassigned. The work order also may not designate all the other NEs on the ring that need to be provisioned with pass through cross-connections. In this case, use successive **rtrv-map-netwk** commands to identify the TIDs for all the NEs in a ring.

Locked Cross-Connection

A variation of ring cross-connections, the locked cross-connection, is supported at the VT1.5 level to lock the path selector to a specified rotation of the ring where an external path selector is used. In this cross-connection, a DS1 or VT1.5 signal from the low-speed interface is cross-connected to the specified VT1.5 channel in the high-speed interface in the specified direction (Table 8-8). Any signal received in the VT1.5 channel from the other rotation of the ring is ignored.

Table 8-8. DDM-2000 FiberReach Manual VT1.5 Cross Connections (Locked)

	From *		To	"To" CP Type	Example Commands
1x1	m-1-{1-7}-{1-4}	<-->	a-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-1-1,a-1-1, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	b-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-4,b-1-4, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	c-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-3,c-1-3, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	d-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-3,d-1-3, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	a-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-1-1,a-1-2, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	b-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-4,b-1-2, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	c-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-3,c-1-1, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	d-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-3,d-1-1, cct=locked,ring={m1,m2}
1x7	m-1-{1-7}-{1-4}	<-->	a-{1-2}-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-1-1,a-2-1, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	b-{1-2}-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-4,b-2-4, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	c-{1-2}-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-3,c-2-3, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	d-1-{1-4}	DS1,DS1PM	ent-crs-vt1:m-1-3-3,d-2-3, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	a-{1-2}-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-1-1,a-2-2, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	b-{1-2}-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-4,b-2-2, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	c-{1-2}-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-3,c-2-1, cct=locked,ring={m1,m2}
	m-1-{1-7}-{1-4}	<-->	d-1-{1-2}	T1EXT, HDSL	ent-crs-vt1:m-1-3-3,d-2-1, cct=locked,ring={m1,m2}

* Whenever 28G-U OLIUs are installed in main, the range of STS-1s will be from 1 to 3.

Manual Cross-Connection Procedure

The following steps should be used to provision FiberReach systems for manual cross-connections:

- a. All cross-connections entered by the user are "manual" connections and must be deleted by the user to change service.
- b. All commands to change signal routings (enter or delete) may be service affecting. A warning and confirmation for the request is issued as explained in Chapter 11, "Commands and Reports" for the **ent-crs** and **dlt-crs** commands.
- c. Manual routing requires that slots be equipped. The **ent-crs** routing command will check if the slot is equipped and display an error message denying illegal requests.
- d. Manual routing requires that slots be equipped. Therefore, if the last circuit pack of a protected pair is removed from the slot even if there is no signal on the circuit pack, the action is alarmed. The "Update" command will be denied. The manual routing must be deleted before the circuit pack can be removed and the slot become unequipped using the "Update" command.
- e. The **rtrv-crs** command displays the cross-connect routing table.

The only restriction on manual cross-connections for FiberReach is that a cross-connection may not be made with any signal where a cross-connection already exists. The existing cross-connection must be deleted before a new cross-connection can be entered.

OC-1 Path Protected Ring Application Example

The following example is a path protected ring application with multiple NEs in a two-fiber ring. The main optical units of each FiberReach node in the ring are equipped with 26G2-U OLIU circuit packs to transport signals to the next NE as well as drop signals at the NE. The one or two host nodes are equipped with 27G-U OLIU circuit packs. Valid mapping is provided by termination and pass through cross-connections. The following paragraphs describe a ring network example configuration and describe how to create manual cross-connections to establish the ring network. Figure 8-5 shows the six nodes with dashed lines indicating the cross-connections.

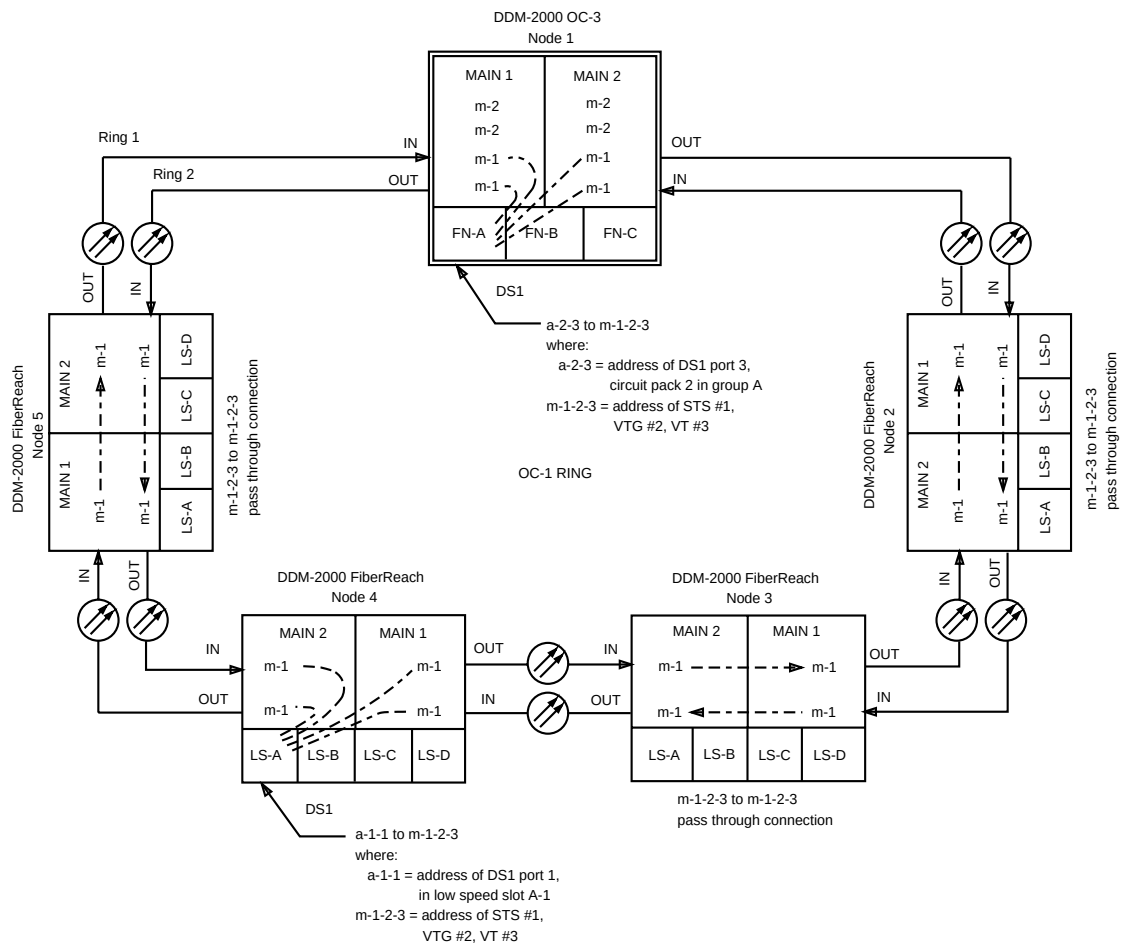


Figure 8-5. Example OC-1 Ring Configuration Cross-Connections

In Figure 8-5, the example configuration is a ring network with two ring fibers and six nodes. Ring 1 carries ring traffic in the clockwise direction while Ring 2 carries ring traffic in the counterclockwise direction. In the example configuration, Node 1 is a DDM-2000 OC-3 shelf equipped with 27-type OLIU circuit packs in the Main slots, MXRVOs in Function Unit A, and DS1 or DS1PM circuit packs in the Low-Speed Group A slots. Nodes 2 through 6 are DDM-2000 FiberReach Multiplexer wideband shelves with 26-type OLIU circuit packs in the Main slots and DS1 or DS1PM circuit packs in the Low-Speed Group A slots. All shelves are properly installed and provisioned. This example is for DS1 services. See "System Turnup/Circuit Order" in the TOP section of this manual for actual procedures.

Ring configurations support manual VT1.5 cross-connections. Manual cross-connections must be made at **each** node in the network for each circuit being established. Drop cross-connections are made at the drop nodes where service enters or exits the node (Nodes 1 and 5) and pass-through cross-connections are made at **each** intermediate node (Nodes 2, 3, and 5).

It is recommended that pass-through cross-connections be entered first, as shown below, to avoid transient alarms during provisioning.

The following commands may be used to delete, enter, and retrieve cross-connections: **dlt-crs-vt1**, **ent-crs-vt1** and **rtrv-crs-vt1**. See Chapter 11, "Commands and Reports" for a description of these commands.

To establish the end-to-end DS1 circuit from Node 1 to Node 5, as shown in Figure 8-5, enter a cross-connection at each node as follows:

1. Enter the following pass-through cross-connections at Nodes 2, 3, and 5:
ent-crs-vt1:m-1-2-3,m-1-2-3:cct=twoway;
2. Enter the following cross-connection to drop the VT1.5 channel from the OC-1 ring to a DS1 interface at Node 1:
ent-crs-vt1:m-1-2-3,a-2-3:cct=twoway;
3. Enter the following cross-connection to drop the VT1.5 channel from the OC-1 ring to a DS1 interface at Node 4, a DDM-2000 FiberReach Wideband shelf:
ent-crs-vt1:m-1-2-3,a-1-3:cct=twoway;
4. Test both paths around the ring. Since DDM-2000 uses non-revertive path switching to minimize the number of hits on services, the initial path selection is arbitrary. Use **rtrv-state-path** and **sw-path-vt1** commands to test both ring paths around the ring network at the drop nodes of the new service. The **sw-path-vt1** command should be limited to the addresses that are being tested. For the example, the commands to be used at Node 1 and Node 4 are:
sw-path-vt1:m1-1-2-3 and **sw-path-vt1:m2-1-2-3**.

Note that this same configuration could be set up using the second OC-1 interface on the 27G-U OLIUs in the main slots of the DDM-2000 OC-3 shelf at Node 1. To do this using the same VT1.5 timeslot on the OC-1 ring, replace the VT1.5 address **m-1-2-3** with **m-2-2-3** in Step 2; all other cross-connections remain the same.

Single-Homed Path-Switched Ring Example

Figure 8-6 shows an example of an OC-1 VT1.5 single-homed path-switched ring application. The network elements on the OC-3 ring can be either DDM-2000 OC-3 Multiplexers or *SLC*-2000 Access Systems. Refer to this figure when reviewing this example.

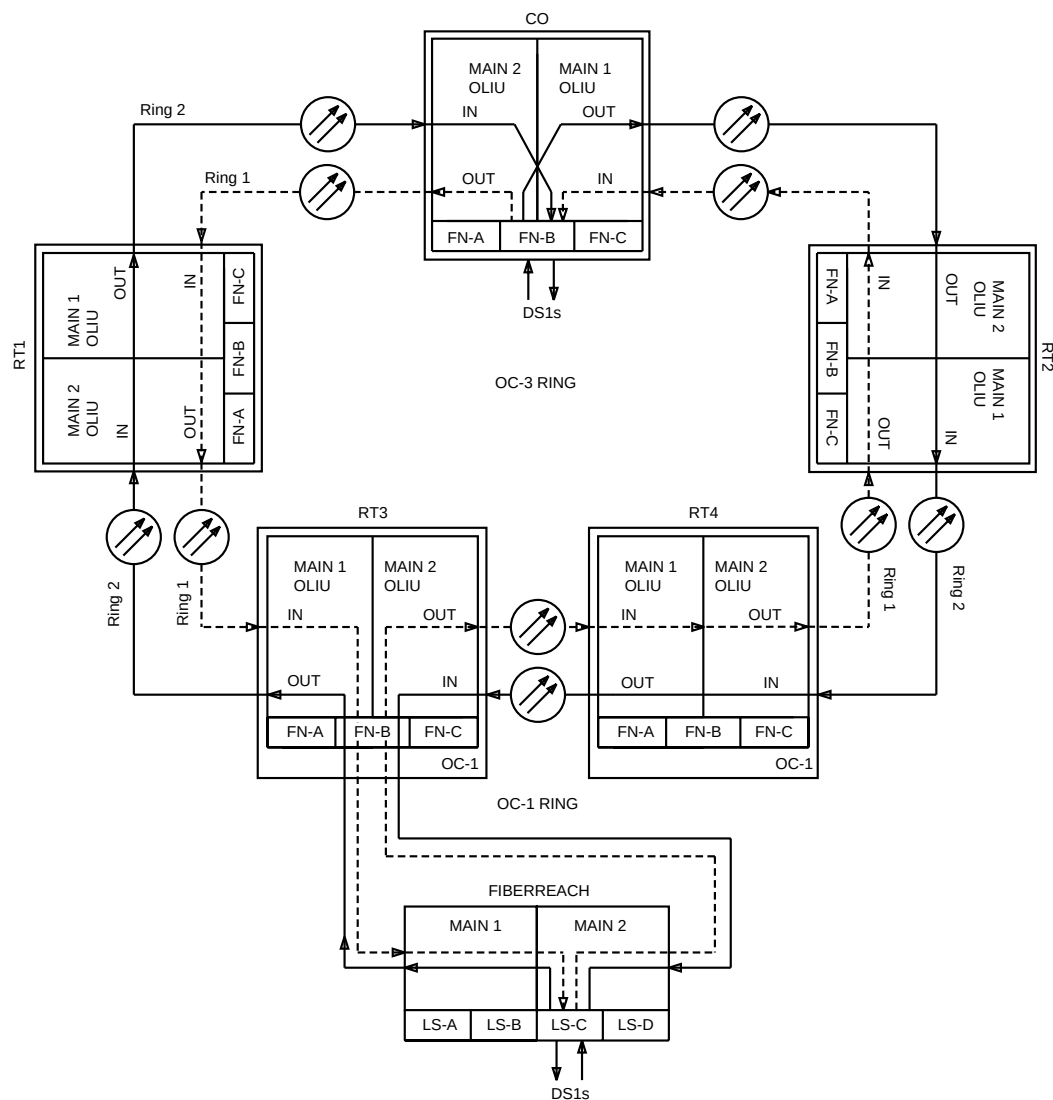


Figure 8-6. Example Single-Homed Path-Switched Ring Configuration Cross-Connections

In Figure 8-6, the DDM-2000 OC-3 shelf at RT3 supports a single-homed OC-1 interface in function unit B. Signals are connected between the OC-3 interface in Main-1 and the OC-1 interface(s) in FN-B-1, and between the OC-3 interface in Main-2 and the OC-1 interface(s) in FN-B-2. Switching is not done on the DDM-

2000 OC-3 Multiplexer on these interfaces; rather VT1.5 level path switching is done on the DDM-2000 FiberReach Multiplexer and on the DDM-2000 OC-3 shelf at the CO node. This allows DDM-2000 FiberReach nodes to interface with DDM-2000 nodes of an OC-3 ring, providing "ring-on-ring" architecture. Each OC-1 ring so supported occupies up to 28 VT1.5 time slots on the OC-3 ring. When single-homing is used, the OC-3 system passes the VT1.5 time slots between the OC-1 interfaces and OC-3 interfaces without terminating them or performing any path protection switching on them. Up to six OC-1 rings can be supported by one DDM-2000 OC-3 shelf in this way. Since the signals from the OC-1 ring(s) are sent as two copies (one clockwise, the other counter-clockwise) on the OC-3 ring, the OC-3 ring capacity is limited to the OC-3 line rate (84 VT1.5 signals). So, although one DDM-2000 OC-3 shelf can support up to six OC-1 rings, the full capacity of all six OC-1 rings cannot be carried on the OC-3 ring.

The OC-1 lines between an OC-3 node and an OC-1 node behave like the OC-1 lines between the nodes on an OC-1 ring and do not perform line level protection switching. Instead, the FiberReach shelves perform the normal path protection switching functions.

Some points to note for this application are:

- Single-homing can be thought of as a "ring on ring" with many of the characteristics of a single ring.
- Pass through cross-connections may be required at the VT level on both the OC-1 and OC-3 rings.
- The OC-1 ring can be composed of up to 28 VT1.5 signals from the OC-3 ring.
- More DDM-2000 FiberReach wideband shelves could be added to the OC-1 ring. A cross-connection from the OC-1 interface to a DS1 interface would be required at one of the FiberReach wideband shelves on the OC-1 ring, and pass-through cross-connections would be required at all other FiberReach wideband shelves on the OC-1 ring.

Example Cross-Connections

To establish the end-to-end DS1 circuit from the CO to the DDM-2000 FiberReach wideband shelf as shown in Figure 8-6, enter a cross-connection at each node as follows:

- At RT1, RT2, and RT4:
ent-crs-vt1:m-1-2-3,m-1-2-3:cct=twoway;
The VT signal passes through these sites on the OC-3 ring, so two-way cross-connections with identical addresses are provisioned here.
- At RT3: **ent-crs-vt1:m-1-2-3,b-1-5-4:cct=twoway;**
This single command establishes the following signal paths through the DDM-2000 OC-3 shelf at RT3:
 - from Main-1, STS-1 #1, VTG #2, VT1.5 #3 to FN-B-1, STS-1 #1, VTG #5, VT1.5 #4
 - from FN-B-1, STS-1 #1, VTG #5, VT1.5 #4 to Main-1, STS-1 #1, VTG #2, VT1.5 #3
 - from Main-2, STS-1 #1, VTG #2, VT1.5 #3 to FN-B-2, STS-1 #1, VTG #5, VT1.5 #4
 - from FN-B-2, STS-1 #1, VTG #5, VT1.5 #4 to Main-2, STS-1 #1, VTG #2, VT1.5 #3
- At the CO: **ent-crs-vt1:m-1-2-3,b-7-4:cct=twoway;**
This is a "drop" from the OC-3 ring to a DS1 interface.
- At FiberReach: **ent-crs-vt1:m-1-5-4,c-1-1:cct=twoway;**
This is a "drop" from the OC-1 ring to a DS1 interface.

It is recommended that the pass-through cross-connections be entered first, as shown here, to avoid transit alarms during provisioning.

Dual-Homed Path-Switched Ring Example

Dual-homing offers even more survivability than a single-homed network, as even the catastrophic failure of a host node can be protected. Figure 8-7 shows an example of a dual-homed OC-1 extension from two remote nodes on an OC-3 access ring. The network elements on the OC-3 ring can be either DDM-2000 OC-3 Multiplexers or *SLC-2000* Access Systems.

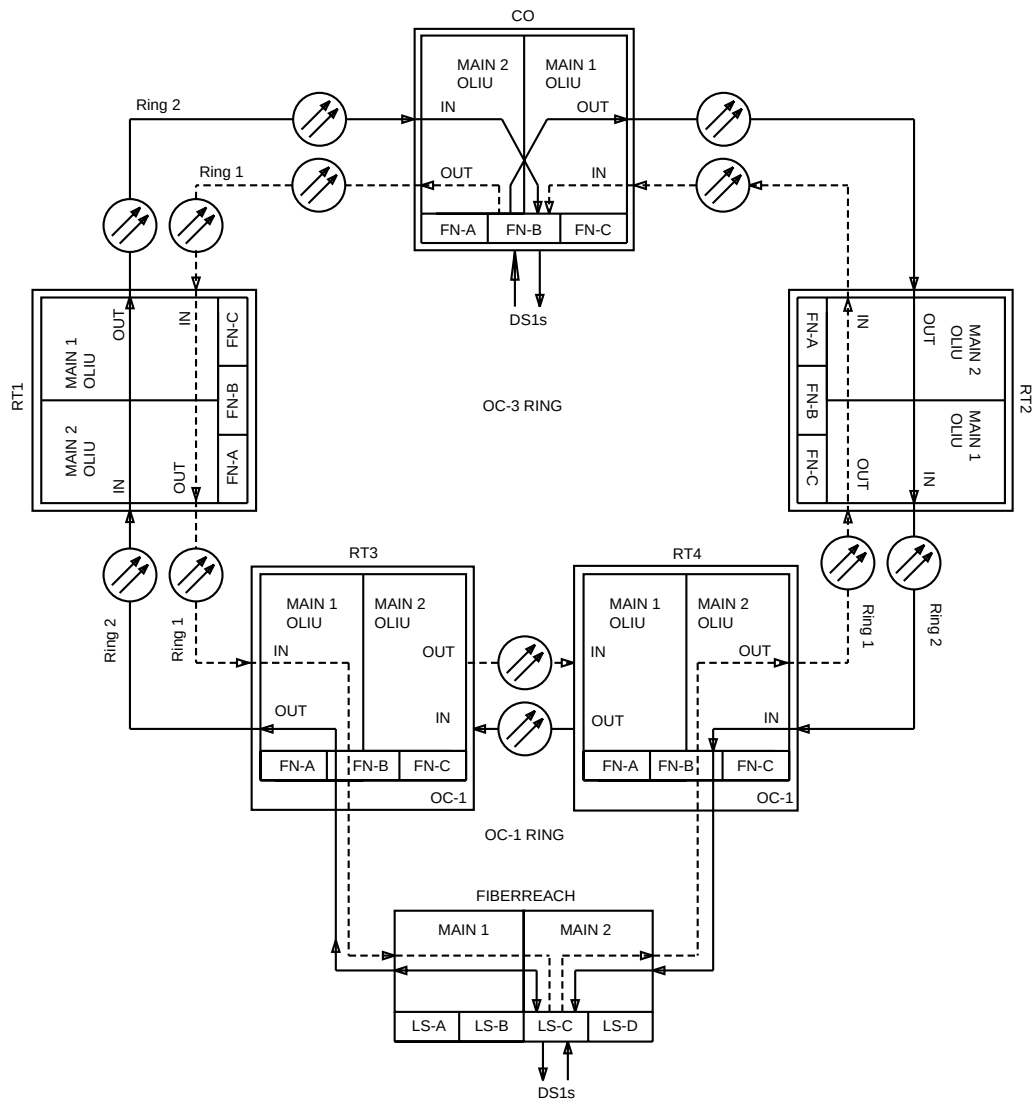


Figure 8-7. Example Dual-Homed Path-Switched Ring Configuration Cross-Connections

Path protection switching is employed for dual-homed applications, just like in single-homed applications. That is, path switching is supplied by the remote DDM-2000 FiberReach nodes and the DDM-2000 OC-3 systems in the wire center. However, the OC-3 host node configuration is different from single homing. Since an OC-3 host node terminates only one leg of the OC-1 extension, it employs a 0x1 low-speed interface to the OC-1 ring extension. The dual OC-1 circuit pack can be unprotected in a dual-homed application. Dual- and single-homed extensions can also be mixed at a host node, allowing the access network to be tailored efficiently to different groups of customers.

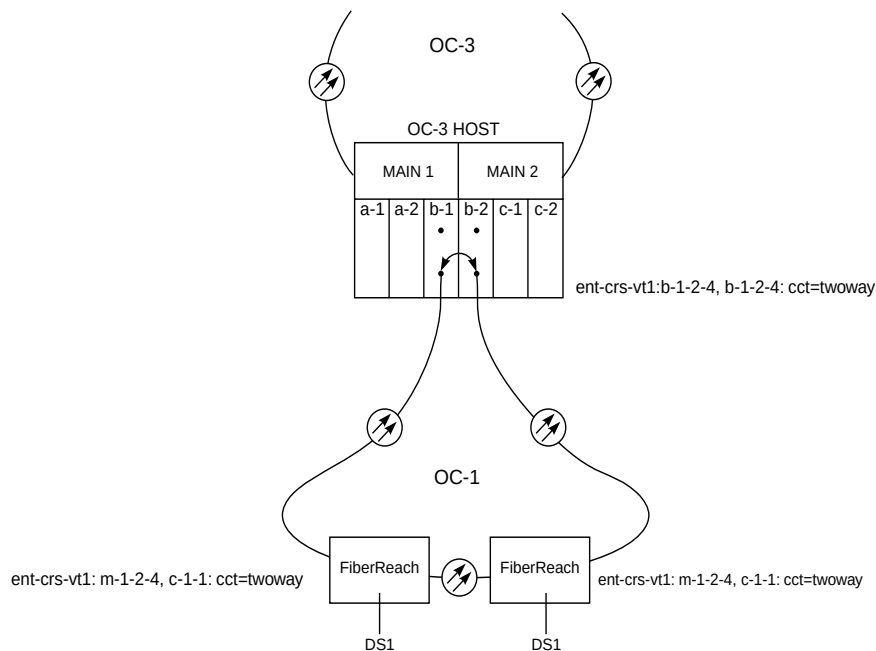
Example Cross-Connections

The cross-connect commands at each node in Figure 8-7 are as follows:

- At RT1 and RT2: **ent-crs-vt1:m-1-2-3,m-1-2-3:cct=twoway;**
The VT signal in the ring is only passing through these sites, so two-way cross-connections with identical addresses are provisioned here.
- At RT3 and RT4: **ent-crs-vt1:m-1-2-3,b-1-4-7:cct=twoway;**
At these sites, the VT1.5 signal is routed between a timeslot on the OC-3 ring and a timeslot on the OC-1 ring.
- At FiberReach: **ent-crs-vt1:m-1-4-7,c-1-4:cct=twoway;**
At this site, the signal is routed from a DS1 interface to the same timeslot on both rotations of the OC-1 ring. In the other direction, the VT1.5 signals received from both rotations of the OC-1 ring are monitored, path protection switching is provided, and the selected signal is routed to the DS1 interface.
- At CO: **ent-crs-vt1:m-1-2-3,b-1-1:cct=twoway;**
At this site, the signal is routed from a DS1 interface to the same timeslot on both rotations of the OC-3 ring. In the other direction, the VT1.5 signals received from both rotations of the OC-3 ring are monitored, path protection switching is provided, and the selected signal is routed to the DS1 interface.

OC-1 Ring Pass-Through Example

In Figure 8-8, the OC-3 Node HOST is equipped with a 22-type OLIU circuit packs in the MAIN unit slots and 27-type OLIU circuit packs in Function Units B1 and B2. Both FiberReach nodes are equipped with 26G2-U OLIUs in Main and DS1 or DS1PM circuit packs in the low speed slots.



100048-1

Figure 8-8. Example of OC-1 Ring Pass-Through Using Function Unit Slots of the OC-3 Shelf

Example Cross-Connections

For example, to establish the end-to-end DS1 circuit that is passed through the OC-3 node (SONET subsystem) HOST without using bandwidth on the OC-3 ring, the following cross-connects need to be established:

- At the node HOST, enter the following cross-connection:
ent-crs-vt1:b-1-2-4,b-1-2-4:cct=twoway;

The VT signal passes through from a FiberReach node to another FiberReach node on the OC-1 ring without using bandwidth on the OC-3 ring.

- At the FiberReach nodes, enter the following cross-connection:
ent-crs-vt1:m-1-2-4,c-1-1:cct=twoway;



NOTE:

This is a drop from the OC-1 ring to a DS1 interface.

OC-1 Ring Hairpin Routing, Single-Homed Example

In Figure 8-9, Node HOST is a DDM-2000 OC-3 shelf equipped with 27-type OLIU circuit packs in Function Unit A slots, and 22-type OLIU circuit packs in the Main slots.

Node RT-B is a DDM-2000 FiberReach Multiplexer with 26-type OLIU circuit packs in Main and DS1 or DS1PM circuit packs in the Low-Speed Group A slots, and it is included in the inner OC-1 ring.

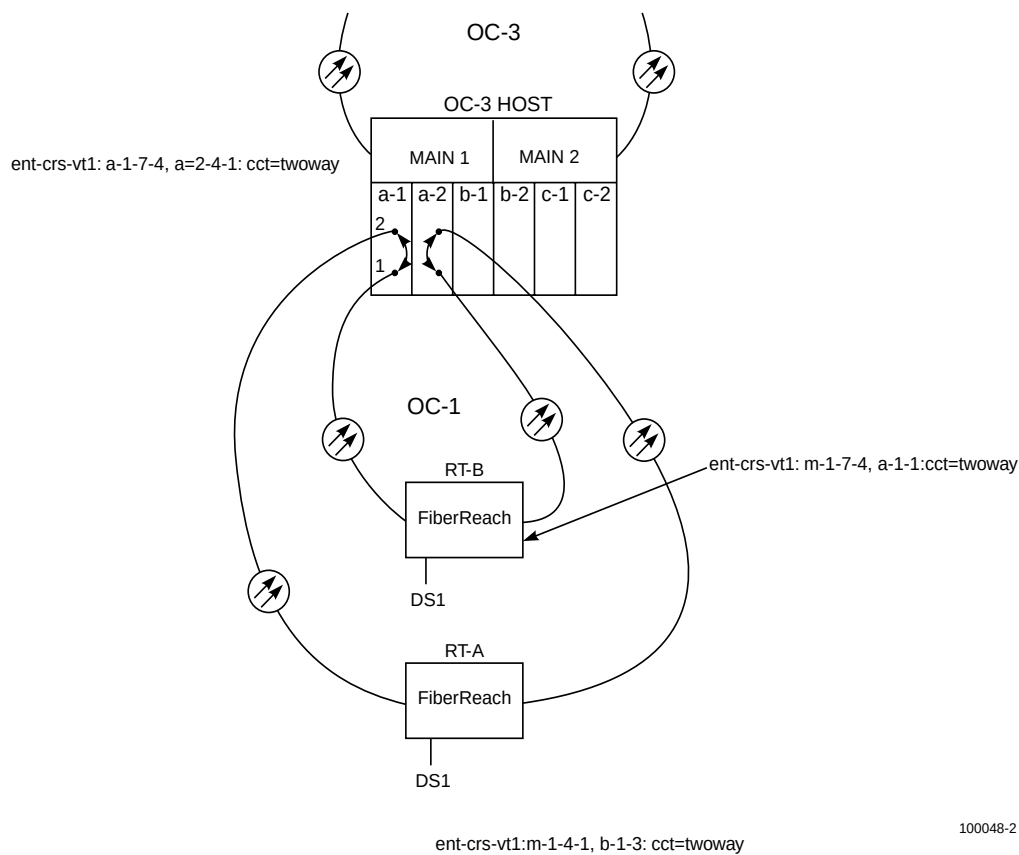


Figure 8-9. Example of an OC-1 Ring Hairpin Routing, Single-Homed Configuration

Node RT-A is a DDM-2000 FiberReach Multiplexer with 26-type OLIU circuit packs in Main and DS1 or DS1PM circuit packs in the Low-Speed Group B slots, and it is included in the outer OC-1 ring.

Both rotations of each of the two OC-1 rings terminate on a pair of 27G2-U OLIUs placed in the Function Unit A. More specifically, the inner OC-1 ring terminates on the OC-1 #1 ports of the 27G2-U OLIUs, and the outer OC-1 ring terminates on the OC-1 #2 ports of the 27G2-U OLIUs.

Example Cross-Connections

In order to cross-connect each rotation of one ring to the corresponding rotation of the other ring, Single-Homed OC-1 Ring Hairpin Routing would consist of the following cross-connections.

To establish the end-to-end DS1 circuit between Node RT-B and RT-A through the HOST as shown in Figure 8-9, enter a cross-connection at each node as follows:

- At Node HOST, enter the following cross-connection:
ent-crs-vt1:a-1-7-4,a-2-4-1:cct=twoway;

This single command establishes the following signal paths through the Function Unit A of the OC-3 shelf:

- from FN-A-1, STS-1 #1, VTG #7, VT1.5 #4
to FN-A-1, STS-1 #2, VTG #4, VT1.5 #1
 - from FN-A-1, STS-1 #2, VTG #4, VT1.5 #1
to FN-A-1, STS-1 #1, VTG #7, VT1.5 #4
 - from FN-A-2, STS-1 #1, VTG #7, VT1.5 #4
to FN-A-2, STS-1 #2, VTG #4, VT1.5 #1
 - from FN-A-2, STS-1 #2, VTG #4, VT1.5 #1
to FN-A-2, STS-1 #1, VTG #7, VT1.5 #4
- At Node RT-B, enter the following cross-connect:
ent-crs-vt1:m-1-7-4,a-1-1:cct=twoway;
 - At Node RT-A, enter the following cross-connect:
ent-crs-vt1:m-1-4-1,b-1-3:cct=twoway;

OC-1 Ring Hairpin Routing, Dual-Homed Example

In Figure 8-10, Node X is a DDM-2000 OC-3 shelf equipped with a 27-type OLIU circuit pack in Function Unit A slot 1, and 22-type OLIU circuit packs in the Main slots. Node Y is also a DDM-2000 OC-3 shelf equipped with a 27-type OLIU circuit pack in Function Unit A slot 2 and Function Unit C slot 2. Note that although the cross-connections go through MAIN, no bandwidth is utilized on the OC-3 ring.

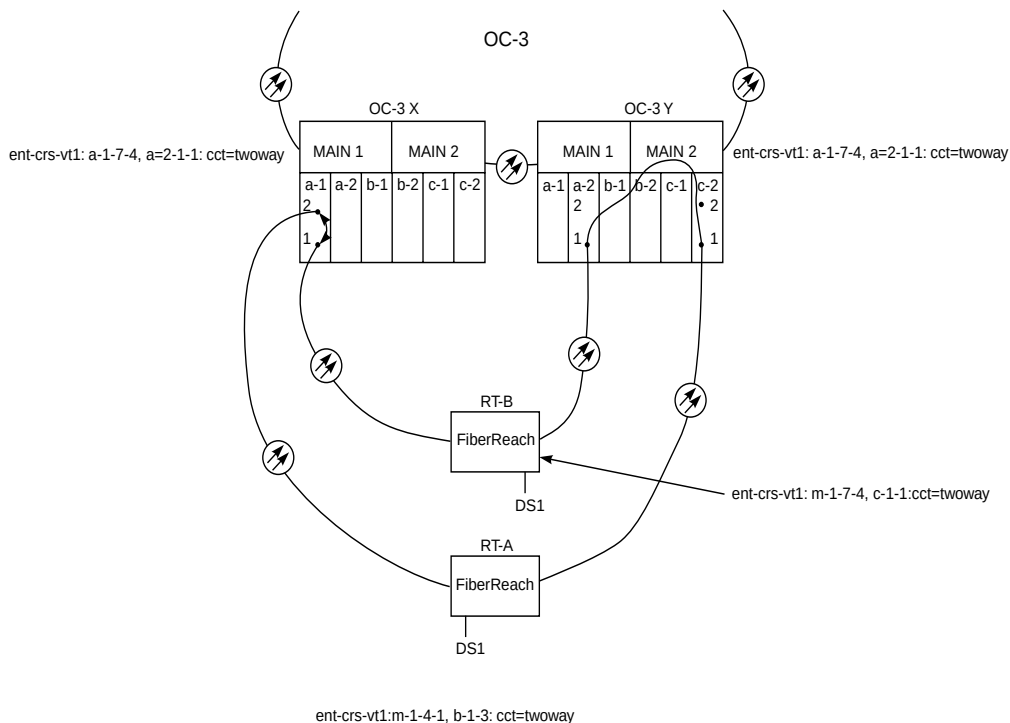


Figure 8-10. Example of OC-1 Ring Hairpin Routing, Dual-Homed Configuration

Node RT-B is a DDM-2000 FiberReach Multiplexer with 26-type OLIU circuit packs in Main and DS1 or DS1PM circuit packs in the Low-Speed Group C slots, and it is included in the inner OC-1 ring.

Node RT-A is a DDM-2000 FiberReach Multiplexer with 26-type OLIU circuit packs in Main and DS1 or DS1PM circuit packs in the Low-Speed Group A slots, and it is included in the outer OC-1 ring.

In this Dual Homed configuration, only one rotation of each of the two OC-1 rings terminates on a single OC-3 shelf. More specifically, one rotation of the inner OC-1 ring terminates on the OC-1 #1 port of the 27G2-U OLIU placed in Function Unit A-1 of OC-3 Node X, and the corresponding rotation of the outer OC-1 ring terminates on the OC-1 #2 port of the 27G2-U OLIU placed in Function Unit A-1 of OC-3 Node X as well.

The other rotation of the inner OC-1 ring terminates on the OC-1 #1 port of the 27G2-U OLIU placed in Function Unit A-2 of OC-3 Node Y, and the corresponding rotation of the outer OC-1 ring terminates on the OC-1 #1 port of the 27G2-U OLIU placed in Function Unit C-2 of the OC-3 Node Y as well.

Example Cross-Connections

In order to cross-connect each rotation of one ring to the corresponding rotation of the other ring as illustrated in Figure 8-10, Dual-Homed OC-1 Ring Hairpin Routing would consist of the following items.

To establish the end-to-end DS1 circuit between Node RT-B and RT-A through Node X and Node Y as shown in Figure 8-10, enter a cross-connection at each node as follows:

- At Node X, enter the following cross-connection:
ent-crs-vt1:a-1-7-4,a-2-1-1:cct=twoway;

This single command establishes the following signal paths through the Function Unit A of the OC-3 shelf:

- from FN-A-1, STS-1 #1, VTG #7, VT1.5 #4
to FN-A-1, STS-1 #2, VTG #1, VT1.5 #1
- from FN-A-1, STS-1 #2, VTG #1, VT1.5 #1
to FN-A-1, STS-1 #1, VTG #7, VT1.5 #4
- from FN-A-2, STS-1 #1, VTG #7, VT1.5 #4
to FN-A-2, STS-1 #2, VTG #1, VT1.5 #1
- from FN-A-2, STS-1 #2, VTG #1, VT1.5 #1
to FN-A-2, STS-1 #1, VTG #7, VT1.5 #4

- At Node Y, enter the following cross-connection:
ent-crs-vt1:a-1-7-4,c-1-1-1:cct=twoway;

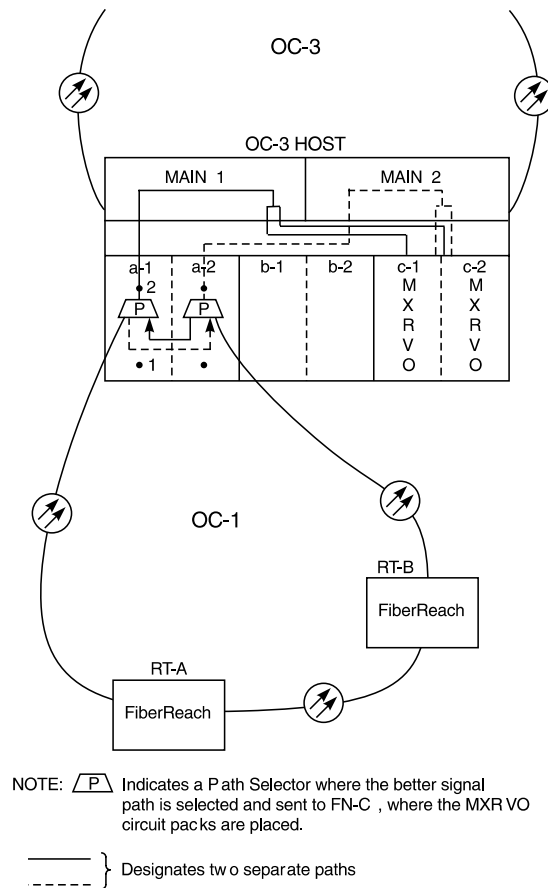
This single command establishes the following signal paths through the Function Unit A of the OC-3 shelf and Function Unit C:

- from FN-A-2, STS-1 #1, VTG #7, VT1.5 #4
to FN-C-2, STS-1 #1, VTG #1, VT1.5 #1
- from FN-C-2, STS-1 #1, VTG #1, VT1.5 #1
to FN-A-2, STS-1 #1, VTG #7, VT1.5 #4

- At Node RT-B, enter the following cross-connect:
ent-crs-vt1:m-1-7-4,c-1-1:cct=twoway;
- At Node RT-A, enter the following cross-connect:
ent-crs-vt1:m-1-1-1,a-1-1:cct=twoway;

Hairpin Local Drop Routing Example

In Figure 8-11, Node HOST is a DDM-2000 OC-3 shelf equipped with 27-type OLIU circuit packs in Function Unit A slots, 22-type OLIU circuit packs in the MAIN slots, and MXRVO circuit packs in Function Unit C along with the DS1 or DS1PM circuit packs in the corresponding Low Speed slots group C. This OC-3 shelf is part of an OC-3 ring. Note that although the cross-connections go through MAIN, no bandwidth is utilized on the OC-3 ring.



100048-4

Figure 8-11. Example of Hairpin Local Drop Routing Configuration

The OC-1 ring hosted by the OC-3 shelf contains two FiberReach nodes; RT-B and RT-A. Both DDM-2000 FiberReach Multiplexers are equipped with 26-type OLIU circuit packs in MAIN and DS1 or DS1PM circuit packs in the Low-Speed slots. Both rotations of the OC-1 ring terminate on a pair of 27-type OLIUs placed in Function Unit A of the OC-3 (HOST) node. More specifically, the OC-1 ring terminates on the OC-1 # 2 ports of the 27-type OLIUs.

By establishing VT1.5 Hairpin local drop cross-connects between FN-A and FN-C of the OC-3 HOST node, the user is allowing traffic to be routed from the FiberReach RT-A node in the OC-1 ring to a local drop on the OC-3 HOST node without using bandwidth on the OC-3 ring.

Example Cross-Connections

To establish the end-to-end DS1 circuit between Node HOST and RT-A as shown in Figure 8-11, enter a cross-connection at each node as follows:

- At Node HOST, enter the following cross-connection:
ent-crs-vt1:a-2-2-4,c-2-4:cct=twoway;

This single command establishes the following signal paths through the OC-3 shelf:

- from FN-A-1, STS-1 #2, VTG #2, VT1.5 #4
to FN-C, VTG #2, VT1.5 #4
- from FN-A-2, STS-1 #2, VTG #2, VT1.5 #4
to FN-C, VTG #2, VT1.5 #4

- At Node RT-B, enter the following cross-connection:
ent-crs-vt1:m-1-2-4,m-1-2-4:cct=twoway;

It is recommended that the user enters the Pass-Through cross-connects first.

- At Node RT-A, enter the following cross-connection:
ent-crs-vt1:m-1-2-4,a-1-1:cct=twoway;

Switch Selectable Parameters

Table 8-9 describes the parameters provisionable via hardware switches. Refer to the command pages in Chapter 11, "Commands and Reports" for a complete explanation of parameters.

Table 8-9. Parameters Provisionable via Hardware Switches

Parameter	Range	Pack	Command
TBOS termination	last, not last	SYSCTL	
Product ID	0-7	SYSCTL	rtrv-ne
DCC connection	WBS, not WBS	SYSCTL	
DS1 line coding *	AMI, B8ZS	DS1, DS1PM, T1EXT	rtrv-t1
DS1 LBO†	5 settings (cable dependent)	DS1, DS1PM	

* CIT can override switch settings. (Factory default is *noOverride*.)
Parameter can be set for each port.

† Parameter can be set for each circuit pack.

CIT Selectable Parameters

Table 8-10 describes the parameters provisionable via the CIT. Refer to the command pages in Chapter 11, "Commands and Reports" for a complete explanation of parameters. Additional information on the ID parameters is provided in the "Identifiers" section immediately following Table 8-10.

Table 8-10. DDM-2000 FiberReach Parameters Provisionable via the CIT

Parameter	Range	Default (Note 1)	Command (Note 2)
Date Time	current value current value	70-01-01 00:00:00	set-date set-date
Target ID (system name)	20 characters	Site#NE#	set-ne
Site number	1-32	32	set-ne
Network element #	1-5	5	set-ne
CO/RT select	CO, RT	RT	set-ne
TBOS address	1-8	1	set-ne
TBOS link	primary, secondary, normal, no TBOS	no TBOS	set-ne
TBOS remote	enabled, disabled	disabled	set-ne
AGNE	yes, no	no	set-ne
Alarm group number	1-255	255	set-ne
VT Uneqpd./AIS insert	Uneqpd., AIS	AIS	set-ne
CIT page length	0 (pager off), 3-150 rows	24	set-link
PM thresholds	See PM Table	-	set-pmthres
Alarm holdoff delay	0-30 sec	2	set-attr-alm
Alarm clear delay	0-30 sec	15	set-attr-alm
Power minor almn. level	MN, MJ	MN	set-attr-alm
OC1 degrade threshold	10^{-5} to 10^{-9}	10^{-6}	set-oc1
OC3 degrade threshold	10^{-5} to 10^{-9}	10^{-6}	set-oc3
Sync Messaging	K byte, S byte, disabled	enabled	set-oc3
STS-1 path signal degrade threshold	10^{-5} to 10^{-9}	0 (disabled)	set-sts1
NSA STS-1 path AIS alarm level	MN, NR	MN	set-sts1
SA STS-1 path AIS alarm level	CR, NA	MN	set-sts1
STS-1 channel state	NMON, AUTO†	AUTO	set-state-sts1
See notes and footnotes at end of table.			

Table 8-10. DDM-2000 FiberReach Parameters Provisionable via the CIT (Contd)

Parameter	Range	Default (Note 1)	Command (Note 2)
VT1.5 path signal degrade threshold¶ NSA VT path AIS SA VT path AIS VT channel state¶	10 ⁻⁵ to 10 ⁻⁸ MN, NR MJ, NR NMON, AUTO†	10 ⁻⁶ (disabled) MN MJ AUTO	set-vt1 set-vt1 set-vt1 set-state-vt1
DS1 line coding* DS1 alarm level* DS1 AIS insertion* DS1 failure threshold* DS1 BPV to LOS* DS1 PM Mode* DS1 PM Format* DS1 primary port state*	AMI,B8ZS,no Override‡ MJ, MN, NA yes, no 10 ⁻³ , 10 ⁻⁶ yes, no off,on sf, esf, esfn NMON, AUTO‡	noOverride NA yes 10 ⁻³ no off esf AUTO	set-tl* set-tl* set-tl* set-tl* set-tl* set-tl* set-tl* set-state-tl*
Environmental alarm level Environmental alarm type Environmental alarm description Central point description	CR, MJ, MN, NA 10 characters 26 characters 26 characters	MN	set-attr-env set-attr-env set-attr-env set-attr-cont
Far end communication over DCC § DCC identity for OSI ntws.	enabled,disabled userside, networkside	enabled see command page	set-fecom set-fecom
Set security § CIT security § CIT timeout (minutes) § DCC security § DCC timeout (minutes) §	enabled,disabled,lockout enabled,disabled,lockout 0-120 enabled, disabled,lockout 0-120	disabled disabled 15 disabled 15	set-secu set-secu set-secu set-secu set-secu
Sync Timing Source SYNC mode switching	main-1, main-2 revertive, nonrevertive	main-1 revertive	set-sync set-sync
Feature Packaging § VT PM or DS1 PM	enabled, disabled	disabled	set-feat
NSAP Organizational ID (Operator ID) Reserved (Reserved) Routing Data (Domain/Area)	6 hex digits 4 hex digits 8 hex digits	000000 0000 00000000	ent-ulsdcc ent-ulsdcc ent-ulsdcc

See notes and footnotes at end of table.

Table 8-10. DDM-2000 FiberReach Parameters Provisionable via the CIT (Contd)

Parameter	Range	Default (Note 1)	Command (Note 2)
ACID (OS type or funct.)	see command pgs.		ent-tllmsgmap
TL1 message type	see command pgs.		ent-tllmsgmap
Action to assoc. message type to OS	enabled, disabled	enabled	ent-tllmsgmap
Cross-connection type	twoway, locked	twoway	ent-crs-vt1
Ring ID for locked	m1, m2	see command pages	ent-crs-vt1

See notes and footnotes at end of table.

Notes/Footnotes:

1. Default means factory default (the CIT prompts display current provisioned values).
2. To view the current values, precede these commands with **rtrv-** instead of **set-**.

- * Parameter can be set for each port.
- † AUTO means the port or channel is ready to be automatically provisioned via signal detection.
- ‡ noOverride means read and use switch settings on circuit pack.
- § This command is available to privileged users only.
- ¶ Parameters can be set for each channel.

Identifiers

The following identifiers (ID) are used for the site, network element (NE), network services access point (NSAP) address, and alarm group network element (AGNE).

- **Site ID:** The site ID is a parameter with values of from 1 to 32 site addresses. The site ID is displayed on the 7-segment display on the SYSCTL circuit pack to indicate to which site the USER panel alarm LEDs apply. For site IDs greater than eight, a dash is displayed on the 7-segment display. The same site ID should be assigned to all shelves in the same bay or cabinet. It is recommended that the site ID be assigned consecutively starting at the central office (CO) site unless parallel telemetry is used. If

parallel telemetry is used, the CO site should be assigned as site 7 and the remote sites should be assigned numbers 1 through 6. Site IDs can be repeated for separate alarm groups. See the TOP section for procedures on setting the Site ID.

- **Network Element ID:** The network element ID is a parameter with values of from 1 to 5. Network elements at a specific site that belong to the same subnetwork must be assigned a unique network element ID. The network element ID is combined with the site ID to form a default value for the TID.
- **TID:** The target identifier (TID) is a 20-character parameter that is set through the CIT using the **set -ne** command. The TID is used in the **rlgn** command to identify an NE to which a remote login session is being established. The TID is also used by an OS such as Bellcore's Network Monitoring and Analysis (NMA) system to identify NEs using the TL1 message-based communications protocol. After the **init-sys:all** or **init-sys:systcl** command is entered, the system sets the TID to a default value obtained by combining the site ID with the NE ID. The TID must be unique among all NEs. The default TID may be changed using the **set -ne** command to a unique user-assigned value recognized by the OS.
- **NSAP:** The network services access point (NSAP) is a multiple part address that uniquely identifies the NE. The NSAP is used for subnetwork communications using the OSI protocol. The NSAP is set to unique values assigned to control hardware at the factory and does not have to be modified by the user. The user can only modify the values defined by the **ent-ulsdcc** command. The Routing Domain and Area parameters must not be changed from their default values when interworking with FT-2000 OC-48 Lightwave Systems.
- **AGNE:** In an alarm group (either all DDM-2000s or mixed with FT-2000 OC-48 Lightwave Systems), at least one NE must be designated as a AGNE by setting its AGNE parameter to "yes" using the **set -ne** command. An AGNE is an NE in an alarm group, through which members of an alarm group exchange alarm and status information. By default all NEs are in the same alarm group. For subnetworks having more than 16 NEs, the AGNE and GNE should be separate NEs. The AGNE is a "collection point" and does not have to be a NE in a CO, for example.



NOTE:
A FiberReach Multiplexer can serve as an AGNE for alarm groups containing 15 NEs or less.

Performance Monitoring (PM) Parameters Provisionable via the CIT

For a list of PM parameters provisionable via the CIT, see Table 10-7 in the "Technical Specifications" chapter of this manual.

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Overview

This chapter outlines the various features available to the user to maintain and monitor the DDM-2000 FiberReach Multiplexer. Specific trouble clearing and maintenance procedures are provided in the operation and maintenance (TOP) section of this manual.

Three-Tiered Operations

The DDM-2000 FiberReach Multiplexer operation procedures are built on three levels of system information and control, spanning operations needs from summary-level status to detailed reporting. Figure 9-1 shows the three-tiered operation procedures for the DDM-2000 Multiplexers, including DDM-2000 FiberReach wideband shelves.

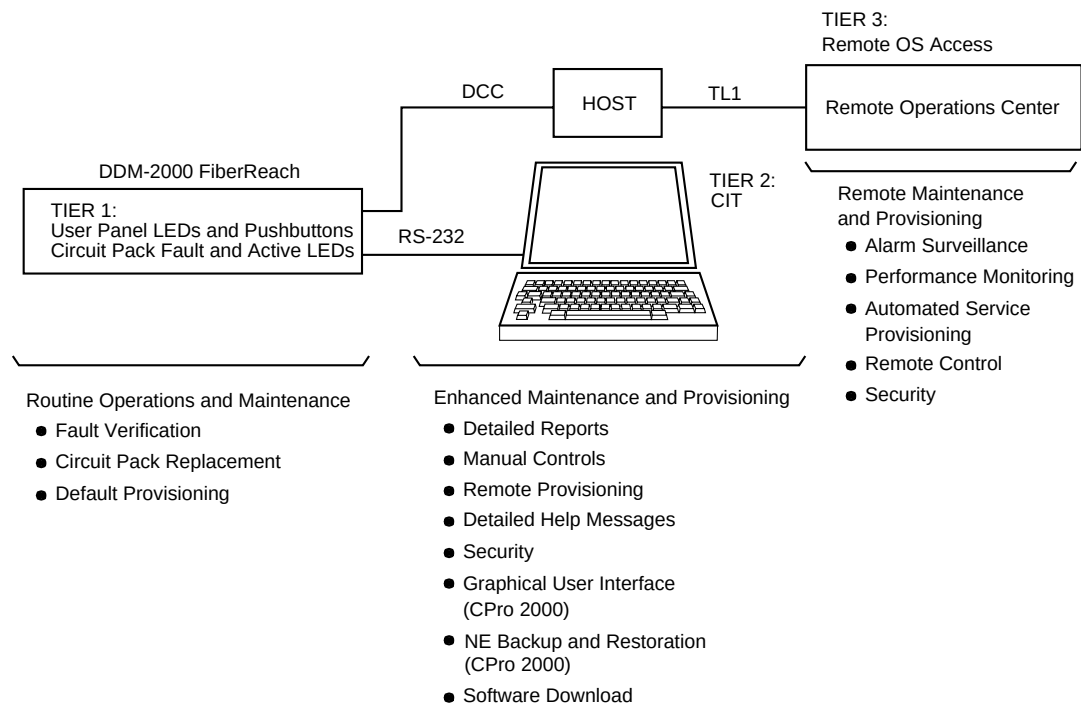


Figure 9-1. Three-Tiered Operation

The first operation tier consists of light-emitting diodes (LEDs) and pushbuttons on the user panel and circuit pack faceplates. These allow routine tasks to be performed without a craft interface terminal (CIT) or any test equipment. The user panel provides system-level alarm and status information for the local terminal and for remote terminals in the same alarm group. The circuit pack faceplate FAULT LEDs allow fast and easy fault isolation to a particular circuit pack.

The second operation tier provides access to DDM-2000 operations from a CIT over an American Standard Code for Information Interchange (ASCII) interface. System details that cannot be obtained from the first maintenance tier alone can be obtained over the CIT interface. A V100^{*} compatible terminal or terminal emulator software running on a personal computer (PC) can be used as a CIT. Command and prompt modes are available with extensive on-line help features. The CIT interface supports operations, administration, provisioning, and maintenance activities, such as performance monitoring, on any and all network elements in the SONET maintenance subnetwork from a single DDM-2000. An optional graphical user interface (SNC-2000 CPro) tool is also available.

Using the graphical user interface tool, which runs on an *MS-DOS*[†] PC, a user can take advantage of the graphics to do many provisioning-related activities.

The third operation tier consists of the remote OS interfaces through the host network. These OS interfaces include parallel telemetry, telemetry byte-oriented serial (TBOS), and TL1 interfaces. A direct TBOS interface is also available on the DDM-2000 FiberReach shelf.

Parallel telemetry consists of individual closures that can be remoted to an operations center. These closures provide information on alarm status, fault location, transmission signal failure indications, and user definable miscellaneous discrete points. These are not "dry" contact closures. They can handle only a limited amount of current and are polarized to operate with the proper voltage polarity. TBOS offers more information over its 2400 b/s RS-422 interface. The TBOS interface offers eight displays with one display dedicated to each shelf in a DDM-2000 alarm group. Each display provides 63 information points (DDM-2000 to OS) and 64 control points (OS to DDM-2000).

DDM-2000 FiberReach Multiplexer wideband shelves support a full-featured TL1 interface to multiple OSs. The DDM-2000 Multiplexers support alarm surveillance and performance monitoring with OSs such as Lucent's TRANSVU II or Bellcore's Network Monitoring and Analysis (NMA) OS.

* Trademark of Digital Equipment Corporation.

† Registered trademark of Microsoft Corporation.

The DDM-2000 FiberReach Multiplexer wideband shelves support automated service provisioning with memory administration such as Bellcore's Operations System Intelligent Network Element (OPS/INE). The DDM-2000 Multiplexers also support remote recovery and control functions, installation provisioning, and security over the TL1 link. The TL1 interface provides significantly more detailed information, such as identifying specific circuit packs and facilities, and control capabilities than the parallel telemetry or TBOS interfaces.

Single-Ended Maintenance Philosophy

As a loop-optimized product, the DDM-2000 Multiplexers allow operation and maintenance of all remote systems in a network of OC-3, DDM-2000 FiberReach, and/or OC-12 subnetworks from the central office shelf. A subnetwork consists of DDM-2000 systems interconnected by optical lines with the synchronous optical network (SONET) data communications channel (DCC) enabled. Similarly, a technician working at a remote site can gain access to the central office shelf associated with the remote system, as well as with other remote sites in the same subnetwork. The DDM-2000 Multiplexers use the SONET DCC to provide craft interface terminal remote access, user panel remote access, and operations system remote access.

Single-Ended Operations

Figure 9-2 shows the single-ended operations (SEO) capability that provides remote access to all DDM-2000 systems in a network from a single location. This minimizes technician travel because most maintenance, provisioning, and administration can be performed on the entire subnetwork by accessing any DDM-2000 Multiplexer in the subnetwork. The SEO capability is provided by the DDM-2000 Multiplexers regardless of the subnetwork topology. The SEO capability is supported for point-to-point, hubbing, rings, and rings with optical extensions topologies. The SEO capability can be disabled between DDM-2000 shelves to create network maintenance boundaries (for example, interoffice applications) or for security reasons.

The single-ended maintenance philosophy is supported in subnetworks with mixed Lucent 2000 Product Family systems. Single-ended operations are supported between DDM-2000, SLC-2000, and FT-2000 systems. See Chapter 2, "Applications," and Chapter 8, "Administration and Provisioning," for more information on operations interworking applications.

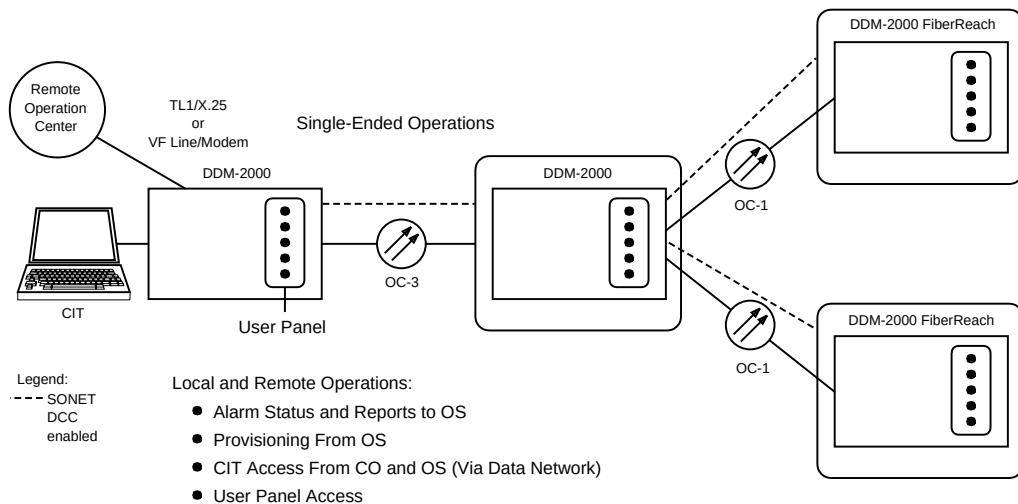


Figure 9-2. DDM-2000 FiberReach Wideband Shelf Single-Ended Operations Philosophy

In DDM-2000 FiberReach Release 2.2, full single-ended operations capabilities are supported in subnetworks as large as 50 network elements. Networks larger than 32 network elements must be partitioned into alarm groups. (See Chapter 8, "Administration and Provisioning," for additional information). Larger networks may be supported for particular applications or with new software releases should subnetwork growth be a concern. Also, there is no limitation on the size of the networks formed by partitioning a large network into a number of smaller maintenance subnetworks by disabling the DCC on the appropriate OC-N interfaces. Software upgrades and DCC partitioning can be done in service without affecting traffic. If larger maintenance subnetworks are needed, contact your Lucent account manager.

User Panel and Faceplate LEDs (Operations Tier 1)

The first operations tier consists of light-emitting diodes (LEDs) and pushbuttons on the user panel and circuit pack faceplates. These allow routine tasks to be performed without a craft interface terminal (CIT) or any test equipment. The user panel provides system-level alarm and status information for the local terminal. The circuit pack faceplate FAULT LEDs allow fast and easy fault isolation to a particular circuit pack. The user panel and equipment indicators are described in Chapter 6, "Operations Interfaces."

Craft Interface Terminal (CIT) (Operations Tier 2)

The second operations tier provides access to DDM-2000 operations from a CIT over an EIA-232-D interface. System details that can not be obtained from the first operations tier alone can be obtained over the CIT interface. A VT-100 compatible terminal or terminal emulator software running on a PC can be used as a CIT. The dialog is CCITT/ANSI MML-compliant and provides both prompt and command modes with extensive on-line help features for assistance in command execution.

The CIT interface supports OAM&P activities such as loopbacks and testing, protection switching, provisioning, PM, retrieving reports, and security on any and all DDM-2000 FiberReach Multiplexers in a subnetwork from a single DDM-2000 or FT-2000. Access to remote DDM-2000 FiberReach Multiplexers is supported via CIT remote login.



NOTE:

The DDM-2000 FiberReach Multiplexer CIT and CPro-2000 are described in Chapter 6, "Operations Interfaces."

Operations System (OS) Interface (Operations Tier 3)

The third operations tier consists of the remote OS interfaces. The OS interface includes an TL1/X.25 interface.

TL1 Interface

The DDM-2000 FiberReach Multiplexer supports a TL1 interface via its host DDM-2000 over the DCC on the OC-1 interface to control and report alarm and status conditions and PM data to an alarm surveillance OS such as Bellcore's NMA operations or Lucent Technologies ITM SNC. The TL1 interface of the DDM-

2000 FiberReach Multiplexer provides detailed information such as identifying specific circuit packs and facilities.

The DDM-2000 FiberReach Multiplexer supports remote and automated provisioning from a provisioning OS such as Bellcore's OPS/INE or Lucent Technologies ITM SNC. The DDM-2000 FiberReach Multiplexer also provides enhanced security.

As an alternative to DDM-2000 or FT-2000 serving as a TL1/X.25 GNE, ITM SNC Release 5.0 can serve as a TL1-GNE via an IAO LAN interface. DDM-2000 FiberReach's TL1 interface is described in Chapter 6, "Operations Interfaces.

Inservice Upgrades

All DDM-2000 FiberReach software releases support upgrades to future software releases.

DDM-2000 FiberReach Software Compatibility

Table 9-1 lists the various releases of the OC-3 and FiberReach and the corresponding CPs.

Table 9-1. DDM-2000 OC-3 Multiplexer Software Compatibility

Releases		Interconnecting CP	
DDM-2000 OC-3 Release	DDM-2000 FR Release	DDM-2000 OC-3	DDM-2000 FiberReach
9.1	2.1	27G-U/27G2-U	26G-U/26G2-U
9.1	2.2	22-type	28G-U
11.0	2.1	27G-U/27G2-U	26G-U/26G2-U
11.0	2.2	27G-U/27G2-U	26G-U/26G2-U
11.0	2.2	22-type	28G-U
11.1	2.2	22-type	28G-U

Maintenance Signaling

The DDM-2000 FiberReach Multiplexer provides maintenance signaling compliant with the SONET standard (ANSI* T1.105). *The DDM-2000 FiberReach Multiplexer generates and detects the following alarm indication signals (AISs), which notify downstream equipment that a failure has been detected and alarmed by some upstream equipment:

- SONET line AIS
- STS-1 path AIS
- Virtual tributary (VT) path AIS

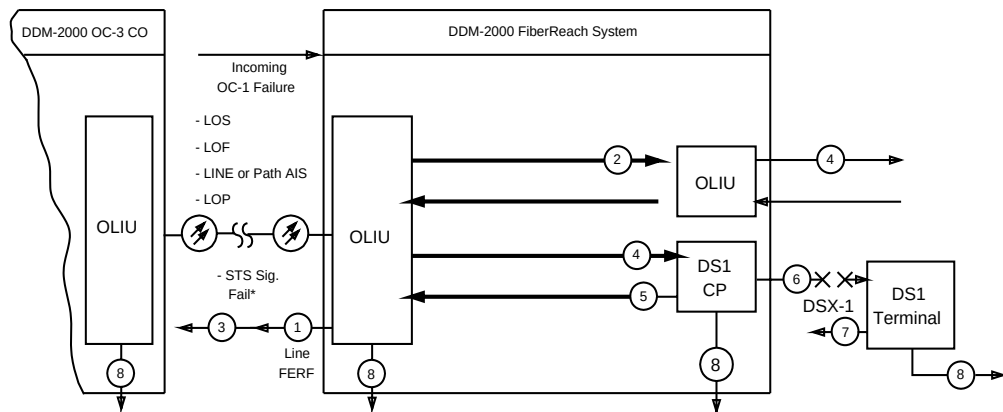
* Registered trademark of American National Standards Institute.

- DS1 AIS (generated, not reported).

The DDM-2000 FiberReach Multiplexer also generates and detects the following signals, which notify upstream equipment of a failure detected downstream:

- Line far-end-receive failure (FERF)
- STS-1 path yellow and VT path yellow.
- STS-1 and VT path unequipped detection.
- An STS-1/VT AIS signal is inserted on paths that are not cross-connected. The user can also provision a shelf to insert STS/VT1.5 unequipped in place of AIS on a path that is not cross-connected.

Figure 9-3 is an example of the AIS, yellow, and FERF signals generated in response to an unprotected incoming OC-1 line failure. In this figure, the labels on the arrows pointing into the DDM-2000 FiberReach Multiplexer indicate the maintenance signals and failure conditions recognized by the DDM-2000 FiberReach Multiplexer. The labels on the arrows pointing out of the DDM-2000 FiberReach Multiplexer indicate the signals generated by the DDM-2000 FiberReach Multiplexer in response to the indicated incoming signals or failure conditions. The **Xs** indicate points of failure, either within the DDM-2000 OC-3 Multiplexer or in upstream equipment. Unlabeled arrows indicate normal transmission except for OC-1 line AIS, maintenance signaling is in response to unprotected failures.



Legend

① FERF ■ LIKELY CAUSES - OC-1 LOS - OC-1 LOF - Line AIS	④ VT Path AIS ■ LIKELY CAUSES - Any of ② - DS1 CP Failure (FE) - Uncross-connected VT-Path - VT LOP	⑥ DS1 AIS ■ LIKELY CAUSES - Any of ④ - VT Unequipped
② STS-1 Path AIS ■ LIKELY CAUSES - OC-1 LOS - OC-1 LOF - Line AIS - OLIU CP Failure (NE) - Uncross-connected STS-Path	⑤ VT Path Yellow ■ LIKELY CAUSES - Any of ④	⑦ DS1 Yellow ■ LIKELY CAUSES - Any of ⑥ - or DS1 LOS, LOF
③ STS-1 Path Yellow ■ LIKELY CAUSES - Any of ① or STS Sig. Fail - STS Unequipped		⑧ Local Indicator - Office Alarms - LEDs - Telemetry Outputs - CIT Initiated Reports

Figure 9-3. Example of Maintenance Signals as a Result of Unprotected Incoming OC-1 Failure for VT1.5 Ring Applications

Figure 9-4 shows an example of the maintenance signals used by the DDM-2000 FiberReach Multiplexer in a VT path-switched ring application.

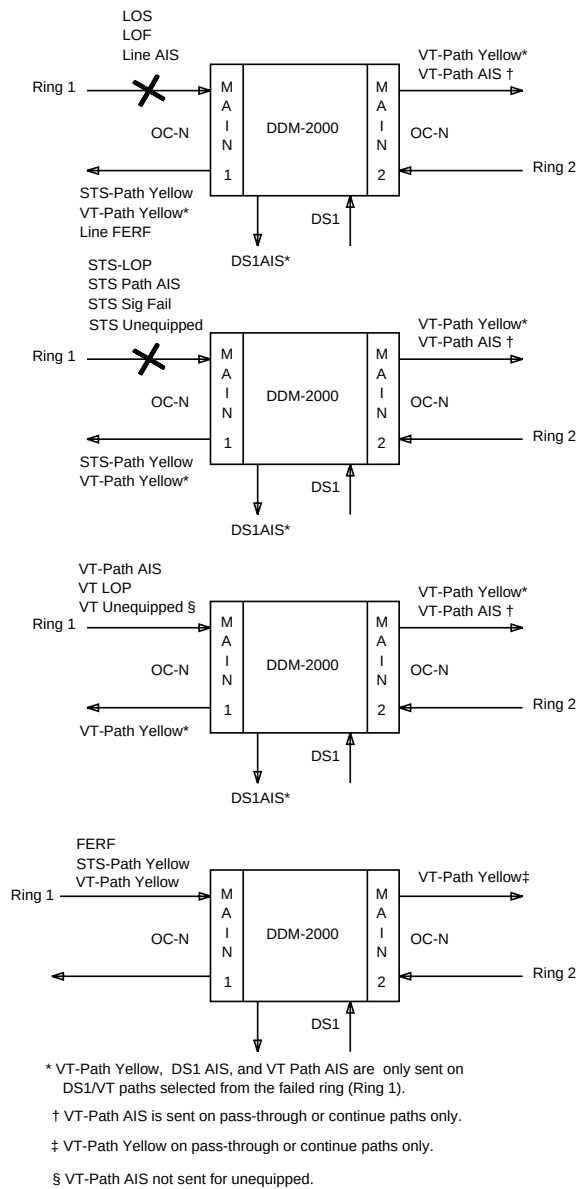


Figure 9-4. Maintenance Signaling — VT Ring Application

Fault Detection, Isolation, and Reporting

Detection

The DDM-2000 FiberReach Multiplexer continuously monitors all circuit packs and incoming signals for faults. Incoming SONET signals are monitored for loss of signal (LOS), loss of frame (LOF), loss of pointer (LOP), and bit error ratio (BER) thresholds, and for the maintenance signals described above. Incoming DS1 signals are monitored for LOS and BER thresholds. The BER thresholds for DS1 are based on bipolar 8-zero substitution (B8ZS) or alternate mark inversion (AMI) violations depending on line coding.

Isolation

When a fault is detected, the DDM-2000 FiberReach Multiplexer uses automatic diagnostics to isolate the fault to a particular signal or circuit pack.

Reporting

The system automatically and autonomously reports all alarm and status conditions through the appropriate user panel and equipment indicators, office alarm relays, telemetry interfaces, and through the TL1/X.25 interface. The system stores a record of all fault conditions and reports them on demand through the CIT and the TL1/X.25 interface. The DDM-2000 FiberReach Multiplexer also stores a history of the past 500 alarm and status conditions and CIT events and reports them on demand. Each event is real time and date stamped.

If the diagnostic determines that a circuit pack has failed, the red FAULT LED on that circuit pack is turned on. If an incoming electrical signal from the DSX fails, the red FAULT LED on the affected circuit pack flashes on and off in one-second intervals. A failed incoming optical signal has the same effect.

The DDM-2000 FiberReach Multiplexer provides alarm holdoff and clear delays. The alarm holdoff delays prevent transient failures from causing unnecessary maintenance activity. The office alarms are not activated and the operations systems are not notified through the telemetry interfaces until a failure lasts at least as long as the alarm holdoff delay. Alarm clear delays prevent premature clearing of alarms. Alarm indications are not cleared until a fault condition has been clear for at least as long as the alarm clear delay. Incoming signal failure conditions, AIS, and FERF signals are subject to the provisionable holdoff delay

and a fixed 15-second clear delay. Yellow signals are not subject to holdoff or clear delays. Circuit pack failures (except control circuit pack failures) are subject to the provisionable holdoff and clear delays. Refer to the **set-attr-alm** and **rtrv-attr-alm** commands in Chapter 11, "Commands and Reports."

Protection Switching

The DDM-2000 FiberReach Multiplexer provides equipment protection switching of all transmission circuit packs, and SONET standard path protection switching for OC-1 lines. Installation of protection equipment is optional. Protection switches are caused by automatically detected faults in the circuit packs or OC-1 lines, and by external commands from a CIT or telemetry byte-oriented serial (TBOS) interface. Refer to the **switch-ls**, and **switch-sync** commands in Chapter 11, "Commands and Reports."

Path Protection Switching (Path Switched Rings)

The path switched ring application is based on the Bellcore's TR-TSY-000496/GR-1400 path protection switching scheme.

The path protection switched ring has two single-fiber counter-rotating rings as shown in Figure 9-5. Each node on the ring terminates four fibers: a transmit and receive fiber in each direction. The architecture of the ring is designed to protect against any single point of failure, including a node failure, single fiber cut, or dual fiber cut. A node failure in a ring affects only traffic dropped at the failed node.

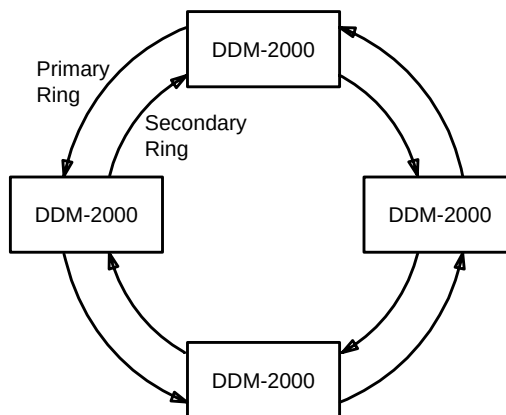


Figure 9-5. Two-Fiber Unidirectional Ring

The signal that enters the ring is protected on a SONET path basis as switching is performed independently for each path. Because of the ring's unidirectional operation, time slots must be reserved all the way around the ring for all ring traffic, limiting the capacity of the ring to the OC-N line rate. DDM-2000 FiberReach can provide VT1.5 path protection.

Path protection switched rings feed a SONET payload from the ring entry point, simultaneously in both rotations of the ring, to the signal's ring drop or exit point as shown by traffic AC and CA in Figure 9-6a. This duplication of the signal that enters the ring is called a "head-end bridge." The node that drops the signal from the ring monitors both ring rotations and is responsible for selecting the signal that has the highest quality based on LOS/LOF, path alarm indication signal (AIS), and path bit error rate (BER) performance. This function at the ring exit point is called a "tail-end switch." The system provides nonrevertive switching. All detected hard failures (LOS, LOF, LOP, line AIS, STS-1 or VT1.5 path AIS, or STS-1 path signal failure or signal degrade based on BER for path protected rings) result in AIS insertion in the outgoing signals. This allows the drop node to detect path failures and to select the good path.

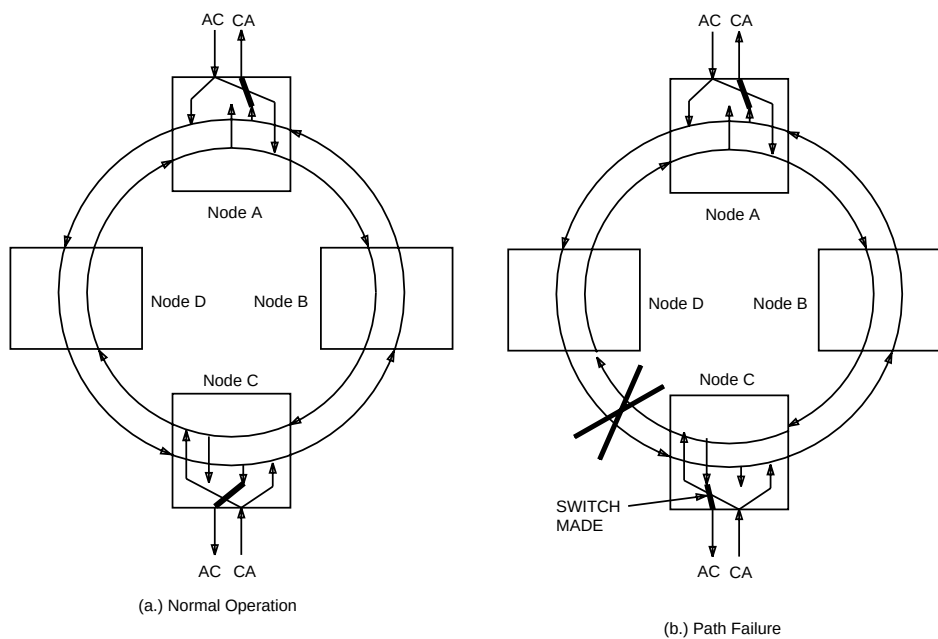


Figure 9-6. Path Protection Switching

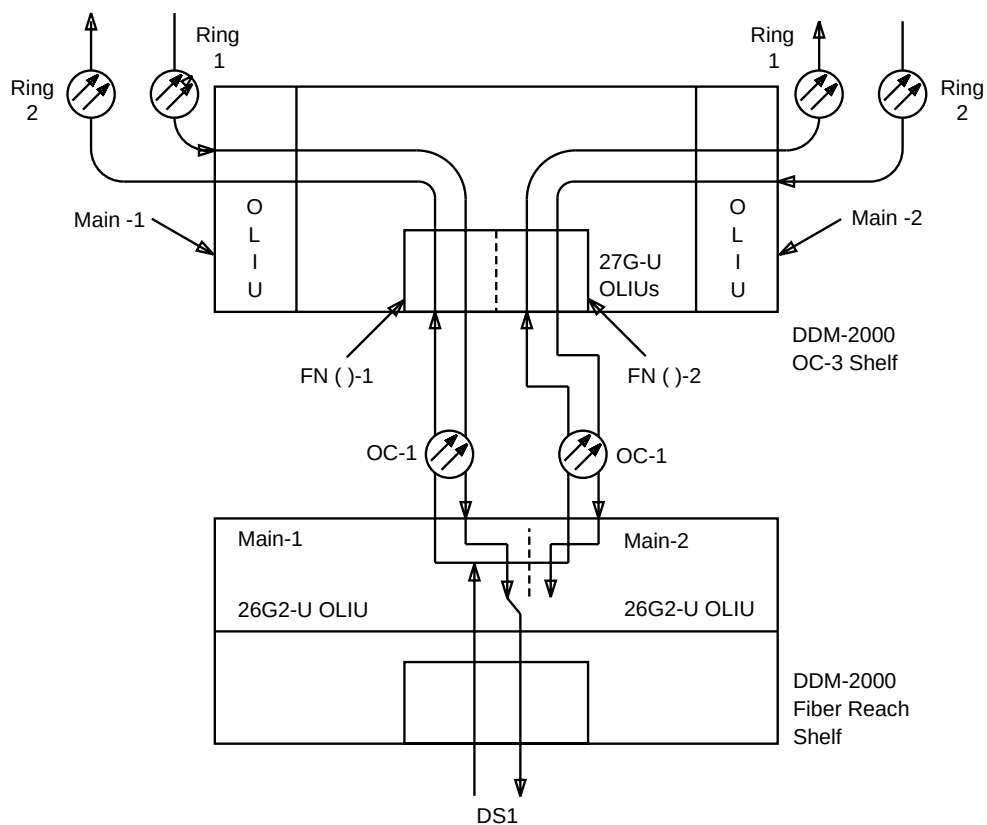
The user can set STS-1 and VT1.5 signal degrade thresholds using the **set-sts1**, **set-vt1**, **rtrv-sts1**, and **rtrv-vt1** commands at a *drop* node on a protected ring. Under normal conditions, both incoming SONET path signals to the switch selection point are of high quality, and the signal can be selected from either ring. A failure or a transmission degradation on one of the rings requires that the other ring path be selected; path selection occurs within 60 milliseconds after a hard failure condition. Figure 9-6b shows how traffic is switched when a dual-fiber cut occurs. The system provides nonrevertive switching to minimize the impact on critical customer services by giving the service provider control when, and if, the critical service should revert to a particular ring. A manual path protection switching command allows switching back to the original path for ease of ring maintenance. Refer to the **switch-path-vt1** command in Chapter 11, "Commands and Reports."

OC-3/OC-1 Ring Interworking

The DDM-2000 OC-3 Multiplexers support both dual-homed and single-homed FiberReach ring interworking applications to provide end-to-end protection from loss of service on traffic traveling over interconnected rings. The dual-homed configuration provides two points (nodes) of interconnection between the OC-3 Multiplexer ring and the FiberReach OC-1 ring to insure a continuation of service between rings, should one interconnecting node fail. The DDM-2000 OC-3 ring interconnects with the FiberReach ring through 0x1 interfaces. The 0x1 interface on the DDM-2000 OC-3 Multiplexer passes traffic from one direction of the OC-3/OC-1 ring to one direction of the FiberReach ring. There is no bridging of traffic onto both rings at the 0x1 interface as there is at a ring drop point. Also, no path protection switching or line protection switching is performed on the OC-3 for traffic connected to the 0x1 interface. Path protection switching is performed on the FiberReach nodes and on the DDM-2000 OC-3 nodes at the traffic exit (drop) points.

Single-Homed Interworking Application

Figure 9-7 shows a single-homed FiberReach configuration. A single DDM-2000 OC-3 shelf provides the point of interconnection between the two rings. On the OC-3 shelf, traffic from one ring is cross-connected through a 0x1 interface to one direction on the other ring. The OC-3 shelf requires two OC-1 OLIUs in a function unit to interface both sides of the FiberReach ring. No line or path protection switching is performed for the 0x1 interface. Path protection switching is performed at the exit points as in the simple ring application previously discussed.



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Figure 9-7. Single-Homed Ring Interworking Application

Dual-Homed Ring Interworking Application

Figure 9-8 shows a dual-homed FiberReach configuration. This application requires two DDM-2000 OC-3 Multiplexers to provide redundant points of interconnection between the FiberReach and the DDM-2000 OC-3 ring. The same 0x1 interface is used as for the single-homed application. However for the dual-homing application, only one 27-type OLIU is required in the DDM-2000 OC-3 function unit to interface one side of the FiberReach ring.

Another FiberReach extension can use the remaining -1 or -2 slots, as long as the bandwidth is not violated. For instance, assume you had a dual homed application where one OC-3 shelf is hosting and terminating one rotation of the subtending OC-1 ring through OC-1 port # 1 on the dual OC-1 (27-type OLIU) in FN-A-1, and another OC-3 shelf is hosting and terminating the other rotation of the subtending OC-1 ring through the OC-1 port #1 on the dual OC-1 (27-type).

As a result, both 27-type OLIU circuit packs located in FN-A-1 of one OC-3 shelf and FN-A-2 of the other OC-3 shelf still have one OC-1 port available (OC-1 #2) to be used for another dual-homed application to host another OC-1 ring, or this OC-1 port can be used to host a single-homed application, which in this case requires the presence of another 27-type OLIU in FN-A-2.

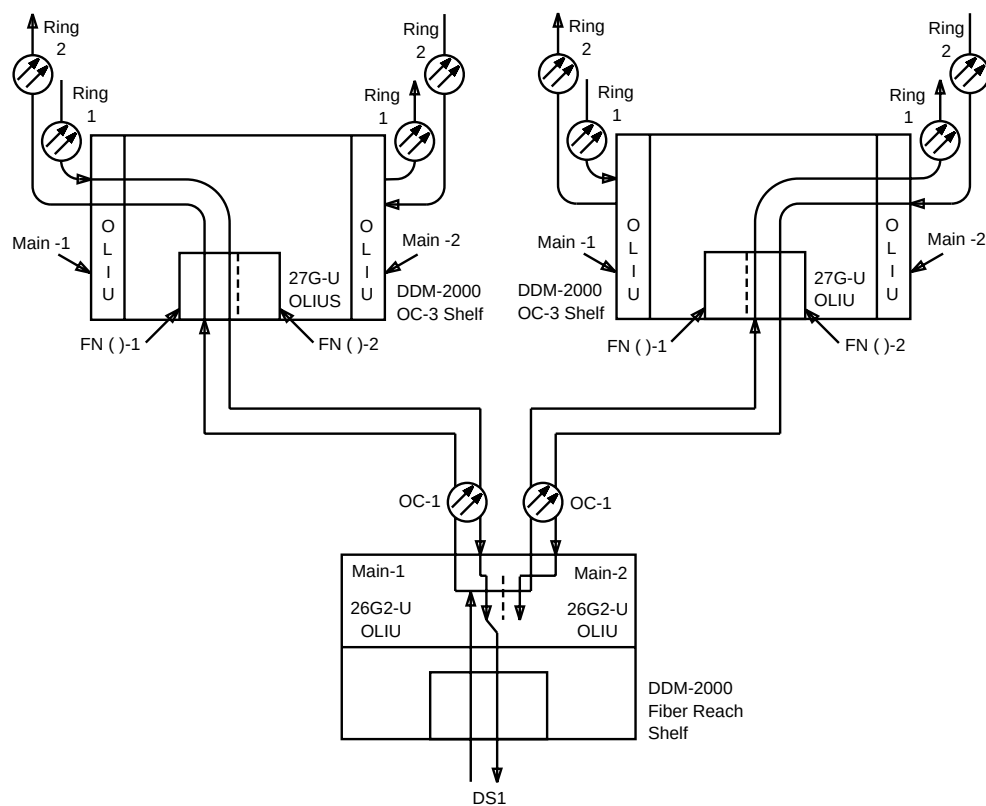
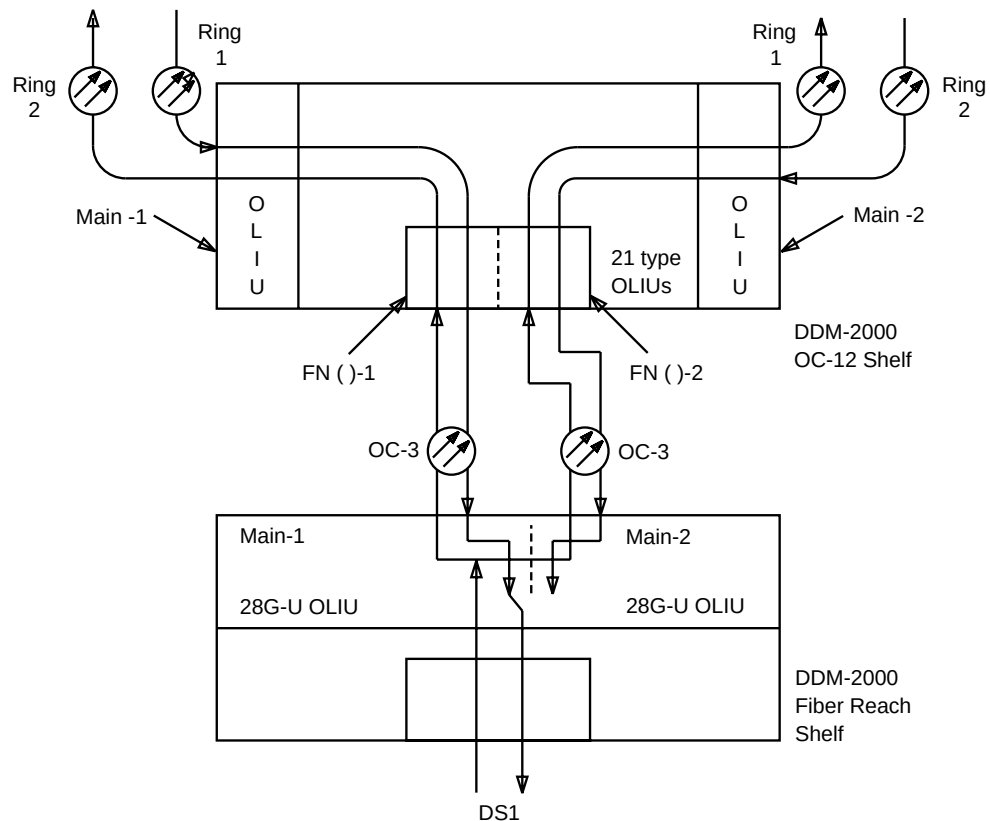


Figure 9-8. Dual-Homed Ring Interworking Application

Single-Homed Interworking Application for FiberReach to a DDM-2000 OC-12

Figure 9-9 shows a single-homed FiberReach configuration. A single DDM-2000 OC-12 shelf provides the point of interconnection between the two rings. On the OC-12 shelf, traffic from one ring is cross-connected through a 0x1 interface to one direction on the other ring. The OC-12 shelf requires two OC-3 OLIUs in a function unit to interface both sides of the FiberReach ring. No line or path protection switching is performed for the 0x1 interface. Path protection switching is performed at the exit points as in the simple ring application previously discussed.

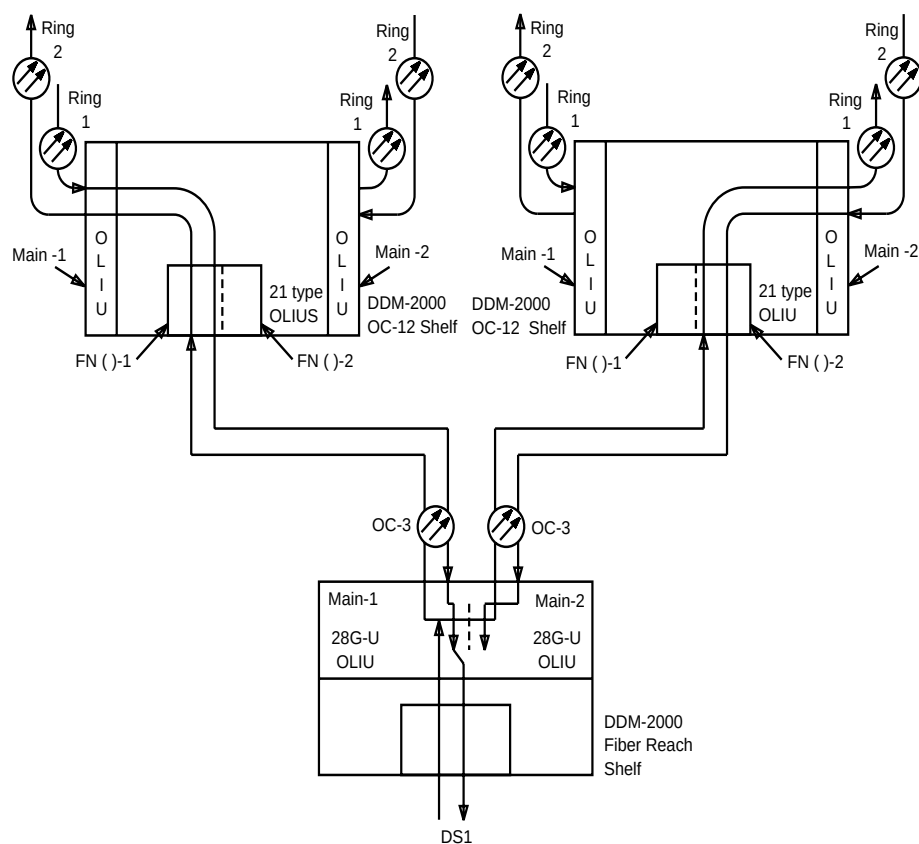


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Figure 9-9. Single-Homed Ring Interworking Application for FiberReach to DDM-2000 OC-12

Dual-Homed Ring Interworking Application for FiberReach to DDM-2000 OC-12

Figure 9-10 shows a dual-homed FiberReach configuration. This application requires two DDM-2000 OC-12 Multiplexers to provide redundant points of interconnection between the FiberReach and the DDM-2000 OC-12 ring. The same 0x1 interface is used as for the single-homed application. However for the dual-homing application, only one 21-type OLIU is required in the DDM-2000 OC-12 function unit to interface one side of the FiberReach ring.



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Figure 9-10. Dual-Homed Ring Interworking Application for FiberReach to DDM-2000 OC-12

Status of ACTIVE LED on Rings

In all ring applications, ACTIVE LEDs on each Main OLIU are always lighted because it is not known if a signal on that OLIU is currently being selected by a far-end network element.

Low-Speed Equipment Protection



NOTE:

The protection module is determined by protection modules that are shipped with each wideband shelf. The module is plugged into P2, the protection bus connector located on the rear of the shelf. Along with the modules, labels are shipped for identifying the low-speed slots.

The DDM-2000 FiberReach Multiplexer offers 1x1 or 1x7 protection revertive switching. In a 1x1 protection configuration, the eight slots are divided into four low-speed groups — A, B, C, and D. The bottom four slots are the service A, B, C, and D slots and the top four slots are the associated protection A, B, C, and D slots. To prevent frequent protection switches caused by intermittent failures of a DS1 or T1EXT circuit pack, the system provides an "automatic lock" feature. If four automatic protection switches are done on the same DS1 or T1EXT circuit pack within a 10-minute interval, traffic is automatically locked onto the protection circuit pack and the automatic lock is reported as a minor alarm. The automatic lock can be reset manually using the **switch-ls** command. It resets automatically at midnight or if the affected DS1/T1EXT circuit pack is replaced. The DDM-2000 FiberReach Multiplexer also supports unprotected equipment configurations. DS1 and T1EXT circuit packs can be mixed in a 1x7 protection group but only one pack type can be protected.

The DDM-2000 FiberReach Multiplexer provides very flexible low speed equipment protection schemes to accommodate mixed services applications. The schemes include 1X1 protected or 1x7 protected configurations, provisionable by the user. Provisioning is done at installation using a low-speed protection assembly on the backplane. The protection scheme can be changed (for example, upgrading from 1x1 to 1x7) but must be done out-of-service.

Synchronization Reference Protection

For DDM-2000 FiberReach, the synchronization references are 1x1 protected. If neither reference is available, the system automatically switches to "holdover" timing mode. The system uses synchronization messaging to determine the quality of the loop timing references by reading the synchronization messages in

| the OC-1/OC-3 transport overhead bytes. If the quality is not adequate, the system will switch to holdover until manually switched to a good reference.

Automatic synchronization reconfiguration is always enabled; thus the system will automatically select the highest quality reference. See "Synchronization Messaging" in Chapter 5, "Transmission and Synchronization Interfaces" and the **set -sync** command in Chapter 11, "Commands and Reports".

The system can be provisioned to revertive or nonrevertive timing mode switching. The default is revertive. If provisioned for revertive mode switching, the system automatically switches out of holdover mode to line timing when an unprotected timing reference failure clears. If provisioned for nonrevertive mode switching, the system must be manually switched from holdover mode to line timing mode when an unprotected timing reference failure clears. Refer to the **rtrv-sync**, **set-sync**, and **switch-sync** commands in Chapter 11, "Commands and Reports."

Loopbacks

| The DDM-2000 FiberReach Multiplexer allows technicians to set up loopbacks on all low- and high-speed interfaces. Low-speed DS1 electronic loopbacks, directed toward the high-speed OC-1/OC-3, can be individually controlled from the CIT. DS1 facility loopbacks toward the DSX-1 can also be set up, in groups of four DS1 signals or individually (BB3B only). Active electronic loopbacks are noted by the user panel's abnormal (ABN) indicator and in the alarm and status report. Refer to the **opr - lpbk** and **rls - lpbk** commands in Chapter 11, "Commands and Reports."

| Front access to the OLIU optical connectors allows an easy manual OC-1 or OC-3 optical loopback. This loopback is set up by connecting a fiber jumper from the OLIU output to its input. An optical attenuator is required for this loopback.

Tests

Transmission Tests

Technicians can use the DDM-2000 FiberReach Multiplexer internal testing capabilities for installation and manual troubleshooting. DS1 test signal generators and detectors are integrated in the system, eliminating the need for external test equipment to do transmission testing.

The DDM-2000 FiberReach Multiplexer lets technicians test specific signals and system components. For example, technicians can manually enable the integrated test signal generators and detectors for a DS1 low-speed interface. Signal tests

can be run selectively in the multiplex or demultiplex direction. Refer to the **test-trmsn** commands in Chapter 11, "Commands and Reports."

Operations Interface Tests

The DDM-2000 FiberReach Multiplexer provides tests for LED indicators, parallel telemetry, miscellaneous discretes and TBOS interfaces, office alarms, and the system controller. Refer to the **test-led**, **test-tlm-par**, **test-tlm-ser**, **test-alm**, and **test-sysctl** commands in Chapter 11, "Commands and Reports."

Performance Monitoring

The DDM-2000 FiberReach Multiplexer uses performance monitoring (PM) to support proactive maintenance of the network and tariffed service performance verification. Proactive maintenance refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending hard or soft failure. Hard and soft failures result in reactive maintenance.

Proactive maintenance consists of monitoring performance parameters associated with the SONET sections, lines, and paths within the SONET network. Refer to Chapter 10, "Technical Specifications" for a table of the SONET performance parameters monitored by DDM-2000 systems. These parameters are thresholded to indicate degraded performance. When a performance-monitoring threshold is crossed, it is reported to the operations system connected via TL1 or to an X.25 or TBOS as a threshold crossing alert (TCA). For TL1 and an X.25 link, all threshold crossings associated with a particular path can be correlated, and the likely source of the degradation can be identified. For TBOS, all threshold crossings are indicated by a single point.

Figure 9-11 shows DS1 line and path performance monitoring.

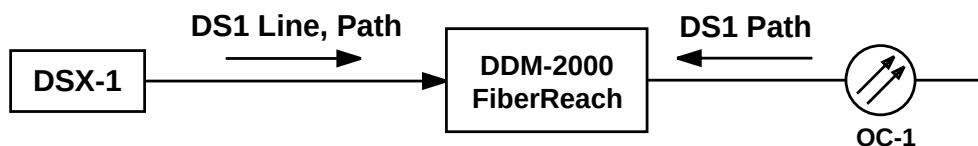


Figure 9-11. DS1 Line and Path Performance Monitoring

The following are definitions and explanations for the terms used in Figure 9-9:

- **Line** — A line is a physical transport vehicle that provides the means of moving digital information between two points in a network. The line is characterized by a metallic transmission medium and its specific coding type. A line is bounded by its two end points, known as line terminations. A line termination is the point where the electrical, bipolar line signal is generated and transmitted, or received and decoded.
 - **DS1** — DS1 line for alternate mark inversion (AMI) or bipolar 8-zero substitution (B8ZS) coding is monitored and the errored second (ES-L) data is displayed for the incoming signal from the DSX-1.
- **Path** — A path is a framed digital stream between two points in a network and represents digital signal transport at a specified rate, independent of the equipment and media providing the physical means of transporting the signal. A path is defined by its two end points, called path terminations, where its frame structure is generated and decoded. A path may be carried wholly within one transport segment (line), or it may span a sequential arrangement of two or more transport segments.
 - **DS1** — DS1 near-end path is monitored for SF framing and both near-end and far-end paths are monitored for ESF framing. The data is displayed in CV-P, ES-P, SES-P, and UAS-P categories.

VT Performance Monitoring

VT performance monitoring provides performance monitoring of the V5 byte for errored seconds, severely errored seconds, and unavailable seconds. VT performance monitoring is a feature package option that requires feature package software licensed by Lucent and the use of the **set-feat** command to enable the feature.

The counts are retrieved using the **rtrv-pm-vt1** command by the message-based operations system or through the CIT to determine if the service is operating within tariffed limits.

DS1 Performance Monitoring

DS1 performance monitoring is a feature package option that requires feature package software licensed by Lucent and the use of the **set-feat** command to enable the feature. Refer to Figure 9-12. DS1 performance monitoring measures near-end performance and extended superframe format far-end performance report of the incoming DS1, allowing service providers to determine the end-to-end performance of a DS1 signal. Tariffed service verification consists of monitoring performance parameters that can be associated with the customer's end-to-end service. The DDM-2000 OC-1/OC-3 Multiplexer provides this

capability for DS1 services with the DS1 performance monitoring feature. Based on the American National Standards Institute *ANSI T1.403* extended superframe format (ESF), this capability retrieves performance report messages written into the ESF data link by the customer's terminal equipment.

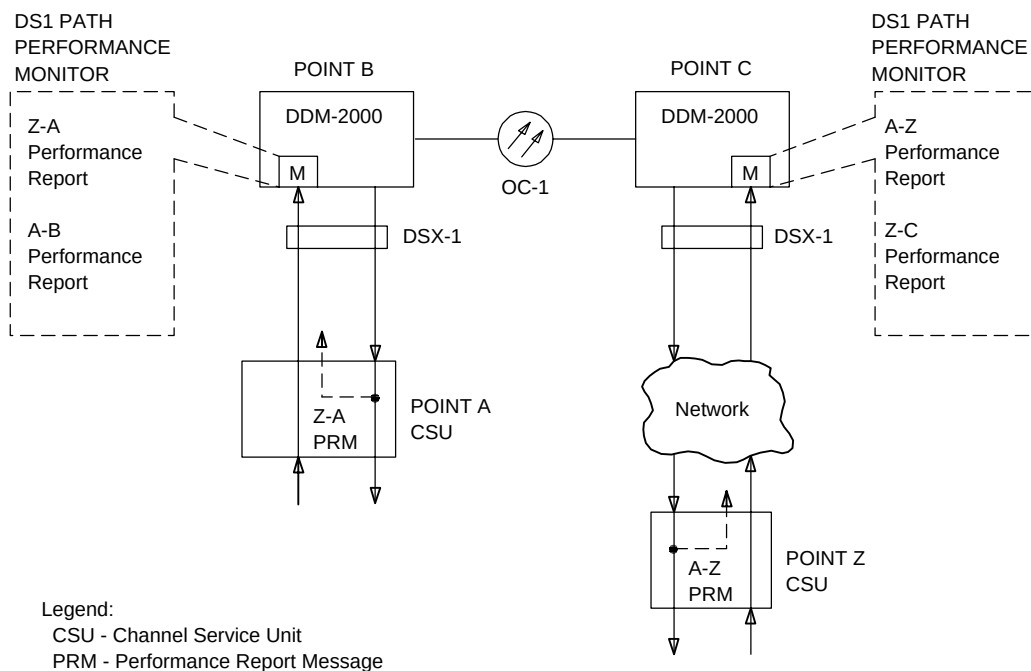


Figure 9-12. DDM-2000 Multiplexer DS1 Path Performance Monitoring

From these messages, the DDM-2000 Multiplexer can determine and report the end-to-end error performance of the entire DS1 link *as seen by the customer*. The counts are retrieved using the **rtrv-pm-t1** command by the message-based operations system to determine if the service is operating within tariffed limits.

Application of the DS1 performance monitoring feature for tariffed service verification is shown in Figure 9-12. Here an ANSI T1.403 ESF format DS1 service carried between points A and Z, using a DDM-2000 system and terminated at the customer's premises with channel service units (CSUs). At the "A" end, the received error performance (Z - A) is detected and written by the customer's CSU onto the outgoing (A - Z) ESF data link, as shown by the dashed lines, as a performance report message (PRM). The DS1PM or HDSL circuit pack interfacing the A end reads the incoming DS1 signal's PRM (received from the customer's premises) and reports the Z - A performance. Likewise, the OC-3 system interfacing the Z end reports the A - Z performance by reading the PRM from the customer's "Z" CSU. By reviewing the data from each OC-3 system, the service provider can determine the complete end-to-end performance (A - Z and Z - A) of the customer's service.

Additionally, each DS1PM or HDSL circuit pack measures the near-end performance of the incoming DS1, allowing the service provider to determine if a good DS1 signal was received from the customer before transporting it through the network. This information can then aid in sectionalizing any reported performance problems. The DS1PM circuit pack can also provide this same near-end information for superframe (SF) formatted (sometimes known as "D4 framing") DS1 services, but complete end-to-end performance verification is limited due to the lack of the PRM in the SF format.

See the "Performance Monitoring Parameters Provisionable via the CIT" table for the DDM-2000 FiberReach Multiplexer in Chapter 10, "Technical Specifications."

Performance Parameters

The "Performance Monitoring Parameters Provisionable via the CIT" table in Chapter 10, "Technical Specifications" lists the performance parameters monitored by the DDM-2000 FiberReach Multiplexer. The collection of performance parameters depends directly on slot state transitions, port states, and cross-connections.

OC-1 and OC-3 Section Parameters

Performance Monitoring Enabling

Collection of section parameters for OC-1/OC-3 interfaces are initiated when a slot is equipped with an OLIU circuit pack. Parameters continue to be available in reports and generate appropriate threshold crossing alerts until the OLIU is removed and the **update** command or the UPD/INIT button is pressed.

Severely Errored Frame Seconds (SEFS)

This parameter counts the number of seconds during which an out-of-frame, loss-of-signal, or OLIU circuit pack failure occurred. SEFSs are counted and thresholded independently for each OC-1/OC-3 interface.

| OC-1 or OC-3 Line Parameters

Performance Monitoring Enabling

Collection of line parameters for OC-1 or OC-3 interfaces are initiated when a slot is equipped with an OLIU circuit pack. Parameters continue to be available in reports and generate appropriate threshold crossing alerts until the OLIU is removed and the **update** command or the UPD/INIT button is pressed.

Line Coding Violations (B2 Parity)

To monitor the performance of the OC-1/OC-3 line, the line BIP-8 (B2 parity) is calculated, written, and checked for errors. The line B2 parity violation counter is incremented for each line BIP error detected. Each line BIP-8 can detect up to eight errors per STS-1 frame. Coding violations are not counted during seconds that contain a line AIS, loss of signal, loss of frame, or during an unavailable second (UAS). The B2 parity violations are counted and thresholded independently for each OC-1/OC-3 line.

Errored Seconds

An "errored second" is a second in which one or more B2 parity violations are detected. An errored second "type A" is a second in which exactly one B2 parity violation is detected. An errored second "type B" is a second in which more than one and less than 12, B2 parity violations are detected. Seconds that are unavailable seconds are not counted as errored seconds. A second that contains a line AIS, loss of signal, loss of frame or is an unavailable second is not counted as a type A or type B errored second. All three of these parameters are counted and thresholded independently for each OC-1/OC-3 line.

Severely Errored Seconds

A severely errored second is a second in which 12 or more, B2 parity violations are detected or one in which a loss of signal, loss of frame or line AIS occurs. An unavailable second is not counted as a severely errored second. Severely errored seconds are counted and thresholded independently for each OC-1/OC-3 line.

Unavailable Seconds

An unavailable second is a second during which the OC-1 line is "unavailable." A line is considered "unavailable" from the beginning of X consecutive severely errored seconds until the beginning of Y consecutive seconds, none of which is severely errored. X is equal to 10 seconds or, in the case of a failure, the line signal failure. Y is equal to 10 seconds of no severely errored seconds or line signal failure. Unavailable seconds are counted and thresholded independently for each OC-1 line.

STS-1 Path Parameters

Performance Monitoring Enabling

STS-1 path performance monitoring is initiated only when the first VT1.5 cross-connection associated with that STS-1 signal is made and the VT channel is in the IS state. Parameters continue to be available in reports and generate appropriate threshold crossing alerts until the last VT1.5 cross-connection is deleted.

STS-1 Path Coding Violations (B3 Parity)

To monitor the performance of the STS-1 path, the "B3" byte in the STS-1 path overhead is written when the path is originated and checked for errors when the path is terminated. The B3 coding violation counter is incremented for each error detected. Up to eight errors per STS-1 frame can be detected in each STS-1 synchronous payload envelope (SPE). B3 coding violations are counted and thresholded separately for each STS-1 path terminated by the system. Coding violations are not counted during seconds that contain a line AIS, loss of signal, loss of frame, loss of pointer, STS path AIS, or during an unavailable second (UAS).

Errored Seconds

An "errored second" is a second in which one or more B3 parity violations are detected. Seconds that are unavailable seconds are not counted as errored seconds. An errored second "type A" is a second in which exactly one B3 parity violation is detected. An errored second "type B" is a second in which more than one and less than nine B3 parity violations are detected. All three of these parameters are counted and thresholded independently for each STS-1 path terminated by the system.

Severely Errored Seconds

A severely errored second is a second in which nine or more B3 parity violations are detected. Severely errored seconds are counted and thresholded separately for each STS-1 path terminated by the system. An unavailable second is not counted as a severely errored second.

Unavailable Seconds

An STS-1 path is considered "unavailable" from the beginning of X consecutive severely errored seconds until the beginning of Y consecutive seconds, none of which is severely errored. X is equal to 10 seconds or, in the case of a failure, the STS signal failure. Y is equal to 10 seconds of no severely errored seconds or STS signal failure. If there is an unprotected STS-1 path terminating equipment (OLIU) failure, unavailable seconds are counted from within 1 second of circuit pack failure to within 1 second of circuit pack recovery.

VT1.5 Path Parameters

Performance Monitoring Enabling

VT1.5 monitoring is initiated when the associated VT1.5 or STS-1 cross-connection is made to a DS1 or DS1PM circuit pack. Parameters continue to be available in reports and generate appropriate threshold crossing alerts until the VT1.5 or STS-1 cross-connection is deleted.

Errored Seconds

An "errored second" is a second that is not an "unavailable second" in which one or more V5 parity violations or an AIS or LOP is detected. This parameter is counted and thresholded independently for each VT1.5 path terminated by the system.

Severely Errored Seconds

A "severely errored" second is a second that is not an "unavailable second" in which four or more V5 violations or an AIS or LOP is detected. Severely errored seconds are counted and thresholded separately for each VT1.5 path terminated by the system.

Unavailable Seconds

A VT1.5 path is considered "unavailable" from the beginning of X consecutive severely errored seconds until the beginning of Y consecutive seconds, none of

which is severely errored. X is equal to 10 seconds or, in the case of a failure, the VT signal failure. Y is equal to 10 seconds of no severely errored seconds or VT signal failure. If there is an unprotected VT path terminating equipment failure, unavailable seconds are counted from within 1 second of circuit pack failure to within 1 second of circuit pack recovery.

DS1 Path Parameters

Performance Monitoring Enabling

Collection of DS1 path parameters are initiated only when a slot is equipped with a DS1PM circuit pack, the DS1 port is in the IS or NMON state, and the DS1 port is provisioned for performance monitoring. Parameters continue to be available in reports and generate appropriate threshold crossing alerts until the input signal to the DS1 interface is removed and the **update** command or the UPD/INIT button is pressed. Alternatively, the DS1 path parameter can be disabled by setting the DS1 port to turn off DS1PM by using the **set - t1** command.

Errored Seconds

An "errored second" for a DS1 SF format is a second in which one or more FEs, or a DS1 AIS, or a DS1 OOF is detected. A near-end "errored second" for a DS1 ESF path is a second in which one or more CRC-6 violations, or a DS1 AIS, or OOF is detected. Errored seconds are not counted during "unavailable seconds". For a DS1 path with the ESF format, the far-end "errored seconds" values are obtained from the performance report message (PRM) in the DS1 ESF data link.

CV-P Coding Violations

This indicates the number of DS1 near-end path coding violations during the data collection interval. For a DS1 in SF format, this is a count of framing bit errors. For a DS1 in ESF format, this is a count of CRC-6 bit errors.

CV-PFE Coding Violations

This indicates the number of DS1 far-end path coding violations during the data collection interval. This parameter is only applicable to a DS1 signal in ESF format. This is a count of CRC-6 bit errors as reported in the G bits of the PRM.

Severely Errored Second

For the DS1 SF format, a "severely errored second" is a second in which eight or more FEs are detected, or an OOF, or DS1 AIS is detected. For the DS1 ESF format, a near-end severely errored second is a second in which 320 or more

CRC-6 violations, or a DS1 AIS, or DS1 OOF are detected. For a DS1 path with the ESF format, the far-end "severely errored seconds" values are obtained from the PRM in the DS1 ESF data link. Severely errored seconds are not counted during "unavailable seconds". For a DS1 path with ESF format, the far-end "severely errored seconds" values are obtained from the PRM.

Unavailable Seconds

A DS1 path is considered "unavailable" from the beginning of 10 consecutive severely errored seconds until the beginning of 10 consecutive seconds, none of which is severely errored. If there is a DS1 pack failure then unavailable seconds are counted from within 1 second of circuit pack failure to within 1 second of circuit pack recovery. Unavailable seconds are counted and thresholded separately for each DS1 path monitored by the system.

For a DS1 path with ESF format, the far-end "unavailable second" performance is obtained from the PRM.

DS1 Line Parameters

ES-L Errored Seconds

This parameter is a count of seconds containing one or more bipolar violations (for both AMI and B8ZS types of coding), or one or more loss of signal defects from the DSX-1.

Performance Monitoring Data Storage and Reports

The DDM-2000 FiberReach Multiplexer can initialize the current registers through the CIT locally or remotely at any time, as well as report the contents of any register at any time. Refer to the **init-pm**, **rtrv-pm-line**, **rtrv-pm-sect**, **rtrv-pm-sts1**, **rtrv-pm-t1**, and **rtrv-pm-tca** commands in Chapter 11, "Commands and Reports."

Performance Monitoring During Failed Conditions

When the DDM-2000 FiberReach Multiplexer detects a trouble condition, the system stops accumulating affected performance parameters. Parameters that continue to provide useful information are accumulated during the trouble condition.

Performance Parameter Thresholds

The DDM-2000 FiberReach Multiplexer provides performance thresholds to alert maintenance staff of degraded transmission. Whenever the threshold for a parameter is exceeded, the DDM-2000 FiberReach Multiplexer generates a threshold-crossing alert (TCA) to alert the OS (via the TBOS or TL1/X.25 interface) to the condition. A summary of all TCAs is available in the performance monitoring TCA summary report. Current quarter-hour and current day thresholds for each parameter are provisionable, via the CIT, on a per shelf basis. Therefore, if values other than the defaults are to be used, only one value needs to be set for each parameter. Generation of TCAs can be disabled independently for each performance parameter. Performance data is still collected if thresholding is disabled. Refer to the **rtrv-pmthres-line**, **rtrv-pmthres-sect**, **rtrv-pmthres-sts1**, **set-pmthres-line**, **set-pmthres-sect**, **set-pmthres-sts1**, **rtrv-pm-tca**, **rtrv-pmthres-vt1**, **rtrv-pmthres-t1**, **set-pmthres-vt1**, and **set-pmthres-t1** commands in Chapter 11, "Commands and Reports."

TCA Transmission to OS

To trigger proactive maintenance activity at the OS, each DDM-2000 FiberReach Multiplexer TBOS display contains one summary level performance monitoring TCA point. When the TL1/X.25 interface to the network monitoring and analysis (NMA) operations system is used, threshold crossings are reported to NMA via **REPT-EVT** messages.

Reports

This section provides information in reports available through the CIT. For reports available through the TL1/X.25 link, refer to 824-102-148, *2000 Family of Products Operations Systems Engineering Guide*. Alarms and Status Report

The system provides a report that lists all active alarm and status conditions. The identity of the condition (circuit pack failure, incoming signal failure, etc.) is included in the report along with a time stamp indicating when the condition was detected.

See the **rtrv-alm** command in Chapter 11, "Commands and Reports" for a complete list of the alarm and status conditions that are reported by the system.

Provisioning Reports

Provisioning reports list the current state of all provisionable options in the system. See the **rtrv-attr-alm**, **rtrv-attr-cont**, **rtrv-attr-env**, **rtrv-crs-vt1**, **rtrv-fecom**, **rtrv-lgn**, **rtrv-link**, **rtrv-ne**, **rtrv-oc1**, **rtrv-pmthres-line**, **rtrv-pmthres-sect**, **rtrv-pmthres-sts1**, **rtrv-pmthres-t1**, **rtrv-pmthres-vt1**, **rtrv-secu**, **rtrv-state-equip**, **rtrv-state-path**, **rtrv-state-sts1**, **rtrv-sts1**, **rtrv-sync**, **rtrv-t1**, **rtrv-ulsdcc**, **rtrv-state-vt1** and **rtrv-vt1** commands in Chapter 11, "Commands and Reports."

Performance Monitoring Reports

TCA Summary Report

The TCA summary report lists the sum of the number of threshold crossings within the last 8 hours for quarter-hour thresholds and the number of threshold-crossings for the current day and current quarter hour. This snapshot provides an overall view of system performance. If there are TCAs identified, it identifies which performance status report to look at for a detailed view of those parameters. See the **rtrv-pm-tca**, command in Chapter 11, "Commands and Reports."

Performance Status Reports

The system provides reports that contain a snapshot of all current and previous performance monitoring registers. The time at which registers were last reinitialized is included. The option to display a specified subset of parameters (for example, line parameters only, data for only one OC-1 line or DS1 port, etc.) is also provided. See the **rtrv-pm-sect**, **rtrv-pm-line**, **rtrv-pm-sts1**, **rtrv-pm-vt1**, and **rtrv-pm-t1**, commands in Chapter 11, "Commands and Reports." Equivalent reporting information is available through TL1/X.25 commands. Refer to 824-102-148, *2000 Family of Products Operations Systems Engineering Guide*.

Maintenance History Report

A maintenance history report containing the past 500 alarm, status, protection switching, and CIT (for example, provisioning, loopback request, manual protection, etc.) events is provided. This summary contains real time and date stamps indicating when each condition was detected and when it cleared; CIT events contain a time stamp indicating when the command was entered. Alarm and status entries in the retrieve history report are not subject to holdoff and clear delay. See the **rtrv-hsty** command in Chapter 11, "Commands and Reports."

State Report

The state report lists the state of all slots and low-speed ports on the system. DS1 ports can be in the AUTO (available for automatic provisioning), IS (in service), or NMON (not monitored) states. When a good signal from the DSX is detected, a port in the AUTO state automatically transitions to the IS state and is monitored for failures. When a port is in the NMON state, the signal coming from the DSX is not monitored. This report also includes the protection switching state ("active" or "standby") and protection switching priority of all protected lines and equipment in the system. See the **rtrv-state(t1, sts1, vt1)** command in Chapter 11, "Commands and Reports."

Path State Report

This report lists each VT1.5 active and standby path in a path switched ring configuration. The active paths are identified and the protection switching status of each path is provided. See the **rtrv-state- (t1, sts1, vt1)** command in Chapter 11, "Commands and Reports."

Equipment Report

This report displays the equipage and version information for one or more slots. Refer to the **rtrv-eqpt** command in Chapter 11, "Commands and Reports."

Network Map Report

This report shows the names ("Target Identifiers," or "TIDs") of other DDM-2000 systems in the subnetwork and the gateway network element (GNE) for the subnetwork. Refer to the **rtrv-map-network** command in Chapter 11, "Commands and Reports."

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Overview

This section contains the technical specifications for the DDM-2000 FiberReach Multiplexer.

DDM 2000 FiberReach Multiplexer

External Transmission Interfaces

The DDM-2000 FiberReach Multiplexer transmission interfaces adhere to industry standards as listed in Table 10-1.

Table 10-1. Transmission Interface Standards

Interface	Standard	Comments
DS1 low-speed	CB-119, <i>ANSI</i> * T1.102-1992 (Draft), TR-499, Iss. 5, <i>ANSI</i> T1.403-1989	B8ZS/AMI option SF, ESF
OC-1/OC-3	<i>ANSI</i> T1.106/88, <i>ANSI</i> T1.105/95, T1.105.03/94, & T1.105.02/95 GR-253, Iss. 2, GR-496, Iss. 2	

* Registered trademark of American National Standards Institute, Inc.

Electrical Interfaces

The DDM-2000 OC-3 Multiplexer supports a DS1 low-speed interface.

DS1 Low-Speed (BBF1B)

- Electrical Specification

The DS1 low-speed interface transmits and receives a standard electrical DS1 signal as specified in *ANSI* T1.102-1993, Section 2 (1.544 Mb/s nominal rate, DSX-1 interconnect specification). Line coding is provisionable to alternate mark inversion (AMI) with or without bipolar 8-zero substitution (B8ZS). Line buildout is provisionable as follows:

- 613C (22 gauge): 30 to 655 ft.
- 1249-C (26 gauge) 30 to 450 ft.

- Format Specification

The DS1 low-speed interface provides clear channel transport of any DSX-1 compatible signal. There are no format constraints on this interface.

- Alarm Thresholding

The following parameters are monitored at the DS1 interface:

- Loss of signal
- Line coding violations

The alarm level for each of the monitored parameters can be provisioned to critical (CR), major (MJ), minor (MN), or status. B8ZS and AMI coding violation failure thresholds are user settable to 10^{-3} or 10^{-6} bit error ratio (BER).

DS1PM Low-Speed (BBF3/BBF3B)

■ Electrical Specification

The DS1PM low-speed interface transmits and receives a standard electrical DS1 signal as specified in *ANSI T1.102-1993*, Section 2 (1.544 Mb/s nominal rate, DSX-1 interconnect specification). Line coding is provisionable to AMI with or without B8ZS. Line buildout is provisionable as follows:

- 613C (22 gauge): 30 to 655 ft.
- 1249-C (26 gauge): 30 to 450 ft.

■ Format Specification

The DS1Pm low-speed interface can be provisioned for the following DS1 formats: clear channel (default), superframe (SF) as specified in *ANSI T1.403-1995*, or extended superframe (ESF) as specified in *ANSI T1.403-1995*. In the case of SF or ESF format selections, DS1 performance information is collected by monitoring the associated DS1 framing format.

■ Alarm Thresholding

The following parameters are monitored at the DS1PM interface:

- Loss of signal (LOS)
- Line coding violations (CV-L).

The alarm level for each of the monitored parameters can be provisioned to CR, MJ, MN, or status. B8ZS and AMI coding violation failure thresholds are user settable to 10^{-7} or 10^{-8} BER.

■ Loopback

- Quad DS1 facility loopback (BBF3)
- Single DS1 facility loopback (BBF3B).

■ Performance Monitoring (See Table 10-12)

Near-End DS1 Path Parameters:

- Errored Seconds (ES)
- Severely Errored Second (SES)
- Unavailable Seconds (UAS)
- SF or ESF framed signals incoming to the DSX-1.
- CV-P Coding Violations
- CV-PFE Coding Violations

Far-End DS1 Path Parameters:

- SES, and UAS for ESF framed signals using performance report messages (PRM) incoming from the DSX-1.

DS1 Line Parameters:

- ES-L Errored Seconds

T1 Carrier Low-Speed (BBF6 T1EXT)

■ Electrical Specification

The T1 carrier low-speed interface (T1EXT) transmits and receives a standard electrical T1 carrier signal as specified in CB No. 113, Issue 2, April 1978. The T1EXT supports two interfaces. Line coding is provisionable to AMI with or without B8ZS. The following are specifications for the driver/receiver:

- Driver Output: 3 V peak pulse
- Receiver Gain: 35 dB maximum at 772 KH
- Receiver Dynamic Range: 0 to 35 dB (no pad at input).

The driver/receiver does not require any special provisioning to support up to 6,000 feet of 22-gauge copper cable (at 22 degrees Celsius) used in a T-Carrier system.

The T1EXT will support a single span of the following distances:

- In a central office: up to 3000 feet (± 1500 feet)
- In an outside plant cabinet or wall DT: up to 6,000 feet.

The 60 mA constant current regulator will support a simplex loop resistance of 221 ohms.

- The T1EXT does not support fault locating using bipolar violations
- The T1EXT can interface with "looping regulator" type repeaters only
- The T1EXT does not have the capability to loop the simplex current back to a T1 line repeater
- The T1EXT does not include any components for primary or secondary lightning protection/surge protection or power cross. Primary protection (Lucent Technologies' protector unit 4B3EW or equivalent) is always required for tip/ring lines exposed to lightning and surges either in cabinet or as lines enter a building. An external secondary lightning and surge protection assembly (ED-8C783) must be collocated with the FiberReach shelf for all outside plant applications. Refer to Figure 10-1 for T1EXT span powering.

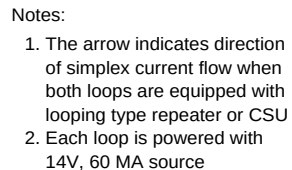


Figure 10-1. T1EXT Span Powering

■ Format Specification

The T1EXT BBF6 low-speed interface can be provisioned for the following formats: clear channel (default), SF as specified in *ANS/T1.403-1989*, or ESF as specified in *ANS/T1.403-1989*. In the case of SF or ESF format selections, T1EXT performance information is collected by monitoring the associated T1EXT framing format.

■ Alarm Thresholding

The following parameters are monitored at the T1EXT interface:

- Loss of signal
- Line coding violations.

The alarm level for each of the monitored parameters can be provisioned to CR, MJ, MN, or status. B8ZS and AMI coding violation failure thresholds are user settable to 10^{-7} or 10^{-8} BER.

■ Performance Monitoring (PM) (see Table 10-12)

- Near-end T1EXT path parameters (ES, SES, and UAS) for SF or ESF framed signals incoming to the DSX-1
- Far-end T1EXT path parameters (ES, SES, and UAS) for ESF framed signals using performance report messages (PRM) incoming from the DSX-1.
- Coding violations (CV) for near-end and far-end
- T1EXT line PM monitoring and ES reporting

Refer to Chapter 6, "System Planning and Engineering," for specific engineering rules regarding T1EXT lines.

HDSL Interface (BBF8)

■ Electrical Specification

The High Bit-rate Digital Subscriber Line (HDSL) circuit pack transmits and receives a 2B1Q signal as specified in PairGain Product Specifications, OEM-HMO-SP2-01 dated February 21, 1997.

- Data is scrambled/descrambled with a pseudo-random sequence
- Line buildout is automatically provisioned
- Compensated for data inversion caused by tip-ring reversals

■ Format Specification

The HDSL allows for clear channel transport of a framed or unframed DS1. Its data stream consists of two 780 Kb/s signals transported on separate wire pairs. Together, the aggregate bi-directional bit rate is 1.554 MB/s. The remaining 24 Kb/s is used for training and diagnostic information.

- Compatible with *PairGain** equipment

■ Alarm reporting

- LOS

A LOS is reported if either HDSL line experiences a synchronization failure

■ Loopback

DS1 facility loopback for each HDSL interface

■ Performance Monitoring (PM) — Available through the HDSL link management port only.

- User-configurable alarm thresholds
- 15-minute, 24-hour, and 7-day performance histories
- Asynchronous serial interface for provisioning and PM

■ Management

- SONET Management

This link is accessible via the SONET DCC and DDM-2000 CIT. It allows the HDSL circuit pack to be provisioned for DS1 facility loopbacks.

- HDSL Link Management

This link is accessible via a faceplate mounted RS-232 interface. It allows management of each HDSL port only. Management of the DDM-2000 is not accessible through this interface. This management port supports a menu driven interface for each HDSL port. Managed features include:

- PM features listed above

* *PairGain* is a registered trademark of PairGain Technologies, Inc.

- Local and remote loopbacks
- Programmable loopback time-out
- Alarm status.

- Described in *PairGain* Specifications, OEM-HMO-SW1-02.

Optical Interfaces

The DDM-2000 FiberReach Multiplexer supports an OC-1 and an OC-3 high-speed interface that is synchronous optical network (SONET) compliant: the 26G2-U OLIU. When the FiberReach Multiplexer is equipped with the 26G2-U OLIU, the companion OLIU at the host node is the 27G-U OLIU. The nominal OC-1 rate is 51.84 Mb/s for the OC-1 OLIUs and 155.52 for OC-3 OLIUs.

Lightguide Jumpers

The DDM-2000 FiberReach Multiplexer provides Lucent's universal optical connector on the OLIU. The universal optical connectors are receptacles on the faceplate of the OLIU that allows a single OLIU to support either *ST*[®], FC-PC, or SC connectors as needed. Both 0 dB and attenuating buildouts are supported.

The DDM-2000 FiberReach lightguide interface uses single-mode jumpers for connecting to and from the outside plant *LGX*[®] panel and the DDM-2000 OC-3.

Lightguide jumpers can be ordered from Lucent. See the appropriate "Miscellaneous and Tools" section for ordering information.

Long Reach OC-1 Interface (26G-U/26G2-U and 27G-U/27G2-U OLIUs)

- Optical Specification

The multilongitudinal mode laser transmitter supplies a non-return to zero (NRZ)-coded signal. For direct optical loopbacks, at least 7.0 dB (use 10 dB of attenuation) is needed for the 26-type and 27-type.

The 26-type and 27-type OLIU long reach OC-1 interfaces support span lengths up to 44 km, assuming 0.45 dB/km single-mode fiber and the span engineering rules outlined in Table 10-4. Transmit and receive powers are referenced to Points S and R as shown in Figure 10-2. Table 10-2 and Table 10-3 provide detailed specifications and link budget information for the 26-type/27-type OLIU.

- Alarm Thresholding

The following parameters are monitored at the OC-1 interface:

- Loss of signal

- Loss of frame
- Loss of pointer
- Line AIS
- B2 thresholding signal fail
- B2 thresholding signal degrade.

B2 signal degrade thresholds are user settable in the range from 10^{-5} to 10^{-9} BER.

- Performance Monitoring (see Table 10-12)
 - Section severely errored frame seconds (SEFS)
 - Line parameter B2.

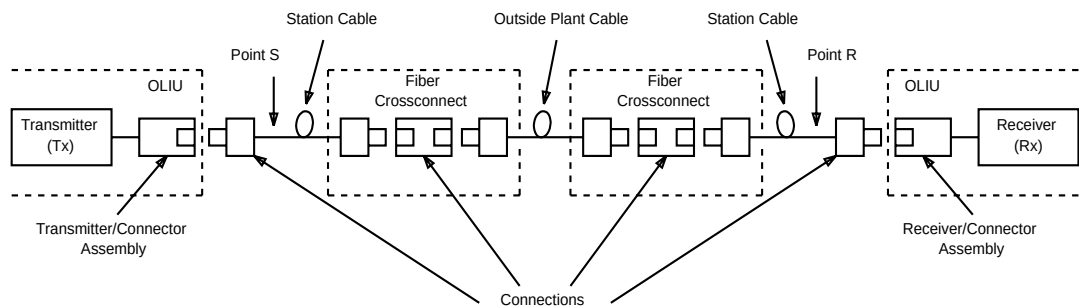


Figure 10-2. Optical System Interfaces (Points S and R)

Table 10-2 lists the 26G-U/26G2-U and 27G-U/27G2-U OLIU specifications.

Table 10-2. 26G2-U/ 27G-U/27G2-U OLIU Specifications

System Information:	
Terminal Equipment Identification	26G2-U/27-type OLIU
Optical Line Rate (Mb/s)	51.84 Mb/s
Optical Line Coding	Scrambled NRZ
Optical Wavelength	1310 nm
Performance	Not applicable
Transmitter Information:	
Optical Device Temperature Controller	No TEC
FDA Classification	Class I
Optical Source	InGaAsP Laser, MLM Structure
Faceplate Optical Connector	UOC buildout assembly* Single Mode
Receiver Information:	
Optical Device Temperature Controller	None
Optical Detector	InGaAsP PIN
Faceplate Optical Connector	UOC buildout assembly* Multi-Mode

- * The universal optical connector (UOC) buildout assembly consists of a faceplate-mounted block assembly and either 0 dB, 5 dB, 10 dB, or 15 dB buildout in either *S7*[®], SC, or FC-type connectors. FC-type connectors are not available for multimode cabling.

Table 10-3 and Table 10-4 list the link budgets for the 26-type and 27-type OLIU circuit packs.

Table 10-3. 26G2-U/ 27G-U/27G2-U OLIU Link Budgets (Note 1)

Parameter	Value
Minimum Wavelength (λ_{Tmin})	1272 nm
Maximum Wavelength (λ_{Tmax})	1350 nm
Spectral Width ($\delta \lambda_{rms}$)	3.0 nm
Maximum Transmitter Power (P_{Tmax}) *	-0.0 dBm
Minimum Transmitter Power (P_{Tmin}) *	-7.0 dBm
Maximum Received Power (P_{Rmax})	-13.8 dBm
Minimum Input Power (P_{Rmin})	-30.8 dBm
Minimum System Gain (S-R)‡	23.8 dB
Optical Path Penalty (P_O) †	1.0 dB
Connector Loss ‡	1.5 dB
Unallocated Margin	1.5 dB
Minimum Loss Budget	13.8 dB
Maximum Loss Budget	19.8 dB
Maximum Span Length§	44 km

Notes:

1. All values are for both controlled and uncontrolled environmental conditions.
- * Transmit and receive powers are referenced to points S and R as shown in Figure 10-2.
- † Optical path penalty includes effects of dispersion, reflection and jitter that occur on the optical path.
- ‡ One connector (0.75 dB) on each end is assumed to connect station cable to outside plant.
- § The 26G2-U and 27G-U OLIUs are dispersion limited at 44 km, due to the wider wavelength range. Assuming fiber with zero dispersion wavelength between 1300 and 1320 nm, the worst case dispersion over the transmitter wavelength range of 1272 to 1350 nm is 4.88 psec/nm km. This implies a 44 km span would have a total dispersion of about 215 psec/nm.

Table 10-4. 26G-U/27G-U OLIU Link Budgets — Multimode Operation (Note)

Fiber Bandwidth	Maximum Span Length (km)
1000 MHz-km	19.8
800 MHz-km	19.8
500 MHz-km	19.8
300 MHz-km	13.6

Note: The maximum Link Budget loss is 19.8 dB

Multimode fiber operation requires a minimum exit bandwidth of 44 MHz to ensure that dispersion loss is kept below acceptable levels. If the fiber is already installed and the exit bandwidth is measured to be 44 MHz or greater, then the maximum link budget values can be used to determine if the loss budget is sufficient for that fiber.

If planning a new fiber installation, the values given in the table (given for a number of commercially available fiber bandwidth-distance products) can be used. Fiber distances are calculated using the 44 MHz exit bandwidth limit; however, actual exit bandwidths may be higher for these distances due to the existence of splices. This may permit longer span lengths to be achieved for the given fiber bandwidths than those specified in the table. In this case, however, the span length can only be increased to the point where the system is loss limited as specified by the maximum multimode link budget given in the table (1 db/km cable is assumed).

28G-U Long Reach OC-3 OLIU Interface

■ Optical Specification

The multilongitudinal mode laser transmitter supplies a non-return to zero (NRZ)-coded signal. For direct optical loopbacks, no attenuations needed for the 28-type.

The 28-type OLIU long reach OC-3 interface supports span lengths up to 51km, assuming 0.45 dB/km single-mode fiber and the span engineering rules outlined in Table 10-6. Transmit and receive powers are referenced to Points S and R as shown in Figure 10-2. Table 10-5 and Table 10-6 provide detailed specifications and link budget information for the 28-type OLIU.

■ Alarm Thresholding

The following parameters are monitored at the OC-3 interface:

- Loss of signal
- Loss of frame
- Loss of pointer
- Line AIS
- B2 thresholding signal fail
- B2 thresholding signal degrade.

B2 signal degrade thresholds are user settable in the range from 10^{-5} to 10^{-9} BER.

■ Performance Monitoring (see Table 10-12)

- Section severely errored frame seconds (SEFS)
- Line parameter B2.

Table 10-5. 28G-U OLIU Specifications

System Information:	
Terminal Equipment Identification	28-type OLIU
Optical Line Rate (Mb/s)	155.520 Mb/s
Optical Line Coding	Scrambled NRZ
Optical Wavelength	1280-1335 nm
Performance	Not applicable
Transmitter Information:	
Optical Device Temperature Controller	None
FDA Classification	Class I
Optical Source	InGaAsP Laser, MLM Structure (See Note.)
Faceplate Optical Connector	UOC buildout assembly* Single Mode
Receiver Information:	
Optical Device Temperature Controller	None
Optical Detector	InGaAsP PIN
Faceplate Optical Connector	UOC buildout assembly* Multi-Mode

- * The universal optical connector (UOC) buildout assembly consists of a faceplate-mounted block assembly and either 0 dB, 5 dB, 10 dB, or 15 dB buildout in either *S7*[®], SC, or FC-type connectors. FC-type connectors are not available for multimode cabling.



NOTE:
A tighter specification DFB laser may be supplied instead of the MLM layer. The DFB laser meets all of the requirements of the MLM laser and of the DFB requirements in GR-253-CORE, Issue 2, December 1995.

Table 10-6 lists the link budgets for the 28-type OLIU.

Table 10-6. 28G2-U OLIU Link Budgets (Note 1)

Parameter	Value
Minimum Wavelength (λ_{Tmin})	1280 nm
Maximum Wavelength (λ_{Tmax})	1335 nm
Spectral Width ($\delta \lambda_{rms}$)	4.0 nm
Maximum Transmitter Power (P_{Tmax})	0.0 dBm
Minimum Transmitter Power (P_{Tmin})	-5.0 dBm
Maximum Received Power (P_{Rmax})	0.0 dBm
Minimum Input Power (P_{Rmin})	-34.0 dBm
Minimum System Gain (S-R) *	29.0 dB
Optical Path Penalty (P_o) †	1.0 dB
Connector Loss‡	1.5 dB
Unallocated Margin**	1.5 dB
Minimum Loss Budget	0.0 dBm
Maximum Loss Budget	25.0 dB
Maximum Span Length§	55 km

Notes:

1. All terminology is consistent with TR-253, Issue 2. All specifications for 28G-U OLIU meets or exceeds long reach long reach (LR) values described in TR-253, Iss. 2.
- * One connector (0.75) on each end is assumed to connect station cable to outside plant.
- † Optical path penalty includes effects of dispersion, reflection and jitter that occur on the optical path
- ‡ The minimum system gain for the DDM-2000 already takes into account aging, temperature, and manufacturing tolerances as these figures are built into the minimum transmitter power. The DDM-2000 system gain can, thus, not be directly compared with the DDM-1000 system gain because the DDM-100 system gain does not include all of these effects. A similar penalty, called eye margin, is subtracted from the DDM-1000 loss budget after the value of system gain is determined.

- § Attenuation and dispersion can be the limiting factors in span length. For OC-3 single-mode fiber systems, dispersion is not a factor and all applications are attenuation limited. The limits must be calculated based on both factors and the lesser of the two defines the actual maximum span length. A rough rule of thumb for attenuation-limited systems is 0.45 dB/km. This estimate includes typical value loss (0.4 dB/km) and splice loss (0.2 dB per splice, 11 total splices) associated with single-mode fiber.
- ** Unallocated margin, or safety margin, is typically specified from 0 dB to 3dB.

28G-U Optical Line Interface (28G-U OLIU)

General Description of Operation

If an incoming STS-1 signal from the fiber is to be VT1.5 cross-connected, VT1.5 pointer-processing is performed on this pack and STS-1 overhead termination is performed on these signals. All signals entering this pack from either the backplane or from the optical interface may be routed as STS-1s. If appropriate, VT1.5 routings may be established between STS-1s using a limited VT1.5 cross-connection.

28G-U OLIU Faceplate Indicators

The red FAULT LED lights on detection of circuit pack hardware failure. In the event of an incoming signal failure, this LED flashes on and off.

The green ACTIVE LED lights when the circuit pack is active (carrying service).

Interfaces

Each 28G-U OLIU has the following interfaces via its backplane connector:

- Nine STS-1 data inputs and nine STS-1 data outputs:
 - Three of each with each of the two function unit slots (when it is used in the main slots of the wideband shelf)
 - Three of each with a companion in adjacent slot
- Eight VTG data inputs and eight VTG data outputs, one of each to each of 8 associated low-speed slots
- Four clock and four frame signals associated with the VTG interfaces, two of each for each direction of transmission
- Two 51.84 MHZ clock inputs and two 2/8kHz composite frame sync inputs
- Four 51.84 MHz clock outputs and four 2/8kHz composite frame sync outputs
- Two -48V power interface from the user panel.
- +5V power interfaces to the associated low-speed slots
- Two serial control interfaces with the SYSCTL
- One control interface with the SYSCTL which carries the 192 Kb/s DCC and the S1 byte sync messaging information.

Each 28G-U OLIU has the following interfaces via its faceplate:

- Two LEDs

- One OC-3 input
- One OC-3 output
- 64 KHz timing reference input and output.

28G-U OLIU Quick Reference Summary

Transmit Functions

Major transmit functions of the 28G-U OLIU circuit pack are as follows:

- Provides VT1.5/STS-1 signal cross-connections
- Byte-interleaves and scrambles up to three STS-1 signals and the signal is converted to an OC-3 optical signal and output on a single mode optical fiber
- Adds SONET transport overhead and, for up to three VT1.5 cross-connected STS-1s, adds STS-1 path overhead.
- Converts the STS-3 electrical signal to an optical signal and transmits it over the fiber

Receive Functions

The following are major receive functions of the 28G-U OLIU circuit pack:

- Receives an OC-3 signal and converts it to an electrical STS-3 signal.
- Demultiplexes the STS-3 signal into 3 STS-1s signals
- Up to 28 VT1.5s from the 3 STS-1s are dropped terminated to the low-speed slots.

OC-3 Optical Interface Mixing

Mixing different OC-3 rate OLIUs at opposite ends of an optical link is often necessary for technical reasons or for convenience. The following information will aid in planning and engineering optical links having different types of OC-3 rate OLIUs at each end of the fiber. Table 10-7 details the minimum link budget necessary for each pairing of OC-3 rate OLIUs.

To use Table 10-7, locate the number at the intersection of the transmitter/receiver pair of interest. This number is the minimum attenuation necessary for proper operation of that transmitter/receiver pair. The link must have at least this much attenuation either from fiber loss, splice loss, connector loss, external attenuators, or a combination of these, or the receiver will be overdriven and the link will not operate properly.

Table 10-7. OC-3 Rate OLIU Mixes - Minimum Link Budgets (dB)

Transmitter	Receiver							
	21G/ 21G-U	21G2-U (S1:2)	22F	22F-U/ 22F2-U	22G-U	22G2-U/ 22G3-U	21D/21D- U/22D-U (Ctrld/ Unctrld Env.)	28G-U
21G/21G-U (high power)	4.5	0.0	4.5	0.0	4.5	0.0	11.5	0.0
21G/21G-U (low power)	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0
21G2-U (S1:2)	7.0	0.0	7.0	0.0	7.0	0.0	14.0	0.0
22F	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0
22F-U/22F2-U	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0
22G-U*	7.0	0.0	7.0	0.0	7.0	0.0	14.0	0.0
22G2-U/22G3-U	7.0	0.0	7.0	0.0	7.0	0.0	14.0	0.0
21D/21D-U/ 22D-U (ctrld./ unctrld. env.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28G-U	7.0	0.0	7.0	0.0	7.0	0.0	14.0	0.0

Note that the minimum link budget is not always symmetrical. A transmitter/receiver pair may have one minimum link budget in one direction and another in the opposite direction. For example, a 28G-U OLIU transmitting to a 21D/21D-U (controlled environment) OLIU has a minimum link budget of 11.5 dB. In the opposite direction, though, a 21D/21D-U (controlled environment) OLIU transmitting to a 28G-U OLIU has a minimum link budget of 0.0 dB. Be careful of this asymmetry when planning and engineering a link having mixed OLIUs.



NOTE:

When using universal optical buildout attenuators for OLIUs equipped with Universal Optical Connectors (for example, 28G-U and 22D-U), the buildout must have the same type fiber on both sides, that is, single-mode to single-mode or multimode to multimode. The buildout must also match the mode of the fiber. Therefore, when a single-mode jumper is used, the buildout would be on the transmit side (OUT) of the OLIU and when a multimode jumper is used, the buildout would be on the receive side (IN) of the OLIU. When using in-line attenuators for non-U OLIUs, place the attenuator in the bay frame PANDUIT. Make sure that the mode type of the attenuator matches the mode of the fiber to ensure proper attenuation.

Table 10-8 details the maximum link budgets for each pairing of OC-3 rate OLIUs when operating on single-mode (SM) fiber. These numbers give the maximum attenuation acceptable for proper operation of each transmitter/receiver pair. The link must have no more than this much attenuation either from fiber loss, splice loss, connector loss, external attenuators or a combination of these or the link will not operate properly. The maximum link budgets for SM fiber were calculated using the following margins:

- Optical Path Penalty (dB) 1.0
- Connector Loss (dB) 1.5

Table 10-8. OC-3 Rate OLIU Mixes - Maximum Link Budgets for SM Fiber (dB)

Transmitter	Receiver					
	21G/ 21G2-U/ 21G2-U	22F	22G-U/ 22G2-U/ 22G3-U	21D/21D-U/ 22D-U (Ctrld. Env.)	21D/21D-U/ 22D-U (Unctrld. Env.)	28G-U
21G/21G2-U (high power)	25.0	25.0	25.0	24.8	22.8	25.0
21G/21G2-U (low power)	18.6	18.6	18.6	18.4	16.4	18.6
22F	15.0	15.0	15.0	14.8	12.8	15.0
22G-U*/22G2-U	23.0	23.0	23.0	22.8	20.8	23.0
22G3-U	25.0	25.0	25.0	24.8	22.8	25.0
21D/21D-U/22D-U (ctrld. env.)	n/a	n/a	n/a	n/a	n/a	n/a
21D/21D-U/22D-U (unctrld. env.)	n/a	n/a	n/a	n/a	n/a	n/a
28G-Type	25.0	25.0	25.0	24.8	22.8	25.0



NOTE:

The maximum link budget is not always symmetrical. A transmitter/receiver pair may have one maximum link budget in one direction and another in the opposite direction. For example, a 28G-U OLIU transmitting to a 22F OLIU has a maximum SM link budget of 25.0 dB. In the opposite direction, though, a 22F OLIU transmitting to a 28G-U OLIU has a maximum SM link budget of 15.0 dB. Be careful of this asymmetry when planning and engineering a link having mixed OLIUs. Note also that 21D/21D-U and 22D-U OLIUs will not operate when transmitting into single-mode fiber.

Table 10-9 details the maximum link budgets for each pairing of OC-3 rate OLIUs when operating on multimode (MM) fiber. These numbers give the maximum attenuation acceptable for proper operation of each transmitter/receiver pair. The link must have no more than this much attenuation either from fiber loss, splice loss, connector loss, external attenuators or a combination of these or the link will not operate properly. The maximum link budgets for MM fiber were calculated using the following margins. The first column of margins applies to any link where there is at least one OC-3 OLIU (28G-U, 21G/21G-U, 22F or 22G-U/22G2-U/22G3-U). The second column of margins applies to links having two IS-3 (21D/21D-U or 22D-U) OLIUs.

	At Least One OC-3 OLIU	IS-3 OLIUs Only
MM Optical Path Penalty (dB)	4.0	1.6
Connector Loss (dB)	1.5	1.5
Unallocated Margin (dB)	1.5	2.0



NOTE:

The maximum link budget is not always symmetrical. A transmitter/receiver pair may have one maximum link budget in one direction and another in the opposite direction. For example, a 28G-U transmitting to a 22F has a maximum MM link budget of 22.0 dB. In the opposite direction, though, a 22F transmitting to a 28G-U has a maximum MM link budget of 12.0 dB. Be careful of this asymmetry when planning and engineering a link having mixed OLIUs.

Table 10-9. OC-3 Rate OLIU Mixes—Maximum Link Budgets for MM Fiber (dB)

Transmitter	Receiver					
	21G/21G-U/ 21G2-U	22F/ 22F-U/ 22F2-U	22G-U/ 22G2-U/ 22G3-U	21D/21D-U/ 22D-U (Ctrld. Env.)	21D/21D-U/ 22D-U (Unctrld. Env.)	28G-U
21G/21G-U/21G2-U (high power)	22.0	22.0	22.0	21.8	19.8	22.0
21G/21G-U (low power)	15.6	15.6	15.6	15.4	13.4	15.6
22F/22F-U/22F2-U	12.0	12.0	12.0	11.8	9.8	12.0
22G-U*/22G2-U	20.0	20.0	20.0	19.8	17.8	20.0
22G3-U	22.0	22.0	22.0	21.8	19.8	22.0
21D/21D-U/22D-U (ctrld. env.)	8.2	8.2	8.2	9.9	7.9	8.2
21D/21D-U/22D-U (unctrld. env.)	5.2	5.2	5.2	6.9	4.9	5.2
28G-U	22.0	22.0	22.0	21.8	19.8	22.0

Universal Optical Connectors

The DDM-2000 FiberReach Multiplexers provide Lucent's universal optical connector on the OLIUs. This connector is a 2-part connector consisting of a faceplate-mounted block and an optical buildout. The faceplate block optionally supports an *ST*, *SC*, or *FC*-type optical buildout.

A 0 db *ST*-type connector is shipped as standard with each OLIU. Optional *SC* or *FC* 0 dB, or attenuated buildouts can be ordered separately as listed in Table 10-10.

Table 10-10. Universal Buildout Attenuators

Description	Connection	Loss (dB)	Comcode
A3060 SC 0 dB buildout	SM-SM	0	106708951
A3060B1 SC 5 dB buildout	SM-SM	5	107406142
A3060D1 SC 10 dB buildout	SM-SM	10	107406159
A3060F1 SC 15 dB buildout	SM-SM	15	107406167
A3070 <i>ST</i> ® 0 dB buildout	SM-SM	0	106795354
A3070B1 <i>ST</i> 5 dB buildout	SM-SM	5	107406183
A3070D1 <i>ST</i> 10 dB buildout	SM-SM	10	107406191
A3070F1 <i>ST</i> 15 dB buildout	SM-SM	15	107406209
A3080 FC 0 dB buildout	SM-SM	0	106795404
A3080B1 FC 5 dB buildout	SM-SM	5	107406225
A3080D1 FC 10 dB buildout	SM-SM	10	107406233
A3080F1 FC 15 dB buildout	SM-SM	15	107406241
A2060B SC 5 dB buildout	MM-MM	5	106795271
A2060D SC 10 dB buildout	MM-MM	10	106795289
A2060F SC 15 dB buildout	MM-MM	15	106795297
A2070B <i>ST</i> 5 dB buildout	MM-MM	5	106795313
A2070D <i>ST</i> 10 dB buildout	MM-MM	10	106795321
A2070F <i>ST</i> 15 dB buildout	MM-MM	15	106795339

SONET Overhead Bytes

The DDM-2000 FiberReach Multiplexer currently uses the K2 byte in the SONET format for synchronization signaling when equipped with 26-type OLIUs. The reserved V4-byte in the VT1.5 superframe is used for internal fault detection in a DDM-2000 FiberReach Multiplexer. This internal usage of the V4-byte may cause the value of the transmitted V4-byte to vary.

The DDM-2000 FiberReach Multiplexer does not depend on, and always ignores, the value of the V4-byte received on its optical interface.

Performance

Wander/Jitter

- The OC-1/OC-3 interface accommodates at least 10 microseconds of wander per 24-hour period without buffer overflow or depletion.
- For SONET optical interfaces, the maximum time interval error (MTIE) does not exceed 60 nanoseconds phase variation when timed with a wander-free reference
- Jitter transfer, tolerance, and generation requirements are met as specified in GR-253 and GR-499
- The SONET interfaces meet the T1.101 OC-N output short-term stability mask.

Signal Performance

The DDM-2000 FiberReach Multiplexer significantly exceeds the following specifications for the standard networks, as defined in GR-499.

- For systems interfacing at the DS1 rate, the number of errored seconds, during a two-hour, one-way loopback test, is less than ten.
- The bit error rate (BER) is less than 10^{-9} for both the DS1 and DS3 rates. Burst-errored seconds are excluded.
- The frequency of burst-errored seconds, other than those caused by protection switching induced by hard equipment failures, averages less than four per day.

Synchronization

Optical Line Interface Unit (26G-Type)

The 26G-Type OLIU circuit pack meets the specifications of TR-253, SONET Transport Systems Generic Criteria. The OLIU circuit pack supports a line-timing mode which locks to a recovered clock from an OC-1 signal. A free-running mode will be supported in a future software release.

Holdover mode is entered on failure of the line-timing reference, providing a temperature stability of ± 8.8 ppm (-40°C to $+75^{\circ}\text{C}$). Holdover capability for 24 hours will be better than ± 4.6 ppm.

Protection Switching

Ring Networks

Path protection rings feed a SONET payload (STS or VT) from the ring entry point, simultaneously in both rotations of the ring, to the signal's ring exit point. The node that terminates the signal from the ring monitors both ring rotations and is responsible for selecting the signal that has the highest quality based on loss of signal (LOS), path alarm indication signal (AIS), and path bit error rate (BER) performance. On pass-through paths, all detected hard failures (LOS, LOF, LOP, line AIS, STS-1 path AIS, or STS-1 path signal failure based on BER) result in VT AIS insertion in the outgoing signals. This allows the terminating node to be aware of the failure and to switch to protection. Protection switching is completed within 50 milliseconds of failure detection. Similarly, for dropped nonterminated paths, if both incoming STS-1s have any of the previous failures, VT AIS will be inserted in the dropped signal.

Under normal conditions, both incoming SONET path signals to the switch selection point are of high quality, and the signal can be selected from either ring. A failure or a transmission degradation on one of the rings requires that the other ring path be selected. DDM-2000 FiberReach provides nonrevertive switching to minimize the impact on critical customer services by giving the service provider control when, and if, the critical service should revert to a particular ring. A manual path protection switching command allows switching back to the original path for ease of ring maintenance, if desired.

Transient Performance

Power Loss Restart

After system shutdown due to power loss, the system will begin error free transmission within one minute of restoration of power.

Transmission Start-Up on Signal Application

The system, after having no signal applied for greater than one minute at the DSX-n interface, will begin error free transmission within five seconds of the reapplication of a signal.

Delay

Table 10-11 lists the worst-case measured 1-way transmission delay within a DDM-2000 FiberReach Multiplexer.

Table 10-11. DDM-2000 OC-1 Transmission Delay in Microseconds

		High-Speed OC-1/OC-3 Pass through	
Mode (High-Speed)	DS1 Low-Speed Interface	STS-1	VT
Ring (OC-1/OC-3)*	100	7	27

* Ring delay is based on an OC-1/OC-3 to low-speed DS1.

Performance Monitoring

Table 10-12 shows the provisionable range of the thresholds for monitored parameters and, in brackets, the default thresholds. Thresholding of any parameter(s) can be disabled.

Table 10-12. Performance Monitoring Parameters Provisionable via the CIT

Parameter Definition		Threshold Range [Default]		Command
Facility	Measure	Current Quarter Hour	Current Day	set-pmthres-
OC-1/OC-3* Section	SE Frame Seconds (SEFS)	1-63[10]	1-4095[30]	sect
OC-1 Line	B2 Coding Violations (CV)	1-4613[461]	1-442848 [44285]	line
	B2 Errored Seconds (ES)	1-900[40]	(1-65535)[900]	line
	B2 Errored Seconds Type A (ESA)	1-900[30]	(1-65535)[90]	line
	B2 Errored Seconds Type B (ESB)	1-900[30]	(1-65535)[90]	line
	B2 Severely Errored Seconds (SES)	1-63[20]	(1-4095)[60]	line
	B2 Unavailable Seconds (UAS)	1-63[30]	(1-4095)[90]	line
OC-3 Line*	B2 Coding Violations (CV)	1-13841[1384]	1-1328736 [132874]	line
	B2 Errored Seconds (ES)	1-900[40]	(1-65535)[900]	line
	B2 Errored Seconds Type A (ESA)	1-900[30]	(1-65535)[90]	line
	B2 Errored Seconds Type B (ESB)	1-900[30]	(1-65535)[90]	line
	B2 Severely Errored Seconds (SES)	1-63[20]	(1-4095)[60]	line
	B2 Unavailable Seconds (UAS)	1-63[30]	(1-4095)[90]	line
STS-1 Path	B3 Coding Violations (CV)	1-4510[451]	1-432960 [43296]	sts1
	B3 Errored Seconds (ESA)	1-900[40]	1-65535[900]	sts1
	B3 Errored Seconds Type A (ESA)	1-900[30]	1-65535[90]	sts1
	B3 Errored Seconds Type B (ESB)	1-900[30]	1-65535[90]	sts1
	B3 Severely Errored Seconds (SES)	1-63[20]	1-4095[60]	sts1
	B3 Unavailable Seconds (UAS)	1-63[30]	1-4095[90]	sts1
VT1.5 Path	V5 Errored Seconds (ES) [†]	1-900 [40]	1-65535 [900]	vtl
	V5 Severely Errored Seconds (SES) [†]	1-63[20]	1-4095 [60]	vtl
	V5 Unavailable Seconds (UAS) [†]	1-63[30]	1-4095 [90]	vtl
DS-1 Path	ES-P Errored Seconds [†]	1-900[65]	1-65535 [648]	tl
	SES-P Severely Errored Seconds [†]	1-63[10]	1-4095 [100]	tl
	UAS-P Unavailable Seconds [†]	1-63[10]	1-4095 [10]	tl
	ES-PFE Errored Seconds [†]	1-900[65]	1-65535 [648]	tl
	SES-PFE Severely Errored Seconds [†]	1-63[10]	1-4095 [100]	tl
	UAS-PFE Unavailable Seconds [†]	1-63[10]	1-4095 [10]	tl
	CV-P (SF) Coding Violations [†]	1-16383[72]	1-1048575 [691]	tl
	CV-P (ESF) Coding Violations [†]	1-16383[13296]	1-1048575 [132960]	tl
DS-1 Line	CV-PFE Coding Violations [†]	1-16383[13296]	1-1048575 [132960]	tl
	ES-L Line Errored Seconds	1- 900[65]	1-65535 [648]	tl

* When equipped with a 28G-U OLIU in the main slots.

† Feature package option

Terminal-to-Terminal Voice-Frequency Transmission

The CUs used in the central office terminal (COT) and MSDT determine the voice-frequency (VF) transmission characteristics. The specifications for POTS, *SPOTS*[®], and coin CUs are given in Table 10-13. Table 10-14 lists the specifications for multiparty and frequency selective ringing (FSR) CUs. Specifications for the dual ringing repeater channel unit are listed in Table 10-15. Table 10-16 lists the specifications for 2- and 4-wire special services. Table 10-17, Table 10-18, Table 10-19, and Table 10-20 list the specifications for quad POTS/*SPOTS* CUs. Table 10-21 and Table 10-21 list the specifications for the *SPQ909* LP-POTS channel units.

Table 10-13. Transmission Specifications — VF Channel Units with Fixed Settings

Parameter	Value (Measured at 25 ° C)		
	POTS	SPOTS [®] Unit	Coin
Loop Resistance (Beyond the HDT excluding the set)	0-1500 Ω	CSA Loops	0-1500 Ω
Loop Current	> 20 mA	> 23 mA	
1,000-Hz Loss (±0.5dB typical, ±1.0dB max)	1 dB (R _{EXT} ≤ 1,100 ±100) * 0 dB (R _{EXT} ≥ 1,100 ±100) *	0 dB †	
Bandwidth (Relative to the 1,000-Hz loss)	0 to −3.0 dB at 300 Hz and 3,000 Hz 0 to −1.5 dB at 400 Hz and 2,800 Hz		
Return Loss at the COT ‡	ERL ≥ 18 dB, SRL ≥ 12 dB		
Return Loss at the HDT §	ERL ≥ 18 dB, SRL ≥ 15 dB		
Idle Channel Noise (at the HDT)	20 dB _{nC} Maximum		
Signal-to-Distortion Ratio (at −10 dBm)	> 33 dB		
Dial Pulse Distortion [Peak to Average Ratio (PAR)]	> 90		
Gain Tracking (1,004 Hz)			
−37 dBm ₀ to +3 dBm ₀	±0.5 dB Maximum (±0.25 dB Average)		
−50 dBm ₀ to −37 dBm ₀	±1.0 dB Maximum (±0.5 dB Average)		

See footnotes at end of table.

Continued on next page

Table 10-13. Transmission Specifications — VF Channel Units with Fixed Settings — *Continued*

Parameter	Value (Measured at 25 ° C)		
	POTS	SPOTS [®] Unit	Coin
Intermodulation Distortion (–13 dBm0 Input)	A-B (R2) Product: > 43 dB 2A-B (R3) Product: > 44 dB		
Single Frequency Distortion (0-12 kHz 0 dBm0)	< –28 dBm0		
Impulse Noise ¶	≤ 15 Counts in 15 Minutes		
Overload at COT and HDT	≥ + 3 dBm0		
Longitudinal Balance at the HDT ** (Minimum)	200 Hz, 500 Hz, 1,000 Hz: ≥ 58 dB 3,000 Hz: ≥ 53 dB		

* Measured as insertion loss between 900-ohm terminations. R_{EXT} includes both the loop resistance and the station set resistance. Actual threshold value for R_{EXT} is 1100 ohms ±100 ohms.

† Measured as the ICL with the HDT terminated in 600 ohms and with the COT terminated in 900 ohms.

‡ Measured with respect to 900 ohms and 2.16 µF with the 4-wire path broken or with the other end terminated in 1,100 ohms in parallel with 0.03 µF.

§ Measured with respect to 600 ohms and 2.16 µF with the 4-wire path broken or with the other end terminated in 900 ohms and 2.16 µF.

¶ Measured with a holding tone of –13 dBm0 and a threshold of 59 dBmC0.

** Measured by Institute of Electrical and Electronics Engineers (IEEE) method 455-1976.

Table 10-14. Transmission Specifications — Multiparty and FSR Channel Units

Parameter	Value (Measured at 25 ° C)	
	Multiparty**	FSR
Loop Resistance (Beyond the HDT excluding the set)	0-1500 Ω	0-900 Ω
1,004 Hz On-Hook Loss	≤ 5 dB over 1004 Hz Off-Hook Loss	On-hook transmission not supported
Loop Current	> 20 mA	
1000-Hz Loss (± 0.5 dB typical, ± 1.0 dB max)	1 dB	
Bandwidth (Relative to the 1,004-Hz loss) *	-0.5 to $+1.0$ dB at 400 Hz and 2,800 Hz	
Return Loss at the COT †	ERL ≥ 18 dB, SRL ≥ 10 dB	
Return Loss at the HDT ‡	ERL ≥ 18 dB, SRL ≥ 10 dB	
Idle Channel Noise (at the HDT)	20 dBmC Maximum	
Signal-to-Distortion Ratio (at -10 dBm)	> 33 dB	
Dial Pulse Distortion [Peak to Average Ratio (PAR)]	> 90	
Gain Tracking (1,004 Hz) –37 dBm0 to +3 dBm0 –50 dBm0 to –37 dBm0	± 0.5 dB Maximum (± 0.25 dB Average) ± 1.0 dB Maximum (± 0.5 dB Average)	
Intermodulation Distortion (–13 dBm0 Input)	A-B (R2) Product: > 43 dB 2A-B (R3) Product: > 44 dB	
Single Frequency Distortion (0-12 kHz 0 dBm0)	< -28 dBm0	
Impulse Noise §	≤ 15 Counts in 15 Minutes	
See footnotes at end of table.	Continued on next page	

Table 10-14. Transmission Specifications — Multiparty and FSR Channel Units—*Continued*

Parameter	Value (Measured at 25 ° C)	
	Multiparty**	FSR
Overload at COT and HDT	$\geq +3$ dBm0	
Longitudinal Balance at the HDT (Minimum)¶	200 Hz, 500 Hz, 1,000 Hz: ≥ 58 dB 3,000 Hz: ≥ 53 dB	

* Measured with a signal level of 0 dBm0. + means more loss, – means less loss.

† Measured with respect to 900 ohms and 2.16 μ F and with 900 ohms in series with 2.16 μ F in parallel with a hold coil at the HDT.

‡ Measured with respect to 900 ohms in series with 2.16 μ F with a hold coil at the HDT and with –48 V battery feed terminated with 900 ohms in series with 2.16 μ F at the COT.

§ Measured with a holding tone of –13 dBm0 at a threshold of 59 dBnC0.

¶ Measured by IEEE Method 455-1976.

** MSDT does not support positive ringing.

Table 10-15. Transmission Specifications — AUA45 Dual Ringing Repeater Channel Unit

Parameter	Value (Measured at 25 ° C)
Loop Design	The AUA45 channel unit is not limited to CSA design rules. Maximum cable loss should not exceed 9 dB, split in any proportion between the two end cable links. Total combined loop resistance (not including the terminating equipment) should not exceed 1500 ohms.
Structural Impedance	900 ohms +2.16 μ F
Balance Impedance	900 ohms +2.16 μ F
1,000-Hz Loss * ($\pm$ 0.5 dB typical, $\pm$ 1.0 dB max)	0 dB or 3 dB (switch selectable)
Bandwidth (Relative to the 1000-Hz loss)	+1 to -0.5 dB at 400 Hz and 2,800 Hz
Return Loss† (end-to-end)	ERL $\geq$ 26 dB, SRL $\geq$ 20 dB
Idle Channel Noise ‡	20 dBrnC Maximum
Signal-to-Distortion Ratio (at -10 dBm)	> 33 dB
Peak to Average Ratio (PAR) (dial pulse distortion) at -13 dBm	> 90
Gain Tracking (1,004 Hz) -37 dBm0 to +3 dBm0 -50 dBm0 to -37 dBm0	$\pm$ 0.5 dB Maximum $\pm$ 1.0 dB Maximum
Intermodulation Distortion (-13 dBm0 Input)	A-B (R2) Product: > 43 dB 2A-B (R3) Product: > 44 dB
Single Frequency Distortion (0-12 kHz 0 dBm0)	< -28 dBm0
Impulse Noise at 47 dBrnC0	$\leq$ 15 Counts in 15 Minutes
Overload at COT and HDT	at + 3 dBm0 is $\leq$ 0.5 dB compression
See footnotes at end of table.	<i>Continued on next page</i>

Table 10-15. Transmission Specifications — AUA45 Dual Ringing Repeater Channel Unit—*Continued*

Parameter	Value (Measured at 25 ° C)
Longitudinal Balance at the HDT (Minimum)¶	200 Hz, 500 Hz, 1,000 Hz: ≥ 58 dB 3,000 Hz: ≥ 53 dB
Equal-Level Cross talk	Better than –65 dB (200 Hz to 3,400 Hz)

* Measured as insertion loss between 900-ohm terminations.

† Measured with respect to 900 ohms and 2.16 µF with the opposite end terminated in 900 ohms in series with 2.16 µF.

‡ Measured with 900-ohm terminations on both ends.

¶ Measured with IEEE method 455-1976.

Table 10-16. Transmission Specifications — VF Channel Units with Adjustable Settings

Parameter	2-Wire E SPOTS [®] CUs(AUA42, AUA43)	4-Wire CUs (AUA41, AUA44, AUA54)
Loop Resistance (beyond HDT, excluding telset)	CSA loops	0-2800 ohms (loop start, ground-start) 0-5000 ohms (DX)
Gain Range (Granularity)		
Metallic Interface to digital line	–1.0 dB to 6.75 dB (in 0.25-dB steps)	Range depends on function code
Digital line to metallic interface	–8.0 dB to 1.5 dB (in 0.25-dB steps)	Granularity = 0.1 dB
Gain Tracking		
Input –37 to +3 dBm	± 0.25 dB	± 0.25 dB
Input –50 to –37 dBm	± 0.50 dB	± 0.50 dB
Equalization	(Slope type) Equalized CSA cable roll-off at 0.4 kHz varies from 0.0 dB to 1.1 dB; at 2.8 kHz, roll-off varies from 0.3 dB to 1.75 dB	Post-equalization of cable less than 15 dB (H88) or 18 kft (NL) is comparable to D4 4FXS CU (J98726SB). Pre-equalization and post-equalization available by emulating 150-ohm mismatch.
Structural Impedance	600 ohms + 2.16 µF or 900 ohms + 2.16 µF	600 ohms or 1200 ohms
ERL/SRL (2-wire return loss with 4-wire path broken)	28/20 dB	
RL (any Hz) / RL (1 kHz)		23/28 dB
Balance Capability, CSA loops	ERL better than 12 dB at digital line interface of channel unit facing loop	—
Longitudinal Balance (IEEE method)		
	AUA42	AUA43
200 Hz	63 dB	58 dB
500 Hz	63 dB	58 dB
1,000 Hz	63 dB	58 dB

Continued on next page

Table 10-16. Transmission Specifications — VF Channel Units with Adjustable Settings—*Continued*

Parameter	2-Wire E SPOTS® CUs(AUA42, AUA43)	4-Wire CUs (AUA41, AUA44, AUA54)
3,000 Hz	58 dB 58 dB	62 dB
Equal-Level Cross talk, C-message weighted between 0.2 and 3.4 kHz	–65 dB	–65 dB (channel unit) –65 dB (interunit cross talk)
Idle-Channel Noise	23 dBrnc0 for AUA42/ AUA43 pair	20 dBrnc0 per channel unit, each direction
Impulse Noise, no more than 15 counts in 15 minutes at	59 dBrnc0	59 dBrnc0
Signal Distortion (at –10 dBm)	> 33 dB	> 33 dB
Single-Frequency distortion 0 dBm0 input tone at any frequency from 0 to 12 kHz	–28 dBm0 for AUA42/ AUA43 pair	–28 dBm0 per channel unit
Intermodulation Distortion (IM) , –13 dBm0 input (IM products)	A-B (R2) < –43 dB 2A-B (R3) < –44 dB	R2 < –49 dB R3 < –51 dB
Pulse Distortion [Peak to Average Ratio (PAR)]	not less than 90	not less than 94

Table 10-17. *SPQ*[®]400 Electrical and Transmission Specifications

Parameter	Value
Loop Resistance (excluding telset)	0 Ω to 900 Ω
Loop Current	20 mA (900 Ω loop) to 30 mA (0 Ω loop)
VF loss, off-hook, between CO and network interface (NIF) at customer location	4 to 8 dB
Nominal 1,000-Hz loss, <i>SPQ400</i> only: 0 Ω tip-to-ring 900 Ω loop resistance	6.0 dB 1.4 dB
VF loss, on-hook, between CO and NIF at customer location	9 dB to 13 dB
Return loss at COT (reference Z of 900 Ω + 2.16 μ F, terminated with 900 Ω + 2.16 μ F)	ERL > 18 dB SRL > 10 dB
Return loss at RT (reference Z of 900 Ω + 2.16 μ F, CO terminated with 900 Ω + 2.16 μ F)	ERL > 18 dB SRL > 10 dB
Structural impedance	900 Ω + 2.16 μ F
Minimum longitudinal balance (measured by IEEE Method 455-1976)	200 Hz to 1,000 Hz: $\geq$ 58 dB 3,000 Hz: $\geq$ 53 dB
Idle channel noise, end-to-end	$\leq$ 20 dBnC
Frequency response (loss relative to 1,004 Hz) End-to-end <i>SPQ400</i> only (1/2 channel)	400 Hz to 2,800 Hz: -0.5 dB to +1 dB 3200 Hz: -0.5 dB to +1.5 dB 300 Hz and 3,400 Hz: -0 dB to +3 dB 400 Hz to 2800 Hz: -0.25dB to + 0.5 dB 3,200 Hz: -0.25 dB to +0.75 dB 300 Hz and 3,400 Hz: -0 dB to +1.5 dB

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Table 10-17. *SPQ*[®]400 Electrical and Transmission Specifications — *Continued*

Parameter	Value
60-Hz Rejection	> 20 dB
Cross talk (0-dBm0 input, 200 Hz to 3,400 Hz)	≤ -65 dBm0
Impulse noise at a threshold of 47 dBmCO for 15 minutes	≤ 15 counts
Data pulse distortion (PAR)	
End-to-end	> 90
<i>SPQ</i> 400 only (1/2 channel)	≥ 94
Single frequency distortion with input of:	
0 Hz to 12 kHz, 0 dBm0	< -28 dBm0 at 0 Hz to 12 kHz
1,004 Hz to 1020 kHz, 0 dBm0	< -40 dBm0 at 0 Hz to 4,000 Hz
Signal-to-distortion with input of:	
0 dBm0 to -30 dBm0	> 33 dB
-30 dBm0 to -40 dBm0	> 27 dB
-40 dBm0 to -45 dBm0	> 22 dB
System generated tones 0 Hz < f < 16 kHz	< -50 dBm0
Gain tracking at 1,004 Hz, relative to 0 dBm0	
-37 dBm0 to +3 dBm0	±0.5 dB maximum (±0.25 dB average)
-50 dBm0 to -37 dBm0	±1.5 dB maximum (±0.5 dB average)

Table 10-18. *SPQ*[®]400 Environmental Specifications

Temperature Range (Ambient)	
Operating	−40° to 85°C (−40° to 185°F)
Storage	−40° to 85°C (−40° to 185°F)
Relative Humidity, Noncondensing	
5% to 95%	

Table 10-19. *SPQ*[®]440 Electrical and Transmission Specifications

Parameter	Value	
	POTS	Special Services
Loop resistance (excluding telset)	0 to 900 Ω	CSA
Loop current	20 mA to 30 mA	25 mA to 30 mA
VF loss, off-hook, between CO and network interface (NIF) at customer location	4 to 8 dB	2 to 5 dB
Nominal 1,000Hz loss, <i>SPQ440</i> only: 0 Ω tip-to-ring Maximum loop resistance	6.0 dB 1.4 dB	3.4 dB 0 dB
VF loss, on-hook, between CO and NIF at customer location	9 dB to 13 dB	7 dB to 12 dB
Return loss at COT (reference Z of 900 Ω + 2.16 μ F, terminated with 900 Ω + 2.16 μ F for POTS or TR-57 CSA test loops for special services)	ERL > 18 dB SRL > 10 dB	ERL > 10 dB SRL > 5 dB
Return loss at RT (reference Z of 600 Ω + 2.16 μ F, CO terminated with 900 Ω + 2.16 μ F)	ERL > 22 dB SRL > 14 dB	ERL > 22 dB SRL > 14 dB

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Table 10-19. *SPQ*[®]440 Electrical and Transmission Specifications — *Continued*

Parameter	Value
POTS and Special Services	
Structural Impedance	600 ohms + 2.16 μ F
Minimum longitudinal balance (measured by IEEE Method 455-1976)	200 Hz to 1,000 Hz: ≥ 58 dB 3,000 Hz: ≥ 53 db
Idle channel noise, end-to-end	≥ 20 dBmC
Frequency Response (Loss Relative to 1,004 Hz)	
End-to-end	400 Hz to 2,800 Hz: -0.5 dB to $+1$ dB
	3,200 Hz: -0.5 dB to $+1.5$ dB
	300 Hz and 3,400 Hz: -0 dB to $+3$ dB
<i>SPQ</i> 440 only (1/2 channel)	400 Hz to 2,800 Hz: -0.25 dB to $+0.5$ dB
	3,200 Hz: -0.25 dB to $+0.75$ dB
	300 Hz and 3,400 Hz: -0 dB to $+1.5$ dB
60 Hz Rejection	> 20 dB
Cross talk (0 dBm0 input, 200 Hz to 3,400 Hz)	≤ -65 dBm0
Impulse noise at a threshold of 47 dBmCO for 15 minutes	≤ 15 counts
Data pulse distortion (PAR)	
End-to-end	> 90
<i>SPQ</i> 440 only (1/2 channel)	≥ 94
Single frequency distortion with input of:	
0 Hz to 12 kHz, 0 dBm0	< -28 dBm0 at 0 Hz to 12 kHz

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Table 10-19. *SPQ*[®]440 Electrical and Transmission Specifications — *Continued*

Parameter	Value
1,004 Hz to 1020 kHz, 0 dBm0	< -40 dBm0 at 0 Hz to 4,000 Hz
Signal-to-distortion with input of:	
0 dBm0 to -30 dBm0	> 33 dB
-30 dBm0 to -40 dBm0	> 27 dB
-40 dBm0 to -45 dBm0	> 22 dB
System generated tones 0 Hz < f < 16 kHz	< -50 dBm0
Gain tracking at 1,004 Hz, relative to 0 dBm0:	
-37 dBm0 to +3 dBm0	±0.5 dB maximum (±0.25 dB average)
-50 dBm0 to -37 dBm0	±1.5 dB maximum (±0.5 dB average)

Table 10-20. *SPQ*[®]440 Environmental Specifications

Temperature Range (Ambient)	
Operating	-40° to 85°C (-40° to 185°F)
Storage	-40° to 85°C (-40° to 185°F)
Relative Humidity, Noncondensing	
5% to 95%	

Table 10-21. SPQ[®]909 Electrical and Transmission Specifications

Parameter	Value
DC Supervisory Range (including telset)	450 Ω
Loop Resistance (up to 500 ft. of AWG 22)	0 Ω to 20 Ω
Loop Current	20 mA to 25 mA
Nominal 1,000-Hz VF loss off-hook between CO and RT CUs	4 dB
SPQ909 alone	4 dB
Nominal 1,000-Hz VF loss off-hook between RT CUs and CO	2 dB
SPQ909 alone	2 dB
Nominal 1,000-Hz VF loss on-hook between CO and RT CUs	5.5 dB
SPQ909 alone	4 dB
Nominal 1,000-Hz VF loss on-hook between RT CUs and CO	3.5 dB
SPQ909 alone	2 dB
Return loss at COT (reference Z of 900 Ω + 2.16 μ F, RT terminated with 600 Ω)	ERL > 18 dB SRL > 10 dB
Return loss at RT (reference Z of 600 Ω , CO terminated with 900 Ω + 2.16 μ F)	ERL > 26 dB SRL > 21 dB
Hybrid Balance of SPQ909 (RT terminated with 600 Ω)	ERL > 26 dB SRL > 21 dB

Continued on next page

Table 10-21. *SPQ*[®]909 Electrical and Transmission Specifications — *Continued*

Parameter	Value
Output impedance (structural impedance, hybrid impedance)	600 Ω
Minimum longitudinal balance (measured by IEEE Method 455-1985)	200 Hz to 1,000 Hz: ≥ 45 dB 3,000 Hz: ≥ 40 dB
Idle channel noise, end-to-end	≤ 20 dBnC
Frequency response (loss relative to 1,004 Hz)	
End-to-end	300 Hz to 3,000 Hz: -0.5 dB to $+1$ dB 3,200 Hz: -0.5 dB to $+1.5$ dB
<i>SPQ</i> 909 alone	300 Hz to 3000 Hz: -0.25 dB to $+0.5$ dB 3200 Hz: -0.25 dB to $+0.75$ dB
60-Hz Rejection (loss relative to 1,004 Hz)	> 20 dB
Cross talk (0 dBm0 input, 200 Hz to 3,400 Hz)	-65 dBm0
Impulse noise at a threshold of 47 dBnC0 for 15 minutes	≤ 15 counts
Data pulse distortion (PAR)	
End-to-end	> 90
<i>SPQ</i> 909 alone	≥ 94
Single frequency distortion with input of:	
0 Hz to 12 kHz, 0 dBm0	< -28 dBm0 at 0 Hz to 12 kHz
1,004 Hz to 1,020 kHz, 0 dBm0	< -40 dBm0 at 0 Hz to 4000 Hz
Signal-to-distortion with input of:	
0 dBm0 to -30 dBm0	> 33 dB
-30 dBm0 to -40 dBm0	> 27 dB
-40 dBm0 to -45 dBm0	> 22 dB

Continued on next page

Table 10-21. *SPQ*[®]909 Electrical and Transmission Specifications — *Continued*

Parameter	Value
System generated tones 0 Hz < f < 16 kHz	< –50 dBm0
Gain tracking at 1004 Hz, relative to 0 dBm0:	
–37 dBm0 to +3 dBm0	±0.5 dB maximum (±0.25 dB average)
–50 dBm0 to –37 dBm0	±1.5 dB maximum (±0.5 dB average)
–55 dBm0 to –50 dBm0	±3.0 dB maximum (±1.5 dB average)

Table 10-22. *SPQ*[®]909 Environmental Specifications

Temperature Range (Ambient)	
Operating	–40° to 85°C (–40° to 185°F)
Storage	–40° to 85°C (–40° to 185°F)
Relative Humidity, Noncondensing	
5% to 95%	

Signaling Mode

Loop start signaling with fast forward disconnect is provided with the channel units used in the *SLC* Series 5 and *SLC-2000* systems with the *SLC-2000* MSDT feature.

Digital Data Performance

The AUA52B OCU (office channel unit) dataport is designed to provide end links in DDS. These end links have certain features as follows:

- One 4-wire circuit per plug-in pair.
- Data rate — 2.4, 4.8, 9.6, 19.2, 56, or 64 kb/s.
- Error correction. A digital line bit error rate of 10^{-3} is improved to 10^{-8} for any data rate without reducing the channel capacity of the bank.
- Zero Code Allowed option. Allows an all-zero byte to be transmitted toward the digital line (which must be optioned for B8ZS zero code suppression).
- Secondary channel. An option which permits a feature of DDS that provides the customer with a low-speed telemetry channel supplementing the primary data channel at any data rate. (See RL83-01-163.)

Operations Interfaces

This section presents the operation interfaces that are required to support technician access to the system and allow alarms and status information generated by the system to be reported. The local operations interfaces include the craft interface terminal (CIT), the user panel, and the equipment indicators. The DDM-2000 FiberReach Multiplexer supports a direct serial TBOS interface and user-definable miscellaneous discretes. Office alarms, parallel telemetry, and TL1/X.25 interfaces are supported indirectly through the host DDM-2000 OC-3 Multiplexer.

Craft Interface Terminal

The system provides an EIA-232-D compatible front access CIT interface configured as data communications equipment (DCE). The CIT interface provides data rates of 300, 1200, 2400, 4800, 9600, and 19,200 baud.

The CIT interface operates full duplex using one start bit, eight data bits, and one stop bit. Table 10-23 describes the pins supported on the CIT interfaces.

Table 10-23. CIT Interface Pin Connections

EIA-232-D Pin	Front Access CIT (DCE)
Pin 2 - Circuit BA Transmitted Data	carries data from terminal to DDM-2000 FiberReach
Pin 3 - Circuit BB Received Data	carries data from DDM-2000 FiberReach to terminal
Pin 7 - Circuit AB Signal Ground	signal ground
Pin 8 - Circuit CF Received Line Signal Detector	not used
Pin 20 - Circuit CD DTE Ready	indicates to DDM-2000 FiberReach that modem or terminal is connected

Although not required for routine installation and maintenance, a CIT is recommended for more sophisticated maintenance and administrative activities. A personal computer (PC) is required for software download and to run the CPro-2000 software. The DDM-2000 FiberReach Multiplexer CIT port (mounted on the user panel) is a standard EIA-232-D (supersedes RS-232C specification) interface configured as DCE for direct connection to a CIT. The CIT port is compatible with most *ANSI* 3.64 ASCII terminals; however, it is optimized for standard screens with display areas of 24 lines by 72 (or more) columns. A pager function is included in the DDM-2000 FiberReach Multiplexer to accommodate screen lengths from 3 lines to 150 lines.

Those CITs compatible with DDM-2000 OC-3 or OC-12 Multiplexers are directly compatible with the DDM-2000 FiberReach Multiplexer.

Personal Computer Specifications for Software Download

The personal computer (PC) used for software download should have:

- A minimum of 640K of random access memory (RAM)
- *MS-DOS*^{*} version 2.0 or newer
- Hard disk
- At least one floppy disk drive of 360K or larger capacity. Although software download can be done with either floppy or hard disk, a hard disk is preferred for its better performance. The disk requirement is met with most

* Registered trademark of Penril Corporation.

portable *MS-DOS* PCs with a single 3.5-inch disk (720K or larger capacity). An *MS-DOS* PC with a hard disk and either a 3.5-inch 720K or 5.25-inch 360K (or larger) floppy disk may also be used.

Compatible Modems

A compatible modem must meet the following minimum requirements:

- 300, 1200, 2400, 4800, 9600, or 19,200 baud
- Full duplex
- 8 data bits
- No parity bits
- 1 start bit
- 1 stop bit
- No flow control.

The following stand-alone modems meet the modem requirements and can be used with the DDM-2000 system. *Western Electric*® 103-compatible and 212A- compatible modems are also suitable for use with the DDM-2000 system. This is not an exhaustive list of compatible modems:

- Lucent *Paradyne*® 2224-CEO modem (at 1200 and 2400 baud)
- Lucent *Paradyne* 2224 modem (at 1200 and 2400 baud)
- Lucent *Paradyne* 4024 modem (at 1200 and 2400 baud)
- Lucent *Paradyne* 2296 modem (at 4800 and 9600 baud)
- Hayes *V-series** Smartmodems
- *Penril*† Alliance V.32 modem.

The NCR 3170 computer and the AT&T *Safari*® computer have a built-in modem and meet the modem requirements.

* Trademark of Hayes Microcomputer Products, Inc.

† Registered trademark of Penril Corporation, Inc.

CPro-2000 Graphical User Interface and Provisioning Tool

The CPro-2000 Graphical User Interface (GUI) and Provisioning Tool is a *Microsoft Windows*^{*} based user interface that can optionally be used with the DDM-2000 FiberReach Multiplexer. The tool simplifies and mechanizes administration, maintenance, and provisioning operations. CPro-2000 supports DDM-2000 OC-3 Multiplexers, DDM-2000 OC-12 Multiplexers, FT-2000 OC-48 Lightwave Systems. A minimum platform configuration is:

- 486 SX *IBM*[†]-compatible desktop or laptop PC
- Disk drive — one 1.44 Megabyte (3.5 inch)
- Hard disk with at least 40 Megabytes of available space
- 8 Megabyte RAM required (12 Megabyte RAM preferred)
- *MS-DOS* operating system version 5.0 or later
- *Windows* version 3.1, *Windows* NT, or *Windows* 95
- Serial port (EIA-232-D) — configured as COM1 or COM2
- Mouse
- VGA color monitor.

CPro-2000 has been tested with AT&T, *NCR*, *IBM*, *NEC*[‡], and *Gateway-2000*[§] personal computers. For more information, see 365-576-130, *CPro-2000 User Manual*, Release 7.0. See Section 10, "Technical Specifications," for PC requirements to use the tool.

User Panel

The user panel contains red light emitting diodes (LEDs) for CR and MJ alarms, yellow LEDs for MN and PMN alarms, and for abnormal (ABN) and near end activity (NE-ACTY) status. These LEDs are used in conjunction with the far-end identification (FE-ID) seven-segment display on the front panel of the adjacent SYSCTL circuit pack to provide CIT-less single-ended operations.

Two green PWR ON LEDs are lighted when the shelf is receiving –48 V power for each of two independent –48 V DC power feeders. A green ACO LED is lighted when the ACO function is active.

The FE SEL test, ACO/TEST, and UPD/INIT pushbuttons are provided to control system operation.

* Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.
† IBM is a registered trademark of International Business Machines Corporation.
‡ NEC is a registered trademark of NEC Corporation.
§ Gateway 2000 is a trademark of Gateway 2000, Inc.

Equipment Indicators

A red LED FAULT indicator is provided on each circuit pack. A green ACTIVE indicator is provided on all 1x1 protected circuit packs to indicate which circuit packs are actively carrying traffic.

Office Alarms

The office alarms interface is a set of discrete relays that control office audible and visual alarms. Separate relays handle critical, major, and minor alarms. Each contact closure is rated at 1 A, 60 V maximum. The CR and MJ alarms can be wire-ORed. The critical alarm relays are fail safe against unprotected power failures.

Serial Telemetry

Serial telemetry is provided using the telemetry byte-oriented serial (TBOS) protocol. TBOS telemetry provides detailed alarm, status, and control (AS&C) information to and from a remote maintenance center via a 2400 baud RS-422 port. The AS&C TBOS link can be shared among multiple DDM-2000 OC-3 Multiplexer shelves. A TBOS link can support up to eight displays.

Parallel Telemetry

Parallel telemetry brings a minimum set of alarm and status information to an operations center. A parallel telemetry interface to a DDM-2000 FiberReach Multiplexer is provided through a host system (for example, a DDM-2000 OC-3 Multiplexer).

User-Definable Miscellaneous Discrete Environmental Alarms and Controls

The user-definable miscellaneous discrete environmental alarm and control interface allows the DDM-2000 FiberReach Multiplexer to monitor and control collocated equipment at the remote site. At the remote terminal (RT) site, 15 alarm or status environmental inputs can monitor environmental conditions (for example, open door, high temp); these inputs are activated by contact closures. The 15th environmental alarm or status input is provided to monitor the condition of the power shelf and fans at the RT site; this closure is activated by –48 V DC. Four environmental control outputs are provided to control external equipment (for example, pumps or generators). The miscellaneous discrete outputs (control outputs at an RT), tolerate –60 V maximum open circuit voltage and 35 mA maximum current. Transient voltages up to –135 V are tolerated for up to 1 ms. The miscellaneous discrete inputs provide –48 V nominal (–60 V maximum) open circuit voltage and 2 mA maximum current.

The miscellaneous discrete output closures generated by the optoisolator require external voltage and ground to operate.

TL1/X.25 Interface

A TL1/X.25 interface to a DDM-2000 FiberReach Multiplexer is provided through a host system (for example, a DDM-2000 OC-3 Multiplexer). The DDM-2000 FiberReach Multiplexer host supports a TL1/X.25 interface for communication between local and remote DDM-2000s, and alarm surveillance and provisioning operations systems such as Bellcore's Network Monitoring and Analysis (NMA) and Operations Systems/Intelligent Network Element (OPS/INE) operations systems. The DDM-2000 OC-3 Multiplexer TL1/X.25 interface is based on Bellcore TR-TSY-000833, Issue 5.

The TL1 maintenance messages of the DDM-2000 FiberReach Multiplexer are based on Bellcore's TR-NWT-000833, Issue 3, Rev. 1, Issue 4, Supplement 1, and Issue 5, Rev. 1. The TL1 provisioning messages of the DDM-2000 FiberReach Multiplexer are based on Bellcore's TR-NWT-000199, Issue 2, and TA-NWT-000199, Issue 6, Supplement 1.

Subnetwork Size

	Maximum number of NEs per subnetwork	50
	Maximum number of alarm groups per subnetwork	255
	Maximum number of NEs per alarm group	15
	Maximum number of directory services NEs per subnetwork	1

Physical Specifications

Wideband Shelf Physical Characteristics

- Dimensions: 9.65 in. H x 9.17 in. W x 13.11 in. D
- Weight (Max.): 20 lb. (9 kg)
- Appearance: Coordinated with other equipment in the Lucent 2000 Product Family.

Narrowband Shelf Physical Characteristics

- Dimensions: 9.65 in. H x 8.03 in. W x 11.93 in. D
- Weight (Max.): 20 lb. (9 kg)
- Appearance: Coordinated with other equipment in the Lucent 2000 Product Family.

Network Bay and Cabinet Mounting

The DDM-2000 FiberReach Multiplexer can be mounted in both ED-8C500 and ED-8C501 network bay frames and in 23-inch network bay frames. Up to two shelves (any combination of wideband and narrowband shelves) can be mounted side by side in a carrier assembly. In addition to bay mounting, the DDM-2000 FiberReach Multiplexer can be packaged with other equipment in 51A or 61A cabinets, wall mount enclosures, controlled environment vaults (CEVs), or huts.

Environmental Specifications

Temperature and Humidity

A DDM-2000 FiberReach Multiplexer shelf meets Bellcore Network Equipment Building System (NEBS) requirements* for use in central office environments without fans.*

A heat baffle assembly is required for all applications in a bay frame and for cabinet configurations where thermal environments are specified. The baffle should be installed above and below any DDM-2000 FiberReach shelves. Refer to Chapter 7, "DDM-2000 FiberReach Ordering," for information for detailed information on heat baffles in typical bay arrangements.

The DDM-2000 FiberReach Multiplexer operates in uncontrolled environments at temperatures of -40°C to $+75^{\circ}\text{C}$ and humidity of 5 to 95 percent (noncondensing). Forced convection cooling (fans) is required when the air inlet temperature is above 50°C . The DDM-2000 FiberReach Multiplexer provides optional control and alarming of the 2-type fan units used in Lucent cabinets and alarming of the DDM-2000 fan shelf.

EMC Requirements

The DDM-2000 FiberReach Multiplexer has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residence is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

Earthquake Requirements

The DDM-2000 FiberReach Multiplexer meets the earthquake requirements defined in Bellcore TR-NWT-000063, Issue 5 and Pacific Bell Standard PBS-000-102PT. Installations in Zone 4 regions require the ED-8C800-50 or ED-8C801-50 bay frame. Drawing ED-8C800-70 provides ordering and engineering application information for these frames.

Fire Resistance

The DDM-2000 FiberReach Multiplexer meets the ignitability requirements specified in *ANSI T1.307-1997*. In addition, the DDM-2000 FiberReach Multiplexer meets the fire resistance requirements of *UL* * 1459, 2nd Edition. *

Underwriters Laboratories (*UL*)

The DDM-2000 FiberReach Multiplexer is *UL* listed for restricted access installations in business and customer premises applications installed in accordance with

* "*NEBS Generic Equipment Requirements*," GR-63-CORE, Issue 1, October 1995.

* Registered trademark of Underwriters Laboratories Inc.

Articles 110-16 and 110-17 of the *National Electric Code*^{*}, ANSI/NFPA Number 70-87. Other installations exempt from the requirements of the *National Electric Code* may be engineered according to the accepted practices of the local telecommunications utility.^{*}

Canadian Standards Association

The DDM-2000 FiberReach Multiplexer has been certified by the Canadian Standards Association per standard C22.2, Number 225-M90.

Power Requirements

Shelf Fuses

Up to four –48 V feeders (A and B) are required for each DDM-2000 FiberReach shelf. Each shelf power is protected by 3-amp fuses provided with the shelf.

Power Dissipation

Table 10-24 lists the power dissipation and current drains for the listed configurations. The maximum current drain can be calculated for any configuration by dividing the total power dissipation by 40V (the minimum battery voltage).

* Registered trademark of the National Fire Protection Association, Inc.

When reviewing Table 10-24, the following items should be noted:

- The DDM-2000 FiberReach wideband shelf accommodates two –48 V power feeders ("A" and "B" office power feeders). The DDM-2000 FiberReach narrowband shelf has two –48 V power feeds.
- Loss of one power feeder does not cause a loss of service.
- All supply voltages other than –48V required by the system are generated by DC-to-DC converters within the system.
- The system meets all performance requirements when the DC input voltage varies between –40.0 V and –60.0 V.
- The system tolerates DC input voltages between 0 V and –60 V without damage.
- The system complies with electrical noise tolerance requirements in Section 13.2 of TR-TSY-000499.

Table 10-24. Power Dissipation — Wideband Shelf

Configuration	Power Dissipation	
	with 2 26G2-U	with 2 28G-U
DDM-2000 FiberReach WBS with 8 BBF3 circuit packs (16 DS1s, 1x1 protected)	41 Watts	44 Watts
DDM-2000 FiberReach WBS with 8 BBF6 (T1EXT) circuit packs (8 T1EXT, 1x1 protected)	66 Watts	69 Watts
DDM-2000 FiberReach WBS with 8 BBF3 circuit packs (28 DS1s, 1x7 protected)	38 Watts	41 Watts
DDM-2000 FiberReach WBS with 8 BBF6 (T1EXT) circuit packs (14 T1EXT, 1x7 protected)	65 Watts	68 Watts
DDM-2000 FiberReach WBS with 3* BBF8 circuit packs	—	46 Watts

Note:

- * Limited to 3 due to power limitations from a single 28G-U.



CAUTION:

This information is for a typical application only. Consult 801-525-168, DDM-2000 Floor Plan Data Sheets, and T82046-30, Power Systems DC Distribution Circuit for Digital Transmission System, for proper engineering of battery plant and feeders.

Table 10-25. Power Dissipation — Narrowband Shelf

Configuration	Power Dissipation
DDM-2000 FiberReach NBS with DSXBIU, CDTU, RGU, and PCU (No Channel Units)	14 Watts*
Maximum power available to CUs in narrowband shelf. This power is allocated among different CUs based on the following data for power requirement per channel unit.‡ SPQ909 - 4.0 Watts AUA159C - 3.2 Watts AUA94 - 1.7 Watts AUA58C - 3.1 Watts AUA53 - 1.9 Watts AUA150 - 3.3 Watts SPQ400 - 6.0 Watts SPQ440B - 6.1 Watts SPQ443 - 6.5 Watts SPQ494 - 4.7 Watts§	37 Watts†

Notes:

- * When the DDM-2000 FiberReach is configured to include a wideband shelf and a narrowband shelf, this power requirement as well as the power requirement for specific channel units and the appropriate wideband shelf configuration should be added to get the total power requirement.
- † This number must be added to the power requirement for the narrowband shelf without channel units to obtain the total power requirements for the narrowband shelf.
- ‡ Other channel units can be used, but the total power requirements must not exceed 37 Watts for an enclosed cabinet. However, 82 watts is allowed for a shelf with a heat baffle. These numbers assume all lines off hook simultaneously. A more typical power drain is about one third of the stated drain: equal to a traffic rate of 12.2.us.
- § The SPQ494 channel unit (Quad ISDN) consumes 4.2 Watts of power. However, a maximum of eight SPQ494 channel units can be installed in specified physical slots of the narrowband shelf, due to the limit of DSOs carried by the four DS1 links to the host.



CAUTION:

This information is for a typical application only. Consult 801-525-168, DDM-2000 Floor Plan Data Sheets, and T82046-30, Power Systems DC Distribution Circuit for Digital Transmission System, for proper engineering of battery plant and feeders.

DDM-2000 FiberReach Multiplexer Reliability

Summary

This section describes the Bellcore reliability requirements that apply to the DDM-2000 FiberReach Multiplexer and the calculations used to predict how the DDM-2000 FiberReach Multiplexer meets those standards.

The DDM-2000 FiberReach Multiplexer meets all the applicable Bellcore reliability requirements that cover transmission availability, operation system (OS) availability, optical module maintenance, and infant mortality. A summary of the reliability predictions and requirements is shown in Table 10-26 and Table 10-27. The applicable Bellcore requirements and objectives were clarified through interactions with Bellcore during their audit of the DDM-2000 OC-3 Multiplexer. The basis for these requirements comes from TA-TSY-000418, *Generic Reliability Assurance Requirements for Fiber Optic Transport Systems*. The method and assumptions used to calculate DDM-2000 FiberReach Multiplexer reliability predictions are described in the following paragraphs. Each paragraph is devoted to one of the reliability parameters which must meet a Bellcore requirement or objective.

Transmission Availability

Bellcore *requirements* state that the probability of a hardware caused outage on a two-way channel within a SONET multiplexer should be less than 1.75 minutes per year in a central office environment^{*} and 5.25 minutes per year in a remote terminal environment.[†] Bellcore *objectives* for outages are 0.25 minutes per year for the central office[‡] and 0.75 minutes per year for remote terminal environments.[§]

The outage requirements and objectives apply to any part of the product needed to process an incoming high-speed or low-speed signal (DS1 to OC-1 or OC-1 to DS1). An outage is defined, for this and all other outage requirements, as any 1-second interval with a bit error rate of 10^{-3} or worse.[¶] The predicted hardware outages for various configurations of the system are given in Table 10-27.

A Markov model was used to calculate the predicted system outage. The model assumes a mean time to repair of 2 hours for the CO environment and 4 hours for the RT environment. Individual circuit pack failure rates used in the model were calculated using the method described in TR-TSY-000332, Issue 4, *Reliability Prediction Procedure for Electronic Equipment (RPP)*. A summary of the circuit pack failure rates is shown in Table 10-27.

* TA-NWT-000418, Issue 3, November 1991, p. 17.
† TA-NWT-000418, Issue 3, November 1991, p. 28.
‡ TA-NWT-000418, Issue 3, November 1991, p. 18.
§ TA-NWT-000418, Issue 3, November 1991, p. 28.
¶ TR-TSY-000009, Issue 1, May 1986, p. 4-11.

Operation System Interface Availability

The Bellcore objective states that the OS outage should be less than 28 minutes per year (50 percent hardware, 50 percent software).^{*} Therefore, the objective applies to the TBOS interface[†]. This objective applies to circuitry needed to maintain communication from the DDM-2000 Multiplexer to the CO's X.25 interface for access by an OS. Since the OS interface is used in the CO, the reliability model assumes the mean time to repair is 2 hours and the environmental factor is 1.0.

Optical Module Maintenance Objective

According to Bellcore, the objective for mean time between failure (MTBF) of a one-way regenerator is a minimum of four years[‡]. A regenerator is defined as any circuit pack that performs the electrical-to-optical and optical-to-electrical conversion. Table 10-27 lists the failure rate and MTBFs of the OLIU circuit packs. All OLIU circuit packs meet Bellcore objectives.

Infant Mortality

Bellcore requires that the number of circuit pack failures in the first year of operation should not exceed 2.5 times the number of failures per year beyond the first year. The ratio of first year failures to failures in subsequent years is known as the infant mortality factor (IMF). The requirement is to have an IMF of less than 2.5.[§]

DDM-2000 FiberReach Multiplexer circuit packs are subjected to an environmental stress-testing (EST) program. The purpose of the program is to eliminate early life failures, conduct failure mode analysis on defective circuit packs, and use corrective action to make the product more reliable. All new circuit pack codes in manufacturing are subjected to EST. However, based on field return data, when the early life failures for any circuit pack codes have been minimal and the IMF is below 2.5, these circuit pack codes may be subjected only to sampling EST.

* TA-NWT-000418, Issue 3, November 1991, p. 36.
† TA-NWT-000418, Issue 3, November 1991, p. 36.
‡ TA-NWT-000418, Issue 3, November 1991, p. 37.
§ TA-NWT-000418, Issue 3, November 1991, p. 40.

DDM-2000 FiberReach System Reliability Predictions

Table 10-26 and Table 10-27 show the system reliability predictions for the DDM-2000 FiberReach Multiplexer.

Table 10-26. DDM-2000 FiberReach System Reliability Prediction (Note 1)

	Environment	Bellcore Criteria (Note 3)		Prediction (Note 4)	
Application	(Note 2)	Requirement	Objective	Outage (min/yr)	MTBF (Yrs)
DS1 to OC-1	CO	1.75	0.25	0.1657	723.9
DS1 to OC-1	RT	5.25	0.75	0.4970	482.5
DS1 to OC-3	CO	1.75	0.25	0.1657	723.8
DS1 to OC-3	RT	5.25	0.75	0.4971	482.5
OS Interface TBOS	CO	—	14.00	4.74	25.3

Notes:

1. Hardware failure rates are calculated per the RPP method, TR-NWT-000332, Issue 6, *Reliability Prediction Procedure*.
2. The environmental factor for the CO = 1.0 and for the RT = 1.5, per TR-NWT-000332, Issue 6, *Reliability Prediction Procedure*.
3. Bellcore criteria (Outage Requirements and Objectives) is based on GR-418, Issue 1, December 1997, *Generic Reliability Assurance Requirements for Fiber Optic Transport Systems*. Outage is in minutes per year.
4. Mean time to repair is assumed to be two hours for the CO and four hours for RT environments.

Table 10-27. DDM-2000 FiberReach Circuit Pack Reliability (Note 1)

Circuit Pack	Central Office		Remote Terminal	
	FITS (Note 2)	MTBF (Years)	FITS (Note 2)	MTBF (Years)
BBF1B (DS1)	859	132.8	1289	88.5
BBF3 (DS1PM)	1310	87.1	1965	58.1
BBF3B (DS1PM)	1235	92.4	1853	61.6
BBF6 (T1EXT)	1427	79.9	2141	53.3
BBF8 (HDSL)	5216	21.9	7824	14.6
BBG8 (SYSCTL)	4505	25.3	6758	16.9
26G2-U (OLIU)	2575	44.3	3863	29.5
28G-U (OLIU)	3860	29.6	5790	19.7

Notes:

1. Calculations are based on Bellcore TR-332, Issue 6 data. All KS and Lucent components considered as quality level III. All components evaluated at 40°C and 50 percent electrical stress.
2. FITS is the number of failures per billion hours of operation (10^9).

Commands and Reports

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Overview

This chapter describes the command and report features of the American Standard Code for Information Interchange (ASCII) terminal interface to a DDM-2000 FiberReach Multiplexer. It provides detailed information about each command, as well as system report outputs and explanations.

Command Page Format

This chapter includes DDM-2000 commands that are presented as one- or multiple-page entries in alphabetical order. The name of each command appears at the top of each page.

Each entry is presented in a common format:

- The **NAME** part gives the name of the command and summarizes its function.
- The **INPUT FORMAT** provides the syntax for each command. Each command starts with a command name followed by a colon. Parameters follow the colon. Optional parameters are enclosed in square brackets [].
- The **DESCRIPTION** part provides detailed information about each command.
- The **RELATED COMMANDS** part identifies commands that affect or are affected by the named command or sets the conditions displayed by a report. Some commands are not affected by any other command and will not have this part included on the command page.

Entries which are to be typed exactly as shown are printed in **bold** type. System responses are printed in `courier` type. Descriptive names entry values are shown in *italic* type.

Input Format

All commands have a common input format:

command name[:Address][:parameters]

Address identifies a slot, channel, or operations interface within the shelf. In commands which require an address, it must appear immediately after the command name.

Parameters identifies a variable name assigned to some provisionable attribute of the command. The value of the parameter is defined on each command page.

Parameters are separated with commas (,). The parameters may be entered in *any* order, but they must be entered in the *name=value* format.

Brackets ([]) are not part of the command line. Parameters enclosed in brackets are optional. Default values are provided for these parameters.

Any command can be entered on a single line.

DDM-2000 is case sensitive. Commands may be entered in upper- and lower-case letters. Entries other than commands may be case sensitive (for example, passwords). DDM-2000 addresses and logins are sensitive to white space (that is, blanks between characters). For example, the address parameters "**m1-all**" and "**m1- all**" may be interpreted differently by DDM-2000. As a general rule, white space should not be included in commands.

Addresses

Table 11-1 specifies the valid addresses for slots, lines, ports, channels, paths, cross-connections, and operations interfaces. Where lists of items appear in braces { }, and one (and only one) of these items may be used to form the address.

Each address is made up of several components that are combined to indicate a specific location on the DDM-2000. The following list shows the potential values for each address component. Refer to this list when reviewing Table 11-1:

slot type: Possible values are: main, m, fn, ls, sysctl, userpanel, and all.

group: Possible values are: m, a, b, c, and all.

Note carefully in Table 11-1 when this value is followed by a dash (-) and when it is not.

slot within a group (abbreviated as slot):

Possible values are: 1-2, and all.

line: Possible values are: 1, 2, and all.

Note carefully in Table 11-1 when all is not allowed.

STS-1: Possible values are: 1-1, and all.

VTG: Possible values are: 1-7, and all.

VT1.5: Possible values are: 1-4, and all.

special: Possible values are: cit, dcc, tbos, env, cont, and ref.

environmental alarm or control point (abbreviated as alm/cont point):

Possible values are: 1-15, and all.

Table 11-1. DDM-2000 FiberReach Address Table

Object	Entity	Address	Example
<i>Slots</i>	Entire System	all	all
	MainSlot	main-{1,2,all}	main-all
	Low speed slot	ls-all ls-{a,b,c,d}-{1-2,all}	ls-all ls-b-2
	Sys. control slot	sysctl	sysctl
	Aux. control slot	auxctl	auxctl
	Function unit slot	fn-{1,2,all}	fn-1
<i>Lines</i>	OC-1 line (using 26-type OLIUs in Main)	all main-{1,2,all}	all main-1
	OC-3 line (using 28-type OLIUs in Main)	all main-{1,2,all}	all main-1
<i>Ports</i>	DS1 port	all {a,b,c,d}-all {a,b,c,d}-{1}-{1-4,all} {a,b,c}-{2*}-{1-4,all}	all b-all c-1-all c-2-3
	T1 port	all {a,b,c,d}-all {a,b,c,d}-{1}-{1-2,all} {a,b,c}-{2*}-{1-2,all}	all b-all c-1-all b-2-2
<i>Channels</i>	STS-1 Channel (within OC-1)	m{1,2}-1	m2-1
	STS-1 Channel (within OC-3, using 28-type OLIUs in Main)	m{1,2}-{1-3,all}	m2-3
	VT1.5 Channel (within OC-1)	all m{1,2}-1-all m{1,2}-1-{1-7}-{1-4,all}	all m2-1-all m2-1-4-all m2-1-4-3
	VT1.5 Channel (within OC-3, using 28-type OLIUs in Main)	all m{1,2}-{1-3,all} m{1,2}-{1-3,all}-{1-7,all}-{1-4,all}	all m2-3 m1-1-3-all

* The value "2" is only used in shelves where low-speed slots are configured as unprotected.
(Table continues on the following page)

Table 11-1. DDM-2000 FiberReach Address Table

Object	Entity	Address	Example
<i>VT1.5 Channels for Cross-connections</i>	VT1.5 Channels (within OC-1)	all m-1-all m-1-{1-7}-{1-4,all}	all m-1-all m-1-4-all m-1-3-3
	VT1.5 Channels (within OC-3, using 28-type OLIUs in Main)	all m-{1-3}-all m-{1-3,all*}-{1-7,all*}-{1-4,all}	all m-1-all m-1-4-all m-1-2-2
	VT1.5 Channel for DS1	all {a,b,c,d}-{1}-{1-4,all} {a,b,c}-{2*}-{1-4,all}	all a-1-all a-2-all
	VT1.5 Channel for T1	all {a,b,c,d}-{1}-{1-2,all}	all a-1-all b-1-2
<i>Operation Interfaces</i>	Environmental Alarm Input	env-{1-15,all}	env-1
	Environmental Control Input	env-{1-4,all}	env-2
	User Panel	userpanel	userpanel
	CIT	cit-1	cit-1
	Section Data	dcc-{m1,m2,all}	dcc-m1
	Communication Channel	dcc-all (security only)	dcc-all
	Environmental Alarm Input	env-{1-15,all}	env-1
	Environmental Control Input	env-{1-4,all}	env-2

* If all is chosen as any part of an address, no subsequent address fields should be defined.

The 2000 Product Family includes many SONET products that are capable of interworking with each other. At times, references to other SONET products may appear in DDM-2000 reports. The following list shows standard abbreviations for the various members of the 2000 family.

<u>Complete Product Name</u>	<u>Abbreviated Product Name</u>
unknown	unknown*
DDM-2000 OC-3	DDM-OC3
DDM-2000 OC-12	DDM-OC12
DACS IV-2000	DACS-IV
FT-2000	FT-2000
SLC-2000 Access System	SLC-2000
DDM-2000 FiberReach	FbrRch
Foreign	Foreign**

* Indicates the type of product is unknown.

** Indicates that the product is not compatible with other SONET products.

Command Mode and Prompt Mode

There are two entry modes: command mode (no prompts) and prompt mode. In the command mode (the default), the command line and any user responses are terminated by the semicolon (;) or carriage return (<cr>).

The prompt mode is designed for users that are not familiar with DDM-2000. To enter the prompt mode, terminate any line with a carriage return (**ENTER**) or **RETURN** key) or question mark (?). Prompts generally appear in the form:

Prompt Message [Default value]=

with the default value enclosed in square brackets ([.]). There are two types of default values:

Static default values, which assume the same value each time the command is invoked.

Current default values, which reflect the mode recent value entered into the system. In the case of an address containing the value "all", the prompt will display the value [CurrentValues]. When "Current Values" is selected, the current setting of that parameter is not changed.

To reenter the command mode from the prompt mode, answer the current prompt, then continue entering input on the same line after typing a comma (.). When the input is completed, terminating the command with a semicolon (;) will return the session to the command mode. If a command is terminated with a semicolon (;), the system will use default values for all optional parameters for which a value has not been given.

The **help** command provides in-context help during a dialog with DDM-2000. Help is provided automatically when an invalid input is entered and can also be requested anytime by typing a question mark (?).

Special Control Characters

The following characters have special meaning when used with DDM-2000:

- Backspace characters control H (^H), BACKSPACE key is used to erase character input.
- At sign (@) is used to erase an entire line of input.
- Question mark (?) is used to get help and to enter prompt mode at any time.
- Comma (,) is used to separate parameters from each other.
- Equal sign (=) is used to separate parameter names from parameter values.
- Control T (^T) is the **toggle** command. See the **toggle** command page for additional details.
- Carriage return (ENTER or RETURN key) or exclamation point (!) are used to end a line of input.
- Semicolon (;) is used to end a command. The system will use default values for all optional parameters for which a value has not been given.
- CAncel, DElete, and CTRL-x are used to abort a command which has been entered but has not yet started to execute. All commands can be aborted anytime before the "In Progress..." message is printed. Test commands (except **test-sysctl**) can be aborted at any time during execution using these keys. Reports may be aborted at any time using these keys.
- Colon (:) is used to separate the command name, address, and parameters.

Paged Reports

Reports are paged. When the end of the page has been reached, the prompt "more? [yes]= " is displayed if more report text remains. Page length can be set with the **set-link** command.

Confirmation Requests

NOTE: Some commands can be service-affecting if their default parameters are ignored.

After all parameters have been entered, a caution message followed by the command name, the selected values of parameters, and the prompt "Execute? (y/n or CANCEL/DELETE to quit)=" is printed. To execute the command, enter "y" and carriage return. To change the value of any of the parameters, enter "n" and carriage return and you will be reprompted for all parameters. To abort the command, enter CANCEL or DELETE.

Output Descriptions

The output for most commands is described on the following manual pages. Refer to the "Detailed Alarm and History Reports" part of this section for more complete examples and explanations of the alarm and status report (**rtrv-alm**) and the history report (**rtrv-hsty**).

Alarm Level Prompt

When the system is ready to accept a new command, it prints the system prompt "<". If there is an active alarm or status condition, the level of the highest level active alarm in the system is printed before the "<". For example, the system prompt is "MN<" when a minor alarm condition exists in the system.

Security

The option of system security is provided for DDM-2000 systems. Three privileged user logins and a maximum of 100 nonprivileged user logins, consisting of general users, maintenance users, and Reports-Only users, are available. Privileged users may set system security on all data communication channels (DCC) and each craft interface terminal (CIT) interface (using the **set-secu** command) and assign login and password pairs to general users (using the **set-lgn** command). General users may execute commands that are not restricted to privileged users and obtain reports. Maintenance users may only execute commands that access the system, extract reports, and execute maintenance functions. Reports-Only users may only obtain reports and execute several basic commands.

When system security is enabled, all users are then required to enter a valid login and password pair to access the system.

The following commands are always restricted to privileged users only:

- **init-sys** (initialize system)
- **rstr-passwd** (restore password)
- **rtrv-lgn** (retrieve login)
- **rtrv-passwd** (retrieve password)
- **set-fecom** (set far-end communication)
- **set-lgn** (set login)
- **set-secu** (set security)
- **set-feat** (set feature)
- **set-sync** (set synchronization)

When security is enabled on a system, the following commands become restricted to privileged users only:

- **cpy-prog** (copy program)
- **ent-ulsdcc** (enter upper layer section DCC)
- **ent-tl1msgmap** (enter TL1 message map for Operations Systems)
- **init-pm** (initialize performance monitoring)
- **ins-prog** (install program)
- **reset** (reset system software)
- **set-date** (set date)
- **set-ne** (set network element)

When security is enabled on a system, only the following commands may be executed by Reports-Only users:

- **?** (help)
- **logout** (log out)
- **rlgn** (remote login)
- **set-link** (set link)
- **set-passwd** (set password)
- **T** (toggle)
- all **rtrv** commands except **rtrv-lgn** and **rtrv-passwd**

Refer to the **set-secu** command for more details on system security.

DDM-2000 FiberReach Command Menu

Table 11-2 lists the DDM-2000 FiberReach commands by category and indicates what type of user is able to execute each command.

Table 11-2. DDM-2000 FiberReach Command Menu

Command Category	Verb	Modifier	Security Level
CONFIGURATION	rtrv-	alm	Privileged, General, Maintenance, Reports only
		state-eqpt	Privileged, General, Maintenance, Reports only
		state-path	Privileged, General, Maintenance, Reports only
		state-sts1	Privileged, General, Maintenance, Reports only
		state-vt1	Privileged, General, Maintenance, Reports only
		eqpt	Privileged, General, Maintenance, Reports only
		feat	Privileged, General, Maintenance, Reports only
		fecom	Privileged, General, Maintenance, Reports only
		hsty	Privileged, General, Maintenance, Reports only
		sync	Privileged, General, Maintenance, Reports only
		link	Privileged, General, Maintenance, Reports only
		oc1	Privileged, General, Maintenance, Reports only
		oc3	Privileged, General, Maintenance, Reports only
		attr-alm	Privileged, General, Maintenance, Reports only
		attr-cont	Privileged, General, Maintenance, Reports only
		attr-env	Privileged, General, Maintenance, Reports only
		ne	Privileged, General, Maintenance, Reports only
		map-neighbor	Privileged, General, Maintenance, Reports only
		map-network	Privileged, General, Maintenance, Reports only

Table 11-2. DDM-2000 FiberReach Command Menu (Contd)

Command Category	Verb	Modifier	Security Level
CONFIGURATION (Continued)	rtrv-	crs-sts1	Privileged, General, Maintenance, Reports only
		crs-sts3c	Privileged, General, Maintenance, Reports only
		crs-vt1	Privileged, General, Maintenance, Reports only
		ulsdcc	Privileged, General, Maintenance, Reports only
		sts1	Privileged, General, Maintenance, Reports only
		sts3c	Privileged, General, Maintenance, Reports only
		tl1msgmap	Privileged, General, Maintenance, Reports only
		trace-sts1	Privileged, General, Maintenance, Reports only
		vt1	Privileged, General, Maintenance, Reports only
		x25	Privileged, General, Maintenance, Reports only
	set-	oc1	Privileged, General
		oc3	Privileged, General
		t1	Privileged, General
		date	Privileged only if Security enabled. Privileged, General if Security disabled.
		link	Privileged, General, Maintenance, Reports only
		attr-alm	Privileged, General
		attr-cont	Privileged, General
		attr-env	Privileged, General
		ne	Privileged only if Security enabled. Privileged, General if Security disabled.
		state-t1	Privileged, General
		state-sts1	Privileged, General
		state-vt1	Privileged, General
		fecom	Privileged
		feat	Privileged

Table 11-2. DDM-2000 FiberReach Command Menu (Contd)

Command Category	Verb	Modifier	Security Level
CONFIGURATION (Continued)	upd	sts1	Privileged, General
		vt1	Privileged, General
			Privileged, General
	init-	sys	Privileged
	switch-	ls	Privileged, General, Mainenance
		path-vt1	Privileged, General, Mainenance
	opr-	lpbk-t1	Privileged, General, Mainenance
	rls-	lpbk-t1	Privileged, General, Mainenance
	test-	trmsn-t1	Privileged, General, Mainenance
		led	Privileged, General, Mainenance
		alm	Privileged, General, Mainenance
		sysctl	Privileged, General, Mainenance
	ins-	prog	Privileged only if Security enabled. Privileged, General if Security disabled.
	ent-	crs-vt1	Privileged, General
		usldcc	Privileged only if Security enabled. Privileged, General if Security disabled.
		tl1msgmap	Privileged only if Security enabled. Privileged, General if Security disabled.
		osacmap	Privileged only if Security enabled. Privileged, General if Security disabled.
	dlt-	crs-vt1	Privileged, General
	cnvt-	crs	Privileged, General
	cpy-	prog	Privileged only if Security enabled. Privileged, General if Security disabled.

Table 11-2. DDM-2000 FiberReach Command Menu (Contd)

Command Category	Verb	Modifier	Security Level
FAULT	rtrv-	alm	Privileged, General, Mainenance, Reports-Only
		state-eqpt	Privileged, General, Mainenance, Reports-Only
		state-path	Privileged, General, Mainenance, Reports-Only
		eqpt	Privileged, General, Mainenance, Reports-Only
		hsty	Privileged, General, Mainenance, Reports-Only
	opr-	aco	Privileged, General, Mainenance, Reports-Only
	reset		Privileged, General, Mainenance, Reports-Only
PERFORMANCE	rtrv-	pm-tca	Privileged, General, Mainenance, Reports-Only
		pm-sect	Privileged, General, Mainenance, Reports-Only
		pm-line	Privileged, General, Mainenance, Reports-Only
		pm-t1	Privileged, General, Mainenance, Reports-Only
		pm-sts1	Privileged, General, Mainenance, Reports-Only
		pm-vt1	Privileged, General, Mainenance, Reports-Only.
		pmthres-sect	Privileged, General, Mainenance, Reports-Only.
		pmthres-line	Privileged, General, Mainenance, Reports-Only.
		pmthres-sts1	Privileged, General, Mainenance, Reports-Only.
		pmthres-vt1	Privileged, General, Mainenance, Reports-Only.
		pmthres-t1	Privileged, General, Mainenance, Reports-Only.
		alm	Privileged, General, Mainenance, Reports-Only.
		state-eqpt	Privileged, General, Mainenance, Reports-Only.
		state-path	Privileged, General, Mainenance, Reports-Only.

Table 11-2. DDM-2000 FiberReach Command Menu (Contd)

Command Category	Verb	Modifier	Security Level
PERFORMANCE (Continued)	rtrv-	eqpt	Privileged, General, Mainenance, Reports-Only.
		hsty	Privileged, General, Mainenance, Reports-Only.
	set-	pmthres-sect	Privileged, General, Mainenance, Reports-Only.
		pmthres-line	Privileged, General, Mainenance, Reports-Only.
		pmthres-sts1	Privileged, General, Mainenance, Reports-Only.
		pmthres-vt1	Privileged, General, Mainenance, Reports-Only.
		pmthres-t1	Privileged, General, Mainenance, Reports-Only.
	init-	pm	Privileged only if Security enabled. Privileged, General if Security disabled.
SECURITY	rtrv-	lgn	Privileged
		secu	Privileged, General, Mainenance, Reports-Only.
		passwd	Privileged
	set-	lgn	Privileged
		secu	Privileged
		passwd	Privileged, General, Mainenance, Reports-Only.
	rstr-	passwd	Privileged
MISCELLANEOUS	apply		Privileged
	help		Privileged, General, Mainenance, Reports-Only.
	logout		Privileged, General, Mainenance, Reports-Only.
	rlgn		Privileged, General, Mainenance, Reports-Only.
	toggle (^T)		Privileged, General, Mainenance, Reports-Only.

Starting a CIT Session

Procedures in the "Operation and Maintenance" section of this manual describe how to "Connect a CIT and Establish a Session" with the DDM-2000.

CPro-2000

CPro-2000 is a software package from Lucent Technologies to help users of DDM-2000 Multiplexer systems set up and use an advanced, yet simple, craft operations environment on a personal computer using *Microsoft* Windows*3.1* in the enhanced mode. CPro-2000 provides the user with the normal CIT access to DDM-2000 as well as a mouse-driven graphical user interface (GUI). The user may issue commands to DDM-2000 by using the mouse to select items from a menu and/or objects from the graphics display.

CPro-2000 Release 3.0 and later supports DDM-2000 OC-3, OC-12 and FiberReach Multiplexers, as well as FT-2000 OC-48 Systems. For complete information on CPro-2000, refer to the *CPro-2000 User Manual*, 190-253-101 (for CPro-2000 Release 3.0) or 365-576-1xx (for CPro-2000 Release 4.0 and later).

Commands

The following pages provide detailed information about the user interface commands supported by DDM-2000. Detailed report information is located at the end of this chapter.

* Registered trademark of Microsoft Corporation.

NAME

cpy-prog: Copy Program

INPUT FORMAT

cpy-prog: *TID*;

DESCRIPTION**CAUTION:**

Normal alarming and protection switching are disabled for the selected DDM-2000 FiberReach system while this command is used to copy program to a DDM-2000 FiberReach system

For all DDM-2000 FiberReach releases, this command copies the system controller program from the local network element to a remote network element.

The controller program is copied directly from the local controller's memory to a remote controller's memory. The local and remote systems must have DCC connectivity.

This command provides remote program copy capability from the local controller's memory to a remote controller's memory. The **ins-prog** command has been enhanced to support local program installation to a network element from a personal computer (PC) connected to the CIT port of the target system.

The **ins-prog** command also supports a remote program installation to a DDM-2000 OC-3 or a DDM-2000 FiberReach system from a PC connected to the CIT port of another DDM-2000 or *SLC*®-2000 system.

**NOTE:**

For all DDM-2000 FiberReach releases, if security is enabled on any CIT or DCC port on a system, then this command is available to privileged users only for all CIT or DCC ports on the system. If security is not enabled on *some* systems in the network, users on unsecured systems will be able to copy controller program onto systems with security enabled.

The input parameter is:

TID The Target Identifier (system name) of the system into which the program will be loaded. TIDs are case insensitive.

If the command syntax is correct, the following message will be displayed:

```
/* Testing for program copy ... */
```

If the system name specified is the name of the local system instead of the remote system, the following error message will be displayed and the user will be asked to reenter the TID.

```
/* Invalid Target Identifier (TID) */  
/* Enter the name (TID) of the far end system. */  
TID=
```

If the system name specified is unknown to the local system, the following error message will be displayed and the user will be asked to reenter the TID.

```
/* Unknown Target Identifier (TID) */  
/* Enter the name (TID) of the far end system. */  
TID=
```

If the system name specified currently has a duplicate TID alarm condition, the following denial message will be displayed:

```
IITA  
/* Input, Invalid TArget identifier (TID) */  
/* Duplicate Target Identifier. */
```

If a user attempts to copy program from one product type to a different product type (for example, DDM-2000 OC-12 program into an FT-2000 system), the following denial message will be displayed:

```
IITA
/* Input, Invalid TArget identifier (TID) */
/* <TID> is a different product type;
   Incompatible software. */
```

The above message is displayed before any association is established between the local and target network elements (NEs).

If the remote system has a communication failure or a "P" is displayed in the SYSCTL 7-segment LED display, the following denial message will be displayed:

```
SSTP
/* Status, execution STOPped */
/* Communication failure. */
```

After testing for program copy, the following confirmation message will be displayed for all FiberReach releases:

```
/* Caution! Execution of this command will erase the current
   generic n.n.n at Target Identifier and replace it with
   generic m.m.m. If this fails prior to completion,
   the control system will likely become inoperable
   until another install program attempt is successful.
   This command will terminate any other active CIT sessions.
   This command will take time to install the new program. Check
   the Software Release Description for the time estimates. */
```

```
Execute? (y/n or CANCEL/DElete to quit) =
```

For all FiberReach releases, when this command is used to copy a new release of program that is significantly different from the program currently running on the system, the following confirmation message will be displayed after testing for program copy:

```
/* Caution! Execution of this command will erase the current
generic n.n.n at Target Identifier and replace it with
generic m.m.m. If this fails prior to completion,
the control system will likely become inoperable
until another install program attempt is successful.
This command will terminate any other active CIT sessions.
This command will take time to install the new program. Check
the Software Release Description for the time estimates. */

/* Caution! Major changes exist between these two generics such
that they may not be compatible. Check the TOPS and program
compatibility information for additional information or actions
needed. */

Execute? (y/n or CANCEL/DELETE to quit) =
```

See "Install New Generic Program" in the TOP section of this manual for complete instructions before using this command. Use the **rtrv-map-network** command to obtain the exact TID for the target system. The current program version may also be obtained from the initial screen when logged into the system with a craft interface terminal (CIT).

When the user gives a positive response to the confirmation message, the program copy begins and the following message is displayed:

```
In progress .....
```

The number of dots and how fast they are displayed depend on the size of the program to be copied, number of DCC spans between the local and remote systems, and DCC traffic.

When the program has successfully been copied to the remote system, the following message is displayed:

```
/* Generic program m.m.m is copied. */
```

If the program copy fails, the following failure message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Program copy failed to Target Identifier
   Before attempting another copy, check the User's Manual
   to review a list of possible problems and their solutions. */
```

RELATED COMMANDS

rtrv-map-network

rtrv-ne

ins-prog

NAME

dlt-crs-sts1: Delete Cross-Connection STS-1

INPUT FORMAT

dlt-crs-sts1:*Address1,Address2*[:*cct*=Crstype];

DESCRIPTION**CAUTION:**

Execution of this command may affect service.

This command deletes STS-1 cross-connections.

This command is available beginning with FiberReach Release 2.2, when the FiberReach shelf may be equipped with 28G-U OC-3 OLIUs in both Main unit slots.

The input parameters are:

Address1 and *Address2* These are the addresses of the two STS-1 channels, or one STS-1 channel and one where the existing STS-1 cross-connection is to be deleted. In ring applications, pass-through connections are deleted by using the same address for *Address1* and *Address2*.

If the shelf is equipped with 28G-type OLIUs in Main unit slots (available in Release 2.2 and later), valid addresses are: **m-{1-3}**

cct

Crstype specifies the cross-connection type. The valid values are:

twoway Two-way cross-connections apply to terminating, hubbing, add/drop, hairpin, pass-through, 0x1 ring, and 0x1 DS3 configurations. This is the default value.

dc Drop and continue connections support dual ring applications. Drop and continue connections are only allowed if the function unit

**NOTE:**

The *cct* parameter is an optional parameter if the cross-connection type to be deleted is **twoway**. The *cct* parameter is required for other Crstype values.

Address1, *Address2*, and *CrsType* must match an existing STS-1 cross-connection or execution of the command will complete with the following message:

```
/* The specified STS-1 cross-connection does not exist  
and cannot be deleted. */
```

If an attempt is made to execute this command, when a mix of incompatible OLIU packs exists in Main, the request will be denied with the following message:

```
SNVS  
/* Status, Not in Valid State */  
/* Both main slots must be equipped with compatible OLIU packs. */
```

Users may not delete an STS-1 pass-through cross-connect through a 24G-U OLIU containing traffic VT1.5 traffic. To remove the pass-through cross-connect, users should first delete the associated VT1.5 or STS-3 cross-connect at the ring drop nodes. Otherwise, the request will be denied with the following message:

```
SNVS  
/* Status, Not in Valid State */  
/* The specified path must be in the AIS state  
to delete the cross-connect. */
```

After entering this command, the following confirmation message is displayed:

```
/* Caution! Execution of this command may affect service.  
You have selected the dlt-crs-sts1 command with these parameters:  
  
Address1 = address  
Address2 = address  
CrsType = value */  
  
Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

ent-crs-sts1

rtrv-crs-sts1

NAME

dlt-crs-vt1: Delete Cross-Connection VT1.5

INPUT FORMAT

dlt-crs-vt1:*Address1,Address2*[:*cct*=Crstype];

DESCRIPTION**CAUTION:**

Execution of this command may affect service.

This command deletes VT1.5 signal cross-connections within a DDM-2000 FiberReach system.

The input parameters are:

Address1 and *Address2*

These are the addresses of the two VT1.5 channels, or one VT1.5 channel and one DS1 or T1 port, where existing cross-connections are to be deleted. In ring applications, pass-through connections are deleted by using the same address for *Address1* and *Address2*.

Valid Addresses:

m-1-{1-7}-{1-4,all}, m-1-all

Valid port addresses in 1X1 protected low-speed configurations:

{a,b,c,d}-1-{1,4,all}

Valid port addresses in 1x7 protected low-speed configurations:

{a,b,c}-{1,2}-{1,4,all},

d-1-{1-4,all}

The T1EXT (BBF6) circuit pack supports two T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid. Specifying **all** selects ports 1 and 2 only.

When the FiberReach shelf is equipped with 28G-U OLIU circuit packs in Main (in Release 2.2 and later), valid addresses are:

m-{1-3}-{1-7}-{1-4,all}, m-{1-3}-all

cct

Crstype specifies cross-connection type. The valid values are:

twoway Two-way cross-connections apply to add/drop and pass-through cross-connections only. Twoway is the default value.

locked Locked cross-connections support nonpath-switched DS1 or T1 drop applications.

If the address includes the value **all**, the value for *cct*

applies to every cross-connection within the range of the addresses.

The *Address1*, *Address2* and *CrsType* parameters must match an existing VT1.5 cross-connection or execution of the command will complete with the following message:

```
/* The specified VT1.5 cross-connection does not exist
and can not be deleted. */
```

If the cross-connection request address includes the value **all** and the addresses do not have a one-to-one relationship, this command will be denied with the following denial message:

```
SNVS
/* Status, Not in Valid State */
/* Invalid cross-connection request. */
```

If this command is entered with several addresses or an address of **all** is used and one or more of these addresses cannot be processed, the command will complete but the following message will be displayed:

```
/* The following cross-connections not processed.
Cross-connect exists with different address:
Address1 Address2
Address1 Address2
.          .
.          .
.          . */
```

When *CrSType* is used and the command is entered with one or more addresses that cannot be processed or an AID of **all** that cannot be processed, the command will complete but the following message will be displayed:

```
/* The following cross-connections were not processed
because the address or cross-connection type did not match.
Address1 Address2 CrSType
Address1 Address2 CrSType
      :      :      :      */
```

After entering this command, the following confirmation message is displayed:

```
/* Caution! Execution of this command may affect service.
You have selected the dlt-crs-vt1 command with these parameters:

Address1 = address
Address2 = address
CrSType = value */

Execute? (y/n or CANCEL/DELETE to quit) =
```

If this command is entered with **all** as part of the address, the following confirmation message is displayed:

```
/* Caution! Execution of this command may affect service.
Multiple cross-connections may be affected.
You have selected the dlt-crs-vt1 command with these parameters:

Address1 = address
Address2 = address
CrSType = value */

Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

ent-crs-vt1

rtrv-crs-vt1

NAME

ent-crs-sts1: Enter Cross-Connection STS-1

INPUT FORMAT

ent-crs-sts1:*Address1,Address2[:cct=CrSType][,ring=RingId];*

DESCRIPTION

This command sets bidirectional STS-1 cross-connections between Main slots, and is available with FiberReach 2.2 and later releases. All cross-connections require the presence of 28G-U OLIU circuit packs in Main slots in order to establish STS-1 cross-connections.

The input parameters are:

Address1 and *Address2*

These are the addresses of the two STS-1 channels that are to be cross-connected. For STS-1 ring pass-through traffic, *Address1* and *Address2* must be the same time slot. All cross-connections are bidirectional.

 NOTE:

Address 1 and Address 2 for FiberReach must always be equal.

Valid addresses are listed on the following pages.

cct CrSType specifies the cross-connection type. The valid values are:

twoway When a FiberReach shelf is equipped with 28-type OLIUs in Main unit slots, only a two-way cross-connection (pass-through) can be established. Twoway is the default value.

If the addresses indicate a pass-through cross-connection, the CrSType is not prompted for but is automatically set to **twoway**. The confirmation message indicates that a CrSType of **twoway** has been selected for the user. If a CrSType other than **twoway** is entered on the command line when the addresses indicate a pass-through cross-connection, the request is rejected.

In DDM-2000 ring releases, the cross-connect mode is always manual (**crs=manual**). Valid manual cross-connections are listed below. Where items appear in braces { }, any one (and only one) of these items may be used to form the address.

Ring Release Cross-Connect Addresses:

m-{1-3} to m-{1-3}

Allowed when Main slots are equipped with 28G-U OLIUs (Release 2.2 and later). Only pass-through cross-connections are permitted.

If this command is invoked using addresses where active cross-connections already exist, the following denial message will be displayed:

```
SACC
/* Status, Already Cross-Connected */
/* Establishing new cross-connections requires that
existing cross-connections associated with these
addresses be deleted. */
```

If the cross-connection request includes an invalid circuit pack type, invalid port address, or specifies a cross-connection not supported by the system, the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* Invalid cross-connection request. */
```


If the addresses indicate a pass-through cross-connection and the CrsType is not **twoway**, the request is denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* Invalid cross-connection request */
```

If an attempt is made to execute this command, when a mix of incompatible OLIU packs exists in Main, the request will be denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* Both main slots must be equipped with compatible OLIU packs. */
```

RELATED COMMANDS

dlt-crs-sts1

rtrv-crs-sts1

NAME

ent-crs-vt1: Enter Cross-Connection VT1.5

INPUT FORMAT

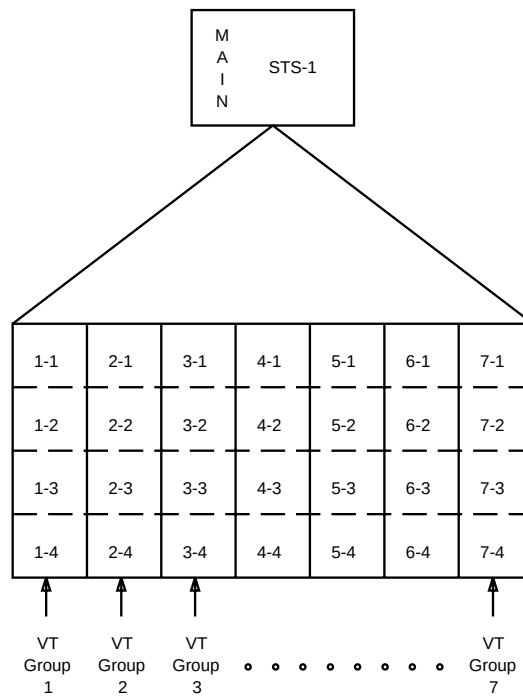
ent-crs-vt1:*Address1,Address2[:cct=Crstype][,ring=RingId];*

DESCRIPTION

This command sets bidirectional VT1.5 cross-connections among main and low-speed slots and may be applied to systems with various arrangements.

All cross-connections require the presence of OLIU circuit packs in the Main slots. The 26-type and 28-type (in Release 2.2 and later) OLIU circuit packs must be used to establish VT1.5 cross-connections.

Figure 11-1 shows a DDM-2000 FiberReach shelf and highlights a function unit with 28 VT1.5 signals.



Note: Each STS-1 signal contains 28 VT1.5 signals.

Figure 11-1. DDM-2000 FiberReach Shelf with VT1.5 Signals

As highlighted in Figure 11-1, each OC-1 signal contains 1 STS-1 signal. The STS-1 signal contains 7 VT Groups of signals. Each VT Group contains 4 VT1.5 signals, and each VT1.5 signal corresponds to an individual DS1 or T1 port.

The input parameters are:

Address1 and *Address2*

These are the addresses of the two VT1.5 channels or one VT1.5 channel and one DS1 or T1 port that are to be cross-connected. For VT1.5 ring pass-through traffic, *Address1* and *Address2* must be the same. Valid addresses are listed on the following pages.

 NOTE:

All cross-connections are bidirectional.

cct

CrsType specifies the cross-connection type. The valid values are:

twoway Two-way applies to add/drop and pass-through configurations. **Twoway** is the default value for *cct*.

locked Locked cross-connections support nonpath-switched DS1 drop applications.

If the addresses indicate a pass-through cross-connection, the CrsType is not prompted for but is automatically set to **twoway**. The confirmation message indicates that a CrsType of **twoway** has been selected for the user. If a CrsType other than **twoway** is entered on the command line when the addresses indicate a pass-through cross-connection, the request is rejected. If the value **all** is used in the address, the *cct* applies to every cross-connection within the range of the addresses.

ring

RingId is the ring identification for locked cross-connections. The valid values are:

m1 Ring **m1** is the ring that is received on the main-1 OLIU and is transmitted on the main-2 OLIU.

m2 Ring **m2** is the ring that is received on the main-2 OLIU and is transmitted on the main-1 OLIU.

If the CrsType is **locked**, the RingId is always prompted for and is displayed in confirmation messages. If the CrsType is not **locked**, the RingId is not prompted for and it is not displayed in confirmation messages. If the CrsType is not **locked** and RingId is entered anyway, the value entered for RingId is ignored.

The following is a list of valid cross-connections. To successfully perform any cross-connection, the user *must* equip the Main slots with 26-type OLIU circuit packs. Where items appear in braces {}, any one (and only one) of these items may be used to form the address. **all** may be used as part of an address (allowed as indicated below) to cross-connect entire groups of signals. When **all** is used, no subsequent address fields should be defined.

Ring Cross-Connection Addresses:

m-1-{1-7}-{1-4,all} to {a,b,c,d}-1-{1-4,all}

Allowed when the addressed low-speed (LS) port is equipped with a DS1 circuit pack in a 1x1 protected LS configuration.

m-{1-3}-{1-7}-{1-4,all} to {a,b,c,d}-1-{1-4,all}

Allowed when equipped with 28-type OLIUs in Main slots (available in Release 2.2 and later releases), and the addressed low-speed (LS) port is equipped with a DS1 circuit pack in a 1x1 protected LS configuration.

m-1-{1-7,all}-{1-4,all} to {a,b,c}-{1,2}-{1-4,all} or

m-1-{1-7,all}-{1-4,all} to d-1-{1-4,all}

Allowed when the addressed low-speed (LS) port is equipped with a DS1 circuit pack in a 1x7 protected LS configuration.

m-1-{1-7}-{1-4,all} to {a,b,c,d}-1-{1-4,all}

Allowed when equipped with 26-type OLIUs in Main unit slots, and the addressed low-speed (LS) port is equipped with a DS1 circuit pack in a 1x1 protected LS configuration.

m-1-{1-7,all}-{1-4,all} to {a,b,c}-{1,2}-{1-4,all} or

m-1-{1-7,all}-{1-4,all} to d-1-{1-4,all}

Allowed when equipped with 26-type OLIUs in Main unit slots, and the addressed low-speed (LS) port is equipped with a DS1 circuit pack in a 1x7 protected LS configuration.

m-{1-3}-{1-7,all}-{1-4,all} to {a,b,c}-{1,2}-{1-4,all} or

m-{1-3}-{1-7,all}-{1-4,all} to d-1-{1-4,all}

When equipped with 28-type OLIUs in Main slots (available in Release 2.2 and later), and the addressed low-speed (LS) port is equipped with a DS1 circuit pack in a 1x7 protected LS configuration.

m-1-{1-7,all}-{1-4,all} to m-1-{1-7,all}-{1-4,all}

Allows pass-through connections. The two addresses must be the same.

m-{1-3}-{1-7,all}-{1-4,all} to m-{1-3}-{1-7,all}-{1-4,all}

Allows pass-through connections when equipped with 28-type OLIUs in Main slots (available in Release 2.2 and later). The two addresses must be the same.

The T1EXT (BBF6) circuit pack supports two T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid. Specifying `all` selects ports 1 and 2 only.

If the cross-connection request includes an invalid circuit pack type, invalid port address, or specifies a cross-connection not supported by the system, the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* Invalid cross-connection request. */
```

If the cross-connection request includes `all` in the addresses and the addresses do not have a one-to-one relationship, the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* Invalid cross-connection request. */
```

In ring systems, if this command is issued and one of the Main slots is not equipped, the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* Both main slots must be equipped. */
```

When setting up a path-protected hairpin local drop cross-connection, both slots of the function unit to which the OC-1 ring is terminated must be equipped with 27G2-U OLIU circuit packs. Otherwise the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* Both FN slots terminating the OC-1 ring must be
   equipped with 27G2-U OLIU circuit packs. */
```

If this command is invoked using addresses where active cross-connections already exist, the following denial message will be displayed:

```
SACC
/* Status, Already Cross-Connected */
/* Establishing new cross-connections requires that existing
   cross-connections associated with these addresses must
   be deleted first. */
```

If this command is entered with several addresses (for example, when an address of **all** is used) and one or more of these addresses are already cross-connected, the command will complete but send the following message indicating the requested cross-connections that could not be completed because of previously existing cross-connections:

```
/* The following cross-connections not processed.
   Cross-connect exists with different address:
   Address1 Address2
   Address1 Address2
   .          .
   .          . */
```

When the command is entered with several addresses (for example, when an AID of **all** is used), but one or more of these addresses is already cross-connected, the following response message will be displayed:

```
/* The following cross-connections were not processed
because the address or cross-connection type did not match
Address1  Address2  CrsType
Address1  Address2  CrsType
      :           :           :
      :           :           :
```

If the addresses indicate a pass-through cross-connection and the CrsType is not **twoway**, the request is denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* Invalid cross-connection request */
```

After entering this command, the following confirmation message is displayed. If CrsType is not **locked**, RingId is not displayed in the following confirmation message:

```
/* Caution!  Network Cross-connections are affected by this command.
You have selected the ent-crs-vt1 command with these parameters:

Address1 = address
Address2 = address
CrsType = value
RingId = value */

Execute? (y/n or CANCEL/DElete to quit) =
```

If this command is entered with the parameter *all* as part of the address, the following confirmation message is displayed. If CrsType is not **locked**, RingId is not displayed in the confirmation message.

```
/* Caution! Execution of this command may affect service.  
Multiple cross-connections may be affected.  
You have selected the ent-crs-vt1 command with these parameters:  
  
Address1 = address  
Address2 = address  
CrsType = value  
RingId = value */  
  
Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

dlt-crs-vt1

rtrv-crs-vt1

NAME

ent-tl1msgmap: Enter TL1 Message Map for Operation Systems

INPUT FORMAT

ent - tl1msgmap: acid=ACID,msgtype=MessageType,action=Action;

DESCRIPTION**⇒ NOTE:**

If security is enabled on any CIT or DCC port on a shelf, then this command is available to privileged users only for all CIT or DCC ports on the shelf.

This command maps the DDM-2000 TL1 message types to the operations systems (OS) for this network element in the subnetwork. This command provides a filter for TL1 messages by specifying TL1 message classes (known as *MessageTypes*) and allowing the user to determine which message classes should be received at each type of OS (specified in the *ACID* parameter).

There are default message classes that exist for the ACIDs supported by DDM-2000. The following table shows the default mappings supported by DDM-2000. Most users should be able to use these mappings as defined. However, users may change the default mapping by using this command. Users may check the current provisioning by using the **rtrv-tl1msgmap** command.

```

/* DDM-2000 TL1 Autonomous Message Map
=====
      ACID                ALM  ENV  CON  DB   EVT  PM   SW
=====
tl1Maintenance           | x | x | x |   | x | x | x |
tl1MemoryAdministration  |   |   |   | x |   |   |   |
tl1Test                   |   |   |   |   |   |   |   |
tl1PeerComm               |   |   |   |   |   |   |   |
tl10ther1                 | x | x | x | x | x | x | x |
tl10ther2                 |   |   |   |   |   |   |   |

      x - enabled
<blank> - disabled
*/

```

Each message type can be assigned to more than one ACID. However, if more than one assignment is made, a 9600 or higher baud x.25 link is recommended.

The input parameters are:

ACID Application Context ID (ACID) is a string of up to 23 alphanumeric characters, which is the OS function. The valid ACID values are:

tl1Maintenance

tl1MemoryAdministration

tl1Other1

tl1Test

tl1PeerComm

tl1Other2

msgtype MessageType is one of the supported classes of TL1 messages that the system generates. These message types are *not* sent to the OS unless they are enabled and associated with an ACID. The supported message types are:

ALM To report the occurrence of an event that requires immediate attention by the craft at the OS. Report is sent via the REPT ALM command.

ENV To report the occurrence of an environmental alarm to the OS. Report is sent via the REPT ALM ENV command.

CON To report the active status conditions at the network element. Report is sent via the REPT COND command.

DB To report database changes that have occurred as a result of line termination and cross-connection provisioning commands and changes due to external events such as circuit pack insertion or removal. Report is sent via the REPT DBCHG command.

EVT To report events that do not require alarmed notifications or to report a status change of the network element. Report is sent via the REPT EVT command.

PM To report performance monitoring data from the network element. Report is sent via the REPT PM command.

SW To report equipment protection switches at the network element. Report is sent via the REPT SW command.

action Action is either **enabled** or **disabled** and associates the MessageType to the OS.

When this command is entered, the following confirmation message will be displayed:

```
/* Caution! Operations Systems Autonomous message mapping is
   affected by this command.

   You have selected the ent-tl1msgmap command with these parameters:

   ACID = x
   MessageType = x
   Action = x          */

Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

rtrv-tl1msgmap

NAME

ent-ulsdcc: Enter Upper Layer Section DCC

INPUT FORMAT

ent -ulsdcc:[**L3org**=*OrganizationID*][,**L3res**=*Reserved*][,**L3rou**=*RoutingData*];

DESCRIPTION**CAUTION:**

Execution of this command with parameters other than the default values at the directory services network element (DSNE) will disrupt all DCC communications. Errors in provisioning this command could result in silent alarm failures. Command parameters should *only* be changed by users who intend to provision the SONET subnetwork and partition DCC communications.

This command provisions parameters of Layers 3 through 7 of the open systems interconnection (OSI) 7-layer protocol stack. This stack refers to the OSI reference model which is a logical structure for network operations. This model defines a standard communication protocol between network elements as specified by the International Standards Organization (ISO).

This command is used to provision the user-settable fields of the Layer 3 network service access point (NSAP) address. The NSAP address is a 20-byte address required by OSI to provide unique identification within the OSI network. Each DDM-2000 is programmed with a unique NSAP address at the factory. For current software releases, only a single routing area can be supported and it is not possible to establish DCC connections between separate routing areas. Therefore, the default factory values are adequate to operate current networks. NSAP provisioning, using this command, will be used as part of future upgrade procedures. However, this command may be used now to change the user-settable portions of the NSAP to further uniquely identify the network element and to begin setting the addressing and routing structure of the SONET subnetwork. To facilitate future software upgrades, parameters should be set to the same values at each network element in the subnetwork.

**NOTE:**

If security is enabled, then this command is available to privileged users only for all CIT or DCC ports on the shelf.

The input parameters are:

L3org OrganizationID is a 6-digit hexadecimal field used to provision into the NSAP address the allocated company code assigned by the ANSI-administered USA Registration Authority for OSI Organization Names. The original value for this parameter is 000000.

L3res Reserved is a 4-digit hexadecimal field that currently has not been assigned a specific purpose by the SONET standards. Users may populate this field to further uniquely identify the NSAP address. The original value for this parameter is 0000.

L3rou RoutingData is an 8-digit hexadecimal parameter that covers two logical fields of the NSAP address. They are:

Routing Domain This field identifies a unique routing domain within an administrative domain.

Area This field identifies the area within the routing domain to which the NSAP address belongs.

The original value for this parameter is 00000000.

If an incorrect number of digits is entered for a specific parameter, the following message is issued and the user is prompted:

```
/* Invalid data entry
Enter a <num> digit hexadecimal number */
```

The <num> specifies four, six, or eight digits, as required.

After entering this command, the following confirmation message is displayed:

```
/* Caution! Network Element access is affected by this command.

Caution! When executed, this command causes the NE to
restart the program. This action will erase all of
the performance monitoring data and the history file.
If possible, it will reinitialize the date and time with
the far end via the DCC. Otherwise, the
date and time will assume default values.
You have selected the ent-ulsdcc command with these parameters:

L3org = xxxxxx
L3res = xxxx
L3rou = xxxxxxxx */
Execute? (y/n or CANCEL/DElete to quit) =
```

The full confirmation message is displayed if a change is made to any of the three parameters.

If the user enters the same parameter values as currently defined, the system does not reset. The following brief confirmation message is displayed:

```
/* Caution! Network Element access is affected by this command.  
You have selected the ent-ulsdcc command with these parameters:  
  
L3org = xxxxxx  
L3res = xxxx  
L3rou = xxxxxxxx */  
Execute? (y/n or CANCEL/DElete to quit) =
```

RELATED COMMANDS

rtrv-ulsdcc

NAME

help: Provide In-context Help

INPUT FORMAT

?

DESCRIPTION

Help (?) provides help within a craft dialog on the CIT. Help is provided automatically when an invalid input is entered and can also be requested at any time by typing "?". The "?" displays a help message and then displays another prompt.

The help message is either a description of format of the required entry or a menu of choices.

NAME

init-pm: Initialize Performance Monitoring

INPUT FORMAT

init-pm:reg=Register;

DESCRIPTION

This command initializes all current day and/or all current quarter-hour performance-monitoring storage registers. Registers for previous day and previous quarter-hours are not affected.

⇒ NOTE:

If security is enabled on any CIT or DCC port on a shelf, then this command is available to privileged users only for all CIT or DCC ports on the shelf.

The input parameter is:

reg Register is the class of registers to be initialized and may be one of the following:

day Day registers

qh Quarter-hour registers

all Day and quarter-hour registers

RELATED COMMANDS

rtrv-pm-line

rtrv-pm-sect

rtrv-pm-sts1

rtrv-pm-tca

NAME

init-sys: Initialize System

INPUT FORMAT

init-sys:*Address*;

DESCRIPTION**CAUTION:**

Execution of this command may affect service. The command **init-sys:all** should NOT be used on an in-service system. This command should only be used at the end of installation before system turnup.

This command initializes provisionable parameters to their default values. The time and date parameters are reset from the far end.

**NOTE:**

After entering the **init-sys** command, the system will show transient DCC failures that are recorded in the Alarm and History reports. This is a normal, expected system response.

The command **init-sys:all** should be used only at the end of installation before system turnup. The command **init-sys:sysctl** should only be used after a SYSCTL is replaced. To clear a system problem, the **reset** command should be used since it resets the system software without changing the provisioned parameters except for the page parameter in **set-link**, which is reset to default value in this case.

**NOTE:**

This command is available to privileged users only.

The input parameter is:

Address Address determines whether just system controller parameters are initialized or whether all parameters on the entire system are initialized. Address may have the following values:

sysctl The address **sysctl** can be used after a system controller is replaced on an in-service system. It is the equivalent of pressing the UPD/INIT button within 10 seconds of the processor start-up sequence (while the CR LED on the user panel is flashing). This command restores the following list of parameters to their default values.

**NOTE:**

Parameters can be provisioned using the following commands listed below the parameters.

Alarm delays

set-attr-alm

NSAP

ent-ulsdcc

Security

set-lgn

set-passwd

set-secu

CIT link configuration

set-link

Protection Switching

(inhibit, forced, lockout, manual)

switch-ls

switch-sync

Performance monitoring thresholds

set-pmthres-sect

set-pmthres-line

set-pmthres-sts1

set-pmthres-t1

set-pmthres-vt1

Synchronization Characteristics

set-sync

Environmental alarm names and alarm levels

set-attr-env

Environmental control names

set-attr-cont

Far-end communications enabled/disabled

set-fecom

Idle value

set-ne

all The address **all** is used only at the end of an installation before turning over the system. This ensures that all parameters in the system have the proper default values before any system-specific provisioning is done.

**CAUTION:**

The address **all** should NOT be used on an in-service system.

**NOTE:**

The **init-sys:all** command is available to privileged users only.

This parameter initializes all the parameters listed under **sysctl** PLUS the following:

Loopbacks

opr-lpbk-t1

Cross-connections

dlt-crs-vt1

ent-crs-vt1

OC-1 signal degrade threshold

set-oc1

set-sts1

set-vt1

Signal failure thresholds

set-t1

Protection Switching (manual)

switch-ls

switch-sync

Feature Options

set-feat

System name (TID)

set-ne

PMN

set-attr-alm

Site Id, NE Id and Shelf Id

set-ne

TBOS and CO/RT selection

set-ne

UserSide/NetworkSide settings on DCC
set - fecom

Low-Speed Protection Mode

The low-speed protection mode is set to match the installed low-speed protection assembly. If no valid protection assembly can be detected, the low-speed protection mode defaults to 1x7.

In addition to initializing parameters, entering the address **all** will clear all performance monitoring data and alarms. For failure conditions that still exist after parameters are initialized, the alarms will be redeclared. Time and date parameters are not affected by this command.

Executing an **init-sys:sysctl** with no main OLIU packs equipped will set the following parameters to default values:

Feature Options

Directory Services Network Element (DSNE)

System name (TID)

PMN

Site Id, NE Id

TBOS Address

TBOS Enabled

TBOS link

CO/RT selection

UserSide/NetworkSide settings on DCC

DCC channel enable/disable

When the command **init-sys:sysctl** is entered, the following confirmation message will be displayed:

```
/* CAUTION!  
Execution of this command will set ALL parameters on the  
controller to their original default values.  
This may disrupt this system's operations interfaces.  
Refer to the DDM-2000 User/Service Manual before executing  
this command.  
  
Caution! When executed, this command causes the NE to  
restart the program. This action will erase all of  
the performance monitoring data and the history file,  
and reinitialize the date and time with the far end  
system.  
  
Proceed with EXTREME CAUTION!  
  
You have selected the init-sys command with these parameters:  
  
Address = sysctl */  
Execute? (y/n or CANCEL/DELeTe to quit) =
```

⇒ NOTE:

Executing **init-sys:sysctl** may cause the system to respond with the following message: Parameters set to default values. This means that the circuit pack in a specified slot has failed or has been removed, and the parameters for ports associated with that slot have been set to their default values.

Entering the command **init-sys:all** will cause the following confirmation message to be displayed:

```
/* CAUTION!
```

```
THIS COMMAND SHOULD NEVER BE EXECUTED ON AN IN-SERVICE SYSTEM!
```

```
This command will set ALL parameters in the whole system  
to their original default values.  
This may result in a lengthy service outage and may disrupt  
this system's operations interfaces.
```

```
Caution! When executed, this command causes the NE to  
restart the program. This action will erase all of  
the performance monitoring data and the history file,  
and reinitialize the date and time with the far end  
system.
```

```
PROCEED WITH EXTREME CAUTION!
```

```
You have selected the init-sys command with these parameters:
```

```
Address = all */  
Execute? (y/n or CANCEL/DElete to quit) =
```

RELATED COMMANDS

reset

upd

NAME

ins-prog: Install Program

INPUT FORMAT

ins-prog: *TID*;

DESCRIPTION**CAUTION:**

For all FiberReach releases, normal alarming and protection switching are disabled for the *TID* specified while this command is in progress.

For all FiberReach releases, this command installs a new program into the system controller. This command supports a local program installation to a network element from a personal computer (PC) connected to the CIT port of the target system. The command **cpy-prog** is used to copy the system controller program from a local network element to a remote network element.

**NOTE:**

This command cannot be executed during a remote login session.

For all FiberReach releases, this command also supports remote program installation to a DDM-2000 controller from a PC connected to the CIT port of another DDM-2000 system.

**NOTE:**

For all FiberReach releases, if security is enabled on any CIT or DCC port on a shelf, then this command is available to privileged users only for all CIT or DCC ports on the shelf. If security is not enabled on *all* shelves in the network, users on unsecured shelves will be able to install software that affects shelves with security enabled.

The input parameter is:

TID The Target Identifier (system name) of the shelf into which the program will be loaded. TIDs are case insensitive.

If the command syntax is correct, the following message will be displayed:

```
/* Testing for program installation ... */
```

This command can only be completed successfully if it is executed from a CIT or modem port, but not if it is received over the DCC. This command cannot be executed during a remote login session. If this command is executed during a remote login session, the following message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* This command cannot be executed from within a rlgn session. */
```

If the system name specified is unknown to the local system, the following error message will be displayed and the user will be asked to reenter the TID.

```
/* Unknown Target Identifier (TID) */
/* Enter the name (TID) of the local or far end system. */
TID=
```

If the system name specified currently has a duplicate TID alarm condition, the following denial message will be displayed:

```
IITA
/* Input, Invalid TArget identifier (TID) */
/* Duplicate Target Identifier. */
```


If this command is not executed from a PC, the following denial message will be displayed:

```
SSTP
/* Status, execution SToPped */
/* PC communication link could not be established.
   Please connect PC with program to be installed and start again. */
```

If this command is used to install a program for a certain product type while the Target Identifier **TID** of the shelf into which the program will be loaded identifies a different product type (for example, a program to be installed is for DDM-2000 OC-3 product type, while the target product type is FT-2000), the request will be denied and the following message is displayed:

```
IITA
/* Input, Invalid TArget identifier (TID) */
/* <TID> is a different product type;
   Incompatible software. */
```

If this command is used to install a program locally to a DDM-2000 but the PC contains DLC Subsystem program, the following denial message will be displayed:

```
SSTP
/* Status, execution SToPped */
/* Incompatible program. */
```

If the communication link between the PC and the system that it connects to fails, the following denial message will be displayed:

```
SSTP
/* Status, execution SToPped */
/* PC communication link failure. */
```

To support remote program installation from a PC, the PC, the local system that the PC connects to, and the target system must be running compatible programs. To support local program installation from a PC, the PC, and the local (target) system that the PC connects to must be running compatible programs. If the programs are not compatible, the following denial message will be displayed:

```
SSTP
/* Status, execution SToPped */
/* Communication protocol failure. */
```

For remote program installation, if the target system has a communication failure, has a "P" displayed in its SYSCTL 7-segment LED display, or does not support remote program installation from a PC, the following denial message will be displayed:

```
SSTP
/* Status, execution SToPped */
/* Communication failure. */
```

If communication cannot be established when attempting to download software to a local site from a PC, the following message will be displayed:

```
SSTP
/* Status, execution SToPped */
/* Communication link cannot be established.
Please connect PC with DDM-2000 upgrade
program and start again. */
```

For FiberReach, when this command is used to download software to a local site from a PC or to download software to a remote site, the following confirmation message will be displayed after testing for program installation:

```
/* Caution! Execution of this command will erase the current
generic n.n.n at Target Identifier and replace it with
generic m.m.m. If this fails prior to completion,
the control system will likely become inoperable
until another install program attempt is successful.
This command will terminate any other active CIT sessions.
This command will take time to install the new program. Check
the Software Release Description for the time estimates. */
```

Execute? (y/n or CANCEL/DELETE to quit) =

For FiberReach, when this command is used to download a new release of software that is significantly different from software currently running on the remote system, or to download software to a local system from a PC where the software to be downloaded is significantly different from software currently running on the local system, the following confirmation message is displayed:

```
/* Caution! Execution of this command will erase the current
generic n.n.n at Target Identifier and replace it with
generic m.m.m. If this fails prior to completion,
the control system will likely become inoperable
until another install program attempt is successful.
This command will terminate any other active CIT sessions.
This command will take time to install the new program. Check
the Software Release Description for the time estimates. */
```

```
/* Caution! Major changes exist between these two generics such
that they may not be compatible. Check the TOPS and software
compatibility information for additional information or actions
needed. */
```

Execute? (y/n or CANCEL/DELETE to quit) =

When a user gives a positive response to the confirmation message, the following message is displayed:

```
In progress .....
```

The number of dots and how fast they are displayed depend on the size of the program to be installed, baud rate, and for remote program installation, number of DCC spans between the local and remote systems, and DCC traffic.

See "Install New Generic Program" in the TOP section of this manual for complete instructions before using this command. Use the **rtrv-ne** or **rtrv-map-network** commands to obtain the exact TID for the system. The command **rtrv-eqpt** provides the current program version. The current program version may also be obtained from the initial screen and every report header line when logged into the system with a craft interface terminal (CIT). The current program version is also available on the user panel.

Each time a carriage return is entered, the system will also print a header line containing the TID and program version.

RELATED COMMANDS

rtrv-eqpt

rtrv-ne

NAME

logout: Terminate CIT Session

INPUT FORMAT

logout;

DESCRIPTION

This command terminates a user CIT session.

If this command is entered during a local session, it will terminate all sessions established by the user. If entered during a remote session, this command will terminate the remote session and return the user to the local session.

RELATED COMMANDS

rlgn

toggle

NAME

opr-aco: Operate Alarm Cutoff

INPUT FORMAT

opr -aco;

DESCRIPTION

This command silences the audible office alarms. Alarms remain silent until a new alarm condition arises.

If this command is executed while there is an active alarm condition in the system, it will:

- Silence active audible office alarms
- Light the alarm cut-off (ACO) LED on the user panel
- Set the parallel telemetry ACO output point
- Clear all parallel telemetry outputs except the system ID and ACO outputs.

This command is equivalent to pushing the ACO button on the user panel, activating the TBOS ACO control point, or activating the parallel telemetry ACO input.

For any DDM-2000 Multiplexer shelf in a network that has co-located DDM-2000 shelves (same *site* parameter settings), any one of the following actions will silence audible office alarms on all shelves at the same site:

- Pressing the ACO button
- Executing the OPR-ACO command
- Setting the TBOS ACO control point.

NAME

opr-lpbk-t1: Operate-Loopback-T1

INPUT FORMAT

opr - lpbk - t1:*Address*[:**lpbktype**=*LoopbackType*];

DESCRIPTION**CAUTION:**

Execution of this command may affect service.

This command executes a loopback on a DS1 or T1 port towards the optical fiber (terminal) as shown in Figure 11-2. The loopback remains in place until released by the **rls - lpbk - t1** command.

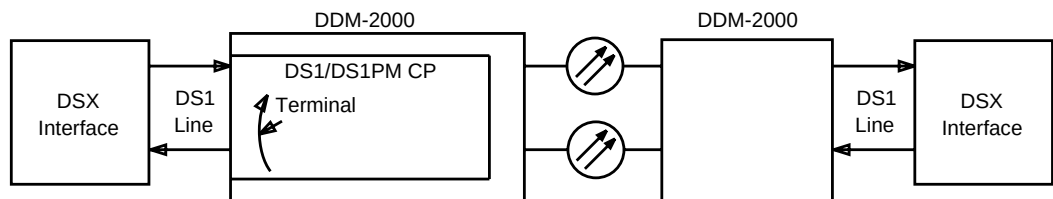


Figure 11-2. DS1 Loopback

The input parameters are:

Address Address of DS1 or T1 port(s) to be looped back.
For a terminal loopback, valid addresses in a 1x1 protected LS configuration are:

all, {a,b,c,d}-all, {a,b,c,d}-1-{1-4,all}

For a terminal loopback, valid addresses in a 1x7 protected LS configuration are:

all, {a,b,c}-{1,2}-{1-4,all}, d-1-{1-4,all}

The BBF6 circuit pack supports two T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid. Specifying **all** selects ports 1 and 2 only.

lpbktype The only valid value for this parameter is:

terminal Terminal loopback directed towards the high speed facility. This is a default value.

If the loopback type is not consistent with the address, the following denial message is displayed:

```
SNVS
/* Status, Not in Valid State */
/* loopback type is not consistent with the address. */
```

If the command cannot be completed due to hardware problems on the circuit pack, the following message is displayed:

```
/* Address CPname CP failed */
```

Address and *CPname* refer to the slot address and provisioned circuit pack type for the slot, respectively.

If a slot is in AUTO state or determined to have the wrong circuit pack type for the command, the following message is displayed:

```
/* Slot is in AUTO state or Address is not equipped - no
   loopback established */
/* Enter DS1 port Address: */
```

If the command cannot be completed due to hardware problems on the SYSCTL, the following message is displayed:

```
/* SYSCTL failed - no loopback established */
```

When input for a terminal loopback, this command will cause the following confirmation message to be displayed:

```
/* Caution! Execution of this command may affect service.
   You have selected the opr-lpbk-t1 command with these parameters:

   Loopbacktype= loopbacktype
   Address=address */

Execute? (y/n or CANCEL/DELeTe to quit) =
```

RELATED COMMANDS

rls-lpbk-t1

NAME

reset: Reset the System Software Program

INPUT FORMAT

reset;

DESCRIPTION**CAUTION:**

Execution of this command may affect performance-monitoring data.

This command resets the system software program. All history and performance-monitoring data is lost. All alarm information is lost and "rediscovered." The date and time are lost and "rediscovered" from the far end or set to default (**70-01-01** for date and **00:00:00** for time). No provisioning information is lost or changed, except for the *page* length parameter in **set-link**, which is reset to the default value.

An automatic date and time recovery process takes place by reading the date and time from the remote shelf connected to the interface of the local shelf (in linear applications). In ring applications, the date and time data is recovered from the remote shelf connected to the local shelf.

If the low-speed protection assembly has been changed since the last reset, this command will also attempt to change the low-speed protection mode to match the new protection assembly. The attempt will fail only if one or more cross-connects to low-speed ports are still provisioned. In this case, a *ls prot mode not chgd-(crs)* alarm will be raised against the low speed protection assembly. To complete the change, remove all cross-connections to low-speed ports and reexecute the **reset** command.

**NOTE 1:**

Unlike other commands, an abbreviated version of this command name may not be entered. The user must type the complete command name when entering this command or the command request will be denied.

**NOTE 2:**

If security is enabled on any CIT or DCC port on a shelf, then this command is available to privileged users only for all CIT or DCC ports on the shelf.

⇒ NOTE 3:

If a reset is done on any shelf, all adjacent shelves (shelves at the other ends of the optical interfaces that terminate on the shelf being reset) may show transient "section DCC channel failed" alarms. This is a normal system response.

When input, this command displays the following confirmation message:

```
/* Caution! When executed, this command causes the NE to
restart the program. This action will erase all of
the performance monitoring data and the history file.
If possible, it will reinitialize the date and time with
the far end system.
You have selected the reset command. */
```

```
Execute? (y/n or CANCEL/DElete to quit) =
```

During system start-up after reset or other initialization, the user who is connected to a CIT port cannot log in. When the user presses RETURN, the following message is issued:

```
/* System Initialization is in progress.
Try to log in again later. */
```

NAME

rlgn: Remote Login

INPUT FORMAT

r lgn: *TID*;

DESCRIPTION

This command establishes a remote login session via the SONET DCC. Any network element (NE) which is part of the same maintenance subnetwork and has a compatible product type may be accessed with this command.

The alarm and status report for the far-end system is printed automatically when this command is executed.

The input parameter is:

TID TID is the target identifier (system name) of the desired remote shelf.

If the command is successfully completed and security is enabled the user will be prompted for login and password (similar to a local login session).

⇒ NOTE:

A remote login session may be terminated unexpectedly if a user elsewhere in the network enables or disables DCC communications.

If a user attempts to login to a remote shelf where another remote session is already established, the following denial message will be displayed:

```
RNBY
/* Resource, Ne is BusY */
/* A remote session is not allowed.
   Try again later. */
```

If the far-end is not communicating, the following denial message will be displayed:

```
/* No communication with the TID entered. */
```

If the far-end communication request fails, the following denial message will be displayed:

```
SROF
/* Status, Requested Operation Failed */
/* Far end communication failure. */
```

If a user is logged into a shelf and then tries to remotely login to the same shelf, the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* Local session already established.
   A remotd login to this TID is not allowed. */
```

If a user has toggled back to the local NE after establishing a remote session and tries to return to the remote session using this command, the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* Remote session already established.
   A second remote session is not allowed. */
```

If the user attempts to log into a system whose product type does not support remote logins from the local NE, the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* Remote session cannot be established.
   A remotd login to this product type is not allowed. */
```

If a nonprivileged user remotely logs into a remote NE through a DCC in **lockout** state, the following denial message will be displayed:

```
PIPW
/* Privilege, Illegal Password */
/* Access Blocked. */
```

If an unknown TID is entered, the following message will be displayed and the user will be reprompted for the TID:

```
/* TID entered is not found. */
```

RELATED COMMANDS

logout

toggle

rtrv-map-neighbor

rtrv-map-network

NAME

rls-lpbk-t1: Release-Loopback-T1

INPUT FORMAT

rls-lpbk-t1:*Address*;

DESCRIPTION

This command releases a previously established loopback on a DS1 or T1 port.

The input parameters are:

Address Address of DS1 or T1 port(s) where a loopback is to be released.
For a terminal loopback, valid addresses in a 1X1 protected LS configuration are:

all, {a,b,c,d}-all, {a,b,c,d}-1-{1-4,all}

For a terminal loopback, valid addresses in a 1x7 protected LS configuration are:

all, {a,b,c}-{1,2}-{1-4,all}, d-1-{1-4,all}

The BBF6 circuit pack supports two T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid. Specifying **all** selects ports 1 and 2 only.

If the command is issued with an incorrect address for the specified loopback type, the following denial message is displayed:

```
SNVS
/* Status, Not in Valid State */
/* loopback type is not consistent with the address. */
```

 NOTE:

If the address **all** is used, the command will be denied if the loopback type is inconsistent with any existing loopback.

RELATED COMMANDS

opr-lpbk-t1

NAME

rstr-passwd: Restore Logins, Passwords, and User Types

INPUT FORMAT

rstr-passwd: *login,password,user_type,clr;*

DESCRIPTION **NOTE:**

This command is available to privileged users only.

This command is *only* used to restore the login, password (in encrypted and encoded form), and user type information from an external workstation into the network element (NE). The restored information is information that would have been previously loaded from the NE into the external workstation through the **rtrv-passwd** command.

This command is intended to be used *only* in expert mode by an external PC workstation and not at a CIT.

The input parameters are:

login	This is the login name that was established by the security administrator on the NE before the rtrv-passwd command was executed.
passwd	This is the current encrypted and encoded password selected by the owner of the login before the rtrv-passwd command was executed.
user_type	This is the user access class assigned to this login by the security administrator before the rtrv-passwd command was executed. This parameter may have one of the following values: privileged The privileged user may execute any commands including restricted commands. general The general user may execute any commands that are not restricted to privileged users. maintenance The maintenance user may only execute commands that access the system, extract reports, and execute maintenance functions through a specific set of commands. No privileged commands are allowed to be executed by maintenance users.

reports-only

The reports-only user may only execute basic commands that extract reports from the system.

clr

This parameter indicates whether the login data existing on the NE should be deleted before the login, password, and user type information can be restored. This parameter may have one of the following values:

- clear** Clear the NE login file before restoring the login information (used only when **user_type** is privileged).
- noclear** Append the restored login information to the network element login file.

If this command is executed with the parameter **clr** set to **clear**, all login information in the NE login file will be cleared, then the new login information is restored from the external workstation. However, all active login sessions will not be terminated.

Attempts to input invalid parameter(s) data will result in the user being denied execution of this command. The following denial message is displayed:

```
IDNV
/* Input Data Not Valid, invalid data entered. */
```

An invalid parameter indicates that either a login does not match the valid login definition, the length of the encrypted password (after decoding it into encrypted form) is invalid, a **user_type** is invalid (for example, a misspelled **user_type**), or a **clr** value is invalid (that is, other than **clear** or **noclear**).

If this command attempts to restore another login line when the NE's maximum number of supported logins is reached, the following denial message will appear:

```
SLEM
/* Status, List, Exceeds Maximum */
/* Maximum number of logins already exists.
  Cannot enter another login. */
```

If the user attempts to restore another **privileged** user when the maximum number of **privileged** users has already been reached, this attempt will be denied and the following message will be displayed:

```
SLOM
/* Status, List, Over Maximum allowed */
/* Maximum number of privileged users already exists. */
```

If an attempt is made to restore an already existing **privileged** user's login/password information with a *user_type* of either **general**, **maintenance**, or **reports-only**, this attempt is denied and the following message is displayed:

```
SDNC
/* Status, Data Not Consistent */
/* Privileged user logins cannot be restored as
   General, maintenance or Reports-only. */
```

If an attempt is made to restore a user's login/password information, with a *user_type* of either **general**, **maintenance** or **reports-only** and *clr=clear*, the attempt will be denied and the following message is displayed:

```
SDNC
/* Status, Data Not Consistent */
/* for clr=clear, user_type must be set to privileged. */
```

RELATED COMMANDS

rtrv-passwd

set-lgn

set-passwd

NAME

rtrv-alm: Retrieve Alarm and Status

INPUT FORMAT

rtrv-alm[: **alm**=*AlarmLevel*];

DESCRIPTION

This command displays a report of active alarm and status conditions at the local network element. The report includes the source address of the alarm as well as date and time of the alarm, whether or not the condition is service-affecting, and a short description of the condition.

The input parameter is:

alm AlarmLevel for which a report is desired. This parameter may have one of the following values:

all (default)

cr

mj

mn

pmn

other (abnormal, ne-acty, status conditions)

Alarms are listed from greatest to least severity. Within a severity level, newer alarms are listed first.

⇒ NOTE:

Due to the large number of conditions reported, the RTRV-ALM report pages have been located at the end of this section for easier reference. Please refer to the RTRV-ALM table (Table 11-3) for a complete description of report outputs.

RELATED COMMANDS

rtrv-hsty

rtrv-ntalm

NAME

rtrv-attr-alm: Retrieve Attribute Alarm

INPUT FORMAT

rtrv-attr-alm;

DESCRIPTION

This command displays current alarm attributes, as provisioned by the **set-attr-alm** command.

The output report appears as follows:

```
/* System Alarm Attributes Report
=====
Alarm Delay (almdel)=almdel, Clear Delay (clrdel)=clrdel, PMN=pmn
*/
```

The output parameters are:

Alarm Delay	This shows the alarm holdoff delay in seconds for incoming signal and equipment failures. This parameter is an integer with a range of 0 through 30.
Clear Delay	This shows the alarm clear delay in seconds for equipment failures. This parameter is an integer with a range of 0 through 30.
PMN	PMN is the office alarm level to be raised during a power minor alarm condition. This parameter has the values MJ (major) or MN (minor) indicating the alarm level.

⇒ NOTE:

Incoming signal failure conditions, AIS, and FERF signals are subject to the provisionable alarm holdoff delay and a fixed 15-second clear delay. Yellow signals are not subject to holdoff or clear delays. Circuit pack failures (except control circuit pack failures) are subject to the provisionable alarm holdoff and clear delays.

RELATED COMMANDS

set-attr-alm

NAME

rtrv-attr-cont: Retrieve Attribute Control

INPUT FORMAT

rtrv-attr-cont[:*Address*];

DESCRIPTION

This command displays the provisioned name of miscellaneous discrete environmental control points, as set by the **set-attr-cont** command.

The input parameter is:

Address Address of the environmental control point. The default address is **cont-all**.
Valid Addresses: **cont-{1-4,all}**

The output report appears as follows:

```
/* Control Point Provisioning Report
=====
Address  Description
=====
cont-1   StartGenerator
cont-2   StartPump
cont-3   control3
cont-4   control4
*/
```

The output parameters are:

Address This is the address of the control point.

Description This is the provisioned description of the environmental control point.

 NOTE:

This command will be denied if it is entered in a system whose SYSCTL CO/RT parameter is set to CO (via the **set-ne** command). Use the **rtrv-ne** command to determine the switch setting. The following denial message will be displayed:

```
ENRI
/* Equipage, Not equipped for Retrieving specified Information */
/* Environmental controls can be provisioned only in RT systems. */
```

RELATED COMMANDS

rtrv-attr-env

rtrv-ne

set-attr-cont

set-attr-env

NAME

rtrv-attr-env: Retrieve Attribute Environment

INPUT FORMAT

rtrv-attr-env[:*Address*];

DESCRIPTION

This command displays the provisioned alarm and provisioned name and provisioned alarm type of miscellaneous discrete environmental alarm/status points, as set by the **set-attr-env** command.

The input parameter is:

Address The address of the environmental input point.

Valid Addresses: **env-{1-15,all}**, **env-{all}** (default)

The output report appears as follows:

```

/* Environmental Alarm Provisioning Report
=====
Address  Alarm  Alarm Type  Description
=====
env-1    CR    MISC        Fire
env-2    NA    Power       OpenDoor
env-3    MN    code-7      environment3
.        .        .           .
.        .        .           .
.        .        .           .
env-15   MN    Misc        externalMinor
*/

```

The output parameters are:

Address The address of the environmental alarm/status point.

Alarm	Alarm is the provisioned alarm level of the environmental input and has the following values: CR Critical alarm MJ Major alarm MN Minor alarm NA Not alarmed, but reported
Alarm~Type	This is the user-defined classification of the environmental alarm/status point.
Description	Provisioned description of the environmental alarm/status point.

⇒ NOTE:

This command will be denied if it is entered in a system whose SYSCTL CO/RT parameter is set to CO (via the **set -ne** command). Use the **rtrv-ne** command to determine the switch setting. The following denial message will be displayed:

```
ENRI
/* Equipage, Not equipped for Retrieving specified Information */
/* Environmental alarms can be provisioned only in RT systems. */
```

RELATED COMMANDS

rtrv-attr-cont

rtrv-ne

set-attr-cont

set-attr-env

NAME

rtrv-crs-sts1: Retrieve Cross-Connection STS-1

INPUT FORMAT

rtrv-crs-sts1[:*Address*];

DESCRIPTION

This command retrieves STS-1 cross-connections within the DDM-2000 system. This command uses the 28-type OLIU circuit pack, which is available with FiberReach 2.2 and later releases.

The input parameter is:

Address The address of one or more STS-1 channels for which cross-connections are to be reported. The default address is **all** STS-1 channels in the system.

When the shelf is equipped with 28-type OLIUs in the Main units, the valid addressses are: **m-{1-3,all}**

The only STS-1 cross-connect type allowed in FiberReach is STS-1 pass through.

The output report appears as follows:

```

/* Cross-Connection Map Report
=====
Address  Address      Cross Connect  Ring Id
  1      2          Type
=====
-----STS-1-----
m-1      a          twoway          m1
m-2      b-1        twoway          -
m-3      VT1.5 Cross-Connection
a        c-1        twoway          -
*/

```

⇒ NOTE:

Each cross-connection is reported only once (not once in each direction).

The output report shows the channels in an order that reflects the physical layout of the system (for example, the high-speed slots are shown first, followed by those associated with function unit A, function unit B, etc.).

The output parameters are:

Address 1 Address 1 is the address of an STS-1 channel.

Address 2 Address 2 is the address of an STS-1 channel.

⇒ NOTE:

Address 1 and Address 2 for FiberReach must always be equal.

Cross Connect Type

This column specifies whether the cross-connection is two-way (**twoway**) or drop and continue (**dc**). Two-way cross-connections apply to terminating, hub, add/drop, pass-through, hairpin, 0x1 ring, dual locked, and 0x1 DS3 configurations. For detailed information on the mentioned cross-connection types, refer to **ent-crs-sts1** command page.

⇒ NOTE:

The only allowed value of CCT (cross-connect type) is "two-way" (pass-throughs).

RELATED COMMANDS

dlt-crs-sts1

ent-crs-sts1

NAME

rtrv-crs-vt1: Retrieve Cross-Connection VT1.5

INPUT FORMAT

rtrv-crs-vt1[:*Address*];

DESCRIPTION**⇒ NOTE:**

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), the output report for this command will include data for what is considered at the time as the valid system pack type.

This command retrieves VT1.5 signal cross-connections within a DDM-2000 FiberReach system, as set by the **ent-crs-vt1** command.

The input parameter is:

Address Following is the list of valid addresses:

Valid Addresses:

m-1-{1-7}-{1-4,all}, m-1-all

If the shelf is equipped with 26-type OLIUs in Main unit slots, valid addresses are: **m-1-{1-7}-{1-4,all}, m-1-all**

If the shelf is equipped with 28-type OLIUs in Main units (available in Release 2.2 and later), valid addresses are:

m-{1-3,all}-{1-7}-{1-4,all}

Valid port addresses in 1X1 protected low-speed configurations: **{a,b,c,d}-1-{1-4,all}**

Valid port addresses in 1x7 protected low-speed configurations: **{a,b,c}-{1,2}-{1-4,all}, d-1-{1-4,all}**

The T1EXT (BBF6) circuit pack supports 2 T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid. Specifying **all** selects ports 1 and 2 only.

The output report appears as follows. Only existing ports or channels that are cross-connected will be displayed in the report.

```

/* VT1 Cross Connect Report
=====
Address      Address      Cross Connect      Ring Id
  1          2          Type
=====
m-1-1-2      m-1-1-2      twoway             -
m-1-5-4      c-1-4        twoway             -
m-1-7-4      d-1-4        locked             m1
.            .            .                 .
*/

```

The output parameters are:

Address 1 Address1 is the address of a VT1.5 channel or a DS1 or T1 port.

Address 2 Address2 is the address of a VT1.5 channel or a DS1 or T1 port.

Cross Connect Type
This parameter specifies the cross-connection type. It also specifies whether the cross-connection is two-way, or locked. Two-way applies to add/drop and pass-through configurations.

Ring Id This column identifies the ring for locked connections.

The report shows the current state of VT1.5 cross-connections in the NE. When the address of multiple VT1.5 channels, DS1 ports, or T1 ports are specified in the execution of this command, the report will show the addresses in the first column in numerical order reflecting the physical layout of the shelf.

RELATED COMMANDS

dlt-crs-vt1

ent-crs-vt1

rtrv-state-path

NAME

rtrv-eqpt: Retrieve Equipment

INPUT FORMAT

rtrv-eqpt[:*Address*];

DESCRIPTION

This command displays the circuit pack type and version information for one or more slots on a network element (NE). It also shows which low-speed protection mode (1x1 or 1x7) is active for the shelf.

The input parameter is:

Address Address identifies one or more slot(s). The default is **all** slots.
Valid Slot Addresses: **all**, **main-{1,2,all}**, **ls-all**,
 ls-{a,b,c,d}-{1,2,all}, **sysctl**, **auxctl**,
 fn-{1,2,all}

A sample output report appears on the following page.

/* Equipage and Version Report

Slot Address	Circuit Pack	Apparatus Code	Series Number	CLEI Code	ECI Code	Serial Number
main-1	OLIU	26G-U	S1:1	SNTRFBXDAA	200320	94MV11057853
main-2	OLIU	26G-U	S1:1	SNTRFBXDAA	200320	94MV11057867
fn-1	-	-	-	-	-	-
fn-2	-	-	-	-	-	-
ls-a-1	DS1	BBF1B	S3:4	SNCLAA1AAB	682891	92MV09578358
ls-a-2	DS1	BBF1B	S3:4	SNCLAA1AAB	682891	92MV07648136
ls-b-1	DS1	22mc	22Iss	22CLEI	22CECI	22Ser
ls-b-2	DS1	22mc	22Iss	22CLEI	22CECI	22Ser
ls-c-1	-	-	-	-	-	-
ls-c-2	-	-	-	-	-	-
ls-d-1	-	-	-	-	-	-
ls-d-2	-	-	-	-	-	-

Low speed protection mode: 1x7

sysctl	SYSCTL	bbg8	S1:1	SNC11W0AAA	205700	94MV00000075
auxctl	USPNL					

Program version X.X.X

*/

The output parameters are:

Address	This is the address of the slot.
Circuit Pack	Circuit pack is the mnemonic name that identifies the general type function provided by a circuit pack. For example, Optical Line Interface Units are all named OLIU; SYSTEM ConTrollers are named SYSCTL.
Apparatus Code	Apparatus code uniquely identifies the specific function provided by a circuit pack. Circuit packs with different apparatus codes are not interchangeable even if they have the same name.
Series Number	This is used to indicate interchangeability among circuit packs with the same circuit pack name and apparatus code but different manufacturing versions. In general, a circuit pack can be replaced by another circuit pack that has the same apparatus code and the same or later series number.

CLEI Code	CLEI* code is the 10-character code identifying each circuit pack.
ECI Code	Equipment catalog item (ECI) code is a 6-character code identifying each circuit pack. This code corresponds to the bar-coded label on the faceplate of the circuit pack, and is uniquely equivalent to the CLEI code.
Serial Number	This is a 12-character code uniquely identifying each circuit pack and indicating the date and place of manufacture.
Program Version	Program version is the version of software that is currently stored on the circuit pack.
PID	Program identification code identifies the version of firmware on one or more socketed devices on the circuit pack.
Low speed protection mode	This identifies which low-speed protection mode is active. Possible values are 1x1 and 1x7. If the installed low-speed protection assembly does not match this mode or is missing, the report will also identify the error condition.

The report always contains a line for every slot included in the range of the address whether or not the slot is equipped.

Hyphens (-) indicate information in that field is not applicable (that is, type and version information for slots that are not equipped).

Question marks (?) indicate that the information is unknown (for example, an unrecognized circuit pack, because the system is unable to read version information from a circuit pack inserted into a slot in the AUTO state)

If an incorrect circuit pack is inserted in a slot, the report will show the expected circuit pack name for that slot and indicate that the current circuit pack does not match inventory.

If an unpowered circuit pack is placed in a slot, the report will indicate that the circuit pack is unpowered and version information is unavailable.

If the system cannot report complete, correct version information for a circuit pack because of a field upgrade, then the information that may be incorrect (apparatus code, series, CLEI code, and ECI code) is followed by a "?".

* COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

RELATED COMMANDS

rtrv-state

NAME

rtrv-feat: Retrieve Feature

INPUT FORMAT

rtrv-feat;

DESCRIPTION

This command retrieves a list of active feature options enabled by the **set-feat** command.

The output report appears as follows:

```
/* Feature Options Enabled Report
=====
Feature Option      Description
=====
      feature      description
      feature      description
      .              .
      .              .
      .              .
      .              .
*/
```

The output parameters are:

Feature Option This is the name of the feature currently enabled.

Description Description of the feature.

RELATED COMMANDS

set-feat

NAME

rtrv-fecom: Retrieve Far-end Communications

INPUT FORMAT

rtrv-fecom: [*Address*];

DESCRIPTION

This command displays the provisioned state of a network element's (NE's) section data communication channels (DCC), as set by the **set-fecom** command.

The DCC is an embedded overhead communications channel in the SONET line used for end-to-end communications and maintenance. The DCC carries alarm, control, and status information between NEs.

The input parameter is:

Address Address is the address of the DCC. The default value is **dcc-all**.
Valid Addresses: **dcc-{m1,m2,all}**

The far-end communication output report appears as follows:

```
/* Far End Communication Configuration Report
```

```
=====
DCC      Communications      DCC
Address                                     NS/US
=====
dcc-m1      enabled          us
dcc-m2      disabled         ns
```

```
*/
```

The output parameters for this report are:

DCC Address This column displays the address of a DCC.

Communication This column shows whether communication over the DCC is enabled or disabled.

DCC NS/US

DCC user side/network side (NS/US) parameter settings are available with the BBG8 controller to identify the setting of each end of the DCC in the Network Element. This identification is needed for OSI communications and is required for all nodes in the subnetwork. To avoid alarms, only one end of a span may be designated as the user side and only one end of a span may be designated as the network side.

RELATED COMMANDS

rtrv-map-neighbor

rtrv-map-network

set-fecom

NAME

rtrv-hsty: Retrieve History

INPUT FORMAT

rtrv-hsty;

DESCRIPTION

This command displays an event-history report. This report contains a list of the most recent system events. This report will contain up to 500 events. The events are listed in last-in, first-out order and are date- and time-stamped.

⇒ NOTE:

Due to the large number of conditions reported, the RTRV-HSTY report pages have been located at the end of this section for easier reference. Please refer to the RTRV-HSTY table (Table 11-4) for a complete description of report outputs.

RELATED COMMANDS

rtrv-alm

NAME

rtrv-lgn: Retrieve Login

INPUT FORMAT

rtrv-lgn;

DESCRIPTION

This command retrieves login authorization information. This report lists each user's login and privileges. The report does not contain passwords.

⇒ NOTE:

This command is available to privileged users only.

The output report appears as follows:

```
/* Login Provisioning Report
```

```
=====
Login      User Type
=====
name       privileged
name       privileged
name       privileged
-----
name       general
.          .
.          .
-----
name       maintenance
.          .
.          .
-----
name       reports-only
.          .
.          .
*/
```

The output parameters are:

Login This column lists the login names.

User Type This column indicates the type of authorization each user is assigned. The valid values are **privileged**, **general**, **maintenance**, and **reports-only**.

Privileged logins are listed first in the report, followed by general logins, maintenance logins, and then reports-only logins. Each category of logins

is separated by a row of hyphens.

 NOTE:

There are always three (and only three) privileged logins on the DDM-2000 system.

RELATED COMMANDS

set-lgn

set-secu

rtrv-secu

NAME

rtrv-link: Retrieve CIT Link Configuration

INPUT FORMAT

rtrv-link;

DESCRIPTION

This command displays the currently-provisioned parameters for the user's craft interface link, as set by the **set-link** command. This includes the link which the user is logged into, the baud rate, and the page length of reports.

In FiberReach, the baud rate is set by autobaud and is not a provisionable parameter.

The output report appears as follows:

```
/* Interface Link Configuration Report
=====
Link=link, PageLength (pg)=pg, Baud=baud (auto)
*/
```

The output parameters are:

Link Link identifies the CIT link from which the command was executed and may have the following values:

cit-1 This indicates the front-access port.

dcc-x A SONET DCC port used for remote access (**dcc-m**).

PageLength This is the number of lines displayed in one page of a report. Reports with a number of lines greater than one page will be paged.

Baud Baud identifies the data rate for this link. The CIT data rate is automatically set to agree with the terminal or workstation connected to the link. The (auto) after the data rate indicates that the data rate is set by the autobaud routine on the SYSCTL circuit pack. After connecting to the CIT port, press <enter><enter> or <CR><CR> (double carriage return) or "AA" or "aa" to allow the system to automatically set its baud rate to the rate of the terminal or workstation attached to the port.

RELATED COMMANDS

set-link

rtrv-ne

NAME

rtrv-map-neighbor: Retrieve Neighbor Map

INPUT FORMAT

rtrv-map-neighbor;

DESCRIPTION

This command displays Network Elements (NEs) that can be accessed by the local NE, and its immediate DCC neighbors.

The output report appears as follows:

```
/* Neighbor Map for local_system
=====
System Name      Connected   Link
(TID)            Through    Comm.
=====          =====
local_system
Site7NE1         main-1      FiberReach
Site3NE1         main-2      DDM-2000 OC-3
*/              FiberReach
```

The above report contains one line for each neighbor system with which the local system is communicating via SONET section DCC. The local system name is listed first in the report.

⇒ NOTE:

If the local system is connected through a local area network (LAN) to a remote NE, the Neighbor Map report will not show the remote (LAN-connected) NE.

If multiple DSNEs are accidentally provisioned in a subnetwork, a warning message is displayed followed by the Neighbor Map report, which may display inaccurate information (for example, if this command is executed from a DSNE node, another DSNE and a NE might be listed as neighbors. If this command is executed from a non-DSNE node, a DSNE and another non-DSNE node might be listed as neighbor to the local system). In these events, the user must always check the **rtrv-alm** and **rtrv-map-network** reports for more details. In such cases, the output report might appear as follows.

```
/* Neighbor Map for local_system
```

```
=====
System Name      Connected   Link
(TID)            Through    Comm.
                  Status    Product
=====
```

```
-----
WARNING! The information displayed may be incomplete. Check
Rtrv-Alm report for further details.
-----
```

```
local_system
Site7NE1      main-1      FiberReach
Site3NE1      main-2      DDM-2000 OC-3
*/
FiberReach
```

The multiple DSNE situation is transparent in the above report (because the *NE Type* is not listed) and would have already created an alarm event. To recover from the above condition, the user must reprovision the incorrect DSNE as a non-DSNE, reset it, and obtain the **Network Map** report, which shows the *NE_Types* of NEs listed in the report. Furthermore the user is reminded that if at a certain NE, the multiple DSNE situation is not detected, the warning message will not be displayed and the report will show that there is only a single DSNE. To avoid confusing situations, the user is encouraged to *always* check the **rtrv-alm** report.

In the event no DSNE is provisioned for a subnetwork or because of a DCC failure, none of the NEs in the subnetwork can be identified as a DSNE, and the Neighbor Map report appears as follows:

```
/* Neighbor Map for local_system
```

```
=====
System Name      Connected   Link
(TID)            Through    Comm.
                  Status    Product
=====
```

```
Notice: No DSNE can be identified; local system is displayed.
```

```
local_system
*/
FiberReach
```

The above situation must have already created an alarm event in the **rtrv-alm** report.

The following sample report will be displayed for an NE that has a duplicate Site/NE parameter setting (the DSNE did not register the NE that it considered duplicate):

```

/* Neighbor Map for local_system
=====
System Name          Connected   Link
(TID)                Through    Comm.   Product
                               Status   Type
=====
-----
WARNING! The information displayed may be inaccurate.  Check
          Rtrv-Alm report for further details.
-----

Notice: No DSNE can be identified; local system is displayed.

local_system                      FiberReach
*/

```

If the user were to run the rtrv-map-neighbor report from a certain node in a subnetwork after a DCC link failure condition, the local node's neighbor map report will not show the node at the other end of the failed DCC link.

The user is always encouraged to check the **rtrv-alm** report.

The output report parameters are:

System Name	This column contains the system name (or TID) of the local NE's direct DCC neighbors.
Connected Through	This column indicates the address of the OC-1 lines through which the local system is connected to the system identified in the System Name column.
Link Comm. Status	This column contains the word FAILED if there is a communication failure with the system identified in first line, first column of the report. If communication with the system identified as local NE is good, it is illustrated by a blank in this column.

Product Type

Product Type identifies the members of the AT&T 2000 Product Family that could be listed in this report. In larger subnetworks, various product families will interwork. The AT&T 2000 Product Family product types capable of interworking are listed after Table 11-1.

⇒ NOTE 1:

The **rtrv-map-neighbor** report may be incomplete if there are network elements with the same TBOS or Site/NE parameter settings. These duplicate parameter settings will cause an alarm to be raised. Refer to the TOP section for additional information.

⇒ NOTE 2:

Any time local network element is unable to recognize its neighbor's TID, the neighbor map report will indicate this by showing a "?" under the TID column. Also, if the rest of the information (Connected Through, Link Comm. Status, and Product Type) is not known, each corresponding field or column will display a "?".

RELATED COMMANDS

rtrv-fecom

rtrv-map-network

rtrv-ne

set-fecom

set-ne

NAME

rtrv-map-network: Retrieve Network Map

INPUT FORMAT

rtrv-map-network;

DESCRIPTION

This command causes the display of all network elements (NEs) that are registered in the DSNE and can be accessed through DCC by the local NE.

The output report appears as follows:

```

/* Network Map for local-system
=====
System Name      Comm.   Product      NE      Alarm
(TID)            Status  Type          Type    Group
=====
Site4NE1          FAILED  DACS IV-2000      56
Site3NE1          DDM-2000 OC-12    56
local_system      FiberReach        3
Site5NE1          FiberReach        201
Site6NE1          FiberReach        201
Site8NE1          FiberReach        201
Site9NE1          FiberReach        250
Site10NE1         FiberReach        250
Site11NE          FiberReach        250
Site7NE1          FT-2000          DSNE    3
*/

```

The above report contains one line for each system with which the local system is communicating via the SONET section DCC. The local system name is listed first in the report.

If multiple DSNEs are accidentally provisioned for a subnetwork, a warning message is displayed followed by the Network Map report, which may display inaccurate information (for example, if this command is executed from a DSNE node, multiple DSNEs and other NEs of the same subnetwork are listed).

If this command is executed from a non-DSNE node, only one DSNE may be listed, along with non-DSNE nodes). If these events occur, the user must always check the **rtrv-alm** report.

The output report may appear as follows:

```

/* Network Map for local-system
=====
System Name      Comm.   Product      NE      Alarm
(TID)            Status  Type         Type     Group
=====
-----
WARNING! The information displayed may be incomplete. Check
         Rtrv-Alm report for further details.
-----
Site4NE1          FAILED  DACS IV-2000              3
Site3NE1              DDM-2000 OC-12            3
Site6NE1              DDM-2000 OC-12          201
local_system        FiberReach                3
Site8NE1              FiberReach              201
Site9NE1              FiberReach              250
Site10NE1             FiberReach              250
Site11NE             FiberReach              250
Site5NE1              FT-2000                 DSNE    201
Site7NE1              FT-2000                 DSNE     3
*/

```

The above situation would have already created the "Duplicate DSNE" alarm event. To recover from the above (multiple DSNE) condition, the user must reprovision the incorrect DSNE as a non-DSNE and reset it. Furthermore the user is reminded that if at a certain NE the multiple DSNE situation is not detected, the warning message will not be displayed and the report will show that there is only a single DSNE. Again, to avoid confusing situations, the user is encouraged to *always* check the **rtrv-alm** report.

In the event no DSNE is provisioned for a subnetwork or (because of a DCC failure) none of the NEs in the subnetwork can be identified as a DSNE, the Network Map report appears as follows:

```

/* Network Map for local-system
=====
System Name      Comm.  Product      NE      Alarm
(TID)           Status Type         Type    Group
=====
Notice: No DSNE can be identified; local system is displayed.

local_system          FiberReach          3
*/

```

The above situation will have already created a corresponding alarm event. Check the **rtrv-alm** report.

The following sample report might be displayed for an NE that has a duplicate Site/NE parameter setting (the DSNE did not register the NE that it considered duplicate):

```

/* Network Map for local-system
=====
System Name      Comm.  Product      NE      Alarm
(TID)           Status Type         Type    Group
=====
-----
WARNING! The information displayed may be inaccurate. Check
        Rtrv-Alm report for further details.
-----
Notice: No DSNE can be identified; local system is displayed.

local_system          FiberReach          3
*/

```


The output report parameters are:

System Name	This column contains the system name (or TID) of the local and other systems in the subnetwork.
Communication Status	This column contains the word FAILED if there is a communication failure with the system identified in the first line, first column of the report. If communication with the system identified as local NE is good, it is illustrated by a blank in this column.
Product Type	Product Type identifies the members of the AT&T 2000 Product Family that could be listed in this report. In larger subnetworks, various product families will interwork. The 2000 Product Family product types capable of interworking are listed after Table 11-1.
NE Type	The possible value for this parameter is: DSNE Specified for the NE designated by the user as the Directory Services Network Element.
Alarm Group	Alarm Group is a set of NEs grouped together. Their alarms are reported through an NE [known as an alarm gateway network element (AGNE)] which is a member of the same Alarm Group. Valid values are 1 to 255. This parameter can have the value of "0", indicating that the corresponding NE belongs to no Alarm Group.

⇒ **NOTE 1:**

The **rtrv-map-network** report may be incomplete if there are network elements with the same TBOS parameter settings. These duplicate parameter settings will cause an alarm to be raised. Refer to the TOP section for additional information.

⇒ **NOTE 2:**

Any time the local NE is unable to recognize a TID, the network map report will indicate this by showing a "?" under the TID column; also if the rest of the information is not known, each corresponding field or column will display a "?."

RELATED COMMANDS

rtrv-fecom

rtrv-map-neighbor

rtrv-ne

set-fecom

set-ne

NAME

rtrv-ne: Retrieve Network Element

INPUT FORMAT

rtrv-ne;

DESCRIPTION

This command displays the information that is provisioned by the **set-ne** command and set by switches on the SYSCTL pack. It also displays TIDs of the network elements currently provisioned to be alarm gateway network elements (AGNEs) and the directory services network element (DSNE) serving this local NE.

The output report appears as follows:

```
/* System Provisioning Report
=====
TID=system_name
Alarm Group=number
AGNE=yes/no
AGNE Address=TID1
AGNE Address=TID2 ****entry if more AGNEs exist****
DSNE=yes/no
DSNE Address=TID
Site=number
NE=number
IDLE=ais/unequipped
CO/RT Selector=location
TBOS: Address=number
      Link=setting (Link Active only if Selector = CO)
      Remote Reporting=setting
Product=value (hw)
*/
```

The output parameters are:

TID This is the system name, indicated by a string of up to 20 alphanumeric characters. The default value for TID is that set by the site and NE values and is a string of the form "Site~~m~~NE~~n~~". The TID must be unique for each element in a subnetwork.

Alarm Group	Alarm Group is used to identify all Network Elements that should be sharing NE Status, Alarm information and telemetry information with each other. For small networks of similar NEs, all NEs might be in the same Alarm Group. For larger applications such as DDM-2000 with FiberReach rings, one Alarm Group might be assigned to DDM-2000 shelves and one or more different Alarm Groups might be assigned for FiberReach.
AGNE	AGNE indicates whether this system is an alarm gateway network element (AGNE) that provides the NE alarm status communications for all NEs in this Alarm Group. It has a value of yes or no.
AGNE Address	The AGNE Address is the Target Identifier (TID) of the AGNE for this Alarm Group. It can be the TID of this NE or any other NE in the Alarm Group. More than one NE can be an AGNE for backup reasons. If more than one AGNE exists for this Alarm Group, it is also listed here. AGNE Addresses for NEs in other Alarm Groups are not listed here. If an AGNE is not defined, this parameter is left blank.
GNE	The GNE field is used to identify whether this system is the gateway network element (GNE), providing TL1 interface. It has a value of either active or not active.
DSNE	The DSNE is used to identify whether this system is the Directory Services Network Element. There should be one and only one DSNE provisioned for a network. In mixed product networks refer to the User Service Manual for further instructions on DSNE provisioning.
DSNE Address	The DSNE Address is the Target identifier (TID) of the DSNE. It can be the TID of this NE or any other NE in the subnetwork. If a DSNE is not defined, this parameter is left blank.
Site	Site is the site address. The value is 1 through 64 (1-64).
NE	NE is the network element address (1-5).
IDLE	If value is ais, the system will insert an Alarm Indication Signal toward the SONET line when channels are not cross-connected or not equipped with path terminating equipment. If value is unequipped, the system will insert the Unequipped signal toward the SONET line when channels are not cross-connected or not equipped with path terminating equipment.

CO/RT Selector

Two types of TBOS displays are provided to support central office and remote terminal applications. The CO/RT Selector identifies either a central office (CO) shelf or a remote terminal (RT) shelf to control the TBOS display formats and operation of the miscellaneous discrete points and fan control relays.

TBOS:

Address Address specifies the TBOS display address (1-8). This number identifies the TBOS display associated with a shelf and determines the TBOS poll to which a DDM-2000 will respond.

Link When multiple CO DDM-2000s are connected to the same TBOS link, this parameter is used to provision a backup function. The TBOS backup function assures that each DDM-2000 on the TBOS link is polled for its TBOS display even if one or more of the DDM-2000s fails to respond to the telemetry remote when polled. Link may be set to the following values:

- normal** The DDM-2000 has a TBOS link, but does not provide any backup functions. Of the four shelves connected to the TBOS link, only one may be set to primary and only one may be set to secondary. The remaining two should be set to normal.
- primary** The DDM-2000 serving as the primary TBOS backup will respond for any other DDM-2000 on the same TBOS link if the polled DDM-2000 fails to respond to the telemetry remote poll within 50 msec. The primary backup DDM-2000 will respond for the nonresponsive DDM-2000 by reporting TBOS point 59 (communications failure) and reporting all other TBOS points polled in the display as clear.
- secondary** The DDM-2000 serving as the secondary TBOS backup responds the same as the primary TBOS backup, except the secondary backup does not respond to polls for other DDM-2000s until about 100 msec after the poll is received. If after 100 msec neither the polled DDM-2000 or the primary backup DDM-2000 has

responded to the telemetry remote poll, the secondary TBOS backup DDM-2000 will respond for the nonresponsive DDM-2000.

no TBOS link

No TBOS interface is directly connected to the shelf.

TBOS Remote Reporting

This parameter has the possible values of enabled and disabled. When the TBOS remote reporting is set to enabled, the shelf will report all its status and alarm conditions to other shelves via the SONET DCC. When the TBOS remote reporting is set to disabled, the shelf will not report its status and alarm conditions to other shelves. The disabled option is used when there are more than 8 DDM-2000 shelves in a SONET network.

Product

Product is a keyword that is set by switches on the BBG8 SYSCTL and the value of the SHELFID pin (DDM shelf or ARM shelf) of the backplane to identify the product to be supported.

DDM-2000 OC-3

The shelf is part of a DDM-2000 network. The software also checked for the OHCTL and determined that the product is OC-3 (BBG9 or BBG10).

DDM-2000 OC-12

The shelf is part of a DDM-2000 network. The software also checked for the OHCTL and determined that the product is OC-12 (BCP4).

SLC-2000 ARM

The shelf is part of a SLC-2000 ARM network. The software also checked for the OHCTL and determined that the product is OC-3 (BBG9 or BBG10).

DDM-2000 FiberReach

The shelf is part of a FiberReach network. The OHCTL is not a part of the shelf.

RELATED COMMANDS

rtrv-map-network

set-ne

NAME

rtrv-oc1: Retrieve OC1

INPUT FORMAT

rtrv-oc1[:*Address*];

DESCRIPTION

This command displays the configuration of OC-1 line(s), as set by the set-oc1 command.

The input parameter is as follows:

Address Address identifies the OC-1 line(s). The default is **all**.
Valid OC-1 Addresses: **all, main-{1,2,all}**

For Release 2.0 and earlier, the output report appears as follows:

```
/* OC-1 Line Provisioning Report
=====
Line      Signal Degrade
Address   Threshold
=====
address    n
address    n
*/
```

For Release 2.1 and later, the output report appears as follows:

```
/* OC-1 Line Provisioning Report
=====
Line      Signal Degrade   AIS
Address   Threshold   Alarm
=====
address    n           alm
address    n           alm
*/
```


The output parameters are:

Line Address Address of the OC-1 line.

Signal Degrade Threshold

This is the bit error rate (BER) threshold shown as a logarithm to the base 10. The value of n is an integer with a range of -5 through -9 corresponding to BERs of 10^{-5} through 10^{-9} , respectively.

RELATED COMMANDS

set-oc1

NAME

rtrv-oc3: Retrieve OC3

INPUT FORMAT

rtrv-oc3[:*Address*];

DESCRIPTION

This command displays the configuration of OC-3 lines, as set by the **set-oc3** command.

This command is available with FiberReach Release 2.2 and later releases, using the 28-type OLIU circuit pack.

The input parameter is as follows:

Address Address identifies the OC-3 line(s). The default is **all**.
If the shelf is equipped with 28-type OLIUs in Main unit slots
(starting with FiberReach Release 2.2), valid addresses are:
main-{1,2,all}

For FiberReach Release 2.2 (or any FiberReach shelf equipped with OC-3 OLIUs in Main unit slots), the output report appears as follows:

```
/* OC-3 Line Provisioning Report
```

Line Address	Signal Degrade Threshold	Sync Message	AIS Alarm
<i>address</i>	<i>n</i>	<i>message</i>	<i>alm</i>
<i>address</i>	<i>n</i>	<i>message</i>	<i>alm</i>
.	.	.	.
*/	.	.	.

The output parameters are:

Line Address	Address of the OC-3 line.
Signal Degrade Threshold	This is the bit error rate (BER) threshold shown as a logarithm to the base 10. The value of n is an integer with a range of -5 through -9 corresponding to BERs of 10^{-5} through 10^{-9} , respectively.
Sync Message	This parameter indicates the type of synchronization messaging that has been provisioned for that OC-3 optical interface by the set-oc3 command. The valid values for this parameter are Kbyte (default value), Sbyte, and disabled. The sync messages use the K2 byte or the S1 byte in the SONET line overhead to determine synchronization quality.
AIS Alarm	This parameter specifies the alarm level of a non-service-affecting OC-3 line AIS failure condition. The valid values are: cr Critical alarm mj Major alarm mn Minor alarm na Not alarmed, but reported (default).

RELATED COMMANDS

rtrv-sync

set-oc3

NAME

rtrv-passwd: Retrieve Passwords

INPUT FORMAT

rtrv-passwd;

DESCRIPTION

This command displays the logins, passwords (in encrypted form), and user type for all logins in the system. This command should *only* be used to back up this information to an external workstation.

Additional workstation software and the **rstr-passwd** command will be used to re-create this information on the network element when a new controller is installed.

⇒ NOTE:

This command is available to privileged users only.

The output report appears as follows:

```
/* Password Provisioning Report
=====
Login : Password : User Type :
=====
ATT01:08:sdfsdt-g:privileged:
ATT02:08:67&&8#1g:privileged:
ATT03:08:57s&8#1g:privileged:
DDM-2000:07:kds5:-:general:
george:09:RVoc6*bQ1:maintenance:
pete:08:RTnu8*bB:reports-only:
*/
```

The output parameters are:

Login	The login name established by the security administrator.
Password	The length and current encrypted password selected by the user of the login.
User Type	The access class assigned to this login by the security administrator.

RELATED COMMANDS

rstr-passwd

rtrv-lgn

set-lgn

set-passwd

NAME

rtrv-pm-line: Retrieve Performance Monitoring Line

INPUT FORMAT

rtrv-pm-line:*Address*;

DESCRIPTION

This command displays performance-monitoring data associated with the OC-1 or OC-3 lines terminated on the system.

⇒ NOTE:

If Main slots 1 and 2 are equipped with different pack types (for example, during an upgrade), the output report for this command will include data for what is considered at the time as the valid system pack type.

The input parameters are:

Address Address of the OC-1 lines.

Valid OC-1 Line Addresses: **all, main-{1,2,all}**

When the shelf is equipped with 28-type OLIUs in Main (available in Release 2.2 and later), valid OC-3 Line Addresses are:

all, main-{1,2,all}

The output report appears as follows:

```

/* Line Performance Monitoring Status Report
   Last initialized:  day registers at yy-mm-dd hh:mm:ss
                     quarter hour registers at yy-mm-dd hh:mm:ss
=====
Address  Start   B2 CV   B2 ES   B2 ES   B2 ES   B2 SES   B2 UAS
         Time                                Type A   Type B
=====
address  time    nn...  nn...  nn...  nn...  nn...  nn...
.        .      .      .      .      .      .      .
.        .      .      .      .      .      .      .
-----
address  time    nn...  nn...  nn...  nn...  nn...  nn...
.        .      .      .      .      .      .      .
.        .      .      .      .      .      .      .
*/

```

The output parameters are:

Address	This column shows the address of the monitored signal.
Start Time	This column indicates the time on the system clock when the data collection started.
B2 CV	This parameter shows the number of coding violations for the data collection interval that started at the time reported in the previous column.
B2 ES	This parameter shows the number of errored seconds in the data collection interval.
B2 SES	This parameter shows the number of severely errored seconds. An OC-1 severely errored second contains 12 or more errors.
B2 ESA	This parameter shows the number of Type A errored seconds in the data collection interval. A Type A errored second is a second with a single error.
B2 ESB	This parameter shows the number of Type B errored seconds in the data collection interval. A Type B errored second is a second with more than one error but less than the number of errors in a severely errored second.
B2 UAS	This parameter shows the number of unavailable seconds.

⇒ NOTE:

Rows that are all zeros are not printed, except for the current day and current quarter, which are always printed.

A greater-than symbol (>) following a count indicates that the register has overflowed and that the indicated count is the register maximum.

A hyphen (-) indicates that the count for that parameter is not available due to a trouble condition.

A blank indicates that the report field does not apply.

A question mark (?) following a count indicates that the count includes data for less than the full counting interval. This may occur if a **reset** or **set-date** command is entered into the system or if the OLIU circuit pack is inserted or removed. If the count is both overflowed and incomplete, only the greater-than symbol (>) appears.

An asterisk (*) following a count for a parameter indicates that a threshold crossing has occurred for that parameter.

RELATED COMMANDS

init-pm

rtrv-pm-sect

rtrv-pm-tca

rtrv-pmthres-line

set-pmthres-line

NAME

rtrv-pm-sect: Retrieve Performance Monitoring Section

INPUT FORMAT

rtrv-pm-sect:*Address*;

DESCRIPTION

This command displays performance-monitoring data associated with the OC-3 (if the shelf is equipped with 28-type OLIUs in Main unit slots), STS-1, and STS-3 (within an OC-3 line, if the shelf is equipped with 28-type OLIUs in Main unit slots) section. The 28-type OLIU is available with FiberReach 2.2 and later releases.

⇒ NOTE:

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), the report will include data for what is considered at the time as the valid system pack type.

The input parameter is:

Address Address of the OC-1 or OC-3 line. The address **all** may be used to retrieve all performance-monitoring information.
Valid OC-1 Line Addresses: **main-{1,2,all}**

If the shelf is equipped with 26-type OLIUs in Main unit slots, valid OC-1 line addresses are: **main-{1,2,all}**

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), valid OC-3 line addresses are: **main-{1,2,all}**

The output report appears as follows:

```

/* Section Performance Monitoring Status Report
   Last initialized:  day registers at yy-mm-dd hh:mm:ss
                     quarter hour registers at yy-mm-dd hh:mm:ss
=====
Address  Start   SEFS
        Time
=====
address  time    aaa
.        .      .
.        .      .
-----
address  time    aaa
.        .      .
.        .      .
*/

```

The output parameters are:

Address	This indicates the address of the OC-1 line.
Start Time	This indicates the time on the system clock when the data collection started.
SEFS	This column displays the number of severely errored frame seconds.

⇒ NOTE:

Rows that are all zeros or "no's" are not printed except for current day and current quarter hour, which are always printed.

A greater-than symbol (>) following a count indicates that the register has overflowed and that the indicated count is the register maximum.

A hyphen (-) indicates that the count for that parameter is not available due to a trouble condition or the parameter is not applicable for current equipage.

A blank indicates that the report field does not apply.

A question mark (?) following a count indicates that the count includes data for less than the full counting interval. This may occur if a **reset** or **set-date** command is entered into the system or if the OLIU circuit pack is inserted or removed. If the count is both overflowed and incomplete, only the greater-than symbol (>) appears.

An asterisk (*) following a count for a parameter indicates that a threshold crossing has occurred for that parameter.

RELATED COMMANDS

init-pm

rtrv-pm-line

rtrv-pm-tca

rtrv-pmthres-sect

set-pmthres-sect

NAME

rtrv-pm-sts1: Retrieve Performance Monitoring STS-1

INPUT FORMAT

rtrv-pm-sts1:*Address*;

DESCRIPTION

This command reports path performance-monitoring data associated with STS-1 signals terminating on the network element. For all VT1.5 cross-connections, there is an STS-1 path that is terminated. For OC-1 and OC-3 ring applications, data is collected on *both* STS-1 ring paths and both paths are reported.

The input parameter is:

Address This parameter identifies the address of STS-1 channels. It is the address of the incoming STS-1 signal before it is cross-connected.

Valid Addresses: **all, m{1,2}-1**

If the shelf is equipped with 26-type OLIUs in Main unit slots, valid addresses are:

all, m{1,2}-1

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), valid addresses are:

all, m{1,2}-{1-3}

The output report appears as follows:

```

/* STS-1 Path Performance Monitoring Status Report
   Last initialized: day registers at yy-mm-dd hh:mm:ss
                   quarter hour registers at yy-mm-dd hh:mm:ss
=====
Address  Start   B3 CV   B3 ES   B3 ES   B3 ES   B3 SES  B3 UAS
        Time                                Type A  Type B
=====
address  time    nn...  nn...  nn...  nn...  nn...  nn...
:        :      :      :      :      :      :      :
:        :      :      :      :      :      :      :
-----
address  time    nn...  nn...  nn...  nn...  nn...  nn...
:        :      :      :      :      :      :      :
:        :      :      :      :      :      :      :
*/

```

The output parameters are:

Address	This column shows the address of the monitored signal.
Start Time	This column indicates the time on the system clock when the data collection started.
B3 CV	This column shows the number of coding violations.
B3 ES	This column shows the number of errored seconds.
B3 ES Type A	This column shows the number of Type A errored seconds. A Type A errored second is a second with a single error.
B3 ES Type B	This column shows the number of Type B errored seconds. A Type B errored second is a second with more than one error but less than the number of errors in a severely errored second.
B3 SES	This column shows the number of severely errored seconds. A severely errored second contains 9 or more errors.
B3 UAS	This column shows the number of unavailable seconds of service. A count of unavailable seconds begins after 10 consecutive severely errored seconds has occurred.

 NOTE:

Rows that are all zeros are not printed except for current day and current quarter hour, which are always printed.

A greater-than symbol (>) following a count indicates that the register has overflowed and that the indicated count is the register maximum.

A hyphen (-) indicates that the count for that parameter is not available due to a trouble condition.

A blank indicates that the report field does not apply.

A question mark (?) following a count indicates that the count includes data for less than the full counting interval. This may occur if a **reset** or **set-date** command is entered into the system or if the DS3, EC1, OLIU circuit pack is inserted or removed. If the count is both overflowed and incomplete, only the greater-than symbol (>) appears.

An asterisk (*) following a count for a parameter indicates that a threshold crossing has occurred for that parameter.

RELATED COMMANDS

init-pm

rtrv-pm-tca

rtrv-pmthres-sts1

set-pmthres-sts1

NAME

rtrv-pm-t1: Retrieve Performance Monitoring T1

INPUT FORMAT

rtrv-pm-t1:*Address*;

DESCRIPTION

This command displays the parameter data associated with one or more DS1 signals passing through the system and is available only if the DS1 performance monitoring feature is set via the **set-feat** command.

In OC-1 Release 2.1 and later releases, quarter-hour registers will be available for DS1 PM, in addition to daily registers.

The input parameter is:

Address

Address is the address of DS1 or T1 ports.

Valid Addresses (1x1 protected systems):

all, {a,b,c,d}-1-{1-4,all}

Valid Addresses (1x7 protected systems): **all,**

{a,b,c}-{1,2}-{1-4,all}

d-1-{1-4,all}

The BBF6 circuit pack supports 2 T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid. Specifying **all** selects ports 1 and 2 only.

The output report appears as follows:

/* DS1 Path Performance Monitoring Status Report						
Last initialized: day registers at yy-mm-dd hh:mm:ss						
Address	Start Time	ES-L	CV-P CV-PFE	ES-P ES-PFE	SES-P SES-PFE	UAS-P UAS-PFE
address	time	n	n	n	n	n
address	time	n	n	n	n	n
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.

The output parameters are:

Address	This shows the address of the DS1 or T1 signal.
Start Time	This indicates the time on the system clock when the data collection started.
ES-L	This indicates the number of errored second line (ES-L) counts during the data collection interval that started at the time reported in the second column.
CV-P	This indicates the number of path coding violations (CV-P) during the data collection interval that started at the time reported in the second column.
ES-P	This indicates the number of errored second path (ES-P) counts during the data collection interval that started at the time reported in the second column.
SES-P	This indicates the number of severely errored second path (SES-P) counts during the data collection interval that started at the time reported in the second column.
UAS-P	This indicates the number of unavailable second path (UAS-P) counts during the data collection interval that started at the time reported in the second column.
CV-PFE	This indicates the number of far-end path coding violations (CV-PFE) during the data collection interval that started at the time reported in the second column.
ES-PFE	This indicates the number of errored second path far-end (ES-PFE) counts during the the data collection interval that started at the time reported in the second column.
SES-PFE	This indicates the number of severely errored second path far-end (SES-PFE) counts during the data collection interval that started at the time reported in the second column.

UAS - PFE This indicates the number of unavailable second path far-end (UAS-PFE) counts during the data collection interval that started at the time reported in the second column.

⇒ NOTE 1:

There are two rows of output for each address. The first row reports ES-L and near-end parameters. The second row reports far-end parameters.

⇒ NOTE 2:

Rows that are all zeros are not printed except for current day, which is always printed.

⇒ NOTE 3:

In FiberReach Release 2.1 and later, rows that are all zeros are not printed except for current quarter-hour and current day, which are always printed. Any rows containing partial counts will always be printed as well.

A greater-than symbol (>) following a count indicates that the register has overflowed and that the indicated count is the register maximum.

A hyphen (-) indicates that the count for that parameter is not available due to a trouble condition.

A blank indicates that the report field does not apply.

A question mark (?) following a count indicates that the count includes data for less than the full counting interval. This may occur if a **reset** or **set-date** command is entered into the system or if the DS1 or T1EXT circuit pack is inserted or removed. If the count is both overflowed and incomplete, only the greater-than symbol (>) appears.

An asterisk (*) following a count for a parameter indicates that a threshold crossing has occurred for that parameter.

This command may only be used if the `ds1pm` feature is enabled via the **set-feat** command. If this feature is not enabled, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available, feature disabled */
```

If this command is entered on a DDM-2000 loaded with a release of software that does not currently support this feature, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available in this release */
```

RELATED COMMANDS

`init-pm`

`rtrv-feat`

`rtrv-pmthres-vt1`

`set-feat`

NAME

rtrv-pm-tca: Retrieve Performance Monitoring TCA

INPUT FORMAT

rtrv-pm-tca;

DESCRIPTION

This command displays the number of threshold crossing alerts (TCAs) associated with signals terminating in or passing through the system. A TCA occurs when a performance-monitoring counter exceeds a user-selected threshold.

⇒ NOTE:

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), the output report for this command will include data for what is considered at the time as the valid system pack type.

The output report appears as follows:

```
/* TCA Performance Monitoring Summary Report
```

```
=====
```

Address	Section	Line	STS-1 Path

```
=====
```

<i>address</i>	<i>n</i>	<i>n</i>	
<i>address</i>	<i>n</i>	<i>n</i>	
<i>address</i>			<i>n</i>

If the **ds1pm** feature is enabled (via the **set-feat** command), the following additional lines will appear in the TCA report:

```
=====
DS1      TCA  DS1      TCA  DS1      TCA  DS1      TCA
Address  Count Address  Count Address  Count Address  Count
=====
address  count address  count address  count address  count
:         :         :         :         :         :         :         :
:         :         :         :         :         :         :         :
```

If the **vt1pm** feature is enabled (via the **set-feat** command), the following additional lines will appear in the TCA report:

```
=====
VT1.5    TCA  VT1.5    TCA  VT1.5    TCA  VT1.5    TCA
Address  Count Address  Count Address  Count Address  Count
=====
address  count address  count address  count address  count
:         :         :         :         :         :         :         :
:         :         :         :         :         :         :         :
```

The output report shows the address and type of parameters that are generating TCAs. Blanks in the report indicate that the output parameter does not apply for the specified address.

The output parameters are:

Address	Address of the monitored signal. This can be the address of an OC-1 or OC-3 (with 28-type OLIUs in Main) line, or STS-1 channel.
Section	This shows the total number of TCAs associated with section performance monitoring parameters (severely errored frame seconds).
Line	This shows the total number of TCAs associated with line performance monitoring parameters (B2 CV, B2 ES, B2 ES Type A, B2 ES Type B, B2 SES, B2 UAS, PSC, or PJC).

STS-1 Path	This shows the total number of TCAs associated with STS-1 path performance monitoring parameters (B3 CV, B3 ES, B3 ES Type A, B3 ES Type B, B3 SES, or B3 UAS).
DS1 Address	This column shows the address of the DS1 signal.
VT1.5 Address	This column shows the address of the VT1.5 signal.
TCA Count	This column indicates the total number of TCAs associated with the addressed signal.

RELATED COMMANDS

init-pm

rtrv-pm-line

rtrv-pm-sect

set-pmthres-line

set-pmthres-sect

NAME

rtrv-pm-vt1: Retrieve Performance Monitoring VT1.5

INPUT FORMAT

rtrv-pm-vt1:*Address*;

DESCRIPTION

This command displays the parameter data associated with one or more VT1.5 channels terminating on a DS1, DS1PM, or T1EXT circuit pack. This command is available only if the VT1.5 performance monitoring feature is set via the **set-feat** command.

⇒ NOTE:

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), the output report for this command will include data for what is considered at the time as the valid system pack type.

The input parameter is:

Address Address is the address of VT1.5 channels.

Valid Addresses: **all**, **m-1-{1-7,all}-{1-4,all}**,
{a,b,c,d}-1-{1-4,all} (1x1 protected system)

{a,b,c}-{1,2}-{1-4,all}, **d-1-{1-4,all}**
(1x7 protected system)

m-1-{1-7,all}-{1-4,all}
(For 26-type OLIUs in Main unit slots)

m-{1-3,all}-{1-7,all}-{1-4,all}
(For 28-type OLIUs in Main unit slots, Release 2.2 and later)

The output report appears as follows:

/* VT1.5 Path Performance Monitoring Status Report				
Last initialized: day registers at yy-mm-dd hh:mm:ss				
quarter hour registers at yy-mm-dd hh:mm:ss				
=====				
Address	Start Time	V5 ES	V5 SES	V5 UAS
=====				
address	time	n	n	n
address	time	n	n	n
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

The output parameters are:

Address	This shows the address of the VT1.5 signal.
Start Time	This indicates the time on the system clock when the data collection started.
V5 ES	This indicates the number of VT1.5 errored seconds (ES) during the data collection interval that started at the time reported in the previous column.
V5 SES	This indicates the number of VT1.5 severely errored seconds (SES) during the data collection interval that started at the time reported in the previous column.
V5 UAS	This indicates the number of VT1.5 unavailable seconds (UAS) during the data collection interval that started at the time reported in the previous column.

⇒ NOTE:

Rows that are all zeros are not printed except for current day and current quarter, which are always printed.

A greater-than symbol (>) following a count indicates that the register has overflowed and that the indicated count is the register maximum.

A hyphen (-) indicates that the count for that parameter is not available due to a trouble condition.

A blank indicates that the report field does not apply.

A question mark (?) following a count indicates that the count includes data for less than the full counting interval. This may occur if a **reset** or **set-date** command is entered into the system or if the DS1, DS1PM, or T1EXT circuit pack is inserted or removed or a facility loopback is established. If the count is both overflowed and incomplete, only the greater-than symbol (>) appears.

An asterisk (*) following a count for a parameter indicates that a threshold crossing has occurred for that parameter.

This command may only be used if the `vtpm` feature is enabled via the **set-feat** command. If this feature is not enabled, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available, feature disabled */
```

If this command is entered on a DDM-2000 system loaded with a release of software that does not currently support this feature, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available in this release */
```

RELATED COMMANDS

`init-pm`

`rtrv-pmthres-vt1`

NAME

rtrv-pmthres-line: Retrieve Performance Monitoring Threshold Line

INPUT FORMAT

rtrv-pmthres-line;

DESCRIPTION

This command displays the system's current OC-1 (26-type) and OC-3 (28-type) line performance parameter thresholds, as set by the **set-pmthres-line** command. The 28-type OLIU circuit pack is available with Release 2.2 and later releases.

⇒ NOTE:

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), this report will include data for what is considered at the time as the valid system pack type.

The output report appears as follows:

```

/* Line Performance Monitoring Thresholds Report
=====
Parameter                                Thresholds
                                      Quarter   Day
                                      Hour
=====
B2 Coding Violations OC1 (B2CVOC1)      n         n
B2 Errored Seconds (B2ES)               n         n
B2 Errored Seconds Type A (B2ESA)       n         n
B2 Errored Seconds Type B (B2ESB)       n         n
B2 Severely Errored Seconds (B2SES)     n         n
B2 Unavailable Seconds (B2UAS)          n         n
*/

```

The first column of the report contains the names of the line performance monitoring parameters. The second and third columns contain the quarter hour and day thresholds for each parameter. The output parameters are:

B2 Coding Violations OC1	This parameter displays the threshold values for the B2 coding violation counts for OC-1 lines.
B2 Errored Seconds	This parameter displays the threshold values for the B2ES count.

B2 Errored Seconds Type A	This parameter displays the threshold values for the B2ESA count.
B2 Errored Seconds Type B	This parameter displays the threshold values for the B2ESB count.
B2 Severely Errored Seconds	This parameter displays the threshold values for the B2SES count.
B2 Unavailable Seconds	This parameter displays the threshold values for the B2UAS count.

A parameter threshold of zero indicates that thresholding is disabled.

A negative threshold value indicates that the coding violation threshold is specified in terms of an equivalent bit error ratio (BER) of 10^{-n} .

RELATED COMMANDS

init-pm

rtrv-pm-line

rtrv-pm-tca

set-pmthres-line

NAME

rtrv-pmthres-sect: Retrieve Performance Monitoring Threshold Section

INPUT FORMAT

rtrv-pmthres-sect;

DESCRIPTION

This command displays the system's current section performance parameter thresholds, as set by the **set-pmthres-sect** command.

The output report appears as follows:

```
/* Section Performance Monitoring Thresholds Report
=====
Parameter                                Thresholds
                                      Quarter   Day
                                      Hour
=====
Severely Errored Frame Seconds (SEFS)    n         n
```

The output parameters are:

Severely Errored Frame Seconds

This parameter displays the threshold values for the SEFS count. A parameter threshold of zero indicates that the thresholding is disabled.

RELATED COMMANDS

init-pm

rtrv-pm-sect

rtrv-pm-tca

set-pmthres-sect

NAME

rtrv-pmthres-sts1: Retrieve Performance Monitoring Threshold STS-1

INPUT FORMAT

rtrv-pmthres-sts1;

DESCRIPTION

This command retrieves the system's STS-1 path performance monitoring thresholds, as set by the **set-pmthres-sts1** command.

The output report appears as follows:

```

/* STS-1 Path Performance Monitoring Thresholds Report
=====
Parameter                                Thresholds
                                      Quarter   Day
                                      Hour
=====
B3 Code Violations (B3CV)                n         n
B3 Errored Seconds (B3ES)                n         n
B3 Errored Seconds Type A (B3ESA)        n         n
B3 Errored Seconds Type B (B3ESB)        n         n
B3 Severely Errored Seconds (B3SES)      n         n
B3 Unavailable Seconds (B3UAS)           n         n
*/

```

The first column of the report contains the names of the path performance monitoring parameters. The second and third columns contain the quarter-hour and day thresholds for each parameter. The output parameters are:

Quarter Hour	This column contains the quarter-hour thresholds for each performance monitoring parameter.
Day	This column contains the day thresholds for each performance-monitoring parameter.
B3CV	This parameter shows the threshold for coding violations. A negative threshold value indicates that the coding violation threshold is specified in terms of an equivalent Bit Error Ratio (BER) of 10^n . A threshold of zero indicates that the thresholding is disabled.
B3ES	This parameter shows the threshold for errored seconds.
B3ESA	This parameter shows the threshold for type A errored seconds.

B3ESB	This parameter shows the threshold for type B errored seconds.
B3SES	This parameter shows the threshold for the number of severely errored seconds.
B3UAS	This parameter shows the threshold for unavailable seconds of service.

RELATED COMMANDS

init-pm

set-pmthres-sts1

rtrv-pm-sts1

rtrv-pm-tca

NAME

rtrv-pmthres-t1: Retrieve Performance Monitoring Threshold T1

INPUT FORMAT

rtrv-pmthres-t1;

DESCRIPTION

This command displays the current DS1 path and line performance parameter thresholds set for a shelf by the **set-pmthres-t1** command, and it is available only if the DS1 performance monitoring feature is set via the **set-feat** command.

For FiberReach Release 2.0 and earlier, the output report appears as follows:

```
/* DS1 Path Performance Monitoring Thresholds Report
```

```
=====
Parameter                                Thresholds
                                      Day
=====
```

```
Errorred Seconds-Line (ESL)                n
Code Violations-Path SF (CVPSF)            n
Code Violations-Path ESF (CVPESF)          n
Errorred Seconds-Path (ESP)                 n
Severely Errorred Seconds-Path (SESP)       n
Unavailable Seconds-Path (UASP)             n
Code Violations-Path Far End (CVPFE)        n
Errorred Seconds-Path Far End (ESPFE)       n
Severely Errorred Seconds-Path Far End (SESPFE) n
Unavailable Seconds-Path Far End (UASPFE)   n
*/
```

For FiberReach Release 2.1 and later, the output report appears as follows:

/* DS1 Path Performance Monitoring Thresholds Report		
Parameter	Thresholds	
	Quarter Hour	Day
Errored Seconds-Line (ESL)	<i>n</i>	<i>n</i>
Code Violations-Path SF (CVPSF)	<i>n</i>	<i>n</i>
Code Violations-Path ESF (CVPEsf)	<i>n</i>	<i>n</i>
Errored Seconds-Path (ESP)	<i>n</i>	<i>n</i>
Severely Errored Seconds-Path (SESP)	<i>n</i>	<i>n</i>
Unavailable Seconds-Path (UASP)	<i>n</i>	<i>n</i>
Code Violations-Path Far End (CVPFE)	<i>n</i>	<i>n</i>
Errored Seconds-Path Far End (ESPFE)	<i>n</i>	<i>n</i>
Severely Errored Seconds-Path Far End (SESPFE)	<i>n</i>	<i>n</i>
Unavailable Seconds-Path Far End (UASPFE)	<i>n</i>	<i>n</i>
*/		

The output parameters are:

Errored Seconds-Line This parameter shows the daily threshold for DS1 line errored seconds. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value.

Code Violations-Path SF
This parameter shows the daily threshold for DS1 path code violations for SF encoded paths. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value. A negative threshold value indicates that the coding violation threshold is specified in terms of an equivalent bit error ratio (BER) of 10^n .

Code Violations-Path ESF
This parameter shows the daily threshold for DS1 path code violations for ESF encoded paths. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value. A negative threshold value indicates that the coding violation threshold is specified in terms of an equivalent bit error ratio (BER) of 10^n .

Errored Seconds-Path This parameter shows the daily threshold for DS1 path errored seconds. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value.

Severely Errored Seconds-Path
This parameter shows the daily threshold for DS1 path severely errored seconds. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value.

Unavailable Seconds-Path
This parameter shows the daily threshold for DS1 path unavailable seconds. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value.

Code Violations-Path Far End
This parameter shows the daily threshold for DS1 path code violations at the far end. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value. A negative threshold value indicates that the coding violation threshold is specified in terms of an equivalent bit error ratio (BER) of 10^n .

Errored Seconds-Path Far End
This parameter shows the daily threshold for DS1 path errored seconds at the far end. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value.

Severely Errored Seconds-Path Far End
This parameter shows the daily threshold for DS1 path severely errored seconds at the far end. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value.

Unavailable Seconds-Path Far End
This parameter shows the daily threshold for DS1 path unavailable seconds at the far end. Beginning with FiberReach Release 2.1, this parameter will also show the quarter-hour threshold value.

A threshold of zero indicates that thresholding is disabled.

A negative threshold value indicates that the coding violation threshold is specified in terms of an equivalent Bit Error Ratio (BER) of 10^n .

This command may only be used if the `ds1pm` feature is enabled via the **set-feat** command. If this feature is not enabled, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available, feature disabled */
```

If this command is entered on a DDM-2000 system loaded with a release of software that does not currently support this feature, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available in this release */
```

RELATED COMMANDS

`rtrv-feat`

`set-feat`

`set-pmthres-t1`

NAME

rtrv-pmthres-vt1: Retrieve Performance Monitoring Threshold VT1.5

INPUT FORMAT

rtrv-pmthres-vt1;

DESCRIPTION

This command displays the current VT1.5 path performance parameter thresholds set for a shelf by the **set-pmthres-vt1** command, and it is available only if the VT1.5 performance monitoring feature is enabled via the **set-feat** command.

The output report appears as follows:

/* VT1.5 Path Performance Monitoring Thresholds Report		
Parameter	Thresholds	
	Quarter	Day
	Hour	
V5 Errored Seconds (V5ES)	nnnn	nnn
V5 Severely Errored Seconds (V5SES)	nnnn	nnn
V5 Unavailable Seconds (V5UAS)	nnnn	nnn
*/		

In the report, a threshold of zero indicates that thresholding is disabled. A negative threshold value indicates that the coding violation threshold is specified in terms of an equivalent bit error ratio (BER) of 10^n .

The output parameters are:

V5 Errored Seconds	This parameter shows the quarter hour and daily threshold for VT1.5 errored seconds.
V5 Severely Errored Seconds	This parameter shows the quarter hour and daily threshold for VT1.5 severely errored seconds.
V5 Unavailable Seconds	This parameter shows the quarter hour and daily threshold for VT1.5 unavailable seconds of service.

This command may only be used if the `vtpm` feature is enabled via the **set-feat** command. If this feature is not enabled, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available, feature disabled */
```

If this command is entered on a DDM-2000 loaded with a release of software that does not currently support this feature, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available in this release */
```

RELATED COMMANDS

`rtrv-feat`

`set-feat`

`set-pmthres-vt1`

NAME

rtrv-secu: Retrieve Security

INPUT FORMAT

```

rtrv-secu;

```

DESCRIPTION

This command retrieves CIT and DCC ports security and timeout information.

The output report appears as follows:

```
/* Port Security Configuration Report
```

Access Link	Security	Timeout, minutes

```
cit-1      lockout      0
dcc-m      enabled      15
*/
```

The output parameters are:

Access Link	Access link is the address of a CIT or DCC interface. Valid Addresses: dcc-{m} , cit-1

Security	Security shows whether security is enabled, disabled, or in lockout state on the listed CIT or DCC port. The valid values are enabled, disabled, or lockout. When security is enabled, a user must enter a valid login and password to begin a session. When security is in lockout state, only a privileged user is permitted to access the system through the locked out CIT/DCC ports.

Timeout	This parameter shows the time duration, in minutes, before an inactive session is terminated on a specified CIT or DCC interface. If timeout is zero (0), then there is no timeout.

RELATED COMMANDS

rtrv-lgn

set-secu

NAME

rtrv-state-eqpt: Retrieve State Equipment

INPUT FORMAT

rtrv-state-eqpt[:*Address*];

DESCRIPTION

This command displays slot, port, and protection switching state information for the network element (NE).

⇒ NOTE:

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), the report will include data for what is considered at the time as the valid system pack type.

The input parameter is:

Address Address identifies one or more slots. The default is **all** for all slots in the system.

Valid FiberReach Addresses: **all**, **main-{1,2,all}**,
fn-{1,2,all}, **ls-all**, **ls-{a,b,c,d}-{1,2,all}**

The output report appears as follows:

```

/* Equipment State Report
=====
Address   Circuit   Port   Switch   Switch
          Pack    State(s) State   Priority
=====
address   pack      p       s        priority
address   pack      p       s        priority
.         .       .       .         .
.         .       .       .         .
-----
address   pack      p       s        priority
.         .       .       .         .
.         .       .       .         .
address   pack      p       s        priority
*/

```

In the output report, slot types are separated by a row of dashes. Within each slot type, slots are listed in order of their addresses, with protection slots listed last. Slots for control circuit packs (SYSCTL, AUXCTL) are not listed in this report.

The output parameters are:

Address	Address is the address of a slot.
Circuit Pack	Circuit pack is the circuit pack name. A hyphen (-) means not applicable or not equipped.
Port State(s)	The state of the signal, from the DSX or T1 interface for DS-1 signals, is reported.

Port State (p) may be one of the following:

- i (In Service) In this state, the port is monitored for failures, and the appropriate alarm is generated if a failure is detected. To retire the alarm and transition the associated port to the "auto" state, the update function must be performed after the input signal is removed.
- a (Automatic) In this state, the port will automatically be put "in service" if a good signal is detected. This state is not allowed for OC-N signals.
- n (Not Monitored)
In this state, the signal is not monitored or alarmed. The port will not automatically go to the "in service" state when a signal is detected.
- Not applicable (not equipped).

blank

The port state is always blank for timing circuits, for protection slots for 1x1 and 1xn protected circuit packs, and for OLIU circuit packs. Note that the BBG19 DS3 circuit pack is 0x1 protected and thus has independent port states for the service and protection slots. The port state is always a hyphen (-) for low speed slots in the auto state.

Switch State	This indicates whether the circuit pack is active or standby, corresponding to the state of the protection switching relays. Switch state(s) may be one of the following:
active	Each OLIU in the main slots is feeding its ring channels incoming from the fiber to the other side for pass-through connections and is sending drop channels to the low-speed slots. Some or all of the received ring channels incoming from this

OLIU may be active. This can be determined using the **rtrv-state-path** command on this system. Some or all of the transmitted ring channels outgoing to the fiber may also be active. This can be determined by using the **rtrv-state-path** command on *all* remote systems.

active-fn For a main OLIU slot, this means that the ring path protection switching is currently being done on this pack, and this pack is choosing each active ring channel from either ring and sending it to the low-speed slots.

For other pack types, active means the signal is being transmitted and received from this pack. Even if the pack is removed, the slot will remain active unless there is a protection circuit pack that service can be switched to.

standby The circuit pack or optical line is not currently active.

- Not applicable or not equipped.

For ring applications because of pass-through connections, the switch state will always be active for both main OLIUs.

Switch Priority Switch priority is the currently active protection switch request. Only a higher priority protection switch request can cause a protection switch to be done. For ring applications, the switch priority in this report applies only to the equipment switching of the main to function unit signals. See the **rtrv-state-path** command for path protection switching information. Switch priority may be one of the following:

lockout of protection
This prevents access to the protection pack for the group.

lockout of service
This prevents access to the protection circuit pack for the specified service slot.

forced No automatic or manual switches will be done until the forced switch is reset.

APS-pack failure

Automatic protection switching has occurred due to a circuit pack failure.

APS-automatic lock

Traffic is forced and held onto the protection pack, unable to revert to the service pack until midnight. This occurs following four automatic switches from service to protection during a 10-minute interval.

manual

Traffic has been manually switched to protection.

—

No manual or automatic switch requests are active.

For ring applications, the switch priority in this report applies only to the equipment switching of the main OLIUs to low-speed slots. See the **rtrv-state-path** command for path protection switching information.

The switch priority is always blank for protection slots, with one exception. For 1xn protected slots, the protected slot may have a switch priority of **lockout of protection**.

The state of the timing reference is reported in the **rtrv-sync** command.

RELATED COMMANDS

rtrv-alm

rtrv-state-path

rtrv-sync

set-state-t1

switch-ls

switch-sync

upd

NAME

rtrv-state-path: Retrieve State Path

INPUT FORMAT

rtrv-state-path[:*Address*];

DESCRIPTION

This command displays signal path state information for path-protected signals dropped at the network element (NE). To determine which of the transmitted ring channels outgoing to the fiber are active, it may be necessary to also use the

rtrv-state-eqpt command on all remote systems.

Any application that is path protected is reported.

⇒ NOTE:

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), the report will include data for what is considered at the time as the valid system pack type.

Any application that is path protected is reported.

The input parameter is:

Address In FiberReach systems, *address* is any connected VT1.5 path. The default is **all** for all paths in the system.

Valid VT1.5 Addresses:

all, {m1,m2}-1-{1-7,all}-{1-4,all}

If the shelf is equipped with 26-type OLIUs in Main unit slots, valid VT1.5 addresses are:

all, {m1,m2}-1-{1-7,all}-{1-4,all}

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), valid addresses are:

m{1,2}-{1-3,all}-{1-7,all}-{1-4,all},all

The output report appears as follows:

```

/* Path Protection Switch State Report
=====
----- Ring 1 ----- Ring 2 -----
Address Act APS Condition Address Act APS Condition
=====
address x condition address x condition
address x condition address x condition
. . . . .
. . . . .
*/

```

The output parameters are:

- Address** The address is any VT1.5 path. The report always displays both the Ring 1 and Ring 2 addresses.
- Act** This column indicates whether the associated Ring 1 path (receive into local main-1) or Ring 2 path (receive into local main-2) is active.
- This column may contain one of the following:
- Y The path is provisioned as drop, and this side is active (path protection switching is allowed).
- (blank) The path is provisioned as drop, and this side is in standby.
- APS Condition** This column lists the condition that caused the automatic protection switch to occur and appears on the path where the condition was detected. (The manual protection switch request is not shown because the system is nonrevertive.) The condition may be one of the following:
- signal failure
 - pack removal
 - pack failure
 - signal degrade
- Only manual or automatic protection switch (APS) requests that are higher priority than the currently active requests will cause a protection switch to occur. Currently, only the manual protection switch request is allowed, and because it is a lower priority than the APS requests, only APS requests will appear in the report. The

APS conditions will remain active while the condition that caused the switch still exists. When that failure clears, the APS condition is changed to blank if no other APS requests exist.

⇒ NOTE:

Whenever a VT1.5 cross-connection is made, the STS-1 path is actually terminated. When an STS-1 address is entered, this command does not report any STS-1 signals because individual VT1.5s within that STS-1 can be active on different rings. In general both rings are normally active.

To really know the state of VT cross-connected STS-1 signals, it is necessary to look at the states of all the constituent VT1.5 signals.

RELATED COMMANDS

rtrv-state-eqpt

switch-path-vt1

NAME

rtrv-state-sts1: Retrieve State of STS-1 Channels

INPUT FORMAT

rtrv-state-sts1[:Address];

DESCRIPTION

This command retrieves STS-1 channel states.

⇒ NOTE 1:

A channel state will be reported when the path of the channel can be either switched or terminated.

⇒ NOTE 2:

If slots 1 and 2 are equipped with different pack types (for example, during and upgrade), the report will include data for what is considered at the time as the valid system pack type.

The input parameter is:

Address Address is the address of the STS-1 channels whose state is to be reported. The default is **all** STS-1 channels. The other valid address for FiberReach is **m-1**.

If the shelf is equipped with 26-type OLIUs in Main unit slots, the valid address is: **m-1**.

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), valid addresses are:
m-{1-3,all}

The output report appears as follows.

⇒ **NOTE:**

An empty report is displayed if there are no cross-connections.

```

/* STS-1 Channel State Report
=====
Address      Channel State
=====
m-1          AUTO
*/

```

The output parameters are:

Address Address is the address of an STS-1 channel.

Channel State Channel State is the state of the STS-1 channel identified in the address field. It may have one of the following values:

- auto** Automatic. There is not a good signal on this channel. [STS-1 AIS or STS-1 loss of pointer (LOP) condition may be present.] Alarm or status conditions associated with this channel are not reported. Performance monitoring is not done for the channel. If a good signal is detected on this channel, then the channel will be put in the "In Service" state automatically.
- is** In Service. The channel is monitored. Alarm and status conditions are reported normally.
- nmon** Not Monitored. The channel is not being monitored. Alarm and status conditions are not reported for this channel. Performance monitoring is not done for the channel. The channel will remain in this state until the state is changed (with the **set-state-sts1** command) or until the cross-connection involving this channel is deleted.

RELATED COMMANDS

set-state-sts1

upd

NAME

rtrv-state-vt1: Retrieve State of VT1.5 Channels

INPUT FORMAT

rtrv-state-vt1[:*Address*];

DESCRIPTION

This command retrieves VT1.5 channel states.

⇒ NOTE:

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), this report will include data for what is considered at the time as the valid system pack type.

The input parameter is:

Address Address is the address of VT1.5 channels whose state is to be reported. The default address is **all**.

Valid addresses are:

m-1-all, m-1-{1-7}-{1-4,all}

If the shelf is equipped with 26-type OLIUs in Main unit slots, valid addresses are:

m-1-all, m-1-{1-7}-{1-4,all}

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), valid addresses are:

m-{1-3}-all, m-{1-3}-{1-7}-{1-4,all}

The output report appears as follows. Only channels that are cross-connected will be displayed in the output report.

```
/* VT1.5 Channel State Report
```

```
=====
```

Address	Channel State
m-1-1-1	auto
m-1-1-2	is
m-1-1-3	nmon
m-1-1-4	auto

```
=====
```

```
*/
```

The output parameters are:

Address Address is the address of a VT1.5 channel.

Channel State Channel State is the state of the VT1.5 channel identified in the address field. It may have one of the following values:

auto Automatic. There is not a good signal on this channel. (The VT AIS or a VT loss of pointer (LOP) condition may be present.) Alarm or status conditions associated with this channel are not reported. Also, performance monitoring is not reported. If a good signal is detected on this channel, then the channel will be put in the "In Service" state automatically.

is In Service. The channel is monitored. Alarm and status conditions are reported normally.

nmon Not Monitored. The channel is not being monitored. Alarm and status conditions are not reported for this channel. Performance monitoring is not done for the channel. The channel will remain in this state until the state is changed (with the `set - state - vt1` command) or until the cross-connection involving this channel is deleted.

RELATED COMMANDS

dlt-crs-vt1

ent-crs-vt1

rtrv-crs-vt1

rtrv-state-sts1

set-state-vt1

upd

NAME

rtrv-sts1: Retrieve STS1

INPUT FORMAT

rtrv-sts1[:*Address*];

DESCRIPTION

This command retrieves three types of provisioned parameters for STS-1 channels. The parameter types are:

- signal degrade alarm threshold
- signal fail alarm threshold
- alarm level for sa/nsa STS path AIS condition
(Reported only for FiberReach Release 2.1 and later)

⇒ NOTE:

If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), this report will include data for what is considered at the time as the valid system pack type.

The input parameter is:

Address Address is the address of the STS-1 channels whose parameters are to be reported. The address parameter is only available for Release 2.1 and later. The default is **all** STS-1 channels. Other valid addresses are: **m-1**.

If the shelf is equipped with 26-type OLIUs in Main unit slots, valid addresses are: **m-1**.

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), valid addresses are:
m-{1-3,all}

Only STS-1 channels that are cross-connected will be displayed in the output report.

When the command is entered (in Release 2.0 and earlier) or when the command is entered with the default address of **all** (Release 2.1 and later), the output report appears as follows:

```

/* STS1 Channel Provisioning Report
=====
SignalDegrade = value
SignalFailure = value

STS-1 AIS Alarm Information
Address      AIS Alarm      AIS Alarm
              Service Affecting  Non Service Affecting
=====
address      sa              nsa
address      sa              nsa
.            .              .
.            .              .
*/

```

The STS-1 AIS alarm information is reported only for Release 2.1 and later.

If the address is anything but **all**, then the report appears as follows:

```

/* STS-1 Channel Provisioning Report
=====
Address      AIS Alarm      AIS Alarm
              Service Affecting  Non Service Affecting
=====
address      sa              nsa
address      sa              nsa
.            .              .
.            .              .
.            .              .
*/

```

The output parameters are:

SignalDegrade This is the signal degrade threshold value.

SignalFailure This is the signal failure threshold value.

address This is the address of the provisioned channel.

AIS Alarm One or more columns of information will show the AIS alarm values for service affecting (SA) and non-service affecting (NSA) alarms. SA alarms may have one of the following values:

cr Critical alarm (default for ring channels)

na Not alarmed, but reported

NSA alarms may have one of the following values:

mn Minor alarm (default)

nr Not alarmed and not reported

RELATED COMMANDS

set-sts1

NAME

rtrv-sync: Retrieve Synchronization

INPUT FORMAT

rtrv-sync;

DESCRIPTION

This command displays the provisioning and operational information on the synchronization attributes of the DDM-2000, as set by the **set-sync** command.

The following pages show output reports for this command and explain the various fields on the reports. Output reports will vary according to the provisioned timing mode and the software release.

The following report is for FiberReach Release 2.0 and earlier:

```

/* Synchronization Report
=====
Parameter                      Value(s)
=====
Sync Source (src)              address  timing_message

Shelf Timing
Provisioned Mode                mode
Active Timing Mode              mode
Active Circuit Pack             pack
Active Reference/Line           ref
Mode Switching (mdsw)          mode

Sync Message Information
OC-N Line      Input Message      Output Message
-----
address        Message            Message
address        Message            Message
*/

```

The following report is for FiberReach Release 2.1 and later releases:

```

/* Synchronization Report
=====
Parameter                      Value(s)
=====
Sync Source (src)              address  timing_message

Shelf Timing
Provisioned Mode               mode
Active Timing Mode             mode
Active Circuit Pack            pack
Active Reference/Line          ref
Mode Switching (mdsw)         mode

Sync Message Information
OC-N Line      Input Message      Output Message      Type
-----
address        Message            Message            Type
address        Message            Message            Type
*/

```

The output parameters for the reports are as follows. Some parameters may not apply to all the reports. The output parameters are:

Sync Source The sync source is the optical line provisioned from which shelf timing is derived.

main-1

main-2

The choices for Sync Source (except the dash) are followed by this message:

for Shelf only Sync Source is set for LineTimed shelf.

Provisioned Mode

Provisioned Mode is the provisioned synchronization mode. The valid values are:

LineTimed Timing derived from OC-1 payload-carrying signal in the MAIN slots.

If the shelf is equipped with 28-type OLIUs in the Main unit slots (available in Release 2.2), the timing is derived from the OC-3 payload carrying signal in the Main slots.

Active Timing Mode

Active timing mode is the active timing synchronization mode of the system. The value may be any of the values listed previously in Provisioned Mode or one of the following:

Holdover	Timing generator is operating in holdover mode because the provisioned references are not available, or because the system has been manually switched to holdover mode.
No Timing	Timing circuit packs have been removed.
?	Timing mode is unreadable.

Active Circuit Pack

Active Circuit Pack indicates which timing generator circuit pack is currently active. The value is main-1, main-2, or - (empty slot).

Active Reference/Line

Active Line is the active LineTimed reference for the timing generator. When Provisioned Mode is LineTimed, Active Line has the following values:

main-1, main-2, or NA (neither timing reference is active). When the active timing mode is Holdover, Active Line is the timing reference that will provide timing if the system switches out of holdover mode.

Mode Switching

Mode Switching indicates whether the mode switching for the timing generator is revertive or nonrevertive.

Revertive	Revertive mode switching. If the system is provisioned for revertive mode switching, it will automatically switch from holdover mode to the provisioned mode (LineTimed) when a good reference becomes available.
Nonrevertive	Nonrevertive mode switching. If the system is provisioned for nonrevertive mode, it will switch to holdover mode (as a result of a timing reference failure) and remain in this mode until it is manually switched back to the

provisioned timing mode by the **switch-sync** command.

Sync Message Information

This heading identifies the section of the report where input and output messages used to determine the timing source quality are listed. This section of the report is available only if the `kbyte` message parameter is set to **enabled**.

When the shelf is equipped with 28-type OLIUs (in FiberReach Release 2.2 and later), this section of the report is available only if any of the optical interfaces have been provisioned for `kbyte` (default) or `Sbyte` sync messaging (using the **set-oc3** command if equipped with 28-type OLIUs in Main unit slots).

OC-N Line

This parameter identifies the addresses of optical interfaces that can carry sync messages.

Input Message

disabled	Indicates that the field is not applicable (for example, if synchronization messaging is disabled).
?	Indicates that the message is not readable (for example, due to a line failure).

This column identifies the `Kbyte` input message received on each optical interface line, and may have one of the following values:

Don't Use The interface is not suitable for synchronization timing (Quality Level 7).

Timing Looped Back

The network element connected to this interface is line-timed from it (Quality Level 7).

Stratum 4 The interface is receiving timing from a Stratum 4 clock source (Quality Level 6).

Internal Clock

This interface is receiving timing from a system in holdover or free running (Quality Level 5).

Stratum 3 The interface is receiving timing from a Stratum 3 clock source (Quality Level 4).

Stratum 2 The interface is receiving timing from a Stratum 2 clock source (Quality Level 3).

Sync Quality Unknown
This interface is receiving timing from a good quality clock source (Quality Level 2).

Stratum 1 The interface is receiving timing from a Stratum 1 clock source (Quality Level 1).

Output Message

This identifies the output message sent out on each OC-N interface line. The valid values for this parameter are the same as those listed for Input Message.

Type In FiberReach Release 2.2 (if equipped with 28-type OLIUs in Main unit slots) and later releases, this column identifies the type of sync messaging the optical interface was provisioned for using the **set -oc3** command. The valid values are:

Kbyte

Sbyte

disabled

NOTE:

For OC-1 interfaces, this column will only display Kbyte.

Sync Autoreconfiguration

This capability allows the system to choose the best timing source to use when it is provisioned for line timing. The valid values are **enabled** and **disabled**.

RELATED COMMANDS

rtrv-state

set-sync

set-oc3

rtrv-oc3

set-oc12

rtrv-oc12

switch-sync

NAME

rtrv-t1: Retrieve T1

INPUT FORMAT

rtrv-t1[:*Address*];

DESCRIPTION

This command displays the configuration information and attributes of one or more DS1 or T1 ports, as set by the **set-t1** command.

The input parameter is:

Address Address identifies the DS1 or T1 port(s). One or more ports may be specified. The default address is **all**.

Valid Addresses (1x1 protected shelves):

all, {a,b,c,d}-1-{1-4,all}

Valid Addresses (1x7 protected shelves):

all, {a,b,c}-{1,2,all}-{1-4,all}

d-1-{1-4,all}

The BBF6 circuit pack supports 2 T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid.

Specifying **all** selects ports 1 and 2 only.

The output report appears as follows:

```
/* T1 Port Provisioning Report
```

Port Address	Line Coding	Alarm Level	AIS	Failure Thrshld	BPV to LOS	State	PM Mode	Format
a-1-1	ami (hw)	na	yes	-3	no	is	off	none
a-1-2	ami (hw)	na	yes	-3	no	auto	off	none
a-1-3	ami (hw)	na	yes	-3	no	auto	off	none
a-1-4	ami (hw)	na	yes	-3	no	auto	off	none
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.

```
*/
```

The output parameters are:

Port Address Port Address is the address of the DS1 or T1 port.

Line Coding Line Coding is the DS1 line coding which may have the value **ami** (alternate mark inversion) or **b8zs** (AMI with bipolar 8-zero substitution).

If a previous **set -t1** command has set this parameter to a value that overrides the circuit pack switch setting, either of these values will be followed with the string "override." Otherwise, it will be followed by the string "(hw)" to indicate that the line coding for the port is determined by the hardware switches.

Alarm Level

Alarm Level describes the alarm level for an incoming DS1 signal failure and may have one of the following values:

MJ	Major alarm
MN	Minor alarm
NA	No alarm

If the system is provisioned for and reporting no alarm but an alarm exists, the NE ACTY LED on the user panel will be illuminated and the fault LED on the circuit pack will flash. The condition will be reported in the alarm and status report as a near-end activity.

AIS

Alarm Indication Signal indicates whether an AIS is to be inserted toward the fiber when a loss of an incoming DS1 signal is detected. The values are yes and no.

⇒ NOTE:

When the "BPV to LOS" DLC parameter is set to yes, the AIS parameter is ignored. (An all zeros signal, not AIS, is transmitted to the far end even if the AIS parameter is set to yes.)

Failure Thrshld

Failure threshold is the BER threshold in terms of a logarithm to the base 10. The value may be -8, -7, -6, or -3, corresponding to BERs of 10^{-8} , 10^{-7} , 10^{-6} , and 10^{-3} , respectively.

BPVtoLOS

This column indicates whether an incoming DS1 signal failure (a bit error ratio above the threshold set by the failure threshold parameter) will be translated into an outgoing all-zeros signal at the far end. The values are yes and no.

State	State is the state of the port. It may be one of the following: is In Service. A valid T1 signal from the DSX-1 or T1 interface that is being monitored. auto Automatic. The system is waiting for a valid T1 signal from the DSX-1 or T1 interface. nmon Not Monitored
PM Mode	This column indicated the performance-monitoring (PM) mode of the DS1 or T1 interface and may be one of the following values: on DS1 PM enabled on this port off DS1 PM disabled on this port
Format	This column indicates the PM format of the DS1 or T1 interface and may be one of the following values: none No DS1 PM possible on this port due to equipage. (PM Mode always off.) sf Superframe. esf Extended superframe, near end and far end. esfn Extended superframe, near end only.

RELATED COMMANDS

set-state-t1

set-t1

NAME

rtrv-tl1msgmap: Retrieve Message Map for Operation Systems

INPUT FORMAT

rtrv-tl1msgmap;

DESCRIPTION

This command displays the table that associates the OS Application Context Identifier (ACID) to TL1 autonomous message types. This allows the DDM-2000 network element to direct messages to the proper OS destination.

The output report appears as follows:

```
/* TL1 Autonomous Message Map
```

ACID	ALM	ENV	CON	DB	EVT	PM	SW
tl1Maintenance	x	x	x		x	x	x
tl1MemoryAdministration				x			
tl1Test							
tl1PeerComm							
tl10ther1	x	x	x	x	x	x	x
tl10ther2							

```

      x - enabled
<blank> - disabled
*/

```

The output parameters are:

ACID ACID is the Application Context ID to be assigned to a particular SNPA or SubNetwork Point of Attachment on the x.25 channel. Each ACID defines the type of TL1 messages to be sent by the network element. Default MessageType mappings exist for ACIDs supported by DDM-2000. Supported ACID values are:

tl1Maintenance

tl1MemoryAdministration

tl10ther1

tl1Test

tl1PeerComm

tl10ther2

msgtype MessageType is one of the supported classes of TL1 messages that the system generates. These message types are not sent to the OS unless they are enabled and associated to an ACID. The supported message types are:

ALM - REPT ALM

ENV - REPT ALM ENV

CON - REPT COND

DB - REPT DBCHG

EVT - REPT EVT

PM - REPT PM

SW - REPT SW

RELATED COMMANDS

ent-tl1msgmap

NAME

rtrv-ulsdcc: Retrieve Upper Layer Section DCC

INPUT FORMAT

rtrv-ulsdcc;

DESCRIPTION

This command retrieves the network service access point (NSAP) as provisioned by the **ent-ulsdcc** command. The NSAP is a 20-byte address that provides unique identification for each network element in the system. Only certain portions of this address are user-settable.

The output report appears as follows:

/* Upper Layer Section DCC Provisioning Report			
=====			
	Parameter	Value	Provisionable
=====			
NSAP address:	L3idp	<i>value</i>	no
	L3dfi	<i>value</i>	no
	L3org	<i>value</i>	YES
	L3res	<i>value</i>	YES
	L3rou	<i>value</i>	YES
	L3sys	<i>value</i>	no
	L3sel	<i>value</i>	no
*/			

The output parameters are:

NSAP Address This is the 20-byte address assigned to a network element.

Parameter This identifies the following seven parameters that make up the NSAP address:

L3idp This part of the NSAP address is assigned according to the International Standards Organization (ISO) standards. For SONET systems, the value is set to 39/0840 to indicate that U.S. American National Standards Institute (ANSI) is the registration authority responsible for the assignment of the NSAP address.

L3dfi This part of the NSAP address specifies the format for the rest of the NSAP address. For SONET systems, the value is set to 128.

- L3org** This part of the NSAP address contains the allocated hexadecimal company code assigned by the ANSI-administered USA Registration Authority for OSI Organization Names.
- L3res** This part of the NSAP address currently has not been assigned a specific purpose by the SONET standards.
- L3rou** This part of the NSAP address indicates the routing domain, identifying a unique routing domain within an Administrative Domain, and the area, identifying the area within the routing domain to which the NSAP address belongs. Both parts of this address are hexadecimal values.
- L3sys** This part of the NSAP address is assigned by IEEE administrators to U.S.-manufactured systems to guarantee a globally-unique NSAP.
- L3sel** This part of the NSAP address is used to differentiate multiple NSAP addresses within a system. For DDM-2000, this parameter is always set to zero and is not user-settable.

Value This field indicates the numerical value of each portion of the NSAP Address.

Provisionable This field indicates whether each portion of the NSAP address is user-settable. The valid values are **YES** or **no**.

RELATED COMMANDS

ent-ulsdcc

NAME

rtrv-vt1: Retrieve VT1.5

INPUT FORMAT

rtrv-vt1[:*Address*];

DESCRIPTION

This command retrieves two types of provisioned parameters for VT1.5 channels. The parameter types are:

- Signal degrade alarm threshold
- Alarm level for sa/nsa VT1.5 path AIS condition (Reported only for Release 2.1 and later).

The input parameter is:

Address This parameter is available for Release 2.1 and later only. Address is the address of VT1.5 channels whose state is to be reported. The default is **all** addresses.

Valid Addresses:

m-1-{1-7,all}-{1-4,all}

If the shelf is equipped with 28-type OLIUs in Main (available in Release 2.2 and later), the valid addresses are:

m-{1-3,all}-{1-7,all}-{1-4,all}

Only VT1.5 channels that are cross-connected will appear in the output report. The output report appears as follows:

```

/* VT1.5 Channel Provisioning Report
=====
SignalDegrade = value

VT AIS Alarm Information
Address      AIS Alarm      AIS Alarm
              Service Affecting  Non Service Affecting
=====
address      sa              nsa
address      sa              nsa
.             .              .
.             .              .
.             .              .
*/

```

The VT AIS Alarm Information is reported only for Release 2.1 and later.

For Release 2.0 and earlier, if the signal degrade value is zero (0), then signal degrade is disabled and the following output report appears:

```

/* VT1.5 Channel Provisioning Report
=====
SignalDegrade=0 (disabled)

VT AIS Alarm Information
Address      AIS Alarm      AIS Alarm
              Service Affecting  Non Service Affecting
=====
address      sa              nsa
address      sa              nsa
.             .              .
.             .              .
.             .              .
*/

```

For Release 2.1 and later, a signal degrade value of zero (0) will not appear in the report.

The output parameters are:

SignalDegrade	This is the signal degrade threshold value.
address	This is the VT1.5 address of the provisioned channel.
AIS Alarm	One or more columns of information will show the AIS alarm values for service affecting (SA) and non-service affecting (NSA) alarms. SA alarms may have one of the following values:
	mj Major alarm (default for ring channels)
	na Not alarmed, but reported
	NSA alarms may have one of the following values:
	mn Minor alarm (default)
	nr not alarmed and not reported

RELATED COMMANDS

set-vt1

NAME

set-attr-alm: Set Alarm Attribute

INPUT FORMAT

set-attr-alm[:**almdel**=*AlarmDelay*][,**clrdel**=*ClearDelay*][,**pmn**=*PMN*];

DESCRIPTION

This command sets the alarm holdoff and clear delays.

The input parameters are:

almdel AlarmDelay is the delay for incoming signal and equipment failures. It sets an interval of time that a fault condition is present before an alarm is declared. The delay is in seconds, between 0 and 30, with a default value of 2.

⇒ NOTE:

If a signal degrade threshold is exceeded, the recovery interval for the signal degrade condition may be longer than the provisioned holdoff delay, and an alarm will result. For example, suppose an OC-3 interface with an alarm delay of 20 seconds and a signal degrade threshold of 10^{-6} has a signal degrade failure of 10 seconds. Since the recovery interval for a 10^{-6} error rate threshold is 15 seconds, the total length of the alarm condition (10 seconds of failure plus 15 seconds of recovery) will exceed the provisioned alarm delay of 20 seconds, and an alarm will be declared.

clrdel ClearDelay is the delay in time before an alarm can be declared to be clear. For equipment failures and signal failures (including AIS and FERF), the clear delay time interval begins when the alarm failure clears. For equipment failures, the delay is between 0 and 30 seconds, with a default value of 15 seconds. For signal failures, clear delay is fixed at 15 seconds.

pmn PMN is the Power Minor alarm level, which can be either minor (**MN**) or major (**MJ**). The default is Minor.

When input, this command will cause the following confirmation message to be displayed:

```
/* Caution! Alarm or maint. thresholds are affected by this command.  
You have selected the set-attr-alm command with these parameters:
```

```
AlarmDelay = nn  
ClearDelay = nn */  
PMN = nn */
```

```
Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

rtrv-attr-alm

NAME

set-attr-cont: Set Attribute Control

INPUT FORMAT

set-attr-cont:*Address:desc=Description;*

DESCRIPTION

This command is used to provision (define) the name of the environmental control points.

The input parameters are:

Address Address identifies the control point to be provisioned. There is no default for this parameter.

Valid Addresses: **cont - {1-4}**

desc Description is a descriptive name for the control point. The description may be an alphanumeric string, upper- and lower-case with no spaces, up to 26 characters long. Symbolic characters may be included in the descriptive name of the control point.

The following symbolic characters have special meanings either for the CIT interface or for the X.25 TL1 interface and cannot be included in the description:

;	semicolon	?	question mark
@	at sign		space
\	back slash	!	exclamation point
:	colon	=	equal sign
"	double quote	,	comma

All control characters and special keys cannot be included in the description.

 NOTE:

This command will be denied if entered in a system whose CO/RT parameter is set to CO (via the **set -ne** command). The following denial message will be displayed:

```
ENSI
/* Equipage, Not equipped for Setting specified Information */
/* Environmental controls can be provisioned only in RT systems. */
```

RELATED COMMANDS

rtrv-attr-cont

NAME

set-attr-env: Set Attribute Environment

INPUT FORMAT

set-attr-env:*Address*[:**alm**=*Alarm*][,**almtype**=*AlarmType*][,**desc**=*Description*];

DESCRIPTION

This command is used to provision (set) the alarm level of the environmental input points. Active inputs appear as entries in the alarm and history reports of the local network element (NE) and generate autonomous TL1 messages through the gateway network element (GNE). Inputs 1 through 15 also appear in the TBOS alarm display. Parallel telemetry outputs appear at the CO NE and are limited to inputs 1 through 10.

The input parameters are:

Address Address identifies the environmental point to be provisioned. There is no default value for this parameter.
Valid Addresses: **env-{1-15}**, **env-{all}**

⇒ NOTE:

The **address env-{all}** is allowed only when **alm** is the only parameter used for this command. The **address env-{all}** is not allowed when the **almtype** and/or **desc** parameters are used.

alm Alarm is the provisioned alarm level of the environmental input and has the following values:

cr Critical alarm
mj Major alarm
mn Minor alarm (default)
na Not alarmed, but reported.

almtype AlarmType. This parameter is used to classify the type of alarm. The description may be an alphanumeric string, upper- and lowercase with no spaces, up to 10 characters long. The original value of AlarmType is "Misc."

desc Description is a descriptive name for the point. The description may be an alphanumeric string, upper- and lowercase with no spaces, up to 26 characters long.

The following symbolic characters have special meanings either for the CIT interface or for the X.25/TL1 interface and cannot be included in the description:

;	semicolon	?	question mark
@	at sign		space
\	back slash	!	exclamation point
:	colon	=	equal sign
"	double quote	,	comma

All control characters and special keys cannot be included in the description.

NOTE:

This command will be denied if entered in a system that has the CO/RT parameter is set to CO (via the **set-ne** command). The following denial message will be displayed:

ENSI

```
/* Equipage, Not equipped for Setting specified Information */  
/* Environmental alarms can be provisioned only in RT systems. */
```

RELATED COMMANDS

rtrv-attr-cont

rtrv-attr-env

rtrv-ne

set-attr-cont

NAME

set-date: Set Date and Time

INPUT FORMAT

set-date:[**date=***Date*][**,time=***Time*];

DESCRIPTION

This command sets the date and time. Executing this command will corrupt the current quarter hour and day performance-monitoring (PM) bins.

⇒ NOTE 1:

If security is enabled on any CIT or DCC port on a shelf, then this command is available to privileged users only for all CIT or DCC ports on the shelf.

⇒ NOTE 2:

In the event of a shelf reset, an automatic date and time recovery process takes place by reading the date and time from the remote shelf connected to the interface of the local shelf (in linear applications). In ring applications, the date and time data is recovered from the remote shelf connected to of the local shelf. In both linear and ring applications, if the automatic recovery fails, both date and time are set to default (**70-01-01** for date and **00:00:00** for time).

The input parameters are:

- date** Date is entered as six digits YYMMDD, where YY is the last two digits of the year, MM is the month, and DD is the day. Default is the current system day.
- time** Time is entered as six digits HHMMSS, where HH is hours (00-23), MM is minutes (00-59), and SS is seconds (00-59). Default is the current system time.

When input, this command will cause the following confirmation message to be displayed:

```
/*Caution! Execution of this command will corrupt the  
current quarterhour and current day performance monitoring data.  
You have selected the set-date command with these parameters:
```

```
  Date = YYMMDD  
  Time = HHMMSS */
```

```
Execute? (y/n or CANCEL/DELETE to quit) =
```

NAME

set-feat: Set Feature

INPUT FORMAT

set - feat:feat=Feature,act=Action;

DESCRIPTION

This command enables a user to configure the network element (NE) for feature options that are licensed for use.

 NOTE:

This command is available to privileged users only.

The input parameters are:

feat	Feature is the feature option available to the user, and it may have one of the following values:
vtpm	This feature provides performance-monitoring of cross-connected VT1.5 services.
ds1pm	This feature provides performance-monitoring of cross-connected (dropped) DS1 services in ring systems.
 act	 Action is the action the user wants to perform on the listed feature and it may have one of the following values:
enabled	This enables a feature option. This action will also unblock the use of commands needed by this feature.
disabled	This disables a feature option. This action will also block the use of commands needed by this feature. The user may be required to reprovision the shelf before disabling a feature.

If a user fails to remove all equipment or reprovision parameters associated with a feature before disabling that feature, the command will be denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* System must be reprovisioned to disable <Feature>. */
```

If this command is entered and no main OLIUs are equipped, there is no place to store a backup copy of the feature options. Thus, the command will be denied with the following message:

```
EQWT
/* Equipage, Wrong Type */
/* No change in provisioning - both main slots are unequipped */
```

Enabling a feature will cause the following confirmation message to be displayed:

```
/* ACCESS TO, AND USE OF THIS <feature> FEATURE IS PERMITTED ONLY
   IF SPECIFICALLY AND EXPRESSLY AUTHORIZED UNDER THE RELEVANT
   DDM-2000 SOFTWARE AGREEMENT BETWEEN AT&T AND CUSTOMER.

   You have selected the set-feat command with the parameters:
   Feature = feature
   Action = action */

Execute? (y/n or CANCEL/DELeTe to quit) =
```

Disabling a feature will cause the following confirmation message to be displayed:

```
/* Caution! Execution of this command will disable all of the
system capabilities associated with the <feature> feature
and circuit packs which support that feature will no longer
provide access to that feature.

You have selected the set-feat command with these parameters:
Feature = feature
Action = action */

Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

rtrv-feat

NAME

set-fecom: Set Far-End Communications

INPUT FORMAT

set - fecom: *Address*[:**com**=*Communications*][,**nsus**=*NS/US*];

DESCRIPTION

This command enables or disables communication over the section data communication channels (DCC). A DCC is an embedded overhead communications channel in the SONET line used for end-to-end communications and maintenance. The DCC carries alarm, control, and status information between network elements (NEs).

⇒ NOTE:

This command is available to privileged users only.

The input parameters are:

Address	Address identifies the address of the DCC. Valid Addresses: dcc-{m1,m2,all}				
com	This parameter indicates whether communication over a specified DCC is enabled or disabled. The valid values are enabled or disabled . The default value is enabled .				
nsus	NS/US (NetworkSide/UserSide) is the identification of the DCC identity for the NE. Each DCC on the NE must define its NS/US identity in the OSI network. When the NS/US parameter is the same at both ends, an alarm is active. NetworkSide/UserSide may have the following parameter values: <table><tr><td><i>ns</i></td><td>Network Side (ns) defines this end of the DCC to be a network site. For DDM-2000 networks either termination of the DCC can be this value as long as the other termination is different. Default values are listed on the following page.</td></tr><tr><td><i>us</i></td><td>User Side (us) defines this end of the DCC to be a user site. For DDM-2000 networks, either termination of the DCC can be this value as long as the other termination is different. Default values are listed on the following page.</td></tr></table>	<i>ns</i>	Network Side (ns) defines this end of the DCC to be a network site. For DDM-2000 networks either termination of the DCC can be this value as long as the other termination is different. Default values are listed on the following page.	<i>us</i>	User Side (us) defines this end of the DCC to be a user site. For DDM-2000 networks, either termination of the DCC can be this value as long as the other termination is different. Default values are listed on the following page.
<i>ns</i>	Network Side (ns) defines this end of the DCC to be a network site. For DDM-2000 networks either termination of the DCC can be this value as long as the other termination is different. Default values are listed on the following page.				
<i>us</i>	User Side (us) defines this end of the DCC to be a user site. For DDM-2000 networks, either termination of the DCC can be this value as long as the other termination is different. Default values are listed on the following page.				

The following chart shows default settings for the NS/US parameter:

Rings Applications	dcc-m1	dcc-m2
26-type OLIUs	us	ns
28-type OLIUs	us	ns

This command can only be completed successfully if it is executed from a CIT or modem port. This command cannot be executed during a remote login session. If the command is executed during a remote login session, it will be denied with one of the following messages:

```
SNVS
/* Status, Not in Valid State */
/* This command cannot be executed from within a rlgn session. */
```

```
SNVS
/* Status, Not in Valid State */
/* Farend communication can not be set from a remote session. */
```

When this command is input, the following confirmation message will be displayed:

```
/* Caution! Network element access is affected by this command.  
You have selected the set-fecom command with these parameters:
```

```
Address = address  
Communications = enabled  
NS/US = value */
```

```
Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

rtrv-fecom

rtrv-map-neighbor

rtrv-map-network

NAME

set-lgn: Set Login

INPUT FORMAT

set - lgn[:act=Action];

DESCRIPTION

This command enters, edits, and deletes logins and passwords. Prior to the first use of this command, the 3 default logins are ATT01, ATT02, and ATT03 (all upper-case letters) for Release 2.0 and earlier. For Release 2.1 and later, the 3 default logins are LUC01, LUC02, and LUC03. The default password is DDM-2000.

**NOTE 1:**

This command is available to privileged users only.

**NOTE 2:**

To enable security, a privileged user must execute the **set - secu** command. Creating logins and passwords does *not* automatically enable security.

A maximum of 100 (general, maintenance and reports-only user) logins is supported. When security is enabled, the following four types of users are permitted to access the system with a valid login and password:

privileged user	The privileged user may execute any commands, including restricted commands.
general user	The general user may execute any commands that are not restricted to privileged users.
maintenance	The maintenance user may only execute commands that access the system, extract reports, and execute maintenance functions through a specific set of commands. No privileged commands are allowed to be executed by maintenance users.
reports-only	The reports-only user may only execute commands that access the system and extract reports.

All users may use the **set - passwd** command to modify their own passwords.

The input parameters are:

act Action has one of the following values:

enter Enter a new login and password pair (default value). Login is a case-sensitive alphanumeric string consisting of a minimum of five and a maximum of ten alphabetic characters and/or numbers. When entering a new login, the type of user (privileged user, general user, maintenance or reports-only) must be specified and a password should also be assigned to the new user. A user may then use the **set-passwd** command to modify his/her own password after the login has been activated.

Password is a case-sensitive string of alphanumeric and symbolic characters. Password may have a minimum of six and a maximum of ten characters. Additionally, the password must include at least two numeric characters and one symbolic (non-alphabetic and non-numeric) character. The following symbolic characters have special meanings either for the User Interface or for the X.25 TL1 interface and cannot be included in a password:

;	semicolon	space
@	at sign	? question mark
\	back slash	! exclamation point
:	colon	= equal sign
"	double quote	, comma

Additionally, the following control characters and special keys CANNOT be included in a password:

<CR>	carriage return	<tab>	tab key
<bksp>	backspace key	<esc>	escape key
<del>	delete key		

edit Change an existing login and/or password.

delete Delete an existing login.

The **set-lgn** command executes in prompt mode. Based on the action selected, there are three different dialogs, shown on the following pages. In these dialogs, the user input is indicated with bold type.

The following screen shows the dialog to enter a login:

```
set-lgn:act=enter;  
enter the new login = new_login  
enter password for new login = new_password  
reenter password for new login = new_password  
enter user type for this login = user_type  
  
/* Caution! Network Element access is affected by this command.  
You have selected the set-lgn command with these parameters:  
  
Action = enter  
Login = new_login  
User Type = user_type */  
  
Execute? (y/n or CANCEL/DELeTe to quit) =  
;
```

**NOTE:**

Passwords will not be displayed when they are entered.

The following screen shows the dialog to edit a login:

```
set-lgn:act=edit;  
enter the login to be changed = old_login  
enter the new login = new_login  
enter password for new login = new_password  
reenter password for new login = new_password  
enter user type for this login = user_type  
  
/* Caution! Network Element access is affected by this command.  
You have selected the set-lgn command with these parameters:  
  
Action = edit  
Old Login = old_login  
New Login = new_login  
Old User Type = user_type  
New User Type = user_type */  
  
Execute? (y/n or CANCEL/DELeTe to quit) =  
;
```

The following screen shows the dialog to delete a login:

```
set-lgn:act=delete;  
enter the login to be deleted = user_login  
/* Caution! Network Element access is affected by this command.  
   You have selected the set-lgn command with these parameters:  
  
   Action = delete  
   Login = user_login */  
  
Execute? (y/n or CANCEL/DELeTE to quit) =  
;
```

If the login value does not match the valid login definition (syntactically incorrect), the following message will appear:

```
/* Entry does not follow rules for logins. */  
/* Logins must be 5 to 10 alphabetic characters and/or numbers;  
   characters allowed are A..Z, a..z and/or 0..9 */
```

The user may try once again to enter a login. If the user enters a login that does not match the valid login definition, the following denial message will be displayed:

```
IDEI  
/* Input, Data Entry Invalid */  
/* Entry does not follow rules for passwords and logins. */
```

If the entered password value does not match the valid password definition (syntactically incorrect), the following message will appear:

```
/* Entry does not follow rules for passwords. */
/* Passwords must be 6 to 10 characters, with at least 2 non
   alphabetic characters and additionally, at least 1 symbolic.
   Characters allowed are: A..Z or a..z, 0..9, all symbolic
   characters, EXCEPT the following:

           ; semicolon           ? question mark
           @ at sign             space
           : colon               = equal sign
           " double quote       , comma
           \ back slash         ! exclamation point

*/
```

The user may try once again to enter a password. If the user enters a password that does not match the valid password definition, the following denial message will be displayed:

```
IDEI
/* Input, Data Entry Invalid */
/* Entry does not follow rules for passwords and logins. */
```

Privileged user logins can be edited to change the login name, password, or both. However, privileged logins cannot be deleted. If an attempt is made to delete a privileged user login, the following denial message will be displayed:

```
SDNC
/* Status, Data Not Consistent */
/* Privileged user logins cannot be deleted. */
```

If an attempt is made to add a privileged user login, the following message will keep displaying until a valid user type (general, maintenance or reports-only) is entered:

```
/* Not a valid response */
/* Select from: */
1. general
2. maintenance
3. reports-only
enter user type for this login [general] =
```

When a user selects the `edit` or `delete` option for a login but the login entered does not exist, the following message will be displayed:

```
IIUS
/* Input, Invalid USer identifier */
/* login <value> is unknown. */
```

If a user invokes this command with **Action=enter** and the entered login matches the login definition (syntactically correct) but *also* matches an already existing valid login, the attempt will be denied and the following denial message will be displayed:

```
IIUS
/* Input, Invalid USer identifier */
/* login <value> is unknown. */
```


If a user attempts to enter another login when the maximum supported logins already exists, the following denial message will appear:

```
SLEM
/* Status, List, Exceeds Maximum */
/* Maximum number of logins already exists.
   Cannot enter another login. */
```

RELATED COMMANDS

rtrv-lgn

set-passwd

set-secu

NAME

set-link: Set CIT Link Configuration

INPUT FORMAT

set - link:pg=*page length*;

DESCRIPTION

This command sets the configuration of the current user's craft interface link.

The input parameter is:

pg PageLength is the vertical size of the displayed page in lines. The value may be an integer between 3 and 150 with a default of 24. If the page length is set to zero, no pager is used and system output is sent directly to the screen. The page length is set to the default value each time a new CIT session is started.

RELATED COMMANDS

rtrv-link

NAME

set-ne: Set Network Element

INPUT FORMAT

```
set -ne:tid=TID[,dsne=DSNE][,almgrp=AlarmGroup][,agne=AGNE]  
[,site=Site][,ne=NE][,cort=CO/RT][,tbaddr=TBOSAddress]  
[,tblink=TBOSLink][,tbrem=TBOSRemote][,idle=IdleChannelSignal];
```

DESCRIPTION

This command sets the network element (NE) characteristics (parameters) of a DDM-2000.

⇒ NOTE:

If security is enabled on any CIT or DCC port on a shelf, then this command is available to privileged users only for all CIT or DCC ports on the shelf.

In a steady-state network with an existing DSNE, allow 5 minutes between changes to individual nodes.

After a reset of the DSNE, wait 20 to 30 minutes before issuing the **set-ne** command to any remote network element.

The input parameters are:

tid TID is a string of up to 20 characters, and may include upper- and lowercase letters, numbers, and the following characters: "-", "+", "%", "#", ".". Prior to the first use of this command, the initial value is Site x NE y , where x and y are the site and network element numbers. The *TID* will be printed at the beginning of the output for all commands. For proper operation of TL1/X.25 OS interfaces, the *TID* must be unique for each NE.

⇒ NOTE:

Changing the TID (system name) does not change the network address, which is determined by the NSAP but does affect proper TL1 message reporting.

**CAUTION:**

Changing the TID will cause all active TL1 logins to this NE to be dropped. New TL1 logins to this NE will have to be activated using the new TID value.

dsne The directory services network element (DSNE) is the NE element for OSI releases where the map listing all active nodes in the network is maintained. A FiberReach node may not be a DSNE, thus the only

allowable value for this parameter is *no*. One (and only one) NE in the subnetwork must be designated as a DSNE for proper DCC communication between nodes.

With FiberReach R2.1 provisioning of the DSNE is removed from the **set -ne** command.

- almgrp** AlarmGroup (AG) has a numeric value of 1 through 255. All NEs in the subnetwork, whether nearby or not, that have the same AG number are members of the same group. All members of the AG will share NE Status information with each other and with any Alarm Status NE (ASNE) monitoring this Alarm Group but not with NEs of different Alarm Groups. The default AG number for DDM-2000 is 255 and may not have to be changed if a single AG is desired.
- The default AG number for FT-2000 is also 255 and when a subnetwork with mixed Product Family 2000 network elements is first engineered, both DDM-2000 and FT-2000 by default will belong to the same AG. The default AG number for FiberReach is 255, which means that by default FiberReach nodes are also in the same AG as DDM-2000 and FT-2000.
- agne** AGNE (Alarm Gateway NE) has a value of *yes* or *no*, which indicates whether this system is an alarm gateway network element. The default value for this parameter is *no*. One AGNE is needed for each Alarm Group to support the message communications for NE Status features (FE activity, office alarms, parallel telemetry, miscellaneous discretes, remote ACO, and FE user panel status). Any member of the Alarm Group can be an AGNE but some may be preferred because of their position in the subnetwork or location near a maintenance center. Other NEs of the same Alarm Group may be provisioned as backup AGNEs if required. At least one NE in each Alarm Group must be designated as an **agne**. Alarm Groups without an AGNE have "AGNE communication failure" alarms.
- site** Site is the numeric identification (1-64) used by all NEs at the same location or site. The default value is 64.
- ne** Network Element is the numeric identification (1-5) of the system at a site. NEs at the same site must have unique NE settings. The default value is 5.

⇒ NOTE:

Refer to the TOP section for specific procedures for setting Site and NE values at multiple network elements.

- cort** The CO/RT parameter for "CO" (Central Office) or "RT" (Remote Terminal) identifies the system as having characteristics of a CO or an RT. The values for CO/RT are `co` and `rt` with `rt` as the default value. The value of CO/RT controls the TBOS display type, the operation of the miscellaneous discretes, and the external fan control.
- tbaddr** TBOSAddr sets the TBOS display address (1-8) of the NE. This address is used if the TBOS Link is enabled. The default value is 1 but must be changed if it conflicts with existing settings of other enabled TBOS displays.
- tblink** TBOSLink sets the TBOS Link function. The default value is **noTBOS**. Link may be set to the following values:
- `normal` The NE has a TBOS link, but does not provide any backup functions. Of all the shelves connected to the TBOS link, only one may be set to primary and only one may be set to secondary. The remaining NEs (up to 6) should be set to normal.
 - `primary` The NE is serving as the primary TBOS backup and will respond for any other NE on the same TBOS link if the polled NE fails to respond to the telemetry remote poll within 50 msec. The primary backup NE will respond for the nonresponsive NE by reporting TBOS point 59 (communications failure) and reporting all other TBOS points polled in the display as clear.
 - `secondary` The NE is serving as the secondary TBOS backup and responds the same as the primary TBOS backup, except the secondary backup does not respond to polls for other NEs until about 100 msec after the poll is received. If after 100 msec neither the polled NE nor the primary backup NE has responded to the telemetry remote poll, the secondary TBOS backup NE will respond for the nonresponsive NE.
 - `noTBOS` No TBOS interface is directly connected to the shelf.
- tbrem** TBOSRemote sets the TBOS Remote reporting status. TBOS Remote may be set to the following values:
- `enabled` The shelf will report all its status and alarm conditions to other shelves via the SONET DCC.
 - `disabled` The shelf will not report its status and alarm conditions to other shelves. This option is used when there are more than 8 NEs in a SONET network. The default value is **disabled**.

idle IdleChannelSignal determines whether or not an AIS or Unequipped signal should be inserted toward the SONET line in VT1.5 and STS-1 channels that are not cross-connected. The value may be one of the following:

ais STS-1 or VT1.5 AIS is inserted towards the SONET line from SONET interfaces (OLIUs and STS1Es) if the channel is not cross-connected or if a low-speed slot is not equipped but the function unit is STS-1 cross-connected.

unequipped The STS-1 or VT1.5 Unequipped signal is inserted towards the SONET line from SONET interfaces (OLIUs and STS1Es) if the channel is not cross-connected or if a low-speed slot is not equipped but the function unit is STS-1 cross-connected.

⇒ NOTE:

It is recommended that the user choose the **ais** option for this parameter, since all SONET equipment is capable of detecting and performing path protection switching when receiving a VT/STS AIS signal.

If the user executes this command while the DSNE is in a busy state (for example, handling an initial registration), the following denial message will be displayed:

```
SNVS
/* Status, Not in Valid State */
/* DIB is currently locked, try again later. */
```

If the user enters a duplicate TID (within the same subnetwork), the following denial message will be displayed (after entering y for the confirmation message):

```
SRCN
/* Status, Requested CoNdition already exists */
/* The system name entered (TID) already exists.
   Enter a unique system name. */
```

Some of these parameters are backed up on the main OLIU packs (dsne, tid, site, ne, cort, tbaddr, tblink, tbrem). Starting with FiberReach Release 2.1, an attempt to provision any of these parameters with no main OLIU packs equipped will be denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* System must be equipped with at least one main OLIU circuit
   pack to provision selected parameters. */
```

When this command is entered, the following confirmation message will be displayed:

```
/* Caution! Network Element access is affected by this command.
```

```
You have selected the set-ne command with these parameters:
```

```
TID = SitenNEn  
DSNE = yes/no  
AlarmGroup = number  
AGNE = yes/no  
Site = site  
NE = ne  
IDLE = ais/unequipped  
CO/RT = co/rt  
TBOSAddress = number  
TBOSLink = value  
TBOSRemote = enabled/disabled */
```

```
Execute? (y/n or CANCEL/DElete to quit) =
```


For FiberReach Release 2.0 and earlier, changing the following parameters caused the NE to reset. If the **dsne**, **cort**, **tbaddr**, **tblink**, **tbrem**, **site**, or **ne** parameter is changed, the following caution message will be displayed before the confirmation message:

```
/* Caution! Network Element access is affected by this command.
```

```
Caution! When executed, this command causes the NE to
restart the program. This action will erase all of
the performance monitoring data and the history file.
If possible, it will reinitialize the date and time with
the far end via the DCC. Otherwise, the
date and time will assume default values.
You have selected the set-ne command with these parameters:
```

Starting with FiberReach Release 2.1, no reset is required for the special parameters listed previously and the DSNE parameter, which still requires a reset, is provisioned by the **reset** command.

RELATED COMMANDS

ins-prog

reset

rlgn

rtrv-ne

rtrv-map-network

NAME

set-oc1: Set OC-1 Characteristics

INPUT FORMAT

```
set-oc1:Address[:dgr=SignalDegradeThreshold]
[,aisalm=Alarm];
```

DESCRIPTION

This command sets the characteristics (parameters) of a specified OC-1 line.

The input parameters are:

Address Address identifies the OC-1 line(s).

Valid OC-1 Addresses: **all**, **main-{1,2,all}**

dgr SignalDegradeThreshold specifies the signal degrade threshold as a BER in terms of a logarithm to the base 10. When this threshold is crossed, an alarm will be raised. The value of this parameter has a range of -9 to -5. The default value is -6.
The signal degrade value for both addresses of each OC-1 line pair *must* be the same. Therefore, any change to signal degrade for one address will automatically be made to the other by the software.

aisalm This parameter is available in FiberReach Release 2.1 and later. Alarm is the provisioned alarm level of the NSA OC-1 line AIS and has the following values:

cr Critical alarm

mj Major alarm

mn Minor alarm

na Not alarmed, but reported (default)

When input, this command will cause the following confirmation request to be displayed (NonServiceAffecting AIS will be displayed for Release 2.1 and later):

```
/* Caution! Alarm or maint. thresholds and sync messages
are affected by this command.
You have selected the set-oc1 command with these parameters:

Address = x
SignalDegradeThreshold = -n

Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

rtrv-oc1

NAME

set-oc3: Set OC-3 Characteristics

INPUT FORMAT

```
set-oc3::Address[:dgr=SignalDegradeThreshold]
[,syncmsg=SynchronizationMessaging][,alarm=Alarm];
```

DESCRIPTION

This command sets several characteristics (parameters) of a specified OC-3 line or line pair, using the 28-type OLIU. The 28-type OLIU is available in FiberReach Release 2.2 and later releases.

The input parameters are:

Address	Address identifies the OC-3 line(s) or line pair(s). If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), the only OC-3 valid addresses are: main-{1,2,all}, all
dgr	SignalDegradeThreshold specifies the signal degrade threshold as a BER in terms of a logarithm to the base 10. When this threshold is crossed, an alarm will be raised and automatic protection switching of the service line will be initiated. The value of this parameter has a range of -9 to -5. The default value is -6. For ring releases, the signal degrade value for addresses of main-1 and main-2 <i>must</i> be the same. Therefore, any change to signal degrade for one address will automatically be made to the other by the software.
syncmsg	Synchronization messaging allows timing to be reconfigured in a network upon a node or fiber failure. This parameter has one of the following values:
Kbyte	This is the default value. When this option is selected, both K2 and S1 byte sync messages are transmitted, but only K2 byte is received and interpreted for sync messaging.
Sbyte	When this option is selected, only the S1 byte is sent and received for sync messaging. K2 byte will always send a "Don't Use" message.

⇒ NOTE:

To minimize the amount of time that DDM-2000 is in holdover mode when upgrading a ring network from **Kbyte** to **Sbyte** messages, it is recommended that the user first upgrade the nodes farthest away from the external timing

source, and then proceed to nodes closer to the timing source.

disabled When this option is selected, interpretation of both K2 and S1 bytes will be disabled and hence a "Don't Use" message will be transmitted on both bytes at all times.

aisalm Alarm is the provisioned alarm level of the NSA OC-3 line AIS and has the following values:

cr Critical alarm

mj Major alarm

mn Minor alarm

na Not alarmed, but reported (default).

If an attempt is made to execute this command, when a mix of incompatible OLIU packs exists in Main, the request will be denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* Both main slots must be equipped with compatible OLIU packs. */
```

When input, this command will cause the following confirmation request to be displayed:

```
/* Caution! Alarm or maint. thresholds and sync messages
are affected by this command.
You have selected the set-oc3 command with these parameters:

Address = x
SignalDegradeThreshold = -n
NonServiceAffectingAIS= value

Execute? (y/n or CANCEL/DElete to quit) =
```

Beginning with FiberReach Release 2.2 (if the shelf is equipped with 28-type OLIUs in Main unit slots), this command will cause the following confirmation request to be displayed:

```
/* Caution! Alarm or maint. thresholds and sync messages
are affected by this command.
You have selected the set-oc3 command with these parameters:

Address = x
SignalDegradeThreshold = -n
SynchronizationMessaging = value
NonServiceAffectingAIS= value

Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

rtrv-oc3

rtrv-sync

NAME

set-passwd: Set Password

INPUT FORMAT

set -passwd;

DESCRIPTION

This command changes a user's password. All users can change their own passwords. Privileged users can change other users' passwords by using the **set -lgn** command.

The following screen shows the dialog to change a password. In the dialog, the user input is shown in bold type.

⇒ NOTE:

Passwords will not be displayed when they are entered.

```
<set -passwd;
```

```
enter your old password = old_password  
enter your new password = new_password  
reenter your new password = new_password  
;
```

There are no default values for the old and new passwords.

A valid password is a case-sensitive ASCII string containing a minimum of six and a maximum of ten characters. The password must also include at least two numeric characters and one symbolic (non-alphabetic and non-numeric) character. The following symbolic characters have special meanings either for the User Interface or for the x.25 TL1 interface and cannot be included in a password:

;	semicolon	?	question mark
@	at sign		space
:	colon	=	equal sign
"	double quote	,	comma
\	back slash	!	exclamation point

Additionally, the following control characters and special keys CANNOT be included in a password:

<CR>	carriage return	<tab>	tab key
<bks>	backspace key	<esc>	escape key
<del>	delete key		

If the entered password value does not match the valid password definition (syntactically incorrect), the following message will be displayed:

```
/* Entry does not follow rules for passwords. */
/* Passwords must be 6 to 10 characters, with at least 2 non
   alphabetic characters and additionally, at least 1 symbolic.
   Characters allowed are: A..Z or a..z, 0..9, all symbolic
   characters, EXCEPT the following:
```

;	semicolon	?	question mark
@	at sign		space
:	colon	=	equal sign
"	double quote	,	comma
\	back slash	!	exclamation point

```
*/
```

enter your new password:

The user may try once again to enter a password. If the user tries again to enter a password that does not match the valid password definition, the following denial message will be displayed:

```
IDEI
/* Input, Data Entry Invalid */
/* Entry does not follow rules for passwords and logins. */
```

If a user is changing a password and the password entered does not match the present valid password, it will be rejected and the user will be prompted to try again. The user is allowed only one retry. If the user attempts and fails a second time, the entry will be denied with the following message and the old password will remain in effect:

```
PIPW
/* Privilege, Illegal Password. */
/* The old password remains in effect. */
```

If the new password that a user enters when changing a password meets the password definition requirements (syntactically correct), but does not match on its two entries (enter your new password; reenter your new password), the following message will be displayed:

```
/* The first and second entries of new password did not match. */
```

The user may try once again to change the password. If the user fails a second time to match the two entries, the following denial message will be displayed and the old password will remain in effect:

```
IDNC
/* Input, Data Not Consistent */
/* First and second entries of new password did not match.
   The old password remains in effect. */
```

RELATED COMMANDS

rtrv-lgn

set-lgn

set-secu

NAME

set-pmthres-line: Set Performance Monitoring Threshold Line

INPUT FORMAT

set - pmthres - line:

```
[QHB2CVOC3=nnnnn][,DayB2CVOC3=nnnnn]
[,QHB2CVOC1=nnnnn][,DayB2CVOC1=nnnnn][,QHB2ES=nnn]
[,DayB2ES=nnnnn][,QHB2ESA=nnn][,DayB2ESA=nnnnn]
[,QHB2ESB=nnn][,DayB2ESB=nnnnn][,QHB2SES=nn]
[,DayB2SES=nnnn][,QHB2UAS=nn][,DayB2UAS=nnnn]
```

where *nnn . . .* is a numerical value in the range given in the following parameter descriptions.

⇒ NOTE:

Parameters are shown in uppercase letters for readability. Parameters may be entered in either upper- or lowercase letters.

DESCRIPTION

This command sets the performance parameter thresholds of OC-1 (if the shelf is equipped with 26-type OLIUs in Main unit slots) or OC-3 (if the shelf is equipped with 28-type OLIUs in Main unit slots) lines and activates and deactivates the processing of threshold crossings for performance parameters. The 28-type OLIU is available with FiberReach Release 2.2 and later releases.

Entering a value of zero (0) for a parameter will disable thresholding for that parameter.

The input parameters are:

QHB2CVOC3	This parameter is available with FiberReach 2.2 and later releases. This parameter sets the threshold for the OC-3 coding violations count on a quarter-hourly basis. This parameter has a range of -10 through -7, corresponding to BERs of 10^{-10} through 10^{-7} , and an integer range of 0 through 13841. The default value is 1384. A negative value of this parameter indicates that the parity count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10.
DayB2CVOC3	This parameter is available with FiberReach 2.2 and later releases. A positive value of this parameter sets the threshold for the OC-3 coding violation count on a daily basis. This parameter has a range of -10 through -7, corresponding to BERs of 10^{-10} through 10^{-7} , and an integer range of 0 through 1328736. The default value is 132874. A negative value of this parameter sets the parity

count threshold in terms of an equivalent BER expressed as a logarithm to the base 10.

QHB2CVOC1	This parameter sets the threshold for the OC-1 coding violations count on a quarter-hourly basis. This parameter has a range of -10 through -7, corresponding to BERs of 10^{-10} through 10^{-7} , and an integer range of 0 through 4613. The default value is 461. A negative value of this parameter indicates that the parity count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10.
DayB2CVOC1	A positive value of this parameter sets the threshold for the OC-1 coding violation count on a daily basis. This parameter has a range of -10 through -7, corresponding to BERs of 10^{-10} through 10^{-7} , and an integer range of 0 through 442848. The default value is 44285. A negative value of this parameter sets the parity count threshold in terms of an equivalent BER expressed as a logarithm to the base 10.
QHB2ES	This parameter sets the threshold for the ES type A count on a quarter-hourly basis. This parameter is an integer with range 0 through 900 and a default value of 40.
DayB2ES	This parameter sets the threshold for the ES type A count on a daily basis. This parameter is an integer with range 0 through 65535 and default value of 900.
QHB2ESA	This parameter sets the threshold for the ES type A count on a quarter-hourly basis. This parameter is an integer with range 0 through 900 and default value of 30.
DayB2ESA	This parameter sets the threshold for the ES type A count on a daily basis. This parameter is an integer with range 0 through 65535 and default value of 90.
QHB2ESB	This parameter sets the threshold for the ES type B count on a quarter-hourly basis. This parameter is an integer with range 0 through 900 and default value of 30.
DayB2ESB	This parameter sets the threshold for the ES type B count on a daily basis. This parameter is an integer with range 0 through 65535 and default value of 90.
QHB2SES	This parameter sets the threshold for the SES count on a quarter-hourly basis. This parameter is an integer with range 0 through 63 and default value of 20.
DayB2SES	This parameter sets the threshold for the SES count on a daily basis. This parameter is an integer with range 0 through 4095 and default value of 60.

QHB2UAS

This parameter sets the threshold for the UAS count on a quarter-hourly basis. This parameter is an integer with range 0 through 63 and default value of 30.

DayB2UAS

This parameter sets the threshold for the UAS count on a daily basis. This parameter is an integer with range 0 through 4095 and default value of 90.

The following table shows the error counts equivalent to different BER thresholds for OC-1.

B2 OC1 Line Errors

BER Threshold	Equivalent 15 Min. Threshold (QHB2CVOC1)	Equivalent Day Threshold (DayB2CVOC1)
-7	4613	442848
-8	461	44285
-9	46	4428
-10	5	443

RELATED COMMANDS

init-pm

rtrv-pm-line

rtrv-pm-tca

rtrv-pmthres-line

set-pmthres-sect

NAME

set-pmthres-sect: Set Performance Monitoring Threshold Section

INPUT FORMAT

set - pmthres - sect:[**Qhsefs**=*nn*][,**Daysefs**=*nnnn*];

DESCRIPTION

This command sets the performance-monitoring thresholds of an OC-1 section as well as activating and deactivating the processing of threshold crossings for performance parameters.

The input parameters are:

Qhsefs	This parameter sets the threshold for SEFS on a quarter-hourly basis. This parameter is an integer with range of 0 through 63 and default value of 10. Entering a parameter value of zero (0) will disable thresholding for this parameter.
Daysefs	This parameter sets the threshold for SEFS on a daily basis. This parameter is an integer with range of 0 through 4095 and a default value of 30. Entering a parameter value of zero (0) will disable thresholding for this parameter.

RELATED COMMANDS

init-pm

rtrv-pm-sect

rtrv-pm-tca

rtrv-pmthres-sect

NAME

set-pmthres-sts1: Set Performance Monitoring Threshold STS-1

INPUT FORMAT

```
set -pmthres - sts1:[QHB3CV=nnnn][,DayB3CV=nnnnnn][,QHB3ES=nnn]
[,DayB3ES=nnnnnn][,QHB3ESA=nnn][,DayB3ESA=nnnnnn][,QHB3ESB=nnn]
[,DayB3ESB=nnnnnn][,QHB3SES=nn][,DayB3SES=nnnn][,QHB3UAS=nn]
[,DayB3UAS=nnnn];
```

where *nnn* . . . is the numerical value given in the following parameter descriptions.

⇒ NOTE:

Parameters are shown in upper-case letters for readability. Parameters may be entered in either upper- or lower-case letters.

DESCRIPTION

This command provisions STS-1 path performance parameter thresholds as well as enabling and disabling the processing of threshold crossings for the various parameters. Entering a parameter value of zero (0) will disable thresholding for that parameter.

The input parameters are:

QHB3CV	This parameter sets the threshold for the coding violations count on a quarter-hourly basis. A negative value of this parameter indicates that the parity count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10. This parameter has a range of -10 through -7, corresponding to BERs of 10^{-10} through 10^{-7} , and an integer range of 0 through 4510. The default value is 451.
DayB3CV	This parameter sets the threshold for the coding violations count on a daily basis. A negative value of this parameter indicates that the parity count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10. This parameter has a range of -10 through -7, corresponding to BERs of 10^{-10} through 10^{-7} , and an integer range of 0 through 432960. The default value is 43296.
QHB3ES	This parameter sets the threshold for errored seconds on a quarter-hourly basis. This parameter has an integer range of 0 through 900, and a default value of 40.
DayB3ES	This parameter sets the threshold for errored seconds on a daily basis. This parameter has an integer range of 0 through 65535, and a default value of 900.

QHB3ESA	This parameter sets the threshold for type A errored seconds on a quarter-hourly basis. A type A ES is a second with a single error. This parameter has an integer range of 0 through 900, and a default value of 30.
DayB3ESA	This parameter sets the threshold for type A errored seconds on a daily basis. A type A ES is a second with a single error. This parameter has an integer range of 0 through 65535, and a default value of 90.
QHB3ESB	This parameter sets the threshold for type B errored seconds on a quarter-hourly basis. A type B ES is a second with more than one error, but less than the number of errors in a severely errored second. This parameter has an integer range of 0 through 900, and a default value of 30.
DayB3ESB	This parameter sets the threshold for type B errored seconds on a daily basis. A type B ES is a second with more than one error, but less than the number of errors in a severely errored second. This parameter has an integer range of 0 through 65535, and a default value of 90.
QHB3SES	This parameter sets the threshold for the severely errored frame seconds count on a quarter-hourly basis. This parameter has an integer range of 0 through 63, and a default value of 20.
DayB3SES	This parameter sets the threshold for the severely errored frame seconds count on a daily basis. This parameter has an integer range of 0 through 4095, and a default value of 60.
QHB3UAS	This parameter sets the threshold for unavailable seconds on a quarter-hourly basis. This parameter has an integer range of 0 through 63, and a default value of 30.
DayB3UAS	This parameter sets the threshold for unavailable seconds on a daily basis. This parameter has an integer range of 0 through 4095, and a default value of 90.

The following table shows the error counts equivalent to different BER thresholds.

B3 STS-1 Path Errors

BER Threshold	Equivalent 15 Min. Threshold (QHB3CV)	Equivalent Day Threshold (DayB3CV)
-7	4510	432960
-8	451	43296
-9	45	4330
-10	5	433

RELATED COMMANDS

init-pm

rtv-pmthres-sts1

rtv-pm-sts1

rtv-pm-tca

NAME

set-pmthres-t1: Set Performance Monitoring Threshold T1

INPUT FORMAT

set - pmthres - t1:[DayESL=nnnn][,DayCVPSF=nnnn][,DayCVPESF=nnnn]
[DayESP=nnnnnn][,DaySESP=nnnnnnnn][,DayUASP=nnn][,DayCVPFE=nnnn]
[,DayESPFE=nnnnnn][,DaySESPFE=nnn][,DayUASPFE=nnnnnn]
(For DDM-2000 FiberReach Release 2.0 and earlier)

set - pmthres - t1:[QHESL=nnn][DayESL=nnnnnn][,QHCVPSPF=nnnnnn][,DayCVPSF=nnnnnnnn]
[,QHCVPSF=nnnnnn][,DayCVPESF=nnnnnnnn][,QHESP=nnn][DayESP=nnnnnn]
[,QHSESP=nn][,DaySESP=nnnn][,QHUASP=nn][,DayUASP=nnnn]
[,QHCVPF=nnnnnn][,DayCVPFE=nnnnnnnn][,QHESPFE=nnn][,DayESPFE=nnnnnn]
[,QHSESPFE=nn][,DaySESPFE=nnnn][,QHUASPFE=nn][,DayUASPFE=nnnn]
(For DDM-2000 FiberReach Release 2.1 and later)

where *nnn . . .* is a numerical value in the range given in the following parameter descriptions.

⇒ NOTE:

Parameters are shown in upper-case letters for readability. Parameters may be entered in either upper- or lower-case letters.

DESCRIPTION

This command sets DS1 path and line performance monitoring thresholds. This command also enables and disables the processing of threshold crossing alerts (TCAs) for these parameters.

This command may only be used if the **ds1pm** feature is enabled via the **set - feat** command.

Entering a value of zero (0) for a parameter will disable thresholding for that parameter.

A negative integer threshold value indicates that the threshold is specified in terms of an equivalent Bit Error Ratio (BER) of 10^n .

The input parameters are:

QHESL This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the errored second line (ESL) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 900 and a default value of 65.

DayESL	This parameter sets the threshold for the errored second line (ESL) count on a daily basis. This parameter is an integer with a range of 0 through 65535 and a default value of 648.
QHCVPSPF	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the code violations path SF (CVPSPF) count on a quarter-hourly basis. A negative value of this parameter indicates that the code violation count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10. This parameter has a range of -7 through -5, corresponding to BERs of 10^{-7} through 10^{-5} , and an integer range of 0 through 16383. The default value is 72.
DayCVPSPF	This parameter sets the threshold for the code violations path SF (CVPSPF) count on a daily basis. A negative value of this parameter indicates that the code violation count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10. This parameter has a range of -8 through -5, corresponding to BERs of 10^{-8} through 10^{-5} , and an integer range of 0 through 1048575. The default value is 691.
QHCVPESF	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the code violations path ESF (CVPESF) count on a quarter-hourly basis. A negative value of this parameter indicates that the code violation count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10. This parameter has a range of -8 through -5, corresponding to BERs of 10^{-8} through 10^{-5} , and an integer range of 0 through 16383. The default value is 13296.
DayCVPESF	This parameter sets the threshold for the code violations path ESF (CVPESF) count on a daily basis. A negative value of this parameter indicates that the code violation count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10. This parameter has a range of -8 through -5, corresponding to BERs of 10^{-8} through 10^{-5} , and an integer range of 0 through 1048575. The default value is 132960.
QHESP	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the errored second path (ESP) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 900 and a default value of 65.
DayESP	This parameter sets the threshold for the errored second path (ESP) count on a daily basis. This parameter is an integer with a range of 0 through 65535 and a default value of 648.

QHSESP	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the severely errored second path (SESP) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 63 and a default value of 10.
DaySESP	This parameter sets the threshold for the severely errored second path (SESP) count on a daily basis. This parameter is an integer with a range of 0 through 4095 and a default value of 100.
QHUASP	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the unavailable second path (UASP) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 63 and a default value of 10.
DayUASP	This parameter sets the threshold for the unavailable second path (UASP) count on a daily basis. This parameter is an integer with a range of 0 through 4095 and a default value of 10.
QHCVPFE	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the code violations path far-end (CVPFE) count on a quarter-hourly basis. A negative value of this parameter indicates that the code violation count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10. This parameter has a range of -8 through -5, corresponding to BERs of 10^{-8} through 10^{-5} , and an integer range of 0 through 16383. The default value is 13296.
DayCVPFE	This parameter sets the threshold for the code violations path far-end (CVPFE) count on a daily basis. A negative value of this parameter indicates that the code violation count threshold is specified in terms of an equivalent BER expressed as a logarithm to the base 10. This parameter has a range of -8 through -5, corresponding to BERs of 10^{-8} through 10^{-5} , and an integer range of 0 through 1048575. The default value is 132960.
QHESPFE	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the errored second path far-end (ESPFE) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 900 and a default value of 65.
DayESPFE	This parameter sets the threshold for the errored second path far-end (ESPFE) count on a daily basis. This parameter is an integer with a range of 0 through 65535 and a default value of 648.

QHSESPFE	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the severely errored second path far-end (SESPFE) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 63 and a default value of 10.
DaySESPFE	This parameter sets the threshold for the severely errored second path far-end (SESPFE) count on a daily basis. This parameter is an integer with a range of 0 through 4095 and a default value of 100.
QHUASPFE	This parameter applies to FiberReach Release 2.1 and later releases. This parameter sets the threshold for the unavailable second path far-end (UASPFE) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 63 and a default value of 10.
DayUASPFE	This parameter sets the threshold for the unavailable second path far-end (UASPFE) count on a daily basis. This parameter is an integer with a range of 0 through 4095 and a default value of 10.

The following tables show the error counts equivalent to different BER thresholds.

DS1 Coding Violations-Path (SF)

BER Threshold	Equivalent 15 Min. Threshold (QHCVP)	Equivalent Day Threshold (DayCVP)
-5	72	6912
-6	7	691
-7	1	69
-8	--	7

DS1 Coding Violations-Path (ESF)

BER Threshold	Equivalent 15 Min. Threshold (QHCVP)	Equivalent Day Threshold (DayCVP)
-5	13842	1328832
-6	1384	132883
-7	138	13288
-8	14	1329

This command may only be used if the `ds1pm` feature is enabled via the **set-feat** command. If this feature is not enabled, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available, feature disabled */
```

If this command is entered on a DDM-2000 loaded with a release of software that does not currently support this feature, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available in this release */
```

RELATED COMMANDS

rtrv-feat

rtrv-pmthres-t1

set-feat

NAME

set-pmthres-vt1: Set Performance Monitoring Threshold VT1.5

INPUT FORMAT

set - pmthres - vt1:[QHV5ES=nnnnn][,DayV5ES=nnnnnnn][,QHV5SES=nnn]
[,DayV5SES=nnnnn][,QHV5UAS=nnn][,DayV5UAS=nnnnn];

where *nnn*. . . . is a numerical value in the range given in the following parameter descriptions.

⇒ NOTE:

Parameters are shown in upper-case letters for readability. Parameters may be entered in either upper- or lower-case letters.

DESCRIPTION

This command sets VT1.5 path performance monitoring thresholds. This command also enables and disables the processing of threshold crossing alerts (TCAs) for these parameters.

This command may only be used if the `vtpm` feature is enabled via the **set - feat** command. Entering a value of zero (0) for a parameter will disable thresholding for that parameter.

The input parameters are:

QHV5ES	This parameter sets the threshold for the errored second (ES) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 900 and a default value of 40.
DayV5ES	This parameter sets the threshold for the errored second (ES) count on a daily basis. This parameter is an integer with a range of 0 through 65535 and a default value of 900.
QHV5SES	This parameter sets the threshold for the severely errored second (SES) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 63 and a default value of 20.
DayV5SES	This parameter sets the threshold for the severely errored second (SES) count on a daily basis. This parameter is an integer with a range of 0 through 4095 and a default value of 60.

- QHV5UAS** This parameter sets the threshold for the unavailable second (UAS) count on a quarter-hourly basis. This parameter is an integer with a range of 0 through 63 and a default value of 30.
- DayV5UAS** This parameter sets the threshold for the unavailable second (UAS) count on a daily basis. This parameter is an integer with a range of 0 through 4095 and a default value of 90.

This command may only be used if the `vtpm` feature is enabled via the **set-feat** command. If this feature is not enabled, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available, feature disabled */
```

If this command is entered on a DDM-2000 loaded with a release of software that does not currently support this feature, the following denial message will be displayed:

```
SSTP
/* Status, execution STopped */
/* Command not available in this release */
```

RELATED COMMANDS

`rtrv-feat`

`rtrv-pmthres-vt1`

`set-feat`

NAME

set-secu: Set Security

INPUT FORMAT

set - secu:*address[:sec=Security][,to=Timeout];*

DESCRIPTION

This command configures NE system security on each CIT and DCC interface.

FiberReach Release 2.0 and earlier, the three default logins are ATT01, ATT02, and ATT03 (all uppercase letters). For FiberReach Release 2.1 and later, the three default logins are LUC01, LUC02, and LUC03 (all uppercase letters). The default password is DDM-2000. Privileged users should change these defaults before enabling security or setting security to a lockout state.

 NOTE:

This command is available to privileged users only.

The input parameters are:

address Address is the address of one or more CIT and/or DCC ports. There is no default address.

Valid Addresses: **dcc-all**, **cit-1**

sec Security determines whether security is enabled, disabled, or in lockout state on the specified CIT and DCC port(s). Enabling security requires users to enter a valid login and password pair to access the system via the specified CIT or DCC-all.

The values for this parameter are **enabled**, **disabled** (default value), and **lockout**.

When security is in lockout state, **privileged** is the only user type permitted to access the system through the locked out CIT/DCC port; all **non-privileged** users, even with a valid login and password pair, are not allowed to access the system.

 NOTE:

When in lockout state, non-privileged users are not deleted from the login/password database, but are simply blocked from accessing the system. Currently **active** login sessions initiated by non-privileged users are not affected (that is, not dropped) if security is set to **lockout**.

to Timeout specifies the time, in minutes, before an inactive session is automatically terminated. This has a value ranging from 0 to 120 minutes, and a default value of 15 minutes. Setting this parameter to 0 will disable the timeout function.

Execution of this command affects all subsequent attempts to establish login sessions but does not affect currently active sessions.

When security is enabled, the following four types of users are permitted to access the system with a valid login and password:

privileged user	The privileged user may execute any commands, including restricted commands.
general user	The general user may execute any commands not restricted to privileged users.
maintenance	The maintenance user may only execute commands that access the system, extract reports, and execute maintenance functions through a specific set of commands. This user may not execute any privileged commands.
reports-only	The reports-only user may only execute commands that extract reports from the system and several other basic commands.

When security is enabled on a system, only the following commands may be executed by reports-only users:

- **? (help)**
- **logout** (logout)
- **rlgn** (remote login)
- **set-passwd** (set password)
- **set-link** (set link)
- **^T** (toggle)
- all **rtrv** commands except **rtrv-lgn**.

In addition to **set-secu**, the commands **init-sys**, **rtrv-lgn**, **set-fecom**, **set-feat**, **set-lgn**, **set-sync**, **rtrv-passwd**, and **rstr-passwd** are restricted to privileged users only. The following commands also become restricted to privileged users only when security is enabled on a system:

- **cpy-prog** (copy program)
- **ent-ulsdcc** (enter upper layer section DCC)
- **init-pm** (initialize performance-monitoring)
- **ins-prog** (install program)
- **reset** (reset system software)
- **set-date** (set date)
- **set-ne** (set network element)
- **ent-tl1msgmap** (enter TL1 message map)

Entering this command will cause the following confirmation message to be displayed:

```
/* Caution! Network Element access is affected by this command.
   You have selected the set-secu command with these parameters:

   Address = address
   Security = security
   Timeout = n */

Execute? (y/n or CANCEL/DELeTE to quit) =
```

RELATED COMMANDS

rtrv-lgn

rtrv-secu

set-fecom

set-lgn

NAME

set-state-sts1: Set State of STS-1 Channels

INPUT FORMAT

set-state-sts1:Address:ps=PrimaryState;

DESCRIPTION

This command sets the states of STS-1 channels. It is used to turn on and off the monitoring of signal failures and maintenance signals for specified channels.

The input parameters are:

Address Address identifies the STS-1 channel(s).

If the shelf is equipped with 26-type OLIUs in Main unit slots, valid address is:

m-1.

If the shelf is equipped with 28-type OLIUs in Main (available in Release 2.2 and later), unit slots, valid addresses are:

m-{1-3,all}

ps PrimaryState is the channel state which may have one of the following values:

auto Set the channel state to "Automatic." Monitor the channel, but do not report alarm or status conditions. When a good signal is detected, automatically change the channel state to "In Service" and begin normal reporting of alarm and status conditions.

nmon Set the channel state to "Not Monitored." Do not report alarm or status conditions for the channel. Do not change the channel state to "In Service" if a good signal is detected. The channel will remain in this state until the state is changed again with this command or until the cross-connection involving this channel is deleted.

If a primary state of **nmon** is entered, the following message will be displayed:

```
/* Channel(s) address will not be monitored or
   alarmed in this state */
```

The following confirmation message will be displayed after the command entry:

```
/* Caution! Alarm or maint. thresholds are affected by this command.  
You have selected set-state-sts1 command with these parameters:  
  
Address = x  
PrimaryState = x */  
  
Execute? (y/n or CAncel/DELeTe to quit) =
```

If an attempt is made to execute this command, when a mix of incompatible OLIU packs exists in main (for example, during the in-service upgrade from 22-type OLIU to 24-type OLIU), the request will be denied with the following message:

```
SNVS  
/* Status, Not in Valid State */  
/* Both main slots must be equipped with compatible OLIU packs. */
```

RELATED COMMANDS

ent-crs-vt1

dlt-crs-vt1

rtrv-state-sts1

upd

NAME

set-state-t1: Set T1 Port State

INPUT FORMAT

set-state-t1:Address:ps=PrimaryState;

DESCRIPTION

This command sets the state of DS1 or T1 ports. This command is used to turn on and off the alarm due to signal failures from a specified port.

The input parameters are:

Address Address identifies the DS1 or T1 port(s).

Valid Addresses (1x1 protected configuration): **all**,
{a,b,c,d}-{1,all}-{1-4,all}

Valid Addresses (1x7 protected configuration): **all**,
{a,b,c}-{1,2,all}-{1-4,all}, d-1-{1-4,all}

The BBF6 circuit pack supports 2 T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid. Specifying **all** selects ports 1 and 2 only.

ps PrimaryState is the port state which may have one of the following values:

auto Set state to be monitored for good signal at the specified port.

nmon Set state to "not-alarmed" (not monitored).

⇒ NOTE:

If a port is in the **nmon** state, it must be returned to the **auto** state, using this command, before any circuit packs associated with that port can be removed from the equipment list by the **upd** command.

If a primary state of **nmon** is entered, the following message will be displayed:

/* Port(s) *address* will not be alarmed in this state */

The following confirmation message will be displayed after the command entry:

```
/* Caution! Alarm or maint. thresholds are affected by this command.  
You have selected set-state-t1 command with these parameters:  
  
Address = x  
PrimaryState = x */  
  
Execute? (y/n or CAnCel/DElete to quit) =
```

RELATED COMMANDS

rtrv-t1

rtrv-state

upd

NAME

set-state-vt1: Set State of VT1.5 Channels

INPUT FORMAT

set-state-vt1:Address:ps=PrimaryState;

DESCRIPTION

This command sets the states of VT1.5 channels within OC-1 interfaces. It is used to turn on and off the monitoring of signal failures and maintenance signals for specified channels.

The input parameters are:

Address Address identifies the VT1.5 channel(s). If the shelf is equipped with 26-type OLIUs in Main unit slots, valid addresses are:

m-1-all, m-1-{1-7}-{1-4,all}

If the shelf is equipped with 28-type OLIUs in Main slots (available in Release 2.2 and later), valid addresses are:

m-{1-3,all}-{1-7,all}-{1-4,all}

Channel states can be set for VT1.5 channels within OC-1 interfaces that are cross-connected to DS1 interfaces.

ps PrimaryState is the channel state which may have one of the following values:

auto Set the channel state to "Automatic." Monitor the channel, but do not report alarm or status conditions. Do not do performance monitoring for this channel. When a good signal is detected, automatically change the channel state to "In Service."

nmon Set the channel state to "Not Monitored." Do not report alarm or status conditions for the channel. Do not do performance monitoring for this channel. Do not change the channel state to "In Service" if a good signal is detected. The channel will remain in this state until the state is changed again with this command or until the cross-connection involving this channel is deleted.

If a primary state of **nmon** is entered, the following message will be displayed:

```
/* Channel(s) address will not be monitored or  
   alarmed in this state */
```

The following confirmation message will be displayed after the command entry:

```
/* Caution! Alarm or maint. thresholds are affected by this command.  
   You have selected set-state-vt1 command with these parameters:  
  
   Address = x  
   PrimaryState = x */  
  
Execute? (y/n or CANCEL/DELETE to quit) =
```

If an attempt is made to execute this command, when a mix of incompatible OLIU packs exists in main (for example, during the in-service upgrade from 22-type OLIU to 24-type OLIU), the request will be denied with the following message:

```
SNVS  
/* Status, Not in Valid State */  
/* Both main slots must be equipped with compatible OLIU packs. */
```

RELATED COMMANDS

dlt-crs-vt1

ent-crs-vt1

rtrv-crs-vt1

rtrv-state-vt1

set-state-sts1

NAME

set-sts1: Set STS-1 Characteristics

INPUT FORMAT

set-sts1: *address:dgr=SignalDegrade:sfail=SignalFailure[,nsa=Alarm]*
[,sa=Alarm];

DESCRIPTION

This command provisions the following three types of parameters for STS-1 channels:

Signal Degrade Alarm Threshold:

This parameter is only provisioned for ring channels (for example, incoming STS-1 channels on optical linear extensions in ring systems are not monitored). Possible values are 10^{-5} through 10^{-9} , with a default value of 10^{-6} . Only the 26-type and 28-type (available in Release 2.2 and later) OLIU circuit packs support the provisionable signal degrade function.

Signal Fail Alarm Threshold:

This parameter is only provisioned for ring channels. Possible values are 10^{-3} and 10^{-6} , with a default value of 10^{-3} .

Alarm Level for sa/nsa STS Path AIS Condition:

The alarm level for both service affecting and non-service affecting path AIS conditions can be provisioned in Release 2.1 and later.

The input parameters are:

Address Address identifies the STS-1 channels.

Valid Address: **all**, **m-1** (Release 2.1 and later)

Releases prior to Release 2.1 do not accept an address parameter.

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), the valid addresses are:

m-{1-3,all}, **all**

dgr *SignalDegrade* specifies a bit error rate (BER) threshold for the STS-1 channel in terms of a logarithm to base 10. When this threshold is crossed, an alarm will be raised and automatic protection switching to the STS-1 protection path will be initiated. For Releases 2.1 and later, the only valid address for the SignalDegrade parameter is **all**. For FiberReach, the signal degrade is an integer with range -5 through -9 and default or original value of -6.

sfail *SignalFailure* specifies the BER of the STS-1 channel in terms of a logarithm to the base 10. Meeting or exceeding this threshold in a "VT Path_Switched ring" is considered a signal fail condition, resulting in a VT AIS insertion and subsequently causing a VT path protection switching. The only valid address for the SignalFailure parameter is **all**. This parameter can have one of the following values:

- 3 BER threshold resulting in VT AIS insertion in a "VT Path_switched ring" and causing the VT path protection switching (default).
- 6 If provisioned, this BER threshold will result in VT AIS insertion in a "VT Path_Switched ring", and will cause a VT path protection switching.

nsa This parameter is available in FiberReach Release 2.1 and later. This parameter is the provisioned alarm level of the non-service affecting STS-1 path AIS and has the following values:

- mn** Minor alarm (default)
- nr** Not alarmed and not reported.

sa This parameter is available in FiberReach Release 2.1 and later. This parameter is the provisioned alarm level of the service affecting STS-1 path AIS and has the following values:

- cr** Critical alarm (default for ring channels)
- na** Not alarmed, but reported

Starting with Release 2.1, if the signal degrade or signal fail threshold parameter is entered and the address used is any value other than **all** the command will be denied with the following message:

```
/* The only valid address for the signal degrade or the signal
   fail parameter is { all }.
   To set the signal degrade parameter enter
   set-sts1:all:dgr=value; */
```

To provision the AIS parameters requires that at least one VT cross-connection exist in the specified address range or the command will not execute, and the following message will be displayed.

```
SNVS
/* Status, Not in Valid State */
/* The specified path is not properly cross-connected. */
```

In Release 2.0 and earlier, if the main slots are not equipped at all, the command will be denied with the following message:

```
ENEQ
/* Equipage, Not EQuipped */
/* Circuit pack type with signal degrade function is missing. */
```

Starting with Release 2.1, this denial is removed.

The following confirmation message will be displayed after the command entry (**ServiceAffectingAIS** and **NonServiceAffectingAIS** parameters will only appear in Release 2.1 and later):

```
/* Caution! Alarm or maint. thresholds are affected by this command.
You have selected the set-sts1 command with this parameter:

SignalDegrade = <value>
SignalFailure = <value>
ServiceAffectingAIS = <value>
NonServiceAffectingAIS = <value> */

Execute? (y/n or CANcel/DElete to quit) =
```

RELATED COMMANDS

rtrv-sts1

NAME

set-sync: Set Synchronization Characteristics

DESCRIPTION**CAUTION:**

Execution of this command may affect service.

This command provisions the synchronization mode switching, synchronization source, and output mode of timing signals when the 26-type or 28-type OLIU's timing hardware is provisioned to be line-timed. The 28-type OLIU is available with FiberReach 2.2 and later releases.

For FiberReach the only provisioned timing mode is line-timed from an incoming optical interface. This timing reference is used to generate all outgoing signals.

Use of this command may affect timing for other network elements of the timing network.

**NOTE:**

This command is available to privileged users only for all CIT or DCC ports on the shelf.

INPUT FORMAT**RING SYSTEMS - LINE TIMED**

set - sync :[mdsw=*ModeSwitching*][,src=*SynchronizationSource*]

set - sync :[mdsw=*ModeSwitching*][,src=*Synchronizatio Source*]
[,auto=*SyncAutoreconfiguration*];
(When equipped with 28-type OLIUs in Main, Release 2.2 and later)

The input parameters are:

mdsw ModeSwitching may have one of the following values:

revertive	Revertive mode switching (default value). If the system switches to holdover timing mode due to a failure of the timing references, it will automatically switch back to the provisioned timing mode (LineTimed) after one of the references becomes good.
nonrevertive	Nonrevertive mode switching. If the system switches to holdover timing mode due to a failure of the timing references, it will <i>not</i> automatically switch back to the provisioned timing

mode (*LineTimed*) mode after the reference becomes good. The **switch-sync** command must be used to restore the system to the provisioned timing mode (*LineTimed*).

src SynchronizationSource. This parameter selects the line from which shelf line timing will be derived. **Src** may have one of the following values:

main-1 (default)

main-2

auto This parameter is available with FiberReach Release 2.2 and later. SyncAutoreconfiguration allows the system to choose the best timing source to use when it is provisioned for Line Timing. The synchronization source selection is based on the synchronization messages received from the available timing (synchronization) sources. Automatic Protection Switching takes place to the standby timing source when the active source fails. The switch is nonrevertive, and there will not be an automatic switch back to the former timing reference.

When SyncAutoreconfiguration is enabled, the system automatically reconfigures between line timing sources **main-1** and **main-2** (if the shelf is equipped with 28-type OLIUs in Main unit slots).

⇒ NOTE:

When the shelf is equipped with 26-type OLIUs, *auto* is **enabled** by default. When the shelf is equipped with 28-type OLIUs, *auto* is **disabled** by default.

Use the **switch-sync** command to manually switch to the other timing source.

The valid values are:

enabled SyncAutoreconfiguration is active.

disabled SyncAutoreconfiguration is not active.

When sync messages are active and a user requests to set the timing source to a LineTime source which has a sync message that does not support timing, the command will be completed, but the following message will be displayed:

```
/* Source selected currently is unusable for timing.  
Timing will switch to the other source, or to holdover if  
other source is unacceptable */
```

If this command is entered and both MAIN slots are empty, the command will be denied with the following message:

```
EQWT  
/* Equipage, Wrong Type */  
/* No change in provisioning - both main slots are unequipped */
```

For SyncAutoreconfiguration, several other parameters must be set before this feature can be enabled. If these parameters are not set, the SyncAutoreconfiguration request will be denied with the following message:

```
SNVS  
/* Status, Not in Valid State */  
/* <message reason>  
Sync Autoreconfiguration cannot be enabled */
```

Valid message reasons include the following:

- K byte messages disabled
- Sync messages disabled
- Shelf not line timed

The following confirmation message will be displayed after command entry:

```
/* Caution! Execution of this command may modify network
synchronization and affect service.
You have selected the set-sync command with these parameters:

ModeSwitching = x
SynchronizationSource = x

Execute? (y/n or CANCEL/DELETE to quit) =
```

Starting with Release 2.2, if both Main unit slots are equipped with 28-type OLIUs, the following confirmation message will be displayed after command entry:

```
/* Caution! Execution of this command may modify network
synchronization and affect service.
You have selected the set-sync command with these parameters:

ModeSwitching = x
SynchronizationSource = x
SyncAutoreconfiguration = x */

Execute? (y/n or CANCEL/DELETE to quit) =
```

When SyncAutoreconfiguration is available and its value is being changed from **enabled** to **disabled**, the following confirmation message will be displayed after command entry:

```
/* Caution! Execution of this command may modify network
synchronization and affect service. Executing this command with
auto=disabled will disable autonomous selection of source for
shelf timing.
You have selected the set-sync command with these parameters:

ModeSwitching = x
SynchronizationSource = x
OutputMode = x
SyncAutoreconfiguration = disabled */

Execute? (y/n or CANCEL/DELeTe to quit) =
```

If an attempt is made to execute this command when a mix of incompatible OLIU packs exists in the MAIN slots (for example, during the in-service upgrade from 22-type OLIU to 24-type OLIU), the request will be denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* Both main slots must be equipped with compatible OLIU packs. */
```

RELATED COMMANDS

rtrv-sync

set-oc3

set-oc12

switch-sync

NAME

set-t1: Set T1 Characteristics

INPUT FORMAT

```
set -t1: address[:lc=LineCode][,alm=AlarmLevel][,fth=FailureThreshold]
[,dlc=DLCBPVtoLOS][,ais=AlarmIndicationSignal][,pmmd=PMMode]
[,fmt=Format];
```

DESCRIPTION**CAUTION:**

Execution of this command may affect service.

This command sets the parameters of one or more DS1 or T1 ports. These characteristics include alarm levels, line coding, failure thresholds, and AIS conditions.

**NOTE:**

The DS1 protection circuit pack is automatically provisioned with all the same user-settable options as the service pack it protects, except for the line buildout (LBO) value (which is not provisioned via the CIT).

The input parameters are:

Address Address is the address of the DS1 or T1 port(s) to be provisioned. One port or more may be specified.

Valid Addresses (1x1 protected configurations): **all**,
{a,b,c,d}-all, **{a,b,c,d}-1-{1-4,all}**

Valid Addresses (1x7 protected configurations): **all**,
{a,b,c,d}-all, **{a,b,c}-{1,2}-{1-4,all}**
d-1-{1-4,all}

The BBF6 circuit pack supports 2 T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid. Specifying **all** selects ports 1 and 2 only.

lc LineCode is the DS1 line coding which may be one of the following:

ami Alternate Mark Inversion (overrides the linecode switch)

b8zs Bipolar with 8 Zero Substitution (overrides the linecode switch)

noOverride No override of the linecode switch (default value).

If either **ami** or **b8zs** is selected, the line code will be set to the selected value and a software override will be active even if the selected value matches the current switch setting. While the software override is active, changes in the switch settings will not affect the line code. A software override will remain active until the set-t1 command is executed again and the **noOverride** option is selected or until the associated circuit pack is removed from the equipment list.

alm AlarmLevel sets the alarm level for an incoming DS1 Signal Failure and may be one of the following:

mj Major Alarm

mn Minor Alarm

na No Alarm (default value).

If the system is provisioned for no alarm, the NE ACTY LED on the user panel will be illuminated, and the fault LED on the circuit pack will flash. The condition will be reported in the alarm and status report as a near-end activity.

fth FailureThreshold sets the failure threshold in terms of a logarithm to the base 10. The value may be -8, -7, -6, or -3, corresponding to BERs of 10^{-8} , 10^{-7} , 10^{-6} , and 10^{-3} , respectively. The default value is -3. When the failure threshold is crossed, an alarm will be raised and automatic protection switching of the service line will be initiated.

dlc (bpv) DLCBPVtoLOS determines whether an incoming DS1 signal failure (a bit error rate above the failure threshold set by the **fth** parameter, above) will be translated to an outgoing DS1 loss of signal (all zeros) at the far end. The value is either **yes** or **no**. The default value is **no**. Setting this parameter to **yes** permits a digital loop carrier system terminal (such as the SLC® 96 carrier system) to detect the loss of signal and initiate protection switching of the DS1. When the parameter is set to **yes**, the **ais** parameter is automatically set to no. (An all zeros signal, not AIS, is transmitted to the far end even if the **AIS** parameter is set to **yes**.)

ais AlarmIndicationSignal determines whether an AIS should be inserted towards the optical fiber when a loss of incoming DS1 signal is detected. The values are **yes** and **no**; the default value is **yes**. This parameter is ignored if the **bpv** parameter (described above) is set to **yes**.

- pmmd** This parameter sets the mode for ports supported by the DS1 performance-monitoring circuit pack. **Pmmd** is only used for performance-monitoring. Setting this parameter does not affect the transmitted or received signal. This parameter may be one of the following values:
- off DS1 PM turned off (default value)
 - on DS1 PM turned on (only if CP type is BBF3 or BBF6).
- fmt** Format supports the PMMode parameter. It is available only if CP type is BBF3 or BBF6. This parameter sets the format to be monitored by the DS1 performance-monitoring or T1EXT circuit pack. **Fmt** is only used for performance-monitoring. Setting this parameter does not affect the transmitted or received signal. This parameter may be one of the following values:
- sf Superframe
 - esf Extended superframe, near end and far end. (default)
 - esfn Extended superframe, near end only.

The following confirmation message will be displayed after the command entry, when addressing packs without performance-monitoring capability:

```
/* Caution! Execution of this command may affect service.
   You have selected the set-t1 command with these parameters:

   Address = x
   LineCode = x
   AlarmLevel = x
   FailureThreshold = x
   DLCBPVtoLOS = x
   AlarmIndicationSignal = x */

Execute? (y/n or CANCEL/DELETE to quit) =
```

The following confirmation message will be displayed after the command entry when addressing packs with performance-monitoring capability or if addressing a group of packs using "all" in the address:

```
/* Caution! Execution of this command may affect service.  
You have selected the set-t1 command with these parameters:  
  
Address = x  
LineCode = x  
AlarmLevel = x  
FailureThreshold = x  
DLCBPVtoLOS = x  
AlarmIndicationSignal = x  
PMMode = x  
Format = x */  
  
Execute? (y/n or CAnceL/DElete to quit) =
```

If multiple addresses are specified, the following caution message will be displayed immediately before the confirmation request message:

```
/* Caution: This command addresses multiple objects within this  
system. Selections other than CurrentValues will affect all  
addressed objects. */
```

RELATED COMMANDS

rtrv-t1

set-state-t1

NAME

set-vt1: Set VT1.5 Characteristics

INPUT FORMAT

set -vt1:address:dgr=SignalDegrade[, nsa=Alarm][, sa=Alarm];

DESCRIPTION

This command provisions two type of parameters for VT1.5 channels.

Signal Degrade Alarm Threshold

This parameter is provisioned only for ring channels (that is, incoming VT1.5 channels on optical linear extensions in ring systems are not monitored). Possible values are 10^{-5} through 10^{-8} , with a default value of 10^{-6} . Only the 26-type and 28-type OLIU circuit packs support the provisionable signal degrade function. The 28-type OLIU is available in Release 2.2 and later.

Alarm Level for SA/NSA VT Path AIS Condition

The alarm level for both service affecting and non-service affecting path AIS conditions can be provisioned in Release 2.1 and later.

The input parameters are:

Address

Address identifies the VT1.5 channels. Releases prior to FiberReach 2.1 do not use this parameter.

If the shelf is equipped with 26-type OLIUs in Main unit slots, valid addresses are:

m-1-{1-7,all}-{1-4,all}, all

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), valid addresses are:

m-{1-3,all}-{1-7,all}-{1-4,all}

dgr SignalDegrade specifies the bit error ratio (BER) threshold for the VT1.5 signals in terms of a logarithm to the base 10. When this threshold is crossed, an alarm will be raised and automatic protection switching to the protection path will be initiated. For Release 2.1 and later, the only valid address for the SignalDegrade parameter is **all**.

For Releases prior to Release 2.1, the values are 10^{-5} to 10^{-8} , with a default or original value of 0. For Release 2.1 and later, the default or original value is 10^{-6} .

nsa This parameter is available in FiberReach release 2.1 and later. It is the provisioned alarm level of the non-service affecting VT path AIS and has the following values:

mn Minor alarm (default)

nr Not alarmed and not reported.

sa This parameter is available in FiberReach Release 2.1 and later. This is the provisioned alarm level of the service affecting VT path AIS and has the following values:

mj Major alarm (default for ring channels)

na Not alarmed, but reported

Starting with Release 2.1, if the signal degrade parameter is entered and the address used is any value other than **all** the command will be denied with the following message:

```
/* The only valid address for the signal degrade parameter is { all }.  
   To set the signal degrade parameter enter  
set-vt1:all:dgr=value; */
```

Starting with Release 2.1, to provision the AIS parameters requires that at least one VT cross-connection exist in the specified address range or the command will not execute and the following message will be displayed.

```
SNVS  
/* Status, Not in Valid State */  
/* The specified path is not properly cross-connected. */
```

If the MAIN slots are not equipped at all, the command will be denied with the following message:

```
ENEQ
/* Equipage, Not EQuipped */
/* Circuit pack type with signal degrade function is missing. */
```

RELATED COMMANDS

rtrv-vt1

NAME

switch-ls: Protection Switch Low Speed

INPUT FORMAT

switch-ls:Address:pri=Priority;

DESCRIPTION**CAUTION:**

Execution of this command may affect service.

This command controls the operation of low-speed circuit pack protection switching.

This command is denied in unprotected low-speed configurations.

The input parameters are:

Address The address of the low-speed slot(s). Addresses may either be a single low-speed slot (for example, **ls-a-1**) or all low-speed slots in a single group (for example, **ls-b-all**).

Valid Low-Speed Slot Addresses for **manual** and **forced**:

ls-{a,b,c,d}-1 (Note: **all** not allowed)

Valid Low-Speed Service Slot Addresses for **reset** and **lockout**:

ls-{a,b,c,d}-{1,all}

(1x1 low-speed protection configuration)

ls-all, ls-{a,b,c}-{1,2}, ls-d-{1}

(1x7 low-speed protection configuration)

Valid Low-Speed Protection Slot Addresses for **reset** and **lockout**:

ls-{a,b,c,d}-2 (Protection slot only, 1x1 low-speed protection)

ls-d-2 (Protection slot only, 1x7 low-speed protection)

pri Priority indicates the priority of the protection switching request and has the following values:

reset Clear active external switch requests (lockout, forced, or manual) and return any traffic on the protection slot to the service slot.

lockout Locks out protection switching requests (except the reset request). If the lockout is directed to the protection slot, any traffic that is currently on the protection line is unconditionally switched back to the service line, and no traffic from any service line will be

switched to the protection line. If the lockout is directed to a service slot, traffic on that service line that was previously switched to protection is unconditionally switched back to the service line and no further traffic can be switched from that specific service line to the protection line. The lockout request for either condition will remain in effect until a low-speed protection switch reset is entered.

- forced** Force switch to the protection low-speed slot unless there is an outstanding lockout or forced switch request. For a forced switch, the address must be a single slot. The forced switch will remain in effect until a low speed protection switch reset or lockout request is entered.
- manual** Manual switch to the protection low speed slot only if the protection slot is good and not in use (service slot only). For a manual switch, the address must be a single slot. The failure or removal of a DS1 or T1EXT circuit pack or a forced lockout or reset request will preempt a manual switch request.

If the protection switch request changes the protection switching condition to a condition lower or equal to the priority of the pre-existing protection switching condition, execution of this command will be denied with the following denial message:

```
SPSP
/* Status, Protection Switch Priority */
/* The CIT-initiated protection switch request has a lower priority
   than the existing protection switching condition. */
```

If an address of **all** is used with a priority of **manual**, the request will be denied with the following denial message:

```
IDNC
/* Input, Data Not Consistent */
/* Manual switch not allowed for multiple slots. */
```

If an address of **all** is used with a priority of **forced**, the request will be denied with the following denial message:

```
IDNC
/* Input, Data Not Consistent */
/* Forced switch not allowed for multiple slots. */
```

If a protection slot address is used with a priority of **manual**, the request will be denied with the following denial message:

```
IDNC
/* Input, Data Not Consistent */
/* Manual switch not allowed for protection slot. */
```

If a protection slot address is used with a priority of **forced**, the request will be denied with the following denial message:

```
IDNC
/* Input, Data Not Consistent */
/* Forced switch not allowed for protection slot. */
```

If the switch request would place service onto a slot currently holding a circuit pack type that is not allowed ("CP not allowed" alarm active), the request will be denied with the following denial message:

```
SPFA
/* Status, Protection unit FAiled */
```

If the switch request would place service onto a protection circuit pack type that cannot protect the service circuit pack, the request will be denied with the following denial message:

```
SSRD
/* Status, Switch Request Denied */
/* Protection circuit pack cannot protect the service circuit pack */
```

On entry, the following confirmation message is displayed:

```
/*Caution! Execution of this command may affect service.
You have selected the switch-ls command with these parameters:

Address = x
Priority = x */

Execute? (y/n or CAnCel/DELeTe to quit) =
```

If this command is executed with priority **lockout** or **forced**, then automatic protection switching will be disabled until this command is executed again with priority **reset**.

RELATED COMMANDS

rtv-state

rtv-state-eqpt

NAME

switch-path-vt1: Switch Path VT1.5

INPUT FORMAT

switch-path-vt1:Address:pri=Priority;

DESCRIPTION

This command controls VT1.5 path switching on path protected ring configurations. Path switching is always unidirectional (one-way).

The input parameters are:

Address Address is the address of the VT1.5 path currently carrying drop or drop and continue traffic. When this command is executed, traffic will be switched away from this path to the other path on the ring. There is no default for this parameter.
If the shelf is equipped with 26-type OLIUs in Main unit slots, valid addresses are: **m{1,2}-1-all,**
m{1,2}-1-{1-7}-{1-4,all}

If the shelf is equipped with 28-type OLIUs in Main unit slots (available in Release 2.2 and later), valid addresses are:
m{1,2}-{1-3,all}-{1-7,all}-{1-4,all}

pri Priority indicates the priority of the protection switch request. The one and only valid value is:

manual This parameter requests a switch from the addressed path to the standby path unless a path signal failure or path signal degrade exists on the standby path.

If the path address specified in the command is not equipped or VT1.5 cross-connected, the command will be denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* The specified path is not equipped and/or cross-connected. */
```


If the path address specified in the command is a pass-through path, the command will be denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* The specified path cannot be switched. */
```

⇒ NOTE:

A pass-through path passes directly from the OC-N receiver to the OC-N transmitter. The service carried with this path is not dropped at this node.

If an equal or higher priority switch already exists on the addressed path, the command will be denied with the following message:

```
SPSP
/* Status, Protection Switch Priority */
/* Equal or higher priority switch exists */
```

If **-all** appears in the address and if an equal or higher priority switch already exists on some of the addressed paths, the command will list these exceptions. If **-all** appears in the address and the path is STS-1 add/drop cross-connected, it will be listed as an exception.

```
/* vt address equal or higher priority switch exists
   vt address sts cross-connected signal exists
   . . . . .
   . . . . .
   . . . . .
*/
```

Since DDM-2000 path switching is unidirectional, the user will receive the following notification message and confirmation request:

```
/* The path protection switching request is unidirectional.  
It may be necessary to perform a switch-path-vt1 at the far end  
to switch both transmit and receive to the same path. */  
  
/* Caution! Execution of this command may affect service.  
You have selected the sw-path-vt1 command with these parameters:  
  
Address=  
Priority=          */  
  
Execute? (y/n or CAncel/DELeTe to quit) =
```

RELATED COMMANDS

rtrv-state-eqpt

rtrv-state-path

NAME

switch-sync: Protection Switch Synchronization

INPUT FORMAT

switch-sync:s=SyncFunction,pri=Priority,

DESCRIPTION**CAUTION:**

Execution of this command may affect service.

This command controls operation of the synchronization protection switching. This command lets the user control which synchronization reference is used and enables the user to switch a synchronization reference when needed.

The input parameters are:

s SyncFunction specifies the synchronization function and may be one of the following:

mode	Selects protection switching of timing mode. Specify only if the system is provisioned for LoopTimed.
src	Selects the optical line from which shelf line-timing will be derived. The SynchronizationSources that can be switched are main-1 and main-2 .

pri Priority indicates the priority of the protection switching request.

For a SyncFunction value of **mode**, the priority (**pri**) values are:

reset	Clear any active manual switch. This will allow the system to switch back to LoopTimed if the system is provisioned for non-revertive mode switching or if it has been manually switched to holdover mode.
manual	Switch from the provisioned timing mode, LoopTimed, to holdover mode. The system will remain in holdover mode until the switch is reset.

For a SyncFunction value of **src**, the priority (**pri**) value is:

manual	Switch from the active SynchronizationSource to the standby source.

If no synchronization source switch can be completed due to the equippage of the alternate sources, the command will be denied with the following message:

```
EQWT
/* Equipage, Wrong Type */
/* Alternate sync sources improperly equipped */
```

If this command is executed with `SyncFunction=mode`, then automatic protection switching will be disabled until this command is executed again with the same `SyncFunction` and with `Priority=reset`.

If an equal or higher priority switch (for example, **pri=inhibit**) already exists on the addressed path, the command will be denied with the following message:

```
SPSP
/* Status, Protection Switch Priority */
/* Equal or higher priority switch exists */
```

If the `SyncFunction` is **src** and the priority of **reset** or **inhibit** is entered, the request will be denied with the following denial message:

```
IDNC
/* Input, Data Not Consistent */
/* Reset not allowed for source switching. */
```

or

```
IDNC
/* Input, Data Not Consistent */
/* Inhibit not allowed for source switching. */
```

If this command is entered and both timing slots are empty, the command will be denied and the following denial message will be displayed:

```
ENEQ
/* Equipage, Not EQuipped */
```

After entering this command, the following confirmation message is displayed:

```
/* Caution! Execution of this command may affect service.
You have selected the switch-sync command with these parameters:

SyncFunction=s
Priority=pri */

Execute? (y/n or CAncel/DElete to quit) =
```

RELATED COMMANDS

rtrv-sync

set-sync

rtrv-state-eqpt

NAME

test-alm: Test Office Alarms

INPUT FORMAT

test - alm:[*md=Mode*][*,r=Repeat*];

DESCRIPTION

This command tests the audible and visible office alarms and associated user panel LEDs.

The specific office alarm test turns on a specific alarm for 10 seconds and turns it off for 10 seconds, after which the office alarm reverts to its normal operation.

The general office alarm test cycles through the various alarm levels (CR, MJ, MN) at 4-second intervals as shown in the following table:

General Alarm Test

Step	Time (Seconds)	ALARM LEVEL		
		CR	MJ	MN
1	0-4	<i>off</i>	<i>off</i>	<i>off</i>
2	4-8	ON	<i>off</i>	<i>off</i>
3	8-12	<i>off</i>	ON	<i>off</i>
4	12-16	<i>off</i>	<i>off</i>	ON
5	16-20	<i>off</i>	<i>off</i>	<i>off</i>

The alarm cutoff (ACO) button functions normally while this test is executing. Depressing ACO silences audible office alarms.

Input parameters are:

md Mode identifies the office alarm test to be performed. It takes the following values:

all General test of all office alarms (default)

cr Specific test of critical alarm

mj Specific test of major alarm

mn Specific test of minor alarm.

r Repeat specifies the number of times that Steps 2 through 4 should be repeated. It is an integer with a range of **1** through **10** and a default value of **1**.

This command can be aborted by pressing the "CANcel" or "DELeTe" key while the command is in progress.

The following denial message will be output if the test cannot be performed due to other activity in the system:

```
test-alm: DENY
SSRB
/* Status, System Resource Busy */
```

NAME

test-led: Test LED Indicators

INPUT FORMAT

test - led:*[Address]**:[r=Repeat]*;

DESCRIPTION

This command activates circuit pack or user panel LEDs for 10 seconds on, then 10 seconds off, after which the LED reverts to normal operation. This command does not affect office alarms.

This test can also be done by pressing the alarm cutoff (ACO) button on the user panel.

The input parameters are:

Address This is the address of any slot(s) or **userpanel**, with a default value of **all**.
Valid Addresses: **all**, **main-{1,2,all}**, **fn-{1,2,all}**,
ls-{a,b,c,d,all}-{1,2,all}, **sysctl**, **auxctl**,
userpanel

r Repeat specifies the number of times that the test should be repeated. It is an integer with the range **1** through **10** and a default value of **1**.

This command can be aborted by pressing the "CANcel" or "DELeTe" key while the command is in progress.

When this command is entered while an alarm test is in progress, the following denial message will be output if the test cannot be done due to other activity in the system.

```
test-led:address DENY
SSRB
/* Status, System Resources Busy */
```


NAME

test-sysctl: Test System Controllers

INPUT FORMAT

test-sysctl;

DESCRIPTION

This command causes the entire control system (system controller) to perform a self-test. If this command is entered while a transmission test (**test-trmsn-t1**) is in progress, the following denial message will be displayed:

```
SSRB
/* Status, System Resources Busy */
```

At the end of the test, one of several messages will be displayed.

If the test passes, the following message will be displayed:

```
test-sysctl: COMPLD
/* Controller Diagnostic Test Report
=====
Test PASSED
*/
```

If the test fails, the following message is displayed, indicating that the controller circuit pack has failed:

```
test-sysctl: COMPLD
/* Controller Diagnostic Test Report
=====
SYSCTL CP FAILED
*/
```

In addition to a failure message, the Fault LED on the failed circuit pack and the Major alarm LED on the user panel will be illuminated and the MJ office alarm will be activated.

NAME

test-tlm-par: Test Parallel Telemetry

INPUT FORMAT

test - t l m - p a r:[*md=Mode*][,*r=Repeat*];

DESCRIPTION

This command provides for general and specific tests of the parallel telemetry outputs. The general test turns all parallel telemetry points on for 20 seconds, then off for 20 seconds, and then reverts to normal operation. The specific test performs similarly, but on only one parallel telemetry point.

The input parameters are:

md	Mode identifies the parallel telemetry output(s) to be tested. It takes the following values:
all	- General test of ALL parallel telemetry outputs (static default)
output{1-4}	Specific test of miscellaneous discrete control point numbers 1, 2, 3, or 4.
r	Repeat specifies the number of times that the test should be repeated. It is an integer with a range of 1 through 10 and a static default value of 1.

This command can be aborted by pressing the "CANcel" or "DELeTe" key while the command is in progress.

The following denial message will be output if the test cannot be performed due to other activity in the system:

```
SSRB
/* Status, System Resources Busy */
```

NAME

test-tlm-ser: Test Telemetry Serial

INPUT FORMAT

test - t l m - s e r:*[d=Display][,p=Point][,r=Repeat]*;

DESCRIPTION

This command initiates specific and general tests of the TBOS outputs. During the test, the telemetry points addressed by the command are turned ON and all other points are turned OFF for 20 seconds. When the test completes, all points return to normal operation.

The input parameters are:

- d** Display is the particular TBOS display being used and has a provisionable value between 1 and 8. For a central office (CO) and the associated remotes, the TBOS display values may be provisioned. For a remote terminal (RT), only the current values may be used for this test.
- p** Point is the particular TBOS point(s) to be tested and has the following values:
 - 1-63**
 - even**
 - odd**
 - all** (default)
- r** Repeat is the number of times the test is to be repeated and has a range of 1-10, and a default of 1.

This command may be aborted by pressing the "CANcel" or "DElete" key while the command is in progress.

The following denial message will be displayed if the test cannot be performed due to other activity in the system:

```
SSRB  
/* Status, System Resources Busy */
```

RELATED COMMANDS

test-tlm-par

test-alm

NAME

test-trmsn-t1: Test Transmission T1

INPUT FORMAT

test-trmsn-t1:Address:[dirn=Direction][,dur=Duration];

DESCRIPTION**CAUTION:**

Execution of this command will affect service. This command causes the insertion of a test signal on the selected channel in the MUX or DEMUX direction and will affect service on the selected channel.

This command sets up an automated transmission test for a low-speed DS1 or T1 port. The test signal is a repetitive pattern which the system checks for bit errors. Only one channel is tested each time; multiple channels may not be tested simultaneously. Before this command is executed, the signal must be appropriately looped back. DDM-2000 checks for the presence of a loopback before beginning the test. If no loopback exists, the system will return a warning message before performing the test.

This command is used for installation of new equipment and for maintenance.

The input parameters are:

Address	Address of the DS1 or T1 port. Valid Addresses (1x1 protected configuration): {a,b,c,d}-1-{1-4} Valid Addresses (1x7 protected configuration): {a,b,c}-{1,2}-{1-4}, d-1-{1-4},all) The BBF6 circuit pack supports 2 T1 ports. When addressing ports on a BBF6, only port numbers 1 and 2 are valid.
dirn	Direction of the transmission test. This parameter has the following values: mux The test signal is inserted in the MUX direction (towards the optical fiber) as shown in Figure 11-3. This is the default for this parameter. demux The test signal is inserted in the DEMUX direction (towards the DSX or T1 interface) as shown in Figure 11-4.

dur Duration of the test in minutes. This value has a range of 1 through 120 with a default value of 1.

This command can be aborted by pressing the "CANcel" or "DELeTe" key while the command is in progress.

⇒ NOTE:

Loopbacks on the fiber when testing in the MUX direction will cause an "inconsistent DCC switches" alarm condition. The alarm should be ignored during the loopback testing. To avoid this alarm, the user may disable the DCC prior to performing this test.

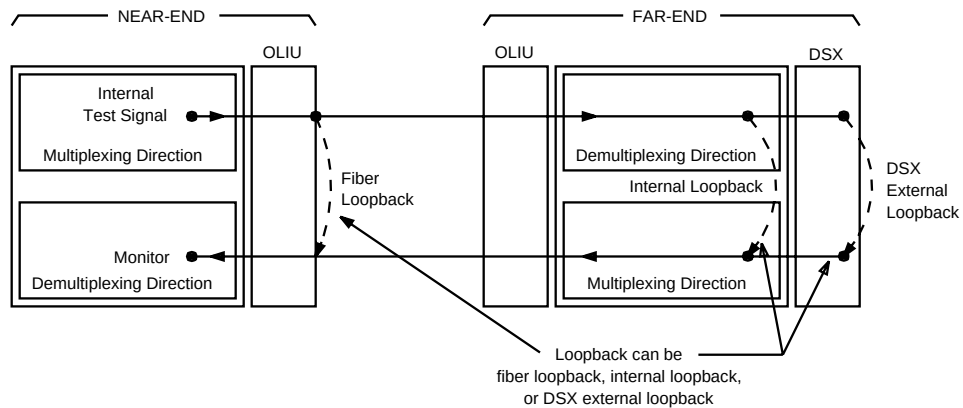


Figure 11-3. Automated Transmission Test of DS1 Signal in MUX Direction

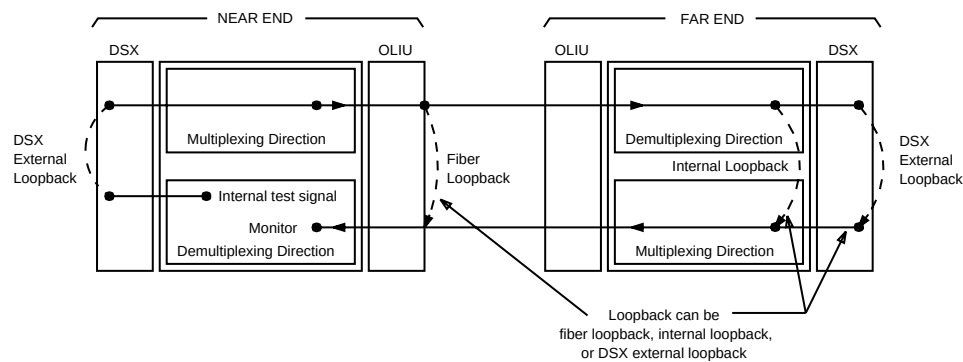


Figure 11-4. Automated Transmission Test of DS1 Signal in DEMUX Direction

This command displays the following output report:

```
/* DS-1 Transmission Test Report
=====
DS-1 Port = addr, Direction = dirn, Duration = dur minutes
=====
Elapsed      Errored
Time(sec)    Seconds
=====
  nnn        nnn
  .
  .
  .
  nnn        nnn
  */
```


The output parameters are:

DS1 Port	The address of the DS1 or T1 port
Direction	The direction of the transmission test
Duration	The duration of the test in minutes
Elapsed Time	Elapsed time of the test in seconds
Errored Seconds	Total number of errored seconds.

A question mark (?) as the rightmost character in the Errored Seconds indicates uncertain data because of a protection switch during the test.

If an equipment failure is detected during test, the following message is displayed:

```
/* Hardware failed - Test Aborted */
```

The system checks for presence of a loopback at the beginning of the test. If a loopback does not exist, the test continues and the following message appears before and after the report:

```
/* Preliminary hardware test indicates no loopback. */
```

If the test is interrupted or aborted, the following message is displayed:

```
/* Test Manually Aborted */
```

The following denial message will be displayed if the test cannot be performed due to other activity in the system:

```
SSRB  
/* Status, System Resources Busy */
```

When this command is entered, the following confirmation message is displayed:

```
/* Establish appropriate loopbacks (manual or electronic)
   prior to test execution, if appropriate. */

/* Caution! Execution of this test may interrupt service.
   You have selected the test-trmsn-t1 command with these parameters:

   Address = x
   Direction = dirn
   Duration = dur */

Execute? (y/n or CANCEL/DELETE to quit) =
```

RELATED COMMANDS

opr-lpbk-t1

rls-lpbk-t1

NAME

toggle: Toggle Between Local and Remote Sessions

INPUT FORMAT

^t (Press "t" while holding the **CTRL** key)

DESCRIPTION

This command toggles the user between the local and remote sessions. It provides a quick and easy way to switch from the local session to the remote session, while not terminating either one. The user must have established two valid sessions with network elements (NEs) in the local NE's subnetwork before this command executes successfully.

This command may be entered *only* between command executions; that is, *only* at the system prompt. If entered as a response to a parameter prompt, an error message will be displayed.

This command does not display a typical completion message. When entered, the TID for the NE switched to is displayed, followed by the date and time. This line is followed by a prompt from that system.

The following denial message will be output if the toggle cannot be performed.

```
SNVS
/* Status, Not in Valid State */
/* No remote login is active */
```

If the toggle request fails due to a far end communication failure (after trying for 45 seconds or more), the following denial message will be displayed:

```
SROF
/* Status, Requested Operation Failed */
/* Far end Communication failure */
```

RELATED COMMANDS

logout

rlgn

NAME

upd: Update Equipment List

INPUT FORMAT

upd;

DESCRIPTION**CAUTION:**

Execution of this command may affect service.

This command updates the system data base (as recorded in the nonvolatile memory) to reflect the existing hardware configuration and incoming signals.

This command can be executed either by pushing the Update/Initialize button, located on the SYSCTL circuit pack, or by entering the command from the CIT. When the Update/Initialize button is pushed, a dot (.) will appear on the 7-segment display.

**NOTE 1:**

upd may be performed at any time *except* before or during the 10-second window after powering up the System Controller (SYSCTL) while the CR LED is flashing.

**NOTE 2:**

The user should note that the critical LED light on the SYSCTL circuit pack will continue to flash after pressing the Update/Initialize button for a system reset. Do *not* reenter this command. The LED light will stop flashing after 10 seconds.

This command should be executed after the following:

- Removing a circuit pack — Activating the **upd** command following circuit pack removal deletes the circuit pack from the equipment list and clears the associated alarm. This command also changes the slot state to *auto*. Failure to update after removing a circuit pack will continue the "CP removed" alarm, which will become an "unexpected CP type", or similar alarm when a new and different type of circuit pack is placed in the slot. Performing the update at this later time will clear this alarm and provide default provisioning for the new circuit pack, provided the circuit pack is acceptable.
- Removing a signal input — When an incoming DS1 or T1 signal is removed, the system data base must be updated to reflect the change and clear the associated alarm.

- Removing an STS1 or VT1.5 AIS alarm for incoming channels.
- Changing a switch setting on a circuit pack — The **upd** command should be activated following switch setting changes on the BBF1/BBF1B DS1, BBF3 DS1PM, or BBF6 T1EXT circuit packs. This command enters the new settings into the system. Failure to update will cause an "unexpected CP switches" or "unexpected CP type" alarm since the new switch settings do not agree with the switch settings already recorded in the system. Activating the update function will clear this alarm and make the new switch settings effective.
- Replacing Circuit Pack types — The user can "upgrade" from one type of circuit pack to another type in the following cases.

Automatic Upgrades — no alarms occur and there is no need to update:

1. For low-speed slots — from any BBF1/BBF1B to any other BBF1B/BBF1 type DS1 pack
2. For 1+1 slot pairs — from older 26 type to enhanced 26 type OLIU packs.

Manual Upgrades — "unexpected CP type" alarm or "protection CP different" alarm will occur, and an update must be done:

1. For low-speed slots — from BBF1/BBF1B to BBF3 type DS1 packs
2. For low-speed slots — from BBF3 to BBF1/BBF1B type DS1 packs

Following the documented upgrade procedures (slot 1 of 1x1 or 1+1 pairs), the old type circuit pack is removed and replaced with the new type circuit pack. Activating the update function will clear the alarm for new pack type and make the new circuit pack settings active.

ALARM RESTRICTIONS

Pressing the UPD button or issuing the **update** command will *not* change provisioning if the following alarms exist. The user will have to correct the alarmed condition before executing this command. These alarms are:

- illegal CP type
- CP not allowed *-(reason)*
- invalid CP switches.

SYSTEM RESTRICTIONS AND CORRECTIVE ACTIONS

Pressing the UPD button or issuing the **update** command will not retire a "CP removed", "unexpected CP type", or "unexpected CP switches" alarm or allow the system to accept the new provisioning request if certain system conditions exist. The user will have to correct the condition before updating the system.

If a restriction is detected, the following message will be displayed:

```
/* Address not equipped properly -- provisioning unchanged. */
```

The system restriction and corrective actions needed are:

- **Port status in NMON or IN SERVICE**

If a low-speed circuit pack is removed before the incoming signal is removed or while the associated port or ports are in the *nmon* state, the system will not recognize that the service is no longer being carried on the port and will not remove the circuit pack from the equipment list. Note that this restriction does not apply to OLIU circuit packs in systems that support OC-N line states.

Corrective Action: If the port is in the *nmon* state, it must be moved to the *auto* state, using the **set-state-t1** command, before the circuit pack can be removed and the system can be updated. If an incoming signal is present, it must first be removed, then the circuit pack can be removed, and the system can be updated.

- **Manual cross-connection exists**

A manual cross-connection is entered into the system when an arrangement other than the default is desired and to support various applications.

Corrective Action: The system will not recognize a circuit pack removal until the manual cross-connection to the addressed circuit pack is deleted. (See the **dlt-crs-vt1** and **rtrv-crs-vt1** commands for more information on manual cross-connections.)

For 1+1 or 1x1 slot pairs, one circuit pack of the pair can be removed as long as the other remains to support the cross-connection. For rings systems, the MAIN circuit packs are special and all cross-connections in the system must be deleted before the addressed circuit pack can be removed.

- **Upgrades from Slot 2**

Upgrades from Slot 2 of a 1x1 or 1+1 pair are not permitted when Slot 1 is equipped.

Corrective Action: The documented upgrade procedures to change one type of circuit pack for another require that the change first be made in slot 1 of a slot pair when slot 1 is equipped.

■ **Timing Source removed**

When the sync timing source is provisioned to be LineTimed and the addressed circuit pack is selected for timing, the slot state will not change to *auto*.

Corrective Action: Insert an OLIU circuit pack that supports the timing selected or change the timing source.

■ **Sync Autoreconfiguration Selected**

When the sync timing is provisioned for Autoreconfiguration and the addressed circuit pack is one of the sources for timing, the slot state will not change to *auto*.

Corrective Action: Insert an OLIU circuit pack that supports the timing selected or change the timing provisioning.

■ **Change Time setting from Line to External**

If a system's sync timing source switch from Line to External timing is attempted by changing the switches on the TGS pack to an External timing setting while leaving the sync timing in Autoreconfiguration mode *enabled*, the attempt to switch from Line to External Timing will fail.

Corrective Action: In order to switch from Line to External timing you **MUST** ensure that in addition to setting the switches on the TGS pack to External timing, the Sync Autoreconfiguration parameter is set to *disabled*.

If a protection switch request of **forced**, **inhibit**, or **lockout** is specified to a slot that is now empty, entering the **upd** command may cause the protection switch to occur possibly affecting service. When this occurs, the following confirmation message will be displayed:

```
/* Caution! Execution of the update command may interrupt
service because of an active protection switch request on
an empty slot. It also updates the equipment list and
initializes ALL parameters associated with empty slots. */
```

Execute? (y/n or CANCEL/DElete to quit) =

RELATED COMMANDS

dlt-crs-vt1

rtrv-crs-sts1

rtrv-crs-vt1

rtrv-eqpt

rtrv-state

set-state-t1

Detailed Alarm and History Reports

This section provides details of the Retrieve Alarm and Retrieve History commands with explanations of specific output messages.

Each command includes an **INPUT FORMAT** part, providing the syntax for the command, and a **DESCRIPTION** part, providing the details of the command input and output parameters. Following the **DESCRIPTION** part is a table listing the output messages associated with each command and a description of each message.

NAME

rtrv-alm: Retrieve Alarm and Status

INPUT FORMAT

rtrv-alm[:alm=AlarmLevel];

DESCRIPTION

This command displays a report of active alarm and status conditions of the local network element. The report includes the source address of the alarm, as well as the date and time of the alarm, whether or not the condition is service affecting, and a short description of the condition.

Use the **rtrv-ntalm** to report far-end (network) alarm conditions.

The input parameter is:

alm AlarmLevel for which a report is desired. This parameter may have one of the following values:

all

cr

mj

mn

pmn

other

Alarms are listed from greatest to least severity. Within a severity level, newer alarms are listed first.

Example Alarm Report:

/* Active Alarms and Status Report					
=====					
Alarm	Source	Date	Time	Srv	Description
Level	Address	Detected			
=====					
<i>Condition</i>	<i>address</i>	<i>MM-DD</i>	<i>HH:MM:SS</i>	<i>srv</i>	<i>description</i>
			.		
			.		
			.		
<i>Condition</i>	<i>address</i>	<i>MM-DD</i>	<i>HH:MM:SS</i>	<i>srv</i>	<i>description</i>
*/					

The output parameters are:

Alarm Level Alarm level is the alarm or status condition being reported. A status condition is named status if there is no user panel LED illuminated for that condition. An alarm condition is the name of the topmost LED on the user panel that is illuminated and may be one of the following conditions:

CRITICAL

MAJOR

MINOR

PWR MINOR

abnormal (status LED)

ne-acty (status LED)

status (no LED)

Source Address Source address is the address of the event. An event source may be a slot, channel, port, or an operations interface. See Table 11-1 at the beginning of this chapter for the address of slots, ports, channels, and operations interfaces, respectively.

Date Detected	Month (MM) and day (DD) of the event.	
Time Detected	Time (Hours, Minute, Seconds) of event occurrence.	
Srv	Srv indicates whether the condition is service affecting or not, and may have the following values:	
	SA	Service affecting
	NSA	Not service affecting
	-	Not applicable for this condition (not service affecting).
Description	Table 11-3 lists the meanings and likely causes of the conditions reported in the alarm and status report. For conditions with more than one possible cause, the most likely causes are listed first.	

RELATED COMMANDS

rtrv-hsty

Table 11-3. RTRV-ALM Descriptions

Description	Meaning
-48V power/fuse failed	A -48 volt power feeder or a fuse on the user panel has failed.
-48V power/fuse FA FB failed	A -48 volt power feeder or a fuse on the user panel has failed. (FA or FB identifies failure if BBG8 controller used.)
AC power failed	The AC power supply to a remote terminal cabinet has failed.
ACO active	The parallel telemetry outputs and audible office alarms normally active due to the alarm conditions in the system are being suppressed. See the opr-aco command.
AGNE communication failure	A network element cannot establish communication with the alarm gateway network element (AGNE), or the AGNE cannot establish communication with a network element in the same alarm group. Use the rtrv-map-network command to determine if both network elements are in the same alarm group.
APS - automatic lock	The service associated with a DS1 or T1EXT CP has been automatically switched and locked onto the protection DS1 or T1EXT CP. The automatic protection switching (APS) lock will remain active until midnight. Cause: Four automatic switches of a single DS1 or T1EXT CP in 10 minutes, probably because of an intermittent failure of the DS1 or T1EXT CP.
communication failure	The system is not communicating with another shelf in the subnetwork. The rtrv-map-network command will report the name of the system(s) with which this system is not communicating. Likely cause: An unprotected OC-n line failure in the subnetwork; a controller failure, reset, or initialization on another shelf; section DCC channel failure on this or another shelf; failure of the OLIU or SYSCTL CP.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
controln	The specified environmental control point (miscellaneous discrete output) is active. Note: The actual message that appears in the alarm and status report for this condition can be provisioned; this is the default message. See the rtrv-attr-cont and set-attr-cont commands. Cause: The system was instructed to close the environmental control point by either a TBOS control point or by the closing of the corresponding environmental control input at the far end.
CP not allowed-(eqpt)	A DS1, DS1PM, or T1EXT CP is installed in a low-speed slot and has caused a protection mismatch between a service slot and a protection slot.
CP removed	A CP previously installed in this system is removed. The CP should be replaced, or an "update" should be done to remove it from the system equipment list.
DS1 CP failed	Internal equipment failure of the specified DS1 CP.
DS1 loopback	A loopback (toward the optical fiber) is active on the specified T1 port. See the opr-lpbk-t1 and rls-lpbk-t1 commands.
DS1 loopback (to fiber)	A loopback (toward the optical fiber) is active on the specified T1 port. See the opr-lpbk-t1 and rls-lpbk-t1 commands.
DS1 loopback (to DSX)	A loopback (toward the DSX or T1 interface) is active on the specified T1 port. See the opr-lpbk-t1 and rls-lpbk-t1 commands.
DS1 trmsn test IP	A transmission test using the internal test signal generator and monitor is in progress on the specified T1 port. See the test-trmsn-t1 command.
DS1PM CP failed	Internal equipment failure of the specified DS1PM CP.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
DSNE not reachable	This alarm condition can be caused by the following cases: 1. When a non-DSNE starts up and it does not identify or get registered by a DSNE within a time interval, it will raise this alarm condition. 2. Any node (NE) registered with the DSNE will raise this alarm condition if it can no longer reach the DSNE because of a change in provisioning by the set-ne command to "DSNE = no". See the set-ne and rtrv-ne commands for DSNE provisioning information. 3. Any Network Element registered with the DSNE will raise this alarm condition if it can no longer reach the DSNE because of a DCC failure between local Network Element and the DSNE. Other likely causes: OC-n line failure in the subnetwork, a controller failure, reset, or initialization of the DSNE.
duplicate DSNE	A network element has been provisioned as a directory services network element (DSNE) in a subnetwork that already has a DSNE. Only one NE in the subnetwork may be provisioned as the DSNE to ensure proper DCC communication between nodes. See the set-ne and rtrv-ne commands for DSNE provisioning information.
duplicate site/ne address	Two or more shelves in the alarm group have the same site address and the same network element address.
duplicate TBOS display	Two or more shelves in the alarm group have the same TBOS display number.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
duplicate TID	Two or more shelves in the network have the same system name or "TID" set by the set-ne command.
environmentn	The specified environmental alarm point (miscellaneous discrete input) is active. The actual message that appears in the alarm and status report for this condition can be provisioned; this is the default message. See the rtrv-attr-env and set-attr-env commands.
excessive holdover	The system has been in holdover mode for more than 4 hours. This may cause degraded performance (high error rates) on the transmitted and/or received signals. Whenever this condition exists, the condition "holdover mode active" also exists. Likely Causes: See "holdover mode active."
externalMinor	The external minor alarm input (environmental alarm input 15) is active. Typically, this input will be connected to the power shelf and will indicate that the DC power or the cooling fan in a remote terminal cabinet has failed. The actual message that appears in the alarm and status report for this condition can be provisioned; this is the default message. See the rtrv-attr-env and set-attr-env commands.
fan control relay failed	The thermostat on the SYSCTL indicates that the cooling fan should be turned on, and the fan control relay on the SYSCTL CP failed to operate or the fan control relay output (backplane connector P62) does not connect to a fan. The system will continue to operate but might overheat if the SYSCTL controls a fan, leading to degraded or interrupted transmission and/or circuit pack failures. Likely causes: Telemetry output common pin on P62 is not grounded; SYSCTL CP failure.
fan shelf failed	The system has detected a failure of the DDM-2000 fan shelf. The system will continue to operate but it may overheat. The fan must be replaced within 4 hours of the failure; otherwise service might be interrupted and/or circuit packs might fail. Likely causes: Filter needs replacing, a fan pack failed, fan shelf has lost one or both power feeders, or the fan shelf control board has failed.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
forced switch	When associated with a line, this message means that the identified line is not selected as the active receiving line, and an automatic or manual protection switch to make this the active receiving line will not be done. The forced switch will remain in effect until the protection switch is reset, or a lockout or inhibit switch request is received. Note that switching is unidirectional (one-way). Because of this, the specified line might still be active (if the far end is selecting the specified line to receive traffic), and the far end might still be free to switch the line it is selecting to receive traffic. See the switch-line command. See the switch-ls command.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
holdover mode active	The system is in holdover synchronization mode. Likely causes: a. The system was manually switched to holdover mode (with the switch-sync command) and the switch has not been reset b. The system automatically switched to holdover mode due to failure of the timing references, as follows: 1. The reference failures have not cleared. 2. The system is provisioned for nonrevertive synchronization mode switching. 3. The system is provisioned for loop-timed operation and the optical line or OLIU circuit pack has failed, or a message indicating an upstream clock problem has been received on the sync message bits of the optical line. (See the rtrv-sync command.) 4. The system is provisioned for sync message signaling, but the upstream system from which it loop-times has not been provisioned for sync message signaling. The condition can be cleared by provisioning both systems the same. (See the set-sync and rtrv-sync commands.) The condition can be cleared by repairing at least one of the timing references (if both are failed) and resetting synchronization mode protection switch with the command switch-sync:s=mode,pri=reset. In a central office system, the synchronization mode can also be reset with a TBOS control point.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
inc. (from DSX) DS1 LOS	At least 128 consecutive zeros are received in the DS1 signal incoming from the DSX-1, or the energy at the DS1 input is below a preset threshold. Likely causes: Hard failure of upstream equipment or facility (towards the DSX-1). The DS1 input is disconnected at the backplane or the DSX-1; equipment is failed or removed at DSX-1.
inc. (from DSX) DS1 sig fail	The bit error ratio (BER) in the DS1 signal incoming from the DSX-1 exceeds the provisioned failure threshold, 10^{-3}, 10^{-6}, 10^{-7}, or 10^{-8}. Likely causes: Mismatch of line code (AMI/B8ZS); failure of upstream equipment or facility (towards the DSX-1); cross talk in office wiring; failure of the DS1 CP.
inc. OC3 BER	This message is associated with the 28-type OLIU, available in Release 2.2 and later. The bit error ratio (BER) in the received OC-3 signal exceeds 10^{-3}. Likely causes: Failure of the OLIU CP at the near end, failure of the receive fiber, or failure of the OLIU CP at the far end.
inc. OC3 FERF	This message is associated with the 28-type OLIU, available in Release 2.2 and later. The system has detected the OC-3 far end receive failure (FERF) signal in the incoming OC-3 signal. Likely causes: The far end has detected an incoming signal failure on the specified OC-3 line. This may be caused by failure of the OLIU CP at the near end, the OLIU CP at the far end, or the transmit fiber on the specified line.
inc. OC3 LOF	This message is associated with the 28-type OLIU, available in Release 2.2 and later. The system has detected a loss-of-frame (LOF) condition in an incoming OC-3 signal. LOF is defined as an out-of-frame (OOF) condition (five consecutive errored STS-1 framing patterns) that lasts for at least 3 milliseconds. Likely causes: Failure of the OLIU CP at the near end, failure of the OLIU CP at the far end, or failure of the receive fiber.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
inc. OC3 LOP STS1 x	This message is associated with the 28-type OLIU, available in Release 2.2 and later. The system has detected a loss-of-pointer (LOP) condition. A valid STS-1 pointer could not be found for eight consecutive frames in the identified STS-1 signal. Likely causes: If this condition occurs on the STS-1 on both OC-3 lines, the likely cause is an unprotected failure of a MXRVO or DS3 CP at the far end. If this condition occurs only on one OC-3 line, the likely cause is failure of the OLIU CP at the near end or far end.
inc. OC3 LOS	This message is associated with the 28-type OLIU, available in Release 2.2 and later. The system has detected loss-of-signal (LOS) condition on the OC-3 line. Likely causes: Failure of the OLIU CP at near end, failure of the OLIU CP at far end, or failure of the receive fiber.
inc. OC3 line AIS	This message is associated with the 28-type OLIU, available in Release 2.2 and later. The system has detected OC-3 line alarm indication signal (AIS) on an incoming OC-3 line. Likely cause: Failure of an OLIU CP at the far end.
inc. OC3 sig. degrade (BER)	This message is associated with the 28-type OLIU, available in Release 2.2 and later. The bit error ratio (BER) in the specified OC-3 line exceeds the provisioned soft error threshold (10^{-9} to 10^{-5}) but below the hard error threshold of 10^{-3}. Likely causes: Failure of the OLIU CP at the near end, failure of the OLIU CP at the far end, failure of the receive fiber, or incorrect setting of the optical power switch on the OLIU CP.
inc. OC3 sig. failed (BER)	This message is associated with the 28-type OLIU, available in Release 2.2 and later. The bit error ratio (BER) in the received OC-3 signal exceeds 10^{-3}. Likely causes: Failure of the OLIU CP at the near end, failure of the receive fiber, or failure of the OLIU CP at the far end.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
inc. OC1 FERF	The system has detected the OC-1 far end receive failure (FERF) signal in the incoming OC-1 signal. Likely causes: The far end has detected an incoming signal failure on the specified OC-1 line. This may be caused by failure of the OLIU CP at the near end, the OLIU CP at the far end, or the transmit fiber on the specified line.
inc. OC1 LOF	The system has detected a loss-of-frame (LOF) condition in an incoming OC-1 signal. LOF is defined as an out-of-frame (OOF) condition (five consecutive errored STS-1 framing patterns) that lasts for at least 3 milliseconds. Likely causes: Failure of the OLIU CP at the near end, failure of the OLIU CP at the far end, or failure of the receive fiber.
inc. OC1 LOS	The system has detected loss-of-signal (LOS) condition on the OC-1 line. Likely causes: Failure of the OLIU CP at near end, failure of the OLIU CP at far end, or failure of the receive fiber.
inc. OC1 line AIS	The system has detected OC-1 line alarm indication signal (AIS) on an incoming OC-1 line. Likely cause: Failure of an OLIU CP at the far end.
inc. OC1 sig. degrade (BER)	The bit error ratio (BER) in the specified OC-1 line exceeds the provisioned soft error threshold (10^{-9} to 10^{-5}) but below the hard error threshold of 10^{-3} . Likely causes: Failure of the OLIU CP at the near end, failure of the OLIU CP at the far end, or failure of the receive fiber.
inc. OC1 sig. failed (BER)	The bit error ratio (BER) in the received OC-1 signal exceeds 10^{-3} . Likely causes: Failure of the OLIU CP at the near end, failure of the receive fiber, or failure of the OLIU CP at the far end.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
inc. STS1 AIS	The system has detected an incoming STS-1 alarm indication signal (AIS) in the active OC-1 line. The system responds by transmitting DS1 AIS toward the DSX or T1 interface and transmitting STS-1 yellow back toward the fiber from which the AIS is being received. Likely causes: Incomplete or incorrect cross-connect provisioning in an end-to-end network; unprotected removal or failure of an OLIU CP at the far end; unprotected optical line failure.
inc. STS1 LOP OC1 x	The system has detected a loss-of-pointer (LOP) condition. A valid STS-1 pointer could not be found for eight consecutive frames in the identified STS-1 signal. Likely causes: If this condition occurs on the STS-1 on both OC-1 lines, the likely cause is an unprotected failure of an MXRVO or an OLIU CP at the far end. If this condition occurs on only one OC-1 line, the likely cause is failure of the OLIU CP at the near end or far end.
inc. STS1 sig. degrade (BER)	For STS-1 path switched ring applications, the bit error ratio (BER) of the specified STS-1 signal exceeds the user-provisioned signal degrade threshold. Likely causes: Failure at a fiber or failure of an OLIU circuit pack at some point in the STS-1 path.
inc. STS1 unequipped	The system has detected the unequipped code (SONET path overhead signal code label byte=0) on an in-service STS-1 channel. Likely cause: An upstream STS-1 cross-connect has been deleted.
inc. STS1 sig. failed (BER)	For ring applications, the bit error ratio (BER) of the specified STS-1 signal exceeds the signal fail threshold (10^{-6}). For VT1.5 path-switched rings, the system responds by inserting VT Path AIS in each pass-through VT contained in the STS-1. Locally, the system will select the VTs from the STS-1 on the other ring, as appropriate. Likely causes: Failure of the near end OLIU CP reporting the STS-1 failure, failure of the far end OLIU, or failure of the receive fiber if the OC-n is also reporting a failure.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
inc. STS1 yellow	The system has detected an incoming STS-1 yellow signal inserted by the far-end path terminating equipment. Likely causes: Unprotected unidirectional failure of an OLIU CP or fiber at some point in the end-to-end path.
inc. VT AIS	The system has detected a VT path alarm indication signal (AIS) incoming from the active OC-n line. The system responds by transmitting DS1 AIS toward the DSX-1 or T1 interface and VT yellow back toward the fiber from which the AIS is being received. Likely causes: Incomplete or incorrect cross-connect provisioning in end-to-end network; unprotected removal or failure of a DS1 or T1EXT CP at the far end. In ring applications, a non-service affecting VT AIS alarm message may result from an upstream OLIU or fiber failure affecting only one ring direction. A VT yellow alarm message is not returned for a non-service affecting VT AIS.
inc. VT LOP	The system has detected a VT loss-of-pointer (LOP) condition. Likely causes: Unprotected failure of a DS1 or T1EXT CP at the near end; unprotected failure of a DS1 or T1EXT CP at the far end; unprotected failure of an MXRVO CP at the far end; unprotected failure of an OC1 CP at the near or far end; unprotected failure of a 2OC1 CP at the far end.
inc. VT sig. degrade (BER)	In a VT path switched ring, the system has detected a VT error rate that exceeds the provisioned threshold of 10^{-5} to 10^{-8} . The system selects a good VT signal from the other ring path. Likely causes: An OLIU circuit pack failure or a fiber failure at some point on the failed ring.
inc. VT unequipped	The system has detected the unequipped code (SONET path overhead VT signal code label byte=0) on an in-service VT1.5 channel. Likely cause: An upstream VT1.5 cross-connect has been deleted.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
inc. VT yellow	The far end is detecting VT AIS or VT LOP and inserting VT yellow in its transmit signal. Likely causes: Unprotected unidirectional failure of a circuit pack or fiber at some point in the end-to-end path.
inconsistent DCC values	The "User/Network" parameter values are set the same at both ends of the DCC.
inhibit auto. OS messages	This message occurs when TL1 autonomous alarm reporting is inhibited by the TL1 inh-msg command. This message is cleared by enabling autonomous message reporting with the TL1 alw-msg command.
lockout of protection	When associated with a low-speed protection slot, this message means that no service slot in the entire low-speed group will be allowed to switch to protection. The lockout will remain in effect until the protection switch is reset. See the switch-ls command.
lockout of service	When associated with a low-speed service slot, this message means that the specified low-speed service slot is active and will not be switched to protection. The lockout will remain in effect until the protection switch is reset. See the switch-ls command.
ls prot assembly removed	The system has been reset with no low-speed protection assembly installed. This is not a valid system configuration. The user should install a low speed protection assembly and execute the reset function.
ls prot mode not chgd-(crs)	An attempt to change the low-speed protection mode has failed because all cross-connections terminating on low-speed ports were not removed. The user should remove all such cross-connections and execute the reset function.
manual switch	The specified DS1 or T1EXT CP is manually switched to protection. The manual switch will remain in effect until the protection switch is reset or until a failure occurs and an automatic switch preempts the manual switch. See the switch-ls command.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
manual sync. mode switch	The synchronization mode has been manually switched to holdover or free-running and will remain in that mode until the switch request is reset. See the switch-sync command.
OLIU CP failed	Internal equipment failure of the specified OLIU CP.
program installation IP	This system is being used to install software into another system. If this procedure is interrupted prior to completion, the remote systems' control circuit packs will likely become inoperable until another install program attempt is successful.
protection CP different	This message will only be seen when a FiberReach node is configured for 1x7 low-speed protection. The circuit pack in the protection slot is different from and will not protect all of the circuit packs in the service slots. If this is acceptable, execute the update function to clear the alarm. Otherwise, one or more of the service or protection circuit packs must be changed.
section DCC channel failed	The system cannot communicate with the far-end system through the SONET section data communications channel (DCC). Likely causes: SYSCTL or OHCTL CP failure, reset, or initialization at the far end; failed program installation at far end; program installation in progress at the far end; SYSCTL or OLIU CP failure at the near end.
SYSCTL CP failed	Internal equipment failure of the SYSCTL CP. The system has determined that some part of the SYSCTL CP has failed. Note that some types of failures cannot be reported since the SYSCTL CP cannot function under these conditions.
SYSCTL standby boot fail	Internal equipment failure of the SYSCTL circuit pack during a local or remote software download. Likely cause: SYSCTL circuit pack hardware failure.

Table 11-3. RTRV-ALM Descriptions (Contd)

Description	Meaning
T1EXT CP failed	Internal equipment failure of the specified T1EXT CP.
unexpected CP present	A circuit pack has been installed into the one of the function unit slots. The circuit pack should be removed from the shelf.
unexpected CP switches	When associated with the SYSCTL slot, this message means that an invalid switch setting has been selected on the CP, or that some of the unused switches are not in the prescribed position. For DS1 or T1EXT slots, this message means that a change in a circuit pack switch setting was made.
unexpected CP type	When associated with a low-speed slot, this message means that a different but supported circuit pack type (for example, BBF3) is inserted in a slot already provisioned.

NAME

rtrv-hsty:Retrieve History

INPUT FORMAT

rtrv-hsty;

DESCRIPTION

This command displays an event-history report. This report contains a list of the most recent system events. This report contains up to 500 events. The events are listed in last-in, first-out order and are date- and time-stamped.

The output report appears as follows:

```

/* Maintenance History Report
=====
Date      Time      Sys.Alm.   Source      Event
          Level                      Description
=====
MM-DD HH:MM:SS  alarm      address     description
          .
          .
          .
MM-DD HH:MM:SS  alarm      address     description
*/

```

The output parameters are:

Date Month (MM) and day (DD) of the event.

Time Time (hours, minute, seconds) of event occurrence.
Time stamps reflect the time the entry is made.
Entries are added to the history report BEFORE any applicable holdoff delays and AFTER any applicable clear delays.

System Alarm Level Alarm level corresponds to the system alarm level at the time immediately after the event occurred. Alarm level is the level of the highest active or pending alarm/status condition. The alarm level is reported as if the holdoff delay was zero. Additionally, the alarm level column may show CR, MJ, MN, or PMN alarms for troubles that never really became alarms, since holdoff delays may prevent the troubles from reaching an alarm condition.

The alarm level may be one of the following:

CRITICAL	Critical Alarm
MAJOR	Major Alarm
MINOR	Minor Alarm
PWR MINOR	Power Minor Alarm
abnormal	Abnormal condition
ne-acty	Near-End Activity
fe-acty	Far-End Activity
status	Status condition
-	No active alarm or status condition in the system.

Source

The source of the event. An event source may be the entire system or a slot, a channel, or an operations interface. If security is enabled, it may also be a CIT or a login name. Refer to "Commands" and Table 11-1 at the beginning of this section for the addresses of lines, slots, ports, channels, and operations interfaces.

Event Description

Table 11-4 lists the meaning and likely cause of each of the messages that appear in the maintenance history report.

In addition to the messages listed here, any of the messages that appear in the alarm and status report can appear in the history report to record the onset of alarm and status conditions.

Also, all CIT and TL1 commands that affect the state of the system (provisioning commands; protection switching commands; loopbacks; transmission, alarm, and telemetry tests) will appear in the report.

⇒ NOTE:

Any messages that appear in the RTRV-ALM report may also appear in the history report.

Table 11-4. RTRV-HSTY Descriptions

Description	Meaning
-48V power/fuse good	A failed -48 volt power feeder or a failed fuse on the user panel has been repaired.
CP removed	A circuit pack has been removed from the specified slot.
AC power failed-FE clrd	The AC power supply to a remote terminal cabinet has been restored.
AC power good	The AC power supply to the shelf has been restored.
AGNE communication good	An AGNE communication failure has been cleared.
APS - CP failed	An automatic protection switch was done because the system detected a circuit pack failure.
APS - automatic lock reset	The automatic protection switch lock for a DS1 or T1EXT circuit pack has been released.
APS - sig. degraded	An automatic protection switch was done because the system detected a degraded signal on the OC-N line or path.
APS - sig. failed	An automatic protection switch was done because the system detected a failure of the OC-N line or path (incoming AIS, loss of signal, or bit error rate higher than 10^{-3}).
auto switch	An automatic protection switch of a DS1 or T1EXT circuit pack is active. When the failure that caused the switch to be done clears, the switch will be reset automatically. Likely causes: Protected failure or removal of a DS1 or T1EXT CP.
auto sync. mode switch	An automatic protection switch of the synchronization mode is active. When the failure that caused the switch to be done clears, the switch will be reset automatically if automatic mode switching is enabled. (See the set-sync and rtrv-sync commands.)

Table 11-4. RTRV-HSTY Descriptions (Contd)

Description	Meaning
CIT timeout	A craft interface terminal (CIT) session was automatically terminated because there was no activity on the CIT for the provisioned time. (See the set -secu command.)
communication good	A communication failure has cleared. The system can now communicate, via the SONET section DCC, with another system with which it had previously lost communication.
controln rlcd	The system has released the specified miscellaneous discrete environmental control because it has been requested to do so through the serial telemetry or discrete telemetry interface. This message will appear only in a remote terminal. Any name may be provisioned in place of the controln part of this message.
cpy-prog compl.	The software copy procedure has been completed. This message will show at the source NE.
disconnect	The craft interface terminal has been disconnected.
DS1 CP good	The failure of the specified circuit pack has cleared.
DS1 CP inserted	A circuit pack was inserted into the shelf.
DS1 or T1 port in service	A DS1 or T1 port was put in the "in service" state. This happens automatically when an incoming signal is detected (coming from the DSX or T1 interface) unless the port has been provisioned to the "not monitored" state.
DS1PM CP good	The failure of the DS1PM circuit pack has cleared.
DS1PM CP inserted	A DS1PM circuit pack was inserted into the shelf.
DSNE not reachable clrd	Communication has been restored between the DSNE and other network elements in the subnetwork, or other NE(s) can now reach the DSNE.
duplicate site/ne address clrd	A shelf has been reprovisioned and no longer has the same site or NE address as any other shelf in the network.

Table 11-4. RTRV-HSTY Descriptions (Contd)

Description	Meaning
duplicate TID clrd	A shelf has been renamed and no longer has the same TID as any other shelf in the network.
duplicate TBOS display clrd	A shelf has been reprovisioned and no longer has the same TBOS display number as any other shelf in the network.
enable auto OS messages	Autonomous OS message reporting has been enabled with the TL1 command alw-msg .
environmentn rlrd	The specified miscellaneous discrete environment alarm input point has been released, indicating that an environmental alarm or status condition has cleared. This message will appear only in a remote terminal. Any name may be provisioned in place of the environmentn part of this message.
externalMinor clrd	The external minor alarm condition has cleared.
fan control relay good	The fan control relay on the SYSCTL CP was failed but is now operating properly to turn on the fans.
fan shelf good	A fault on the fan shelf has been cleared.
frequency error clrd	The frequency offset failure has been cleared.
holdover mode clrd	The system is no longer in holdover timing mode. It has switched from holdover mode to the provisioned timing mode (LoopTimed).
inc. DS1 good	A failure of the DS1 signal coming from the DSX or T1 interface is cleared.
inc. OC3 FERF clrd	The system is no longer detecting the OC-3 far end receive failure (FERF) signal. This message is applicable for FiberReach Release 2.2 and later.
inc. OC3 good	A failure of the OC-3 line has been cleared. This message is applicable for FiberReach Release 2.2 and later.
inc. OC3 LOP STS1 #x clrd	The system is no longer detecting a loss-of-pointer (LOP) condition on the specified STS-1 signal. This message is applicable for FiberReach Release 2.2 and later.

Table 11-4. RTRV-HSTY Descriptions (Contd)

Description	Meaning
inc. OC3 sig. degrade clrd	A failure of the specified OC-3 signal has cleared. OC-3 line AIS and/or OC-3 line FERF conditions may still be present on the specified OC-3 line. The OC-3 LOP condition may still be present for one or more of the STS-1 signals in the OC-3 line. This message is applicable for FiberReach Release 2.2 and later.
inc. OC3 line AIS clrd	The system is no longer detecting the OC-3 alarm indication signal (AIS) on the specified OC-3 line. This message is applicable for FiberReach Release 2.2 and later.
inc. OC1 FERF clrd	The system is no longer detecting the OC-1 far end receive failure (FERF) signal.
inc. OC1 good	A failure of the OC-1 line has been cleared.
inc. OC1 sig. degrade clrd	A failure of the specified OC-1 signal has cleared. OC-1 line AIS and/or OC-1 line FERF conditions may still be present on the specified OC-1 line. The OC-1 LOP condition may still be present for the STS-1 signal in the OC-1 line.
inc. OC1 line AIS clrd	The system is no longer detecting the OC-1 alarm indication signal (AIS) on the specified OC-1 line.
inc. STS1 AIS clrd	The STS-1 alarm indication signal (AIS) is no longer being received. An upstream failure (in the MUX direction) has cleared.
inc. STS1 LOP OC1 slot clrd	The system is no longer detecting a loss-of-pointer (LOP) condition on the specified STS-1 signal.
inc. STS1 sig. degrade clrd	A failure of the specified STS-1 signal has cleared.
inc. STS1 sig. failed clrd	A failure of the specified STS-1 signal has cleared.
inc. STS1 unequipped clrd	A failure of the specified STS-1 signal has cleared.
inc. STS1 yellow clrd	The STS-1 yellow signal is no longer being received.
inc. VT AIS clrd	The VT alarm indication signal (AIS) is no longer being received. A downstream failure (in the MUX direction) has cleared
inc. VT LOP clrd	A loss-of-pointer condition on the VT1.5 signal has been cleared.

Table 11-4. RTRV-HSTY Descriptions (Contd)

Description	Meaning
inc. VT sig. degrade clrd	Failure of the specified VT1.5 signal has cleared.
inc. VT unequipped clrd	A failure of the specified VT1.5 signal has cleared.
inc. VT yellow clrd	The VT yellow signal is no longer being received from the fiber (in the DEMUX direction).
ins-prog compl.	The software installation procedure has been completed. This message will show at the source NE.
login: <i>login_id</i>	A login session with a user's login identification has been started on the specified CIT port.
login: <i>login_id</i> <i>DENY</i>	A login session was attempted but denied because of an invalid login and password pair, or the system was in Lockout state.
logout: <i>login_id</i>	A login session with a user's login identification has ended on the specified CIT port.
logout: <i>login_id</i> <i>DISCONNECT</i>	A login session with a user's login identification has ended by a disconnect on the specified CIT port.
low speed prot mode chgd to 1x1	The low-speed protection mode has been changed from 1x7 to 1x1. This was accomplished by changing the low speed protection assembly and executing a system reset.
low speed prot mode chgd to 1x7	The low-speed protection mode has been changed from 1x1 to 1x7. This was accomplished by changing the low speed protection assembly and executing a system reset.
ls prot assembly removed clrd	The alarm indicating that the system was reset with no low-speed protection assembly installed has been cleared.
ls prot mode not chgd clrd	The alarm indicating a failed attempt to change the low-speed protection mode has been cleared. If the low-speed protection mode has been changed, a separate history log event will document the change.

Table 11-4. RTRV-HSTY Descriptions (Contd)

Description	Meaning
main-{1,2} protection switch	Equipment switching in a ring application has occurred due to equipment failure.
OLIU CP good	The failure of the specified circuit pack has cleared.
OLIU CP inserted	A circuit pack was inserted into the shelf.
protection CP different clrd	The alarm indicating that a low-speed protection slot contains a circuit pack that cannot protect all of the service slots has been cleared. Note that the condition that caused the alarm may not have been removed.
remote session logout	A remote CIT session (set up by the <code>r lgn</code> command) has been terminated. This may have been caused by normally logging out of the remotely accessed far end session, or once in the far end session, the user toggled back and logged out of the local session.
remote session terminated	A remote CIT session (set up by the <code>r lgn</code> command) has been abnormally terminated. This may have been caused by a failure of the controller, circuit pack failure, timeout, or any other abnormal termination at the far end NE.
reset	The system software program has been reset.
<code>r lgn: login_id DENY</code>	A remote login session was attempted but denied because of an invalid login and password pair, or the DCC connecting the remote system was in Lockout state. section DCC channel good!T{ The failure of the SONET section data communications channel has cleared.
STS1 channel in service	An STS1 channel was put in the "in service" state. This happens automatically when a "good" signal is detected on the channel (neither AIS, unequipped signal, nor "loss of pointer" condition is present), unless the channel has been provisioned to the "not monitored" state.

Table 11-4. RTRV-HSTY Descriptions (Contd)

Description	Meaning
switch reset	— An automatic protection switch of a DS1 or T1EXT circuit pack been automatically reset. — The system has switched from holdover synchronization mode to the provisioned synchronization mode (LoopTimed). - or — A manually initiated protection switch has been reset (by the switch-sync, or switch-ls command), or by removing a CP from the shelf.
sysctl crs map recovered	A read failure of the cross-connection data base occurred during restart, but the backup copy was recovered and is being used.
sysctl crs map initialized	A read failure of the cross-connection data base occurred during restart, and recovery using backup copies also failed. The cross-connection map was initialized.
sysctl channel states initialized	A read failure of the channel state data base occurred during restart, and recovery using backup copies also failed. The channel state data on SYSCTL was used.
sysctl port states initialized	A read failure of the port state data base occurred during restart, and recovery using backup copies also failed. The port state data on SYSCTL was used.
T1EXT CP good	The failure of the specified circuit pack has cleared.
T1EXT CP inserted	A circuit pack was inserted into the shelf.
VT channel in service	A VT channel was put in the "in service" state. This happens automatically when a "good" signal is detected on the channel (neither AIS, unequipped signal, nor "loss of pointer" condition are present), unless the channel has been provisioned to the "not monitored" state.

Operation and Maintenance (TOP) Wideband Shelf

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Operation and Maintenance (TOP) Wideband Shelf

Overview

This section supports operation and maintenance of the DDM-2000 FiberReach Multiplexer Wideband Shelf. It includes the following five separate tabs:

- Acceptance — Yellow tab
- System Turnup/Circuit Order — Orange tab
- Operation — Green tab
- Trouble Clearing — Red tab
- Detailed Level Procedures — Blue tab.

TOP Section Organization

The **Acceptance** tab covers procedures to check the shelf or system after the shelf has been equipped or after the system has been established.

The **System Turnup/Circuit Order** tab includes procedures for the following:

- a. Equipping (turning up) a shelf in a looped back condition for the first time
- b. Establishing an end-to-end system after the shelf has been equipped
- c. Establishing initial end-to-end DS1/T1 service
- d. Adding or discontinuing DS1/T1 service to an in-service system
- e. Adding a new shelf to existing configurations
- f. Upgrading software to a new release
- g. Establishing single-homed or dual-homed FiberReach access via DDM-2000 OC-3 backbone ring
- h. Establishing stand-alone FiberReach access via DDM-2000 OC-3 host
- i. Establishing FiberReach access via DDM-2000 OC-3 Release 9 host shelf in OC-3 Release 8 linear configuration
- j. Changing protection configuration from 1X1 to 1X7 or 1X7 to 1X1 (out of service).

The **Operation** tab covers procedures for operating the system, such as connecting and using the craft interface terminal (CIT), displaying alarm and status conditions, installing a new generic program, etc.

The **Trouble Clearing** tab covers alarms and trouble reports.

The **Detailed Level Procedures** (DLP) tab contains all of the DLPs, beginning with DLP-500, used in this manual.

DDM-2000 FIBERREACH WIDEBAND SHELF

How to Use This TOP Section

To find the instructions for performing acceptance, system turnup/circuit order, operation, or trouble clearing tasks, proceed as follows:

1. Find your job in the Task Index under the appropriate colored tab and go to the referenced procedure (for example: **Acceptance IXL-001**). Or you may use the Master Task Index (**IXL-001**) in this introduction.
2. Turn to the indicated director level, detail level, or trouble-clearing procedure listed under the **"GO TO"** column for the task being performed.

Procedures in this TOP are of three types:

- a. Non-Trouble-Clearing Procedures (**NTP**) — a director level procedure that lists normal work items to perform other than trouble clearing.
- b. Trouble Analysis Procedure (**TAP**) — a director level procedure that contains step-by-step trouble-clearing instructions to locate and/or fix troubles.
- c. Detailed Level Procedures (**DLP**) — a detailed level procedure that contains step-by-step instructions.

All procedures in each section of this TOP are in numerical order, regardless of the type of procedure (see Table 1). Table 1, which lists all the procedures used in this TOP, is provided as a reference only. It should not be used alone in finding instructions for performing tasks.

3. Perform all the items in the director-level procedure in the indicated order unless it sends you to another director-level procedure. When you complete a director-level procedure, you have finished the task. Where more detailed information is required, you will be sent to a **DLP-()**. You may also be sent to a DLP by another DLP. All DLPs are in the **Detailed Level Procedures** tab section of this manual.
4. **IMPORTANT:** Unless otherwise directed, when you complete a DLP, you **MUST** return to the procedure that sent you there.
5. **IMPORTANT:** Unless otherwise directed, if one director-level procedure sends you to another director-level procedure, you should not return to the first director-level procedure after you complete the second.
6. Sometimes you will be asked to verify that things have occurred. This may take the form of a formal statement of the expected response. At other times, the instructions will merely state *verify that ...*.

If the expected response is not observed and a specific trouble clearing reference is not made, you should reference the trouble analysis procedures under the **Trouble Clearing** tab to clear the trouble.

7. When performing tests or procedures using a CIT and system commands, you should refer to the "Commands and Reports" section of this manual for a description of the command, its parameters, and the output messages associated with the command.
8. If a procedure refers to software releases, for example Release 2 or later, it refers to all releases with a numerical value of 2 or higher.

9. If you need assistance in clearing a trouble after completing all the applicable trouble-clearing procedures in this section, contact your local or regional maintenance assistance group. The telephone number for the Lucent Technologies Regional Technical Assistance Center (RTAC) is **(800) 225-RTAC**.

Circuit packs being returned for repair should be sent to the following address:

Lucent Technologies
Returned Goods Dept.
Dept. JC0221210
1600 Osgood Street
North Andover, MA 01845

Telephone: (978) 960-5179

Facsimile: (978) 960-170

Screen Display and Panel Stamping Fonts

The procedures in this manual use a monospace font to identify actual text on a screen or a response displayed from the system. A **bold** font identifies panel stamping, such as alarm names or circuit pack names. Also, the **bold** font is used throughout this manual for emphasis.

DDM-2000 FiberReach Installation

LTP 363-206-310, *DDM-2000 FiberReach Multiplexer Installation Manual*, is available for customers planning to install the equipment themselves. To acquire this manual, refer to "How to Order Documents" in the **About This Document** tab.

Lucent Technologies recommends that **ONLY** designated Lucent Technologies cables be used with DDM-2000 FiberReach. Failure to use these cables will void the product warranty.

Safety Instructions

Product Safety Labels

These instructions involve lasers, lightwave optical cable and connectors, and precautions when handling circuit packs to prevent damage from electrostatic discharge. The appropriate user/service manual contains admonishments in the form of **DANGERS**, **WARNINGS**, and **CAUTIONS** that must be followed at all times.

These admonishments have the following definitions:

- **DANGER** indicates the presence of a hazard that *will* cause death or severe personal injury if the hazard is not avoided.
- **WARNING** indicates the presence of a hazard that *can* cause death or severe personal injury if the hazard is not avoided.
- **CAUTION** indicates the presence of a hazard that *will* or *can* cause minor personal injury or property damage if the hazard is not avoided. The caution is also used for property-damage-only accidents. This includes equipment damage, loss of software, or service interruption.



The alert symbol appears throughout these products and the appropriate user/service manual to alert the user to the presence of important operating and maintenance (servicing) instructions for the DDM-2000 FiberReach.

Lightwave Safety Guidelines

General Laser Information

Lightwave/lightguide systems, their associated test sets, and similar operating systems use semiconductor laser transmitters that emit light at wavelengths between approximately 800 nanometers and 1600 nanometers. The emitted light is above the red end of the visible spectrum, which is normally not visible to the human eye. Although radiant energy at near-infrared wavelengths is officially designated invisible, some people can see the shorter wavelength energy even at power levels several orders of magnitude below any that have been shown to cause injury to the eye.

Conventional lasers can produce an intense beam of monochromatic light. The term monochromaticity means a single wavelength output of pure color that may be visible or invisible to the eye. A conventional laser produces a small-size beam of light, and because the beam size is small, the power density (also called irradiance) is very high. Consequently, lasers and laser products are subject to federal and applicable state regulations as well as international standards for their safe operation.

A conventional laser beam expands very little over distance or is said to be very well collimated. Thus, conventional laser irradiance remains relatively constant over distance. However, lasers used in lightwave systems have a large beam divergence, typically 10 to 20 degrees. Here, irradiance obeys the inverse square law (doubling the distance reduces the irradiance by a factor of 4) and rapidly decreases over distance.

Lasers and Eye Damage

Light energy emitted by laser and high-radiance LEDs in the 400-1400nm range may cause eye damage if absorbed by the retina. When a beam of light enters the eye, the eye magnifies and focuses the energy, magnifying the irradiance. The irradiance of energy that reaches the retina is approximately 10^5 or 100,000 times that at the cornea and, if sufficiently intense, may cause a retinal burn.

The damage mechanism at the wavelengths used in telecommunications is thermal in origin (that is, damage caused by heating). Therefore, a specific amount of energy is required for a definite time to heat an area of retinal tissue. Damage is not instantaneous. It occurs only when one looks at the light sufficiently long enough that the product of the retinal irradiance and the viewing time exceeds the damage threshold. Light energies above 1400 nm would cause surface and skin burns and do not affect the retinal area.

Classification of Lasers

Manufacturers of lasers and laser products in the U.S. are regulated by the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) under 21 CFR 1040. These regulations require manufacturers to certify each laser or laser product as belonging to one of four major Classes — Class I, II, IIa, IIIa, IIIb, or IV. Lasers are classified according to the accessible emission limits and their potential for causing injury. Lightwave systems are generally classified as Class I, because, under normal operating conditions, all energized laser transmitting circuit packs are terminated on optical fibers which enclose the laser energy with fiber sheath, forming a protective housing. Also, covers are in place over the circuit pack shelves.

Lightwave Safety Precautions

In its normal operating mode, a lightwave system is totally enclosed and presents no risk of eye injury. It is a Class I system under the FDA/CDRH scheme.

The lightguide cables that interconnect various components of a lightwave system can disconnect or break, and may expose people to lightwave emission. Also, certain measures and maintenance procedures may expose the technician to emission from the semiconductor laser during installation and servicing. Unlike more familiar laser devices, such as solid-state and gas lasers, the emission pattern of a semiconductor laser results in a highly divergent beam. In a divergent beam, the irradiance (power intensity) decreases rapidly with distance. The greater the distance, the less energy will enter the eye and the less potential risk for eye injury.

Inadvertently viewing an unterminated fiber or damaged fiber with the unaided eye at distances greater than 5 to 6 inches normally will not cause eye injury provided the power in the fiber is less than a few mW at the shorter wavelengths and higher at the longer wavelengths. However, damage may occur if an optical instrument such as a microscope, magnifying glass, or eye loupe is used to stare at the energized fiber end.



CAUTION:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Safety Precautions for Enclosed Systems

Under normal operating conditions, lightwave transmission systems are completely enclosed; nonetheless, the following precautions should be observed:

1. Because of the potential for eye damage, technicians should neither disconnect any lightwave cable nor splice and stare into the optical connectors terminating the cables.
2. Under no circumstances shall lightwave/lightguide operations be performed by a technician before satisfactorily completing an approved training course.
3. Since viewing lightwave emission directly with an optical instrument, such as an eye loupe, greatly increases the risk of eye damage, an appropriate label must appear in plain view on the front of the main frame or lightguide termination/interconnection equipment. The safety label (Figure 1) shall read as follows:

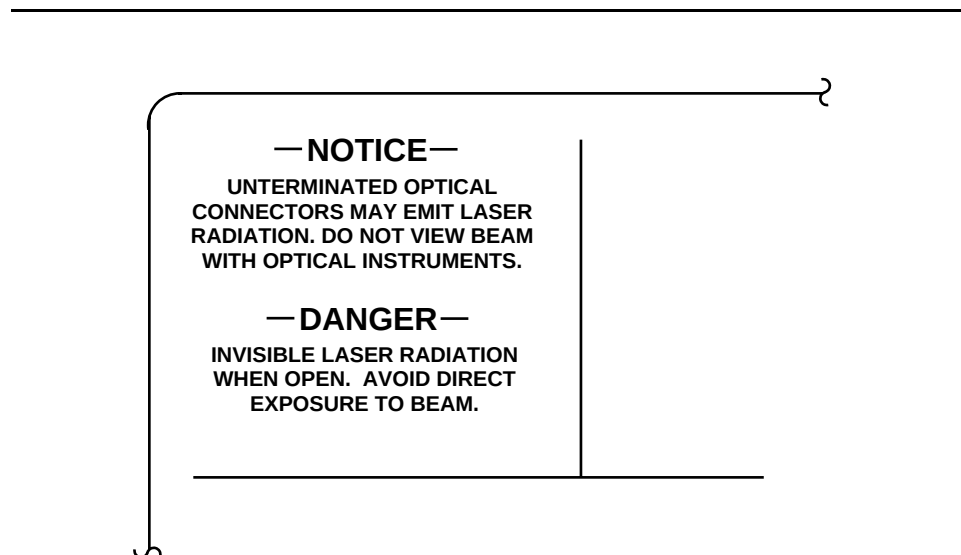


Figure 1. Safety Label

Safety Precautions for Unenclosed Systems

During service, maintenance, or restoration, a lightwave transmission system is considered unenclosed. Under these conditions, follow these practices:

1. Only authorized, trained personnel shall be permitted to do service, maintenance, and restoration. Avoid exposing the eye to emissions from unterminated, energized optical connectors at close distances. Connectors associated with lightwave regenerators are recessed, which limits exposure distance. However, technicians removing or replacing regenerators should not stare or look directly into the vacant regenerator slot with optical instruments or magnifying lenses. (Normal eyewear or indirect viewing instruments are not considered magnifying lenses or optical instruments.)
2. Only authorized, trained personnel shall use the lightwave test equipment during installation or servicing since this equipment contains semiconductor lasers. (Some examples of lightguide test equipment are OTDRs, Hand-Held Loss Test Sets, and Feature Finders.)
3. Under no circumstances shall any personnel scan a fiber with an optical test set without verifying that all lightwave sources on the fiber are turned off.
4. All unauthorized personnel shall be excluded from the immediate area of lightwave transmission systems during installation and service.

Consult ANSI Z136.1 American National Standard for Safe Use of Lasers for guidance on the safe use of lasers in the workplace.

Electrostatic Discharge (ESD) Considerations



CAUTION:

Industry experience has shown that all integrated circuit packs can be damaged by static electricity that builds up on work surfaces and personnel. The static charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

The following precautions should be observed when handling circuit packs in order to prevent damage by ESD:

- Assume all circuit packs contain solid state electronic components that can be damaged by ESD. Use only Lucent Technologies manufactured UL recognized circuit packs specified in the appropriate user/service manual in this system.
- When handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane, always wear a grounded wrist strap or wear a heel strap and stand on a grounded, static-dissipating floor mat. If a static-dissipating floor mat is used, be sure that it is clean.
- Handle all circuit packs by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.
- Observe warning labels on bags and cartons. Whenever possible, do not remove circuit packs from antistatic packaging until ready to insert them into slots.
- If possible, open all circuit packs at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats. If a static-dissipating table mat is used, be sure that it is clean.
- Always store and transport circuit packs in static-safe packaging. Shielding is not required unless specified.
- Keep all static-generating materials such as food wrappers, plastics, and Styrofoam^{®*} containers away from all circuit packs. Upon removal from the bay, immediately put circuit packs into static-safe packages.
- Whenever possible, maintain relative humidity above 20 percent.

To reduce the possibility of ESD damage, shelves are equipped with grounding jacks to enable personnel to ground themselves using wrist straps (see Figure 2) while handling circuit packs or working on a shelf(s). The jacks for connection of wrist straps are located at the lower right-hand corner of each shelf and are labeled. When grounding jacks are not provided, an alligator clip adapter enables connection to bay frame ground.

* Registered trademark of the Dow Chemical Company.

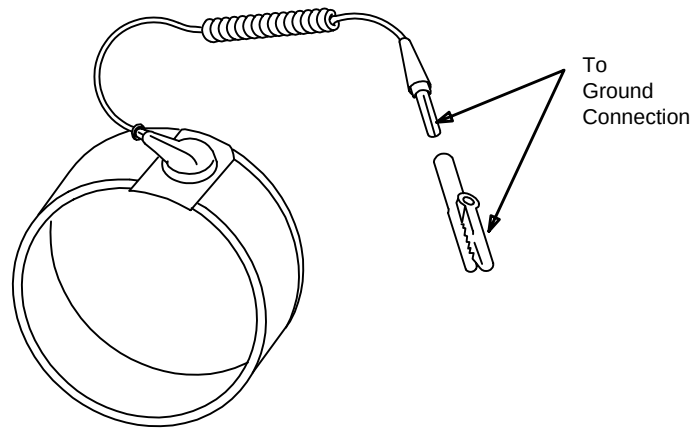


Figure 2. Static Control Wrist Strap

General Safety Instructions

GENERAL SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.
3. Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.
4. Slots and openings in this product's back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided. For information on proper ventilation requirements, consult the "Equipment Installation Considerations" section of LTP 363-206-310, *DDM-2000 FiberReach Multiplexer Installation Manual*.
5. This product should be operated only from the type of power source indicated on the marking label. For information on proper electrical distribution and power requirements, refer to the "Power" and "Technical Specifications" sections of the appropriate user/service manual.
6. Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.
7. To reduce the risk of electrical shock, do not disassemble this product. Service should be performed by trained personnel only. Opening or removing covers and/or circuit packs may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.



CAUTION:

Disconnect two (2) power connections when removing power from the system.

8. Use only Lucent Technologies manufactured UL-recognized circuit packs. Recognized circuit packs are listed in the appropriate user/service manual.

SAVE THESE INSTRUCTIONS.

Installation Safety Instructions

INSTALLATION SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Installation and maintenance procedures must be followed and performed by trained personnel only.
3. All DS1 interfaces should not leave the building premises unless connected to telecommunication devices providing primary or secondary protection, as applicable.
4. For information on proper mounting instructions, consult LTP 363-206-310, *DDM-2000 FiberReach Multiplexer Installation Manual*.
5. Never install telecommunication wiring during a lightning storm.
6. Never install telecommunication connections in wet locations.
7. Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the DS1 interface.
8. Use caution when installing or modifying telecommunication lines.

SAVE THESE INSTRUCTIONS.

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DDM-2000 FIBERREACH WIDEBAND SHELF

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Shelf — Add DDM-2000 FiberReach Node Operating at an OC-3 Rate To an OC-3 Ring	Circuit Order: NTP-024
Shelf — Equip DDM-2000 FiberReach Wideband Shelf (Looped Back)	System Turnup: NTP-007
Software Version ID — Retrieve	Detailed Level Procedure: DLP-531
Test LEDs.	Detailed Level Procedure: DLP-509

DDM-2000 FIBERREACH WIDEBAND SHELF

Test (Accept) DDM-2000 FiberReach Multiplexer
(Looped Back) — Wideband Acceptance: NTP-003

Test (Accept) End-to-End DDM-2000 System
(Network). Acceptance: NTP-004

Test (Accept) DDM-2000 FiberReach
Multiplexer (Equipped) — Overview Acceptance: NTP-002

Trouble Report — Clear Trouble Clearing: TAP-105

Rear Access to the Wall DT Cabinet. Detailed Level Procedure: DLP-542

Numerical List of TOP Procedures

Table A – Numerical List of TOP Procedure (Note)*

Acceptance Tab

IXL-001	Acceptance Task Index
NTP-002	Overview of Acceptance (Test) Procedures for DDM-2000 FiberReach Multiplexer (Equipped) — Wideband
NTP-003	Test (Accept) DDM-2000 FiberReach Multiplexer Shelf (Looped Back) — Wideband
NTP-004	Test (Accept) End-to-End DDM-2000 System (Network) — Wideband

System Turnup/Circuit Order Tab

IXL-001	Task Index — System Turnup/Circuit Order
NTP-002	Add New DDM-2000 FiberReach Node to an OC-1 Ring Off an OC-3 Ring
NTP-003	Discontinue DDM-2000 FiberReach Node (Shelf) From DDM-2000 OC-3 Path Switched Ring Network
NTP-004	Establish Initial End-to-End DS1 Service (Group Equipped but Not in Service)
NTP-005	Discontinue End-to-End DS1 Service
NTP-006	Add New DS1 Service
NTP-007	Equip DDM-2000 FiberReach Wideband Shelf (Looped Back)
NTP-008	Establish Single-Homed FiberReach Access via DDM-2000 OC-3 Host Shelf
NTP-009	Establish Dual-Homed FiberReach Access via DDM-2000 OC-3 Backbone Ring
NTP-010	Establish Stand Alone FiberReach Access via DDM-2000 OC-3 Host Shelf
NTP-011	Install DS1 Protection Bus Module (1x1 or 1x7) System Out-of-Service
NTP-012	Change DS1 Protection Bus Module (1x1 or 1x7) Low-Speed Slots Out-of-Service
NTP-013	Establish Initial End-to End T1 Service (Low-Speed Slot Equipped but Not in Service)
NTP-014	Add New T1 Service
NTP-015	Discontinue End-to-End T1 Service

Table A – Numerical List of TOP Procedure (Note)*

NTP-016	Establish FiberReach Access via DDM-2000 OC-3 Release 9 Host Shelf OC-3 Release Linear Configuration
NTP-017	Establish Initial HDSL Service (Group Equipped but Not in Service)
NTP-018	Add New HDSL Service (Group Already in Service)
NTP-019	Discontinue End-to-End HDSL
NTP-020	Establish Single-Homed FiberReach Node Operating at an OC-3 Rate Access via DDM-2000 OC-12 Backbone Ring
NTP-021	Establish Single-Homed FiberReach Node Operating at an OC-3 Rate Access via FT-2000 OC-48 Backbone Ring
NTP-022	Establish Dual-Homed FiberReach Node Operating at an OC-3 Rate Access via FT-2000 OC-48 Backbone Ring
NTP-023	Establish Dual-Homed FiberReach Node Operating at an OC-3 Rate Access via DDM-2000 OC-12 Backbone Ring
NTP-024	Add New DDM-2000 FiberReach Node Operating at an OC-3 Rate To an OC-3 Ring

Operations Tab

IXL-001 Task Index

Table A – Numerical List of TOP Procedure (Note)*

Trouble Clearing Tab

IXL-001	Task Index
TAD-100	Maintenance Philosophy
TAP-101	Clear Critical (CR) Alarm
TAP-102	Clear Major (MJ) Alarm
TAP-103	Clear Multiple Failure
TAP-104	Clear Power Main or (PMN) Alarm
TAP-105	Clear Trouble Report
TAP-106	Isolate and Clear Failure
TAP-107	Clear Far End Alarm Using Craft Terminal Interface (CIT)
TAP-108	Clear Obscure Failure Condition
TAP-109	Clear Abnormal (ABN) Indication
TAP-110	Clear Flashing FAULT LED Indication
TAP-111	Clear Main OLIU or Fiber Trouble - Path Protected Ring
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TAP-113	Clear Obscure Minor (MN) Alarm
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TAP-115	Clear LED Test Trouble
TAP-116	Clear Trouble During Program Upgrade
TAP-117	Clear NE ACTY/FE ACTY Alarm Only
TAP-118	Clear STS/VT AIS Alarm Conditions
TAP-119	Clear Brownout Conditions - Flashing L in FE ID Display

Table A – Numerical List of TOP Procedure (Note)*

Detailed Level Procedures (DLP) Tab

DLP-500	Enable or Disable System Security and/or Edit, Delete, or Enter a User's Login
DLP-501	Replace BBG8 SYSCTL - In Service
DLP-502	Replace ECC1/ECC2 USPNL User Panel - In Service
DLP-503	Install/Remove Lightguide Buildout
DLP-504	Install OLIU Circuit Packs
DLP-505	Connect Optical Loop
DLP-506	DDM-2000 FiberReach Receiver Sensitivity Test
DLP-507	Install T1EXT Circuit Packs
DLP-508	Install DS1/DS1PM Circuit Packs
DLP-509	Perform LED Test
DLP-510	Perform DS1 Transmission Test
DLP-511	Remove -48 V DC User Panel Fuse
DLP-512	Activate System Features Using CIT
DLP-513	Set Circuit Pack Options
DLP-514	Perform Optical Fiber Connections and Verification of Optical Facility
DLP-515	Perform End-to-End OC-1 Optical Line Test
DLP-516	Check Local Office Alarms
DLP-517	Check Parallel Telemetry
DLP-518	Check TBOS Serial Telemetry
DLP-519	Test Protection Switching Function
DLP-520	Condition DS1/DS1PM Circuit Pack/Port for New DS1 Service
DLP-521	Connect CIT and Establish Session
DLP-522	Establish Remote Login
DLP-523	Replace Circuit Pack
DLP-524	Install User Panel and Check -48 V DC Office Battery
DLP-525	Install Software Generic Program New Shelf Installation - Only BBG8 SYSCTL Installed
DLP-526	Make VT1.5 (DS1) or STS1 Cross-Connections Using CIT Single/Dual Homing OC3/OC1 Ring Configuration
DLP-527	Clean Optical Fibers, Connectors, and Lightguide Buildouts (LBOs)

Table A – Numerical List of TOP Procedure (Note)*

DLP-528	Make VT1.5 (DS1) or STS1 Cross-Connections Using CIT Stand-Alone OC3/OC1 Ring Configuration
DLP-529	Check 197A BATTERY LOAD TEST SET
DLP-530	Operate FE SEL Pushbutton on SYSCTL
DLP-531	Retrieve Generic Software Version ID
DLP-532	Perform Test of RT Batteries Using 197A BATTERY LOAD TEST SET
DLP-533	Introduction to the PC
DLP-534	Copy Diskettes and Make Backups
DLP-535	Unused
DLP-536	Install New Software Generic Program In-Service System - Local Shelf Download
DLP-537	Install New Software Generic Program In-Service System - Remote Shelf Download
DLP-538	Condition T1EXT Circuit Pack/Port for New T1 Service
DLP-539	Install BBG8 SYSCTL — New Shelf
DLP-540	Install BBF8 HDSL Circuit Packs
DLP-541	Obtain Equipment, Check Software, Prepare and Connect PC for Software Download
DLP-542	Rear Access to the Wall DT Cabinet
DLP-543	Out OF Service Upgrade From 26G type to 28G type OLIU Circuit Packs

* Table A is provided as a reference only, and should not be used alone in finding instructions for performing tasks.

Acceptance Task Index

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Acceptance Procedures (Shelf Equipped)

 **NOTE:**
The following procedures are for use in testing the DDM-2000 FiberReach Multiplexer after another organization has equipped it. The procedures test the DDM-2000 FiberReach shelf *after* all circuit packs have been installed and the shelf is looped back or after a system has been established end-to-end. They are not intended to be used for initial system turnup or in establishing an end-to-end system. System Turnup procedures are found in this manual under the **System Turnup/Circuit Order** tab.

- Overview of Acceptance (Test) Procedures for DDM-2000 FiberReach Multiplexer (Equipped Wideband) Acceptance: NTP-002
- Test (Accept) DDM-2000 FiberReach Multiplexer Shelf (Looped-Back) — Wideband Acceptance: NTP-003
- Test (Accept) End-to-End DDM-2000 System (Network) — Wideband Acceptance: NTP-004

Acceptance Procedures (Shelf Unequipped)

 **NOTE:**
Procedures for installing and testing DDM-2000 OC-3 system bays, shelves, and cables are found in LTP 363-206-310, *DDM-2000 FiberReach Multiplexer Installation Manual*.

Overview of Acceptance (Test) Procedures for DDM-2000 FiberReach Multiplexer (Equipped) — Wideband

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to the beam.



CAUTION:

*DDM-2000 FiberReach circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

This procedure is an overview of acceptance procedures that may be performed on the DDM-2000 FiberReach Multiplexer. It assumes that the DDM-2000 FiberReach shelf has been installed and equipped with circuit packs. It also assumes that the shelf is being tested (accepted) by an organization that *did not* install it. This procedure is for reference only. It contains a list of items that may be performed in doing acceptance of a shelf and is not intended to be done in sequence.

Verify that office battery has been applied to the shelf. (**PWR ON**
A and **B** LEDs lit on User Panel.)

DLP-524

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

2.	Set (check) circuit pack option switch settings, if required.	DLP-513
3.	Test (accept) DDM-2000 FiberReach Multiplexer shelf (looped back). [Acceptance: NTP-003]	
4.	Test (accept) DDM-2000 FiberReach optical span [Acceptance: NTP-004]	
5.	If required, perform DS1 transmission tests on each DS1/T1/HDSL port.	DLP-510
6.	Verify/set option settings using rtrv-ne/set-ne:	DLP-512
7.	Verify/set option settings using rtrv-()/set-():	DLP-512

Test (Accept) DDM-2000 FiberReach Multiplexer Shelf (Looped-Back) — Wideband

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to the beam.



CAUTION:

*DDM-2000 FiberReach circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

This test is to be performed if the DDM-2000 FiberReach is being tested or accepted by an organization that did not install it.



NOTE:

It is assumed that the DDM-2000 FiberReach is installed, powered, equipped, and free of alarms. If it was not left in that condition, notify the organization that installed the DDM-2000 FiberReach that they have not completed the installation or use **Trouble Clearing: IXL-001**.



NOTE:

If the DDM-2000 FiberReach fails to respond in the indicated manner, you should refer the trouble to the organization that installed the DDM-2000 FiberReach or use **Trouble Clearing: IXL-001**.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

⇒ **NOTE:**
The `rtrv-( )` commands (`rtrv-ne`, `rtrv-ocl`,
`rtrv-sync`, or `rtrv-tl`) may be used to retrieve switch
settings except for LBO settings on **DS1** and **T1EXT** circuit
packs.

Verify correct circuit packs have been installed and option
switches have been set correctly, if not already performed.

DLP-513

2.

⇒ **NOTE:**
If the **ACO/TEST** pushbutton is depressed longer than
2 seconds, the **SYSCTL** display will scroll through the
software version code and all LEDs will remain lit until the
code is displayed.

⇒ **NOTE:**
Software must be installed for this test. If software has not
been installed, the letter "**P**" will be displayed in the
7-segment **FE ID** display. If software has not been installed,
refer problem to the organization that installed the shelf.

Depress and hold the **ACO/TEST** pushbutton on the User Panel.
Verify that all User Panel and circuit pack LEDs and the **SYSCTL**
display light. Verify proper version of software is installed.

DLP-509

3. Release the **ACO/TEST** pushbutton. Verify that all LEDs on the
DDM-2000 go off.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

4.



CAUTION:

*Before looping a shelf, verify/set DSNE parameter of the rtrv-ne:/set-ne: command to **no**. This parameter will be set as required when the shelf is integrated into a network. Only one DSNE is allowed in a network.*



NOTE:

An inconsistent DCC values alarm will occur when the **OLIUs** are looped back. To clear the alarm during a fiber loopback, use the set-fecom:address:com=disable command to disable the DCC.



NOTE:

An AGNE communication failure alarm will also occur when the **OLIUs** are looped back. This alarm occurs because at least one shelf in the network must be set as an AGNE but the default for the shelf is AGNE=no. To clear the alarm during a fiber loopback, use the set-ne:tid:agne=yes command.

Install **OLIU** optical loops between their respective **IN** and **OUT** optical connectors.

DLP-505

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5.



CAUTION:

*The `init-sys:all` command should **NOT** be used on an in-service system.*



NOTE:

A craft interface terminal (CIT) is required to access the optional features of the DDM-2000 FiberReach.



NOTE:

During installation and/or initial testing, provisionable parameters may have been set which need to be reset to their default values. STS1 and/or VT1.5 cross-connections may have been made which should be deleted before the system is placed in service. The `init-sys:all` command may be used to reset all provisionable parameters and cross-connections to default values.



NOTE:

An inconsistent DCC values alarm will occur when the `init-sys:all` command is executed. To clear the alarm, use the `set-fecom:address:com=disable` command to disable the DCC.



NOTE:

An AGNE communication failure alarm will also occur when the `init-sys:all` command is executed because the AGNE parameter of the `set-ne:` command is set to no again. To clear the alarm, use the `set-ne:tid:agne=yes` command.

If required, use the command `init-sys:all` to reset provisionable parameters to default values.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

6.



NOTE:

If the shelf has not been equipped for the required low-speed protection mode, refer trouble to the organization that installed the shelf or use procedures of **NTP-011** to install the correct protection mode assembly.

Use `rtrv-eqpt` command to verify shelf is equipped for low-speed protection mode required (*Low speed protection mode: 1X1 or 1X7*). Verify proper protection mode designation strip label has been placed on the front of the shelf on the middle designation strip between the **LOW-SPEED** slots.

7.



NOTE:

These procedures assume that the DDM-2000 FiberReach has been connected to the DSX-() cross-connect points, as required. **DS1**, **T1EXT**, and/or **HDSL** (if **28G type OLIUs** are used) circuit packs must be inserted, as required, before performing these tests.

Perform transmission and cross-connect tests for each group, as required. Refer any failures to organization that installed the DDM-2000 FiberReach.

DLP-510

8.



NOTE:

A craft interface terminal (CIT) is required to access the optional features of the DDM-2000 FiberReach. Refer to the "Commands and Reports" section and use the `rtrv-( )` commands to determine the existing options.

Activate optional features that you require at this time.

DLP-512

-
9. After each shelf in the network has been tested, the DDM-2000 FiberReach will be ready for end-to-end testing.
[Acceptance: NTP-004]
-

Test (Accept) End-to-End DDM-2000 System (Network) — Wideband

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.

 **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to the beam.

 **CAUTION:**
*DDM-2000 FiberReach multiplexer circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*

 **NOTE:**
This test is to be performed if the DDM-2000 FiberReach multiplexer is being tested or accepted by an organization that did not install it.

 **NOTE:**
It is assumed that the DDM-2000 FiberReach multiplexer is installed and running in an end-to-end network configuration and each shelf has previously been tested in a looped-back configuration.

 **NOTE:**
If the DDM-2000 FiberReach multiplexer fails to respond in the indicated manner, refer the trouble to the organization that installed the multiplexer or use **Trouble Clearing: IXL-001**.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Determine the optical loss of the optical facility from office records or by making the required measurements.

2.



NOTE:

The `rtrv-map-network` command may be used to retrieve a map of the network, including the systems in the network and how they are connected.

Ensure all DDM-2000 FiberReach shelves (**OLIUs**) in the network have been properly connected to the optical facility. Verify the integrity of each optical span.

DLP-514

3. Use `rtrv-sync` command at each DDM-2000 FiberReach node to verify proper timing options. Each DDM-2000 FiberReach node in the network should be set for *LineTimed*.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

4.



CAUTION:

The `init-sys:all` command should NOT be used on an in-service system.



NOTE:

During installation and/or initial testing, provisionable parameters may have been set which need to be reset to default values. VT1.5 (DS1) cross-connections may have been made which should be deleted before the system is placed in service. The `init-sys:all` command will reset all provisionable parameters and cross-connections to default values. Some parameters will have to be set again later before service is established.



NOTE:

An inconsistent DCC values alarm will occur when the `init-sys:all` command is executed, if the far-end communications has not been enabled at both ends of the system using the `set - fecom:` command.

If required, use the command `init-sys:all` to reset provisionable parameters to default values.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5.

⇒ **NOTE:**
No DDM-2000 FiberReach shelf can be designated as the DSNE in the subnetwork.

⇒ **NOTE:**
Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group is recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes.

Use the `set - ne:tid=TID;dsne=no` command to ensure that the DDM-2000 FiberReach shelf is **NOT** the DSNE in the subnetwork. Use the `rtev - ne:` and `set - ne:` commands to verify/set the AGNE(s) and alarm group number, as required.

6.

⇒ **NOTE:**
The section data communication channel (DCC), used for far-end communications, must be enabled at each network element (shelf) for the end-to-end line test to work. Default condition for the DCC channel is "enabled." If it has been disabled, use the `set - fecom:` command **at each shelf** to enable far-end communications.

⇒ **NOTE:**
The `rlgn` command can be used to log in to each shelf at optical span being tested.

Perform end-to-end OC-1 line test on all optical spans. Report any failures to the organization that installed the DDM-2000 FiberReach shelf. **DLP-515**

7. Perform end-to-end DS1 transmission test in the **mux** direction, if required. **DLP-510**

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

8. Check local office alarm interface as required.	DLP-516

9. Check office telemetry interface as required.	

A. Parallel telemetry	DLP-517

B. Serial telemetry	DLP-518

10. Test protection switching function, if required.	DLP-519

11. The system is ready for service to be established.	

12. Activate optional features as required.	DLP-512

Task Index

System Turnup/Circuit Order

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Equipment Required for Shelf Turnup

1. AT&T PC 6300 compatible personal computer with MS-DOS* Release 2.1 or later. Used for loading software.
2. Proper software release for system configuration you have.
3. **FS1E-E-02** lightguide jumpers for looping shelf **OLIUs**.

Initial Shelf Turnup and Establishing End-to-End System

⇒ **NOTE:**
These procedures are used to equip DDM-2000 FiberReach shelves, establish end-to-end FiberReach/OC-3 networks, and establish initial end-to-end DS1 service after all necessary bay, shelf, and cable installation has been done.

Low-Speed Protection Mode — Install/Change

Install DS1 Protection Bus Module (1X1 or 1X7)

System Out-of-Service Circuit Order: NTP-011

Change DS1 Protection Bus Module (1X1 or 1X7)

Low-Speed Slots Out-of-Service Circuit Order: NTP-012

Shelf — Equipping (Looped Back)

Equip DDM-2000 FiberReach Wideband Shelf

(Looped Back) System Turnup: NTP-007

* Registered trademark of Microsoft Corporation

System — Establish End-to-End

Establish Single-Homed FiberReach Access
via DDM-2000 OC-3 Backbone Ring System Turnup: NTP-008

Establish Dual-Homed FiberReach Access
via DDM-2000 OC-3 Backbone Ring System Turnup: NTP-009

Establish Stand-Alone FiberReach Access
via DDM-2000 OC-3 Host Shelf System Turnup: NTP-010

Establish FiberReach Access
via DDM-2000 OC-3 Release 9 Host Shelf
OC-3 Release 8 Linear Configuration System Turnup: NTP-016

Establish Single-Homed FiberReach
Node Operating at an OC-3 Rate
Access via DDM-2000 OC-12 Backbone Ring System Turnup: NTP-020

Establish Single-Homed FiberReach
Node Operating at an OC-3 Rate
Access via FT-2000 OC-48 Backbone Ring System Turnup: NTP-021

Establish Dual-Homed FiberReach
Node Operating at an OC-3 Rate
Access via FT-2000 OC-48 Backbone Ring System Turnup: NTP-022

Establish Dual-Homed FiberReach
Node Operating at an OC-3 Rate
Access via DDM-2000 OC-12 Backbone Ring System Turnup: NTP-023

Service — Establish Initial DS1/T1/HDSL

Establish Initial End-to-End DS1 Service
(Group Equipped but Not in Service) System Turnup: NTP-004

Establish Initial End-to-End T1 Service
(Low-Speed Slot Equipped but Not in Service) System Turnup: NTP-013

Establish Initial HDSL Service
(Group Equipped but Not in Service) System Turnup: NTP-017

Shelf/Span — Adding New

Add DDM-2000 FiberReach Node
to an OC-1 Ring Off an OC-3 Ring Circuit Order: NTP-002

Add DDM-2000 FiberReach Node
Operating at an OC-3 Rate
to an OC-3 Ring Circuit Order: NTP-024

DDM-2000 FIBERREACH WIDEBAND SHELF

Service — Adding New DS1/T1/HDSL

Add New DS1 Service. Circuit Order: NTP-006
Add New T1 Service Circuit Order: NTP-014
Add New HDSL Service
(Group Already in Service) Circuit Order: NTP-018

Service — Discontinue DS1/T1/HDSL

Discontinue End-to-End DS1 Service. Circuit Order: NTP-005
Discontinue End-to-End T1 Service Circuit Order: NTP-015
Discontinue End-to-End HDSL Service. Circuit Order: NTP-019

Shelf (Node) — Discontinue

Discontinue DDM-2000 FiberReach Node (Shelf)
From DDM-2000 OC-3 Path Switched Ring Network . . . Circuit Order: NTP-003

Add New DDM-2000 FiberReach Node To an OC-1 Ring Off an OC-3 Ring

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in Trouble Clearing: TAD-100.



NOTE:

This procedure assumes that the DDM-2000 is in service and a new RT site (shelf) is being added to the Path Switched Ring configuration. (See Figure 1.)



NOTE:

It is assumed that optical loops are installed on the new shelf, that the new shelf has been tested in a looped-back configuration, and that the proper release of software has been loaded. [**System Turnup: NTP-007**]



NOTE:

All shelves in the same network must have the same or compatible software releases.



NOTE:

This procedure requires information from other sites in the network, either through remote modem connection or by having a technician at the neighboring site.

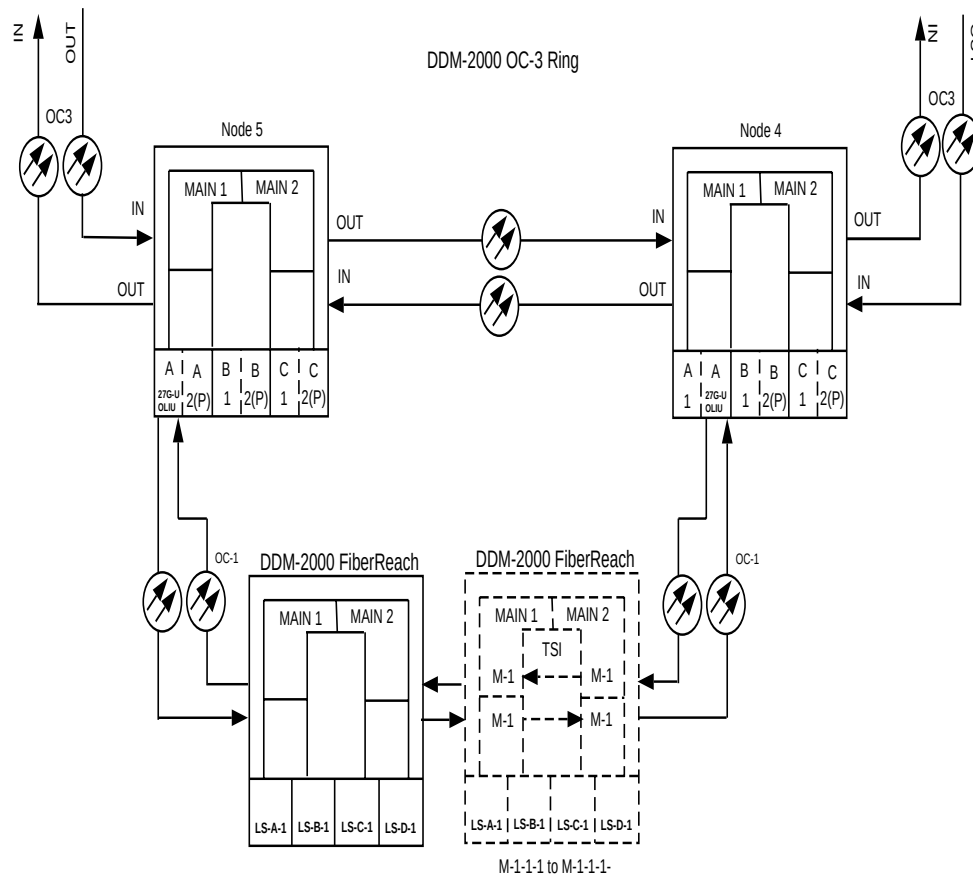


Figure 1 – Adding an RT (Node) to an Existing Ring Network

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.

Use the `rtrv-alm` command to verify that no alarms, locks, loops, or switches are present.

-
2. Notify maintenance center that alarms will be generated.
-

3. Use the `set - fecom` command to set the User Side/Network Side parameters.
-

- 4.



NOTE:

It may be helpful to make a sketch of the network to visualize the cross-connections required.

Use `rtrv-map-network:` and `rtrv-map-neighbor:` commands to determine systems (sites) in the network and how they are connected to each other.

-
5. Two or more shelves in the same network with the same TBOS display number will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID will cause a duplicate TID alarm. If more than one shelf is provisioned as DSNE, a "duplicate DSNE" alarm will occur.

DLP-513

Use the `rtrv-ne` command at each site to verify no duplicate, DSNE, TBOS, site/ne, or TID settings exist. If duplicates exist, determine correct settings; use the `set - ne` command to set the proper parameters.

Use the `set - ne:` command to set the alarm group number for this shelf, if required. (Default alarm group number is 255.) If the shelf is an AGNE, use the `set - ne:` command to designate the shelf as an AGNE. One primary AGNE and one backup per alarm group is recommended.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

6. From office records or by using the `rtrv-crs-vt1:all` command at any site, determine the existing cross-connections.
-

7.



CAUTION:

Critical or Major alarms will be generated if pass-through cross-connections are not made on the new shelf before splicing it into the network.



NOTE:

In ring configurations, you should use the following rules in establishing cross-connections in each ring:

1. All drop connections (including DRI, if present) from the same STS-1 timeslot must be provisioned the same, either all VT1.5 or STS-1.
 2. If all 28 VT1.5s (DS1s) in an STS-1 are being passed through at a node in a VT1.5 path-switched ring, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the pass-through node in the future, you should provision the pass-throughs as VT1.5 cross-connections. OC-3 ring Releases 7.0 and earlier do not support the command (`cnvt-crs`) for converting an STS-1 to a VT1.5 cross-connect. Also, provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted to 28 VT1.5 cross-connects to drop DS1s at a later time.
 3. On STS-1 path-switched rings, all nodes in the ring must be provisioned as STS-1 cross-connections.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

Up to 28 DS1s may be terminated in an OC-1 ring network. Once a DS1 is terminated, that timeslot must be reserved in both directions around the ring to the far end. Therefore, if a DS1 is terminated (cross-connected) on a near-end and far-end terminating shelf, it must also be pass-through cross-connected in every shelf in the network. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross connections.

Use the `ent-crs-vt1:` command at the new shelf to make all required *pass-through* cross-connections (for example, `ent-crs-vt1:m-1-1-1,m-1-1-1`). Pass-through cross-connections must be made at the new shelf to correspond to each terminating cross-connection present on every shelf in the ring network. (See Figure 1.)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

8.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to the beam.



CAUTION:

An automatic protection switch service hit may occur when the correct optical fibers are cut. Cutting the wrong fiber lines will cause a service interruption.

At the point where the new DDM-2000 FiberReach shelf will be added, use local procedures to cut the two fiber lines connecting existing shelves and condition the fiber for connection to the new shelf.

9.



NOTE:

Cutting the main sync source will cause the line-timed node to go into *holdover*.

Verify that only minor nsa OC-1 LOS and nsa inc. VT/STS1 AIS alarms are present at each end of the fiber cut.

10. At new shelf, remove **OLI** optical loops.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

11. Determine the optical loss of the optical facility from office records or by making the required measurements.

-
12. Connect one pair of optical fibers from an adjacent shelf (site) to new shelf **MAIN-1 OLIU**. Ensure that the correct fibers are connected to the proper **OLIU** [**MAIN-2** in one node to **MAIN-1** in an adjacent node]. **DLP-514**
-

13.



NOTE:

If the report in this step indicates wrong fiber connections or no connection, verify that *fecom* is ON (`rtrv-fecom:`) and check fiber integrity.

Use `rtrv-map-neighbor:` command to verify proper fiber connections have been made to the adjacent node.

-
14. Connect optical fibers from the other adjacent shelf (site) to new shelf **MAIN-2 OLIU**. Ensure that the correct fibers are connected to the proper **OLIU** [**MAIN-2** in one node to **MAIN-1** in an adjacent node]. **DLP-514**
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

15.



NOTE:

If the report in this step indicates wrong fiber connections or no connection, verify that *fecom* is ON (`rtrv-fecom:`) and check fiber integrity.

Use `rtrv-map-neighbor:` command to verify proper fiber connections have been made to the adjacent node.

-
16. Verify that all alarm and status conditions clear. If `nsa inc. VT AIS` alarm is present and no `inc. OC-1 LOS` alarm, check that all pass-through cross-connections have been properly made using the `rtrv-crs-vt1:` command. If `nsa inc. STS AIS` alarm is present and no `inc. OC-1 LOS` alarm, check that all pass-through cross-connections have been properly made using the `rtrv-crs-sts1:` command.

-
17. Perform end-to-end OC-1 optical line test on optical spans being established.

DLP-515

18.



NOTE:

Proper cross-connections must be made at each shelf to establish the complete end-to-end path for the DS1 port being tested. After one path (ring1 or ring2) has been tested, use the `sw-path-vt1:` command at both ends to test the other ring path.

Perform end-to-end single ring DS1 transmission test for the circuits being added, as required.

DLP-510

-
19. The system is ready for service to be established.

Initial DS1 Service [**System Turnup: NTP-004**]

Initial T1 Service [**System Turnup: NTP-013**]

Discontinue DDM-2000 FiberReach Node Shelf From DDM-2000 OC-3 Path Switched Ring Network

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

The craft interface terminal (CIT) or `rtrv-map-network:` and `rtrv-map-neighbor:` commands may be used to retrieve a map of the SONET network, including a list of the systems in the network and how they are connected. The `rtrv-crs-vt1:` command may be used to retrieve VT1.5 (DS1) cross-connections within the DDM-2000 system.

Use `rtrv-alm` command to verify no alarms, locks, loops, or switches are present.

2. Determine which DDM-2000 node (shelf) is being discontinued.

3. Verify that optical line loss budget will not be exceeded by removing this node.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

4. At the shelf being discontinued and all associated terminating shelves, ensure service (signals) has been removed from the DS1/T1 being discontinued.

Discontinue DS1 Service [**Circuit Order: NTP-005**]

Discontinue T1 Service [**Circuit Order: NTP-015**]

5.



CAUTION:

Removal of wrong fiber connections will result in a service interruption. Ensure you remove only the fiber connections for the optical span being discontinued.



NOTE:

The following operations will activate office alarms. The audible alarm may be suppressed by depressing the **ACO** button.

Remove optical fiber connections from **MAIN OLIUs** in node (shelf) being discontinued.

6. Reconnect the optical fibers, bypassing the node just removed. Ensure all alarms in the ring configuration are off. If alarms are present, verify fiber connections and integrity.
-

7. If the removed shelf is not to be left powered, power down the shelf per local procedures, then continue with Step 10. Otherwise, continue with Step 8.
-

8. If **OLIUs** circuit packs are not removed, connect optical fiber loops to **OLIUs**.
-

DLP-505

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

9.



NOTE:

The **UPD/INIT** pushbutton on the **SYSCTL** is recessed to prevent its accidental operation. You will need a small pointed object, such as a ball-point pen to operate it.

If any circuit packs were removed, momentarily depress the **UPD/INIT** button on the **SYSCTL** or use the upd command to update the DDM-2000 internal equipment list.

10.



NOTE:

When a shelf is removed from a DDM-2000 network, the `dlt-tadmap:tid=tid` command must be used at the DSNE to delete the TID of the removed shelf from the directory services data base used for routing messages over the DCC. This prevents that TID from appearing in either the `rtrv-map-network` or `rtrv-map-neighbor` reports and will retire the communication failure alarms at all shelves in the network.



NOTE:

The `dlt-tadmap:tid=tid` command is valid only at the DSNE. The `rtrv-map-network` command may be used to determine which shelf is the DSNE.

Wait at least one minute, then at the DSNE, use the `dlt-tadmap:tid=tid` command to delete the TID of the removed shelf from the directory services data base, if required.

11. Verify that all alarms go off.

Establish Initial End-to-End DS1 Service (Group Equipped but Not In Service)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in Trouble Clearing: TAD-100.



NOTE:

The FiberReach and host system must be established before continuing with this procedure. If all the nodes of the network have not been equipped and installed, refer to **System Turnup/Circuit Order: IXL-001** for procedures to equip the DDM-2000 shelves and establish the system.



NOTE:

This procedure assumes that **DS1** circuit packs have already been installed during initial shelf turnup and circuit packs have been installed during initial shelf turnup at the other DS1 terminating end(s) of the circuit. If the terminating end is in another system, it is assumed that the appropriate installation and connections have been made to that system. If the appropriate circuit packs have not been installed and the system is in service on other groups, refer to **System Turnup/Circuit Order: IXL-001** for procedures to add a new group for DS1 service.



NOTE:

If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.

Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

2.



NOTE:

The `rtrv-eqpt:` command retrieves the Equipage and Version Report. This report lists the circuit pack type and version information for one or more slots. See the "Commands and Reports" section of this manual for a description of the `rtrv-eqpt:` command format.

At each FiberReach terminating end, use the `rtrv-eqpt:` command to obtain the Equipage and Version Report and verify that the proper service and protection (if required) **DS1/DS1PM** circuit packs have been installed in **LOW-SPEED** group(s) being put into service.

-
3. At the DS1 terminating node(s) of the circuit being established, determine which DS1 port(s) is to be put into service and what options are to be selected.
-

4.



NOTE:

The `rtrv-t1:` command retrieves the T1 Port Provisioning Report. This report lists information about each DS1 port. This information includes attributes set by the `set-t1:` command. See the "Commands and Reports" section of this manual for a description of the `rtrv-t1:` command format.

At each DS1 terminating node, use the `rtrv-t1:` command to obtain the T1 Port Provisioning Report and verify the hardware and software option settings.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5.

⇒ **NOTE:**
Standard DS1 transmitter sources are designed to terminate in a nominal 100-ohm impedance. This termination is usually provided by the receiving equipment. When not connected to receiving equipment (that is, idle or unterminated), DS1 transmitter equipment should terminate in a 100-ohm load. When connecting through DSX equipment, this can be accomplished with terminating plugs available from the DSX manufacturer. Any alternative method may be used resulting in 100-ohms across the TIP and RING of the DS1 circuit output while in an idle state. Failure to terminate DS1 outputs may result in violation of FCC Part 15 emission requirements and possibly interfere with other electronic equipment. Also, AIS should be turned off (using the set - t1 : address : ais = no command) on any DS1 circuit that is not in service.

⇒ **NOTE:**
For the 1X1 protection configuration, circuit packs are protected on a one-to-one basis. For example, if protection is required for a DS1 circuit pack in a service **LOW-SPEED-[A1, B1, C1, or D1]** slot, a **DS1** circuit pack must be installed in the protection **LOW SPEED-[A2(P), B2(P), C2(P), or D2(P)]** slot. If **BBF3 DS1PM** circuit packs are installed in service slots, then a **BBF3 DS1PM** circuit pack must be installed in the protection slot if protection is required.

⇒ **NOTE:**
For the 1X7 protection configuration, the circuit pack type installed in the **LOW-SPEED-D2(P)** slot is the only circuit pack type that is protected. In a 1X7 protection configuration, **177A** Apparatus Blank cards are required in unequipped **LOW-SPEED** slots.

At each DS1 terminating node, set option switches and install **DS1/DS1PM** circuit pack(s), as required.

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DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

6. At each DS1 terminating node, use the `set - t1:` command to set the characteristics of the DS1 port of the circuit being established.

-
7. At each DS1 terminating node, make the appropriate cable connection(s) to the DS1 cross-connect point(s) or equivalent connection point(s) for the circuit being added.

-
8. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.

9.

⇒ **NOTE:**
DS1 cross-connections have to be made at each shelf to configure the transmission path for each DS1 circuit being established. Either terminating (drop) cross-connections are made at terminating nodes and pass-through cross-connections are made at intermediate nodes.

⇒ **NOTE:**
The following commands may be used to delete, enter, and retrieve cross-connections: `dlt-crs-vt1`, `ent-crs-vt1`, and `rtrv-crs-vt1`. See the "Commands and Reports" section of this manual for a description of commands. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connection provisioning.

Determine the necessary cross-connections for each node from the work order or circuit order.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

10. Make necessary VT1.5/STS1 cross-connections at each node in the network.

A. Single-Homed OC-3/FiberReach Configuration	DLP-526
B. Dual-Homed OC- 3/FiberReach Configuration	DLP-526
C. Stand-Alone OC-3/OC-1 Ring Configuration	DLP-528
-

- 11.



NOTE:

For a DS1 circuit in a path protected ring network, the `sw-path-( ):address` command must be used at the terminating nodes to switch the active VT1.5 (DS1) path to repeat this test on the other path(s).

Perform DS1 end-to-end transmission test for each circuit being put into service, as required. **DLP-510**

12. Use the `rtrv-state:` command to determine the port state of the DS1 port(s) of the circuit being established.
-

- 13.



NOTE:

If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set-state-t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

Use the `set-state-t1:` command to set the port state of the DS1 port(s) of the circuit being established.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

14.



NOTE:

If **BBF3 DS1PM** circuit packs are installed and the optional *ds1pm* performance monitoring feature is to be used, use the set-feat:feat=ds1pm,act=enable command to enable the feature.

Discontinue End-to-End DS1 Service

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

Standard DS1 transmitter sources are designed to terminate in a nominal 100-ohm impedance. This termination is usually provided by the receiving equipment. When not connected to receiving equipment (that is, idle or unterminated), DS1 transmitter equipment should terminate in a 100-ohm load. When connecting through DSX equipment, this can be accomplished with terminating plugs available from the DSX manufacturer. Any alternative method may be used resulting in 100-ohms across the TIP and RING of the DS1 circuit output while in an idle state. Failure to terminate DS1 outputs may result in violation of FCC Part 15 emission requirements and possibly interfere with other electronic equipment. Also, AIS should be turned off (using the `set - t1: address: ais=no` command) on any DS1 circuit that is not in service.

Determine which DS1 ports are to be discontinued and verify no alarms exist on the system.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

2. Notify maintenance center that alarms will be generated while performing this procedure.

3.

⇒ **NOTE:**
The following operation may activate the office major, minor, or no alarm. The audible alarm may be suppressed by depressing the **ACO** button.

⇒ **NOTE:**
One of the terminating nodes for the DS1 service may be equipped with **STS1E** circuit packs to provide an EC-1 interface for the DS1 service.

At the DSX-1 at the DS1 terminating nodes, remove the DS1 signals associated with the port(s) being discontinued. (**FAULT** LEDs begin flashing on **DS1/DS1PM** circuit pack with signals removed.)

4.

⇒ **NOTE:**
The **UPD/INIT** pushbutton on the **SYSCTL** is recessed to prevent its accidental operation. You will need a small pointed object such as a ball-point pen to operate it.

Momentarily depress the **UPD/INIT** button on the **SYSCTL** at the DS1 terminating nodes or use the upd command to update the equipment list. (Flashing **FAULT** LEDs go off.)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5. Use the `rtrv-state-eqpt` command to verify that the correct port(s) has been changed from *in-service* (i) to *auto* (a) state.
-

6.



CAUTION:

Removing the wrong cross-connections may cause service interruption.

From work order or `rtrv-crs- ( )` command, determine the cross-connections for circuit being discontinued.

7.



NOTE:

DS1 **LOW-SPEED** slots cannot be unequipped without an alarm until all port cross-connections are removed. The cross-connections must be removed first before removing circuit packs. In a ring configuration, remove the cross-connections from the terminating nodes first, then remove the pass-through cross-connections at the intermediate nodes. A Major alarm may occur when the first cross-connection at the terminating node is deleted and clear when the other terminating cross-connection is deleted.



NOTE:

The following commands may be used to delete, enter, and retrieve cross-connections at the FiberReach shelf:
`dlt-crs-vt1`, `ent-crs-vt1`, and `rtrv-crs-vt1`.
See the "Commands and Reports" section of this manual for a description of commands. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connections.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Use the `dlt-crs-vt1:` command to delete the terminating (drop) node cross-connections for all DS1 service being removed, if required.

8.



NOTE:

If other nodes in the DS1 path being discontinued are not DDM-2000 FiberReach nodes, use the documentation for the other systems to delete the necessary cross-connections, if required.

Use the `dlt-crs-vt1:` command to delete the pass-through cross-connections at each nonterminating node for all DS1 service being removed, if required.

9.



NOTE:

If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set-state-t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

If circuit packs are going to be removed, use the
`rtrv-state-t1:/set-state-t1:` command to verify/set the
port state of the DS1 ports to *auto*.

If circuit packs are **not** going to be removed, use the
`set-state-t1:` command to set the port state of the DS1
port(s) to *auto* or *nmon*, as required.

-
10. If all four DS1 ports on the **DS1/DS1PM** circuit pack are being discontinued, you may remove the **DS1/DS1PM** circuit pack, if required.

-
11. If circuit packs have been removed, momentarily depress the **UPD/INIT** button on the **SYSCTL** or use the `upd` command to update the DDM-2000 internal equipment list.

-
12. If the FiberReach shelf is equipped for 1X7 protection mode and circuit packs have been removed, install **177A** Apparatus Blank cards into empty low-speed slots.

-
13. Verify all alarms are off.
-

Add New DS1 Service

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

*DDM-2000 FiberReach circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

This procedure assumes that a new DS1 port or **DS1/DS1PM** circuit pack is being added to a DDM-2000 FiberReach shelf that is already in service. It also assumes that **STS1E** circuit packs have been installed if the other end is an EC-1 interface.



NOTE:

For the 1X1 protection configuration, circuit packs are protected on a one-to-one basis. For example, if protection is required for a DS1 circuit pack in a service **LOW-SPEED-[A1, B1, C1, or D1]** slot, a **DS1** circuit pack must be installed in the protection **LOW SPEED-[A2(P), B2(P), C2(P), or D2(P)]** slot. If **BBF3 DS1PM** circuit packs are installed in service slots, then a **BBF3 DS1PM** circuit pack must be installed in the protection slot if protection is required.



NOTE:

For the 1X7 protection configuration, the circuit pack type installed in the **LOW-SPEED-D2(P)** slot is the only circuit pack type that is protected. In a 1X7 protection configuration, **177A** Apparatus Blank cards are required in unequipped **LOW-SPEED** slots.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

⇒ **NOTE:**
Standard DS1 transmitter sources are designed to terminate in a nominal 100-ohm impedance. This termination is usually provided by the receiving equipment. When not connected to receiving equipment (that is, idle or unterminated), DS1 transmitter equipment should terminate in a 100-ohm load. When connecting through DSX equipment, this can be accomplished with terminating plugs available from the DSX manufacturer. Any alternative method may be used resulting in 100-ohms across the TIP and RING of the DS1 circuit output while in an idle state. Failure to terminate DS1 outputs may result in violation of FCC Part 15 emission requirements and possibly interfere with other electronic equipment. Also, AIS should be turned off (using the `set - t1: address: ais=no` command) on any DS1 circuit that is not in service.

⇒ **NOTE:**
If the DDM-2000 FiberReach fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.

Determine which DS1 ports/slots are to be put into service and what options are to be selected.

-
2. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

3.



CAUTION:

*To minimize "hits" on in-service ports on **DS1/DS1PM** circuit packs having a port added, it is recommended that a CIT be used to manually switch (using the switch -ls command) the DS1 to protection if the **DS1/DS1PM** circuit pack is removed or to set channel options without removing the circuit pack.*



CAUTION:

*If the protection **DS1/DS1PM** circuit pack is not available for a protection switch, removing a service **DS1/DS1PM** circuit pack will interrupt service on all ports on that circuit pack. If a CIT is available, use the rtrv-state command to check the status of the protection switch.*

Condition **DS1/DS1PM** circuit pack or port for new DS1 service being added.

DLP-520

4. At each DS1 terminating node, use the set - t1 : command to set the characteristics of the DS1 port being established, if not already performed.

5. At each DS1 terminating node, make the appropriate cable connection(s) to the DS1 cross-connect point(s) or equivalent connection point(s) for the circuit(s) being added.

6. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.

7.



NOTE:

To configure the transmission path for each DS1 circuit being established, terminating (drop) cross-connections or "drop and continue" cross-connections must be made at terminating nodes and pass-through cross-connections made at intermediate nodes.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

In ring configurations, you should use the following rules in establishing cross-connections in each ring:

1. All drop connections (including DRI, if present) from the same STS-1 timeslot must be provisioned the same, either all VT1.5 or STS-1.
2. If all 28 VT1.5s (DS1s) in an STS-1 are being passed through at a node in a VT1.5 path-switched ring, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the pass-through node in the future, you should provision the pass-throughs as VT1.5 cross-connections. Also, provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted to 28 VT1.5 cross-connects to drop DS1s at a later time.
3. On STS-1 path-switched rings, all nodes in the ring must be provisioned as STS-1 cross-connections.



NOTE:

The following commands may be used to convert, delete, enter, and retrieve cross-connections: `cnvt-crs`, `dlt-crs- sts1`, `dlt-crs-vt1`, `ent-crs-sts1`, `ent-crs-vt1`, `rtrv-crs- sts1`, and `rtrv-crs-vt1`. See the "Commands and Reports" section of this manual for a description of commands. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connection provisioning.

Determine the necessary cross-connections for each node from the work order or circuit order.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

8. Make necessary VT1.5/STS1 cross-connections for each node in the network.

A. Single-Homed OC-3/FiberReach Configuration	DLP-526
B. Dual-Homed OC-3/FiberReach Configuration	DLP-526
C. Stand-Alone OC-3/OC-1 Ring Configuration	DLP-528
-

9. For a DS1 circuit in a path protected ring network, the `sw-path-( ) : address` command must be used at the terminating nodes to switch the active VT1.5 (DS1) path to repeat this test on the other path(s).

Perform DS1 end-to-end transmission test for each circuit being put into service. **DLP-510**

10. Use the `rtrv-state:` command to determine the port state of the DS1 port(s) of the circuit being established.
-

11.



NOTE:

If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set-state-t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

Use the `set-state-t1:` command to set the port state of the DS1 port(s) of the circuit being established.

12. If **BBF3 DS1PM** circuit packs are installed and the optional *ds1pm* performance monitoring feature is to be used, use the `set-feat:feat=ds1pm,act=enable` command to enable the feature.
-

Equip DDM-2000 FiberReach Wideband Shelf (Looped Back)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CAUTION:

*DDM-2000 FiberReach circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

This procedure assumes that all hardwired installation and testing of the unequipped DDM-2000 FiberReach shelf has been done. It also assumes that power is applied to the shelf (**PWR ON** LED(s) lighted on User Panel).



NOTE:

Some of the circuit packs have option switches which must be set before they are installed.

Verify proper protection bus module (1X1 or 1X7) has been installed and the proper low-speed designation strip label is placed on the middle designation strip located between the low-speed slots on front of shelf. If the shelf has not been equipped for the required low-speed protection mode, refer trouble to the organization that installed the shelf or use procedures of **NTP-011** to install the correct protection mode assembly.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

-
2. Install User Panel and check –48 V DC power, if required. **DLP-524**
-

3.

⇒ **NOTE:**
If system software has not been previously installed in the **SYSCTL**, it must be installed [**DLP-525**] after the **SYSCTL** is installed.

Install **BBG8 SYSCTL** circuit pack. **DLP-539**

4.

⇒ **NOTE:**
A maximum of three **BBF8 HDSL** circuit packs, including a protection circuit pack, can be installed in one FiberReach if **28G type OLIUs** are used.

Install **BBF8 HDSL** circuit pack (if required). **DLP-540**

5. As additional circuit packs are installed, office alarms may be activated, accompanied by flashing **FAULT** LEDs on some of the circuit packs. This is a normal condition at this stage of the procedure. You can momentarily depress the **TST** pushbutton to retire office alarms.

Install **26G-U/26G2-U** and/or **28G-U OLIU** circuit packs [**DLP-504**].

6.

⇒ **NOTE:**
The **26G-U/26G2-U OLIU** requires a 15 dB LBO for loopback testing.

⇒ **NOTE:**
If fecom is enabled, an inconsistent DCC values alarm will occur when the **OLIUs** are looped back. Normally, the alarm occurs when the network side/user side parameters at both ends of the DCC are set the same. To clear the alarm during a fiber loopback, use the
set - fecom: *address*:com=disable command to
disable the DCC.

⇒ **NOTE:**
An AGNE communication failure alarm will also occur when the **OLIUs** are looped back. This alarm occurs because an AGNE is required in a network. The default for the AGNE is no. To clear the alarm during a fiber loopback, use the set - ne:tid:agne=yes command.

Install **OLIU** optical loops.

DLP-505

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7.  **NOTE:**
Standard DS1 transmitter sources are designed to terminate in a nominal 100-ohm impedance. This termination is usually provided by the receiving equipment. When not connected to receiving equipment (that is, idle or unterminated), DS1 transmitter equipment should terminate in a 100-ohm load. When connecting through DSX equipment, this can be accomplished with terminating plugs available from the DSX manufacturer. Any alternative method may be used resulting in 100-ohms across the TIP and RING of the DS1 circuit output while in an idle state. Failure to terminate DS1 outputs may result in violation of FCC Part 15 emission requirements and possibly interfere with other electronic equipment. Also, AIS should be turned off (using the set - t1: address: ais=no command) on any DS1 circuit that is not in service.

-  **NOTE:**
For the 1X1 protection configuration, circuit packs are protected on a one-to-one basis. For example, if protection is required for a **DS1 (T1EXT)** circuit pack in a service **LOW-SPEED-[A1, B1, C1, or D1]** slot, a **DS1 (T1 EXT)** circuit pack must be installed in the protection **LOW-SPEED-[A2(P), B2(P), C2(P), or D2(P)]** slot. If **BBF3 DS1PM** circuit packs are installed in service slots, then a **BBF3 DS1PM** circuit pack must be installed in the protection slot if protection is required.

-  **NOTE:**
For the 1X7 protection configuration, the circuit pack type installed in the **LOW-SPEED-D2(P)** slot is the only circuit pack type that is protected. In a 1X7 protection configuration, **177A** Apparatus Blank cards are required in unequipped **LOW-SPEED** slots.

Install service and protection **BBF1() DS1** or **BBF3 DS1PM** circuit packs (if required).

DLP-508

-
8. Install service and protection **BBF6 T1EXT** circuit packs (if required).

DLP-507

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

9. If this is a 1X7 protection configuration, install **177A** Apparatus Blank cards in any unequipped **LOW-SPEED** slot.
-

10.



CAUTION:

The command `init-sys:all` may affect service. It should never be used on an in-service system. It should be used only after a shelf has been equipped to reset all provisionable parameters and cross-connections to their default values.



NOTE:

An inconsistent DCC values alarm will occur when the `init-sys:all` command is executed because "fecom" becomes enabled again. To clear the alarm, use the `set-fecom:address:com=disable` command to disable the DCC.



NOTE:

An AGNE communication failure alarm will also occur when the **OLIUs** are looped back. This alarm occurs because an AGNE is required in a network. The default for the AGNE is no. To clear the alarm during a fiber loopback, use the `set-ne:tid:agne=yes` command.

Use the `init-sys:all` command to initialize all provisionable parameters to their original default values.

11. Use `rtrv-eqpt` command to verify shelf is equipped for low-speed protection mode required (Low-speed protection mode: 1X1 or 1X7).
-

12. Perform an LED test.

DLP-509

13.



NOTE:

This procedure assumes that the DDM-2000 FiberReach high-speed signals are looped back [manual optical (OLIU) loopback].

Perform local (looped back) DS1 transmission test.

DLP-510

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

14.



NOTE:

This procedure assumes that the DDM-2000 FiberReach has been connected to the low-speed DSX cross-connection as required.

Perform local wiring DS1 cross-connect test (looped back).

DLP-510

15. Perform DDM-2000 FiberReach OC-1 receiver sensitivity test (if required). Optional test.

DLP-506

16. Check office alarm interface as required.

DLP-516

17. Check telemetry interface as required.

DLP-518

18. Test protection switching function, if required.

DLP-519

19.



CAUTION:

The command `init-sys:all` may affect service. It should never be used on an in-service system. It should be used only after a shelf has been equipped to reset all provisionable parameters and cross-connections to their default values.



NOTE:

An inconsistent DCC values alarm will occur when the `init-sys:all` command is executed because "fecom" becomes enabled again. To clear the alarm, use the `set-fecom:address:com=disable` command to disable the DCC.



NOTE:

An AGNE communication failure alarm will also occur when the **OLIUs** are looped back. This alarm occurs because an AGNE is required in a network. The default for the AGNE is no. To clear the alarm during a fiber loopback, use the `set-ne:tid:agne=yes` command.

Use the `init-sys:all` command to initialize all provisionable parameters to their original default values.

DDM-2000 FIBERREACH WIDEBAND SHELF

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

20.



NOTE:

A craft interface terminal (CIT) is required to access the optional features of the DDM-2000 FiberReach, such as system name, security and logins, date and time, far-end communications (fecom), etc.



NOTE:

If you choose to make VT1 cross-connections at this time using the `ent -crs - ( )` commands, alarm activity will result when optical fiber loops are removed for end-to-end system testing.

Activate system features as required from work order or office records.

DLP-512

21. After all shelves in the network have been tested, you can establish the end-to-end DDM-2000 FiberReach OC-1 subnetwork.

- A. Single-Homed Access to DDM-2000 OC-3 Backbone Ring [**NTP-008**]
 - B. Dual-Homed Access to DDM-2000 OC-3 Backbone Ring [**NTP-009**]
 - C. Stand-Alone Access via DDM-2000 OC-3 Host [**NTP-010**]
 - D. DDM-2000 OC-3 Release 9 Host Shelf in Linear Configuration [**NTP-016**]
-

Establish Single-Homed FiberReach Access via DDM- 2000 OC-3 Backbone Ring

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CAUTION:

DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in
Trouble Clearing: TAD-100.



NOTE:

If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001.**



NOTE:

It is assumed the DDM-2000 FiberReach shelves have been equipped and tested (**System Turnup: NTP-007**). It is also assumed that all DDM-2000 OC-3 shelves in the system have passed the looped transmission test(s) and the DDM-2000 OC-3 ring has been established (LTP 363-206-280, *DDM-2000 OC-3 Multiplexer, User/Service Manual — Volume II, System Turnup: NTP-016*).

Determine the network configuration (for example, see Figure 1).

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

2. Verify that the host DDM-2000 OC-3 shelf is equipped with Release 9 or later ring software. If not equipped with Release 9 or later software, upgrade the DDM-2000 OC-3 host shelf with proper software (LTP 363-206-280, *DDM-2000 OC-3 Multiplexer, User/Service Manual — Volume II, System Turnup: NTP-046*).

-
3. Determine the optical loss of each optical span from office records or by making the required measurements. **DLP-514**
-

4.

⇒ **NOTE:**
The User Side/Network Side parameters of the set - fecom: command must be set opposite at each end of the optical spans (for example, see Figure 2).

Use the rtrv-fecom/set-fecom command to verify/set "User Side/Network Side" parameters at each end of optical span being established.

5.

⇒ **NOTE:**
Two or more shelves in the same network with the same TBOS display number (determined by **SYCTL** switch settings) will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID (set by the set - ne command) will cause a duplicate TID alarm.

Verify no duplicate TBOS, site/ne, or TID settings exist. The rtrv-ne: command may be used at each shelf in the network to display settings. If duplicates exist, determine new settings and use the set - ne command to make new settings.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

6.



NOTE:

The `set -ne :` command designates a shelf as the directory service network element (DSNE). **One**, and only one, shelf in the network **must** be provisioned as a DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as a DSNE, a duplicate DSNE alarm will occur. The DSNE must be an OC-3 shelf with Release 9 or later software, unless an FT-2000 is part of the network, then the DSNE will always be an FT-2000 node. The DSNE must not be a FiberReach shelf. Multiple GNEs are allowed. A shelf is automatically provisioned as a GNE when connected to an active X.25 interface.



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group are recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes. The AGNE parameter of the `set -ne :` command may have been set to **yes** on each new shelf during shelf turnup procedures to suppress an AGNE communication failure alarm.

Use the `rlgn :` and `set -ne :` command to designate ONE shelf in the network as the DSNE, if not already done.

Use the `set -ne :` command to designate the AGNE(s) and alarm group numbers, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7.



NOTE:

This single-homed ring configuration requires that the **FN() 1 OLIU** on the OC-3 shelf connect to the **MAIN-1 OLIU** at the first FiberReach shelf from the (node) connects to the **MAIN-1 OLIU** at an adjacent FiberReach shelf (node). The **MAIN-2 OLIU** at the last FiberReach shelf on the OC-1 ring connects to **FN() 2(P) OLIU** on the OC-3 shel (see Figure 1). This procedure will establish the ring configuration starting from the OC-3 host node (near end) to the first FiberReach node, then continuing to the next node until the final connection is made from the last FiberReach node back to the host OC-3 node.

At the near end, remove the optical loop from the **27G-U/27G2-U OLIU** OC-1 line (**1** or **2(P)**) (for example in Figure 1, OC-3 shelf **FN-A-1**, OC-1 line **1**) associated with the optical span being established. At the other end of the optical span, remove the optical loop from the associated **OLIU** (for example, in Figure 1, FiberReach **MAIN-1 OLIU**).

8.



NOTE:

The section data communication channel (DCC), used for fa-end communications, must be enabled at each network element (shelf) optical interface being tested in order for the end-to-end line tests to work. Default condition for the DCC channel is "enabled.". If it has been disabled, use the set - fecom command **at each shelf** to enable far-end communications.

At each shelf, use the set - fecom : *address* : com=enabled command to ensure far-end communications (fecom) is enabled.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

9. Perform optical fiber connections and verification of the integrity of the optical span being established. **DLP-514**
-

10.



NOTE:
The `rtrv-pm-line` command in the following procedure displays performance monitoring data associated with the OC-1 lines terminated on the system.

Perform end-to-end OC-1 line test.

DLP-535

-
11. Repeat this procedure for all OC-1 optical spans back to the host OC-3 shelf.
-

12. The system is now ready for initial service to be established.

Initial DS1 Service **[System Turnup: NTP-004]**

Initial T1 Service **[System Turnup: NTP-013]**

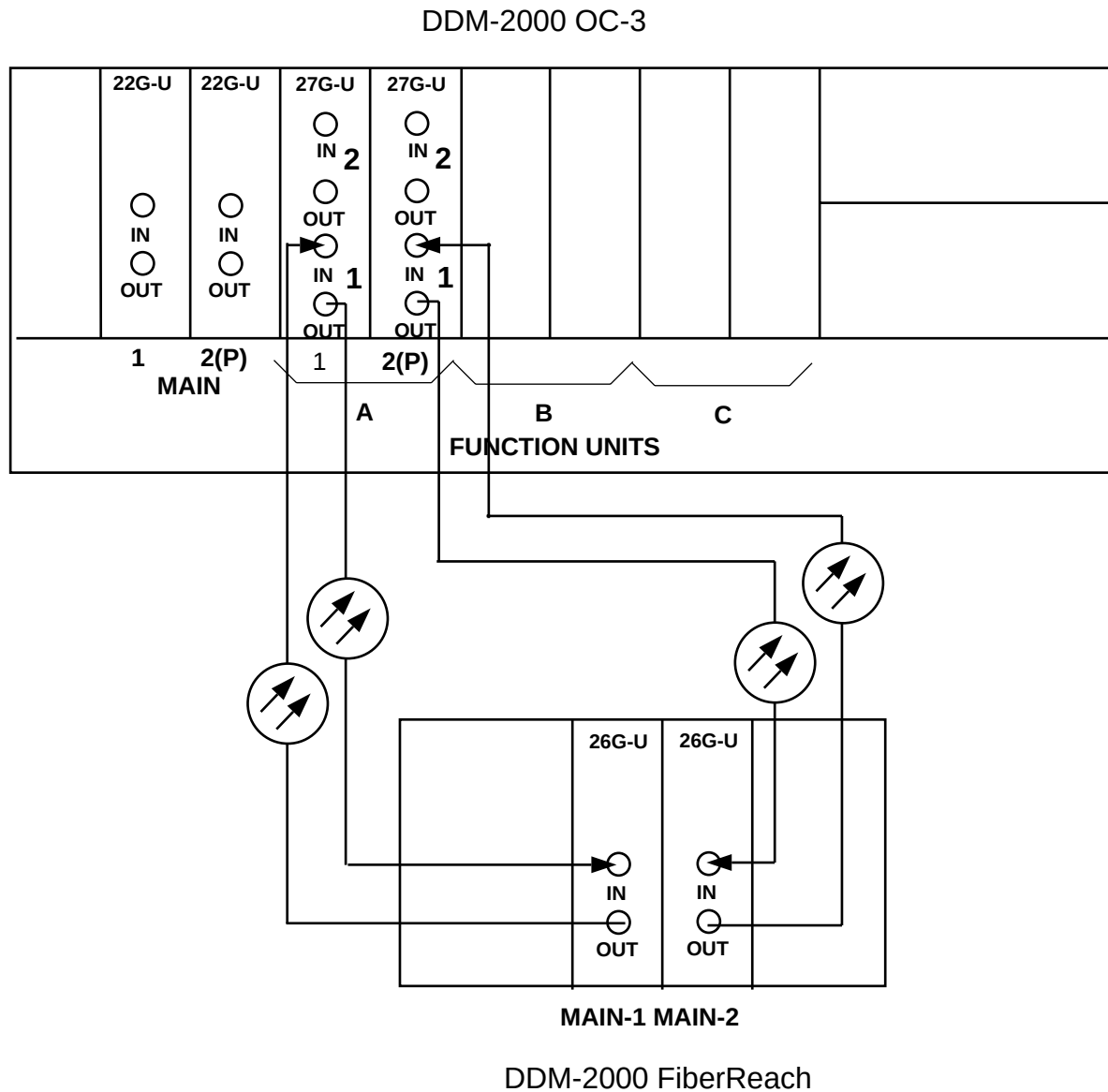
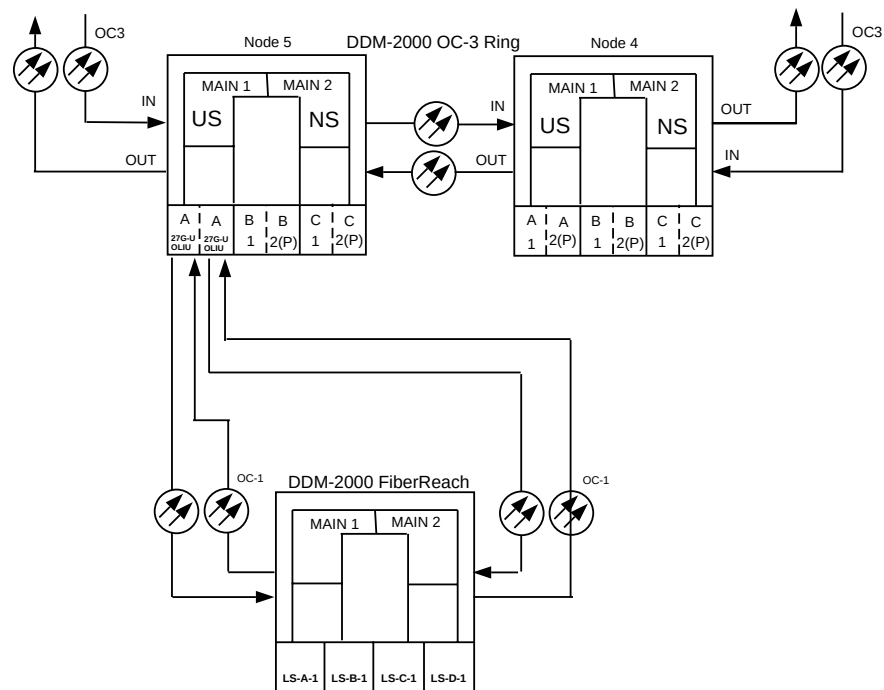


Figure 1 – Example Single-Home Ring Configuration Connections

DDM-2000 OC-3 DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)								
22-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2	FN-A dcc-a		FN-B dcc-b		FN-C dcc-c	
	US	NS	NS		NS		NS	
27-Type OLIUs	MAIN-1	MAIN-2	FN-A-1	FN-A-2	FN-B-1	FN-B-2	FN-C-1	FN-C-2
	dcc-m1-1	dcc-m2-1	dcc-a1-1	dcc-a2-1	dcc-b1-1	dcc-b2-1	dcc-c1-1	dcc-c2-1
	dcc-m1-2	dcc-m2-2	dcc-a1-2	dcc-a2-2	dcc-b1-2	dcc-b2-2	dcc-c1-2	dcc-c2-2
	US	NS	NS	US	NS	US	NS	US



DDM-2000 FiberReach DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)		
26-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2
	US	NS

Figure 2 – Example of User Side/Network Side Value Settings

Establish Dual-Homed FiberReach Access via DDM-2000 OC-3 Backbone Ring

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CAUTION:

*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.



NOTE:

It is assumed the DDM-2000 FiberReach shelves have been equipped and tested (**System Turnup: NTP-007**). It is also assumed that all DDM-2000 OC-3 shelves in the system have passed the looped transmission test(s) and the DDM-2000 OC-3 ring has been established (LTP 363-206-280, *DDM-2000 OC-3 Multiplexer, User/Service Manual — Volume II*, **System Turnup: NTP-016**).

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Determine the network configuration (for example, see Figures 1 and 2).

-
2. Verify the host DDM-2000 OC-3 shelves (for example, Figures 1 and 2, nodes 4 and 5) are equipped with Release 9 or later ring software. If not equipped with Release 9 or later software, upgrade the DDM-2000 OC-3 host shelves with proper software.

-
3. Determine the optical loss of each optical span from office records or by making the required measurements. **DLP-514**

4.

⇒ **NOTE:**
The "Network Side/User Side" parameters of the set - fecom: command must be set opposite at each end of the optical spans (for example, see Figure 3).

Use the rtrv - fecom/set - fecom command to verify/set "Network Side/User Side" parameters at each end of OC-1 optical span being established.

5.

⇒ **NOTE:**
Two or more shelves in the same network with the same TBOS display number (determined by SYSCTL switch settings) will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID (set by the set - ne command) will cause a duplicate TID alarm. Two or more shelves in the same network designated as a DSNE (set by the set - ne command) will cause a duplicate DSNE alarm.

Verify no duplicate TBOS, site/ne, TID, or DSNE settings exist. The rtrv - ne: command may be used at each shelf in the network to display settings. If duplicates exist, determine new settings and use the set - ne command to make new settings.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

6.



NOTE:

The set - ne : command designates a shelf as the directory service network element (DSNE). **One**, and only one, shelf in the network **must** be provisioned as a DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as a DSNE, a duplicate DSNE alarm will occur. The DSNE must be an OC-3 shelf with Release 9 or later software, unless an FT-2000 is part of the network, then the DSNE will always be an FT- 2000. The DSNE must not be a FiberReach shelf. Multiple GNEs are allowed. A shelf is automatically provisioned as a GNE when connected to an active X.25 interface.



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group are recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes. The AGNE parameter of the set - ne : command may have been set to **yes** on each new shelf during shelf turnup procedures to suppress an AGNE communication failure alarm.

Use the rlgn : and set - ne : commands to designate ONE shelf as the DSNE.

Use the set - ne : command to designate the AGNE(s) and alarm group number, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7.



NOTE:

In dual homing configurations, **OLIU** circuit packs must be installed in the correct slots in the host OC-3 nodes to support the direction of traffic required (for example, see Figures 1 and 2). In Figure 1, if a **27G-U/27G2-U OLIU** is installed in Node 5, **FUNCTION UNITS (FN) GROUP A**, slot **1**, traffic will be routed toward Node 6 when cross-connections are made. The other end of the associated OC-1 ring must be connected to a **27G-U/27G2-U OLIU** installed in slot 2(P) of the **FUNCTION UNITS GROUP ()** being used to terminate the OC-1 line (for example, Node 4 in Figure 1). Traffic from Node 4 will then be directed toward Node 3 when cross-connections are made. In Figure 2, note that all traffic from the FiberReach shelf will be directed to Node 7 because of the slot positions that terminate the OC-1 line.



NOTE:

A dual-homed ring configuration requires that the first FiberReach **MAIN-1 OLIU** connect to **FN() 1 OLIU** on one host OC-3 shelf. The last FiberReach **MAIN-2 OLIU** connects to the **FN() 2(P) OLIU** on the other host OC-3 shelf. Intermediate FiberReach shelves on the same OC-1 ring connect from **MAIN-2 OLIU** at one FiberReach shelf to the **MAIN-1 OLIU** at an adjacent FiberReach shelf (node) (or example, see Figure 4). This procedure will establish the ring configuration starting from one OC-3 host node (near end) and continuing to an adjacent FiberReach node, then to the next FiberReach node until the final connection is made from the last FiberReach node to the remaining OC-3 host node.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

All unused ports on the **27G-U/27G2-U OLIU** must be set to *nmon* with the *set - state-oc1* command.

At the near end OC-3 host node, remove the optical loop from the **27G-U/27G2-U OLIU** OC-1 line (**1** or **2(P)**) being used for the OC-1 ring configuration (for example, in Figure 4, OC-3 shelf Node 5, slot **FN A 1**, OC-1 line 1.) At the other end of the optical span being established, remove the optical loop from the associated **OLIU** (for example, in Figure 4, FiberReach **MAIN-1 OLIU**).

8.



NOTE:

The section data communication channel (DCC), used for far-end communications, must be enabled at each network element (shelf) optical interface being tested in order for the end-to-end line tests to work. Default condition for the DCC channel is "enabled." If it has been disabled, use the *set - fecom* command **at each shelf** to enable far-end communications.

At each shelf, use the *set - fecom: address:com=enabled* command to ensure far-end communications (fecom) is enabled.

-
9.	Perform optical fiber connections and verification of the integrity of the optical span being established.	DLP-514
-

10.



NOTE:

The *rtrv-pm-line* command in the following procedure displays performance monitoring data associated with the OC-1 lines terminated on the system.

Perform end-to-end OC-1 line test.

DLP-535

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

11. Repeat this procedure for all OC-1 optical spans being established in the DDM-2000 OC-3/OC-1 network. Ensure that the last optical span connected to the OC-3 host shelf is connected to an **OLI**U in the opposite slot as the one in the first host OC-3 (for example, slot **2(P)** at one node and slot **1** at the other node).

-
12. The dual-homed FiberReach access network is now ready for initial service to be established.

Initial DS1 Service [**System Turnup: NTP-004**]

Initial T-1 Service [**System Turnup: NTP-013**]

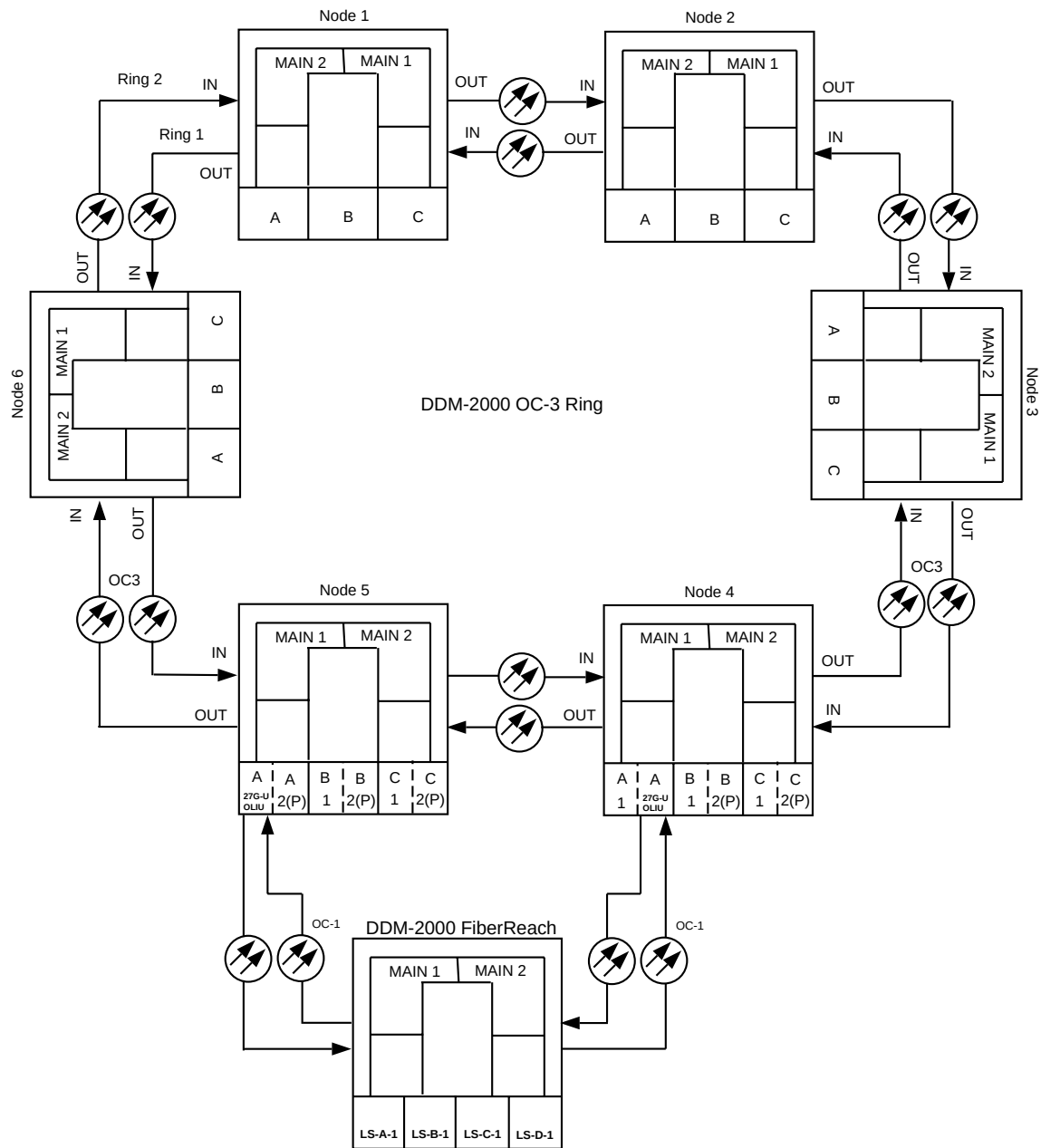


Figure 1 – Example of Dual-Homed OC-1/OC-3 Ring Configuration

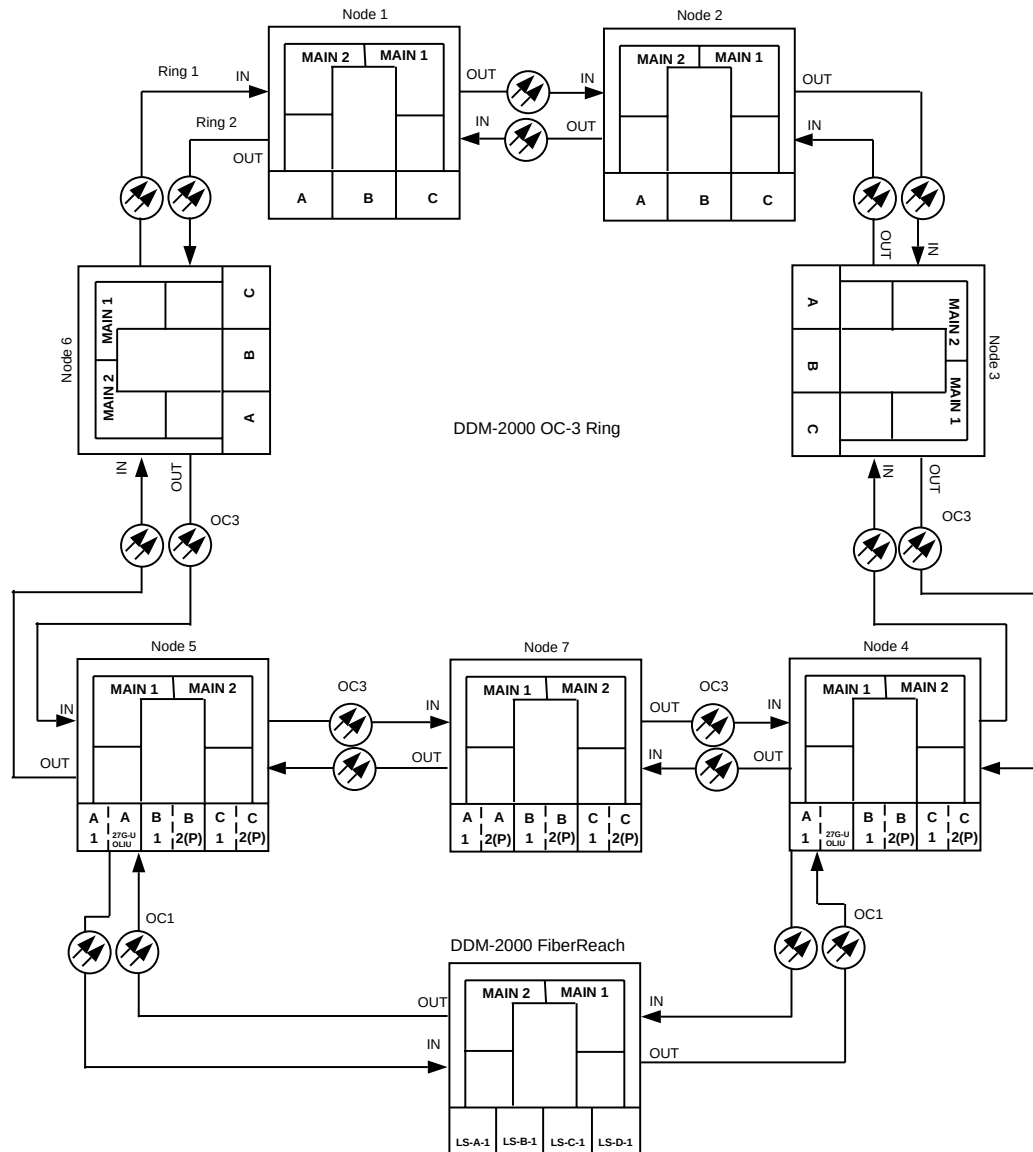
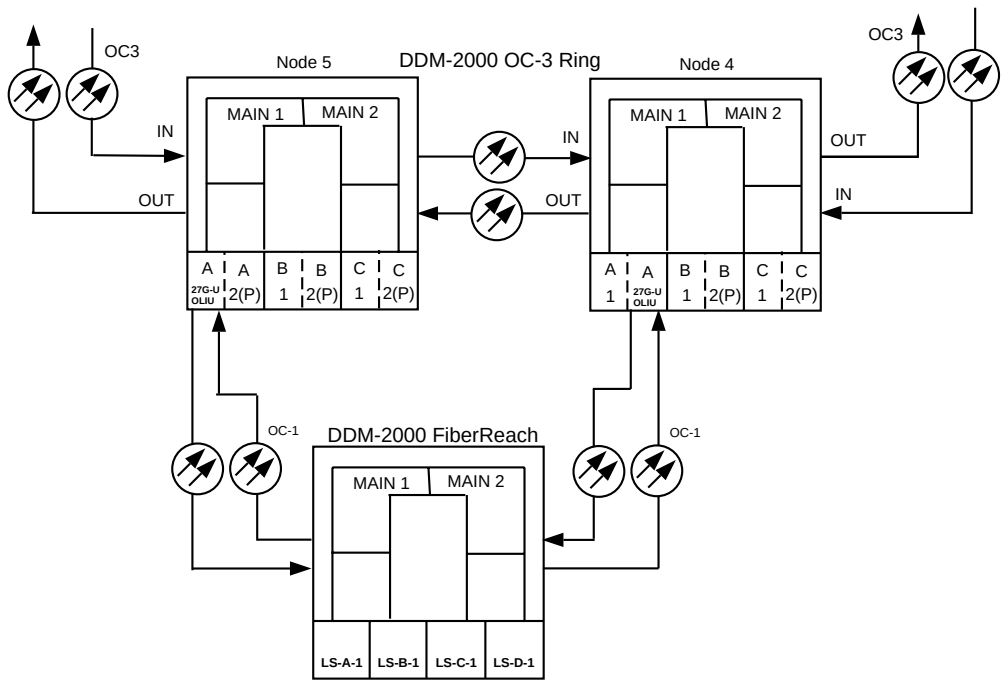


Figure 2 – Example of Dual-Homed OC-1/OC-3 Ring Configuration

DDM-2000 OC-3 DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)								
22-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2	FN-A dcc-a		FN-B dcc-b		FN-C dcc-c	
	US	NS	NS		NS		NS	
27-Type OLIUs	MAIN-1 dcc-m1-1 dcc-m1-2	MAIN-2 dcc-m2-1 dcc-m2-2	FN-A-1 dcc-a1-1 dcc-a1-2	FN-A-2 dcc-a2-1 dcc-a2-2	FN-B-1 dcc-b1-1 dcc-b1-2	FN-B-2 dcc-b2-1 dcc-b2-2	FN-C-1 dcc-c1-1 dcc-c1-2	FN-C-2 dcc-c2-1 dcc-c2-2
	US	NS	NS	US	NS	US	NS	US



DDM-2000 FiberReach DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)		
26-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2
	US	NS

Figure 3 – Example of User Side/Network Side Value Settings

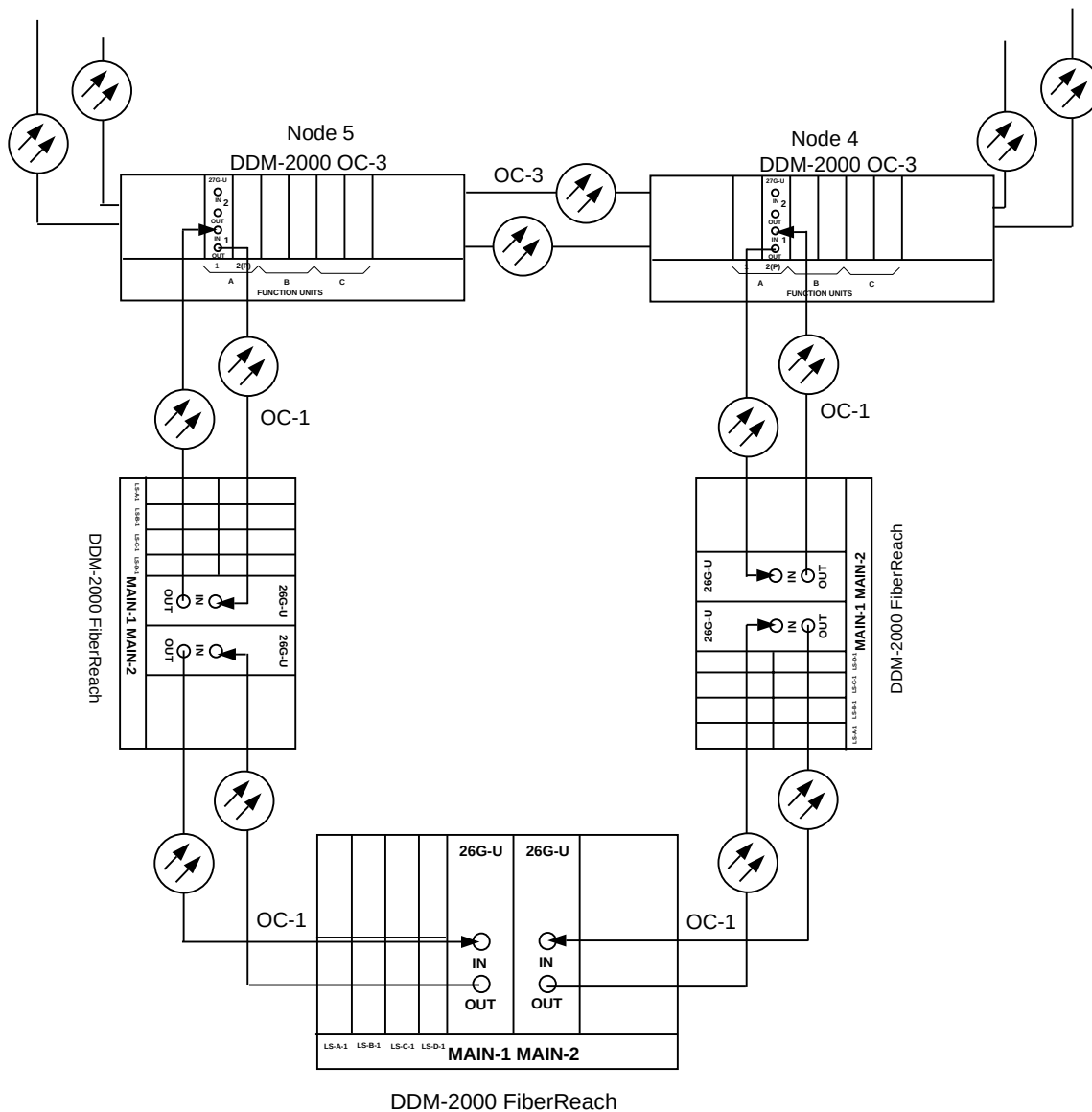


Figure 4 – Example of Dual-Homed OC-1/OC-3 Ring Configuration Connections

Establish Stand-Alone FiberReach Access via DDM-2000 OC-3 Host Shelf

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CAUTION:

*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.



NOTE:

It is assumed that the DDM-2000 FiberReach shelf in the system has passed the looped transmission test(s) (**System Turnup: NTP-007**). It is also assumed the DDM-2000 OC-3 shelves have been equipped and tested (LTP 363-206-280, *DDM-2000 OC-3 Multiplexer, User/Service Manual — Volume II*, **System Turnup: NTP-016**).

Determine the network configuration (for example, see Figure 1).

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

2. Verify that the host DDM-2000 OC-3 shelf is equipped with Release 9 or later ring software. If not equipped with Release 9 or later software, upgrade the DDM-2000 OC-3 host shelf with proper software.
-
3. Determine the optical loss of each optical span from office records or by making the required measurements. **DLP-514**
-

4.



NOTE:

The "Network Side/User Side" parameters of the set - fecom: command must be set opposite at each end of the optical spans (for example, see Figure 2).

Use the rtrv-fecom/set-fecom command to verify/set "Network Side/User Side" parameters at each end of optical span being established.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5.



CAUTION:

Stand-alone OC-3 shelves can be timed from an external source, set as free-running, or line timed from **FUNCTION UNITS C** slot. Stand-alone OC-3 shelves cannot be line timed from the **MAIN** slots. Therefore, if the OC-3 shelf is to be line timed, the set - sync : src = fn - c must be used to derive timing from the **FUNCTION UNITS (FN-C)** slot.



NOTE:

At the OC-3 shelf, if line-timing mode is specified or external timing mode is specified but the timing reference was not available at shelf turnup, the **TGS** option switches are probably set for *free running*. Before the end-to-end system is established, the specified timing mode must be set on the **TGS** circuit packs.



NOTE:

If the option switch setting is changed, an update must be done by momentarily depressing the **UPD/INIT** button on the **SYSCTL** after the **TGS** circuit packs are reinstalled.



NOTE:

If external timing is selected and the **NE ACTY** LED remains lighted after the **TGS** circuit pack is reinserted, use the CIT and the rtrv - sync command to check the operational mode of the system. If the mode is Holdover instead of External, check that the incoming timing references are connected. Also check Mode Switching (revertive or nonrevertive) and the external DS1 Line Code/Format switch settings.

Set timing mode on **TGS** circuit packs to the timing mode specified in work order or office records. Use the set - sync : command to set the OC-3 synchronization source, if required (LTP 363-206-280, *DDM-2000 OC-3 Multiplexer, User/Service Manual - Volume II*, **Detailed Level Procedures: DLP-513**).

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

6.



NOTE:

Two or more shelves in the same network with the same TBOS display number (set using the `set -ne` command) will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID (set by the `set -ne` command) will cause a duplicate TID alarm.

Verify no duplicate TBOS, site/ne, or TID settings exist. The `rtrv -ne:` command may be used at each shelf in the network to display settings. If duplicates exist, determine new settings and use the `set -ne` command to make new settings.

7.



NOTE:

The `set -ne:` command designates a shelf as the directory service network element (DSNE). **One**, and only one, shelf in the network must be provisioned as a DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as a DSNE, a duplicate DSNE alarm will occur. The DSNE must be an OC-3 shelf with Release 9 or later software, unless an FT-2000 is part of the network, then the DSNE will always be an FT-2000 node. The DSNE must not be a FiberReach shelf. Multiple GNEs are allowed. A shelf is automatically provisioned as a GNE when connected to an active X.25 interface.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group is recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes. The AGNE parameter of the `set - ne :` command may have been set to **yes** on each new shelf during shelf turnup procedures to suppress an AGNE communication failure alarm.

Use the `set - ne :` command to designate ONE shelf in the network as the DSNE, if not already done.

Use the `set - ne :` command to designate the AGNE(s) and alarm group numbers, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

8.



NOTE:

This stand-alone ring configuration requires that the **MAIN 1 OLIU** on the OC-3 shelf connect to the **MAIN-2 OLIU** at the first FiberReach shelf from the OC-3 shelf. **MAIN-1 OLIU** at the FiberReach shelf (node) connects to the **MAIN-2 OLIU** at an adjacent FiberReach shelf (node). The **MAIN-1 OLIU** at the last FiberReach shelf on the OC-1 ring connects to **MAIN 2(P) OLIU** on the host OC-3 shelf (see Figure 1). This procedure will establish the ring configuration starting from the OC-3 host node (near end) to the first FiberReach node, then continuing to the next node until the final connection is made from the last FiberReach node back to the host OC-3 node.



NOTE:

All unused ports on the **27G-U/27G2-U OLIU** must be set to *nmon* with the `set -state-oc1` command.

At the near end, remove the optical loop from the **27G-U/27G2-U OLIU** OC-1 line (**1** or **2**) (for example, in Figure 1, OC-3 shelf **MAIN 1**, OC-1 line 1) associated with the optical span being established. At the other end of the optical span, remove the optical loop from the associated **OLIU** (for example, in Figure 1, FiberReach **MAIN-2 OLIU**).

-
9. Perform optical fiber connections and verification of the integrity of the optical span being established.
-

DLP-514

10.



NOTE:

The `rtrv-pm-line` command in the following procedure displays performance monitoring data associated with the OC-1 lines terminated on the system.

Perform end-to-end OC-1 line test.

DLP-535

-
11. Repeat this procedure for all OC-1 optical spans back to the host OC-3 shelf.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

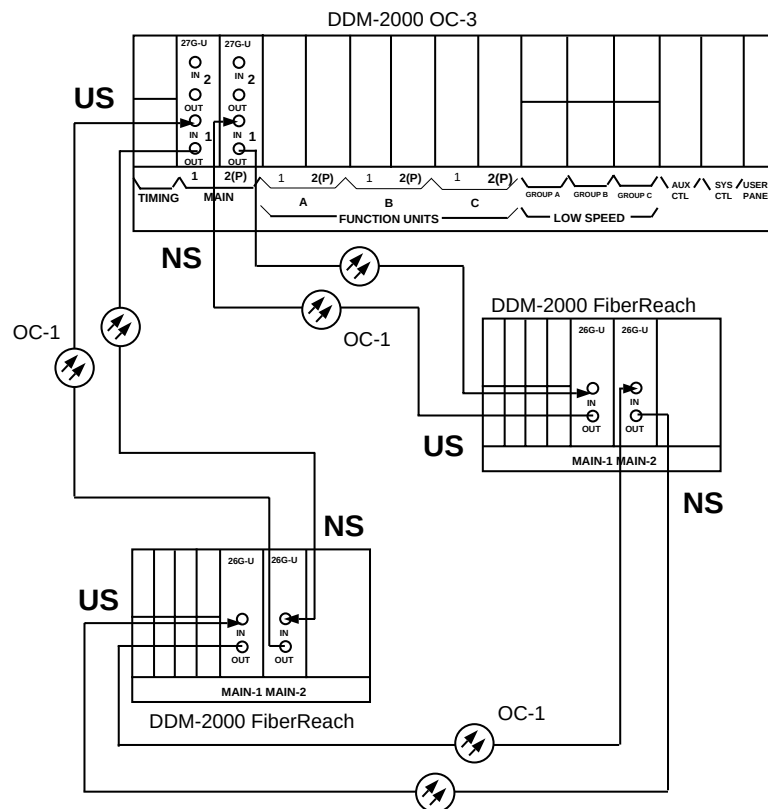
12. The system is now ready for initial service to be established.

Initial DS1 Service **[System Turnup: NTP-004]**

Initial T1 Service **[System Turnup: NTP-013]**



DDM-2000 OC-3 DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)								
22-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2	FN-A dcc-a		FN-B dcc-b		FN-C dcc-c	
	US	NS	NS		NS		NS	
27-Type OLIUs	MAIN-1 dcc-m1-1 dcc-m1-2	MAIN-2 dcc-m2-1 dcc-m2-2	FN-A-1 dcc-a1-1 dcc-a1-2	FN-A-2 dcc-a2-1 dcc-a2-2	FN-B-1 dcc-b1-1 dcc-b1-2	FN-B-2 dcc-b2-1 dcc-b2-2	FN-C-1 dcc-c1-1 dcc-c1-2	FN-C-2 dcc-c2-1 dcc-c2-2
	US	NS	NS	US	NS	US	NS	US



DDM-2000 FiberReach DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)		
26-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2
	US	NS

Figure 2 – Example of User Side/Network Side Value Settings

DDM-2000 FIBERREACH WIDEBAND SHELF

Install DS1 Protection Bus Module (1X1 or 1X7) System Out-of-Service

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



NOTE:

This procedure is used to verify/install the proper DS1 protection bus module (Release 2.0 or later) prior to mounting the FiberReach shelf. If the system is already in service and the protection mode is being changed, use the procedures of **NTP-012** instead of this procedure. A 1X1 or 1X7 protection bus module must be installed for proper shelf operation and to provide the kind of low speed protection desired.

Determine which protection bus module [847578390 (1X1) or 847578416 (1X7)] is required.

2.



CAUTION:

Use caution when removing the small screws used to mount the protection assembly cover. A magnetic screwdriver will speed the removal and installation of the screws.

See Figure 1. At right rear of shelf, remove the metal protection assembly cover by removing the four mounting screws.

3. If a protection bus module is already installed, verify it is the proper module. If a protection bus module is not installed, insert the proper module into connector **P2**. (The connector is keyed to ensure proper insertion.)

4. Reinstall the metal protection assembly cover.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5. If the proper protection bus module was already installed, verify the proper low-speed designation strip label is placed on the middle designation strip located between the **LOW-SPEED** slots on front of shelf. If the proper designation strip label is not attached to the middle designation strip, peel off the label backing and place the proper label on the middle designation strip at the front of the shelf. See Figure 2.
-
6. If the protection mode is **1X7**, low-speed cables must be connected from **J50**, **J51**, **J52**, and **J53** to the DSX-1 or DS1 Interconnect Assembly. If the protection mode is **1X1**, you must not connect the low-speed cables to **J52** and **J53**. See Figure 1.
-

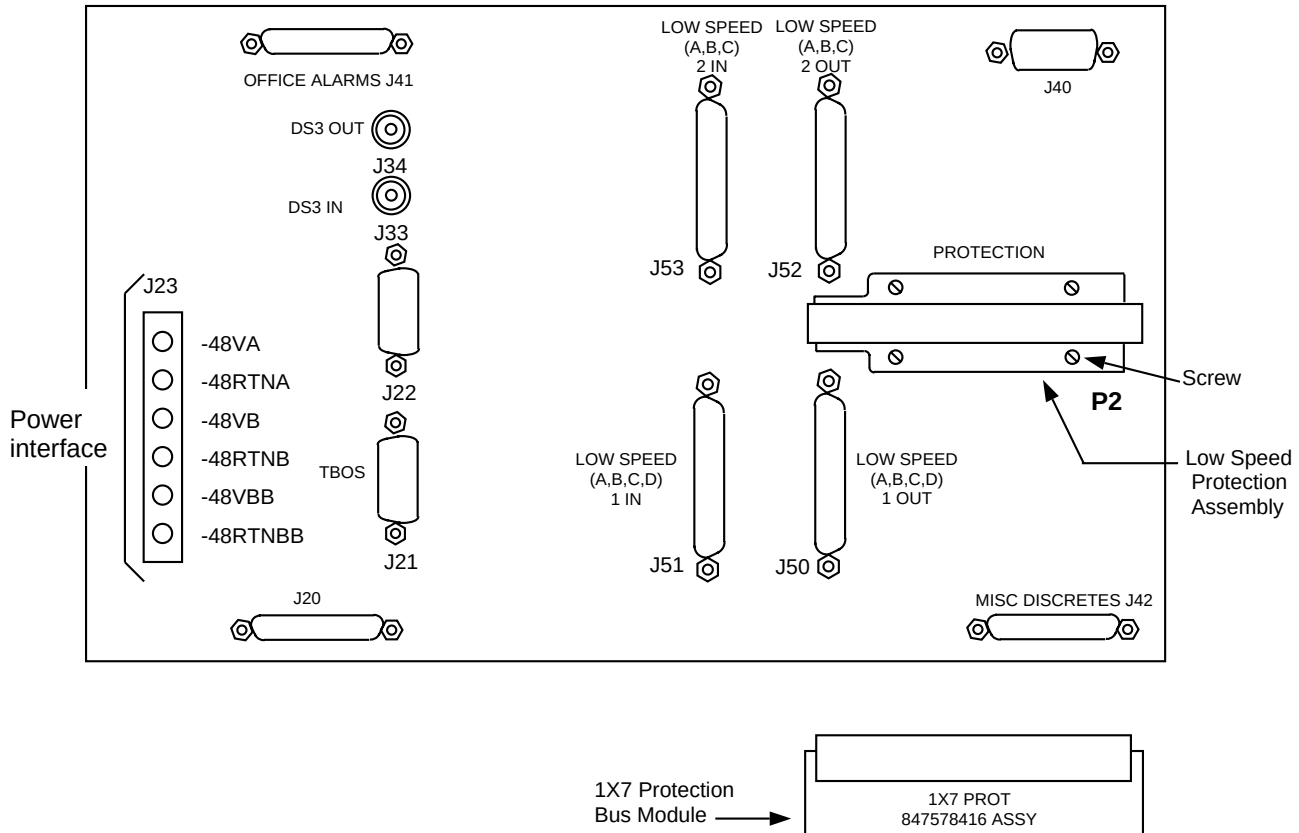


Figure 1 – FiberReach Protection Bus Module (1X1 or 1X7) Installation

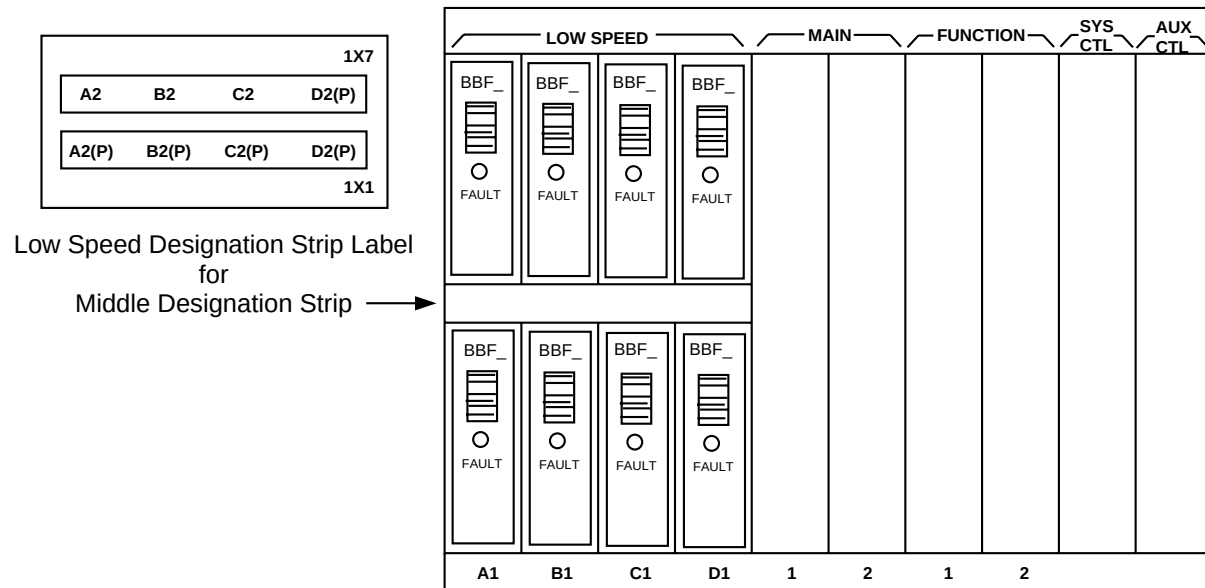


Figure 2 – FiberReach Protection Mode Label Position

Change DS1 Protection Bus Module (1X1 or 1X7) Low-Speed Slots Out-of-Service

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

*This procedure can only be performed with the FiberReach
LOW-SPEED slots out of service.*



NOTE:

This procedure is used to change the low-speed protection mode of a FiberReach wideband shelf to 1X1 or 1X7 (Release 2.0 or later). The **LOW-SPEED** DS1 slots must be taken out of service before performing this procedure. If the shelf has not been mounted, use the procedures of **NTP-011** instead of this procedure.

Determine which protection bus module [847578390 (1X1) or 847578416 (1X7)] is required.

-
2. Remove all low-speed DS1/T1 service (signals) from the FiberReach shelf.	NTP-005
-
3. Clear all active external protection switch requests (locked, forced, or manual) using the `switch-ls:address:pri=reset` command.
-
4. Remove all low-speed loopbacks using the `r ls-lpbk-t1` command.
-
5. Delete all low-speed cross-connections using the `dlt-crs-vt1` command.
-
6. Remove all low-speed **DS1/DS1PM/T1EXT** circuit packs.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7.



CAUTION:

Use caution when removing the small screws used to mount the protection assembly cover. A magnetic screwdriver will speed the removal and installation of the screws.

See Figure 1. At right rear of shelf, remove the metal protection assembly cover by removing the four mounting screws.

-
8. Remove existing protection bus module. Insert the new module into connector **P2**. (The connector is keyed to ensure proper insertion.)
-

9. Reinstall the metal protection assembly cover.
-

10. If the protection mode is **1X7**, low speed cables must be connected from **J50**, **J51**, **J52**, and **J53** to the DSX-1 or DS1 Interconnect Assembly. If the protection mode is **1X1**, you **must not** connect the low-speed cables to **J52** and **J53**. See Figure 1.
-

11. Peel off the label backing from the protection mode designation label. Place the label on the middle designation strip located between the **LOW-SPEED** slots on front of shelf. See Figure 2.
-

12. Reset the shelf (unplug and reseal **SYSCTL** or use reset command).
-

13. Use `rtrv-eqpt` command to verify that the low speed protection mode has been changed (Low speed protection mode: 1X1 or 1X7).
-

14. The system is now ready for DS1/T1 service to be established.

A. DS1 Service [**System Turnup: NTP-006**]

B. T1 Service [**System Turnup: NTP-014**]

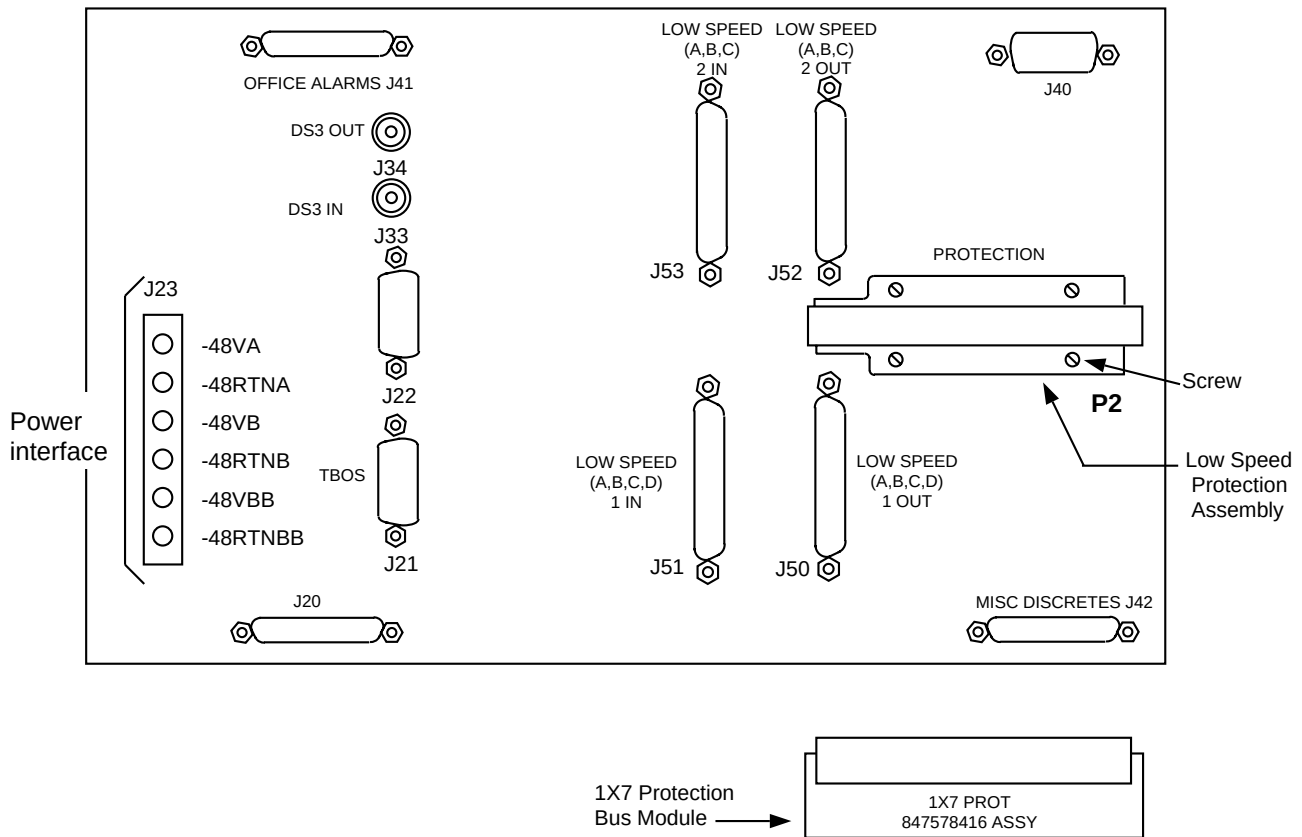


Figure 1 – FiberReach Protection Bus Module (1X1 or 1X7) Installation

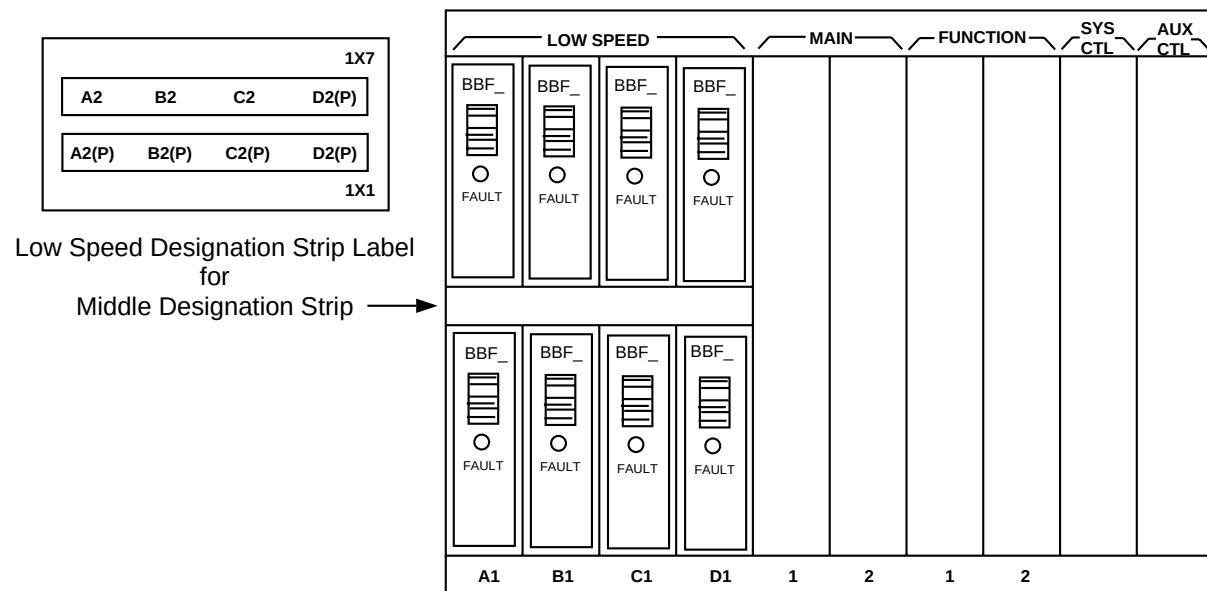


Figure 2 – FiberReach Protection Mode Label Position

Establish Initial End-to-End T1 Service (Low-Speed Slot Equipped but Not in Service)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in
Trouble Clearing: TAD-100.



NOTE:

The FiberReach and host system must be established before continuing with this procedure. If all the nodes of the network have not been equipped and installed, refer to **System Turnup/Circuit Order: IXL-001** for procedures to equip the DDM-2000 shelves and establish the system.



NOTE:

This procedure assumes that **T1 EXT** circuit packs have already been installed during initial shelf turnup and circuit packs have been installed during initial shelf turnup at the other T1 terminating end(s) of the circuit. If the terminating end is in another system, it is assumed that the appropriate installation and connections have been made to that system. If the appropriate circuit packs have not been installed and the system is in service on other groups, refer to **System Turnup/Circuit Order: IXL-001** for procedures to add new T1 service.



NOTE:

If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.

Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

2.



NOTE:

The `rtrv-eqpt`: command retrieves the Equipage and Version Report. This report lists the circuit pack type and version information for one or more slots. See the "Commands and Reports" section of this manual for a description of the `rtrv-eqpt`: command format.

At each FiberReach terminating end, use the `rtrv-eqpt`: command to obtain the Equipage and Version Report and verify that the proper service and protection (if required) **T1 EXT** circuit packs have been installed in **LOW-SPEED** slot(s) being put into service.

-
3. At the T1 terminating node(s) of the circuit being established, determine which T1 port(s) is to be put into service and what options are to be selected.
-

4.



NOTE:

The `rtrv-t1`: command retrieves the T1 Port Provisioning Report. This report lists information about each T1 port. This information includes attributes set by the `set-t1`: command. See the "Commands and Reports" section of this manual for a description of the `rtrv-t1`: command format.

At each T1 terminating node, use the `rtrv-t1`: command to obtain the T1 Port Provisioning Report and verify the hardware and software option settings.

-
5. At each T1 terminating node, use the `set-t1`: command to set the characteristics of the T1 port of the circuit being established.
-
6. At each T1 terminating node, make the appropriate cable connection(s) to the DS1 interconnect assembly, cross- connect point(s), or equivalent connection point(s) for the circuit being added.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.
-

8.

⇒ **NOTE:**
DS1 cross-connections have to be made at each shelf to configure the transmission path for each T1 circuit being established. Either terminating (drop) cross-connections are made at terminating nodes and pass-through cross-connections are made at intermediate nodes.

⇒ **NOTE:**
The following commands may be used to delete, enter, and retrieve cross-connections: `dlt-crs-vt1`, `ent-crs-vt1`, and `rtrv-crs-vt1`. See the "Commands and Reports" section of this manual for a description of commands. See "Cross- Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connection provisioning.

Determine the necessary cross-connections for each node from the work order or circuit order.

-
9. Make necessary VT1.5/STS1 cross-connections at each node in the network:
 - A. Single Homed OC-3/FiberReach Configuration **DLP-526**
 - B. Dual Homed OC-3/FiberReach Configuration **DLP-526**
 - C. Stand Alone OC-3/OC-1 Ring Configuration **DLP-528**
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

10.



NOTE:

For a DS1 circuit in a path protected ring network, the `sw-path-( ) : address` command must be used at the terminating nodes to switch the active VT1.5 (DS1) path to repeat this test on the other path(s).

Perform DS1 end-to-end transmission test for each circuit being put into service, as required.

DLP-510

-
11. Use the `rtrv-state:` command to determine the port state of the DS1 port(s) of the circuit being established.
-

12.



NOTE:

If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set-state-t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

Use the `rtrv-state-t1/set-state-t1:` command to verify/set the port state of the T1 port(s) of the circuit being established.

Add New T1 Service

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

*DDM-2000 FiberReach circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

This procedure assumes that a new T1 port or **T1 EXT** circuit pack is being added to a DDM-2000 FiberReach shelf that is already in service. It also assumes that **STS1E** circuit packs have been installed if the other end is an EC-1 interface.



NOTE:

For the 1X1 protection configuration, circuit packs are protected on a one-to-one basis. For example, if protection is required for a **T1EXT** circuit pack in a service **LOW-SPEED-[A1, B1, C1, or D1]** slot, a **T1 EXT** circuit pack must be installed in the protection **LOW-SPEED-[A2(P), B2(P), C2(P), or D2(P)]** slot.



NOTE:

For the 1X7 protection configuration, the circuit pack type installed in the **LOW-SPEED-D2(P)** slot is the only circuit pack type that is protected. In a 1X7 protection configuration, **177A** Apparatus Blank cards are required in unequipped **LOW-SPEED** slots.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

⇒ **NOTE:**
Standard T1 transmitter sources are designed to terminate in a nominal 100-ohm impedance. This termination is usually provided by the receiving equipment. When not connected to receiving equipment (that is, idle or unterminated), T1 transmitter equipment should terminate in a 100-ohm load. When connecting through DSX equipment, this can be accomplished with terminating plugs available from the DSX manufacturer. Any alternative method may be used resulting in 100-ohms across the TIP and RING of the T1 circuit output while in an idle state. Failure to terminate T1 outputs may result in violation of FCC Part 15 emission requirements and possibly interfere with other electronic equipment. Also, AIS should be turned off (using the `set -t1:address:ais=no` command) on any T1 circuit that is not in service.

⇒ **NOTE:**
If the DDM-2000 FiberReach fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.

Determine which T1 ports/slots are to be put into service and what options are to be selected.

-
2. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

3.



CAUTION:

*To minimize "hits" on in-service ports on **T1 EXT** circuit packs having a port added, it is recommended that a CIT be used to manually switch (using the switch-ls command) the T1 to protection if the **T1 EXT** circuit pack is removed or to set channel options without removing the circuit pack.*



CAUTION:

*If the protection **T1 EXT** circuit pack is not available for a protection switch, removing a service **T1 EXT** circuit pack will interrupt service on all ports on that circuit pack. If a CIT is available, use the rtrv-state command to check the status of the protection switch.*

Condition **T1 EXT** circuit pack for new T1 service being added.

DLP-538

-
4. At each T1 terminating node, use the set-t1: command to set the characteristics of the T1 port being established, if not already performed.
-
5. At each T1 terminating node, make the appropriate cable connection(s) to the DS1 interconnect assembly, cross connect, or equivalent connection point(s) for the circuit(s) being added.
-
6. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7.



NOTE:

To configure the transmission path for each T1 circuit being established, terminating (drop) cross-connections or "drop and continue" cross-connections must be made at terminating nodes and pass-through cross-connections made at intermediate nodes.



NOTE:

In ring configurations, you should use the following rules in establishing cross-connections in each ring:

1. All drop connections (including DRI, if present) from the same STS-1 timeslot must be provisioned the same, either all VT1.5 or STS-1.
2. If all 28 VT1.5s (DS1s) in an STS-1 are being passed through at a node in a VT1.5 path-switched ring, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the pass-through node in the future, you should provision the pass-throughs as VT1.5 cross-connections. Also, provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted to 28 VT1.5 cross-connects to drop DS1s at a later time.
3. On STS-1 path-switched rings, all nodes in the ring must be provisioned as STS-1 cross-connections.



NOTE:

The following commands may be used to convert, delete, enter, and retrieve cross-connections: `cnvt-crs`, `dlt-crs-sts1`, `dlt-crs-vt1`, `ent-crs-sts1`, `ent-crs-vt1`, `rtrv-crs-sts1`, and `rtrv-crs-vt1`. See the "Commands and Reports" section of this manual for a description of commands. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connection provisioning.

Determine the necessary cross-connections for each node from the work order or circuit order.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

8. Make necessary VT1.5/STS1 cross-connections for each node in the network:

A. Single-Homed OC-3/FiberReach Configuration	DLP-526
B. Dual-Homed OC-3/FiberReach Configuration	DLP-526
C. Stand-Alone OC- 3/OC-1 Configuration	DLP-528
-

9.



NOTE:

For a T1 circuit in a path protected ring network, the `sw-path-( ) : address` command must be used at the terminating nodes to switch the active VT1.5 (DS1) path to repeat this test on the other path(s).

Perform DS1 end-to-end transmission test for each circuit being put into service. **DLP-510**

10. Use the `rtrv-state:` command to determine the port state of the T1 port(s) of the circuit being established.
-

11.



NOTE:

If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set-state-t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

Use the `set-state-t1:` command to set the port state of the T1 port(s) of the circuit being established.

Discontinue End-to-End T1 Service

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in Trouble Clearing: TAD-100.



NOTE:

Standard T1 transmitter sources are designed to terminate in a nominal 100-ohm impedance. This termination is usually provided by the receiving equipment. When not connected to receiving equipment (that is, idle or unterminated), T1 transmitter equipment should terminate in a 100-ohm load. When connecting through DSX equipment, this can be accomplished with terminating plugs available from the DSX manufacturer. Any alternative method may be used resulting in 100-ohms across the TIP and RING of the T1 circuit output while in an idle state. Failure to terminate T1 outputs may result in violation of FCC Part 15 emission requirements and possibly interfere with other electronic equipment. Also, AIS should be turned off (using the `set - t1: address: ais=no` command) on any T1 circuit that is not in service.

Determine which T1 ports are to be discontinued and verify no alarms exist on the system.

-
2. Notify maintenance center that alarms will be generated while performing this procedure.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

3.



NOTE:

The following operation may activate the office major, minor, or no alarm. The audible alarm may be suppressed by depressing the **ACO** button.



NOTE:

One of the terminating nodes for the T1 service may be equipped with **STS1E** circuit packs to provide an EC-1 interface for the DS1 service.

At the DS1 interconnect assembly, cross connect, or equivalent assembly at the T1 terminating nodes, remove the T1 signals associated with the port(s) being discontinued. (**FAULT** LEDs begin flashing on **T1 EXT** circuit pack with signals removed.)

4.



NOTE:

The **UPD/INIT** pushbutton on the **SYSCTL** is recessed to prevent its accidental operation. You will need a small pointed object, such as a ball-point pen, to operate it.

Momentarily depress the **UPD/INIT** button on the **SYSCTL** at the DS1 terminating nodes or use the upd command to update the equipment list. (Flashing **FAULT** LEDs go off.)

5. Use the `rtrv-state-eqpt` command to verify that the correct port(s) has been changed from *in-service (i)* to *auto (a)* state.

6.



CAUTION:

Removing the wrong cross-connections may cause service interruption.

From work order or `rtrv-crs-( )` command, determine the cross-connections for circuit being discontinued.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7.



NOTE:

T1 **LOW-SPEED** slots cannot be unequipped without an alarm until all port cross-connections are removed. The cross-connections must be removed first before removing circuit packs. In a ring configuration, remove the cross-connections from the terminating nodes first, then remove the pass-through cross-connections at the intermediate nodes. A Major alarm may occur when the first cross-connection at the terminating node is deleted and clear when the other terminating cross-connection is deleted.



NOTE:

The following commands may be used to delete, enter, and retrieve cross-connections at the FiberReach shelf:
`dlt-crs-vt1`, `ent-crs-vt1`, and `rtrv-crs-vt1`. See the "Commands and Reports" section of this manual for a description of commands. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connections.

Use the `dlt-crs-vt1:` command to delete the terminating (drop) node cross-connections for all T1 service being removed, if required.

8.



NOTE:

If other nodes in the T1 path being discontinued are not DDM-2000 FiberReach nodes, use the documentation for the other systems to delete the necessary cross-connections, if required.

Use the `dlt-crs-vt1:` command to delete the pass-through cross-connections at each nonterminating node for all DS1 service being removed, if required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

9.



NOTE:

If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set - state - t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

If circuit packs are going to be removed, use the `rtrv - state - t1:/ set - state - t1:` command to verify/set the port state of the T1 ports to *auto*.

If circuit packs are **not** going to be removed, use the `set - state - t1:` command to set the port state of the T1 port(s) to *auto* or *nmon*, as required.

-
10. If both T1 ports on the **T1 EXT** circuit pack are being discontinued, you may remove the **T1 EXT** circuit pack, if required.

-
11. If circuit packs have been removed, momentarily depress the **UPD/INIT** button on the **SYCTL** or use the `upd` command to update the DDM-2000 internal equipment list.

-
12. If the FiberReach shelf is equipped for 1X7 protection mode and circuit packs have been removed, install **177A** Apparatus Blank cards into empty low-speed slots.

-
13. Verify all alarms are off.
-

Establish FiberReach Access via DDM-2000 OC-3 Release 9 Host Shelf OC-3 Release 8 Linear Configuration

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CAUTION:

*DDM-2000 multiplexer packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.



NOTE:

It is assumed the DDM-2000 FiberReach shelves have been equipped and tested (**System Turnup: NTP-016**). It is also assumed that the DDM-2000 OC-3 shelves in the system have passed the looped transmission test(s), LTP 363-206-280, *DDM-2000 OC-3 Multiplexer, User/Service Manual - Volume II* (**System Turnup: NTP-016**), and the final configuration has been established with the DDM-2000 OC-3 Release 9 host shelf in the linear network.

Determine the network configuration (for example, see Figures 1 and 2.)

DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

2. Verify that the host DDM-2000 OC-3 shelf is equipped with Release 9 or later ring software.

DLP-514

3. Determine the optical loss of each optical span from office records or by making the required measurements.

4.

⇒ **NOTE:**
The "Network Side/User Side" parameters of the set - fecom: command must be set opposite at each end of the optical spans (for example, see Figure 3).

Use the rtrv-fecom/set-fecom command to verify/set "Network Side/User Side" parameters at each end of optical span being established.

5.

⚠ **CAUTION:**
*The host OC-3 shelf can be timed from an external source or line timed from **FUNCTION UNITS C** slot. The host OC-3 shelf cannot be line timed from the MAIN slots. Therefore, if the OC-3 shelf is to be line timed, the set - sync:src=fn-c must be used to derive timing from the **FUNCTION UNITS (FN-C)** slot.*

⇒ **NOTE:**
At the OC-3 shelf, if line-timing mode is specified or external-timing mode is specified but the timing reference was not available at shelf turnup, the **TGS** option switches are probably set for *free running*. Before the end-to-end system is established, the specified timing mode must be set on the **TGS** circuit packs.

⇒ **NOTE:**
If the option switch setting is changed, an update must be done by momentarily depressing the **UPD/INIT** button on the **SYSCTL** after the **TGS** circuit packs are reinstalled.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

If external timing is selected and the **NE ACTY** LED remains lit after the **TGS** circuit pack is reinserted, use the CIT and the `rtrv-sync` command to check the operational mode of the system. If the mode is Holdover instead of External, check that the incoming timing references are connected. Also check Mode Switching (revertive or nonrevertive) and the external DS1 Line Code/Format switch settings.

Set timing mode on **TGS** circuit packs to the timing mode specified in work order or office records. Use the `set-sync` command to set the OC-3 synchronization source, if required LTP 363-206-280, *DDM-2000 OC-3 Multiplexer, User/Service Manual, Volume II* (**Detailed Level Procedures: DLP-513**).

6.



NOTE:

Two or more shelves in the same network with the same TBOS display number (set using the `set-ne` command) will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID (set by the `set-ne` command) will cause a duplicate TID alarm.

Verify no duplicate TBOS, site/ne, or TID settings exist. The `rtrv-ne` command may be used at each shelf in the network to display settings. If duplicates exist, determine new settings and use the `set-ne` command to make new settings.

DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

7.



NOTE:

The set - ne : command designates a shelf as the directory service network element (DSNE). **One**, and only one, shelf in the network **must** be provisioned as a DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as a DSNE, a duplicate DSNE alarm will occur. The DSNE must be an OC-3 shelf with Release 9 or later software, unless an FT-2000 is part of the network, then the DSNE will always be an FT-2000 node. The DSNE must not be a FiberReach shelf. Multiple GNEs are allowed. A shelf is automatically provisioned as a GNE when connected to an active X.25 interface.



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group is recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes. The AGNE parameter of the set - ne : command may have been set to **yes** on each new shelf during shelf turnup procedures to suppress an AGNE communication failure alarm.

Use the rtrv - ne / set - ne : command to verify/designate ONE shelf in the network as the DSNE, if not already done.

Use the set - ne : command to designate the AGNE(s) and alarm group numbers, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

8.



NOTE:

This configuration requires that the **MAIN 1 OLIU** on the host OC-3 shelf (node) connect to the **MAIN-2 OLIU** at the first FiberReach shelf from the OC-3 shelf. See Figure 3.

MAIN-1 OLIU at the FiberReach shelf connects to the **MAIN-2 OLIU** at an adjacent FiberReach shelf (node). The **MAIN-1 OLIU** at the last FiberReach shelf on the OC-1 ring connects to **MAIN 2(P) OLIU** on the host OC-3 shelf. This procedure will establish the FiberReach ring configuration starting from the OC-3 host node (near end) to the first FiberReach node, then continuing to the next node until the final connection is made from the last FiberReach node back to the host OC-3 node.



NOTE:

All unused ports on the **27G-U/27G2-U OLIU** must be set to nmon with the set - state - oc1 command.

At the near end, remove the optical loop from the **27G-U/27G2-U OLIU** OC-1 line (1 or 2) (for example in Figure 3, OC-3 shelf **MAIN-1**, OC-1 line 1) associated with the optical span being established. At the other end of the optical span, remove the optical loop from the associated **OLIU** (for example, in Figure 3, FiberReach **MAIN-2 OLIU**).

9.



NOTE:

The section data communication channel (DCC), used for far end (fecom) communications, must be enabled at each network element (shelf) optical interface being tested in order for the end-to-end line tests to work. Default condition for the DCC channel is "enabled." If it has been disabled, use the set - fecom: command **at each shelf** to enable far end communications.

At each shelf, use the set - fecom: *address*:com=enabled command to ensure far end communications (fecom) is enabled.

10. Perform optical fiber connections and verification of the integrity of the optical span being established.

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DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

11.



NOTE:

The `rtrv-pm-line` command in the following procedure displays performance monitoring data associated with the OC-1 lines terminated on the system.

Perform end-to-end OC-1 line test.

DLP-535

12. Repeat this procedure for all OC-1 optical spans back to the host OC-3 shelf.

13. The system is now ready for initial service to be established.

Initial DS1 Service [System Turnup: NTP-004]

Initial T1 Service [System Turnup: NTP-013]

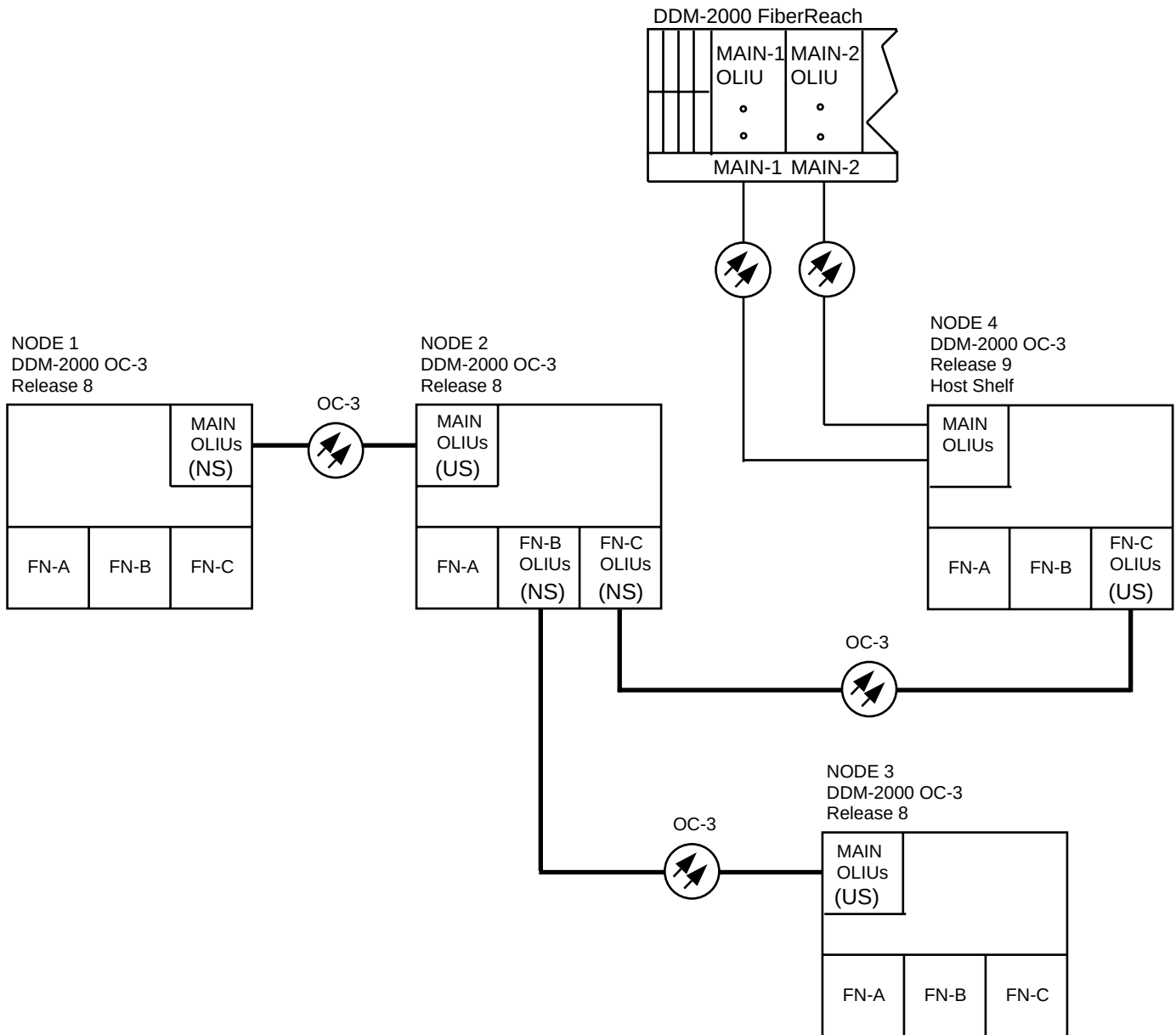


Figure 1 – Example of Single-Homed FiberReach Ring to OC-3 Linear Terminating Node

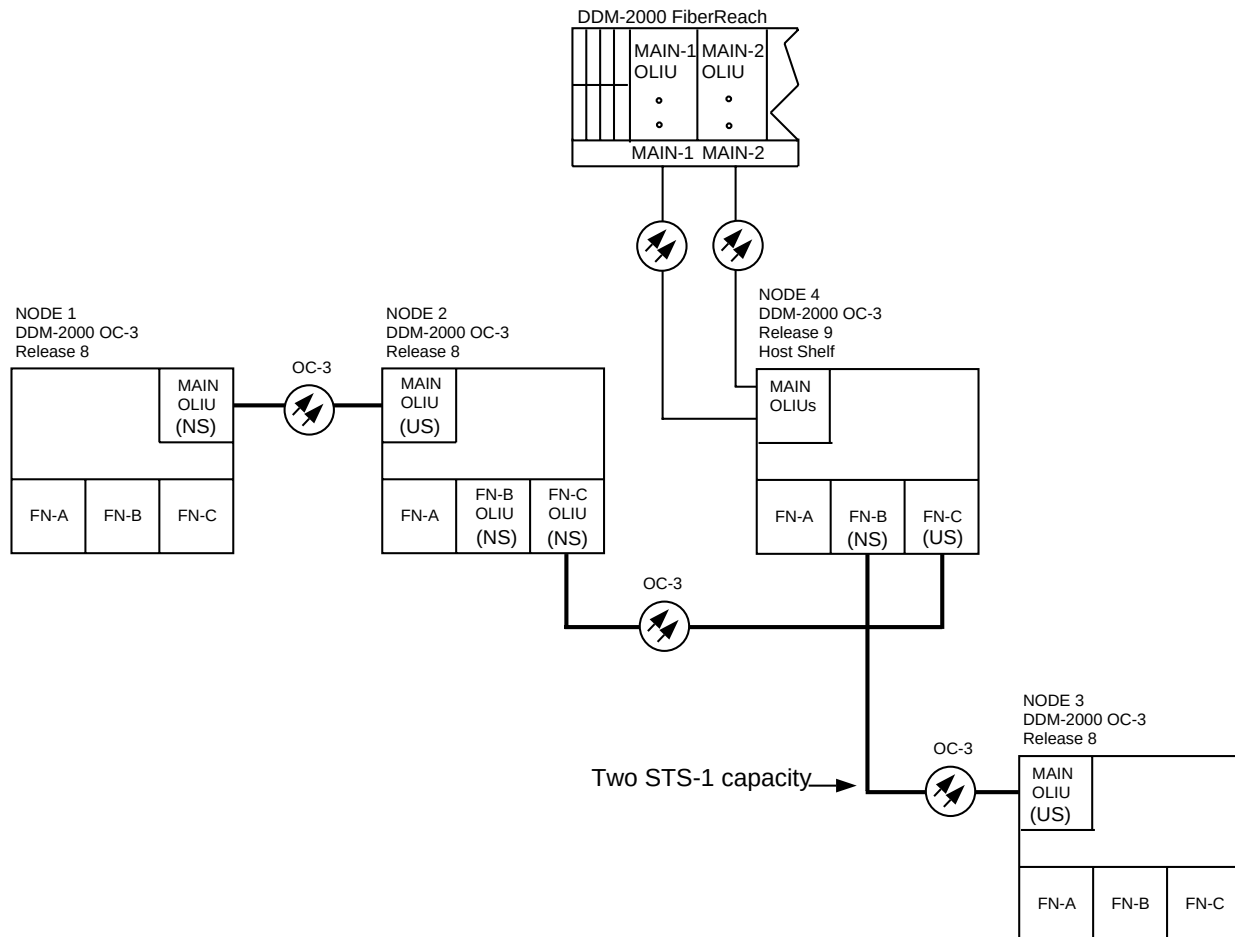
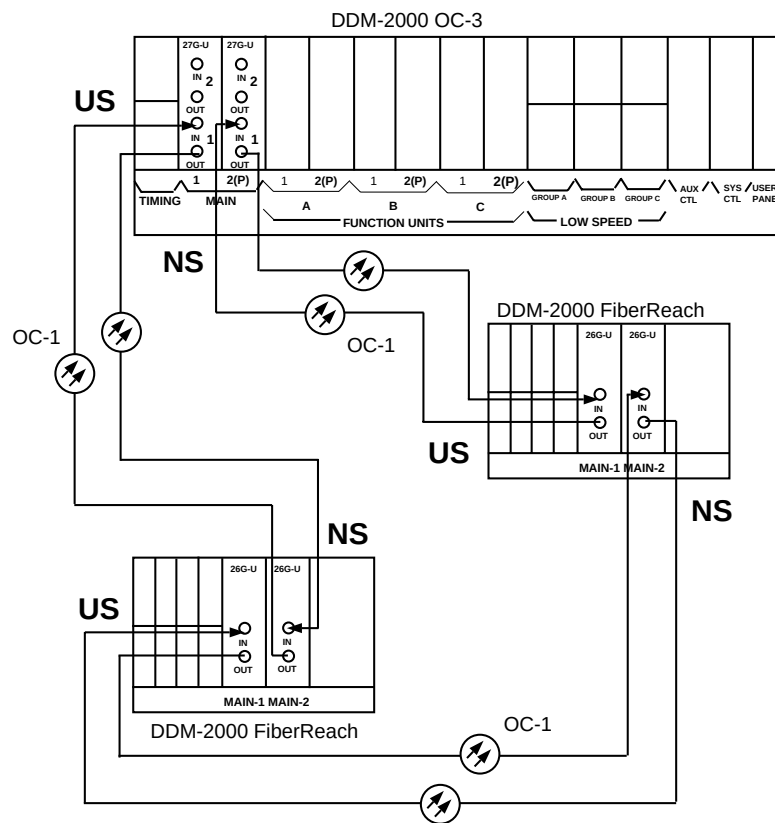


Figure 2 – Example of Single-Homed FiberReach Ring to OC-3 Linear Intermediate Node

DDM-2000 OC-3 DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)								
22-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2	FN-A dcc-a		FN-B dcc-b		FN-C dcc-c	
	US	NS	NS		NS		NS	
27-Type OLIUs	MAIN-1 dcc-m1-1	MAIN-2 dcc-m2-1	FN-A-1 dcc-a1-1	FN-A-2 dcc-a2-1	FN-B-1 dcc-b1-1	FN-B-2 dcc-b2-1	FN-C-1 dcc-c1-1	FN-C-2 dcc-c2-1
	dcc-m1-2	dcc-m2-2	dcc-a1-2	dcc-a2-2	dcc-b1-2	dcc-b2-2	dcc-c1-2	dcc-c2-2
	US	NS	NS	US	NS	US	NS	US



DDM-2000 FiberReach DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)		
26-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2
	US	NS

Figure 3 – Example of User Side/Network Side Value Settings

Establish Initial HDSL Service (Group Equipped But Not in Service)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

 CAUTION:

1. *DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*

The OC-3 system must be established before continuing with this procedure. If all the nodes of the network have not been equipped and installed, refer to **System Turnup/Circuit Order: IXL-001** for procedures to equip the DDM-2000 shelves and establish the system.

If the DS1 terminating end(s) are in a DDM-2000 OC-3, this procedure assumes that **MXRVO** circuit packs have already been installed during initial shelf turnup and either **MXRVO** or **STS1E** circuit packs have been installed during initial shelf turnup at the other DDM-2000 OC-3 terminating end(s) of the circuit. If the terminating end is in another system, it is assumed that the appropriate installation and connections have been made to that system. If the appropriate circuit packs have not been installed and the system is in service on other groups, refer to **DLP-506** for procedures to install new **MXRVO** circuit packs and **DLP-564** for procedures to install new **HDSL** circuit packs.

If the DDM-2000 fails to respond in the indicated manner, refer to Trouble Clearing: IXL-001.

Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to Trouble Clearing: IXL-001 and follow the appropriate trouble-clearing procedure.

DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

2. The **rtrv-eqpt:** command retrieves the Equipage and Version Report. This report lists the circuit pack type and version information for one or more slots. See the "Commands and Reports" section of this manual for a description of the **rtrv-eqpt:** command format.

At each DDM-2000 OC-3 terminating end, use the **rtrv-eqpt:** command to obtain the Equipage and Version Report and verify that the proper service and protection (if required) **MXRVO (STS1E)** circuit packs have been installed in group(s) **(FN A, FN B, or FN C)** being put into service.

-
3. At the HDSL terminating node(s) of the circuit being established, determine which HDSL port(s) is to be put into service and what options are to be selected.

-
4. Both service and protection **MXRVO** circuit packs must be installed in group equipped with HDSL circuit packs.

At each HDSL terminating node, set option switches and install HDSL circuit pack(s), as required.

DLP-564

-
5. No service **LOW SPEED** DS1 slot locations should be left empty in groups equipped with **MXRVO** and protection **HDSL** circuit packs.

When a **HDSL** circuit pack is switched to protection, removal of any other **HDSL** circuit pack or **177A** Retainer Card in the same group will result in a loss of service to the protected **HDSL** and the removed **HDSL** circuit pack.

177A Retainer Cards are used to disconnect the cross-connect wiring associated with unused service DS1 slot locations from the DDM-2000's internal protection bus.

Install **177A** Retainer Cards into all unused service **DS1** slots in groups equipped with **MXRVO** and protection **HDSL** circuit packs.

-
6. At each HDSL terminating node, make the appropriate cable connection(s) to the HDSL cross-connect point(s) or equivalent connection point(s) for the circuit being added.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.
8. If one of the terminating nodes is equipped with **STS1E** circuit packs for an EC-1 interface to support services being established, establish initial EC-1 low-speed interface **[NTP-034]**.
9. Ring releases support only manual VT1.5 and STS-1 cross-connections. Manual STS-1 and/or DS1 cross-connections have to be made at each shelf to configure the transmission path for each circuit being established. Either terminating (drop) cross-connections or "drop and continue" cross-connections are made at terminating nodes and pass-through cross-connections are made at intermediate nodes.

In ring configurations, you should use the following rules in establishing cross-connections in each ring:

1. All drop connections (including DRI, if present) from the same STS-1 timeslot must be provisioned the same, either all VT1.5 or STS-1.
2. If all 28 VT1.5s (DS1s) in an STS-1 are being passed through at a node in a VT1.5 path-switched ring, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the pass-through node in the future, you should provision the pass-throughs as VT1.5 cross-connections. OC-3 ring Releases 7.0 and earlier do not support the command (cnvt - crs) for converting an STS-1 to a VT1.5 cross-connect. Also, provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted to 28 VT1.5 cross-connects to drop DS1s at a later time.
3. On STS-1 path-switched rings, all nodes in the ring must be provisioned as STS-1 cross-connections.

DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

The following commands may be used to convert, delete, enter, and retrieve cross-connections: `cnvt-crs`, `dlt-crs-sts1`, `dlt-crs-vt1`, `ent-crs-sts1`, `ent-crs-vt1`, `rtrv-crs-sts1`, and `rtrv-crs-vt1`. See the "Commands and Reports" section of this manual for a description of commands. See "Cross- Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connection provisioning.

Determine the necessary cross-connections for each node from the work order or circuit order.

-
10. Make necessary VT1.5/STS1 cross-connections at each node in the network:	
A. Single-Ring Configuration	DLP-546
B. Dual-Ring Interworking (DRI) Configuration	DLP-550
C. Single/Dual OC-3/FiberReach Configuration	DLP-557
D. Stand-Alone OC-3/FiberReach Configuration	DLP-558
E. Single/Dual OC-3/OC-48 Configuration	DLP-559
F. Single/Dual OC-3/OC-12 Configuration	DLP-560
-
11. For a DS1 circuit in a path protected ring network, the `sw-path- ( ) :address` command must be used at the terminating nodes [and dual ring interworking (DRI) nodes in a DRI ring network] to switch the active VT1.5 (DS1) path to repeat this test on the other path(s).
- Perform DS1 end-to-end transmission test for each circuit being put into service, as required:
- | | |
|---|----------------|
| A. Ring Configuration | DLP-510 |
| B. Dual Ring Interworking (DRI) Configuration | DLP-554 |
| C. OC-3/FiberReach Configuration | DLP-510 |
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

12. Use the `rtrv-state:` command to determine the port state of the DS1 port(s) of the circuit being established.

-
13. If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set-state-t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

Use the `set-state-t1:` command to set the port state of the DS1 port(s) of the circuit being established.

-
14. Use PairGain procedures to access the faceplate RS-232 interface and set HDSL link management features for each port being provisioned.
-

Add New HDSL Service (Group Already In Service)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.

 **CAUTION:**
*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*

 **NOTE:**
This procedure assumes that the DDM-2000 is in service and that a new **HDSL** port or HDSL circuit pack is being added to a group that is already in service and equipped with **MXRVO** circuit packs at the DS1 terminating end(s). It also assumes that **STS1E** circuit packs have been installed if the other end is an EC-1 interface. If proper circuit packs have not been installed and the system is in service on other groups, refer to **System Turnup/Circuit Order: IXL-001** for procedures to add a new group (**MXRVO** or **STS1E**).

 **NOTE:**
A maximum of three **BBF8 HDSL** circuit packs, including a protection circuit pack, can be installed in any one function group. Both service and protection **MXRVO** circuit packs must also be installed.

 **NOTE:**
If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.

Determine which HDSL ports/slots are to be put into service and what options are to be selected.

-
2. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.
-

DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

3.



CAUTION:

*No service DS1 **LOW-SPEED** slots should be left empty in a group equipped with **MXRVO** and protection **HDSL** circuit packs.*

If a new **HDSL** circuit pack is being installed, remove **177A Retainer Card** from DS1 slot being equipped, then set option switches and install new **HDS** circuit pack.

DLP-564

-
4. At each HDSL terminating node, use the `set - t1:` command to set the characteristics of the DS1 port being established, if not already performed.

-
5. At each HDSL terminating node, make the appropriate cable connection(s) to the cross-connect point(s) or equivalent connection point(s) for the circuit(s) being added.

-
6. Verify that no LEDs or alarms are activated. If any LEDs or alarms are activated, refer to **Trouble Clearing: IXL-001** and follow the appropriate trouble-clearing procedure.

7.



NOTE:

Ring releases support only manual VT1.5 and STS-1 cross-connections. Manual STS-1 and/or DS1 cross-connections have to be made at each shelf to configure the transmission path for each DS1 circuit being established. Either terminating (drop) cross-connections or "drop and continue" cross-connections are made at terminating nodes and pass-through cross-connections are made at intermediate nodes.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

In ring configurations, you should use the following rules in establishing cross-connections in each ring:

1. All drop connections (including DRI, if present) from the same STS-1 timeslot must be provisioned the same, either all VT1.5 or STS-1.
2. If all 28 VT1.5s (DS1s) in an STS-1 are being passed through at a node in a VT1.5 path-switched ring, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the pass-through node in the future, you should provision the pass-throughs as VT1.5 cross-connections. Also, provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted (cnvt - crs) to 28 VT1.5 cross-connections to drop DS1s at a later time.
3. On STS-1 path-switched rings, all nodes in the ring must be provisioned as STS-1 cross-connections.



NOTE:

The following commands may be used to convert, delete, enter, and retrieve cross-connections: `cnvt - crs`, `dlt - crs - sts1`, `dlt - crs - vt1`, `ent - crs - sts1`, `ent - crs - vt1`, `rtrv - crs - sts1`, and `rtrv - crs - vt1`. See the "Commands and Reports" section of this manual for a description of commands. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connection provisioning.

Determine the necessary cross-connections for each node from the work order or circuit order.

DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

8. Make necessary VT1.5/STS1 cross-connections for each node in the network:

A. Single-Ring Configuration	DLP-546
B. Dual-Ring Interworking (DRI) Configuration	DLP-550
C. Single/Dual OC-3/FiberReach Configuration	DLP-557
D. Stand-Alone OC-3/FiberReach Configuration	DLP-558
E. Single/Dual OC-3/OC-48 Configuration	DLP-559
F. Single/Dual OC-3/OC-12 Configuration	DLP-560

9.



NOTE:

For a DS1 circuit in a path protected ring network, the `sw-path-vt1: address` command must be used at the terminating nodes [and dual ring interworking (DRI) nodes in a DRI ring network] to switch the active VT1.5 (DS1) path to repeat this test on the other path.

Perform DS1 end-to-end transmission test for each circuit being put into service.

A. Single-Ring Configuration	DLP-510
B. Dual Ring Interworking (DRI) Configuration	DLP-554
C. OC-3/FiberReach Configuration	DLP-510

-
10. Use the `rtrv-state:` command to determine the port state of the DS1 port(s) of the circuit being established.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

11.



NOTE:

If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set-state-t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

Use the `set-state-t1:` command to set the port state of the DS1 port(s) of the circuit being established.

-
12. Use PairGain Technologies procedures to access the faceplate RS-232 interface and set HDSL link management features for each port being provisioned.
-

Discontinue End-to-End HDSL Service

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.



CAUTION:

*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*

Determine which HDSL ports are to be discontinued and verify no alarms exist on the system.

2.



NOTE:

The following operation may activate the office major, minor, or no alarm. The audible alarm may be suppressed by depressing the **ACO** button.

At the cross-connect point for the HDSL terminating nodes, remove the HDSL signals associated with the port(s) being discontinued. (**FAULT** LEDs begin flashing on **HDSL** circuit pack with signals removed.)

3.



NOTE:

The **UPD/INIT** pushbutton on the **SYSCTL** is recessed to prevent its accidental operation. You will need a small pointed object, such as a ball-point pen, to operate it.

Momentarily depress the **UPD/INIT** button on the **SYSCTL** at the HDSL terminating nodes or use the **upd** command to update the equipment list. (Flashing **FAULT** LEDs go off.)

DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

4. Use the `rtrv-state-eqpt` command to verify that the right port has been changed from *in-service* (i) to *auto* (a) state.
-

5.



CAUTION:

Removing the wrong cross-connection may cause service interruption. Use the `rtrv-crs-( )` command to determine the proper cross-connections.

From work order or `rtrv-crs-( )` command, determine the DS1 (VT1.5) cross-connections for circuit being discontinued.

6.



NOTE:

DS1 **LOW-SPEED** slots cannot be unequipped without an alarm until all port cross-connections are removed. The cross-connections must be removed first before removing circuit packs. In a ring configuration, remove the cross-connections from the terminating nodes first, then remove the pass-through cross-connections at the intermediate nodes. A Major alarm may occur when the first cross-connection at the terminating node is deleted and clear when the other terminating cross-connection is deleted.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

In ring configurations, the following rules are used in establishing cross-connections in each ring:

1. All drop connections (including DRI, if present) from the same STS-1 timeslot must be provisioned the same, either all VT1.5 or STS-1.
2. If all 28 VT1.5s (DS1s) in an STS-1 are being passed through at a node in a VT1.5 path-switched ring, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the pass-through node in the future, you should provision the pass-throughs as VT1.5 cross-connections. Also, provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted to 28 VT1.5 cross-connects to drop DS1s at a later time.
3. On STS-1 path-switched rings, all nodes in the ring must be provisioned as STS-1 cross-connections.



NOTE:

The following commands may be used to convert, delete, enter, and retrieve cross-connections: `cnvt-crs`, `dlt-crs-vt1`, `dlt-crs-sts1`, `ent-crs-vt1`, `ent-crs-sts1`, `rtrv-crs-vt1`, and `rtrv-crs-sts1`. See the "Commands and Reports" section of this manual for a description of commands. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross-connections.

Use the `dlt-crs-vt1` command to delete the terminating (drop) node cross-connections for all HDSL service being removed, if required.

DO ITEMS BELOW IN ORDER LISTED. . . . FOR DETAILS, GO TO

7. Use the `dlt-crs-vt1:` command to delete the pass-through cross-connections at each nonterminating node for all DS1/HDSL service being removed, if required.
8. If both HDSL ports on the **HDSL** circuit pack are being discontinued, you may remove the **HDSL** circuit pack, if required.
9. If *all* **HDSL** circuit packs in a group are removed, you may remove the group function unit **MXRVO** circuit packs and the protection **HDSL** circuit pack, if required.
10. If group **MXRVO/STS1E** circuit packs are removed, proceed to Step 12. Otherwise, continue with Step 11.

11.



CAUTION:

*No service DS1 **LOW-SPEED** slots should be left empty in groups equipped with **MXRVO** or **STS1E** (high-speed mode) and protection **HDSL** circuit packs.*



NOTE:

177A Retainer Cards are used to disconnect the cross-connect wiring associated with unused service DS1 slot locations from the DDM-2000's internal protection bus.

Install **177A** Retainer Card(s), as required, into the DS1 slot(s) for the **HDSL** circuit pack(s) removed.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

12.



NOTE:

If a port is in the *nmon* (*n*) state, the signal is not monitored or alarmed. The port will not automatically go to the *in service* (*i*) state when a signal is detected as it will in the *auto* (*a*) state. In the *nmon* state, the port must be returned to the *auto* state, using the `set - state - t1:` command, to turn on monitoring of signal failures and before any circuit packs associated with that port can be removed from the equipment list by the `upd` command.

If circuit packs have been removed, momentarily depress the **UPD/INIT** button on the **SYSCTL** or use the `upd` command to update the DDM-2000 internal equipment list.

If circuit packs have *not* been removed, use the `set - state - t1:` command to set the port state of the DS1 port(s) to *auto* or *nmon*, as required.

13. Verify all alarms are off.

Establish Single-Homed FiberReach Node Operating at an OC-3 Rate Access via DDM-2000 OC-12 Backbone Ring

1.

 **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

 **CAUTION:**
*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*

 **NOTE:**
FiberReach nodes operating at an OC-3 rate require two **28G type OLIUs** in the **MAIN** slots of the FiberReach shelf.

 **NOTE:**
The **28G type OLIUs** require a faceplate interconnect cable assembly, [comcode(8477212710)].

 **NOTE:**
If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.

 **NOTE:**
It is assumed that all DDM-2000 OC-12 shelves in the system have passed the looped transmission test(s) (363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual (TOP) — Volume II, System Turnup: NTP- 002*) and the DDM-2000 OC-12 ring has been established (363- 206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual (TOP) — Volume II, System Turnup: NTP- 020*). It is also assumed the DDM-2000 OC-3 shelves have been equipped

and tested, **System Turnup: NTP-016.**

Determine the network configuration (for example, see Figure 1).

-
2. Verify that the host DDM-2000 OC-12 shelf is equipped with Release 5 or later ring software. If not equipped with Release 5 or later software, upgrade the DDM-2000 OC-12 host shelf with proper software. Verify that the DDM-2000 OC-3 shelf is equipped with Release 9 or later ring software.	DLP-531
-

3. Determine the optical loss of each optical span from office records or by making the required measurements.	DLP-514
-

4.

⇒ **NOTE:**
The **rtrv-eqpt** : command retrieves the Equipage and Version Report. This report lists the circuit pack type and version information for one or more slots. See the "Commands and Reports" section of this manual for a description of the rtrv-eqpt : command format.

⇒ **NOTE:**
If work order or office records do not specify **OLI** types, refer to 363-206-200, *DDM-2000 OC-3 and OC-12 Multiplexers, Applications, Planning, and Ordering Guide* and/or 363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual — Volume I*, for a description of **OLI** circuit packs and applications. Optical line power measurements and/or office records must be used to verify that the span length can be supported.

At the host OC-12 node, verify/install **OLI** circuit packs in **FUNCTION UNITS (A, B, C, or D)** slots being used for OC-3 access.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5.



NOTE:

If fecom is enabled, an inconsistent DCC values alarm will occur when the **OLIUs** are looped back. Normally, the alarm occurs when the user/network parameters on the **OHCTLs** at both ends of the DCC are set the same. To clear the alarm during a fiber loopback, use the **set -fecom:address:com=disable** command to disable the DCC.

At OC-12 shelf, connect optical loops for **FUNCTION UNITS OLIUs** just installed.

6.



NOTE:

The Network Side (NS)/User Side (US) parameters of the **set -fecom:** command must be set opposite at each end of the optical spans. For example, see Figure 2.

Use the **rtrv-fecom/set-fecom** command to verify/set "Network Side/User Side" parameters at each end of optical span being established.

-
7. Use the **rtrv-oc3/set-oc3** command at the OC-12 shelf to verify/set application (*app*) parameter for the OC-12 **FUNCTION UNITS** slots being used for this single-homed configuration. For example, **set-oc3:fn-a, app=0X1**.

8.



NOTE:

The **set sync:** command provisions the synchronization mode switching, synchronization source, and output mode of timing signals when the **28G type OLIUs** hardware is provisioned to be line-timed. See the "**Commands and Reports**" section of this manual for a description of the **set sync:** command format.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

9.



NOTE:

If Kbyte or Sbyte (sync messaging) is enabled for the OC-3 **MAIN 1** and **MAIN 2(P)** optical interfaces at any node in the OC-3 ring, it **must** be enabled at all nodes in the OC-3 ring and in the **FUNCTION UNITS** slots of the host OC-12 shelf.



NOTE:

The **rtrv-oc3:** command retrieves the OC-3 Line Provisioning Report. This report displays the provisioned configuration of OC-3 lines. See the "Commands and Reports" section of 363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual — Volume I* and 363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual — Volume I* for a description of the **rtrv-oc3:** command format.

Use the **rtrv-oc3:** command to obtain the OC-3 Line Provisioning Report and verify if Kbyte/Sbyte is enabled or disabled. Use the **set-oc3:** command to enable or disable the Kbyte/Sbyte parameter, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

10.

⇒ **NOTE:**
If Sync Autoreconfiguration is enabled, Kbyte/Sbyte must also be enabled.

⇒ **NOTE:**
If Sync Autoreconfiguration is enabled at any line-timed OC-3 node in a ring, it **must** be enabled at all line-timed OC-3 nodes of a ring.

⇒ **NOTE:**
The **rtrv-sync:** command retrieves the Synchronization Report. This report displays the provisioning and operational information on the synchronization attributes of the DDM-2000. See the "Commands and Reports" section of 363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual — Volume I*) and 363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual — Volume I*) for a description of the **rtrv-sync:** command format.

Use the **rtrv-sync:** command to obtain the Synchronization Report and verify if Sync Autoreconfiguration is enabled or disabled. Use the **set-sync:** command to enable or disable the Sync Autoreconfiguration parameter, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

11.



NOTE:

Two or more shelves in the same network with the same TBOS display number (set using the **set -ne** command) will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address (set by the **set -ne** command) will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID (set by the **set -ne** command) will cause a duplicate TID alarm.

Verify no duplicate TBOS, site/ne, or TID settings exist. The **rtrv-ne:** command may be used at each shelf in the network to display settings. If duplicates exist, determine new settings and use the **set -ne** command to make new settings.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

12.



NOTE:

The **set -ne:** command designates a shelf as the directory service network element (DSNE). **One**, and only one, shelf in the network **must** be provisioned as a DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as a DSNE, a duplicate DSNE alarm will occur. Multiple GNEs are allowed. A shelf is automatically provisioned as a GNE when connected to an active X.25 interface.



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group is recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes. The AGNE parameter of the **set -ne:** command may have been set to **yes** on each new shelf during shelf turnup procedures to suppress an AGNE communication failure alarm.

Use the **set -ne:** command to designate ONE shelf in the network as the DSNE, if not already done.

Use the **set -ne:** command to designate the AGNE(s) and alarm group numbers, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

13.



NOTE:

This single-homed ring configuration requires that the **FUNCTION UNITS () 1 OLIU** on the OC-12 shelf connect to the **MAIN 1 OLIU** at the first OC-3 shelf from the OC-12 shelf. **MAIN 2(P) OLIU** at the OC-3 shelf (node) connects to the **MAIN 1 OLIU** at an adjacent OC-3 shelf (node). The **MAIN 2(P) OLIU** at the last OC-3 shelf on the OC-3 ring connects to **FUNCTION UNITS () 2(P) OLIU** on the host OC-12 shelf. See Figure 1. This procedure will establish the ring configuration starting from the OC-12 host node (near end) to the first OC-3 node, then continuing to the next node until the final connection is made from the last OC-3 node back to the host OC-12 node.

At the near end, remove the optical loop from the **OLIU** (for example in Figure 1, Node 5 OC-12 shelf **FUNCTION UNITS A 1**) associated with the optical span being established. At the other end of the optical span, remove the optical loop from the associated **OLIU** (for example, in Figure 1, Node 7 OC-3 shelf **MAIN 1 OLIU**).

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

14.



NOTE:

The section data communication channel (DCC), used for far end communications, must be enabled at each network element (shelf) optical interface being tested in order for the end-to-end line tests to work. Default condition for the DCC channel is "enabled". If it has been disabled, use the **set - fecom:** command **at each shelf** to enable far end communications.

At each shelf, use the **set - fecom: address:com=enabled** command to ensure far end communications (fecom) is enabled.

-
15. Perform optical fiber connections and verification of the integrity of the optical span being established. **DLP-514**
-

16.



NOTE:

The **rtrv-pm-line** command in the following procedure displays performance monitoring data associated with the OC-3 lines terminated on the system.

Perform end-to-end OC-3 line test.

DLP-515

-
17. Repeat this procedure from Step 13 for all OC-3 optical spans back to the host OC-12 shelf.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

18.



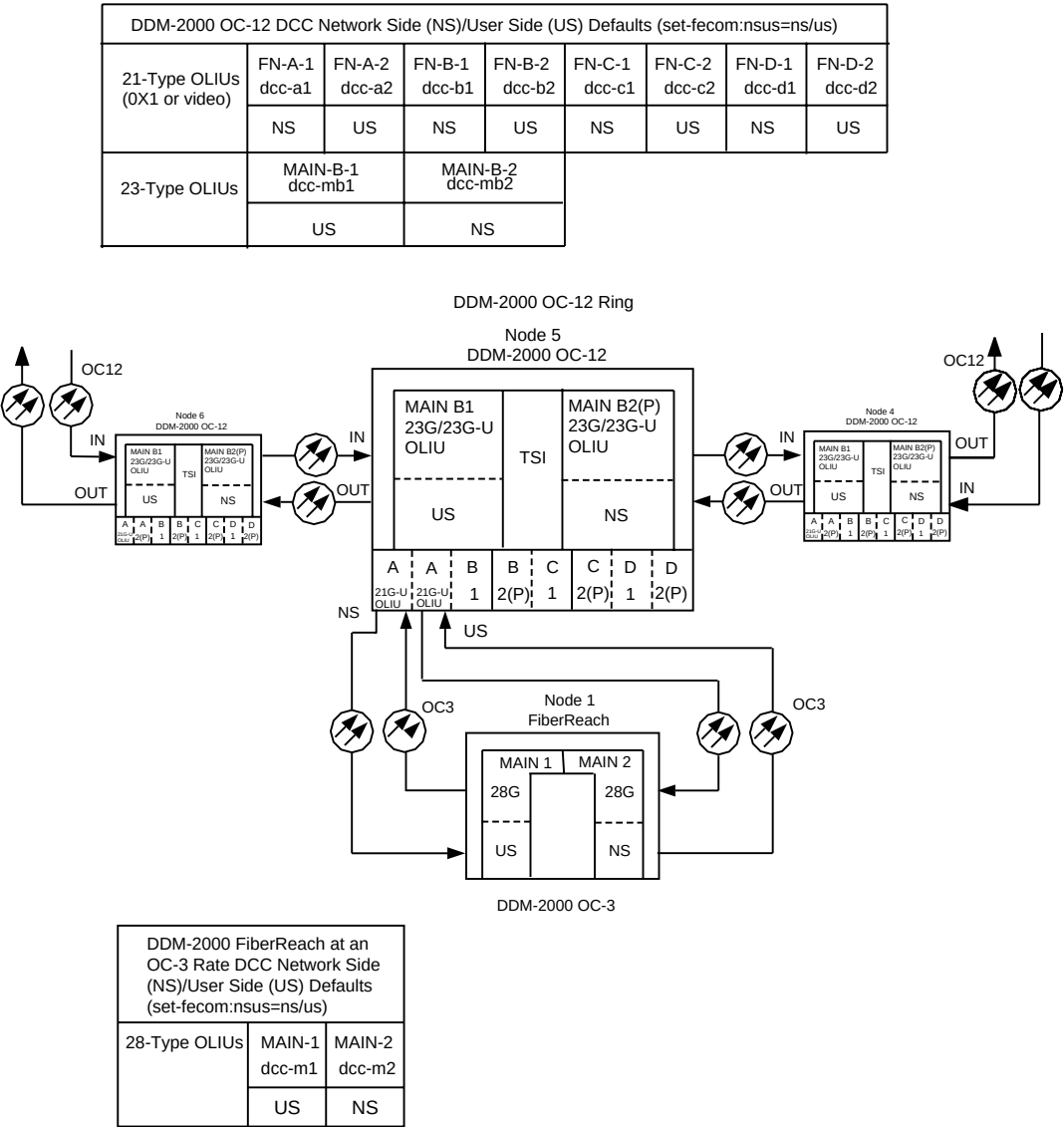
NOTE:

Establishing service requires that the proper slots in each terminating node be properly equipped with the correct circuit pack(s) for the type of service being established. It also requires numerous cross connections in each of the nodes representing the path of the required service. Additionally, transmission tests should be performed to verify the continuity and quality of the established circuit.

The single-homed DDM-2000 OC-3 access network is now ready for initial service to be established. For DS3, EC-1, STS-3c, and video terminations on a DDM-2000 OC-12 shelf, use the procedures in 363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual (TOP) — Volume II* to establish those services. For DS1, DS3, and/or EC-1 terminations on a DDM-2000 OC-3 shelf, use the procedures in this 363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual (TOP) — Volume II* to establish those services.



Figure 1 – Example Single-Home Ring Configuration Connections



tpa 852393/01

Figure 2 – Example of User Side/Network Side Value Settings

Establish Single-Homed OC-3 Access via FT-2000 OC-48 Backbone Ring

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.

 **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

 **CAUTION:**
*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100.***

 **NOTE:**
FiberReach nodes operating at an OC-3 rate require two **28G type OLIUs** in the **MAIN** slots of the FiberReach shelf.

 **NOTE:**
The **28G type OLIUs** require a faceplate interconnect cable assembly, [comcode(8477212710)].

 **NOTE:**
If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001.**

 **NOTE:**
It is assumed that the FT-2000 in the system have passed local tests and the FT-2000 ring has been established. It is also assumed the DDM-2000 OC-3 shelves have been equipped and tested (363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual (TOP)* — Volume II, **System Turnup: NTP-016**).

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

This procedure is used to establish a single-homed DDM-2000 OC-3 ring connection to an FT-2000 ring (See Figure 1). Other configurations may have to be established to obtain your final configuration. See **NTP-048** for dual-homed configurations and **NTP-049** for single OC-3 optical extensions from the FT-2000 low speed interface (**LS INTFC**) ports.

Determine the network configuration (for example, see Figure 1).

-
2. Verify that the host FT-2000 OC-48 shelf is equipped with Release 6 or later ring software. If not equipped with Release 6 or later software, upgrade the FT-2000 OC-48 host shelf with proper software. Verify that the DDM-2000 OC-3 shelves are equipped with Release 7.2, 9.0 or later ring software.
-

DLP-514

3. Determine the optical loss of each optical span from office records or by making the required measurements.
-

- 4.



NOTE:

FAULT LEDs will not go off until fibers are connected to the DDM.

Verify/Add OC-3/IS-3 Low Speed Slots at the host FT-2000 shelves. (365-575-102, *FT-2000 OC-48 Lightwave System, User/Service Manual*, **Add OC-3/IS-3 Low Speed Slot(s), NTP-010**).

-
5. At the FT-2000, verify/provision the FT-2000 low speed OC-3 slots Protection Mode (from OC-3) Parameter to "0X1" (See **CONFIGURATION - Set - OC3** command in 365-575-102, *FT-2000 OC-48 Lightwave System, User/Service Manual*, **Provision Low Speed Slot and Port Parameters, DLP-517**.)
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

6. At the FT-2000, verify/assign DCC channels to FT-2000 low speed OC-3 slots. (See **CONFIGURATION-Enter-Assignment-DCC** command in 365-575-102, *FT-2000 OC-48 Lightwave System, User/Service Manual, Provision Low Speed Slot and Port Parameters, DLP-517.*)
-

7.



NOTE:

This procedure will establish the OC-3 ring configuration starting from the FT-2000 host node (far end) to the first OC-3 node (near end), then continuing to the next OC-3 node until the final connection is made from the last OC-3 node back to the host FT-2000 node.



NOTE:

The Network Side (NS)/User Side (US) parameters of the OC-3 **set - fecom:** command and the FT-2000 DCC orientation must be set opposite at each end of the optical spans. For example, see Figure 2.

Use the **rtrv - fecom/set - fecom** command at the DDM-2000 or the **CONFIGURATION-Enter-Assignment-DCC** command at the FT-2000 to verify/set "Network Side/User Side" parameters at each end of all optical spans being established.

8.



NOTE:

The **set sync:** command provisions the synchronization mode switching, synchronization source, and output mode of timing signals when the **28G type OLIUs** hardware is provisioned to be line-timed. See the "**Commands and Reports**" section of this manual for a description of the **set sync:** command format.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

9.

⇒ **NOTE:**
If Kbyte (Release 9.0 and earlier) or Sbyte (Releases 8.1, 9.1, and later) (sync messaging) is enabled for the OC-3 **main-1** and **main-2** optical interfaces at any node in the OC-3 ring, it **must** be enabled at all nodes in the OC-3 ring.

⇒ **NOTE:**
The **rtrv-oc3:** command retrieves the OC-3 Line Provisioning Report. This report displays the provisioned configuration of OC-3 lines. See the "Commands and Reports" section of this manual and the OC-3 manual for a description of the **rtrv-oc3:** command format.

Use the **rtrv-oc3:** command to obtain the OC-3 Line Provisioning Report. Use the **set-oc3:** command to enable the Kbyte/Sbyte parameter, if required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

10.

⇒ **NOTE:**
If Sync Autoreconfiguration is enabled, Kbyte/Sbyte must also be enabled.

⇒ **NOTE:**
If Sync Autoreconfiguration is enabled at any line-timed OC-3 node in a ring, it **must** be enabled at all line-timed OC-3 nodes of a ring.

⇒ **NOTE:**
The **rtrv-sync:** command retrieves the Synchronization Report. This report displays the provisioning and operational information on the synchronization attributes of the DDM-2000. See the "Commands and Reports" section of this manual and the OC-3 manual for a description of the **rtrv-sync:** command format.

Use the **rtrv-sync:** command to obtain the Synchronization Report and verify if Sync Autoreconfiguration is enabled or disabled. Use the **set-sync:** command to enable or disable the Sync Autoreconfiguration parameter, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

11.



NOTE:

Two or more shelves in the same network with the same TBOS display number (set using the **set -ne** command) will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address (set by the **set -ne** command) will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID (set by the **set -ne** command) will cause a duplicate TID alarm.

Verify no duplicate TBOS, site/ne, or TID settings exist. The **rtrv-ne:** command may be used at each shelf in the network to display settings. If duplicates exist, determine new settings and use the **set -ne** command to make new settings.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

12.



NOTE:

The DDM-2000 **set -ne:** command designates a DDM-2000 shelf as the directory service network element (DSNE). **One**, and only one, shelf in the DDM-2000/FT-2000 network **must** be provisioned as a DSNE. It is recommended that a DDM-2000 shelf be provisioned as the DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as a DSNE, a duplicate DSNE alarm will occur. Multiple GNEs are allowed. A shelf is automatically provisioned as a GNE when connected to an active X.25 interface.



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group is recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes. The AGNE parameter of the **set -ne:** command may have been set to **yes** on each new shelf during shelf turnup procedures to suppress an AGNE communication failure alarm.



NOTE:

It is recommended that the DSNE be changed from an FT-2000 node to a DDM-2000 node, discontinue the FT-2000 DSNE and use the **reset** command to reset the DDM-2000 DSNE node.

Use the **set -ne:** command to designate ONE shelf in the DDM-2000 network as the DSNE, if the DSNE is going to be a DDM-2000 shelf.

Use the **set -ne:** command to designate the AGNE(s) and alarm group numbers, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

13.



NOTE:

If auto reconfiguration is enabled, the DDM-2000 shelf that will connect to the FT-2000 via the **MAIN 1** should be the first of the DDM-2000 ring to connect to the FT-2000. If the DDM-2000 shelf connecting to FT-2000 via **MAIN 2(P)** is connected first, the DDM-2000 shelf will remain in holdover as will all other subsequent DDM-2000 shelves in the ring until the shelf connecting to the FT-2000 via **MAIN 1** is connected.

At the near end, remove the optical loop from the **MAIN OLIU** (for example in Figure 2, OC-3 node 2 **MAIN 1**) associated with the optical span being established. At the other end of the optical span, remove the optical loop from the associated FT-2000 **OLIU** (for example, in Figure 2, FT-2000 **LS INTFC 1A** slot).

14.



NOTE:

The section data communication channel (DCC), used for far end communications, must be enabled at each network element (shelf) optical interface being tested in order for the end-to-end line tests to work. Default condition for the DCC channel is "enabled". If it has been disabled, use the **set - fecom:** command **at each shelf** to enable far end communications.

At each DDM-2000 shelf, use the **set - fecom: address: com=enabled** command to ensure far end DCC communications (fecom) is enabled.

At each FT-2000 shelf, use the **SECURITY-Set -Far End Communications:** command to ensure far end DCC communications (fecom) is enabled.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

15. Perform optical fiber connections and verification of the integrity of the optical span being established. **DLP-514**
-

16.

⇒ **NOTE:**
The **rtrv-pm-line** command in the following procedure displays performance monitoring data associated with the OC-3 lines terminated on the system.

Perform end-to-end OC-3 line test.

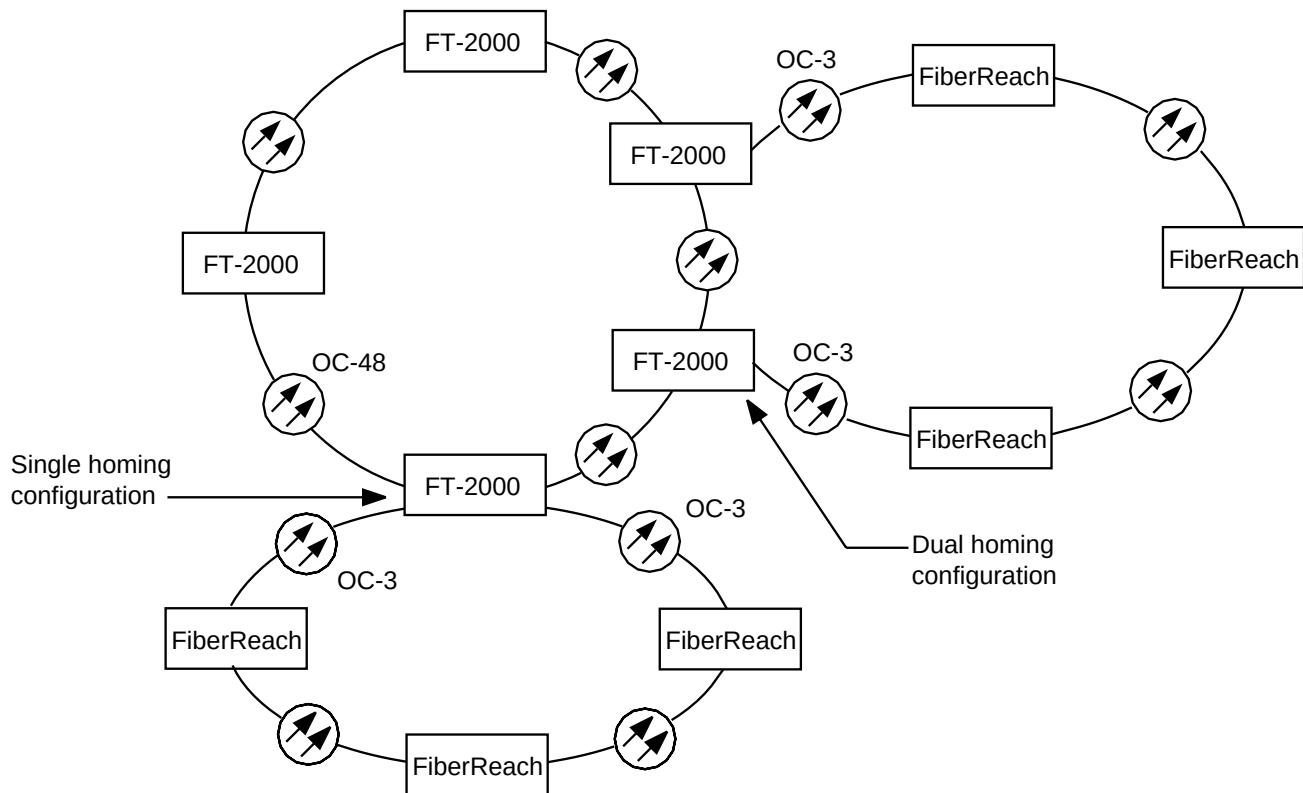
DLP-515

-
17. Repeat this procedure from Item 15 for all OC-3 optical spans until the OC-3 ring is complete back to the host FT- 2000 shelf.
-

18.

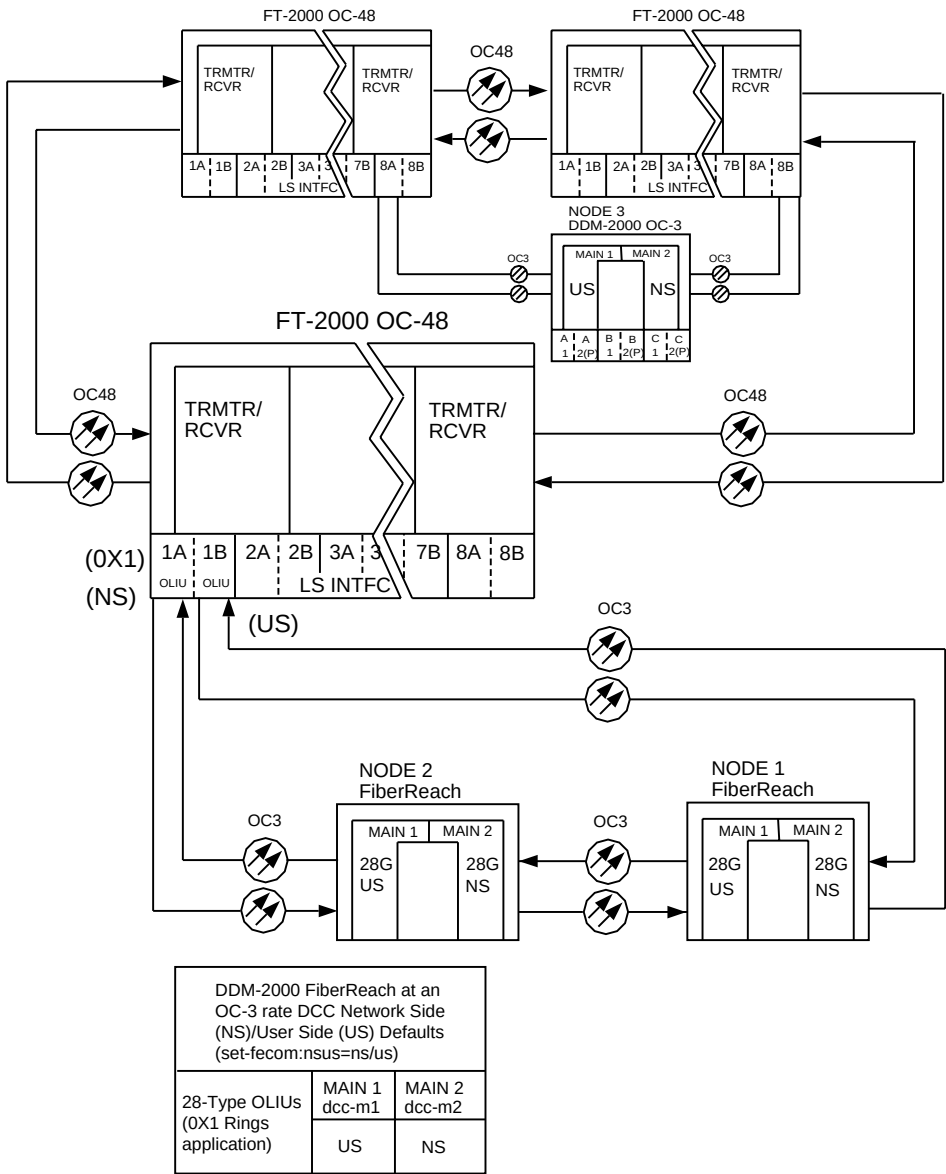
⇒ **NOTE:**
Establishing service requires that the proper slots in each terminating node be properly equipped with the correct circuit pack(s) for the type of service being established. It also requires numerous cross connections in each of the nodes representing the path of the required service. Additionally, transmission tests should be performed to verify the continuity and quality of the established circuit.

The single-homed DDM-2000 OC-3 access network is now ready for initial service to be established. For service terminations on a FT-2000 shelf, use the procedures in the FT-2000 User/Service Manual to establish those services. For DS1, DS3, and/or EC-1 terminations on a DDM-2000 OC-3 shelf, use the procedures in this User/Service manual to establish those services.



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Figure 1 – Example of FT-2000 OC-48/DDM-2000 FiberReach at OC-3 Rate Configurations



tpa 852395/01

Figure 2 – Example of Single-Homed User Side/Network Side Value Settings

Establish Dual-Homed OC-3 Access Via FT-2000 OC-48 Backbone Ring

1.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CAUTION:

*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100**.*



NOTE:

FiberReach nodes operating at an OC-3 rate require two **28G type OLIUs** in the **MAIN** slots of the FiberReach shelf.



NOTE:

The **28G type OLIUs** require a faceplate interconnect cable assembly, [comcode(8477212710)].



NOTE:

If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001**.



NOTE:

It is assumed that the FT-2000 in the system have passed local tests and the FT-2000 ring has been established. It is also assumed the DDM-2000 OC-3 shelves have been equipped and tested (363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual (TOP)* — Volume II, **System Turnup: NTP-016**).

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

This procedure is used to establish a dual-homed DDM-2000 OC-3 ring connection to an FT-2000 ring (See Figure 1). Other configurations may have to be established to obtain your final configuration. See **NTP-047** for single-homed configurations and **NTP-049** for single OC-3 optical extensions from the FT-2000 low speed interface (**LS INTFC**) ports.

Determine the network configuration (for example, see Figure 1.)

2. Verify that the host FT-2000 OC-48 shelves are equipped with Release 6 or later ring software. If not equipped with Release 6 or later software, upgrade the FT-2000 OC-48 host shelves with proper software. Verify that the DDM-2000 OC-3 shelves are equipped with Release 7.2, 9.0 or later ring software.
-
3. Determine the optical loss of each optical span from office records or by making the required measurements. **DLP-514**
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

4.



NOTE:

FAULT LEDs will not go off until fibers are connected to the DDM.

Verify/Add OC-3/IS-3 Low Speed Slots at the host FT-2000 shelves. (See 365-575-102, *FT-2000 OC-48 Lightwave System, User/Service Manual*, **Add OC-3/IS-3 Low Speed Slot(s), NTP-010**).

-
5. At the FT-2000, verify/provision the FT-2000 low-speed OC-3 slots Protection Mode (from OC-3) Parameter to "0X1". (See **CONFIGURATION-Set-OC3** command in 365-575-102, *FT-2000 OC-48 Lightwave System, User/Service Manual*, **Provision Low Speed Slot and Port Parameters, DLP-517**.)

-
6. At the FT-2000, verify/assign DCC channels to FT-2000 low-speed OC-3 slots. (See **CONFIGURATION-Enter-Assignment-DCC** command in 365-575-102, *FT-2000 OC-48 Lightwave System, User/Service Manual*, **Provision Low Speed Slot and Port Parameters, DLP-517**.)
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

7.



NOTE:

This procedure will establish the OC-3 ring configuration starting from one FT-2000 host node (far end) to the first OC-3 node (near end), then continuing to the next OC-3 node until the final connection is made from the last OC-3 node to the other host FT-2000 node.



NOTE:

The Network Side (NS)/User Side (US) parameters of the DDM-2000 OC-3 **set - fecom:** command and the FT-2000 DCC orientation must be set opposite at each end of the optical spans. For example, see Figure 2.

Use the **rtrv - fecom** command at the DDM-2000 to retrieve DCC parameters. Use **set - fecom: nsus=NS/US** command at the DDM-2000 to set "Network Side (NS)/User Side (US)" parameters at each end of all optical spans being established. Use the **CONFIGURATION - Enter - Assignment - DCC** command at the FT-2000 to assign DCC channels.

8.



NOTE:

The **set sync:** command provisions the synchronization mode switching, synchronization source, and output mode of timing signals when the **28G type OLIUs** hardware is provisioned to be line-timed. See the "**Commands and Reports**" section of this manual for a description of the **set sync:** command format.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

9.



NOTE:

If Kbyte (Release 9.0 and earlier) or Sbyte (Releases 8.1, 9.1, and later) (sync messaging) is enabled for the OC-3 **main-1** and **main-2** optical interfaces at any node in the OC-3 ring, it **must** be enabled at all nodes in the OC-3 ring.



NOTE:

The **rtrv-oc3:** command retrieves the OC-3 Line Provisioning Report. This report displays the provisioned configuration of OC-3 lines. See the "Commands and Reports" section of this manual and the OC-3 manual for a description of the **rtrv-oc3:** command format.

Use the **rtrv-oc3:** command to obtain the OC-3 Line Provisioning Report. Use the **set-oc3:** command to enable the Kbyte/Sbyte parameter, if required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

10.

⇒ **NOTE:**
If Sync Autoreconfiguration is enabled, Kbyte/Sbyte must also be enabled.

⇒ **NOTE:**
If Sync Autoreconfiguration is enabled at any line-timed OC-3 node in a ring, it **must** be enabled at all line-timed OC-3 nodes of a ring.

⇒ **NOTE:**
The **rtrv-sync:** command retrieves the Synchronization Report. This report displays the provisioning and operational information on the synchronization attributes of the DDM-2000. See the "Commands and Reports" section of this manual and the OC-3 manual for a description of the **rtrv-sync:** command format.

Use the **rtrv-sync:** command to obtain the Synchronization Report and verify if Sync Autoreconfiguration is enabled or disabled. Use the **set-sync:** command to enable or disable the Sync Autoreconfiguration parameter, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

11.



NOTE:

Two or more shelves in the same network with the same TBOS display number (set using the **set -ne** command) will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address (set by the **set -ne** command) will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID (set by the **set-ne** command) will cause a duplicate TID alarm.

Verify no duplicate TBOS, site/ne, or TID settings exist. The **rtrv-ne:** command may be used at each shelf in the network to display settings. If duplicates exist, determine new settings and use the **set -ne** command to make new settings.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

12.



NOTE:

The DDM-2000 **set -ne:** command designates a DDM-2000 shelf as the directory service network element (DSNE). **One**, and only one, shelf in the DDM-2000/FT-2000 network **must** be provisioned as a DSNE. It is recommended that a DDM-2000 shelf be provisioned as the DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as a DSNE, a duplicate DSNE alarm will occur. Multiple GNEs are allowed. A shelf is automatically provisioned as a GNE when connected to an active X.25 interface.



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group is recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes. The AGNE parameter of the **set -ne:** command may have been set to **yes** on each new shelf during shelf turnup procedures to suppress an AGNE communication failure alarm.



NOTE:

It is recommended that the DSNE be changed from an FT-2000 node to a DDM-2000 node, discontinue the FT-2000 DSNE and use the reset command to reset the DDM-2000 DSNE node.

Use the **set -ne:** command to designate ONE shelf in the DDM-2000 network as the DSNE, if the DSNE is going to be a DDM-2000 shelf.

Use the **set -ne:** command to designate the AGNE(s) and alarm group numbers, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

13.



NOTE:

If auto reconfiguration is enabled, the DDM-2000 shelf that will connect to the FT-2000 via the **MAIN 1** should be the first of the DDM-2000 ring to connect to the FT-2000. If the DDM-2000 shelf connecting to FT-2000 via **MAIN 2(P)** is connected first, the DDM-2000 shelf will remain in holdover as will all othe subsequent DDM-2000 shelves in the ring until the shelf connecting to the FT-2000 via **MAIN 1** is connected.

At the near end, remove the optical loop from the **MAIN OLIU** (for example in Figure 1, OC-3 node 1 **MAIN 1**) associated with the optical span being established. At the other end of the optical span, remove the optical loop from the associated FT-2000 **OLIU** (for example, in Figure 2, FT-2000 **LS INTFC 1A** slot).

14.



NOTE:

The section data communication channel (DCC), used for far end communications, must be enabled at each network element (shelf) optical interface being tested in order for the end-to-end line tests to work. Default condition for the DCC channel is "enabled". If it has been disabled, use the **set - fecom:** command at each shelf to enable far end communications.

At each DDM-2000 shelf, use the **set - fecom: address: com=enabled** command to ensure far end DCC communications (fecom) is enabled.

At each FT-2000 shelf, use the **SECURITY-Set-Far End Communications:** command to ensure far end DCC communications (fecom) is enabled.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

-
15. Perform optical fiber connections and verification of the integrity of the optical span being established. **DLP-514**
-

16. The **rtrv-pm-line** command in the following procedure displays performance monitoring data associated with the OC-3 lines terminated on the system.

Perform end-to-end OC-3 line test. **DLP-515**

17. Repeat this procedure from Item 15 for all OC-3 optical spans until the OC-3 ring is complete to the other host FT-2000 shelf.
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

18.



NOTE:

Establishing service requires that the proper slots in each terminating node be properly equipped with the correct circuit pack(s) for the type of service being established. It also requires numerous cross connections in each of the nodes representing the path of the required service. Additionally, transmission tests should be performed to verify the continuity and quality of the established circuit.

The dual-homed DDM-2000 OC-3 access network is now ready for initial service to be established. For service terminations on a FT-2000 shelf, use the procedures in 365-575-102, *FT-2000 OC-48 Lightwave System, User/Service Manual* to establish those services. For DS1, DS3, and/or EC-1 terminations on a *DDM-2000 OC-3 shelf, use the procedures in 363-206-280, DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual (TOP) — Volume II* to establish those services.

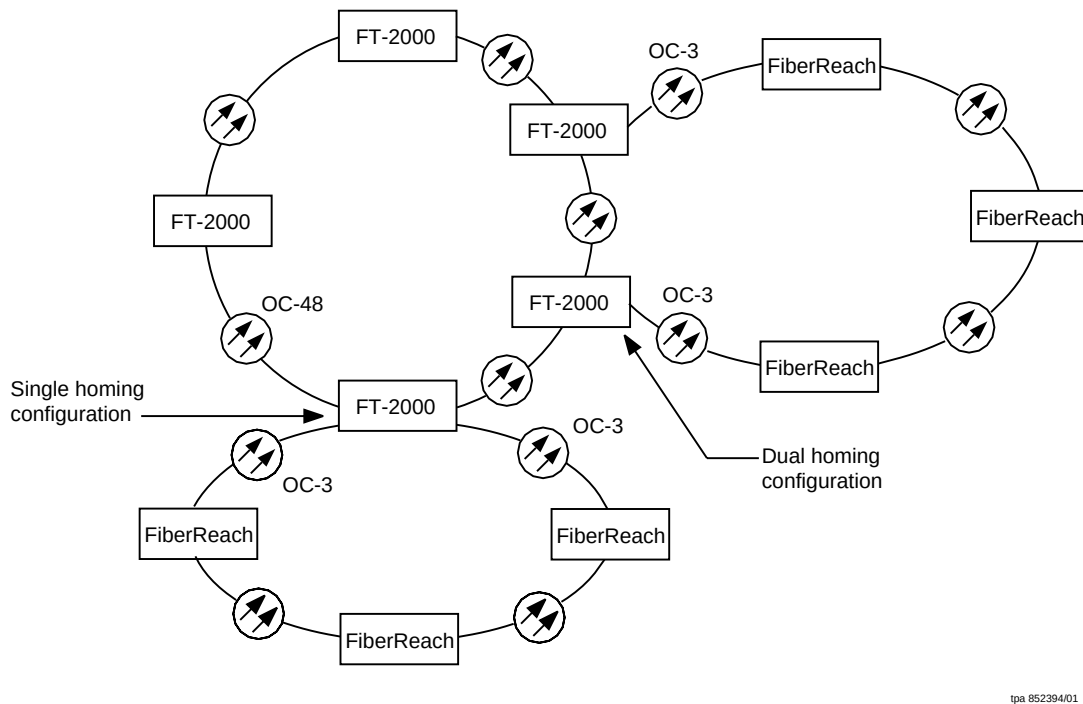
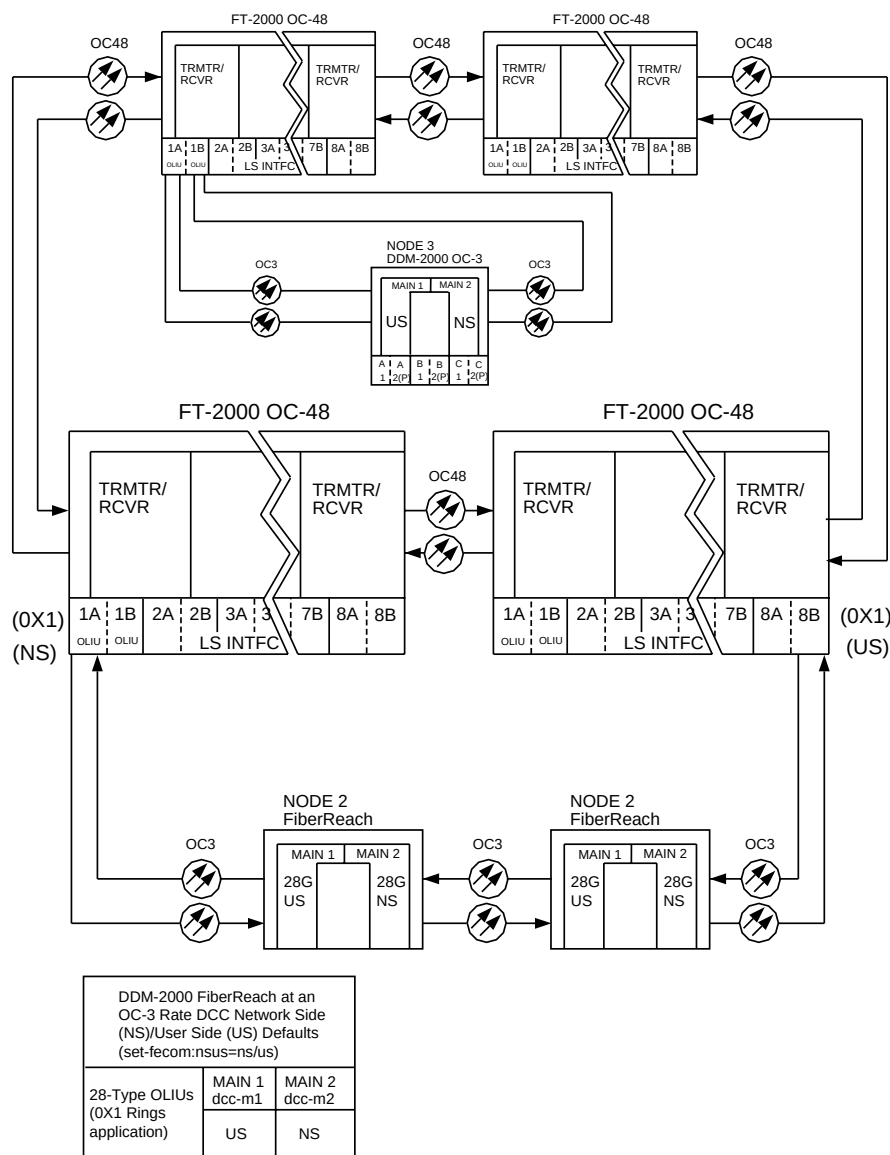


Figure 1 – Example of FT-2000 OC-48/DDM-2000 FiberReach at OC-3 Rate Configurations



tpa 852396/01

Figure 2 – Example of Dual-Homed User Side/Network Side Value Settings

Establish Dual-Homed OC-3 Access Via DDM-2000 OC-12 Backbone Ring

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.

 **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

 **CAUTION:**
DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in
Trouble Clearing: TAD-100.

 **NOTE:**
FiberReach nodes operating at an OC-3 rate require two **28G type OLIUs** in the **MAIN** slots of the FiberReach shelf.

 **NOTE:**
The **28G type OLIUs** require a faceplate interconnect cable assembly, [comcode(8477212710)].

 **NOTE:**
If the DDM-2000 fails to respond in the indicated manner, refer to **Trouble Clearing: IXL-001.**

 **NOTE:**
It is assumed that all DDM-2000 OC-12 shelves in the system have passed the looped transmission test(s) (363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual (TOP) — Volume II, System Turnup: NTP- 002*) and the host DDM-2000 OC-12 ring has been established (363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual (TOP) — Volume II, System Turnup: NTP-020*) with software to support DDM-2000 OC-3 optical line access. It

DDM-2000 FIBERREACH WIDEBAND SHELF

is also assumed the DDM-2000 OC-3 shelves have been equipped and tested, **System Turnup: NTP- 016**.

Determine the network configuration (for example, see Figures 1 and 2.)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

2.	Verify the host DDM-2000 OC-12 shelves (for example, Figures 1 and 2, Nodes 4 and 5) are equipped with Release 5 or later ring software. If not equipped with Release 5 or later software, upgrade the DDM-2000 OC-12 host shelves with proper software. Verify that the DDM-2000 OC-3 shelf is equipped with Release 9 or later software.	DLP-531

3.	Determine the optical loss of each optical span from office records or by making the required measurements.	DLP-514

4.

⇒ **NOTE:**
The **rtrv-eqpt**: command retrieves the Equipage and Version Report. This report lists the circuit pack type and version information for one or more slots. See the "Commands and Reports" section of this manual for a description of the **rtrv-eqpt**: command format.

⇒ **NOTE:**
If work order or office records do not specify **OLI** types, refer to 363-206-200, *DDM-2000 OC-3 and OC-12 Multiplexers, Applications, Planning, and Ordering Guide* and/or 363-206- 280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual — Volume I*, for a description of **OLI** circuit packs and applications. Optical line power measurements and/or office records must be used to verify that the span length can be supported.

At the host OC-12 nodes, verify/install **OLI** circuit packs in **FUNCTION UNITS (A, B, C, or D)** slots being used for OC-3 access.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5.



NOTE:

If fecom is enabled, an inconsistent DCC values alarm will occur when the **OLIUs** are looped back. Normally, the alarm occurs when the user/network parameters on the **OHCTLs** at both ends of the DCC are set the same. To clear the alarm during a fiber loopback, use the **set - fecom: address: com=disable** command to disable the DCC.

At OC-12 shelves, connect optical loops for **FUNCTION UNITS OLIUs** just installed.

6.



NOTE:

The Network Side (NS)/User Side (US) parameters of the **set - fecom:** command must be set opposite at each end of the optical spans. For example, see Figures 3 and 4.

Use the **rtrv - fecom/set - fecom** command to verify/set "Network Side/User Side" parameters at each end of OC-3 optical span being established.

-
7. Use the **rtrv - oc3/set - oc3** command at the OC-12 shelf to verify/set application (*app*) parameter for the OC-12 function slots being used for this single homed configuration. For example, **set - oc3: fn-a, app=0X1**.

8.



NOTE:

The **set sync:** command provisions the synchronization mode switching, synchronization source, and output mode of timing signals when the **28G type OLIUs** hardware is provisioned to be line-timed. See the "**Commands and Reports**" section of this manual for a description of the **set sync:** command format.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

9.

- ⇒ **NOTE:**
If line timing mode is specified or external timing mode is specified but the timing reference was not available at the OC-3 shelf turnup, the **TGS** option switches are probably set for *free running*. Before this configuration is established, the specified timing mode must be set on the **TGS** circuit packs.
- ⇒ **NOTE:**
If the option switch setting is changed, an update must be done by momentarily depressing the **UPD/INIT** button on the **SYSCTL** after the **TGS** circuit packs are reinstalled.
- ⇒ **NOTE:**
If external timing is selected and the **NE ACTY** LED remains lighted after the **TGS** circuit pack is reinserted, use the CIT and the **rtrv-sync** command to check the operational mode of the system. If the mode is **Holdover** instead of **External**, check that the incoming timing references are connected. Also check Mode Switching (revertive or nonrevertive) and the external DS1 Line Code/Format switch settings.

Set timing mode on TGS circuit packs to the timing mode specified in work order or office records. (OC-12 Reference: 363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual (TOP)* — Volume II, **DLP- 510**)

DLP-513

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

10.



NOTE:

If Kbyte (Release 9.0 and earlier) or Sbyte (Releases 8.1, 9.1, and later) (sync messaging) is enabled for the OC-3 **MAIN 1** and **MAIN 2(P)** optical interfaces at any node in the OC-3 ring, it **must** be enabled at all nodes in the OC-3 ring and in the **FUNCTION UNITS** slots of the host OC-12 shelf.



NOTE:

The **rtrv-oc3:** command retrieves the OC-3 Line Provisioning Report. This report displays the provisioned configuration of OC-3 lines. See the "Commands and Reports" section of 363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual — Volume I* and 363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual — Volume I* for a description of the **rtrv-oc3:** command format.

Use the **rtrv-oc3:** command to obtain the OC-3 Line Provisioning Report and verify if Kbyte/Sbyte is enabled or disabled. Use the **set-oc3:** command to enable or disable the Kbyte/Sbyte parameter, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

11.

⇒ **NOTE:**
If Sync Autoreconfiguration is enabled, Kbyte/Sbyte must also be enabled.

⇒ **NOTE:**
If Sync Autoreconfiguration is enabled at any line-timed OC-3 node in a ring, it **must** be enabled at all line-timed OC-3 nodes of a ring.

⇒ **NOTE:**
The **rtrv-sync:** command retrieves the Synchronization Report. This report displays the provisioning and operational information on the synchronization attributes of the DDM-2000. See the "Commands and Reports" section of 363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual — Volume I* and 363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual — Volume I* for a description of the **rtrv-sync:** command format.

Use the **rtrv-sync:** command to obtain the Synchronization Report and verify if Sync Autoreconfiguration is enabled or disabled. Use the **set-sync:** command to enable or disable the Sync Autoreconfiguration parameter, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

12.



NOTE:

Two or more shelves in the same network with the same TBOS display number (set by the **set -ne** command) will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address (set by the **set -ne** command) will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID (set by the **set -ne** command) will cause a duplicate TID alarm. Two or more shelves in the same network designated as a DSNE (set by the **set -ne** command) will cause a duplicate DSNE alarm.

Verify no duplicate TBOS, site/ne, TID or DSNE settings exist. The **rtrv-ne:** command may be used at each shelf in the network to display settings. If duplicates exist, determine new settings and use the **set -ne** command to make new settings.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

13.



NOTE:

The **set -ne:** command designates a shelf as the directory service network element (DSNE). **One**, and only one, shelf in the network **must** be provisioned as a DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as a DSNE, a duplicate DSNE alarm will occur. Multiple GNEs are allowed. A shelf is automatically provisioned as a GNE when connected to an active X.25 interface.



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group is recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes. The AGNE parameter of the **set -ne:** command may have been set to **yes** on each new shelf during shelf turnup procedures to suppress an AGNE communication failure alarm.

Use the **set -ne:** command to designate ONE shelf as the DSNE.

Use the **set -ne:** command to designate the AGNE(s) and alarm group numbers, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

14.



NOTE:

In dual homing configurations, **OLIUs** circuit packs must be installed in the correct **FUNCTION UNITS** slots in the host OC-12 nodes to support the direction of traffic required. For example, see Figures 1 and 2. In Figure 1, if an **OLIU** is installed in Node 5, **FUNCTION UNITS** group **A**, slot **1**, traffic will be routed toward Node 6 when cross connections are made. The other end of the associated OC-3 ring must be connected to an **OLIU** installed in slot **2(P)** of the **FUNCTION UNITS** group () being used to terminate the OC-3 line (for example, Node 4 in Figure 1). Traffic from Node 4 will then be directed toward Node 3 when cross-connections are made. In Figure 2, note that all traffic from the OC-3 shelf will be directed to Node 8 because of the slot positions that terminate the OC-3 line.



NOTE:

A dual-homed ring configuration requires that the first OC-3 **MAIN 1 OLIU** connect to **FUNCTION UNITS () 1 OLIU** on one host OC-12 shelf. The last OC-3 **MAIN 2(P) OLIU** connects to the **FUNCTION UNITS () 2(P) OLIU** on the other host OC-12 shelf. Intermediate OC-3 shelves on the same OC-3 ring connect from **MAIN 2(P) OLIU** at one OC-3 shelf to the **MAIN 1 OLIU** at an adjacent OC-3 shelf (node). For example, see Figure 3. This procedure will establish the ring configuration starting from one OC-12 host node (near end) and continuing to an adjacent OC-3 node, then to the next OC-3 node until the final connection is made from the last OC-3 node to the remaining OC-12 host node.



NOTE:

Unused optical connectors on **OLIUs** should remain looped until optical line connections are made.

At the near end OC-12 host node, remove the optical loop from the **FUNCTION UNITS OC-3 OLIU** being used for the OC-3 ring configuration (for example, in Figure 3, OC-12 shelf Node 5, slot **FUNCTION UNITS A 1**) At the other end of the optical span being established, remove the optical loop from the associated **OLIU** (for example, in Figure 3, OC-3 shelf Node 7 **MAIN 1 OLIU**).

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

15.



NOTE:

The section data communication channel (DCC), used for far end communications, must be enabled at each network element (shelf) optical interface being tested in order for the end-to-end line tests to work. Default condition for the DCC channel is "enabled". If it has been disabled, use the **set - fecom:** command **at each shelf** to enable far end communications.

At each shelf, use the **set - fecom: address: com=enabled** command to ensure far end communications (fecom) is enabled.

-
16. Perform optical fiber connections and verification of the integrity of the optical span being established.	DLP-514
-

17.



NOTE:

The rtrv-pm-line command in the following procedure displays performance monitoring data associated with the OC-3 lines terminated on the system.

Perform end-to-end OC-3 line test.

DLP-515

-
- | |
|---|
| 18. Repeat this procedure from Item 13 for all OC-3 optical spans being established in the DDM-2000 OC-12/OC-3 network. Ensure that the last optical span connected to the OC-12 host shelf is connected to an OLI in the opposite slot as the one in the first host OC-12 (for example in Figure 3, slot 1 at one host node and slot 2(P) at the other host node). |
|---|
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

19.



NOTE:

Establishing service requires that the proper slots in each terminating node be properly equipped with the correct circuit pack(s) for the type of service being established. It also requires numerous cross connections in each of the nodes representing the path of the required service. Additionally, transmission tests should be performed to verify the continuity and quality of the established circuit.

The dual-homed DDM-2000 OC-3 access network is now ready for initial service to be established. For DS3, EC-1, STS-3c, and video terminations on a DDM-2000 OC-12 shelf, use the procedures in 363-206-290, *DDM-2000 OC-12 Multiplexer, Release 5 and Higher, User/Service Manual (TOP) — Volume II* to establish those services. For DS1, DS3, and/or EC-1 terminations on a DDM-2000 OC-3 shelf, use the procedures in 363-206-280, *DDM-2000 OC-3 Multiplexer, Release 8 and Higher, User/Service Manual (TOP) — Volume II* to establish those services.

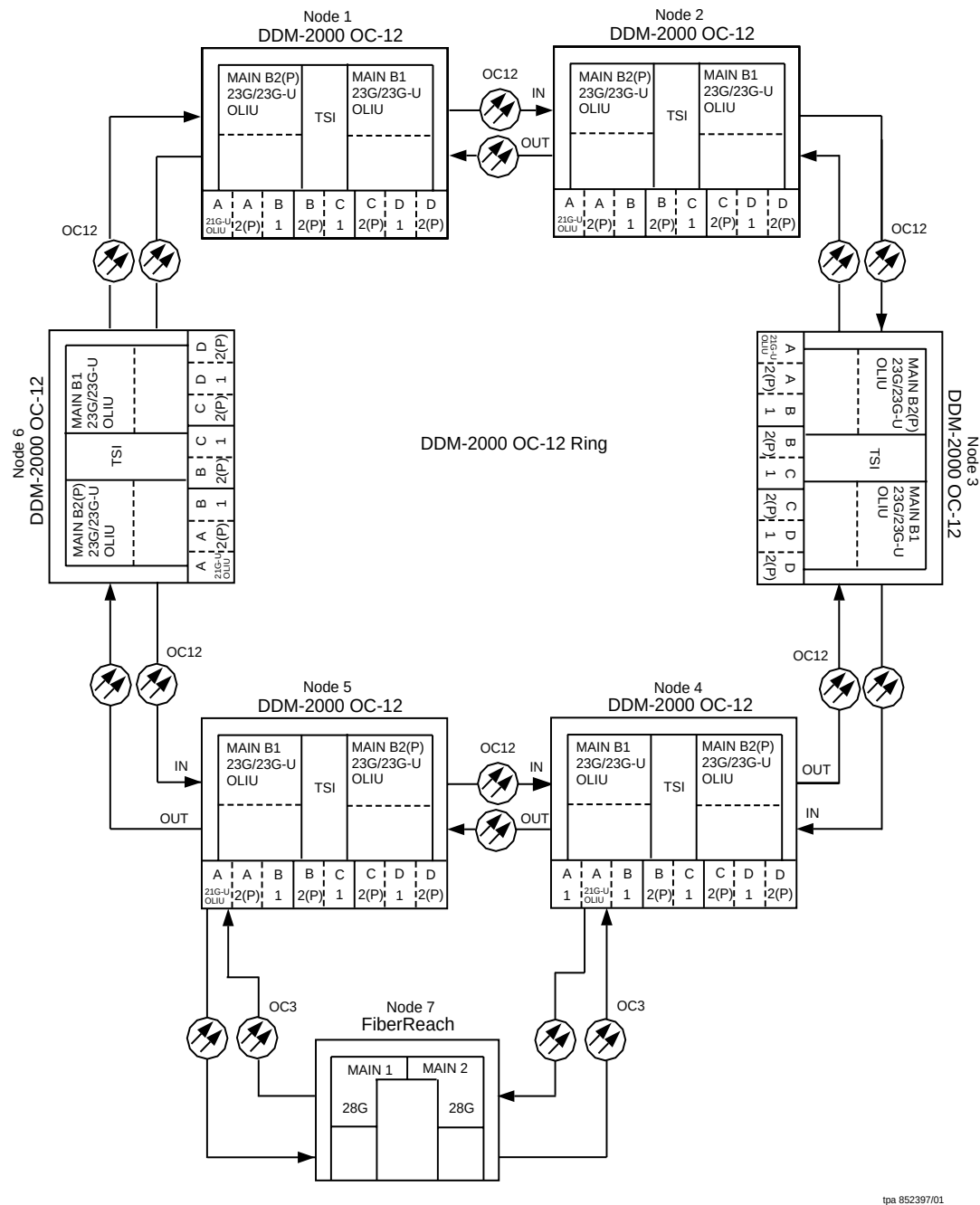


Figure 1 – Example of Dual-Homed FiberReach at OC-3 Rate/OC-12 Ring Configuration — Part 1

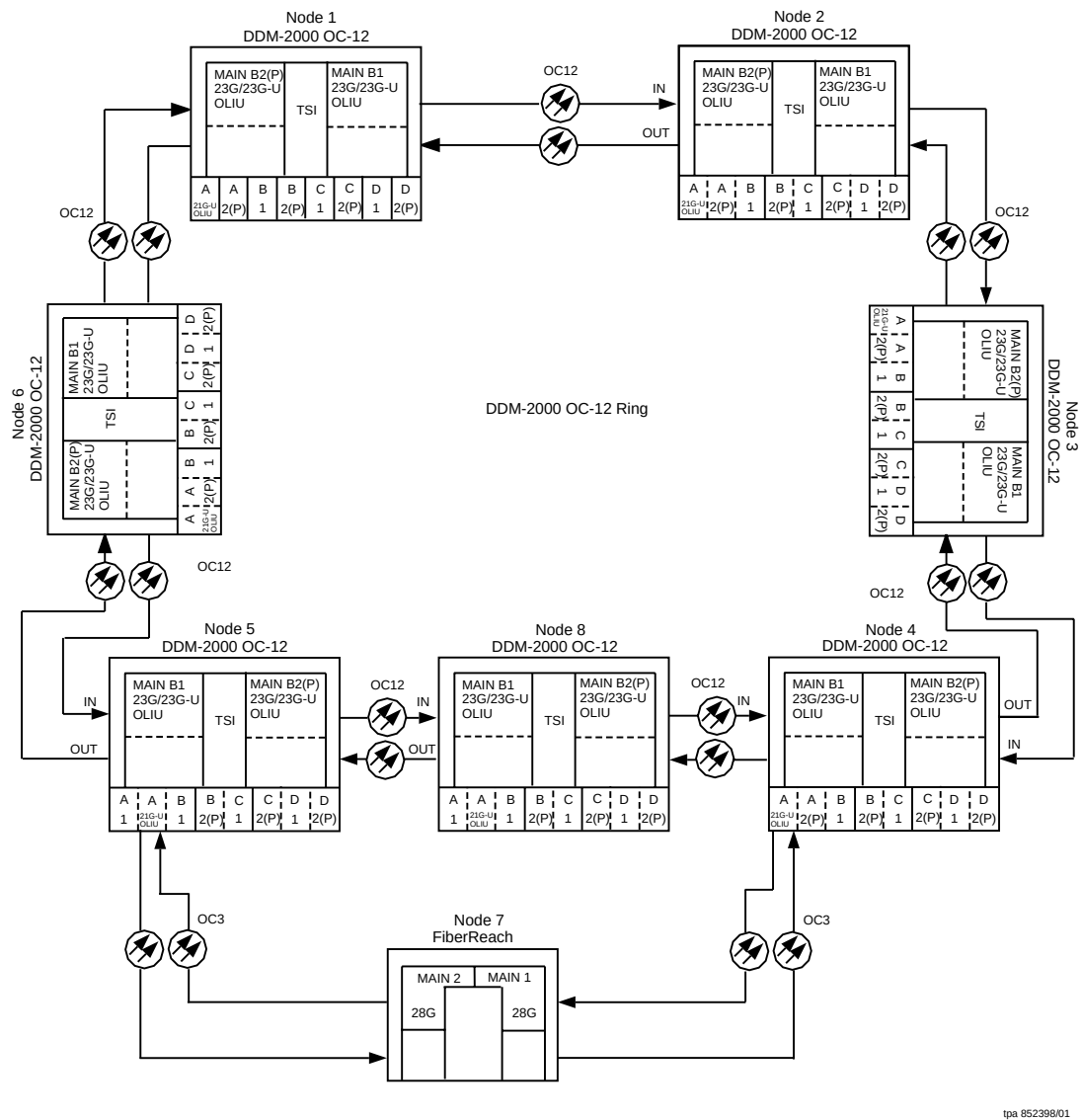
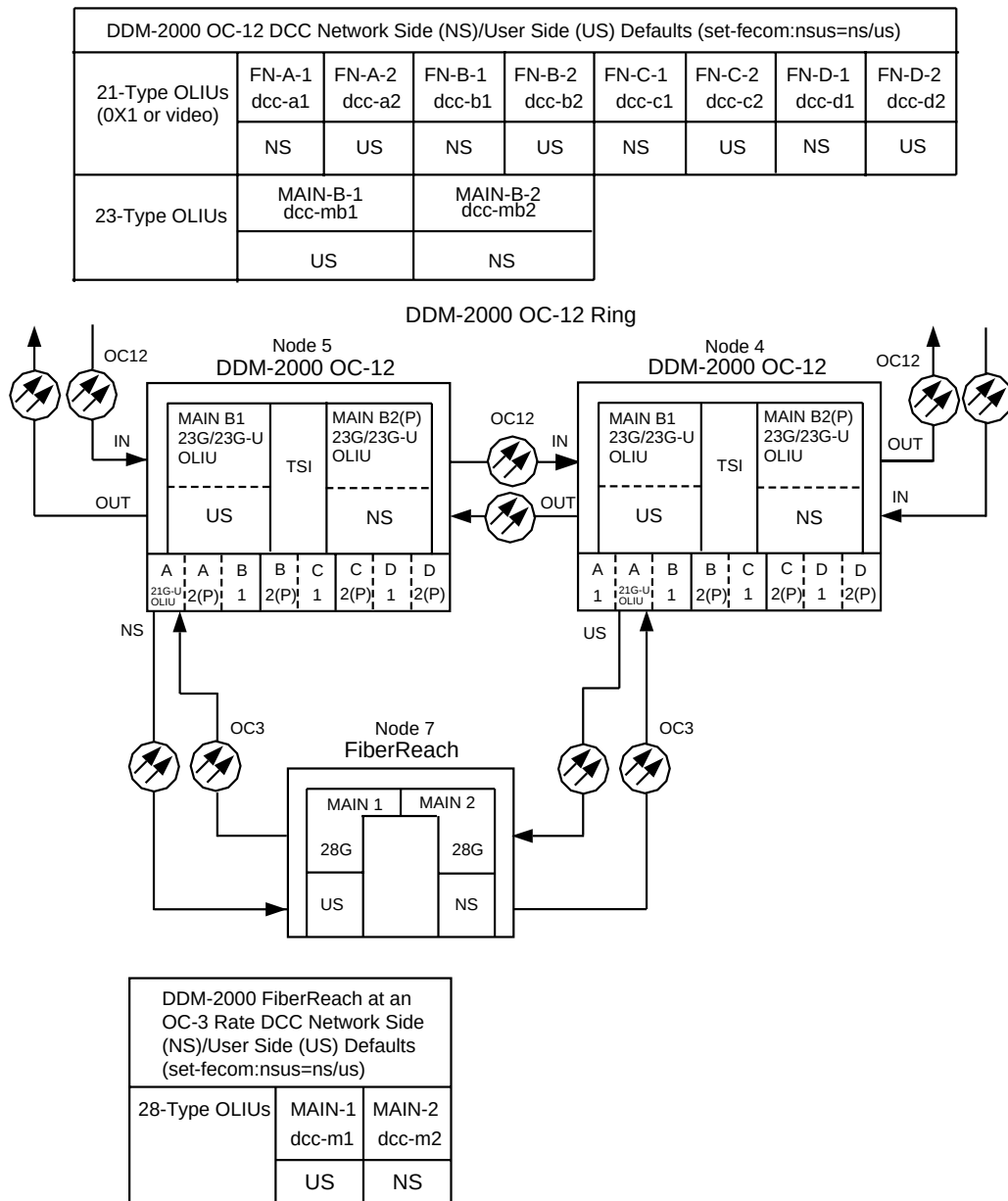


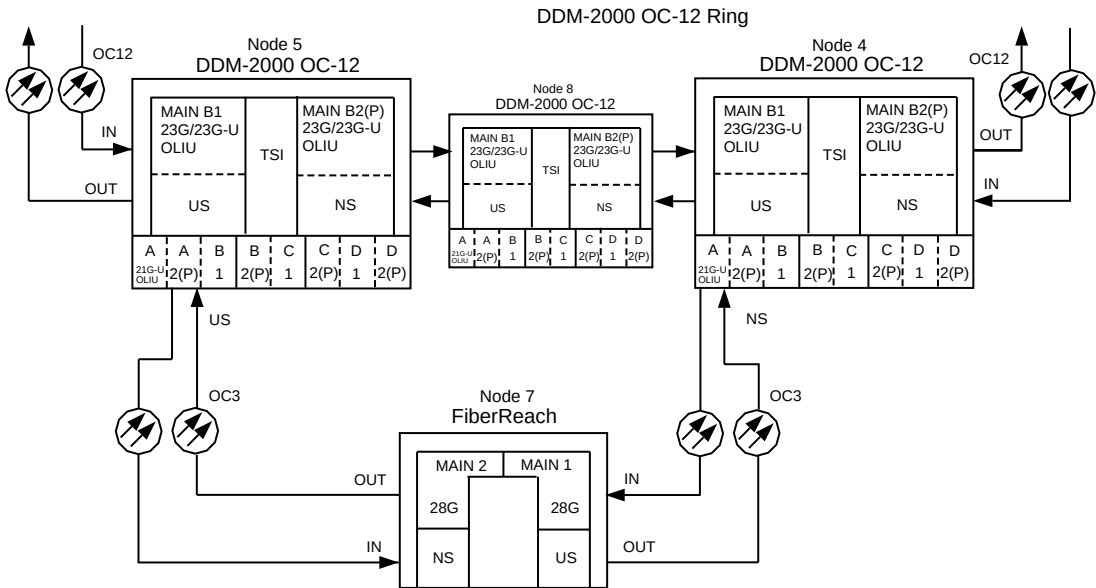
Figure 2 – Example of Dual-Homed FiberReach at OC-3 Rate/OC-12 Ring Configuration — Part 2



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Figure 3 – Example of User Side/Network Side Value Settings — Part 1

DDM-2000 OC-12 DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)								
21-Type OLIUs (0X1 or video)	FN-A-1 dcc-a1	FN-A-2 dcc-a2	FN-B-1 dcc-b1	FN-B-2 dcc-b2	FN-C-1 dcc-c1	FN-C-2 dcc-c2	FN-D-1 dcc-d1	FN-D-2 dcc-d2
	NS	US	NS	US	NS	US	NS	US
23-Type OLIUs	MAIN-B-1 dcc-mb1		MAIN-B-2 dcc-mb2					
	US		NS					



DDM-2000 FiberReach at an OC-3 Rate DCC Network Side (NS)/User Side (US) Defaults (set-fecom:nsus=ns/us)		
28-Type OLIUs	MAIN-1 dcc-m1	MAIN-2 dcc-m2
	US	NS

tpa 852400/01

Figure 4 – Example of User Side/Network Side Value Settings — Part 1Example of User Side/Network Side Value Settings — Part 2

Add New DDM-2000 FiberReach Node Operating at an OC-3 Rate To an OC-3 Ring

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

1.

 **CAUTION:**
*DDM-2000 circuit packs contain static sensitive components which can be damaged by electrostatic discharge. A static ground wrist strap must be worn when handling the circuit packs. See electrostatic discharge considerations in **Trouble Clearing: TAD-100.***

 **NOTE:**
This procedure assumes that the DDM-2000 is in service and a new FiberReach node operating at an OC-3 rate is being added to the Path Switched OC-3 Ring configuration. (See Figure 1.)

 **NOTE:**
It is assumed that optical loops are installed on the new shelf, that the new shelf has been properly equipped and tested in a looped-back configuration, and that the proper release of software has been loaded. [DDM-2000 OC-3 **System Turnup: NTP-016.**]

 **NOTE:**
All shelves in the same network must have the same or compatible software releases.

 **NOTE:**
This procedure requires information from other sites in the network, either through remote modem connection or by having a technician at the neighboring site.

 **NOTE:**
FiberReach nodes operating at an OC-3 rate require two **28G type OLIUs** in the **MAIN** slots of the FiberReach shelf.

 **NOTE:**
The **28G type OLIUs** require a faceplate interconnect cable assembly, [comcode(8477212710)].

DDM-2000 FIBERREACH WIDEBAND SHELF

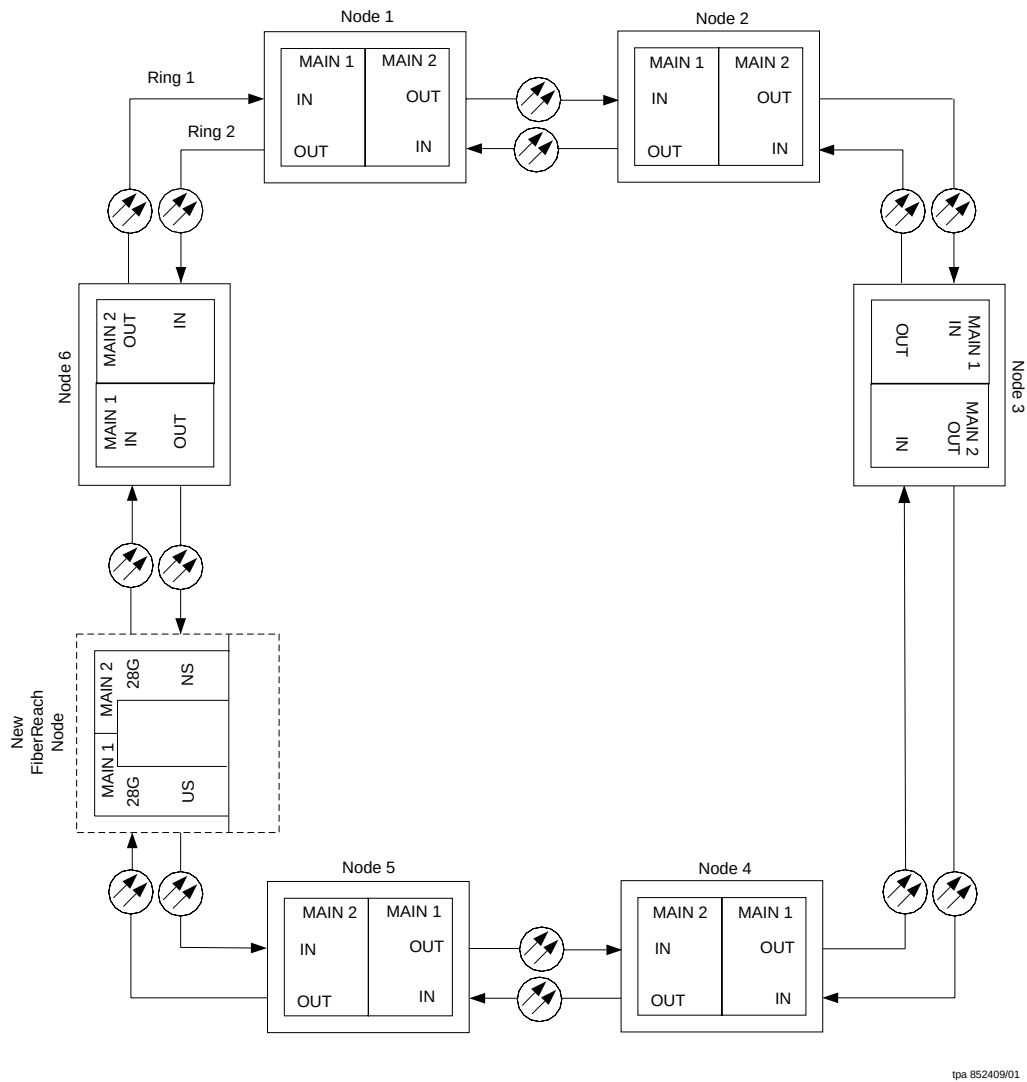


Figure 1 – Adding an RT (Node) to an Existing Ring Network

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

⇒ **NOTE:**
If the DDM-2000 fails to respond in the indicated manner,
refer to **Trouble Clearing: IXL-001**.

Use the **rtrv-alm** command to verify that no alarms, locks,
loops, or switches are present.

2. Notify maintenance center that alarms will be generated.

3.

⇒ **NOTE:**
It may be helpful to make a sketch of the network to visualize
the cross-connections required.

Use **rtrv-map-network:** and **rtrv-map-neighbor:**
commands to determine systems (sites) in the network and how
they are connected to each other.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

4.



NOTE:

The **set -ne:** command designates a shelf as the directory service network element (DSNE). **One**, and only one, shelf in the subnetwork **must** be provisioned as a DSNE. If there is no DSNE in the network, all DCC communication can become disabled. If more than one shelf is provisioned as DSNE, a duplicate DSNE alarm will occur. Multiple GNEs are allowed and a shelf is automatically provisioned as a GNE when connected to an active X.25 interface.



NOTE:

Shelves may be designated as an alarm gateway network element (AGNE) and assigned an alarm group number. (Default alarm group number is 255.) At least one AGNE is required per alarm group. One primary AGNE and one backup per alarm group is recommended. For a network greater than 16 nodes, the AGNE and TL1 GNE should be on separate nodes.



NOTE:

Two or more shelves in the same network with the same TBOS display number will cause a duplicate TBOS display alarm. Two or more shelves in the same network with the same site/ne address will cause a duplicate site/ne address alarm. Two or more shelves in the same network with the same system name or TID will cause a duplicate TID alarm.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Use the **rtrv-ne** command at each site to verify no duplicate DSNE, TBOS, site/ne, or TID settings exist. If duplicates exist, determine new settings and use **set-ne** command to make new settings.

Use the **set-ne:** command to set the alarm group number for this shelf, if required. (Default alarm group number is 255.) If the shelf is an AGNE, use the **set-ne:** command to designate the shelf as an AGNE. One primary AGNE and one backup per alarm group is recommended.

-
5. From office records or by using the **rtrv-crs-vt1:all** or **rtrv-crs-sts1:all** command at any site, determine the existing cross-connections.
-

6.



CAUTION:

Critical or Major alarms will be generated if pass-through cross-connections are not made on the new shelf before splicing it into the network.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO



NOTE:

In ring configurations, you should use the following rules in establishing cross-connections in each ring:

1. All drop connections (including DRI, if present) from the same STS-1 timeslot must be provisioned the same, either all VT1.5 or STS-1.
2. If all 28 VT1.5s (DS1s) in an STS-1 are being passed through at a node in a VT1.5 path-switched ring, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the pass-through node in the future, you should provision the pass-throughs as VT1.5 cross-connections. Also, provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted to 28 VT1.5 cross-connects to drop DS1s at a later time.
3. On STS-1 path-switched rings, all nodes in the ring must be provisioned as STS-1 cross-connections.



NOTE:

Up to 84 DS1s may be terminated in a ring network. Once a DS1 is terminated, that timeslot must be reserved in both directions around the ring to the far end. Therefore, if a DS1 is terminated (cross-connected) to a function group on a near-end and far-end terminating shelf, it must also be pass-through cross-connected in every shelf in the network. See "Cross-Connection Provisioning" in the "Administration and Provisioning" section of this manual for more information on cross connections.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Use the **ent-crs-vt1:** or **ent-crs-sts1:** command at the new shelf to make all required *pass-through* cross-connections (for example, **ent-crs-vt1:m-1-1-1,m-1-1-1** or **ent-crs-sts1:m-1,m-1**). Pass-through cross-connections must be made at the new shelf to correspond to each terminating cross-connection present on every shelf in the ring network. (See Figure 1.)

7.

⇒ **NOTE:**
If Kbyte or Sbyte (sync messaging) is enabled for the **main-1** and **main-2** optical interfaces at any node in a ring, it **must** be enabled at all nodes of the ring.

⇒ **NOTE:**
The **rtrv-oc3:** command retrieves the OC-3 Line Provisioning Report. This report displays the provisioned configuration of OC-3 lines. See the "Commands and Reports" section of this manual for a description of the **rtrv-oc3:** or **rtrv-oc12:** command format.

Use the **rtrv-oc3:** command to obtain the OC-3 Line Provisioning Report and verify if Kbyte/Sbyte is enabled or disabled. Use the **set-oc3:** command to enable or disable the Kbyte/Sbyte parameter, as required.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

8.



NOTE:

If Sync Autoreconfiguration is enabled, Kbyte/Sbyte must also be enabled.



NOTE:

If Sync Autoreconfiguration is enabled at any line-timed node in a ring, it **must** be enabled at all line-timed nodes of a ring.



NOTE:

The **rtrv-sync:** command retrieves the Synchronization Report. This report displays the provisioning and operational information on the synchronization attributes of the DDM-2000. See the "Commands and Reports" section of this manual for a description of the **rtrv-sync:** command format.

Use the **rtrv-sync:** command to obtain the Synchronization Report and verify if Sync Autoreconfiguration is enabled or disabled. Use the **set-sync:** command to enable or disable the Sync Autoreconfiguration parameter, as required.

9.



WARNING:

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to the beam.



CAUTION:

An automatic protection switch service hit may occur when the correct optical fibers are cut. Cutting the wrong fiber lines will cause a service interruption.

At the point where the new DDM-2000 shelf will be added, use local procedures to cut the two fiber lines connecting existing shelves and condition the fiber for connection to the new shelf.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

10.



NOTE:

Cutting the main sync source will cause the line-timed node to go into *holdover*.

Verify that only minor nsa OC-3 LOS and nsa inc. VT/STS1 AIS alarms are present at each end of the fiber cut.

11.



NOTE:

The **set sync:** command provisions the synchronization mode switching, synchronization source, and output mode of timing signals when the **28G type OLIUs** hardware is provisioned to be line-timed. See the “**Commands and Reports**” section of this manual for a description of the **set sync:** command format.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

12.



NOTE:

The Network Side/User Side parameters of the **set - fecom:** command must be set opposite at each end of the optical spans.

Use the **rtrv - fecom/set - fecom** command to verify/set "Network Side/User Side" parameters at each end of optical span being established.

13. At new shelf, remove **OLIU** optical loops.

14. Determine the optical loss of the optical facility from office records or by making the required measurements.

15. Connect one pair of optical fibers from an adjacent shelf to new shelf **MAIN 1 OLIU**. Ensure that you connect the fibers correctly [From adjacent OC-3 shelf **MAIN 2(P) OLIU** or FiberReach shelf **MAIN-2 OLIU** to new OC-3 shelf **MAIN 1 OLIU** or FiberReach shelf **MAIN-1 OLIU**].

16.



NOTE:

If the report in this step indicates wrong fiber connections or no connection, verify that *fecom* is ON (**rtrv - fecom:**) and check fiber integrity.

Use **rtrv-map-neighbor:** command to verify proper fiber connections have been made to the adjacent node.

17. Connect one pair of optical fibers from an adjacent shelf to new shelf **MAIN 2 OLIU**. Ensure that you connect the fibers correctly [From adjacent OC-3 shelf **MAIN 1 OLIU** or FiberReach **MAIN-1 OLIU** to new OC-3 shelf **MAIN 2(P) OLIU** or FiberReach shelf **MAIN-2 OLIU** shelf].

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

18.



NOTE:

If the report in this step indicates wrong fiber connections or no connection, verify that *fecom* is ON (**rtrv-fecom:**) and check fiber integrity.

Use **rtrv-map-neighbor:** command to verify proper fiber connections have been made to the adjacent node.

-
19. Verify that all alarm and status conditions clear. If *nsa inc. VT AIS* alarm is present and no *inc. OC-3 LOS* alarm, check that all pass-through cross-connections have been properly made using the **rtrv-crs-vt1:** command. If *nsa inc. STS AIS* alarm is present and no *inc. OC-3 LOS* alarm, check that all pass-through cross-connections have been properly made using the **rtrv-crs-sts1:** command.

-
20. Perform end-to-end OC-3 optical line test on optical spans being established.

DLP-515

21.



NOTE:

Proper cross-connections must be made at each shelf to establish the complete end-to-end path for the DS1/DS3/EC-1 port being tested. After one path (ring1 or ring2) has been tested, use the **sw-path-():** command at both ends to test the other ring path.

Perform appropriate end-to-end transmission test for the circuits being added, as required. Refer to the DDM-2000 OC-3 User/Service Manual (TOP) for the following procedures:

A. Single Ring DS1 Test	DLP-510
B. Dual Ring Interworking (DRI) DS1 Test	DLP-554
C. Single Ring DS3 Test	DLP-511
D. Dual Ring Interworking (DRI) DS3 Test	DLP-553
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

22. The system is ready for service to be established. Refer to the DDM-2000 OC-3 User/Service Manual (TOP) for the following procedures:

Initial DS1 Service [**System Turnup: NTP-004**]

Initial DS3 Service [**System Turnup: NTP-005**]

Initial EC-1 Service [**System Turnup: NTP-034**]

Initial HDSL Service [**System Turnup: NTP-025**]

Task Index Operation

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Operation Procedures

CIT — Connect and Establish Session Detailed Level Procedure: DLP-521

CIT — Activate System Features Detailed Level Procedure: DLP-512

CIT — Enable or Disable System Security
and/or Edit, Delete, or Enter a User's Login . . . Detailed Level Procedure: DLP-500

Copy Diskettes (Floppy Disks)
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Establish Remote Login Detailed Level Procedure: DLP-522

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Install SYSCTL — New Shelf Detailed Level Procedure: DLP-539

Install Software Generic Program —
New Shelf Installation
Only BBG8 SYSCTL Installed Detailed Level Procedure: DLP-525

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Introduction to the PC Detailed Level Procedure: DLP-533

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Replace SYSCTL — In Service Detailed Level Procedure: DLP-501

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Reference Only Procedures

Option Settings — Check (Set) Detailed Level Procedure: DLP-513

Replace Circuit Pack (Reference Only) Detailed Level Procedure: DLP-523

Maintenance Philosophy

Overview

The maintenance philosophy is built on gathering system information at two levels. One maintenance level is a local visual inspection of the user panel and the circuit pack LEDs. The user panel LEDs show a composite of near-end and far-end alarms. By using the **FE SEL** button on the **SYSCTL**, the alarm conditions at any site may be displayed. Most problems can be corrected at this level. A second maintenance level requires a craft interface terminal (CIT) for detailed information on the local and/or remote DDM-2000 or DDM-2000 FiberReach terminals. The CIT retrieves detailed reports about performance monitoring, alarms and status, and system configuration for near- and far-end terminals.

Trouble Analysis Procedures

The trouble analysis procedures in this document involve replacing faulty circuit packs and obtaining performance reports and/or alarm and status reports for analysis to determine proper system operation and/or trouble. If the trouble cannot be corrected or identified, the procedures direct the technician to obtain assistance because no more step-action procedural data is known for the specific trouble.

RTAC Assistance

The technician must make the decision regarding trouble analysis, corrective action, and obtaining assistance. The technician or local technical support staff may choose to continue trouble analysis based on their knowledge or experience on the DDM-2000 system, or may elect to obtain assistance by calling the Regional Technical Assistance Center **1-800-225-RTAC**.

COACH Assistance

Various customer computer-support tools are on-line and available by means of COACH. A login identification and password must be obtained to gain access to the COACH tools. Contact your regional DDM-2000 coordinator for information on obtaining a COACH login.

Diagnostic Dictionary	The Diagnostic Dictionary tool gives the user access to previously detected symptoms, problems, temporary fixes, cautions, and solutions. These may be usable in diagnosing, correcting, or avoiding a system problem.
Compatibility Data	The Compatibility Data tool gives the user access to hardware configuration data that is compatible to a user-specified software generic.
News and Bulletin	The News and Bulletin tool allows the user to process News and Bulletin information. News consists of messages which may be of general interest to the user. Bulletins contain information of a more urgent nature.

Circuit Pack Failures

Circuit pack failures are identified by LEDs and reported by system alarms and/or by manual or automatic diagnostic reports. When this occurs, a determination must be made as to why a circuit pack has failed. One recommendation as a first step for determining the cause of a failure is to unseat and then reseat the suspected circuit pack. For example, if a DS1 circuit pack is reported faulty, that circuit pack should be unseated and then resealed before being returned as defective. This will cause an automatic recovery and diagnostic operation to be performed on that DS1 circuit pack. If there is a contact problem, such as dirt, oil, or lack of total contact connection, then this may be corrected by reseating and thus avoiding the return of a good unit for repair. Use caution when unseating circuit packs. Extreme caution should be observed to ensure that protection switching is available for any circuit pack being removed.

When circuit packs are replaced in some sequence to clear a trouble, they should be replaced one at a time by installing the original circuit packs if they were found to be operational.

Electrostatic Discharge (ESD) Considerations

Any integrated circuit on a circuit pack can be damaged by static electricity that builds up within a work area, particularly in areas with low-relative humidity. This static buildup on work surfaces and on personnel and their clothing is produced by the various charging effects of even simple movements and by contact between various objects.

As a rule, the greatest potential for electrostatic damage occurs in areas with the lowest relative humidity. But, because such damage can occur anywhere, all personnel handling circuit packs should take the following precautions:

1. Since materials such as food wrappers, plastics, and Styrofoam^{*} containers tend to generate static electricity, keep them away from all circuit packs.
2. Be sure to read all warning labels on bags and cartons before opening any packaging.
3. If possible, open all circuit packs at a static-safe work position using properly grounded wrist straps and table mats that can dissipate static electricity.
4. Whenever possible, wait to remove circuit packs from their protective antistatic packaging until it is time to insert them into a bay.
5. Never touch a circuit pack's components, conductors, or connector pins. Handle all circuit packs only by the faceplate or latch or by the top and bottom outermost edges.
6. When opening and handling circuit packs or when working on backplanes, always wear a grounded wrist strap or wear a heel strap and stand on a grounded floor mat that can dissipate static electricity.
7. Always store and transport circuit packs in static-safe packages. (Shielding is not required unless specified.)
8. Whenever you remove circuit packs from a shelf, immediately put them into static-safe packages.
9. Try to keep relative humidity above 20 percent.
10. DDM-2000 FiberReach shelves are equipped with grounding jacks for connecting static ground wrist straps. The jacks are located on the front edge of the shelves.

* Registered trademark of the Dow Chemical Company.

Task Index Trouble Clearing

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Trouble Analysis Procedures

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FAULT Indication (Flashing) — Clear	TAP-110
Alarm — Critical (CR) Clear	TAP-101
Alarm — Major (MJ) Clear	TAP-102
Alarm — Minor (MN) Clear	TAP-112
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Clear Brownout Condition Flashing L in FE ID Display	TAP-119
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Trouble During Program Upgrade - Clear	TAP-116

Clear Critical (CR) Alarm

1.



NOTE:

Critical alarms are failures that cause loss of service to more than four DS1s (96 DS0 customer channels). Table A lists conditions which may cause critical alarms.

Is a CIT available?

If **NO**, then continue with **Step 2**.

If **YES**, then proceed to **Step 10**.

2. On the User Panel, momentarily depress **ACO** button to silence active audible office alarms.

3.



NOTE:

The **FE SEL** button on the **SYSCTL** is used to display local and remote (farend) alarm and status conditions [**DLP-530**].

Use **FE SEL** button to display alarm conditions for local shelf (**L.** displayed in **FE ID** display).

4. Was **NE ACTY LED** lit on User Panel when local shelf alarm conditions were displayed (**L.** displayed in **FE ID** display)?

If **NO**, then continue with **Step 5**.

If **YES**, then proceed to **Step 16**.

5. Use **FE SEL** button to display alarm conditions for other sites/shelves in the network (observe site address in **FE ID** display).

6. Was **NE ACTY LED** lit on User Panel when alarms were displayed for any selected site?

If **YES**, then continue with **Step 7**.

If **NO**, then do **TAP-108**.

7. Use **FE SEL** button to display alarm conditions for other sites/shelves in the network (observe site address in **FE ID** display) [**DLP-530**].
8. Issue a trouble report of critical alarm condition at the far-end DDM-2000 site indicated in **FE ID** display.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
- 10.

⇒ **NOTE:**
For all network configurations, there will be multiple far - end farend terminals. Using a Craft Interface Terminal (CIT) aids in troubleshooting multi-shelf DDM-2000 networks.

Connect the CIT to the **CIT** connector on the near-end User Panel and log in to the near-end system, if not already performed.

Reference: **DLP-521**

- 11.
- ⇒ **NOTE:**
The `rtrv-alm` command can be used to display a report of active alarm and status conditions. The "Commands and Reports" section of this manual gives a description of the command.
- ⇒ **NOTE:**
The Active Alarm and Status Report is output automatically following CIT log in. The report shown in Figure 1 is an example that shows several entries. There may be only one entry in the actual report.

Note the information in the Source Address and Description columns for the top entry/entries above the first single-dashed line (for example, "CRITICAL ... inc. OC1 LOS" in the report below) in the Active Alarm and Status Report.


```

/* Active Alarms and Status Report
=====
Alarm      Source      Date      Time      Srv  Description
Level      Address      Detected
=====
CRITICAL    main-2      MM-DD    HH:MM:SS    SA    inc. OC1 LOS
-----
MAJOR       m2-1-1-1    MM-DD    HH:MM:SS          inc. VT AIS

MAJOR       dcc-m2      MM-DD    HH:MM:SS          section DCC chan fail
MAJOR       dcc-m1      MM-DD    HH:MM:SS          section DCC chan fail
-----
MINOR       main-1      MM-DD    HH:MM:SS          inc. OC1 LOS
-----
ne-acty     -              holdover mode active
*/

```

Figure 1 – Example of Active Alarms and Status Report

12.

NOTE:
Far-end alarm or status conditions are listed in this report with a Source Address of farend. Local alarm or status conditions have a Source Address of the local slot, line, port, channel, path, cross-connection, or operations interface (DCC, TBOS, etc.) where the event occurred. (See *Addresses* in the “Commands and Reports” section of this manual.) Use the `rtrv-alm` command to get another report, if necessary.

Does the Source Address of any top entry in the alarm report indicate a **local** slot, channel, port or operations interface for the CRITICAL alarm?

If **NO**, then do **TAP-107**.

If **YES**, then continue with **Step 13**.

13. Use `opr -aco` command to silence active audible office alarms, if required.

14. Note the **local** trouble indication in the Description column of the Active Alarm and Status Report, starting with the highest alarm level (Critical) listed in the Alarm Level column.

15. Find the trouble description in Table A for the highest alarm level and go to the indicated step or procedure.

Table A – Critical (CR) Alarm Conditions

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
CRITICAL. CR LED lighted. FAULT LED flashing on OLIU(s).	inc. OC1 LOS inc. OC3 LOS inc. OC1 LOF inc. OC1 sig failed (BER) inc. OC1 sig degrade (BER)	Failure of OLIU circuit pack at near or far end, or failure of receive fiber.	TAP-111
	inc. STS1 LOP OC1 slotaid	If this condition occurs on the STS-1 on both OC-1 lines, the likely cause is an unprotected failure of an MXRVO or an OLIU circuit pack at the far end. If this condition occurs on only one OC-1 line, the likely cause is failure of the OLIU circuit pack at near or far end.	TAP-111
CRITICAL. CR LED lighted.	inc. OC1 line AIS inc. OC3 line AIS	Failure of OLIU circuit pack at the far end.	Step 20
	inc. STS1 AIS*	Incomplete or incorrect cross-connect provisioning in end-to-end network. In ring applications, unprotected removal or failure of OLIU circuit pack at far end or fiber failure.	TAP-118
	inc. STS1 unequipped	STS-1 cross-connects have been deleted in upstream equipment interfacing with the DDM-2000 OC-1 ring.	Find the deleted cross-connects in the upstream equipment.
	inc. STS1 sig failed (BER) inc. STS1 sig degrade (BER)	Failure of near-end OLIU circuit pack reporting the STS-1 failure; failure of the far-end OLIU circuit pack; failure of the receive fiber if the OC-n is also reporting a failure.	TAP-111

Table A – Critical (CR) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
	inc. VT AIS*	Incomplete or incorrect cross-connect provisioning in end-to-end network. In ring applications, unprotected removal or failure of DS1 , DS1PM , or T1EXT circuit pack at far end; fiber or OLI U failure.	TAP-118
CRITICAL. CR LED lit. FAULT LED may be lit on failed circuit packs.	OLIU CP failed	Internal circuit pack failure.	DLP-523
CRITICAL. CR LED lit.	CP removed	OLI U circuit packs removed without doing update (upd) command to remove circuit packs from equipment list.	Step 22
	CP not allowed - (crs)	Circuit pack does not support the manual cross-connection(s) currently provisioned for this slot.	Change cross-connections.
	environmentn*	Default message, can be changed. An environmental alarm point (miscellaneous discrete input) is active.	Use rtrv-attr-env command at RT to determine cause.
	ExternalMinor*	External minor alarm (environmental alarm input 15) is active. DC power or cooling fan in RT cabinet has failed.	Clear trouble using local procedures.
	illegal CP type	An illegal or unknown circuit pack type has been inserted into the shelf.	Remove circuit pack and install correct circuit pack.
	unexpected CP switches	When associated with the SYSCTL slot, this message means that an invalid switch setting has been selected on the circuit pack or that some of the unused switches are not in the prescribed position. For DS1 , DS1PM , or T1EXT slots, this message means that a change in a circuit pack switch setting was made.	Verify switch settings and change settings as required.

Table A – Critical (CR) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
	unexpected CP type	When associated with a low-speed slot, this message means that a different but supported circuit pack type (for example, BBF3) is inserted in a slot already provisioned.	Step 17

* May be provisioned for Critical, Major, Minor, or no alarm.

Note: Similar descriptions of trouble may also appear in the CIT Alarm and Status Report.

16. Is **FAULT** LED on an **OLIU** circuit pack lighted or flashing?

If **YES**, then do **TAP-111**.

If **NO**, then continue with **Step 17**.

17.



NOTE:

Alarm may be caused by circuit packs inserted into the wrong slots.

Are circuit packs installed in the correct slots?

If **YES**, then proceed to **Step 20**.

If **NO**, then continue with **Step 18**.

18. Remove circuit packs from wrong slots, check option switches (**DLP-513**), and reinstall circuit packs into the correct slots.

19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

20. Replace **OLIUs** at far end that are associated with the Source Address of the inc. OC1 line AIS alarm message.

Reference: **DLP-523**

21. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

22. Determine the reason the circuit packs were removed. If the same circuit pack is to be reinserted and no switch settings are changed, reinstall the circuit pack. If the circuit pack was removed and switch settings changed, reinstall the circuit pack and momentarily depress the **UPD/INIT** button on the **SYSCTL**. If the circuit pack is not to be reinserted, momentarily depress the **UPD/INIT** button on the **SYSCTL** to remove the circuit pack from the inventory.
23. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Major (MJ) Alarm

1.



NOTE:

Major alarms are failures that cause loss of service to 96 or less DS0 customer channels. Table A lists conditions which may cause a major alarm.

Is a CIT available?

If **NO**, then continue with **Step 2**.

If **YES**, then proceed to **Step 10**.

2. On the User Panel, momentarily depress **ACO** button to silence active audible office alarms.

3.



NOTE:

The **FE SEL** button on the **SYCTL** is used to display local and remote (farend) alarm and status conditions [**DLP-530**].

Use **FE SEL** button to display alarm conditions for local shelf (**L.** displayed in **FE ID** display).

4. Was **NE ACTY** LED lit on User Panel when local shelf alarm conditions were displayed (**L.** displayed in **FE ID** display)?

If **NO**, then continue with **Step 5**.

If **YES**, then proceed to **Step 15**.

5. Use **FE SEL** button to display alarm conditions for other sites/shelves in the network (observe site address in **FE ID** display).

6. Was **NE ACTY** LED lit on User Panel when alarms were displayed for any selected site?

If **YES**, then continue with **Step 7**.

If **NO**, then do **TAP-108**.

7. Use **FE SEL** button to display alarm conditions for other sites/shelves in the network (observe site address in **FE ID** display) [**DLP-530**].
8. Issue a trouble report of critical alarm condition at the far-end DDM-2000 site indicated in **FE ID** display.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
- 10.

⇒ **NOTE:**
For all network configurations except point-to-point, there will be multiple far-end far end terminals. Troubleshooting multi-shelf DDM-2000 networks is facilitated by use of a Craft Interface Terminal (CIT).

Connect the CIT to the **CIT** connector on the near-end User Panel and log in or remote log in to the near-end system, if not already performed.

Reference: DLP-521

11.
⇒ **NOTE:**
The `rtrv-alrm` command can be used to display a report of active alarm and status conditions. The Commands and Reports section of this manual gives a description of the command.
- ⇒ **NOTE:**
The Active Alarm and Status Report is output automatically following CIT log in. The report shown in Figure 1 is an example that shows several entries. There may be only one entry in the actual report.

Note the information in the Source Address and Description columns for the top entry/entries above the first single-dashed line in the Active Alarm and Status Report (Figure 1) (for example, "MAJOR M1-1-1-1 MM-DD:MM:SS SA inc. VT AIS").


```

/* Active Alarms and Status Report
=====
Alarm      Source      Date      Time      Srv  Description
Level      Address      Detected
=====
MAJOR      m1-1-1-1      MM-DD      HH:MM:SS      SA   inc. VT AIS
-----
ne-acty    m2-1-1-1      MM-DD      HH:MM:SS      nsa  inc. VT AIS
*/

```

Figure 1 – Example of Active Alarms and Status Report

12.



NOTE:

Far-end alarm or status conditions are listed in this report with a Source Address of farend. Local alarm or status conditions have a Source Address of the local slot, line, port, channel, path, cross-connection, or operations interface (DCC, TBOS, etc.) where the event occurred. (See *Addresses* in the “Commands and Reports” section of this manual.) Use the `rtrv-alm` command to get another report, if necessary.

Does the Source Address of any top entry in the alarm report indicate a **local** slot, channel, port or operations interface for the MAJOR alarm?

If **NO**, then do **TAP-107**.

If **YES**, then continue with **Step 13**.

13. Use `opr-aco` command to silence active audible office alarms, if required.

14. Note the **local** trouble indication in the Description column of the Active Alarm and Status Report, starting with the highest alarm level (Major) listed in the Alarm Level column.

15. See Table A for trouble description for the highest alarm level and go to the indicated step or procedure.

Table A – Major (MJ) Alarm Conditions

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MAJOR. MJ LED lit.	AGNE communication failure	A network element cannot establish communication with the alarm gateway network element (AGNE) or the AGNE cannot establish communication with a network element in the same alarm group. The AGNE has not been assigned in an alarm group. The AGNE and NE(s) are assigned different alarm group numbers. The AGNE has failed (Unless there are 2 or 3 AGNEs).	Use <code>rtrv-map-network</code> command to check AGNE assignment and alarm group number assignment. Use <code>set-ne</code> command to change AGNE assignment and alarm group assignment.
	CP not allowed - (eqpt)	A DS1 , DS1PM , or T1EXT circuit pack is installed in a low speed slot and has a protection mismatch between a service slot and protection slot. Identifies a circuit pack upgrade that is not allowed.	Change service or protection circuit pack to eliminate mismatch. User will have to update the slot pair to "auto" before inserting the new circuit pack type.
	DSNE not reachable	Non-DSNE network element starts up and does not identify or get registered by a DSNE within a time interval; change in provisioning of the DSNE by the <code>set - ne</code> command to <code>DSNE=no</code> ; a network element cannot reach the DSNE because of a DCC failure between the network element and the DSNE; OC-n line failure in the subnetwork; controller failure; reset or initialization of the DSNE.	See the <code>set - ne</code> and <code>rtrv - ne</code> commands for DSNE provisioning information. Use the <code>set - ne</code> command to provision one (and only one) shelf as the DSNE.
MAJOR. MJ LED lit. FAULT LED lit on SYSCTL circuit pack.	duplicate site/ne address	Two or more shelves in the network have the same site address and the same network element address (determined by <code>set - ne</code> command).	Use <code>rtrv - ne</code> command to check site and network element assignments at each shelf. Use <code>set - ne</code> command to change site and network element assignments.

Table A – Major (MJ) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MAJOR. MJ LED lit.	duplicate TBOS display	Two or more shelves in the alarm group have the same TBOS display address (determined by set - ne command).	Use rtrv - ne command to check TBOS display address at each shelf. Use set - ne command to change TBOS display address.
	duplicate TID	Two or more shelves in the network have the same system name or TID set by the set - ne command.	Use set - ne to change TID of improperly named shelves.
	ExternalMinor*	External minor alarm (environmental alarm input 15) is active. DC power or cooling fan in RT cabinet has failed.	Clear trouble using local procedures.
	environmentn*	An environmental alarm point (miscellaneous discrete input) is active.	Clear trouble using local procedures.
MAJOR. MJ LED lit. FAULT LED lit on circuit pack.	DS1 CP failed DS1PM CP failed T1EXT CP failed	Internal circuit pack failure.	Step 49
	SYSCTL CP failed	Internal circuit pack failure.	Step 37
MAJOR. MJ LED lit.	CP removed	DS1 , DS1PM , or T1EXT circuit packs removed without doing update (upd) command to remove circuit packs from equipment list.	Step 47
	unexpected CP type	When associated with a low speed slot, this message means that a different but supported circuit pack type (for example, BBF3) is inserted in a slot already provisioned for different circuit pack.	Step 55
	unexpected CP switches	When associated with the SYSCTL slot, this message means that an invalid switch setting has been selected on the circuit pack or that some of the unused switches are not in the prescribed position. For DS1 , DS1PM , or T1EXT slots, this message means that a change in a circuit pack switch setting was made.	Step 58

Table A – Major (MJ) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MN LED lit. FAULT LED lit on affected circuit pack	inc. (from DSX) DS1 LOS inc. (from DSX) DS1 sig fail [†]	Hard failure of upstream equipment or facility (towards the DSX-1 or T1 interface). The DS1 or T1 input is disconnected at the backplane or the DSX-1 or T1 interface; equipment is failed or removed at the DSX-1 or T1 interface. Mismatch of the line code (AMI/B8ZS); cross talk in office wiring; failure of DS1 , DS1PM , or T1EXT circuit pack.	Step 19
MAJOR. MJ LED lit.	illegal CP type	An illegal or unknown circuit pack type has been inserted into the shelf.	Remove circuit pack and install correct circuit pack.
	inc. STS1 AIS*	Incomplete or incorrect cross-connect provisioning in end-to-end network. In ring applications, unprotected removal or failure of OLIUI circuit pack at far end or fiber failure.	TAP-118
	inc. VT AIS*	Incomplete or incorrect cross-connect provisioning in end-to-end network. In ring applications, unprotected removal or failure of DS1 , DS1PM , or T1EXT circuit pack at far end; fiber or OLIUI failure.	TAP-118
	inc. VT LOP	Unprotected failure of DS1 , DS1PM , or T1EXT circuit pack at near end or far end; unprotected failure of MXRVO circuit pack at far end; unprotected failure of OC-1 OLIUI circuit pack at near end or far end; unprotected failure of both OC-1 OLIUI circuit packs at far end.	Replace failed circuit pack [DLP-523]
	inc. VT sig degrade (BER)	An OLIUI circuit pack failure or a fiber failure at some point on the failed ring.	TAP-111
	inc. VT unequipped	VT1.5 cross-connects have been deleted in upstream equipment interfacing with the DDM-2000 OC-1 ring.	Find the deleted cross-connects in the upstream equipment.

Table A – Major (MJ) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MAJOR. MJ LED lit.	excessive holdover	The system was manually switched to holdover mode (with the switch-sync command) and the switch has not been reset. The system automatically switched to holdover mode due to failure of the timing references as follows: - The reference failures have not cleared. - The system is provisioned for nonrevertive synchronization mode switching. - The system is provisioned for loop-timed operation and the optical line of OLI circuit pack has failed or a message indicating an upstream clock problem has been received on the sync message bits of the optical line. (See the rtrv-sync command). - The system is provisioned for sync message signaling, but the upstream system from which it line times has not been provisioned for sync message signaling. The condition can be cleared by provisioning both systems the same. (See the set-sync and rtrv-sync commands).	The condition can be cleared by repairing at least one of the timing references (if both have failed) and resetting synchronization mode protection switch with the command switch-sync:s=mode, pri=reset. In a central office system, the synchronization mode can also be reset with a TBOS control point.
MAJOR. MJ LED lit. Flashing FAULT LED on SYSCTL	section DCC channel failed	SYSCTL or OHCTL failure, reset, or initialization at far end. Program installation in progress or failed at far end. SYSCTL or OLI failed at near end. OLI or fiber failure between this node and node connected to the source address (no communication with other end).	Step 21

Table A – Major (MJ) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MAJOR. MJ LED lit.	inconsistent DCC values	The Network Side/User Side parameters are set the same at both ends of a DCC (optical span).	Use <code>rtrv-fecom</code> command to check Network Side/User Side parameters at each shelf in the network. Use <code>set-fecom</code> command to change Network Side/User Side parameters at one end of optical span.
	TID address map full	The maximum network size (supported by the DSNE) is exceeded or when the size of the database is exceeded due to network elements being removed from the network but not from the DSNE's database.	Use <code>dlt-tadmap</code> command to delete removed NEs from database.
	frequency error	The alarm condition indicates that the frequency of an incoming OC-1 signal deviates by greater than 3 ppm from the local system clock.	Check the external timing source or the timing obtained from a remote shelf.
	LS prot assembly removed	The system has been reset with no low speed protection assembly installed. This is not a valid system configuration.	Install a low speed protection assembly and execute the reset function.
	LS prot mode not chgd-(crs)	An attempt to change the low speed protection mode has failed because all cross connections terminating on low speed ports were not removed.	Remove all such cross connections and execute the reset function.

* May be provisioned for Critical, Major, Minor, or no alarm.

† May be provisioned for Major, Minor, or no alarm.

Note: Similar descriptions of trouble may also appear in the CIT Alarm and Status Report.

16.



NOTE:

If a program installation is being performed to a **SYSCTL** at the far end, it is normal for the **FAULT** LED on the near-end **SYSCTL** to flash and the **MJ** and **NE ACTY** LEDs to light on the User Panel. If there is a **MJ** alarm at the end receiving the program, trouble is indicated. You should check if a program installation is being done.

Was new software generic being downloaded (program upgrade) to the **SYSCTL** at this end when alarm occurred?

If **YES**, then do **TAP-116**.

If **NO**, then continue with **Step 17**.

17. Is the **FAULT** LED on the faceplate of one or more circuit packs flashing?

If **YES**, then continue with **Step 18**.

If **NO**, then proceed to **Step 37**.

18. Find the circuit pack(s) with a flashing LED in Table B below and go to the indicated step or procedure.

Table B – Circuit Pack(s) With Flashing LED

Circuit Pack	Go To
DS1/DS1PM/T1EXT	Step 19
SYSCTL	Step 29
OLIU (Rings)	TAP-111

19. Switch service to protection. If LED is flashing on protection **DS1**, **DS1PM**, or **T1EXT** circuit pack, issue trouble report of bad incoming signal at input to **DS1**, **DS1PM**, or **T1EXT** circuit pack with flashing LED(s). If LED is not flashing on protection **DS1**, **DS1PM**, or **T1EXT** circuit pack, replace service **DS1**, **DS1PM**, or **T1EXT** circuit pack [DLP-523].

20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

21.



NOTE:

If a program installation is being performed to a **SYSCTL** at the far end, it is normal for the **FAULT** LED on the near-end **SYSCTL** to flash and the **MJ** and **NE ACTY** LEDs to light on the User Panel. If there is a **MJ** alarm at the end receiving the program, trouble is indicated. You should check if a program installation is being done.

Is new software generic being downloaded (program upgrade) to the **SYSCTL** at the far end terminal?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 22.**

22. In alarm report, is there any indication of **OLIU** or fiber trouble at near end or far end, such as inc. 0C1 FERF alarm message?

If **YES**, then continue with **Step 23.**

If **NO**, then proceed to **Step 25.**

23.



NOTE:

If there is a DCC failure, a remote log in to the shelf connected through the Source Address cannot be done. The `rtrv-alm` and `rtrv-map-network` or `rtrv-map-neighbor` command can be used to check for dcc failure for **MAIN**. Also, use `rtrv-fecom` command to see if "fecom" has been disabled.

Note Source Address of DCC channel failure. Check optical fibers connected through the Source Address per local procedures. If no trouble found, replace near-end **OLIU** first then far-end **OLIU**.

Reference: **DLP-523**

24. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

25. Use CIT and reset command to reset **SYSCTL** at the near end or unplug and reseal the **SYSCTL**.

26. Is the **FAULT** LED on the **SYSCTL** circuit pack still flashing (section DCC channel failed)?

If **YES**, then continue with **Step 27**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

27. If possible, use CIT and r lgn command to log in to the far-end terminal (**DLP-522**) and use the reset command to reset **SYSCTL** at the far end.

28. Is the **FAULT** LED on the **SYSCTL** circuit pack still flashing (section DCC channel failed)?

If **YES**, then proceed to **Step 33**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

29.



NOTE:

Unseating and reseating the **SYSCTL** performs a *reset* procedure which restarts the software program.

Unseat and reseal **SYSCTL** circuit pack. Do not depress **UPD/INIT** button.

30. Is the **FAULT** LED on the affected circuit pack still flashing?

If **YES**, then continue with **Step 31**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

31. Obtain a CIT and repeat this procedure.

32. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

33. Refer to **DLP-501** and replace **SYSCTL** at near-end terminal.
34. Is the **FAULT** LED on the **SYSCTL** circuit pack still flashing?
 - If **YES**, then continue with **Step 35**.
 - If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
35. At far-end terminal, reset **SYSCTL** by unseating and reseating **SYSCTL** or by using a CIT and the reset command, if not already performed. If **FAULT** LED is still flashing after a reset, refer to **DLP-501** and replace **SYSCTL** at far-end terminal.
36. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
37. Is the **FAULT** LED lit on the **SYSCTL**?
 - If **YES**, then continue with **Step 38**.
 - If **NO**, then proceed to **Step 45**.
38. Use CIT and rtrv-ne command to check provisioning of site ID and network element number. Two or more shelves cannot have the same site address and/or element number.
39. Is provisioning correct?
 - If **YES**, then proceed to **Step 41**.
 - If **NO**, then continue with **Step 40**.
40. Change provisioning using the set -ne command.
41. Is the **FAULT** LED still lit?
 - If **YES**, then continue with **Step 42**.
 - If **NO**, then proceed to **Step 44**.
42. Refer to **DLP-501** and replace the **SYSCTL**.
43. Is the **FAULT** LED still lit on the **SYSCTL**?
 - If **YES**, then proceed to **Step 45**.
 - If **NO**, then continue with **Step 44**.

44. Is the **MJ** alarm LED still lit?

If **YES**, then continue with **Step 45**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

45. The problem appears to be in the backplane of the DDM-2000 FiberReach or another circuit pack in the shelf is causing the **FAULT** LED on the **SYSCTL** to light. Remove service from shelf and unseat all circuit packs except **SYSCTL**. If the trouble clears, it means that one or more of the circuit packs removed is defective. If the trouble cannot be isolated by removing circuit packs, seek technical assistance and/or replace the shelf. Notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

46. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

47. Determine the reason the circuit packs were removed. If the same circuit pack(s) is to be reinserted and no switch settings are changed, reinstall the circuit pack. If the circuit pack was removed and switch settings changed, reinstall the circuit pack and momentarily depress the **UPD/INIT** button on the **SYSCTL**. If the circuit pack is not to be reinserted, momentarily depress the **UPD/INIT** button on the **SYSCTL** to remove the circuit pack from the inventory.

48. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

49.



NOTE:

A major alarm may also be caused by a DS1 line code switch setting that is different from what they were before a **DS1**, **DS1PM**, or **T1EXT** circuit pack was replaced, excessive holdover due to loss of synchronization reference, or a manual switch to holdover in effect too long.

Is **FAULT** LED lit on any **DS1**, **DS1PM**, or **T1EXT** circuit pack?

If **YES**, then continue with **Step 50**.

If **NO**, then proceed to **Step 54**.

50. Check switch settings on **DS1**, **DS1PM**, or **T1EXT** circuit pack (with lit **FAULT** LED) for correct line code settings. If circuit pack has been replaced, check if settings are the same as they were before the circuit pack was replaced.

Reference: **DLP-513**

51. Are switch settings correct?

If **YES**, then do **TAP-103**.

If **NO**, then continue with **Step 52**.

52. Change switch settings to the correct settings. If switch settings are to be changed from what they were previously, update the equipment list by momentarily depressing the **UPD/INIT** button on the **SYSCTL** after the circuit pack is reinstalled.

53. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

54. Is there an inc. VT AIS alarm indication?

If **YES**, then do **TAP-118**.

If **NO**, then do **TAP-103**.

55.



NOTE:

Alarm may be caused by circuit packs inserted into the wrong slots.

Are circuit packs installed in the correct slots?

If **YES**, then proceed to **Step 58**.

If **NO**, then continue with **Step 56**.

56. Remove circuit packs from wrong slots, check option switches (**DLP-513**) and reinstall circuit packs into the correct slots.

57. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

58.



CAUTION:

*When removing circuit packs ensure that protection switching is available. Also, remove the circuit pack without the lit **ACTIVE LED** first.*

Check switch settings on the circuit packs for correct settings. If the circuit pack has been replaced, check if settings are the same as they were before the circuit pack was replaced. Also check if the switches are set the same as the companion circuit pack.

Reference: **DLP-513**

59. Are switch settings correct?

If **YES**, then do **TAP-103**.

If **NO**, then continue with **Step 60**.

60. Change switch settings to the correct settings. (Use switch - () command to switch to other circuit pack before removing pack.) If switch settings are to be changed from what they were previously, update the equipment list by momentarily depressing the **UPD/INIT** button on the **SYSCTL** after the circuit pack is reinstalled.

61. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Multiple Failure

1.



CAUTION:

*Although the **FAULT** LEDs may be lit or flashing on an **OLI**U, service may be interrupted if the **OLI**U is removed. The **OLI**Us may be in unidirectional switching mode and transmitting on one **OLI**U while receiving on the other. The state of the switch mode must be analyzed before removing an **OLI**U.*



NOTE:

A multiple failure condition exists when a service circuit pack and its associated protection circuit pack have failed, when two service DS1 circuit packs in the same group have failed, or when the switch mode is inhibited or locked and a failure occurs on a service circuit pack.

Is the **FAULT** LED on an **OLI**U lit (CP failed) or flashing (inc. OC1 LOS, etc.)?

If **YES**, then do **TAP-111**.

If **NO**, then continue with **Step 2**.

2. Are the **FAULT** LEDs on both a service and protection circuit pack of the same type lit (not flashing) (CP failed)?

If **YES**, then continue with **Step 3**.

If **NO**, then proceed to **Step 7**.

3.



CAUTION:

Replacement circuit pack may have option switches which must be properly set before the circuit pack is installed.

Replace the service circuit pack with the lit **FAULT** LED.

Reference: **DLP-523**

4. Is the **FAULT** LED on the circuit pack just replaced off?
If **YES**, then continue with **Step 5**.
If **NO**, then do **TAP-106**.
5. Replace the protection circuit pack with the lit **FAULT** LED.
Reference: **DLP-523**
6. Is the **FAULT** LED on the circuit pack just replaced off?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then do **TAP-106**.
7. Are the **FAULT** LEDs on two or more service **DS1**, **DS1PM**, or **T1EXT** circuit packs lit (not flashing)?
If **YES**, then continue with **Step 8**.
If **NO**, then proceed to **Step 12**.
8. Replace either of the service **DS1**, **DS1PM**, or **T1EXT** circuit packs with the lit **FAULT** LED.
Reference: **DLP-523**
9. Is the **FAULT** LED on the circuit pack just replaced off?
If **YES**, then continue with **Step 10**.
If **NO**, then do **TAP-106**.
10. Replace the other service **DS1**, **DS1PM**, or **T1EXT** circuit pack with the lit **FAULT** LED.
Reference: **DLP-523**
11. Is the **FAULT** LED on the circuit pack just replaced off?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then do **TAP-106**.
12. Use CIT and the `rtrv-()` commands (`rtrv-state-eqpt`, `rtrv-sync`, etc.) to check switching mode for inhibits, locks, etc.

13. Was any trouble found?

If **YES**, then continue with **Step 14**.

If **NO**, then do **TAP-108**.

14. Determine reason for locks, inhibits, etc., to be in place. See the "Commands and Reports" section of this manual for a description of the `switch- ( )` commands and the `rtrv-aln` command report descriptions. Use the `switch- ( )` commands to reset switching mode or priority.

If you need assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Power Minor (PMN) Alarm

1.



CAUTION:

There is an AC power failure at the remote DDM-2000 FiberReach terminal. This will result in a service interruption if it is not restored.

Are you at the remote terminal site?

If **YES**, then proceed to **Step 5**.

If **NO**, then continue with **Step 2**.

2. Momentarily depress the **ACO** pushbutton on the DDM-2000 FiberReach User Panel.

Response: The audible alarm is silenced.

3. Issue a trouble report of an AC power failure at the remote terminal.

4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5. What type of **RT** configuration do you have?

If **Bulk Power**, then continue with **Step 6**.

If **Distributed Power**, then proceed to **Step 8**.

6. Use documentation for your bulk power plant to clear trouble. Check AC circuit breakers and verify AC power is present at the RT enclosure.

7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8. Using digital multimeter (DMM), measure incoming AC voltage. (Use **AC** and **GND** jacks on **LDU** faceplate in J1C182BA power shelf.)

9. Is measured AC voltage between 105 and 129 volts?

If **YES**, then continue with **Step 10**.

If **NO**, then proceed to **Step 19**.

10. Is power shelf a J1C182BA Power Shelf?
If **YES**, then continue with **Step 11**.
If **NO**, then proceed to **Step 27**.
11. Is **FAIL** LED lit on any **336A RECTIFIERS** at RT?
If **YES**, then continue with **Step 12**.
If **NO**, then proceed to **Step 14**.
12. Replace **336A RECTIFIERS** that have **FAIL** LED lit.
13. Did alarm clear within 20 seconds?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then proceed to **Step 27**.
14. Is **BAT DISCHG** LED lit on any **337A BATTERY CHARGER(s)**?
If **YES**, then continue with **Step 15**.
If **NO**, then proceed to **Step 27**.
15. Replace one **336A RECTIFIER**.
16. Did alarm clear within 20 seconds?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then continue with **Step 17**.
17. Replace another **336A RECTIFIER**.
18. Did alarm clear within 20 seconds?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then proceed to **Step 27**.
19. Is fuse blown or circuit breaker tripped at RT main AC circuit breaker box?
If **YES**, then continue with **Step 20**.
If **NO**, then proceed to **Step 23**.
20. Replace blown fuse or reset circuit breaker.

21. Does fuse blow or circuit breaker trip again?
If **YES**, then proceed to **Step 27**.
If **NO**, then continue with **Step 22**.
22. Did alarm clear within 20 seconds?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then proceed to **Step 27**.
23. Contact local power company if loss of AC power has occurred or if there is overvoltage or undervoltage condition.
24. Does local power company verify abnormal power condition?
If **YES**, then continue with **Step 25**.
If **NO**, then proceed to **Step 27**.
25. Estimate restoration time for AC power. If necessary, equip RT with fully charged batteries or other power source to maintain power until AC power is restored.
26. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
27.
 **NOTE:**
If alarms remain, multiple troubles exist and trouble analysis must be repeated.

If you have a J1C182BA Power Shelf, use SD-7C117 and SD- 7C118 to locate trouble. If another power shelf or powering arrangement is used, use the appropriate documentation and wiring diagrams to locate power trouble. If you need technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.
28. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Trouble Report

1. Is the **CR** alarm LED lit on the User Panel?
If **YES**, then do **TAP-101**.
If **NO**, then continue with **Step 2**.
2. Is the **MJ** alarm LED lit on the User Panel?
If **YES**, then do **TAP-102**.
If **NO**, then continue with **Step 3**.
3. Is the **MN** alarm LED lit on the User Panel?
If **YES**, then do **TAP-112**.
If **NO**, then continue with **Step 4**.
4. Is the **FAULT** LED on the faceplate of a DS1 circuit pack flashing [inc. DS1 LOS]?
If **YES**, then continue to **Step 5**.
If **NO**, then proceed to **Step 7**.
5. There appears to be an incoming DS1 signal failure. Refer to **TAP-110** and clear the condition.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
7. Is the **FAULT** LED on the faceplate of any circuit pack in the FiberReach lit (not flashing) [() CP failed]?
If **YES**, then continue with **Step 8**.
If **NO**, then proceed to **Step 10**.

8.



NOTE:

There is an inconsistent combination of alarms and diagnostic indications.

Refer to **TAP-108** and determine the true status of the system.

9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

10. Perform an LED test by depressing the **ACO/TST** pushbutton or using the test - led command.

Reference: **DLP-509**

11. Did all the circuit packs pass the LED test?

If **YES**, then continue with **Step 12**.

If **NO**, then proceed to **Step 14**.

12.



NOTE:

The DDM-2000 FiberReach appears to be operating correctly with no failures present.

Return a report of NO TROUBLE FOUND.

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14. Replace the circuit pack that failed the LED test.

Reference: **DLP-523**

15. Repeat the LED test.

16. Did all the circuit packs pass the LED test?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 17**.

17.



NOTE:

The failure is not in the circuit pack just replaced.

Refer to **TAP-106** to isolate and clear the failure.

18. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Isolate and Clear Failure

1.



NOTE:

It is assumed that the **FAULT** LED on a circuit pack is lit and replacing the circuit pack does not clear the problem.

Is the circuit pack with the lit LED a **DS1**, **DS1PM**, **T1EXT**, or **OLIU**?

If **YES**, then continue with **Step 2**.

If **NO**, then proceed to **Step 12**.

2. Is a CIT available?

If **YES**, then continue with **Step 4**.

If **NO**, then proceed to **Step 6**.

3. Use the CIT and reset command to reset **SYSCTL**.

4. Is the **FAULT** LED on the affected circuit pack still lit?

If **YES**, then proceed to **Step 8**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

5.



NOTE:

Unseating and reseating the **SYSCTL** performs a reset procedure which restarts the software program.

Unseat and reseal **SYSCTL** circuit pack. Do not depress **UPD/INIT** button.

6. Is the **FAULT** LED on the affected circuit pack still lit?

If **YES**, then continue with **Step 8**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

7.



CAUTION:

*Replacing the **SYSCTL** involves updating the internal memory on the circuit pack.*

Refer to **DLP-501** and replace the **SYSCTL**.

8. Is the **FAULT** LED on the affected circuit pack still lit?

If **YES**, then continue with **Step 9**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.



NOTE:

The problem appears to be in the backplane wiring of the FiberReach. One way to verify this is to swap the **SYSCTL** and any circuit pack with an inconsistent diagnostic indication with the corresponding circuit packs in another FiberReach. If the problem moves with the circuit packs, it means that one or more of the circuit packs is defective. If the problem stays with the original FiberReach the entire assembly, but not the circuit packs, should be replaced. The FiberReach has a printed backplane and cannot be repaired in the field.

Check for bent or broken pins, shorted pins, etc. If you need technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Far-End Alarm Using Craft Interface Terminal (CIT)

1.



NOTE:

It is assumed that a CIT is available and that there is a failure at a far-end node (as indicated by an **FE ACTY** LED on the local system or by the Source Address of farend in the local alarm and status report).

Connect the CIT to the connector on the User Panel or remote log in to the near-end system, if not already performed.

Reference: **DLP-521**

2.



NOTE:

The Active Alarm and Status Report is output automatically following CIT log in. The report shown in Figure 1 is an example that shows several entries. There may be only one entry in the actual report.

Note the information in the Source Address and Description columns for the top entry/entries above the first single-dashed line in the Active Alarm and Status Report (Figure 1) (for example, "MINOR farend MM-DD HH:MM:SS - SiteXNE1")

```
/* Active Alarms and Status Report
=====
Alarm      Source      Date/Time      Srv      Description
Level      Address      Detected
=====
MINOR      farend      MM-DD HH:MM:SS -      SiteXNE1
MINOR      farend      MM-DD HH:MM:SS -      SiteYNE1
-----
ne-acty    m1-1-1-1    MM-DD HH:MM:SS      inc. VT AIS
*/
```

Figure 1 – Example of Active Alarm and Status Report

3.



NOTE:

Far-end alarm or status conditions are listed in this report with a Source Address of farend. Local alarm or status conditions have a Source Address of the local slot, line, port, channel, path, cross-connection, or operations interface (DCC, TBOS, etc.) where the event occurred. (See *Addresses* in the “Commands and Reports” section of this manual.) Use the `rtrv-alm` command to get another report, if necessary.

Does the Source Address of any top entry above the first single-dashed line in the alarm report indicate a **local** alarm?

If **YES**, then continue with **Step 4**.

If **NO**, then proceed to **Step 6**.

4. Find the **Alarm Level** for the local alarm in Table A and go to the indicated procedure.

Table A – Trouble Conditions

Alarm Level	TAP
CRITICAL	TAP-101
MAJOR	TAP-102
MINOR	TAP-112
ne-acty	TAP-117
PWR MINOR (PMN)	TAP-104
abnormal (ABN)	TAP-109

5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6. Use the `rtrv-map-network` command to get a network map report.

7.



NOTE:

The TID of the far-end system is the TID listed in the Description column of the near-end Active Alarm and Status Report obtained using the `rtrv-alm` command.

⇒ **NOTE:**
In a path protection switched ring network, FAILED Communication Status most likely indicates a total node failure (power failure, failure of both **OLIUs** or both fiber pairs).

⇒ **NOTE:**
If any systems have a Communications Status of FAILED, you may have to log in to the system nearest to the system with a FAILED communications status or issue a trouble report on the system you cannot log into.

⇒ **NOTE:**
The far-end alarms refer to alarms in the same alarm group as the local network element. For systems you cannot log into, issue a trouble report on the system indicated in the alarm and status report.

If possible, enter the `r lgn: TID` command to log in to any far-end system indicated in the top entry in the Alarm and Status Report (for example, MINOR farend MM-DD HH:MM:SS - SiteXNE1)

Reference: **DLP-522**

8. Use the `r trv-alm` command at the far-end system to get a report of status and alarms. See Table B for a detailed description of the messages in the alarm and status report.
9. Repeat this procedure from Step 3 for the shelf you are now logged into. Remember that when the procedures refer to local it is now the shelf from which you are getting the Alarm and Status Report.

Table B – RTRV-ALM Message Descriptions

Description	Alarm Level	Meaning
-48V power/fuse FA/FB failed	MN	A –48 volt power feeder or a fuse on the user panel has failed. (FA or FB identifies failure.)
AC power failed	PMN	The AC power supply to a remote terminal cabinet has failed.
ACO active	Status	The parallel telemetry outputs and audible office alarms normally active due to the alarm conditions in the system are being suppressed. See the opr -aco command.
AGNE communication failure	MJ	A network element cannot establish communication with the alarm gateway network element (AGNE) or the AGNE cannot establish communication with a network element in the same alarm group. Likely cause: The AGNE has not been assigned in an alarm group. The AGNE and NEs are assigned different alarm group numbers. Use the rtrv-map-network command to determine if both network elements are in the same alarm group.
APS - automatic lock	MN	The service associated with a DS1, DS1PM, or T1EXT circuit pack has been automatically switched and locked onto the protection DS1, DS1PM, or T1EXT circuit pack. The automatic protection switching (APS) lock will remain active until midnight. Likely cause: Four automatic switches of a single DS1, DS1PM, or T1EXT circuit pack in 10 minutes, probably because of an intermittent failure of the DS1, DS1PM, or T1EXT circuit pack.
communication failure	Status	The system is not communicating with another shelf in the subnetwork. This system is normally communicating with that shelf through the SONET section DCC specified in the address column. The rtrv-map-network and rtrv-map-neighbor command will report the name of the system(s) with which this system is not communicating. Likely causes: An unprotected OC-n line failure in the subnetwork, a controller failure, reset, or initialization on another shelf; section DCC channel failure on this or another shelf; failure of the OLI or SYSCTL circuit pack.

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
controln	Status	The specified environmental control point (miscellaneous discrete output) is active. Note: The actual message that appears in the alarm and status report for this condition can be provisioned; this is the default message. (See the <code>rtrv-attr-cont</code> and <code>set-attr-cont</code> commands.) Likely cause: The system was instructed to close the environmental control point by either a TBOS control point or by the closing of the corresponding environmental control input at the far end.
CP not allowed - (crs)	CR or MN	The circuit pack does not support the manual cross-connection(s) currently provisioned for this slot. The user should change the circuit pack type or change the cross-connection(s) to the slot.
CP not allowed - (eqpt)	MJ or MN	A DS1 , DS1PM , or T1EXT circuit pack is installed in a low-speed slot and has caused a protection mismatch between a service slot and a protection slot. Change service or protection circuit pack to eliminate mismatch. Identifies a circuit pack upgrade that is not allowed. User will have to update the slot pair to "auto" before inserting the new circuit pack type.
CP removed	CR, MJ or MN	A circuit pack previously installed in this system is removed. The circuit pack should be replaced, or an update (<code>upd</code>) command should be done to remove it from the system equipment list.
DS1 CP failed	MJ or MN	Internal equipment failure of the specified DS1 circuit pack.
DS1PM CP failed	MJ or MN	Internal equipment failure of the specified DS1PM circuit pack.
DS1 loopback	ABN	A loopback (toward the optical fiber) is active on the specified T1 port. (See the <code>opr-lpbk-t1</code> and <code>rls-lpbk-t1</code> commands.)
DS1 loopback (to fiber)	ABN	A loopback (toward the optical fiber) is active on the specified T1 port. (See the <code>opr-lpbk-t1</code> and <code>rls-lpbk-t1</code> commands.)
DS1 loopback (to DSX)	ABN	A loopback (toward the DSX or T1 interface) is active on the specified T1 port. (See the <code>opr-lpbk-t1</code> and <code>rls-lpbk-t1</code> commands.)
DS1 trmsn test IP	ABN	A transmission test using the internal test signal generator and monitor is in progress on the specified T1 port. (See the <code>test-trmsn-t1</code> command.)

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
DSNE not reachable	MJ	This alarm condition can be caused by the following cases: 1. When a non-DSNE starts up and it does not identify or get registered by a DSNE within a time interval, it will raise this alarm condition. 2. Any node (NE) registered with the DSNE will raise this alarm condition if it can no longer reach the DSNE because of a change in provisioning by the set - ne command to DSNE=no. See the set - ne and rtrv - ne commands for DSNE provisioning information. 3. Any network element registered with the DSNE will raise this alarm condition. If it can no longer reach the DSNE because of a DCC failure between the local network element and the DSNE. Other likely causes: OC-n line failure in the subnetwork, a controller failure, or initialization of the DSNE.
duplicate site/ne address	MJ	Two or more shelves in the alarm group have the same site address and the same network element address. (Set by the set - ne command.)
duplicate TBOS display	MJ	Two or more shelves in the alarm group have the same TBOS display number. (Set by the set - ne command.)
duplicate TID	MJ	Two or more shelves in the network have the same system name or TID. (Set by the set - ne command.)
environmentn	CR, MJ, MN or none	The specified environmental alarm point (miscellaneous discrete input) is active. Note: The actual message that appears in the alarm and status report for this condition can be provisioned; this is the default message. (See the rtrv - attr - env and set - attr - env commands.)
excessive holdover	MJ	The system has been in holdover mode for more than 4 hours. This may cause degraded performance (high error rates) on the transmitted and/or received signals. Whenever this condition exists, the condition holdover mode active also exists. Likely cause: See holdover mode active.

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
ExternalMinor	CR, MJ, MN or none	The external minor alarm input (environmental alarm input 15) is active. Typically, this input will be connected to the power shelf, and will indicate that the DC power or the cooling fan in a remote terminal cabinet has failed. Note: The actual message that appears in the alarm and status report for this condition can be provisioned; this is the default message. (See the rtrv-attr-env and set-attr-env commands.)
fan control relay failed	MN	The thermostat on the SYCTL circuit pack indicates that the cooling fan should be turned on, and the fan control relay on the SYCTL circuit pack failed to operate or the fan control relay output (backplane connector J42) does not connect to a fan. The system will continue to operate, but it might overheat, leading to degraded or interrupted transmission and/or circuit pack failures. Likely causes: Telemetry output common pin on J42 not grounded; SYCTL circuit pack failure.
fan shelf failed	MN	The system has detected a failure of the DDM-2000 fan shelf. The system will continue to operate but it may overheat. The fan must be replaced within 4 hours of the failure, otherwise service may be interrupted and/or circuit packs may fail. Likely causes: Filter needs replacing, a fan pack failed, a fan pack has lost one or both power feeders, or the fan shelf control board has failed.
forced switch	ABN	When associated with a line, this message means that the identified line is not selected as the active receiving line, and an automatic protection switch to make this the active receiving line will not be done. The forced switch will remain in effect until the protection switch is reset, or a lockout or inhibit switch request is received. Note: Switching is unidirectional (one-way). Because of this, the specified line might still be active (if the far end is selecting the specified line to receive traffic), and the far end might still be free to switch the line it is selecting to receive traffic. (See the switch-path-vt1 or switch-ls command.)
frequency error	MJ	The alarm condition indicates that the frequency of an incoming OC-1 signal deviates by greater than 3 ppm from the local system clock. Check the external timing source or the timing obtained from a remote shelf.

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
holdover mode active	NE ACTY	The system is in holdover synchronization mode. Likely causes: A. The system was manually switched to holdover mode (with the switch-sync command) and the switch has not been reset. B. The system automatically switched to holdover mode due to failure of the timing references, as follows: a. The reference failures have not cleared. b. The system is provisioned for nonrevertive synchronization mode switching. c. The system is provisioned for line-timed operation and the optical line, or an OLI circuit pack has failed, or a message indicating an upstream clock problem has been received on the sync message bits of the optical line. (See the rtrv-sync command.) d. The system is provisioned for sync message signaling, but the upstream system from which it line times has not been provisioned for sync message signaling. The condition can be cleared by provisioning both systems the same. (See the set-sync and rtrv-sync commands.) The condition can be cleared by repairing at least one of the timing references (if both are failed) and resetting the synchronization mode protection switch with switch-sync:s=mode:pr=reset command. In a central office system, the synchronization mode can also be reset with TBOS control point.
illegal CP type	CR, MJ or MN	An illegal or unknown circuit pack type has been inserted into the shelf.

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
inc. (from DSX) DS1 LOS	NE ACTY	At least 128 consecutive zeros are received in the DS1 signal incoming from the DSX-1 or T1 interface, or the energy at the DS1 input is below a preset threshold. Likely causes: Hard failure of upstream equipment or facility (towards the DSX-1 or T1 interface). The DS1 input is disconnected at the backplane or the DSX-1 or T1 interface; equipment is failed or removed at DSX-1 or T1 interface.
inc. (from DSX) DS1 sig fail	NE ACTY	The bit error ratio (BER) in the DS1 signal incoming from the DSX-1 or T1 interface exceeds the provisioned failure threshold, 10^{-3} , 10^{-6} , 10^{-7} , or 10^{-8} . Likely causes: Mismatch of line code (AMI/B8ZS). Failure of upstream equipment or facility (towards the DSX-1 or T1 interface). Cross-talk in office wiring. Failure of the DS1 , DS1PM , or T1EXT circuit pack.
inc. OC1 FERF	NE ACTY	The system has detected the OC-1 far end receive failure (FERF) signal in the incoming OC-1 signal. Likely causes: The far end has detected an incoming signal failure on the specified OC-1 line. This may be caused by failure of the OLIUI circuit pack at the near end, the OLIUI circuit pack at the far end, or the transmit cable on the specified line.
inc. OC1 line AIS	CR or NE ACTY	The system has detected the OC-1 line alarm indication signal (AIS) on an incoming OC-1 line. Likely cause: Failure of an OLIUI circuit pack at the far end.
inc. OC1 LOF	CR or MN	The system has detected a loss-of-frame (LOF) condition in an incoming OC-1 signal. LOF is defined as an out of frame (OOF) condition (five consecutive errored STS-1 framing patterns) that lasts for at least three milliseconds. Likely cause: Failure of the OLIUI circuit pack at the far end, failure of the OLIUI circuit pack at the near end, or failure of the receive fiber.
inc. OC1 LOS	CR or MN	The system has detected loss of signal (LOS) condition on the OC-1 line. Likely cause: Failure of the OLIUI circuit pack at far end, failure of the OLIUI circuit pack at the near end, or failure of the receive fiber.

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
inc. OC1 sig degrade (BER)	CR or MN	The bit error ratio (BER) in the specified OC-1 line exceeds the provisioned soft error threshold (10^{-9} to 10^{-5}) but below the hard error threshold of 10^{-3}. Likely causes: Failure of the OLI circuit pack at the near end, failure of the OLI circuit pack at the far end, or failure of the receive fiber.
inc. OC1 sig failed (BER)	CR or MN	The bit error ratio (BER) in the received OC-1 signal exceeds 10^{-3}. Likely causes: Failure of the OLI circuit pack at the near end, failure of the OLI circuit pack at the far end, or failure of the receive fiber.
inc. STS1 AIS	CR, MJ, MN, or none	The system has detected an incoming STS-1 alarm indication signal (AIS) in the active OC-1 line. The system responds by transmitting DS1 AIS toward the DSX or T1 interface and transmitting STS-1 yellow toward the fiber from which the AIS is being received. Likely causes: Incomplete or incorrect cross-connect provisioning in an end-to-end network; unprotected removal or failure of a OLI circuit pack at the far end, or unprotected optical line failure.
inc. STS1 LOP OC1 slotaid	CR or MN	The system has detected a loss-of-pointer (LOP) condition. A valid STS-1 pointer could not be found for eight consecutive frames in the identified STS-1 signal. Likely causes: If this condition occurs on the STS-1 on both OC-1 lines, the likely cause is an unprotected failure of an MXRVO or an OLI circuit pack at the far end. If this condition occurs on only one OC-1 line, the likely cause is failure of the OLI circuit pack at the near end or far end.
inc. STS1 sig degrade (BER)	CR or MN	For STS-1 path ring applications, the bit error ratio (BER) of the specified STS-1 signal exceeds the user-provisioned signal degrade threshold. Likely cause: Failure at a fiber or failure of an OLI circuit pack at some point in the STS-1 path.

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
inc. STS1 sig failed (BER)	CR or MN	For ring applications, the bit error ratio (BER) of the specified STS-1 signal exceeds the signal fail threshold (10^{-6}). For VT1.5 path-switched rings, the system responds by inserting VT path AIS in each pass-through VT contained in the STS-1. Locally, the system will select the VTs from the STS-1 on the other ring, as appropriate. Likely causes: Failure of the near end OLI circuit pack reporting the STS-1 failure, failure of the far end OLI circuit pack, or failure of the receive fiber if the OC-1 is also reporting a failure.
inc. STS1 unequipped	CR or MN	The system has detected the unequipped code (SONET path overhead signal code label byte=0) on an in-service STS-1 channel. Likely causes: An upstream STS-1 cross-connect has been deleted.
inc. STS1 yellow	NE ACTY	The system has detected an incoming STS-1 yellow signal, which indicates that the far end is receiving STS-1 AIS on the active OC-1 line. The system responds to the STS-1 yellow signal by transmitting DS1 yellow toward the DSX. Likely causes: Incomplete or incorrect cross-connect provisioning in end-to-end network, unprotected unidirectional failure of the OLI circuit pack, or fiber at some point in the end-to-end path.
inc. VT AIS	CR, MJ, MN, or none	The system has detected VT path alarm indication signal (AIS) incoming from the active OC-1 line. The system responds by transmitting DS1 AIS toward the DSX-1 or T1 interface and VT yellow toward the fiber from which the AIS is being received. Likely causes: Incomplete or incorrect cross-connect provisioning in end-to-end network; unprotected removal or failure of a DS1, DS1PM, or T1EXT circuit pack at the far end. In ring applications, a non-service affecting VT AIS alarm message may result from an upstream OLI circuit pack or fiber failure affecting only one ring direction. A VT yellow alarm message is not returned for a non-service affecting VT AIS.

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
inc. VT LOP	MJ or MN	The system has detected a VT loss-of-pointer (LOP) condition. Likely causes: Unprotected failure of a DS1, DS1PM, or T1EXT circuit pack at the near end or far end; unprotected failure of an MXRVO circuit pack at the far end; unprotected failure of a OLI circuit pack at the near end or far end; unprotected failure of a protection OLI circuit pack at the far end.
inc. VT sig degrade (BER)	MJ or MN	In a VT path switched ring, the system has detected a VT error rate that exceeds the provisioned threshold of 10^{-5} to 10^{-8}. The system selects a good VT signal from the other ring path. Likely causes: An OLI circuit pack failure or a fiber failure at some point on the failed ring.
inc. VT unequipped	MJ or MN	The system has detected the unequipped code (SONET path overhead VT signal code label byte=0) on an in-service VT1.5 channel. Likely causes: An upstream VT1.5 cross connect has been deleted or a DS1, DS1PM, or T1EXT low-speed (LS) slot has been unequipped.
inc. VT yellow	NE ACTY	The far end is detecting VT AIS or VT LOP and inserting VT yellow in its transmit signal. Likely causes: Unprotected unidirectional failure of a DS1, DS1PM, or T1EXT circuit pack at the near end or far end, or fiber at some point in the end-to-end path.
inconsistent DCC values	MJ	The Network Side/User Side parameters are set the same at both ends of a DCC (optical span). (See the set - fecom command.)
inhibit auto. OS messages	ABN	This message occurs when TL1 autonomous alarm reporting is inhibited by the TL1 INH-MSG command. This message is cleared by enabling autonomous message reporting with the TL1 ALW-MSG command.
lockout of protection	ABN	When associated with a low speed (LS) protection slot, this message means that no service slot in the entire low speed group will be allowed to switch to protection. The lockout will remain in effect until the protection switch is reset. (See the switch - ls command.)

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
lockout of service	ABN	When associated with a low speed (LS) service slot, this message means that the specified LS service slot is active and will not be switched to protection. The lockout will remain in effect until the protection switch is reset. (See the <code>switch-ls</code> command.)
LS prot assembly removed	MJ	The system has been reset with no low-speed protection assembly installed. This is not a valid system configuration. The user should install a low speed protection assembly and execute the reset function.
LS prot mode not chgd-(crs)	MJ	An attempt to change the low-speed protection mode has failed because all cross connections terminating on low speed ports were not removed. The user should remove all such cross connections and execute the reset function.
manual switch	ABN	The specified DS1 , DS1PM , or T1EXT circuit pack is manually switched to protection. The manual switch will remain in effect until the protection switch is reset or until a failure occurs and an automatic switch preempts the manual switch. (See the <code>switch-ls</code> command.)
manual sync. mode switch	ABN	The synchronization mode has been manually switched to holdover or free running and will remain in that mode until the switch request is reset. (See the <code>switch-sync</code> command.)
OLIU CP failed	CR or MN	Internal equipment failure of the specified OLIU circuit pack.
program installation IP	Status	This system is being used to install software into another system. If this procedure is interrupted prior to completion, the remote systems' control circuit packs will likely become inoperable until another install program attempt is successful.
protection CP different	MN	This message will only be seen when a FiberReach node is configured for 1X7 low-speed protection. The circuit pack in the protection slot is different from and will not protect all of the circuit packs in the service slots. If this is acceptable, execute the <code>update (upd)</code> command to clear the alarm. Otherwise, one or more of the service or protection circuit packs must be changed.
section DCC channel failed	MJ or MN	The system cannot communicate with the far-end system through the SONET section data communications channel (DCC). Likely causes: SYSCTL or OHCTL circuit pack failure, reset, or initialization at the far end; failed program installation at far end; program installation in progress at the far end; SYSCTL or OLIU circuit pack failure at the near end.

Table B – RTRV-ALM Message Descriptions (Continued)

Description	Alarm Level	Meaning
SYSCTL CP failed	MJ	Internal equipment failure of the SYSCTL circuit pack. The system has determined that some part of the SYSCTL circuit pack has failed. Note that some types of failures cannot be reported since the SYSCTL circuit pack cannot function under these conditions.
SYSCTL standby boot fail	MN	Internal equipment failure of the SYSCTL circuit pack failed during local or remote software download. Likely cause: SYSCTL circuit pack hardware failure.
T1EXT CP failed	MJ or MN	Internal equipment failure of the specified T1EXT circuit pack.
TID Address map full	MJ	The size of the directory services network element (DSNE) database has been exceeded. Likely causes: Network elements have been removed from the network but not from the DSNE database. (See the dlt-tadrmap command.)
unexpected CP switches	CR, MJ, or MN	When associated with the SYSCTL slot, this message means that an invalid switch setting has been selected or some of the unused switches are not in the prescribed position. For DS1 , DS1PM , or T1EXT slots, this message means that a change in a circuit pack switch setting was made.
unexpected CP type	CR, MJ, or MN	When associated with a low-speed (LS) slot equipped with a DS1 , DS1PM , or T1EXT circuit packs, this message means that a different but supported DS1 , DS1PM , or T1EXT circuit pack (for example, BBF3 circuit pack) is inserted in a slot already provisioned.

Clear Obscure Failure Condition

1.



NOTE:

It is assumed that a set of alarms or conditions exist which are inconsistent or may not have associated LEDs indications.

Perform LED test by depressing the **ACO/TST** pushbutton or using the CIT command `test - led`.

Reference: **DLP-509**

2. Did any LED fail the LED test?

If **YES**, then do **TAP-115**.

If **NO**, then continue with **Step 3**.

3. Is a CIT available?

If **YES**, then proceed to **Step 7**.

If **NO**, then continue with **Step 4**.

4. Are there associated LED indications (for example, **NE ACTY** or **FE ACTY** LED lit; **CR**, **MJ**, **MN**, **PMN**, etc. LED lit when alarm is present, etc.)?

If **YES**, then continue with **Step 5**.

If **NO**, then proceed to **Step 11**.

5.



NOTE:

Unseating and reseating the **SYCTL** performs a reset procedure which restarts the software program.

Unseat and reseal **SYCTL** circuit pack. Do not depress **UPD/INIT** button.

6. Is trouble still present?

If **YES**, then proceed to **Step 9**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7. Use the CIT and reset command to reset **SYCTL**.

8. Is the trouble still present?

If **YES**, then continue with Step 9.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- 9.



CAUTION:

*Replacing the **SYSCTL** involves updating the internal memory on the circuit pack.*

Replace the **SYSCTL**.

Reference: DLP-501

10. Is the trouble still present?

If **YES**, then continue with **Step 11**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- 11.



NOTE:

The problem may be in the backplane wiring of the FiberReach shelf. One way to verify this is to swap the **SYSCTL** and any circuit pack with an inconsistent diagnostic indication with the corresponding circuit packs in another FiberReach shelf. If the problem moves with the circuit packs, it means that one or more of the circuit packs is defective. If the problem stays with the original FiberReach shelf, the entire assembly, but not the circuit packs, should be replaced. The FiberReach shelf has a printed backplane and cannot be repaired in the field.



NOTE:

A CIT and the system `rtrv-( )` commands may be helpful in determining the condition of the system.

Use CIT and `rtrv-alm` command to get an alarm and status report. See the "Commands and Reports" section of this manual under **RTRV-ALM** for a description of each message retrieved with the `rtrv-alm` command.

If you need technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Abnormal (ABN) Indication

1.



NOTE:

The **ABN** LED indicates a manually caused abnormal condition. Table A lists the conditions which may cause an **ABN** alarm. These conditions may have been initiated locally, from another DDM-2000 at the other end of the facility, or through telemetry.

Is the **CR**, **MJ**, **MN**, or **PMN** LED on the User Panel lit?

If **YES**, then continue with **Step 2**.

If **NO**, then proceed to **Step 4**.

2.



NOTE:

It is better to clear the higher priority alarms (**CR**, **MJ**, etc.) first, although in most cases this will not clear an **ABN** alarm. If the higher priority alarm is cleared first, you can then use this procedure to clear the **ABN** alarm.



NOTE:

In some cases, clearing an **ABN** alarm will result in a higher priority alarm being cleared. For example, clearing the abnormal condition manual sync. mode switch may cause an excessive holdover **MJ** alarm to clear.

Refer to Task Index **IXL-001** for procedure to clear the indicated alarm.

3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4. Is a CIT available?

If **NO**, then continue with **Step 5**.

If **YES**, then proceed to **Step 12**.

5.



NOTE:

The **FE SEL** button on the **SYSCTL** is used to display local and remote alarm and status conditions [**DLP-530**].

Use **FE SEL** button to display alarm conditions for "local shelf" (**L.** displayed in **FE ID** display).

6. Was **NE ACTY** LED lit on the User Panel when local shelf alarm conditions are displayed (**L.** displayed in **FE ID** display)?

If **YES**, then proceed to **Step 27**.

If **NO**, then continue with **Step 7**.

7. Use **FE SEL** button to display alarm conditions for other sites/shelves in the network (observe site address in **FE ID** display).

8. Was **NE ACTY** LED lit on User Panel when alarms were displayed for any "selected site"?

If **YES**, then continue with **Step 9**.

If **NO**, then do **TAP-108**.

9. Refer to **DLP-530** and use **FE SEL** pushbutton on **SYSCTL** to display far-end alarm conditions for other sites/shelves in the network.

10. Issue a trouble report of abnormal (**ABN**) alarm condition at the far-end DDM-2000 terminal.

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- 12.

⇒ **NOTE:**
For all network configurations, there will be multiple far-end farend terminals. Troubleshooting multi-shelf DDM-2000 networks is facilitated by use of a Craft Interface Terminal (CIT).

Connect the CIT to the **CIT** connector on the near-end User Panel and log in to the near-end system, if not already performed.

Reference: **DLP-521**

- 13.

⇒ **NOTE:**
The `rtrv-alrm` command can be used to display a report of active alarm and status conditions. The "Commands and Reports" section of this manual gives a description of the command.

NOTE:
The Active Alarm and Status Report is output automatically following CIT log in. The report shown in Figure 1 is an example that shows several entries. There may be only one entry in the actual report.

Note the information in the Source Address and Description columns for the top entry/entries above the first single-dashed line in the Active Alarm and Status Report (Figure 1) (for example, "abnormal a-1-1 MM-DD HH:MM:SS nsa DS1 loopback").

```

/* Active Alarms and Status Report
=====
Alarm      Source      Date      Time      Srv  Description
Level      Address          Detected
=====
abnormal    a-1-1      MM-DD    HH:MM:SS    nsa  DS1 loopback
-----
*/

```

Figure 1 – Example of Active Alarms and Status Report

14.

NOTE:
Far-end alarm or status conditions are listed in this report with a Source Address of "far end." Local alarm or status conditions have a Source Address of the local slot, line, port, channel, path, cross-connection, or operations interface (DCC, TBOS, etc.) where the event occurred. (See *Addresses* in the "Commands and Reports" section of this manual.) Use the `rt rv-a lm` command to get another report, if necessary.

Does the Source Address of any top entry in the alarm report indicate local slot, channel, port or operations interface for the abnormal alarm?

If **NO**, then do **TAP-107**.

If **YES**, then continue with **Step 15**.

15. Use `opr -aco` command to silence active audible office alarms, if required.

16. Note the **local** trouble indication in the Description column of the Active Alarm and Status Report, starting with the highest alarm level (abnormal) listed in the Alarm Level column.

17. Find the trouble description in Table A for the highest alarm level and note the related commands.

Table A – Abnormal (ABN) Alarm and Status Conditions

Description	Related Commands
DS1 loopback	opr-lpbk-t1
DS1 loopback (to Fiber)	rls-lpbk-t1
DS1 loopback (to DSX)	
DS1 trmsn test IP	test-trmsn-t1
forced switch	switch-ls switch-sync
inhibit auto. OS messages	INH-MSG (TL1) ALW-MSG (TL1)
lockout of protection	switch-ls
lockout of service manual switch	switch-ls
manual sync. mode switch	switch-sync

- 18.



CAUTION:

*You must determine the reason for the **ABN** indication before attempting to clear it.*

Use the command `rtrv-state` to see if you can determine the condition associated with the **ABN** indication.

19. Contact the appropriate personnel at your location, at the far-end location, and at any central maintenance location to determine the reason for the **ABN** indication before clearing it.
20. Have you determined that it is appropriate for you to clear the condition causing the **ABN** indication?
 - If **YES**, then proceed to **Step 23**.
 - If **NO**, then continue with **Step 21**.
21. There is nothing more to be done until the reason for the **ABN** condition is known.
22. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
23. Use the appropriate command to clear the abnormal condition. The command will be `rls-lpbk-( )` or `switch-( )`.

24. Is the **ABN** indicator still lit?
 - If **YES**, then continue with **Step 25**.
 - If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
25. Use the `rtrv-alm` command to determine if there are other conditions causing the **ABN** alarm. See Table A.
26. See Table A. Does the `rtrv-alm` command report any other abnormal conditions.
 - If **NO**, then do **TAP-108**.
 - If **YES**, then repeat this procedure from **Step 16**.
27. Unseat and reseal the **SYSCTL** to perform a reset.
28. Is the **ABN** LED still lit?
 - If **YES**, then continue with **Step 29**.
 - If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
29. Obtain CIT and repeat this procedure from **Step 12**.

Clear Flashing FAULT LED Indication

1. Is the **MN** LED lighted on the User Panel?
If **YES**, then do **TAP-112**.
If **NO**, then continue with **Step 2**.
2. Is the **MJ** LED lighted on the User Panel?
If **YES**, then do **TAP-102**.
If **NO**, then continue with **Step 3**.
3. Is the **CR** LED lighted on the User Panel?
If **YES**, then do **TAP-101**.
If **NO**, then continue with **Step 4**.
4. Is the **FAULT** LED flashing on the faceplate of one or more **DS1**, **DS1PM**, or **T1EXT** circuit packs?
If **YES**, then continue with **Step 5**.
If **NO**, then proceed to **Step 10**.
5.
 **NOTE:**
There is an incoming DS1 signal failure. This failure can be further isolated using a CIT.
Is a CIT available?
If **YES**, then continue with **Step 6**.
If **NO**, then proceed to **Step 8**.
6. Connect the CIT to the connector on the User Panel and establish session.
Reference: **DLP-521**
7. Refer to the "Commands and Reports" section of this manual under **RTRV-()** and use the `rtrv-( )` commands to further isolate the particular incoming DS1 signal failure.

8. Switch service to protection. If LED is flashing on protection **DS1**, **DS1PM**, or **T1EXT** circuit pack, issue trouble report of bad incoming signal at input to **DS1**, **DS1PM**, or **T1EXT** circuit pack with flashing LED(s). If LED is not flashing on protection **DS1**, **DS1PM**, or **T1EXT** circuit pack, replace service **DS1**, **DS1PM**, or **T1EXT** circuit pack [**DLP-523**].
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Main OLIU or Fiber Trouble Path Protected Ring

1.



WARNING:

Open optical connectors may emit invisible laser radiation. Do not view beam with optical instruments. Avoid direct exposure to the beam. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CAUTION:

*When removing **OLIU** circuit packs or replacing fiber, ensure that all VT/STS paths are active on the **OLIU** and fiber that is **NOT** being removed or replaced. When available, use a CIT and the `switch-path- ( ):all:pri>manual` command to switch all VT/STS paths to the **OLIU** and fiber that are not being removed or replaced. It is also recommended to log in to the far end of the **OLIU** and use the `switch-path- ( ):all:pri>manual` command to switch all VT/STS paths to the **OLIU** and fiber that are not being removed or replaced. Be aware that if locked cross-connections are used, the service will be interrupted when a **OLIU** is replaced.*



NOTE:

A lighted **FAULT** LED on the **OLIU** indicates that either the receiver, the transmitter, or both has failed. A flashing **FAULT** LED on the **OLIU** indicates that either the near-end receiver, far-end transmitter, or incoming (receive) fiber has failed. In a Path Protected Ring network, both **OLIUs** are normally **ACTIVE**. One **OLIU** carries service on one path of the ring and the other **OLIU** carries service on the other path. If possible, log into shelf associated with source address (for example, `main-2`) of `inc. OC1 LOS`, etc. to see if circuit pack is removed or failed.

Was **OLIU(s)** removed, or being replaced, or installed when alarm occurred?

If **YES**, then continue with **Step 2**.

If **NO**, then proceed to **Step 8**.

2.



NOTE:

An alarm will occur if a circuit pack is removed without performing an update by momentarily depressing the **UPD/INIT** button or using the upd command.

Is any previously installed **OLIU(s)** removed from the shelf?

If **YES**, then continue with **Step 3**.

If **NO**, then proceed to **Step 5**.

3. Determine the reason the circuit pack was removed. If the same circuit pack is to be reinserted, reinstall the circuit pack. If the circuit pack was removed and is not to be reinserted, momentarily depress the **UPD/INIT** button on the **SYSCTL** to remove the circuit pack from equipment inventory.

4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5. Is **OLIU(s)** installed in correct slot(s) (rtrv-eqpt)?

If **NO**, then continue with **Step 6**.

If **YES**, then proceed to **Step 8**.

6. Remove optical fibers from circuit packs, if connected, then remove circuit pack(s) from wrong slot(s). Install circuit pack(s) into correct slot(s). Reconnect optical fibers (**DLP-514**).

7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8. Is **FAULT** LED lighted (**OLIU CP failed**) on **OLIU** at any location associated with source address?

If **YES**, then continue with **Step 9**.

If **NO**, then proceed to **Step 11**.

9. Replace **OLIU** with lighted **FAULT** LED.

Reference: **DLP-523**

10. Is **FAULT** LED still lighted (**OLIU CP failed**) on **OLIU**?

If **YES**, then do **TAP-106**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11. Is **FAULT** LED flashing (inc. OC1 LOS) on **MAIN-1** or **MAIN-2 OLIUs**?

If **YES**, then continue with **Step 12**.

If **NO**, then proceed to **Step 14**.

12.



NOTE:

Indications are that the incoming (receive) optical fiber line has failed or near-end or far-end **MAIN-1** or **MAIN-2 OLIUs** have failed.

Check optical fiber lines per local procedures, repair if necessary. If no trouble is found in the optical fibers, replace **OLIU(s)** at near end first (**DLP-523**). If trouble still exists, replace **OLIU(s)** at far end. Check for removed or failed **TGS** or **MXRVO** circuit packs at the far end. If trouble still exists, trouble is in receive optical fiber associated with **OLIU** with flashing LED. Clear trouble in optical fiber per local procedures.

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14. For technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Minor (MN) Alarm

1.



NOTE:

Table A lists some possible causes and indications of minor alarms.

Is a CIT available?

If **NO**, then continue with **Step 2**.

If **YES**, then proceed to **Step 10**.

2. On the User Panel, momentarily depress **ACO** button to silence active audible office alarms.

3.



NOTE:

The **FE SEL** button on the **SYSC TL** is used to display local and remote (farend) alarm and status conditions [**DLP-530**].

Use **FE SEL** button to display alarm conditions for local shelf (**L.** displayed in **FE ID** display).

4. Was **NE ACTY** LED lit on User Panel when local shelf alarm conditions were displayed (**L.** displayed in **FE ID** display)?

If **NO**, then continue with **Step 5**.

If **YES**, then proceed to **Step 15**.

5. Use **FE SEL** button to display alarm conditions for other sites/shelves in the network (observe site address in **FE ID** display).

6. Was **NE ACTY** LED lit on User Panel when alarms were displayed for any selected site?

If **YES**, then continue with **Step 7**.

If **NO**, then do **TAP-108**.

7. Use **FE SEL** button to display alarm conditions for other sites/shelves in the network (observe site address in **FE ID** display) [**DLP-530**].

8. Issue a trouble report of critical alarm condition at the far-end DDM-2000 site indicated in **FE ID** display.

9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- 10.

⇒ **NOTE:**
For all network configurations except point-to-point, there will be multiple far-end terminals. Troubleshooting multi-shelf DDM-2000 networks is facilitated by use of a Craft Interface Terminal (CIT).

Connect the CIT to the **CIT** connector on the near-end User Panel and log in or remote log in to the near-end system, if not already performed.

Reference: **DLP-521**

- 11.

⇒ **NOTE:**
The `rtrv-alm` command can be used to display a report of active alarm and status conditions. The Commands and Reports section of this manual gives a description of the command.

⇒ **NOTE:**
The Active Alarm and Status Report is output automatically following CIT log in. The report shown in Figure 1 is an example that shows several entries. There may be only one entry in the actual report.

Note the information in the Source Address and Description columns for the top entry/entries above the first single-dashed line in the Active Alarm and Status Report (Figure 1) (for example, "MINOR dcc-m2 MM-DD HH:MM:SS nsa section channel failed").


```

*Active Alarms and Status Report
=====
Alarm      Source      Date      Time      Srv      Description
Level      Address     Detected
=====
MINOR      farend      MM-DD      HH:MM:SS   nsa      SiteXNE1
MINOR      dcc-m2      MM-DD      HH:MM:SS   nsa      section dcc channel failed
-----
ne-acty    farend      MM-DD      HH:MM:SS   -        SiteYNE1
ne-acty    m2-1       MM-DD      HH:MM:SS   -        inc. STS1 yellow
ne-acty    m2-2       MM-DD      HH:MM:SS   -        inc. STS1 yellow
ne-acty    main-2     MM-DD      HH:MM:SS   -        inc. OC1 FERF
*/

```

Figure 1 – Example of Active Alarms and Status Report

12.



NOTE:

Far-end alarm or status conditions are listed in this report with a Source Address of farend. Local alarm or status conditions have a Source Address of the local slot, line, port, channel, path, cross-connection, or operations interface (DCC, TBOS, etc.) where the event occurred. (See *Addresses* in the “Commands and Reports” section of this manual.) Use the `rtrv-alrm` command to get another report, if necessary.

Does the Source Address of any top entry in the alarm report indicate **local** slot, channel, port or operations interface for the MINOR alarm?

If **NO**, then do **TAP-107**.

If **YES**, then continue with **Step 13**.

13. Use `opr-aco` command to silence active audible office alarms, if required.

14. Note the trouble indication in the Description column of the Active Alarm and Status Report, starting with the highest alarm level (Minor) listed in the Alarm Level column.

15. Find the trouble description in Table A for the highest alarm level and go to the indicated step or procedure.

Table A – Minor (MN) Alarm Conditions

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MN LED lit.	-48V power/fuse FA FB failed	A –48V power feeder or fuse on User Panel has failed	Check power feeders or replace fuse. [DLP-555]
	automatic protection switch (APS) – automatic lock	Four automatic switches of a single DS1 , DS1PM , or T1EXT circuit pack in 10 minutes, probably because of an intermittent failure of the DS1 , DS1PM , or T1EXT circuit pack.	Replace DS1 , DS1PM , or T1EXT circuit pack. [DLP-523]
	CP not allowed – (crs)	Circuit pack does not support the manual cross-connection(s) currently provisioned for this slot.	Change circuit pack or change cross-connections.
	CP not allowed – (eqpt)	A DS1 , DS1PM , or T1EXT circuit pack is installed in a low speed slot and has caused a protection mismatch between a service slot and a protection slot. Identifies a circuit pack upgrade that is not allowed.	Change service or protection circuit pack to eliminate mismatch. User will have to update the slot pair to "auto" before inserting the new circuit pack type.
	protection CP different	This message will only be seen when a FiberReach node is configured for 1X7 low speed protection. The DS1 , DS1PM , or T1EXT circuit pack in the protection slot is different from and will not protect all of the circuit packs in the service slots.	If this is acceptable, execute the update function to clear the alarm. Otherwise, one or more of the DS1 , DS1PM , or T1EXT service or protection circuit packs must be changed.
MN LED lit. FAULT LED lit on affected circuit pack	DS1 CP failed DS1PM CP failed OLIU CP failed T1EXT CP failed	Internal failure of circuit pack with lit LED	Step 17

Table A – Minor (MN) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MN LED lit.	CP removed	A DS1 , DS1PM , T1EXT , or OLI circuit pack previously installed in this system is removed. The circuit pack should be replaced, or an update upd command should be done to remove it from the system equipment list.	Step 25
MN LED lit.	environmentn [†]	The specified environmental alarm point (misc. discrete input) is active at RT. Note: The actual message that appears in the alarm and status report for this condition can be provisioned; this is the default message. See the rtrv-attr-env and set-attr-env commands.	Use rtrv-attr-env command at RT to determine trouble.
	ExternalMinor [†]	The specified environmental alarm point (miscellaneous discrete input) is active. Typically, this input will be connected to the power shelf, and will indicate that the DC power or the cooling fan in a remote terminal cabinet has failed. Note: The actual message that appears in the alarm and status report for this condition can be provisioned; this is the default message. See rtrv-attr-env and set-attr-env commands.	Use rtrv-attr-env command at RT to determine trouble.
MN LED lit. LEDs lit on fan shelf	fan control relay failed	Telemetry output common pin on J42 is not grounded. SYSCTL circuit pack failure.	Step 17

Table A – Minor (MN) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MN LED lit. FAULT LED lit on SYSCTL	fan shelf failed	Filter needs replacing, a fan pack has failed, fan shelf has lost one or both power feeders, or the fan shelf control board has failed. The fan must be replaced within 4 hours of the failure; otherwise service might be interrupted and/or circuit packs might fail.	TAP-118
MN LED lit. FAULT LED lit on affected circuit pack	illegal CP type	An illegal or unknown circuit pack type has been inserted into the shelf.	Remove circuit pack and install correct circuit pack.
MN LED lit. FAULT LED lit on affected circuit pack	inc. (from DSX) DS1 LOS† inc. (from DSX) DS1 sig fail†	Hard failure of upstream equipment or facility (towards the DSX-1 or T1 interface). The DS1 or T1 input is disconnected at the backplane or the DSX-1 or T1 interface; equipment is failed or removed at the DSX-1 or T1 interface. Mismatch of the line code (AMI/B8ZS); cross talk in office wiring; failure of DS1 , DS1PM , or T1EXT circuit pack.	Step 23
MN LED lit. FAULT LED flashing on OLI	inc. OC1 LOF inc. OC1 LOS inc. OC1 sig degrade (BER) inc. OC1 sig failed (BER)	Failure of OLI at near end or far end, or failure of receive fiber.	TAP-111
	inc. STS1 LOP OC1 slotaid	If failure occurs on the STS-1 both OC-1 lines; the likely cause is an unprotected failure of an MXRVO or an OLI circuit pack at the far end.	Step 41

Table A – Minor (MN) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
		If failure occurs on only one OC-1 line; the likely cause is failure of the OLI circuit pack at the near or far end.	TAP-111
MN LED lit.	inc. STS1 AIS*	Incomplete or incorrect cross-connect provisioning in an end-to-end network; unprotected removal or failure of OLI circuit pack at far end; or unprotected optical line failure.	TAP-118
	inc. STS1 sig. degrade (BER)	Failure of OLI circuit pack at some point in the STS-1 path or failure of receive fiber.	TAP-111
	inc. STS1 sig. failed (BER)	Failure of the near end OLI circuit pack reporting the STS-1 failure; failure of the far end OLI ; or failure of the receive fiber if the OC-n is also reporting a failure.	TAP-111
	inc. STS1 unequipped	An STS-1 cross-connect has been deleted in upstream equipment interfacing with the DDM-2000 OC-1 ring.	Find the deleted cross-connect in the upstream equipment.

Table A – Minor (MN) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
MJ LED lit.	inc. VT AIS*	Incomplete or incorrect cross-connect provisioning in end-to-end network; unprotected removal or failure of DS1 , DS1PM , or T1EXT circuit pack at far end. In ring applications; a non-service affecting VT AIS alarm message may result from an upstream OLI circuit pack or fiber failure affecting only one ring direction. A VT yellow alarm message is not returned for a non-service affecting VT AIS.	TAP-118
	inc. VT LOP	Unprotected failure of DS1 , DS1PM , or T1EXT circuit pack at near end or far end, unprotected failure of MXRVO circuit pack at far end, unprotected failure of OLI circuit pack at the near end or far end, or unprotected failure of both OLI circuit packs at far end.	Replace circuit pack associated with alarm.
	inc. VT sig degrade (BER)	An OLI circuit pack failure or a fiber failure at some point on the failed ring.	TAP-111
	inc. VT unequipped	An VT1.5 cross-connect has been deleted in upstream equipment interfacing with the DDM-2000 OC-1 ring.	Find the deleted cross-connect in the upstream equipment.

Table A – Minor (MN) Alarm Conditions (Continued)

Alarm Level or LED Indication	Trouble Description (Note)	Likely causes	Step or Procedure
	section DCC channel failed	SYSCTL or OHCTL circuit pack failure, reset, or initialization at far end. SYSCTL circuit pack removed from a site. Program installation in progress or failed at far end. SYSCTL or OLIUI circuit pack failed or removed at near end. Fiber failure between this node and node connected to the source address (no communication with other end).	Step 45
MN LED lit. FAULT LED lit on affected circuit pack.	SYSCTL standby boot fail	SYSCTL circuit pack failed during local or remote software download.	Try software download again; download a compatible version of software; or replace SYSCTL circuit pack.
	unexpected CP switches	When associated with the SYSCTL circuit pack; an invalid switch setting has been selected or some of the unused switches are not in the prescribed position. For DS1 , DS1PM , or T1EXT circuit pack; switch settings invalid, different from other circuit pack, or different than they were before circuit pack was removed or replaced.	Step 37
	unexpected CP type	When associated with a low speed slot, this message means that a different but supported circuit pack type (for example BBF3) is inserted in a slot already provisioned.	Step 34

* May be provisioned for Critical, Major, Minor, or no alarm.

† May be provisioned for Major, Minor, or no alarm.

Note: Similar descriptions of trouble may also appear in the CIT alarm and status report.

16. Is a **FAULT** LED lit or flashing on an **OLI** circuit pack?
- If **YES**, then do **TAP-111**.
- If **NO**, then continue with **Step 17**.
17. Is the **FAULT** LED lit (not flashing) on the faceplate of one and only one circuit pack of the **DDM-2000**?
- If **YES**, then continue with **Step 18**.
- If **NO**, then proceed to **Step 21**.
- 18.
-  **CAUTION:**
Replacement circuit packs may have option switches which must be properly set before the circuit pack is installed.
- Check circuit pack option switch settings for improper or invalid settings. If no trouble is found, refer to **DLP-523** and replace the circuit pack with the lit **FAULT** LED.
19. Is the **MN** LED off on the User Panel?
- If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
- If **NO**, then continue with **Step 20**.
20. Is the **FAULT** LED lit on the faceplate of the replacement circuit pack just installed?
- If **YES**, then do **TAP-106**.
- If **NO**, then return to **Step 1**.
21. Is the **FAULT** LED on the faceplate of one or more circuit packs flashing?
- If **YES**, then continue with **Step 22**.
- If **NO**, then proceed to **Step 25**.
22. Find the circuit pack(s) with the flashing LED(s) in Table B and go to the step indicated.

Table B – Flashing LEDs

Circui Pack With Flashing LED	Go To
DS1/DS1PM/T1EXT	Step 23

23. There is an incoming DS1/T1 signal failure. Switch service to protection. If LED is flashing on protection **DS1**, **DS1PM**, or **T1EXT** circuit pack, issue trouble report of bad incoming signal at input to **DS1**, **DS1PM**, or **T1EXT** circuit pack with flashing LED(s). If LED is not flashing on protection **DS1**, **DS1PM**, or **T1EXT** circuit pack, replace service **DS1**, **DS1PM**, or **T1EXT** circuit pack [**DLP-523**].

24. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

25. Have two of the same type (service and protection **DS1**, **DS1PM**, or **T1EXT**) circuit packs been removed from the system?

If **YES**, then continue with **Step 26**.

If **NO**, then proceed to **Step 28**.

26. Determine the reason the circuit packs were removed. If the same circuit pack is to be reinserted and no switch settings are changed, reinstall the circuit pack. If the circuit pack was removed and switch settings changed, reinstall the circuit pack and momentarily depress the **UPD/INIT** button on the **SYSCTL**. If the circuit pack is not to be reinserted, momentarily depress the **UPD/INIT** button on the **SYSCTL** to remove the circuit pack from the inventory.

27. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

28.



CAUTION:

*If fuse on User Panel is not blown, trouble may be a failure of **one** of the –48V DC power feeders. Removing the wrong fuse or disconnecting the wrong feeder for power measurement will cause service interruption. Blown fuses are detected by noting that the fuse indicator pin is extended through the fuse holder.*



NOTE:

If fuse is not blown on the User Panel, check office battery distribution fuse board for blown fuses or tripped breakers. Replace fuse or reset breaker if necessary.

Is –48V fuse blown on User Panel?

If **YES**, then continue with **Step 29**.

If **NO**, then do **TAP-113**.

29. Replace blown –48V fuse on User Panel?

30. Did fuse blow again?

If **YES**, then proceed to **Step 32**.

If **NO**, then continue with **Step 31**.

31. Is MINOR alarm cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

If **NO**, then proceed to **Step 34**.

32.



CAUTION:

Removal of an unprotected circuit pack may cause service interruption.



CAUTION:

*Removing the **SYSC**TL without performing a 10-second countdown sequence on the **FE ID** display (**Note 1**) may result in unexpected and undesirable protection switches, incorrect circuit pack fault indications, or incoming signal failure indications.*



NOTE:

Before removing the **SYSC**TL, you must momentarily depress the **ACO/TST** pushbutton on the User Panel and the **FE SEL** pushbutton on the **SYSC**TL at the same time to start a 10- second countdown on the **FE ID** display (9, 8, 7, etc.). During this countdown, the **SYSC**TL may be safely removed. If the **SYSC**TL is failed, the countdown may not occur.



NOTE:

The –48V power feeders/fuses on the User Panel supply power to DC-to-DC converters on the **OLI**U, **DS1**, **DS1PM**, **T1EXT**, and **SYSC**TL circuit packs. It is unlikely that a circuit pack failure would cause only one feeder fuse to blow. The more probable cause of failure of only one feeder fuse would be a short of the backplane feeder path or a problem with a circuit pack shelf connector. After a thorough inspection of the backplane, if no trouble is found, the circuit packs can be removed one at a time to try and isolate the trouble.

Remove **one** of each pair of circuit packs listed in the above note and replace blown –48V fuse. If fuse does not blow again, reinstall all removed circuit packs one at a time, beginning with the **SYSC**TL. Replace any circuit pack that causes the fuse to blow (**DLP-523**). If fuse blows again with one of each pair of circuit packs removed, reinstall removed circuit packs and repeat the procedure for the remaining circuit packs (except **DS1**s or **T1**s). If fuse blows after all circuit packs have been removed, trouble is in the backplane.

33. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

34.



NOTE:

Alarm may be caused by circuit packs inserted into the wrong slots.

Are circuit packs installed in the correct slots (rtrv-eqpt)?

If **YES**, then proceed to **Step 37**.

If **NO**, then continue with **Step 35**.

35. Remove circuit packs from wrong slots, check option switches (**DLP-513**) and reinstall circuit packs into the correct slots.

36. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

37.



CAUTION:

*When removing circuit packs, ensure that protection switching is available. Also, remove the circuit pack without the lit **ACTIVE LED** first.*

Check switch settings for correct settings. If the circuit pack has been replaced, check if settings are the same as they were before the circuit pack was replaced. Also check if the switches are set the same as the companion circuit pack.

Reference: **DLP-513**

38. Are switch settings correct?

If **YES**, then do **TAP-103**.

If **NO**, then continue with **Step 39**.

39. Change switch settings to the correct settings. (Use switch-ls command to switch to other circuit pack before removing pack.) If switch settings are to be changed from what they were previously, update the equipment list by momentarily depressing the **UPD/INIT** button on the **SYSCTL** after the circuit pack is reinstalled.

40. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

41. Indications are that there is an unprotected failure or removal of a **MXRVO** or **OLIU** circuit pack at the far-end associated with the identified **OLIU** slot at the near-end. Determine location of the circuit pack(s) from office records or use the rtrv-crs- () commands to trace back through the STS1/VT1.5 cross-connections associated with the identified **OLIU** slot.

42. If circuit packs are removed, determine the reason the circuit packs were removed. If the same circuit pack is to be reinserted and no switch settings are changed, reinstall the circuit pack. If the circuit pack was removed and switch settings changed, reinstall the circuit pack and momentarily depress the **UPD/INIT** button on the **SYSCTL** or use the upd command. If the circuit pack is not to be reinserted, momentarily depress the **UPD/INIT** button on the **SYSCTL** or use the upd command to remove the circuit pack from the inventory.

43. If the **MXRVO** or **OLIU** circuit packs have not been removed, replace the **MXRVO** or **OLIU** circuit pack associated with the identified **OLIU** slot in the alarm message.

Reference: **DLP-523**

44. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

45. In alarm report, is there any indication of **OLIU** or fiber trouble at near end or far end such as inc. OC1 FERF alarm message?

If **YES**, then continue with **Step 46**.

If **NO**, then proceed to **Step 48**.

46.



NOTE:

If there is a DCC failure, a remote log in to the shelf connected through the Source Address cannot be done. The rtrv-alm, rtrv-map-network, and rtrv-map-neighbor commands can be used to check for dcc failure for main. Also, use rtrv-fecom command to see if "fecom" has been disabled.

Note Source Address of DCC channel failure. Check optical fibers connected through the Source Address per local procedures. If no trouble found, replace near-end **OLIU** first then far-end **OLIU**.

Reference: **DLP-523**

47. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

48. Use CIT and reset command to reset **SYSCTL** at the near end or unplug and reseal the **SYSCTL**.

49. Is the **FAULT** LED on the **SYSCTL** circuit pack still flashing (section DCC channel failed)?

If **YES**, then continue with **Step 50**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

50. If possible, use CIT and r lgn command to log in to the far-end terminal (**DLP-522**) and use the reset command to reset **SYSCTL** at the far end.

51. Is the **FAULT** LED on the **SYSCTL** circuit pack still flashing (section DCC channel failed)?

If **YES**, then continue with **Step 52**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

52.



NOTE:

You may prefer to go to the far end first and check if the **OHCTL** (OC-3) or **SYSCTL** (FiberReach) have failed or removed before replacing the **SYSCTL** at the near end.

Refer to **DLP-501** and replace **SYSCTL** at near-end terminal.

53. Is the **FAULT** LED on the **SYSCTL** circuit pack still flashing?

If **YES**, then continue with **Step 54**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

54. At far-end terminal, reset **SYSCTL** by unseating and reseating **SYSCTL** or by using a CIT and the reset command, if not already performed. If **FAULT** LED is still flashing after a reset, refer to **DLP-501** and replace **SYSCTL** at far-end terminal. If the **FAULT** LED is still flashing after the **SYSCTL** is replaced, replace the **OHCTL** (OC-3) [**DLP-523**] at the far end or the **SYSCTL** (FiberReach) [**DLP-523**] if trouble still exists.

55. **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

Clear Obscure Minor (MN) Alarm

1. Perform an LED test by depressing the **ACO** button or using the test - led command from a CIT.

Reference: **DLP-509**

2. Did any circuit pack fail the LED test?

If **YES**, then do **TAP-115**.

If **NO**, then continue with **Step 3**.

3. Is this site a remote terminal location with separate J1C182BA Power Shelf and/or fan unit?

If **YES**, then continue with **Step 4**.

If **NO**, then proceed to **Step 5**.

4. Look for blown fuses and/or lit LEDs on the battery shelf, battery charger, or fan assembly. Is there any indication of trouble?

If **YES**, then do **TAP-114**.

If **NO**, then continue with **Step 5**.

5. Is a CIT available?

If **YES**, then proceed to **Step 10**.

If **NO**, then continue with **Step 6**.

- 6.



NOTE:

Unseating and reseating the **SYCTL** performs a *reset* procedure which restarts the software program.

Unseat and reseal **SYCTL** circuit pack. Do not depress **UPD/INIT** button.

7. Is the **MN** alarm LED still lit after about 20 to 60 seconds?

If **YES**, then continue with **Step 8**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- 8.



CAUTION:

*Replacing the **SYSCTL** involves updating the internal memory on the circuit pack.*

Replace the **SYSCTL** (**DLP-501**).

9. Is **MN** alarm LED still lit?

If **YES**, then continue with **Step 10**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- 10.



NOTE:

Without a CIT it is difficult to determine the cause of the minor alarm. Table A lists some remaining possible causes of a minor alarm.

Obtain a CIT and establish session with the system.

Reference: **DLP-521**

11. Use CIT and `rt rv -a lm` command to get an Alarm and Status Report. See the "Report Descriptions" section of this manual under **RTRV-ALM** for a description of each message retrieved with the `rt rv -a lm` command.
12. Refer to Table A. Are any of the conditions listed in the Description column reported in the Alarm and Status Report?
- If **YES**, then continue with **Step 13**.
- If **NO**, then proceed to **Step 29**.
13. Refer to Table A. Note the suspected trouble and go to the indicated step or procedure.

Table A – Obscure Minor Alarm Conditions

Description	Meaning	Step
APS – automatic lock	Service associated with a DS1 CP has been automatically switched and locked onto the protection DS1 . The APS lock will remain active until midnight.	Step 14
ExternalMinor	DC power or fan failure at a remote terminal far end.	TAP-114
environmentn	A miscellaneous discrete input is active. This message may be changed using the <code>set-attr-env</code> command. The description may be an alphanumeric string up to 26 characters long (for example, Fire, Open door, etc.).	Step 19
CP removed	A circuit pack previously installed in the system is removed. The pack should be replaced or an update (<code>upd</code>) command should be done to remove it from the equipment list.	Step 21
unexpected CP switches unexpected CP type	A circuit pack is installed in a slot provisioned for a different circuit pack, or switch settings have been changed from what they were before the circuit pack was removed.	Step 23
protection CP different	A circuit pack is installed in the protection slot that is different from the service circuit packs in a shelf configured for 1X7 low speed protection and will not protect the circuit packs in the service slots.	Step 26

14.



NOTE:

There is an automatic lock. An automatic lock occurs when an *automatic* protection switch is made and then broken four times within a 10-minute interval.

From the Alarm and Status Report, determine the source address of the **DS1**, **DS1PM**, or **T1EXT** circuit pack locked onto the protection **DS1**, **DS1PM**, or **T1EXT**.

15. Replace **DS1**, **DS1PM**, or **T1EXT** service circuit pack locked onto protection.

Reference: **DLP-523**

16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

17.



NOTE:

Indications are that the **OLIU** circuit pack on the protection line (**MAIN-2**) has failed at the near end or far end, or the receive fiber on the protection line at the near end has failed.

Go to **TAP-111** and isolate trouble on the **OLIUs**.

18. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

19. Use local procedures to clear condition(s) that caused environmental alarm.

20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

21. Locate source address of removed circuit pack from the Alarm and Status Report; then determine the reason the **DS1**, **DS1PM**, or **T1EXT** circuit pack was removed. If the same circuit pack is to be reinserted and no switch settings are changed, reinstall the circuit pack. If the circuit pack was removed and switch settings changed, reinstall the circuit pack and momentarily depress the **UPD/INIT** button on the **SYSCTL**. If the circuit pack is not to be reinserted, momentarily depress the **UPD/INIT** button on the **SYSCTL** to remove the circuit pack from the inventory.

If the **UPD/INIT** action above does not work, some cross-connections to DS1 ports on the removed circuit pack may still exist. Verify that the service has been disconnected, and delete the cross-connections or replace the circuit pack.

22. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

23.



NOTE:

Indications are that a circuit pack has been installed in a wrong slot; switch settings are invalid or different from a companion circuit pack; or switches are set differently from what they were before a circuit pack was replaced.

Determine the source address from the Alarms and Status Report. Refer to the "Commands and Reports" section of this manual under **RTRV-ALM** for a more detailed description of the meaning of the report.

24. If a circuit pack(s) is installed in the wrong slot, remove the circuit pack. Determine correct position of the circuit pack and install circuit pack into the correct slot.

Check circuit pack switch settings for valid settings or wrong settings (**DLP-513**). If switch settings are to be changed from what they were previously, update the equipment list by momentarily depressing the **UPD/INIT** button on the **SYSCTL** after the circuit pack is reinstalled.

25. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

26.



NOTE:

Indications are that the circuit pack installed in the protection slot is different from the service circuit packs in a shelf configured for 1X7 low-speed protection.

Determine the source address from the Active Alarm and Status Report. Refer to the "Commands and Reports" section of this manual under **RTRV-ALM** for a more detailed description of the meaning of the report.

27. If this is acceptable, execute the update (upd) command to clear the alarm. Otherwise, one or more of the low-speed service or protection circuit packs must be changed.

Check circuit pack switch settings for valid settings or wrong settings (**DLP-513**). If switch settings are to be changed from what they were previously, update the equipment list by momentarily depressing the **UPD/INIT** button on the **SYSCTL** after the circuit pack is reinstalled.

28. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

29. Has the **SYSCTL** been replaced?

If **YES**, then proceed to **Step 34**.

If **NO**, then continue with **Step 30**.

30. Use the CIT and reset command to reset **SYSCTL**.

31. Is the **MN** alarm LED still lit after about 20 to 60 seconds?

If **YES**, then continue with **Step 32**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

32.

⇒ **NOTE:**
Replacing the **SYSCTL** involves updating the internal memory on the circuit pack.

Replace the **SYSCTL (DLP-501)**.

33. Is **MN** alarm LED still lit?

If **YES**, then continue with **Step 34**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

34.

⇒ **NOTE:**
The problem appears to be in the backplane wiring of the FiberReach. One way to verify this is to swap the **SYSCTL** and any circuit pack with an inconsistent diagnostic indication with the corresponding circuit packs in another FiberReach. If the problem moves with the circuit packs, it means that one or more of the circuit packs is defective. If the problem stays with the original FiberReach, the entire assembly, but not the circuit packs, should be replaced. The FiberReach has a printed backplane and cannot be repaired in the field.

⇒ **NOTE:**
If the **MN** LED is lit and there is no **MN** alarm indication in the Alarm and Status Report after the reset is complete, do the LED test using the test - led command. Verify that the **MN** LED goes out during this test. If it does not, replace the User Panel.

Check for broken or bent pins, shorted pins, etc. If you need technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

35. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Clear External Minor Alarm at RT

1. Are there any blown fuses on battery shelf or **BFU** (for bulk powering)?
If **YES**, then continue with **Step 2**.
If **NO**, then proceed to **Step 4**.
2. Replace blown fuse(s).
3. Does alarm clear?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
If **NO**, then continue with **Step 4**.
4. Is bulk power (J1C182BB bulk power shelf) being used?
If **YES**, then proceed to **Step 25**.
If **NO**, then continue with **Step 5**.
5. Is **OPEN BATT** LED on **337A BATTERY CHARGER** lit at RT battery shelf?
If **YES**, then continue with **Step 6**.
If **NO**, then proceed to **Step 25**.
6. Condition DMM (digital multimeter) to measure voltage.
7. Measure voltage at **-48B** and **GND** and **-48L** and **GND** jacks on the **LDU** faceplate.
8. Does voltage measure between -42 and -58 volts?
If **YES**, then continue with **Step 9**.
If **NO**, then proceed to **Step 18**.
9. Use SD-7C119 to check wiring between **337A BATTERY CHARGER** and batteries.

10. Was a problem found in wiring?
If **YES**, then continue with **Step 11**.
If **NO**, then proceed to **Step 12**.
11. Correct wiring problem and proceed to **Step 17**.
12. Is fuse blown on **337A BATTERY CHARGER**?
If **YES**, then proceed to **Step 16**.
If **NO**, then continue with **Step 13**.
13. Is **BAT DISCHG** LED on **337A BATTERY CHARGER** lit?
If **YES**, then continue with **Step 14**.
If **NO**, then proceed to **Step 16**.
14. Depress and hold **HIGH RATE CHG ACTIVATE** pushbutton on **337A BATTERY CHARGER**. Is **BAT DISCHG** LED lit?
If **YES**, then continue with **Step 15**.
If **NO**, then proceed to **Step 16**.
15.
 **NOTE:**
HIGH RATE CHG ON LED will remain lit until batteries reach approximately -58 volts. If batteries are completely discharged, it may take approximately one day for **HIGH RATE CHG ON** LED to go out.
Release **HIGH RATE CHG ACTIVATE** pushbutton. Does **BAT DISCHG** LED go off and is **HIGH RATE CHG ON** LED lit?
If **YES**, then proceed to **Step 17**.
If **NO**, then continue with **Step 16**.
16. Replace **337A BATTERY CHARGER** and proceed to **Step 17**.
17. Did alarm clear?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then proceed to **Step 23**.
18. Use DMM to measure voltage at battery shelf jacks **J5 (+BAT)** and **J6 (-BAT)**.

19. Does voltage measure between -42 and -58 volts?
If **YES**, then proceed to **Step 37**.
If **NO**, then continue with **Step 20**.
20. Is **197A BATTERY LOAD TEST SET** available for use in testing batteries?
If **YES**, then continue with **Step 21**.
If **NO**, then proceed to **Step 23**.
21. Test batteries using **197A** test set.
Reference: **DLP-532**
22. Replace any failed battery pack(s) and reconnect battery leads to battery shelf and proceed to **Step 24**.
23. Replace battery packs one at a time until -48 volts is present at output jacks on battery shelf.
24. Does alarm clear?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then continue with **Step 25**.
25. Is **FAN ALARM** LED lit on a fan assembly?
If **YES**, then continue with **Step 26**.
If **NO**, then proceed to **Step 37**.
26. Remove **FAN H** and **FAN L** fuses on corresponding **BFU** on power shelf. Are fuses blown?
If **YES**, then continue with **Step 27**.
If **NO**, then proceed to **Step 30**.
27. Replace **FAN H** and **FAN L** fuses on corresponding **BFU**.
28. Does alarm clear?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then continue with **Step 29**.

29. Is **FAN ALARM** LED lit on fan assembly?

If **YES**, then continue with **Step 30**.

If **NO**, then proceed to **Step 37**.

30.



WARNING:

To avoid possible damage, do not overextend fan assembly power cable.

Remove fan assembly from bay.

31. Examine fan assembly for anything that will prevent fan from operating properly.

32. Remove any blockages and reinstall fan assembly and fuses.

33. Is fan assembly **FAN ALARM** LED off?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 34**.

34. Remove **FAN H** and **FAN L** fuses on corresponding **BFU**.

35. Replace fan assembly with new fan assembly and install fuses.

36. Is fan assembly **FAN ALARM** LED off?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 37**.

37. Replace one of the **336 RECTIFIERS**.

38. Does alarm clear?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 39**.

39. Reinstall original **336A RECTIFIER**.

40. Replace second **336A RECTIFIER**.

41. Does alarm clear?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 42.**

42. Reinstall original **336A RECTIFIER.**

43. If you need technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

44. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear LED Test Trouble

1. Did all of the LEDs in the **FiberReach** fail to light?

If **YES**, then proceed to **Step 4**.

If **NO**, then continue with **Step 2**.

- 2.



CAUTION:

Replacement circuit packs may have option switches which must be properly set before the circuit pack is installed.

Refer to **DLP-523** and replace the circuit pack that failed the LED test. Repeat the LED test.

3. Did the same LED fail the test again?

If **YES**, then continue with **Step 4**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- 4.



NOTE:

Using the CIT and reset command or unseating and reseating the **SYSCTL** restarts the software program.

Enter reset command or unseat and reseal **SYSCTL** circuit pack. Do not depress **UPD/INIT** button.

5. Repeat the LED test.

6. Did the same LED(s) fail the test again?

If **YES**, then continue with **Step 7**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.



CAUTION:

*Replacing the **SYSCTL** involves updating the internal memory on the circuit pack.*

Replace the **SYSCTL (DLP-501)** and repeat the LED test.

8. Did the LED test fail again?

If **YES**, then continue with **Step 9**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.



NOTE:

The problem appears to be in the backplane wiring of the FiberReach. One way to verify this is to swap the **SYSCTL** and any circuit pack with an inconsistent diagnostic indication with the corresponding circuit packs in another FiberReach. If the problem moves with the circuit packs, it means that one or more of the circuit packs is defective. If the problem stays with the original FiberReach, the entire assembly, but not the circuit packs, should be replaced. The FiberReach has a printed backplane and cannot be repaired in the field.

If you need technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear Trouble During Program Upgrade

1.



NOTE:

Program installation may fail due to failure of communication link between PC and FiberReach, failure of the floppy disk on the PC, failure or loss of power in the PC, or failure of the **SYSCTL**.

Was the following prompt printed indicating communication was established with near-end shelf?

```
/*Enter a shelf number from 1 to 8*/  
shelf [default] =
```

If **YES**, then proceed to **Step 4**.

If **NO**, then continue with **Step 2**.

2. Check PC to CIT port connections. Make sure the cable is connected between the PC **COM()** port and the CIT port on the FiberReach.

If you need assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4. Was the following message received?

```
/*Status, execution stopped. */  
/* Communication link could not be established.  
Please connect PC with DDM-2000 upgrade program and start  
again. */
```

If **YES**, then continue with **Step 5**.

If **NO**, then proceed to **Step 7**.

5.



NOTE:

Indications are that the PC is not functioning properly, you are using a CIT instead of a PC, the disk drive is inoperable, the diskette has been removed, or the program has previously been erased from the **SYSCTL**. A program upgrade to the near-end FiberReach cannot be performed with a CIT. Ensure you are using a PC to upgrade the program. Check that the PC is operating properly and the diskette has not been removed.

Has program installation procedure been tried more than once?

If **YES**, then continue with **Step 6**.

If **NO**, then proceed to **Step 14**.

6. Was the following message received?

```
ins-prog:tid DENY
SSTP
/* Far end not responding.
```

If **YES**, then continue with **Step 7**.

If **NO**, then proceed to **Step 10**.

7. Is **SYSCTL** circuit pack(s) installed at far end?

If **YES**, then proceed to **Step 10**.

If **NO**, then continue with **Step 8**.

8. Determine reason **SYSCTL** is not installed. The **SYSCTL** must be installed to upgrade program. Reinstall the **SYSCTL** and repeat the program installation procedure.

9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

10. Did **SYSC TL** fail, indicated by the following or similar SYSC TL CP failed message?

```
ins-prog:tid DENY
SSTP
/*Status, execution stopped.*/
/*Installation cannot be done because of SYSC TL test
failure. */
```

If **YES**, then proceed to **Step 17**.

If **NO**, then continue with **Step 11**.

11. Did **FAULT** LED on **SYSC TL** light and did the **SYSC TL FE ID** display go off?

If **YES**, then proceed to **Step 19**.

If **NO**, then continue with **Step 12**.

12.



NOTE:

It is assumed that the program installation failed in one of two ways: before the old program was erased or after the old program was erased. If the program installation failed after 1 minute, the FiberReach may have erased its old program and will be unable to report alarms or do protection switches. If program installation failed within 1 minute, the old program may not have been erased and the FiberReach may have automatically reset and restarted its old program. A new attempt must be made to install the program.

Check PC COM() port to CIT connection. Check PC disk drive and floppy diskette.

13. Has program installation procedure been tried more than once?

If **NO**, then continue with **Step 14**.

If **YES**, then proceed to **Step 15**.

14.



NOTE:

The new program installation may have failed because of faulty diskettes.

Disconnect PC and repeat program installation procedure. Use your *backup diskettes* containing new generic program, if available.

15. If new program installation cannot be completed and the old program has been erased, one the following procedures may be used to restore the old program or install a different version program:

- A. Go to the far-end FiberReach shelf and establish session with a CIT.
Enter the `ins-prog: tid [cpy-prog: tid]` command where the `tid` is the `tid` (shelf name) for the failed shelf where you want to install the old program.
- B. Replace the **SYSCTL** with one that has compatible software.

Reference: **DLP-523**

- C. If a "**C**" was displayed in the **FE ID** display during a software upgrade, indications are that the software being loaded will not support the current system transmission configuration. This indicates a problem with the version of software you are trying to install or you are trying to install an older version of software that does not support the system configuration that you have. To load another version of software, unseat and then reseat the **SYSCTL** and immediately push and hold the **FE SEL** and **UPD/INIT** buttons at the same time until a "**P**" appears in the **FE ID** display. Release buttons and install program using the procedures of **DLP-536**.

If you need technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

17. Unseat and reseat **SYSCTL** to perform reset.

18. Is alarm still present?

If **YES**, then continue with **Step 19**.

If **NO**, then proceed to **Step 21**.

19. Has **SYSCTL** been replaced?

If **NO**, then continue with **Step 20**.

If **YES**, then proceed to **Step 23**.

20.



CAUTION:

*Replacing the **SYSCTL** involves updating the internal memory on the circuit pack.*

Replace the **SYSCTL**.

Reference: **DLP-523**

21. Repeat program installation procedure.

Reference: **DLP-536**

22. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

23. If you need technical assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions.

24. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear NE ACTY/FE ACTY Alarm Only

1. Is a CIT available?

If **YES**, then continue with **Step 2**.

If **NO**, then proceed to **Step 8**.

- 2.

⇒ **NOTE:**
For all network configurations, except point-to-point, there will be multiple far end terminals. Troubleshooting multi-shelf DDM-2000 networks is facilitated by use of a Craft Interface Terminal (CIT).

Connect the CIT to the **CIT** connector on the near-end User Panel and log in to the near-end system.

Reference: **DLP-521**

- 3.

⇒ **NOTE:**
The `rtrv-alrm` command can be used to display a report of active alarm and status conditions. The "Commands and Reports" section of this manual gives a description of the command.

⇒ **NOTE:**
The Active Alarm and Status Report is output automatically following CIT log in. The report shown in Figure 1 is an example that shows one entry. There may be many entries in the actual report.

Note the information in the Source Address and Description columns for the top entry/entries above the first single-dashed line in the Active Alarm and Status Report (Figure 1) (for example, "ne-acty m2-1-1-1 MM-DD HH:MM:SS nsa inc. VT AIS").

```
*Active Alarms and Status Report
=====
Alarm      Source      Date      Time      Srv      Description
Level      Address          Detected
=====
ne-acty    m2-1-1-1    MM-DD      HH:MM:SS    nsa      inc. VT AIS
-----
*/
```

Figure 1 – Example of Active Alarms and Status Report

4.



NOTE:

Far-end alarm or status conditions are listed in this report with a Source Address of farend. Local alarm or status conditions have a Source Address of the local slot, line, port, channel, path, cross-connection, or operations interface (DCC, CIT, TBOS, etc.) where the event occurred. (See *Addresses* in the “Commands and Reports” section of this manual.) Use the `rtrv-alm` command to get another report, if necessary.

Does the Source Address of any top entry in the alarm report indicate a **local** slot, channel, port or operations interface for the NE/FE alarm?

If **NO**, then do **TAP-107**.

If **YES**, then continue with **Step 5**.

5. Note the trouble indication in the Description column of the Active Alarm and Status Report.
6. Find the trouble description in Table A and perform the indicated repair procedure(s).
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.



NOTE:

The **FE SEL** button on the **SYSCTL** is used to display local and remote (farend) alarm and status conditions [**DLP-530**].

Use **FE SEL** button to display alarm conditions for local shelf (**L.** displayed in **FE ID** display).

9. Was **NE ACTY** LED lit on User Panel when local shelf alarm conditions were displayed (**L.** displayed in **FE ID** display)?

If **NO**, then continue with **Step 10**.

If **YES**, then proceed to **Step 12**.

10.



NOTE:

The **FE SEL** button on the **SYSCTL** is used to display local and remote alarm and status conditions [**DLP-530**].

Use **FE SEL** button to display alarm conditions for other sites/shelves in the network (observe site address in **FE ID** display).

11. Was **NE ACTY** LED lit on the User Panel when alarms were displayed for any selected site?

If **NO**, then do **TAP-108**.

If **YES**, then continue with **Step 12**.

12. See the description of activity indications in Table A. Without a CIT it is difficult to diagnose the trouble further. If trouble cannot be isolated using the conditions listed in Table A, obtain a CIT for further analysis.

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table A – Alarm and Status — NE ACTY

Activity	Meaning
holdover mode active	System is in holdover synchronization mode. Likely causes: A. Manual switch to holdover mode (with the switch-sync command) and the switch has not been reset. B. Automatic switch to holdover mode due to failure of timing references as follows: a. The reference failures have not cleared. b. The system is provisioned for nonrevertive synchronization mode switching. c. The system is provisioned for line-timed operation and the optical line or OLIU CP has failed, or a message indicating an upstream clock problem has been received on the sync message bits of the optical line. (See the rtrv-sync command). d. The system is provisioned for sync message signaling, but the upstream system from which it line times has not been provisioned for sync message signaling. The condition can be cleared by provisioning both systems the same. (See the set-sync and rtrv-sync commands.) The condition can be cleared by repairing at least one of the timing references (if both are failed) and resetting synchronization mode protection switch with the command switch-sync:s=mode,pri=reset. In a central office, the synchronization mode can also be reset with a TBOS control point.
inc. (from DSX) DS1 LOS	At least 128 consecutive zeros are received in the DS1 signal incoming from the DSX-1 or T1 interface, or the energy at the DS1 input is below a preset threshold. Likely causes: Hard failure of upstream equipment or facility (towards the DSX-1 or T1 interface). The DS1 input is disconnected at the backplane or the DSX-1 or T1 interface; equipment is failed or removed at DSX-1 or T1 interface. Repair using local procedures.
inc. (from DSX) DS1 sig fail	The bit error ratio (BER) in the DS1 signal incoming from the DSX-1 or T1 interface exceeds the provisioned failure threshold, 10^{-3}, 10^{-6}, 10^{-7}, or 10^{-8}. Likely causes: Mismatch of line code (AMI/B8ZS); failure of upstream equipment or facility (towards the DSX-1 or T1 interface); crosstalk in office wiring; failure of the DS1, DS1PM, or T1EXT circuit pack.

Table A – Alarm and Status — NE ACTY (Continued)

Activity	Meaning
inc. OC1 FERF	System detects the OC-1 far end receive failure (FERF) signal in the incoming OC-1 signal. Likely causes: The far end has detected an incoming signal failure on the specified OC-1 line. This may be caused by failure of the OLI U circuit pack at the near end, the OLI U circuit pack at the far end, or the transmit fiber on the specified line [TAP-111].
inc. OC1 line AIS	System has detected OC-1 line alarm indication (AIS) signal on an incoming OC-1 line. Likely cause: Failure of OLIU circuit pack at far end [TAP-111].
inc. STS1 AIS	System has detected an incoming STS-1 alarm indication signal (AIS) in the active OC-1 line. System responds by transmitting DS1 AIS toward the DSX or T1 interface and transmitting STS-1 yellow back toward the fiber from which the AIS is being received. Likely causes: Incomplete or incorrect cross-connect provisioning in end-to-end network [TAP-111]; unprotected removal or failure of OLI U CP at far end; unprotected optical line failure.
inc. STS1 yellow	System detects an incoming STS-1 yellow signal inserted by the far end path terminating equipment. Likely causes: Incomplete or incorrect cross-connect provisioning in the end-to-end network [TAP-111], or unprotected unidirectional failure of the OLI U circuit pack or fiber at some point in the end-to-end path.
inc. VT AIS	System detects inc. VT path AIS from active OC-1 line. System responds by transmitting DS1 AIS toward the DSX-1 or T1 interface and VT yellow toward the fiber. Likely causes: Incomplete or incorrect cross-connect provisioning in end-to-end network [TAP-111] This alarm may be caused by fiber or OLIU failures); unprotected removal or failure of DS1 , DS1PM , or T1EXT circuit pack at far end; DS1 , DS1PM , or T1EXT circuit pack installed at one terminating end with terminating cross-connections made and no DS1 , DS1PM , or T1EXT circuit pack installed at the other terminating end. In ring applications, a non-service affecting VT AIS alarm message may result from an upstream OLI U circuit pack or fiber affecting only one ring direction. A VT yellow alarm message is not returned for a non-service affecting VT AIS.
inc. VT yellow	The far end is detecting VT AIS or VT LOP and inserting VT yellow in its transmit signal. Likely causes: Unprotected unidirectional failure of a circuit pack or fiber at some point in the end-to-end path.

Clear STS/VT AIS Alarm Conditions

1.



NOTE:

Incoming VT and/or STS1 AIS often indicates missing or incorrect cross-connects. In ring configurations, they may have an alarm level of ne-acty, MJ or CR. Incoming STS1 AIS may also indicate an unprotected failure or removal of a **OLI** at the far end associated with the Source Address of the alarm message. Incoming VT AIS may indicate an unprotected failure or removal of a **DS1**, **DS1PM**, **T1EXT**, or **OLI** failures.



NOTE:

VT and STS1 AIS conditions are only reported at service termination (drop) points. Incoming VT and/or STS AIS reported as ne-acty at a shelf where the service is cross-connected to a DS1 drop can be caused by missing or incorrect cross-connections at the other terminal shelf or at any shelves where the service should be pass-through cross-connected.

Does the alarm and status report indicate incoming VT AIS or STS1 AIS (inc. VT AIS or inc. STS1 AIS)?

If **STS1 AIS**, then continue with **Step 2**.

If **VT AIS**, then proceed to **Step 12**.

2. Note the Source Address of the STS1 AIS condition reported in the alarm and status report (for example, m-1). Based on the circuit layout or other office records, determine the other shelf where that time slot is supposed to be terminated (cross-connected to a DS1, OC-3 or EC-1 termination).
3. Use the `rlgn` command to log in to the other terminating shelf. Then use the `rtrv-crs-sts1` command to determine if the time slot identified in Step 2 is cross-connected as specified in circuit layout or other office records.
4. Were there incomplete or incorrect cross-connects?
If **YES**, then continue with **Step 5**.
If **NO**, then proceed to **Step 7**.
5. Use the commands `ent-crs-sts1` and `dlt-crs-sts1`, as necessary, to correct the provisioning.

6. Have all indications of STS1 AIS cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 7.**

7.



NOTE:

If the service is STS1 cross-connected at either terminating shelf, both terminating shelves must be properly equipped to terminate the entire STS1.

Use the `rtrv-eqpt` command at both shelves to verify that the shelves are properly equipped for the service being provided. If the shelves are not properly equipped, install circuit packs as required.

8. Have all indications of STS1 AIS cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 9.**

9. Using the `rlgn` command, log in to every shelf where the service should be pass-through cross-connected (for example, m-1 to c-1) and use the `rtrv-crs-sts1` command to determine if the time slot identified in Step 2 is cross-connected as specified in circuit layout or other office records. If service is cross-connected through other maintenance subnetworks, such as dual ring interworking (DRI), look for missing cross-connections in the other subnetworks.

10. At any shelves with missing cross-connects, use the `ent-crs-sts1` command to provision the pass-through cross-connect (for example, m-1 to c-1).

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12. Note the Source Address of the VT AIS condition reported in the alarm and status report (for example, m-1-1-1). Based on the circuit layout or other office records, determine the other shelf where that time slot is supposed to be terminated (cross-connected to a DS1, OC-3 or EC-1 termination).

13. Use the `rlgn` command to log in to the other terminal shelf, then `rtrv-crs-sts1` and `rtrv-crs-vt1` to determine if the time slot identified in Step 12 is cross-connected as specified in circuit layout or other office records.

14. Were there incomplete or incorrect cross-connects?

If **YES**, then continue with **Step 15**.

If **NO**, then proceed to **Step 17**.

15. Use the commands `ent-crs-( )` and `dlt-crs-( )` as necessary to correct the provisioning.

16. Have all indications of VT AIS cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 17**.

17.



NOTE:

If the service is STS1 cross-connected at either terminating shelf, both terminating shelves must be equipped to terminate the entire STS1.

Use the `rtrv-eqpt` command at both shelves to verify that the shelves are properly equipped for the service being provided. If the shelves are not properly equipped, install circuit packs as required.

18. Have all indications of VT AIS cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 19**.

19. Use the `rlgn` command to login to a shelf where the service should be pass-through cross-connected (for example, m-1-1-1 to c-1-1-1). Use the `rtrv-crs-( )` command to determine if the time slot identified in Step 12 is cross-connected as specified in circuit layout or other office records. If service is cross-connected through other maintenance subnetworks, such as dual ring interworking (DRI), look for missing cross-connections in the other subnetworks.

20. Are there any missing cross-connects?

If **YES**, then continue with **Step 21**.

If **NO**, then proceed to **Step 24**.

21. At any shelves with missing cross-connects, use `ent-crs-( )` to provision the pass-through cross-connect.

22. Use the `rtrv-alm` command to see if alarms have cleared.

23. Did alarms clear?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 24.**

24. Repeat this procedure from Step 19 to look for other missing cross-connections.

Clear Brownout Condition Flashing L in FE ID Display

1. Is fuse **FA** or **FB** blown?

If **YES**, then do **DLP-511**.

If **NO**, then proceed to **Step 2**.

2. Condition the digital multimeter (DMM) to measure voltage.

- 3.



CAUTION:

*If fuse on User Panel is not blown, trouble may be a failure of **one** of the –48V DC power feeders. Removing the wrong fuse or disconnecting the wrong feeder for power measurement will cause service interruption.*

Measure voltage at fuse holder **FA** or **FB**.

4. Does voltage measure less than –40 volts DC?

If **YES**, then continue with **Step 5**.

If **NO**, then proceed to **Step 7**.

- 5.



CAUTION:

*During brownout conditions, the **SYSCTL** will suspend normal operations. No alarms will be generated and CIT commands will not work. Local and remote logins will **not** work.*

Trouble in power feeder(s). Check office battery distribution panel for low-voltage condition.

6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7. Is shelf equipped with **BBG8** or **BBG8B SYSCTL** circuit pack?

If **BBG8**, then continue with **Step 8**.

If **BBG8B**, then proceed to **Step 11**.

8. Are frame ground and battery return feeders at the same potential?

If **NO**, then continue with **Step 9**.

If **YES**, then proceed to **Step 11**.

9. Trouble in frame ground or battery return — Frame ground and battery return should be at about the same potential (traceable to the same source). Find and correct problem.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.



NOTE:

Unseating and reseating **SYSCTL** circuit pack performs a **reset** procedure which restarts the software program.

Unseat and reseal **SYSCTL** circuit pack or use reset command. Do not press **UPD/INIT** pushbutton.

12. Is trouble cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then proceed to **Step 13**.

13.



CAUTION:

*Replacing the **SYSCTL** involves updating the internal memory on the circuit pack.*

Replace the **SYSCTL (DLP-501)**.

14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Enable or Disable System Security and/or Edit Delete, or Enter a User's Login

1.  **CAUTION:**
You must wear an ESD wrist strap plugged into one of the grounding jacks (located on both sides of the assembly) whenever working with the DDM-2000 FiberReach.

Connect CIT to the desired shelf and establish session.

Reference: **DLP-521**

2. Are you going to enable or disable system security or are you going to edit, delete, or enter a user's login?

If **Enable or Disable System Security**, continue with **Step 3**.

If **Edit, Delete, or Enter a User's Login**, proceed to **Step 15**.

3.  **NOTE 1:**
You must be logged into the system as one of the three privileged users to enable or disable system security. Initially, the defaults for the privileged user logins (Release 2.1 and later) are LUC01 (uppercased LUC-zero-one), LUC02 (uppercased LUC-zero-two), and LUC03 (uppercased LUC-zero-three); however, these defaults may have been changed. For Release 2.0 and earlier, the defaults for the privileged user logins are ATT01 (upper case ATT-zero-one), ATT02 (upper case ATT-zero-two), and ATT03 (upper case ATT-zero-three). The CIT login banner for Release 2.0 and earlier reads: AT&T, DDM2000 FiberReach Multiplexer, Release a.b.c.

 **NOTE 2:**
System security requires the defaults for the privileged user logins/password to be changed and CIT and/or DCC port security to be enabled.

At the login< prompt, enter a valid privileged user login (provided by your DDM-2000 administrator).

Response: password<

4.  **NOTE 1:**
Check with the DDM-2000 administrator to determine what the default privileged password is set to.

-  **NOTE 2:**
Passwords are not displayed on the CIT.

At the password< prompt, enter a valid privileged user password (provided by your DDM-2000 administrator).

Response: CIT prints the following message followed by an alarm and status report:

```

/*****
*
*          LUCENT TECHNOLOGIES
*      Bell Labs Innovations
*      DDM-2000 FiberReach
*
*          Release a.b.c
*
*****/

.
.
.

TID date time
M  rtrv-alm:all COMPLD
/* Active Alarms and Status Report
```

5.  **NOTE 1:**
After the prompt (<), the system will respond to commands entered.
The **set-link:pg=()** command may be used to set the vertical size of the displayed page on the CIT. Page (**pg**) length may be set from 3 to 150 lines with a default length of 24 lines.

Did you use the default privileged user login (LUC01, LUC02, or LUC03) and password to log into the system?

If **YES**, continue with **Step 6**.
If **NO**, proceed to **Step 8**.

6.  **NOTE:**
The defaults for privileged user logins (LUC01, LUC02, and LUC03) and password must be changed for system security. There are always three privileged user logins. (Privileged user logins cannot be added or deleted.) See the "Commands and Reports" section of this manual for a description of the **set - lgn** command format.

Use the **set - lgn:** command to change the defaults for the privileged user logins (LUC01, LUC02, and LUC03) and password.

7.  **NOTE:**
The **rtrv - lgn:** command retrieves the Login Provisioning Report. This report lists each user's login and authorization level (user type). The report does not contain passwords. See the "Commands and Reports" section of this manual for a description of the **rtrv - lgn:** command format.

Use the **rtrv - lgn:** command to obtain the Login Provisioning Report and verify that the privileged user logins have been changed.

8.  **NOTE:**
The **rtrv - secu:** command retrieves the Port Security Configuration Report. This report provides CIT and DCC port security and timeout information. See the "Commands and Reports" section of this manual for a description of the **rtrv - secu:** command format.

Use the **rtrv - secu:** command to obtain the Port Security Configuration Report and note the CIT/DCC port security and timeout information.

9.  **NOTE 1:**
The **set-secu:** command enables or disables security on each CIT and DCC interface using one or more CIT and/or DCC port addresses [dcc-all or cit-1]. This command is also used to specify the timeout period for each port address. The timeout period is the time, in minutes, before an inactive session is automatically terminated. See the "Commands and Reports" section of this manual for a description of the command format. For example, **set-secu:cit-1:sec=enabled** enables security on the front CIT port.

 **NOTE 2:**
When security is enabled for a CIT or DCC port address, a valid login and password must be entered by all users to access the system through that port.

 **NOTE 3:**
For applications that have a remote terminal located on a customer premise site, you may want to disable security on the DCC interface at the remote terminal. This allows the user at the terminal in the central office to log in remotely (via the DCC) to the remote terminal without a login/password. At the terminal in the central office, you may want to enable security on the DCC. This means that a user at the remote terminal must have a valid login/password to log in remotely (via the DCC) to the terminal at the central office.

Use the **set-secu:** command to enable or disable security on each CIT and/or DCC port and specify the corresponding timeout period, as required.

10. Use the **rtrv-secu:** command to obtain the Port Security Configuration Report and verify the security and timeout information for the CIT and/or DCC ports.

11.  **NOTE 1:**
There are four types of users:

Privileged users may execute any command, including restricted commands.

General users may execute any commands that are not restricted to privileged users.

Maintenance users may execute commands that obtain nonprivileged system reports, perform protection switching, loopback activities, and perform some other maintenance activities.

Reports-only users may only execute commands that obtain nonprivileged system reports.

Refer to *Security* in the "Administration and Provisioning" section of this manual for more information about restricted commands.

-  **NOTE 2:**
Three privileged and up to one hundred nonprivileged (general and/or reports-only) logins are supported. If a user attempts to enter another login when the maximum supported logins already exist, the command will be denied. See the "Commands and Reports" section of this manual for a description of the **set - lgn** command format.

Use the **set - lgn:** command to enter, edit, or delete nonprivileged (general and/or reports-only) logins/passwords and user types, as required.

12. Use the **rtrv - lgn:** command to obtain the Login Provisioning Report and verify the nonprivileged user logins and user types.
13. See the "Commands and Reports" section of this manual for descriptions of related security commands: **set - passwd**, **rtrv - lgn**, and **rtrv - secu**.
14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

15.  **NOTE:**
You must be logged into the system as one of the two privileged users to edit, delete, or enter a user's login. Initially, the defaults for the privileged user logins are LUC01 (uppercased LUC-zero-one), LUC02 (uppercased LUC-zero-two), and LUC03 (uppercased LUC-zero-three); however, these defaults may have been changed.

At the login< prompt, enter a valid privileged user login (provided by your DDM-2000 administrator).

Response: password<

16. ➡ **NOTE 1:**
Check with the DDM-2000 administrator to determine what the default privileged password is set to.

- ➡ **NOTE 2:**
Passwords are not displayed on the CIT.

At the password< prompt, enter a valid password (provided by your DDM-2000 administrator).

Response: CIT prints the following message followed by an alarm and status report:

```

/*****
*
*          LUCENT TECHNOLOGIES
*      Bell Labs Innovations
*          DDM-2000 FiberReach
*
*          Release a.b.c
*
*****/

```

.
.
.

```

TID date time
M rtrv-alm:all COMPLD
/* Active Alarms and Status Report

```

17.  **NOTE 1:**
After the prompt (<), the system will respond to commands entered.
The **set-link:pg=()** command may be used to set the vertical size of the displayed page on the CIT. Page (**pg**) length may be set from 3 to 150 lines with a default length of 24 lines.

-  **NOTE 2:**
There are four types of users:
- Privileged* users may execute any command, including restricted commands.
 - General* users may execute any commands that are not restricted to privileged users.
 - Maintenance* users may execute commands that obtain nonprivileged system reports, perform protection switching, loopback activities, and perform some other maintenance activities.
 - Reports-only* users may only execute commands that obtain nonprivileged system reports.

Refer to *Security* in the "Administration and Provisioning" section of this manual for more information about restricted commands.

-  **NOTE 3:**
Three privileged and up to 100 nonprivileged (general and/or reports-only) logins are supported. If a user attempts to enter another login when the maximum supported logins already exist, the command will be denied.

-  **NOTE 4:**
Both privileged user logins may be edited to change the login name and/or password, but privileged user logins cannot be added or deleted. See the "Commands and Reports" section of this manual for a description of the **set-lgn** command format.

Use the **set-lgn:** command to edit, delete, or enter logins/passwords and user types, as required.

18.  **NOTE:**
The **rtrv-lgn:** command retrieves the Login Provisioning Report. This report lists each user's login and authorization level (user type). The report does not contain passwords. See the "Commands and Reports" section of this manual for a description of the **rtrv-lgn:** command format.

Use the **rtrv-lgn:** command to obtain the Login Provisioning Report and verify the user logins and user types.

19.  **NOTE:**
Setting logins/passwords does not set system security. In addition to assigning valid logins/passwords, CIT and/or DCC port security must be enabled to secure a system.

Repeat this procedure to enable system security, if required.

20. See the "Commands and Reports" section of this manual for descriptions of related security commands: **set-passwd**, **rtrv-lgn**, and **rtrv-secu**.
21. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Replace BBG8 SYSCTL In Service

This procedure is used for replacing a **BBG8 SYSCTL** in an in-service shelf. For procedures to install the **SYSCTL** in a new shelf (initial installation), refer to **DLP-539**.

1.  **CAUTION:**
*Transmission configuration information for in-service systems is stored on the **26-Type OLIU** circuit pack in **MAIN slot 1**. In some instances (for example, during some upgrades, system tests, or training classes), if the system is in service and a version of software is being installed that is not compatible with the current transmission configuration, it may be necessary to remove the **OLIU** circuit pack in **MAIN slot 1** to force the system to run the software you are trying to download. If both **OLIU** circuit packs are not installed, removal of the only **OLIU** circuit pack will cause service interruption.*

 **NOTE:**
The following step is recommended to protect against a loss of service because of inadvertently loading incompatible software. But, if you are **sure** that you want to load incompatible software, you may elect to remove the **OLIU** in **MAIN slot 1** and allow the software to download without having to force the system to run the software.

Before performing this procedure, it is strongly suggested that both **OLIU** circuit packs be installed in the shelf and the **rtrv-state-path:**, **rtrv-state-egpt:**, and **rtrv-sync:** commands be used **at both ends** of the optical line to verify that the **MAIN-2 OLIU** circuit pack is the *Active* transmission path and *Reference/Line*. If the **MAIN-2 OLIU** is not active, use the **switch-path-vt1:m1-1-all,pri>manual** command and **switch-sync:s=src,pri>manual** command to switch traffic and timing reference to the **MAIN-2 OLIU** circuit pack.

2. Remove **SYSCTL** being replaced and inspect option switch settings.
Option switches on the replacement **BBG8 SYSCTL** are set the same as the original.
 3. Set **SYSCTL** switch **S1** sections **S1-1**, **S1-2**, and **S1-3** to **OFF**, **OFF**, **OFF**, respectively, to set the product (shelf) type. See Figure 1.
 4. Set TBOS termination switch **S2-1** to **ON**.
 5. Set **SYSCTL** switch section **S2-2** to **OFF** and switch sections **S2-3**, **S2-4**, **S2-5**, **S2-6**, **S2-7**, and **S2-8** to **ON**.
-

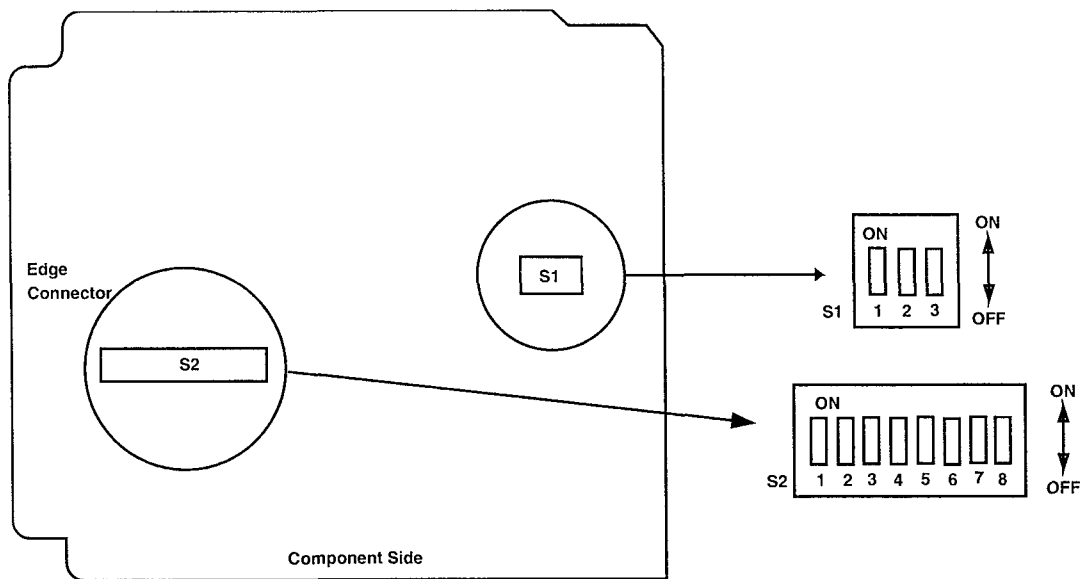


Figure 1. SYSCTL Option Settings

6.  **NOTE:**
Steps 7 and 8 must be performed without unnecessary delays.
Familiarize yourself with these steps before continuing with the procedure.

Read Steps 7 and 8 before proceeding.

7.  **CAUTION 1:**
*Take care to avoid damaging the LEDs that protrude through the opening in the faceplate of the **SYSCTL**.*

 **CAUTION 2:**
*Initializing the **SYSCTL** in the following steps will momentarily interrupt service if protection switches are activated.*

-  **NOTE 1:**
The **UPD/INIT** pushbutton on the **SYSCTL** is recessed to prevent its accidental operation. You will need a small pointed object such as a ballpoint pen to operate it.

Read the remainder of Steps 7 and 8 before installing the SYSCTL
then seat the **SYSCTL**.

If the following responses do not occur, proceed to **Step 9**.

Response: **FAULT** LED on **BBG8 SYSCTL** lights and **ABN** LED on the User Panel lights after approximately 5 seconds. **MJ** and **NE** LEDs may light or flash briefly. **FAULT** LED on the **SYSCTL** goes off after approximately 5 seconds. **ABN** LED goes off after approximately 15 seconds. Approximately 1 minute and 30 seconds after the **ABN** LED goes off, the **CR** LED on the User Panel begins to flash.

8. Momentarily depress the **UPD/INIT** button on the **SYSCTL** while the **CR** LED is flashing (**you have 10 SECONDS** to do this).

If the following responses do not occur, continue with **Step 9**.

Response: **CR** LED on the User Panel stops flashing when the **UPD/INIT** button is pressed.

ABN LED on the User Panel lights after approximately 15 seconds. **ABN** goes off after approximately 30 seconds. Approximately 1 minute and 45 seconds after the **ABN** LED goes off, the **CR** LED on the User Panel flashes again. **DO NOT** depress **UPD/INIT** pushbutton again when the **CR** LED flashes.

All red LEDs on all circuit packs in the **DDM-2000** should be off. Any red LEDs remaining on or flashing represent a failure condition.

Initialization may take 2-3 minutes.

9. NOTE:

FiberReach compatible software must be installed in the **BBG8 SYSCTL**. When the new **SYSCTL** is installed, one of the following indications will be displayed in the **FE ID** display. Displayed letters or conditions indicate one of the following:

- a. Nothing displayed in the **FE ID** display indicates that either FiberReach compatible software is installed in the **SYSCTL** or the **SYSCTL** contains software that is not compatible with the FiberReach shelf. If the **CR** LED did not start flashing in Step 7 and the **FE ID** display is blank, the **SYSCTL** contains software not compatible with the FiberReach shelf. New software must be loaded using the procedures of **DLP-536**.
- b. The letter **P** displayed in the **FE ID** display indicates that no software is installed in the **SYSCTL**. If the **P** is followed by a period (**P.**), it means that a previous download attempt has failed and a new software download will have to be attempted either locally or remotely using the **ins-prog:tid** or **cpy-prog:tid** command. If there is no period (**P**) the software can only be downloaded locally.
- c. The letter **C** displayed in the **FE ID** display indicates that software is installed in the **SYSCTL**, but it will not support the current shelf transmission configuration.
- d. The letter **U** displayed in the **FE ID** display indicates unsupported **SYSCTL** switch settings for the type of shelf being equipped. Remove **SYSCTL**. Check option switch settings and repeat this procedure.
- e. The letter **E** displayed in the **FE ID** display indicates that the **SYSCTL** must be replaced. Replace **SYSCTL** and repeat this procedure.
- f. The letter **F** displayed in the **FE ID** display indicates that the **SYSCTL** faceplate latch is not fully latched. Latch the faceplate. (A reset occurs after the faceplate is latched.)
- g. A flashing letter **L** displayed in the **FE ID** display indicates a low voltage condition (brownout) on the shelf. Use **TAP-119** to clear brownout condition.

Did the letter "**P**" or "**P.**" appear in the **FE ID** display?

If **YES**, then continue with **Step 10**.

If **NO**, then proceed to **Step 12**.

10. Find **SYSCTL** with compatible software and repeat this procedure, or install new software using the procedures of **DLP-536**.

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12. Did the letter "**C**" appear in the **FE ID** display?

If **YES**, then continue with **Step 13**.

If **NO**, then proceed to **Step 17**.

13.  **CAUTION:**
*If the system is in service and is forced to run the current software in the **SYSCTL** that is displaying a **C**, service interruption may result.*

 NOTE:

Indications are that the software in the **SYSCTL** you have installed will not support the system transmission configuration that you have. If this occurs, you must reload the original version of software, load another version of software, or *force* the system to run the current software that is in the **SYSCTL**.

You must decide if you want the system to run this current version of software or if you want to download another version (original version or new version) of software.

Do you want to run the current version of software that is in the **SYSCTL**?

If **NO**, then continue with **Step 14**.

If **YES**, then proceed to **Step 16**.

14. Find **SYSCTL** with compatible software and repeat this procedure, or install new software using the procedures of **DLP-536**.

15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16. To *force* the system to run the current software, perform the following:
 - a. Remove the **OLI** circuit pack from the **MAIN-1** slot, if not already removed.
 - b. Reset (unplug and reseal) the **SYSCTL** to force it to run the current software.
 - c. After the current software is up and running (no alarm LEDs lighted or you can log into the shelf), reinstall the **MAIN-1 OLI** circuit pack.
17. If FiberReach compatible software is installed, you can retrieve the generic software version ID by depressing the **ACO** button longer than 2 seconds and observing version code on the **FE ID** display. If the software version is not the correct version, you must find a **SYSCTL** with the correct software or install new software using the procedures of **DLP-536**.

If software not compatible with the FiberReach shelf is installed in the **SYSCTL** and you cannot retrieve the software version (no response), you must find a **SYSCTL** with the correct software or install new software using the procedures of **DLP-536**.

18.  **NOTE:**
If you are using this procedure to replace a **SYSCTL** that was already in service and the correct version of software is installed, there may have been some options set using the craft interface terminal (CIT).

Refer to **DLP-512** and set any required options.

19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Replace ECC1/ECC2 User Panel (USPNL) In Service

1.  **WARNING:**
P5 will have power on it when power is provided to P4. Avoid contact with and shorts across the terminals on this connector during this procedure.

-  **CAUTION:**
Both power feeders A and B MUST be active for this procedure to be done in service. If both are not active, service must be removed from the shelf before this procedure is done.

Verify **PWR ON A** LED is lit. If not, check power feed and fuse; replace if necessary before proceeding.

2. Disconnect the shelf power lead connectors from **-48VB** and **RTNB (P4)**, slate/slate-black color wires) on the FiberReach Wideband Shelf.
3. After waiting a few seconds, verify that **PWR ON B** LED is NOT lit.
4.  **WARNING:**
After the following step is completed, the shelf will be receiving unfused -48V power. Do not leave the shelf in this condition. Once the following step is done, the rest of this procedure must be completed.

Connect the power feed disconnected in the previous step to **-48VBB** and **RTNBB (P5)**, green/white).

5. Is **PWR ON B** LED lit.

If **YES**, recheck connections in **Step 4**.
If **NO**, continue with **Step 6**.
6. Unscrew screw at top of **ECC2** user panel faceplate and remove **ECC2 USPNL** from the shelf.
7. Replace **ECC2 PNL** and tighten screw at top of faceplate.
8. Verify **PWR ON A** LED is lit.
9. Disconnect power feeder from **P5** (green/white) power cables on FiberReach Shelf.
10. Connect this power feeder to **P4** (slate/slate-black) on FiberReach Shelf.

11. Verify **PWR ON B** LED is now lit.

12.  **WARNING:**
***P5** is now hot (–48V). Be sure that **P5** is dressed and stored in such a way that shorts across and contact with the terminals is avoided.*

Press **ACO/TST** pushbutton and verify that all LEDs on the **ECC2 USPNL** are lit.

13. Connect the CIT and verify operation on the CIT interface.

14. Disconnect the CIT.

15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Install/Remove Lightguide Buildout (LBO)

1. **⚠ WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if beam is viewed directly or with improper optical instruments. Avoid direct exposure to beam.
⚠ CAUTION:
Use static ground wrist strap whenever handling circuit packs or working on DDM-2000 FiberReach terminal to prevent electrostatic discharge damage to sensitive components.

Is buildout being installed or removed?

If **installing**, then continue with **Step 2**.

If **removing**, then continue with **Step 5**.

2. Remove protector caps and plugs (if equipped) from buildout and buildout block.
3. Align lightguide buildout locking tab with slot in buildout block (unlocked position), push in, and rotate clockwise until locked into position. Refer to the appropriate figure (Figure 1, 2, or 3) for the specific buildout type.

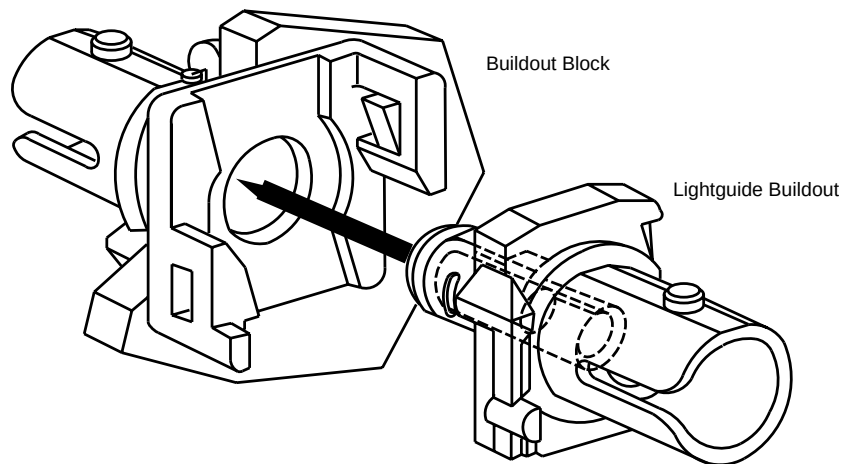


Figure 1. ST[®]-Type Universal Buildout

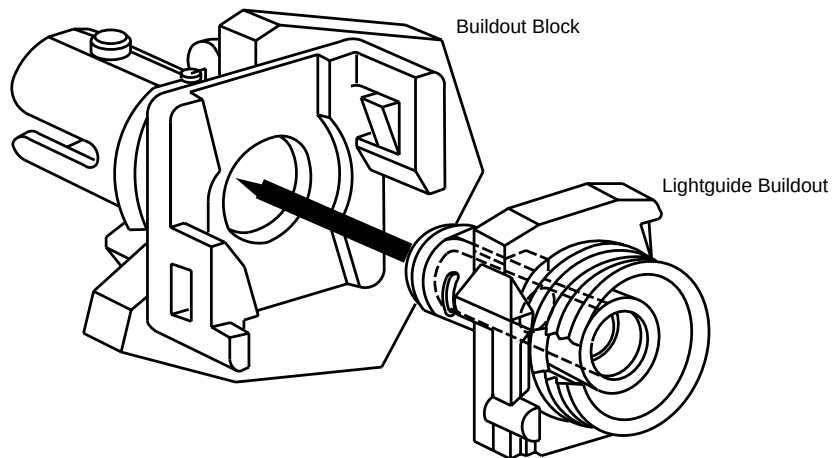


Figure 2. FC/PC-type Universal Buildout

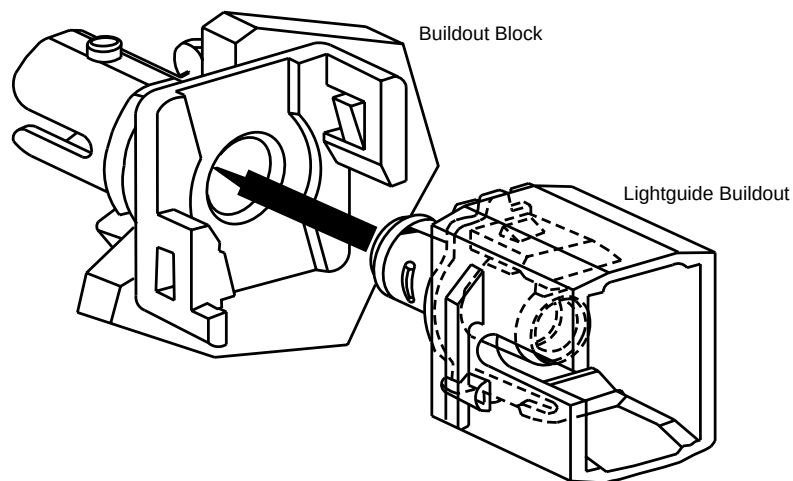


Figure 3. SC-type Universal Buildout

4. **STOP! YOU HAVE COMPLETED THIS PROCEDURE.**
5. Depress locking tab on the LBO until locking tab is free from the locked position, rotate the buildout counterclockwise to the stop position, and separate the buildout block by pulling it toward you. Only the old version of the *ST*-type buildout is shown. Refer to the appropriate figure in Step 3 for the specific buildout type.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Install OLIU Circuit Packs

1.  **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
-  **CAUTION 1:**
*Before installing **OLIUs**, ensure all optical fiber connectors and couplings have been properly cleaned [DLP-527]. Signal performance may be degraded if the connectors and couplings are not cleaned properly.*
-  **CAUTION 2:**
*If optical fiber cables are routed beneath the **OLIUs**, be careful not to pinch or crush the fibers when the **OLIUs** are inserted.*
-  **NOTE 1:**
The DDM-2000 FiberReach shelf requires two **26G-U/26G2-U OLIUs** in the **MAIN** slots when operating at the OC-1 rate and requires two **28G type OLIUs** in the **MAIN** slots when operating at the OC-3 rate.
-  **NOTE 2:**
When installing two **28G type OLIUs** a faceplate interconnect cable assembly, [comcode (847721271)] is required.
-  **NOTE 3:**
The red **FAULT** LED flashes when no signal is present to the **OLIUs**.
-  **NOTE 4:**
When using the following procedures to install the **OLIUs**, if the responses are not correct, check all connections. If connections are correct, replace the **OLIU** that has the wrong response.

Install **OLIU** into required **MAIN-1** slot.

Response: **FAULT** LED and **ACTIVE** LED lights. **FAULT** LED begins flashing after about 10 seconds. The **MJ** (fecom enabled) or **MN** (fecom disabled) LED will light.

2. Install second **OLIU** into **MAIN-2** slot. The FiberReach requires two **OLIUs** for operation.

Response: **FAULT** LED and **ACTIVE** LED lights. **FAULT** LED begins to flash after about 10 seconds. (The **FAULT** LED may go off for a few seconds before starting to flash.)

3. If installed **26G type OLIU**, go to **Step 5**.
4. If installed **28G type OLIU**, install faceplate interconnect cable assembly, [comcode (847721271)].
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Connect Optical Loop

1.  **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
-  **CAUTION 1:**
*Take care to avoid damaging the LEDs that protrude through the opening in the faceplate of the **OLIU**.*
-  **CAUTION 2:**
*The **26G-UI/26G2-U OLIU** requires a 15 dB LBO when it is looped on itself.*
-  **CAUTION 3:**
*Avoid excessive bending of the optical jumper used to loop the **OLIU** on itself.*
-  **CAUTION 4:**
All optical fiber connectors and couplings should be properly cleaned [DLP-527]. Signal performance may be degraded if the connectors and couplings are not cleaned properly.
2.  **CAUTION:**
***26G-UI/26G2-U OLIUs** are shipped with 0 dB ST[®]-type universal LBOs installed (code - **A3070**, comcode - **106795354**). The 0 dB LBO must be replaced with a 15 dB LBO when the **26G-UI/26G2-U OLIU** is looped on itself. See Table A.*
-  **NOTE 1:**
*It may take from 15 seconds to 3 minutes and 25 seconds for the **FAULT** LEDs to stop flashing, depending on the setting of the signal degrade threshold (–5 to –9).*
-  **NOTE 2:**
*The lightguide jumpers used to loop the **OLIUs** must be equipped with ST[®], FC/PC, or SC connectors at both ends, depending on the type of **OLIU** connector. See Figures 1, 2, and 3.*

⇒ **NOTE 3:**
The **26G-U/26G2-U OLIU**s require single mode lightguide jumpers (Table B).

For the **26G-U/26G2-U OLIU**, replace the 0 dB LBO on the **OUT** buildout block(s) with the required 15 dB LBO on the **MAIN-1 OLIU**. See Table A.

Table A – Universal 15 dB Lightguide Buildouts

Code	Comcode	Connector Type	Cable Connection	Label Color
A3060F	106708985	SC	SM-SM	Black
A3070F	106795388	ST [®]	SM-SM	Black
A3080F	106795438	FC/PC	SM-SM	Black

Table B – Single-Mode Lightguide Jumpers

Code	Comcode	Length (Feet)	Connectors
FS1E-E-2	105357727	2	ST [®] -ST
LS1SC-SC-2	106908247	2	SC-SC
LS1FP-FP-10	106593825	10	FC/PC-FC/PC

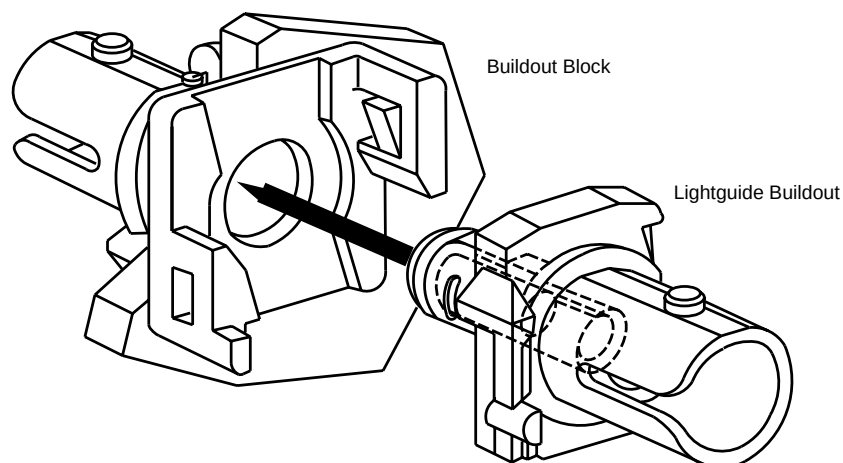


Figure 1. ST[®]-Type Universal Buildout

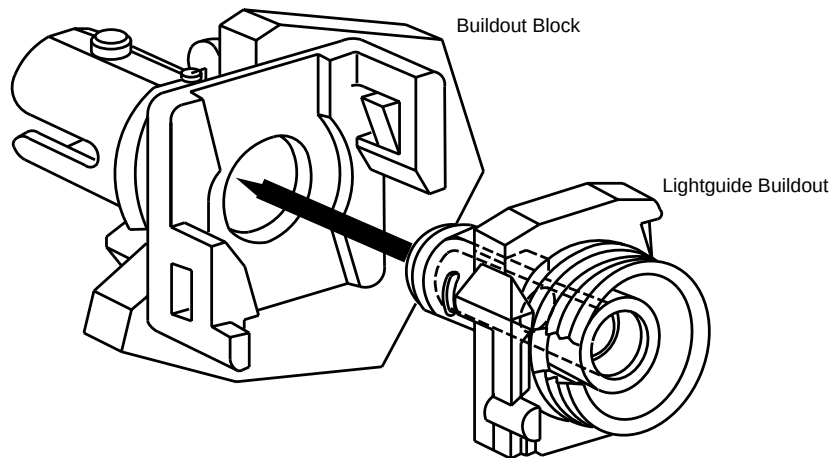


Figure 2. FC/PC-type Universal Buildout

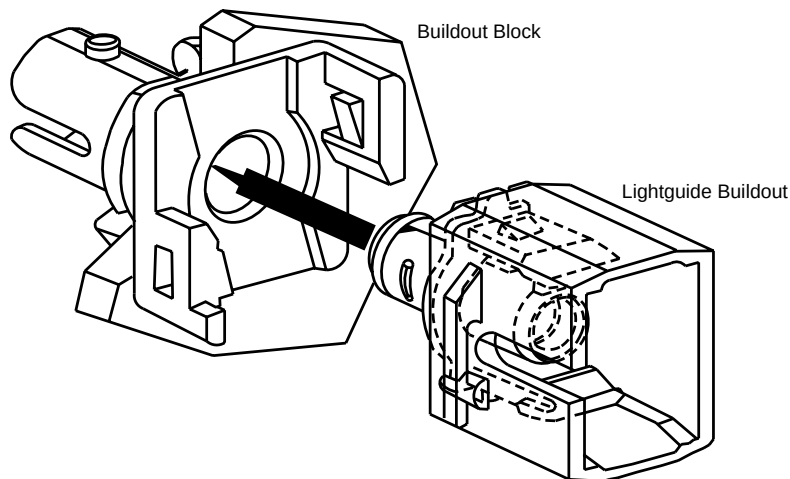


Figure 3. SC-type Universal Buildout

3. Use lightguide jumpers to loop the **IN** and **OUT** connectors of the **MAIN-1 OLIU**. See Table B.

Response: **FAULT** LED on **SYSTL** flashes.
ACTIVE LED remains on.
Lighted major (**MJ**) or minor (**MN**) LED remains lighted.

4. For the **26G-U/26G2-U OLIU**, replace the 0 dB LBO on the **OUT** buildout block(s) with the required 15 dB LBO on the **MAIN-2 OLIU**. See Table A.

5. Use lightguide jumpers to loop the **IN** and **OUT** connectors of the **MAIN-2 OLIU**. See Table B.

Response: **FAULT** LED stops flashing.
ACTIVE LED remains on.
MJ/MN alarm goes off.

6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

DDM-2000 FiberReach Receiver Sensitivity Test

1. **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CAUTION 1:
Take care to avoid damaging LEDs that protrude through opening in faceplate of OLIU.

CAUTION 2:
Avoid excessive bending of optical jumper and cables.

CAUTION 3:
All optical fiber connectors, couplings, and buildouts should be properly cleaned.

Reference: **DLP-527.**

Signal performance may be degraded if connectors, couplings, or buildouts are not cleaned properly.

NOTE 1:
It may take from 15 seconds to 3 minutes and 25 seconds for **FAULT** LEDs to stop flashing, depending on setting of signal degrade threshold (–5 to –9).

NOTE 2:
This test may be accomplished with one shelf by simply using an optical loopback after the optical splitter.

Configure the DDM-2000 shelf and test equipment as shown in Figure 1.

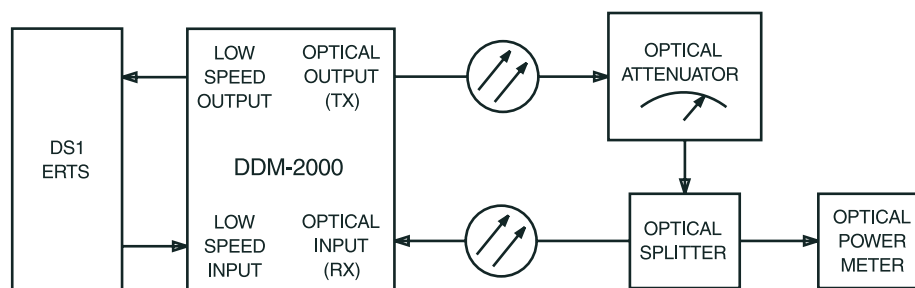


Figure 1. DDM-2000 Receiver Sensitivity Test Configuration

2. Set variable optical attenuator to obtain power level reading on optical power meter as required from Table A.

Table A – OC-1 OLIU Optical Power Levels

OC-1 OLIU	Power Level (dBm)
26G-U/26G2-U	-31.0

3. Monitor the DS1 received signal with the DS1/DS3 Error Rate Test Set (ERTS) for 30 minutes and ensure a bit error rate (BER) result of 10^{-10} or better.
4. Did **OLIU** pass BER test?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
If **NO**, then continue with **Step 5.**
5. Clean optical attenuators and connectors and repeat test. If test fails again, replace **OLIU**.

Install T1EXT Circuit Packs



CAUTION:

In addition to primary lightning protection, an external Lightning and Surge Secondary Protection Assembly (ED-8C783-30 or equivalent) is required for T1EXT circuits used in outside plant applications.



NOTE:

DS1 line coding may be set using either the option switches OR the **set - t1** command. It is recommended that a policy be established to set line coding using either the switches OR the command. If DS1 line code (lc) parameters are set using the **set - t1** command, a software override will be active and the circuit pack switch settings will have no effect. The software override will remain active until the **set - t1** command is executed again and the **noOverride** option is selected. The **rtrv - t1** command may be used to check line code settings.

Refer to Table A and Figure 1 and set the line code option switches, if required.

Table A – T1EXT Line Code Settings (Note)

Line Code Format	Switch S1 Settings				
	S1-1 (Port 1)	S1-2 (Port 2)	S1-3 (Unused)	S1-4 (Unused)	S1-5 (Unused)
B8ZS	OFF	OFF	OFF	OFF	OFF
AMI	ON	ON	OFF	OFF	OFF

Note: Switch 1, section 3 (**S1-3**), section 4 (**S1-4**) and section 5 (**S1-5**) must be set to **OFF**.

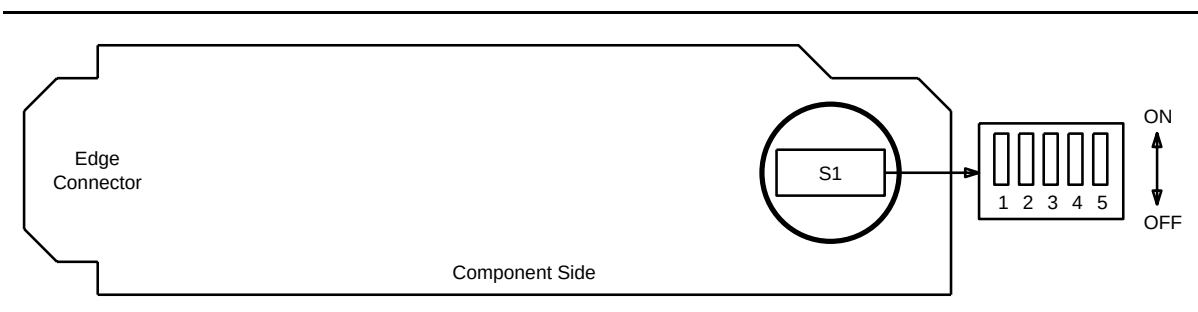


Figure 1. T1EXT Option Settings

2.  **NOTE:**
If the response is not correct when the **T1EXT** circuit pack is installed, check option switch setting. If settings are correct, replace the **T1EXT** circuit pack.

Seat **T1EXT** circuit pack in required **LOW SPEED** slot being equipped.

Response: **FAULT** LED on **T1EXT** circuit pack lights and may remain lighted for about 40 seconds and then goes off.

3. Repeat this procedure from Step 1 for each service **T1EXT** circuit pack being installed.
4.  **NOTE:**
One protection **T1EXT** circuit pack may be installed for each service **T1 EXT** circuit pack installed, if the shelf is equipped for 1X1 protection mode. One protection **T1 EXT** circuit pack may be installed to protect all service **T1 EXT** circuit packs installed, if the shelf is equipped for 1X7 protection mode. The **SYSCTL** automatically provisions the protection **T1 EXT** circuit pack to match the line code setting (B8ZS or AMI) of any service **T1 EXT** circuit pack that it protects.

Is protection **T1EXT** circuit pack(s) being installed?

If **YES**, then continue with **Step 5**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5. Refer to Figure 1 and Table A and set line code option switches on protection **T1EXT** circuit pack(s).
6. Is shelf provisioned for 1X1 or 1X7 protection. (See **NTP-011** and **NTP-012**).
- If **1X1**, then continue with **Step 7**.
If **1X7**, then proceed to **Step 9**.
7. Seat protection **T1EXT** circuit pack into slot **LOW SPEED-[A2(P), B2(P), C2(P), or D2(P)]** immediately above the service low-speed group being equipped.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. Seat protection **T1EXT** circuit pack into slot **LOW SPEED-[D2(P)]**.
10. Install **177A** Apparatus Blank into all unequipped service and protection **T1EXT** slots, if required.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Install DS1/DS1PM Circuit Packs

1.  **CAUTION:**
*Take care to avoid damaging the LEDs that protrude through the opening in the faceplate of the **DS1/DS1PM** circuit pack.*

Determine from office records the length of the DS1 cabling between the DDM-2000 FiberReach and the DSX-1 cross-connect point.

2.  **NOTE 1:**
Switch 1, sections 1 through 3 (**S1-1, S1-2, S1-3**), are set according to the length of DS1 cabling between the DDM-2000 FiberReach and the DSX-1 cross-connection. Switch 1, sections 4 through 7 (**S1-4, S1-5, S1-6, S1-7**), are set for the type of line coding (B8ZS or AMI) required of the DS1 signal. Switch 1, section 8 (**S1-8**) is unused and ignored by the system.
-  **NOTE 2:**
To set switch to ON, depress rocker or slide switch toward side labeled **ON** in the figure. To set switch to OFF, depress rocker or slide switch toward side labeled **OFF** in the figure.

Refer to Figure 1 and Table A and set LBO option switches.

Table A – DS1/DS1PM Cable LBO Settings

613C (608C) Cable Length (feet)	1249C Cable Length (feet)	Other Cable dB Loss at 772 kHz	Switch S1 Settings		
			S1-1	S1-2	S1-3
0 to 133	0 to 90	0 to 0.6	OFF	OFF	OFF
>133 to 267	>90 to 180	>0.6 to 1.2	OFF	OFF	ON
>267 to 400	>180 to 270	>1.2 to 1.8	OFF	ON	OFF
>400 to 533	>270 to 360	>1.8 to 2.4	OFF	ON	ON
>533 to 655	>360 to 450	>2.4 to 2.8	ON	OFF	OFF

Note: Invalid switch settings will cause the **FAULT** LED to light and a DS1 CP failed alarm.

3. **⇒ NOTE:**
DS1 line coding may be set using either the option switches OR the **set - t1** command. It is recommended that a policy be established to set line coding using either the switches OR the command. If DS1 line code (lc) parameters are set using the **set - t1** command, a software override will be active and the circuit pack switch settings will have no effect. The software override will remain active until the **set - t1** command is executed again and the **noOverride** option is selected. The **rtrv - t1** command may be used to check line code settings.

Refer to Table B and Figure 1 and set the line code option switches, if required.

Table B – DS1/DS1PM Line Code Settings

Line Code Format	Switch S1 Settings				
	S1-4 (Port 1)	S1-5 (Port 2)	S1-6 (Port 3)	S1-7 (Port 4)	S1-8 (Note)
B8ZS	OFF	OFF	OFF	OFF	OFF
AMI	ON	ON	ON	ON	OFF

Note: Switch 1, section 8 (S1-8) is unused and ignored by the system.

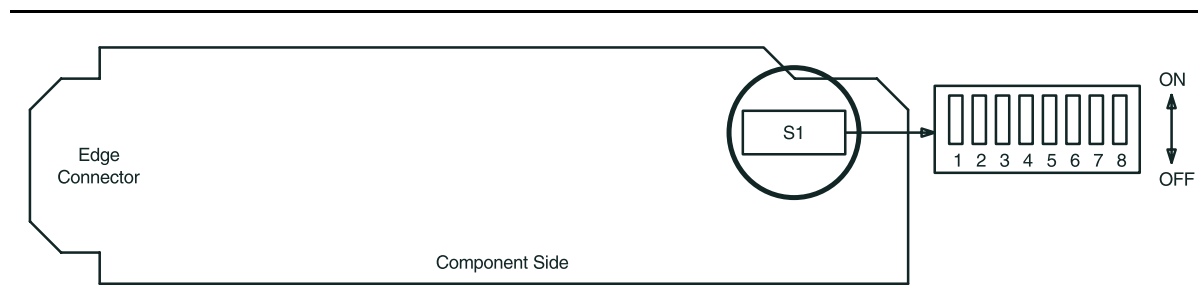


Figure 1. DS1/DS1PM Option Settings

4. **⇒ NOTE:**
If the response is not correct when the **DS1/DS1PM** circuit pack is installed, check option switch setting. If settings are correct, replace the **DS1/DS1PM** circuit pack.

Seat **DS1/DS1PM** circuit pack in required slot of **LOW SPEED** group being equipped.

Response: **FAULT** LED on **DS1/DS1PM** circuit pack lights and may remain lighted for about 40 seconds and then goes off.

5. Repeat this procedure from Step 1 for each service **DS1/DS1PM** circuit pack being installed.

6.  **NOTE:**
One protection **DS1/DS1PM** circuit pack may be installed for each service **DS1/DS1PM** circuit pack installed, if the shelf is equipped for 1X1 protection mode. One protection **DS1/DS1PM** circuit pack may be installed to protect all service **DS1/DS1PM** circuit packs installed, if the shelf is equipped for 1X7 protection mode. The **SYSCTL** automatically provisions the protection **DS1/DS1PM** circuit pack to match the line code setting (B8ZS or AMI) of any service **DS1/DS1PM** circuit pack that it protects.

Is protection DS1 circuit pack(s) being installed?

If **YES**, then continue with **Step 7**.

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7. Refer to Figure 1 and Table A and set LBO option switches on protection **DS1/DS1PM** circuit pack(s).
8. Is shelf equipped for 1X1 or 1X7 protection mode.
- If **1X1**, then continue with **Step 9**.
If **1X7**, then proceed to **Step 11**.
9. Seat protection **DS1/DS1PM** circuit pack into **LOW SPEED-[A2(P), B2(P), C2(P), or D2(P)]** slot immediately above the service low-speed group being equipped.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
11. Seat protection **DS1/DS1PM** circuit pack into slot **LOW SPEED-[D2(P)]**.
12. Install **177A** Apparatus Blanks into all unequipped service and protection DS1 slots, if required.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Perform LED Test

1.  **CAUTION:**
Take care to avoid damaging the LEDs that protrude through the openings in the faceplates of the circuit packs.

Is a CIT available?

If **YES**, then continue with **Step 2**.

If **NO**, then proceed to **Step 5**.

2. Connect CIT to User Panel.

Reference: **DLP-521**

3. Use the **test-led:address:r=()** command to test LEDs.

Where address = address identifier of the system, slot, or user panel that contains the LEDs to be tested. Default is **all**.

r = number of times (1 through 10) test is repeated.

Response: All LEDs for the specified address identifier light. For a **SYSCTL** LED test, all segments of the **SYSCTL FE ID** display (including the period) light. After 10 seconds, all LEDs go off. After another 10 seconds, a completion message is printed and all LEDs are updated to show the current status of the system.

4. Did LED test pass?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then proceed to **Step 7**.

5.  **NOTE:**
When the **ACO/TEST** pushbutton is depressed, all LEDs and the 7-segment **FE ID** display on the **SYSCTL** light. If the **ACO/TEST** pushbutton is released within 2 seconds, the LED test completes and the 7-segment display and all LEDs revert to normal operation. If the **ACO/TEST** pushbutton is depressed longer than 2 seconds, the 7-segment display goes blank for 2 seconds and then each digit of the generic software version code is scrolled through the display. The LEDs remain lighted while the code is being displayed. When the **ACO** pushbutton is released, the LEDs remain lighted until the full software version code is displayed. If the **ACO/TEST** pushbutton is still depressed when the software version code has completed cycling, the display goes blank for 2 seconds and starts cycling through the software version code again. This continues as long as the **ACO/TEST** pushbutton is depressed.

Depress the **ACO/TEST** pushbutton on the User Panel.

Response: All LEDs and the **SYSCTL** 7-segment display light.

6. Was response correct?
- If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
If **NO**, then continue with **Step 7.**
7. Were you sent here by another procedure to perform an LED test?
- If **YES**, then continue with **Step 8.**
If **NO**, then do **Trouble Clearing: TAP-115.**
8. Record the circuit pack(s) (LEDs) that failed the LED test and return to the procedure that sent you here.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Perform DS1 Transmission Test

1.  **NOTE 1:**
This procedure may be used to perform individual DS1 transmission tests in the *mux* (toward the fiber) or *demux* (toward the DSX or T1 lines) direction. When this procedure is being used to perform end-to-end DS1 tests, it is assumed that the complete end-to-end system has already been tested and that only a particular DS1 port is being tested at this time. It is further assumed that the DS1 options (**DS1/DS1PM** circuit packs) have been set correctly (using the **set-t1:** command) at both ends of the circuit being tested. The **rtrv-t1:** command may be used to check for proper DS1 option settings. Ensure proper DS1 line coding settings (AMI/B8ZS) at DS1 ends of the circuit.
-  **NOTE 2:**
Transmission tests in the *mux* direction may be local or end-to-end tests (see Figure 1). Transmission tests in the *demux* direction may be local cross-connect tests (see Figure 2). The "Commands and Report"s section of this manual, under TEST-TRMSN-T1, gives an explanation of commands.
-  **NOTE 3:**
This test can be performed either with a CIT and the automated test command **test-trmsn-t1** or with a suitable low speed test set (such as a KS-20775, L1 DS1 Error Rate Test Set or a KS-22331, L1/KS-22332, L2 DS1/DS1C/DS2 Error Rate Test Set).
-  **NOTE 4:**
When this procedure is used to do end-to-end tests, one DDM-2000 shelf will be referred to as the near end and the other shelf as the far end. These designations are arbitrary; either shelf can be the near-end or the far-end shelf.
-  **NOTE 5:**
Proper cross-connections must be made at each shelf to establish the complete end-to-end path for the DS1 circuit being tested. Release 3.0 has no default cross-connections and supports only manual VT1.5 cross-connections. See the description of the following commands in the "Commands and Reports" section of this manual: **dlt-crs-vt1**, **ent-crs-vt1**, **rtrv-crs-vt1**, **set-ne**, and **rtrv-ne**. See *Cross-Connection Provisioning* in the "Administration and Provisioning" section of this manual for more information on cross-connection provisioning.

- ⇒ **NOTE 6:**
A CIT is required to make cross-connections for this test.

At the near-end **DDM-2000**, connect the CIT to the **CIT** jack on the User Panel, if required.

Reference: **DLP-521**

2. If this test is being performed on a shelf that has the **OLIUs** looped back, use the **rtrv-sync** and **switch-sync:s=mode:pri>manual** commands to verify/switch timing mode to *holdover*.

3. ⇒ **NOTE:**
Work orders, office records, or CIT **ent-crs-vt1** or **rtrv-crs-vt1** commands may be used to make or verify cross-connections.

At each shelf in the network, make/verify that proper VT1(DS1) terminating and pass-through cross-connections have been made for each DS1 circuit being tested, as required.

4. Are you using CIT and **test-trmsn-t1** command to perform this test?

If **YES**, then continue with **Step 5**.

If **NO**, then proceed to **Step 22**.

5. ⇒ **NOTE:**
If one terminating end is equipped with **STS1E** circuit packs to provide EC-1 service and the other terminating end is equipped with **DS1**, **DS1PM**, or **T1EXT** circuit packs, the DS1 transmission test is performed from the DS1 terminating end. If the CIT and **test-trmsn-t1:** command is being used to perform the test and you are at the EC-1 terminating end, log into the DS1 end to perform the test using the **test-trmsn-t1:** command.

See Figures 1 and . If local tests are being performed, the fiber loopbacks at the near-end **OLIUs** must be in place. If end-to-end tests are being performed, do ONE of the following:

- Connect a patch cord from the **OUT** jack to the **IN** jack at the far-end DSX-1, STSX cross-connection, or T1 interface associated with the DS1 channel to be tested.
- Use the **rlgn** command to log in to the far-end shelf and use the **opr-lpbk-t1:address** or **opr-lpbk-ec1:address** command to loop back the DS1 or EC-1 port(s) at the far end. Use **logout** or **toggle** (ctrl t) command to return control of CIT to near end.

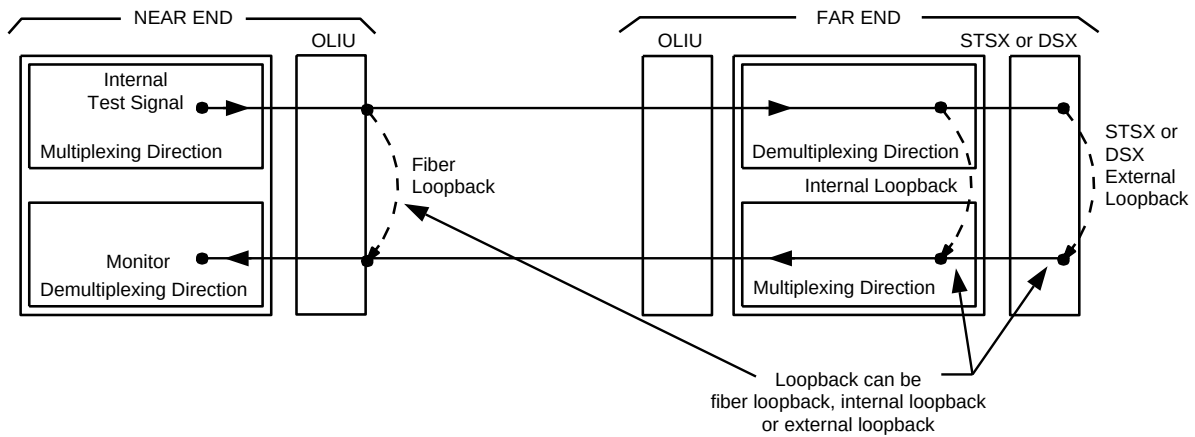


Figure 1. Transmission Test of DS1 Signal in MUX Direction

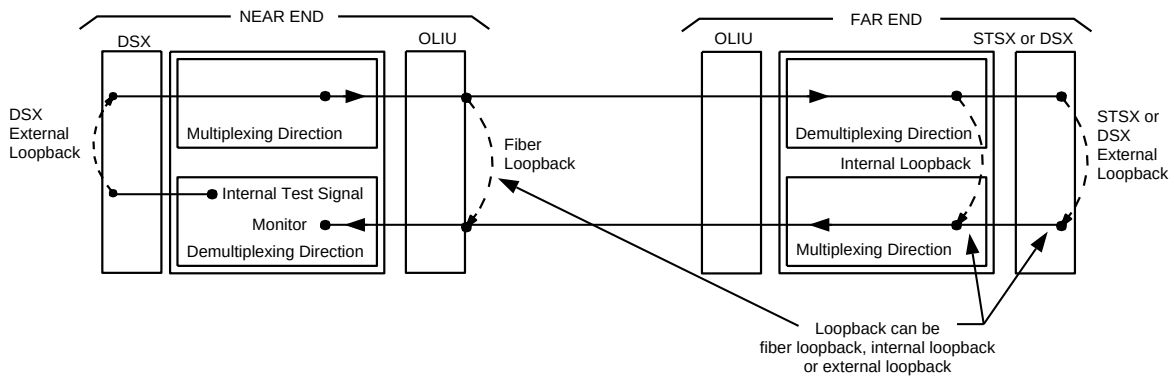


Figure 2. Transmission Test of DS1 Signal in DEMUX Direction

6. Are you doing this test in the mux or demux direction?

If **MUX** direction, then continue with **Step 7**.

If **DEMUX** direction, then proceed to **Step 9**.

7. At the near end, use the following command to perform a test of the DS1 loop in the fiber direction: **test-trmsn-t1:address:dirn=mux:dur=()**;

Where *address* = address identifier of the DS1/T1 signal.

dirn = direction of the test. If **dirn=mux**, direction is toward fiber.

dur = duration of the test in minutes (1-120); default is 1.

8. Was the test successful (error free)?

If **YES**, then proceed to **Step 12**.

If **NO**, then proceed to **Step 36**.

9. See Figures 1 and 2. At the near-end DSX-1 cross-connection or T1 interface associated with the DDM-2000 being tested, connect a patch cord from the **OUT** jack to the **IN** jack for the DS1 channel to be tested.

10. Use the following command to perform a DS1 transmission test in the demux direction to test the DS1 loop in the DSX direction:

test-trmsn-t1:address:dirn=demux:dur=();

Where *address* = address identifier of the DS1/T1 signal.

dirn = direction of the test. If **dirn=demux**, direction is toward DSX or T1 interface.

dur = duration of the test in minutes (1-120); default is 1.

11. Was the test successful (error free)?

If **YES**, then continue with **Step 12**.

If **NO**, then proceed to **Step 36**.

12. Is this first service being placed on the group and is a protection **DS1**, **DS1PM**, or **T1EXT** circuit pack installed?

If **YES**, then continue with **Step 13**.

If **NO**, then proceed to **Step 17**.

13. Use the following command to switch from service to protection circuit pack:
switch-ls:address:pri>manual;

14. Repeat the transmission test in the mux (or demux) direction using the following command:
test-trmsn-t1:address:dirn=mux (or demux):dur=();
 15. Was the test successful (error free)?
If **YES**, then continue with **Step 16**.
If **NO**, then proceed to **Step 36**.
 16. Use the following command to clear active switch requests:
switch-ls:address:pri=reset;
 17. ➤ **NOTE:**
If this is a single-ring configuration and the transmission test is being performed in the *mux* direction, use the **switch-path** command to switch the path to the other ring and then repeat this test before releasing loopbacks.
- The DS1 circuit under test has passed the DS1 transmission test. Remove the looping patch cords from the cross-connect point. Use the **rls-lpbk-t1** command to release loopback(s) at the far end, if required.
18. At the near-end (and the far-end) DDM-2000, momentarily depress the **UPD/INIT** button on the **SYSCTL** (or use the **upd** command) to update the **SYSCTL** and remove alarms after the loopbacks have been removed.
 19. Repeat this procedure from Step 3 for any additional DS1 circuits to be tested.
 20. Use the **rtrv-sync** and **switch-sync:s=mode:pri=reset** commands to verify/switch timing mode back to *LoopTimed*.
 21. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
 22. See Figure 1. If local tests are being performed, the fiber loopback at the near-end **OLI** must be in place. If end-to-end tests are being performed, at the far-end DSX-1, STSX cross-connect point, or T1 interface associated with the DDM-2000 being tested, connect a patch cord from the **OUT** jack to the **IN** jack for the DS1 channel to be tested.
 23. At the near-end DDM-2000 cross-connect point, connect the DS1 test set to the **IN** and **OUT** jacks associated with the circuit under test.
 24. Use the DS1 test set to test for error-free transmission.
 25. Was the test successful (error free)?
If **YES**, then continue with **Step 26**.

If **NO**, then proceed to **Step 36**.

26. Is this first service being placed on the group and is protection circuit pack installed?

If **YES**, then continue with **Step 27**.

If **NO**, then proceed to **Step 31**.

27. Unseat the service **DS1**, **DS1PM**, or **T1EXT** circuit pack associated with the circuit under test.

28. Repeat the DS1 transmission test with the DS1 test set.

29. Was the test successful (error free)?

If **YES**, then continue with **Step 30**.

If **NO**, then proceed to **Step 36**.

30. Reseat the **DS1**, **DS1PM**, or **T1EXT** circuit pack associated with the circuit under test.

31. The **DS1** circuit under test has passed the DS1 transmission test. Remove the looping patch cords from the cross-connections.

32. At the near-end (and the far-end) DDM-2000, momentarily depress the **UPD/INIT** button on the **SYSCTL** to update the **SYSCTL**.

33. Repeat this procedure from Step 22 for any additional DS1 circuits to be tested.

34. Use the **rtrv-sync** and **switch-sync:s=mode:pri=reset** commands to verify/switch timing mode back to *LoopTimed*.

35. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

36. Check for line code (AMI/B8ZS) mismatch at near end and far end. If mismatch is found, set line code [**DLP-513**] to correct value and repeat this test. If no trouble is found, continue with the next step.

37. In some releases, if **dlc=yes** as set by the **set-t1** command, loopbacks are not recognized (loopback not recognized) in this test. Use **rtrv-t1** command to check if **dlc=yes**.

38. Is **d1c** set to yes?

If **YES**, then continue with **Step 39**.

If **NO**, then proceed to **Step 40**.

39. Use **set - t1** command to temporarily set **d1c=no** and repeat this test. If the test fails again, continue with the next step.

40. Has the **DS1**, **DS1PM**, or **T1EXT** circuit pack that failed the test been replaced?

If **YES**, then proceed to **Step 43**.

If **NO**, then continue with **Step 41**.

41. Replace the **DS1**, **DS1PM**, or **T1EXT** circuit pack that failed the test.

Reference: DLP-523

42. Repeat this procedure for the **DS1**, **DS1PM**, or **T1EXT** circuit pack that failed.

43. Trouble may be in the DSX cross-connect or T1 interface wiring, VT1/STS1 cross-connections in the network, or the shelf backplane. Use the **rtrv-crs()** command to ensure proper VT1/STS1 cross-connections have been made at each shelf in the ring for the DS1 being tested. If no trouble found, check DSX cross-connect, T1 interface wiring and backplane connections. If other alarms or trouble indications are present, refer to **Trouble Clearing: IXL-001** to isolate the trouble. If no alarms or indications are present and a CIT is available, use the RETRIEVE commands (for example, **rtrv-alm**, **rtrv-hsty**, etc.) to check for other trouble indications.

44. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Remove –48 V DC User Panel Fuse

1. Obtain multimeter capable of measuring DC voltage in the 40 to 60 volt range.

2.  **WARNING:**
–48 V DC is present in the fuse holders and the –48V A, –RTN A, –48V B, and –RTN B power connectors on the backplane shelf. It may also be present on the –48V BB, –RTN BB connector.

-  **CAUTION:**
If system is in service, service interruption will occur if both fuses are removed or both power feeders are disconnected. Do not remove any User Panel fuse that does not indicate blown without first verifying that –48 V is present on the other incoming power feeder.

Does fuse indicator indicate blown fuse?

If **YES**, then continue with **Step 3**.

If **NO**, then proceed to **Step 7**.

3. Replace –48 V blown fuse.

4. Did fuse blow again?

If **YES**, then continue with **Step 5**.

If **NO**, then proceed to **Step 7**.

5. Trouble in User Panel or backplane connector. If User Panel needs to be replaced, see **DLP-502**.

If you need assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions (**1-800-225-RTAC**).

6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.  **CAUTION:**
Before removing a fuse that does not have a failure indicator activated, you must first verify that –48 V is available to the shelf through the fuse that is not going to be removed.

Momentarily depress the **ACO/TST** pushbutton on the User Panel and the **FE SEL** pushbutton on the **SYSCTL** at the same time to start a 10-second countdown (9, 8, 7, etc.) on the **FE ID** display. During this countdown, remove the **SYSCTL**.

8. If fuse **FA** is being removed, verify that –48 V DC is present between **–48V A** (negative connector) and **–RTN A** (positive connector) on backplane of shelf.

If fuse **FB** is being removed, verify that –48 V DC is present between **–48V B** (negative connector) and **–RTN B** (positive connector) on backplane of shelf.

Requirement: Voltage must be between –40.00 V and –60.0 V DC

9. Was requirement met?

If **YES**, then continue with **Step 10**.

If **NO**, then proceed to **Step 12**.

10. You can safely remove one fuse as required, if power is maintained to the shelf through the other fuse.

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12. Trouble in User Panel, power feeder(s), or office battery distribution. If User Panel needs to be replaced, see **DLP-502**.

If you need assistance, notify your supervisor, your local technical support organization, or call Lucent Technologies RTAC, per local operating instructions (**1-800-225-RTAC**).

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Activate System Features Using CIT

1. Connect CIT to **CIT** connector on User Panel and establish session.

Reference: **DLP-521**

2. Refer to the "Commands and Reports" section of this user/service manual for the descriptions and syntax of the various optional features of the DDM-2000 that may be set using the CIT (see Tables A and B). These optional features can be found under numerous listings.

The following lists optional features which may be lost if the **SYSCTL** is replaced:

ent -ulsdcc	Provisions the user-settable fields of the network service access point (NSAP) address. Command parameters should not be changed from default values except by users who intend to provision the SONET subnetwork and partition DCC communications.
set -attr -alm	Sets alarm delay and clear delay.
set -attr -env	Names and sets alarm level of miscellaneous discrete input points at RT only.
set -attr -cont	Names miscellaneous discrete control output points at RT only.
set -date	Sets date and time.
set -fecom	Enables or disables far end communication over the data communication channel.
set -lgn	Enters, edits, and deletes logins and passwords. Privileged users can change other users' passwords by using this command.
set -link	Sets length of page output on the CIT.
set -ne	Sets the name [Target Identifier (TID)] of the network element. It designates the shelf as a directory services network element (DSNE) for OSI protocol. One , and only one, shelf in the subnetwork must be provisioned as a DSNE. It also designates a shelf as an alarm gateway network element (AGNE) and sets alarm group numbers.

set -passwd	Sets or changes a users' password. All users can change their own passwords.
set -pmthres -line	Sets the thresholds of the line performance parameters. Also enables or disables the processing of the threshold crossings for these performance parameters.
set -pmthres -sect	Sets the thresholds of the section performance parameters. Also enables or disables the processing of the threshold crossings for these performance parameters.
set -pmthres -t1	Sets the thresholds of the DS1 performance parameters. Also enables or disables the processing of the threshold crossings for these performance parameters.
set -pmthres -sts1	Sets the STS-1 path performance parameter thresholds.
set -pmthres -vt1	Sets the thresholds of the VT1.5 path performance parameters. Also enables or disables the processing of the threshold crossings for these performance parameters.
set -secu	Sets security on the CIT port and the DCC interfaces. Enabling security requires users to enter login and password to access the system.
set -sync	Sets synchronization mode switching to revertive or nonrevertive. After the end-to-end system is established, sets synchronization source to select the line from which line-timing for the shelf will be derived.

Other optional features are set from the CIT but are not lost if the **SYSCTL** is replaced.



CAUTION:

Execution of these commands may be service affecting.

These features may be found under the following listings:

ent -crs -vt1	Specifies VT1.5 (DS1) cross-connect routing. Used in establishing service and/or performing transmission tests.
set -feat	Enables feature options that are licensed for use: vtpm and ds1pm.

set - oc1	Sets the characteristics of a OC-1 line. Sets the signal degrade threshold of the OC-1 line as a bit error rate (BER).
set - state - oc1	Sets the state of OC-1 line(s) to be monitored (IS) for a good signal or not monitored (NMON).
set - state - t1	Sets the state of a low-speed port to be automatically monitored (AUTO) for a good signal or not monitored (NMON).
set - state - sts1	Sets the state of a STS-1 channel to be automatically monitored (AUTO) for a good signal or not monitored (NMON).
set - state - vt1	Sets the state of a VT1.5 channel to be automatically monitored (AUTO) for a good signal or not monitored (NMON).
set - sts1	Sets the signal degrade characteristics of an STS-1 channel.
set - t1	Sets the characteristics of a DS1 port.
set - vt1	Sets the signal degrade characteristics of a VT1.5 channel.

3. Determine options required from office records.
4. Set options using the syntax of the Commands and Reports section in this manual.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table A – DDM-2000 FiberReach Parameters Provisionable Via the CIT

Parameter	Range	Default (Note 1)	Command (Note 2)
Communications Network Side(ns)/ User Side(us)	enabled or disabled ns or us	enabled m1-us m2-us	set - fecom\$ set - fecom\$
SYNC Mode Switching SynchronizationSource	revertive or nonrevertive main-1 or main-2	revertive main-1	set - sync set - sync
Date Time	current value current value	70-01-01 00:00:00	set - date set - date
TID (system name) DSNE(R2.0) AlarmGroup AGNE Site NE # CO/RT TBOS address TBOS link TBOS remote IDLE	20 characters no 1-255 yes or no 1-64 1-5 CO or RT 1-8 normal, primary, secondary, no TBOS enabled or disabled AIS or Unequipped inserted	Site#NE# no 255 no 64 5 RT 1 no TBOS disabled AIS	set - ne set - ne set - ne set - ne set - ne set - ne set - ne set - ne set - ne set - ne set - ne
Feature Option\$ VT PM or DS1 PM	enabled or disabled	disabled	set - feat
AlarmDelay Clear Delay Power Minor alarm level	0-30 sec 0-30 sec MN or MJ	2 15 MN	set - attr - alm set - attr - alm set - attr - alm
Environmental Alarm Level Environmental Alarm Type Environmental Alarm Description	CR, MJ, MN, or NA 10 characters 26 characters	MN	set - attr - env set - attr - env set - attr - env
Control Point Description	26 characters		set - attr - cont
OC1 SignalDegradeThreshold OC1 Line AIS(R2.1)	10 ⁻⁵ to 10 ⁻⁹ cr, mj, mn, or na	10 ⁻⁶ na	set - oc1 set - oc1
STS-1 Channel SignalDegrade STS-1 Channel SignalFailure Alarm Level of NSA STS-1 Path AIS(R2.1) Alarm Level of SA STS-1 Path AIS(R2.1)	10 ⁻⁵ to 10 ⁻⁹ 10 ⁻³ to 10 ⁻⁶ mn or nr cr or na	10 ⁻⁶ 10 ⁻³ mn cr	set - sts1 set - sts1 set - sts1 set - sts1

See notes and footnotes at end of table.

Table A – DDM-2000 FiberReach Parameters Provisionable Via the CIT (Contd)

Parameter	Range	Default (Note 1)	Command (Note 2)
VT1.5 Path SignalDegradeThreshold¶ NSA VT Path AIS(R2.1) SA VT Path AIS(R2.1)	10 ⁻⁵ to 10 ⁻⁸ MN or NR MJ or NA	0 or 10 ⁻⁶ (R2.1) MN MJ	set-vt1 set-vt1 set-vt1
DS1 LineCode* DS1 AlarmLevel* DS1 FailureThreshold* DS1 DLCBPVtoLOS* AIS Signal Insertion* DS1 PM Mode* DS1 PM Format*	AMI, B8ZS, or noOverride‡ MJ, MN, or NA 10 ⁻³ , 10 ⁻⁶ , 10 ⁻⁷ , 10 ⁻⁸ BER yes or no yes or no off or on sf, esf, or esfn	noOverride NA 10 ⁻³ no yes off esf	set-t1* set-t1* set-t1* set-t1* set-t1* set-t1 set-t1
STS-1 PrimaryState	AUTO† or NMON	AUTO	set-state-sts1
VT Port PrimaryState¶	AUTO or NMON†	AUTO	set-state-vt1
CIT PageLength	0(pager off) or 3-150 rows	24	set-link
PM Thresholds	See PM Table B	-	set-pmthres
CIT/DCC Security§ DCC Security§ CIT Timeout (minutes)§	enabled, disabled, or lockout enabled, disabled, or lockout 0-120	disabled disabled 15	set-secu§ set-secu§ set-secu§
NSAP OrganizationID (Operator ID) Reserved (Reserved) RoutingData (Routing Domain/Area)	6 hex digits 4 hex digits 8 hex digits	000000 0000 00000000	ent-ulsdcc ent-ulsdcc ent-ulsdcc
ACID (OS Function) TL1 MessageType Action to Associate Message Type to OS	See Commands and Reports See Commands and Reports enabled or disabled	 enabled	ent-tl1msgmap ent-tl1msgmap ent-tl1msgmap
Cross-Connection Type Ring ID for locked	twoway or locked m1 or m2	twoway See Commands and Reports	ent-crs-vt1 ent-crs-vt1

Notes:

1. Default means factory default (the CIT prompts display current provisioned values).
 2. To view the current values, precede these commands with **rtv-** instead of **set-**.
- * Parameter can be set for each port.
† AUTO means the port or channel is ready to be automatically provisioned via signal detection.
‡ noOverride means read and use switch settings on circuit pack.
§ This command is available to privileged users only.
¶ Parameters can be set for each channel.

Table B – DDM-2000 FiberReach Performance Monitoring Parameters Provisionable Via the CIT

Parameter Definition		Threshold Range[Default]*		Command
Facility	Measure	Current Quarter Hour	Current Day	set - pmtres -
OC-1 Section	SE Frame Seconds (SEFS)	0-63[10]	0-4095[30]	sect
OC-1 Line	B2 Coding Violations (CV)	0-4613[461]	0-442848[44285]	line
	B2 Errored Seconds (ES)	0-900[40]	0-65535[900]	line
	B2 Errored Seconds Type A (ESA)	0-900[30]	0-65535[90]	line
	B2 Errored Seconds Type B (ESB)	0-900[30]	0-65535[90]	line
	B2 Severely Errored Seconds (SES)	0-63[20]	0-4095[60]	line
	B2 Unavailable Seconds (UAS)	0-63[30]	0-4095[90]	line
STS-1 Path	B3 Coding Violations (CV)	0-4510[451]	0-432960 [43296]	sts1
	B3 Errored Seconds (ES)	0-900[40]	0-65535[900]	sts1
	B3 Errored SecondsType A (ESA)	0-900[30]	0-65535[90]	sts1
	B3 Errored SecondsType B (ESB)	0-900[30]	0-65535[90]	sts1
	B3 Severely Errored Seconds (SES)	0-63[20]	0-4095[60]	sts1
	B3 Unavailable Seconds (UAS)	0-63[30]	0-4095[90]	sts1
VT1.5 Path	V5 Errored Seconds (ES)	0-900[40]	0-65535[900]	vt1†
	V5 Severely Errored Seconds (SES)	0-63[20]	0-4095[60]	vt1†
	V5 Unavailable Seconds (UAS)	0-63[30]	0-4095[90]	vt1†
DS-1 Line	ES-L Errored Seconds	0-900[65](R2.1)	1-65535[648]	t1‡
DS-1 Path	CV-P (SF) Coding Violations	0-16383[72](R2.1)	0-1048575[691]	t1‡
	CV-P (ESF) Coding Violations	0-16383[13296](R2.1)	0-1048575[132960]	t1‡
	ES-P Errored Seconds	0-900[65](R2.1)	0-65535[648]	t1‡
	SES-P Severely Errored Seconds	0-63[10](R2.1)	0-4095[100]	t1‡
	UAS-P Unavailable Seconds	0-63[10](R2.1)	0-4095[10]	t1‡
	CV-PFE Coding Violations	0-16383[13296](R2.1)	0-1048575[132960]	t1‡
	ES-PFE Errored Seconds	0-900[65](R2.1)	0-65535[648]	t1‡
	SES-PFE Severely Errored Seconds	0-63[10](R2.1)	0-4095[100]	t1‡
	UAS-PFE Unavailable Seconds	0-63[10](R2.1)	0-4095[10]	t1‡

* Threshold is set once for both current quarter hour and current day.

† *vtpm* feature must be enabled with **set - feat** command.

‡ *ds1pm* feature must be enabled with **set - feat** command.

Set Circuit Pack Options

1.  **NOTE:**
When a replacement circuit pack (except the **SYCTL**) is configured the same as the original circuit pack, it may be inserted with no further action. When a replacement circuit pack is different (different code or different switch options) from the original, the **SYCTL UPD/INIT** button must be momentarily depressed (or use the "update" command) to update the inventory.

Find the circuit pack in Table A and go to the indicated step. If you were sent here from another procedure, return to that procedure after setting options.

Table A – Circuit Packs

Circuit Pack	Step
SYCTL	Step 2
26G-U, 26G2-U, or 28G type OLIU*	—
DS1/DS1PM	Step 8
T1EXT	Step 12
HDSL	Step 14

* There are no option switches on these circuit packs.

SYSCTL

2. **⇒** **NOTE:**
There are no **SYSCTL** user selectable options. All switch settings are addressed in **Steps 4, 5, and 6**.

Determine the desired **SYSCTL** option switch settings from office records and see Figure 1.

3. **⇒** **NOTE:**
To set switch to **ON**, depress rocker or slide switch toward side labeled **ON** in the figure. To set switch to **OFF**, depress rocker or slide switch toward side labeled **OFF** in the figure.

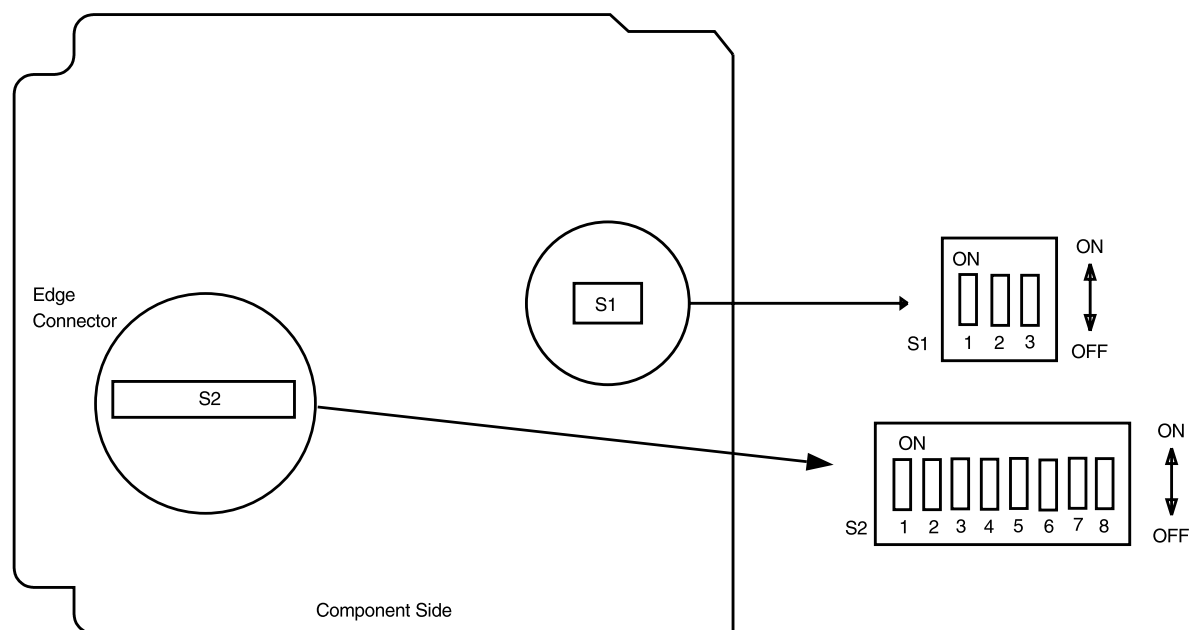


Figure 1. SYSCTL Option Settings

4. Set **SYSCTL** switch **S2** section **S2-1** to **ON** to set TBOS termination.
5. Set **SYSCTL** switch **S1** sections **S1-1**, **S1-2**, and **S1-3** to **OFF**, **OFF**, **OFF**, respectively, to set the product (shelf) type.
6. Set **SYSCTL** switch **S2** sections **S2-3**, **S2-4**, **S2-5**, **S2-6**, **S2-7**, and **S2-8** to **ON**, **ON**, **ON**, **ON**, **ON**, **ON**, respectively, to enable the DCC channel. (Switch **S2-2** is unused.)
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

DS1/DS1PM

8. Determine from office records the length of the DS1 cabling between the DDM-2000 and the DSX-1 cross-connect point.
9.  **NOTE 1:**
Switch 1, sections 1 through 3 (**S1-1**, **S1-2**, **S1-3**), are set according to the length of DS1 cabling between the DDM-2000 and the DSX-1 cross-connection. Switch 1, sections 4 through 7 (**S1-4**, **S1-5**, **S1-6**, **S1-7**), are set for the type of line coding (B8ZS or AMI) required of the DS1 signal. Switch 1, section 8 (**S1-8**) is unused and ignored by the system.
-  **NOTE 2:**
To set switch to ON, depress rocker or slide switch toward side labeled **ON** in the figure. To set switch to OFF, depress rocker or slide switch toward side labeled **OFF** in the figure.

Refer to Table B and Figure 2 and set LBO option switches.

Table B – DS1/DS1PM Cable LBO Settings (Note)

613C (608C) Cable Length (feet)	1249C Cable Length (feet)	Other Cable dB Loss at 772 kHz	Switch S1 Settings		
			S1-1	S1-2	S1-3
0 to 133	0 to 90	0 to 0.6	OFF	OFF	OFF
>133 to 267	>90 to 180	>0.6 to 1.2	OFF	OFF	ON
>267 to 400	>180 to 270	>1.2 to 1.8	OFF	ON	OFF
>400 to 533	>270 to 360	>1.8 to 2.4	OFF	ON	ON
>533 to 655	>360 to 450	>2.4 to 2.8	ON	OFF	OFF

Note: Invalid switch settings will cause the **FAULT** LED to light and a DS1 CP failed alarm.

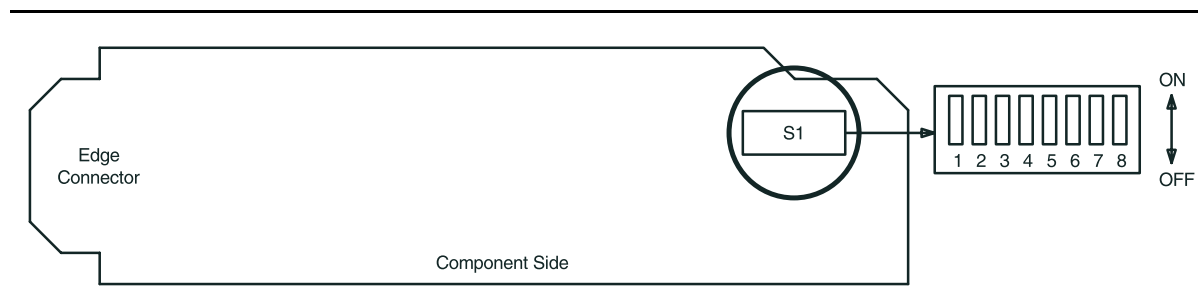


Figure 2. DS1/DS1PM Option Settings

10. **NOTE:**
It is recommended that a policy be established to set line coding either using the option switches OR using the **set - t1** command. If line code (lc) parameters are set using the **set - t1** command, the circuit pack switch settings will have no effect. The **rtrv - t1** command may be used to check line code settings.

Refer to Table C and Figure 2 and set the line code option switches, if required.

Table C – DS1/DS1PM Line Code Settings

Line Code Format	Switch S1 Settings				
	S1-4 (Port 1)	S1-5 (Port 2)	S1-6 (Port 3)	S1-7 (Port 4)	S1-8 (Note)
B8ZS	OFF	OFF	OFF	OFF	OFF
AMI	ON	ON	ON	ON	OFF

Note: Switch 1, section 8 (**S1-8**) is unused and ignored by the system.

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

T1EXT

12.  **NOTE 1:**
To set switch to ON, depress rocker or slide switch toward side labeled **ON** in the figure. To set switch to OFF, depress rocker or slide switch toward side labeled **OFF** in the figure.

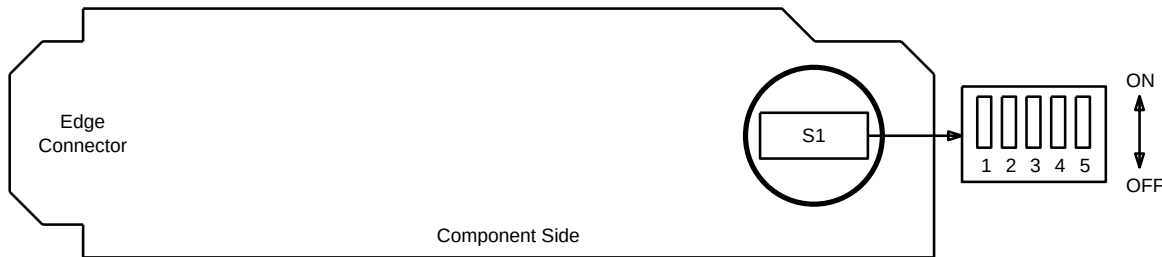


Figure 3. T1EXT Option Settings

-  **NOTE 2:**
It is recommended that a policy be established to set line coding either using the option switches OR using the **set - t1** command. If line code (lc) parameters are set using the **set - t1** command, the circuit pack switch settings will have no effect. The **rtrv - t1** command may be used to check line code settings.

Refer to Table D and Figure 3 and set the line code option switches, if required.

Table D – T1EXT Line Code Settings (Note)

Line Code Format	Switch S1 Settings				
	S1-1 (Port 1)	S1-2 (Port 2)	S1-3 (Unused)	S1-4 (Unused)	S1-5 (Unused)
B8ZS	OFF	OFF	OFF	OFF	OFF
AMI	ON	ON	OFF	OFF	OFF

Note: Switch 1, section 3 (**S1-3**), section 4 (**S1-4**), and section 5 (**S1-5**) must be set to **OFF**.

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

BBF8 HDSL

14. Determine circuit pack option switch settings from office records or work order.
15. Set HDSL option switches per Table E and Figure 4.

Table E – HDSL Control Switch Settings

Control Settings	Switch S1 Settings			
	S1-1	S1-2	S1-3	S1-4
Master	—	OFF	—	OFF
Slave	—	ON	—	ON
Local	OFF	—	OFF	—
Remote	ON	—	ON	—

16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
-

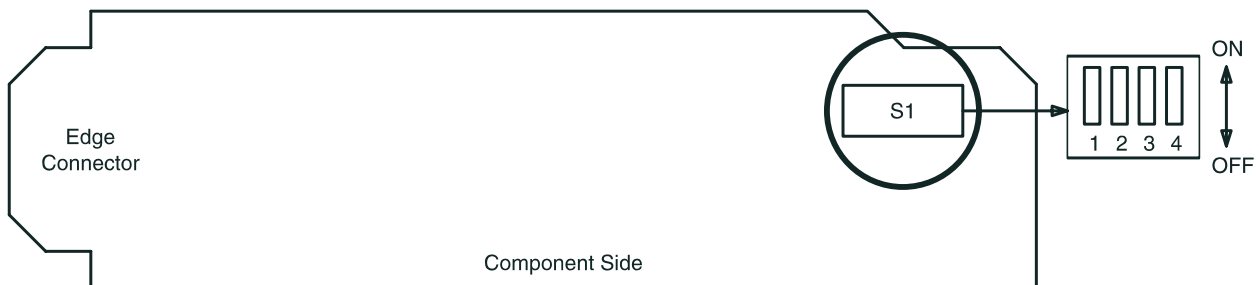


Figure 4. BBF8 HDSL Control Switch

Perform Optical Fiber Connections and Verification of Optical Facility

1.  **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

 **CAUTION:**
When handling optical pigtails or jumpers, take care to keep bending radius as large as possible.

 **NOTE 1:**
This procedure is used to connect the optical fiber spans in an OC-3/OC-1 network consisting of DDM-2000 OC-3 Multiplexers and DDM-2000 FiberReach Wideband Terminals. For each span, determine the loss of each optical fiber and install the proper LBO. Then connect the fibers to the associated **IN** and **OUT** connectors of each **OLI** at the end of the span.

 **NOTE 2:**
It is assumed that the optical jumpers used to connect the DDM-2000 OC-3 Multiplexer and OC-1 FiberReach Wideband Terminal to an optical interconnection point are equipped with *ST*[®], FC/PC, or SC lightguide cable connectors.

If the optical cables have not been placed into the cable tray at the bottom front of the shelf, loosen three screws holding the front cover of the cable tray and slide out the front cover of the tray.

2. Route the optical jumpers up through the slotted hole(s) at the bottom left-front corner of the shelf and up to the **OLIUs**. See Table A.

Table A – Single-Mode Lightguide Jumpers

Code	Comcode	Length (Feet)	Connectors
FS1E-E-2	105357727	2	ST-ST
FS1E-E-10	105357768	10	ST-ST
FS1E-E-25	105357800	25	ST-ST
FS1E-E-50	105357859	50	ST-ST
FS1E-E-100	105357875	100	ST-ST
FS1E-A-2	105420905	2	ST-2016A Biconic
FS1E-A-10	105420947	10	ST-2016A Biconic
FS1E-A-25	105423958	25	ST-2016A Biconic
FS1E-A-50	105424006	50	ST-2016A Biconic
FS1E-A-100	105424022	100	ST-2016A Biconic
LS1SC-SC-2	106908247	2	SC-SC
LS1SC-SC-10	106908270	10	SC-SC
LS1SC-SC-25	106908304	25	SC-SC
LS1SC-SC-50	106908346	50	SC-SC
LS1SC-SC-100	106908395	100	SC-SC
LS1FP-FP-10	106593825	10	FCPC-FCPC
LS1FP-FP-25	106932908	25	FCPC-FCPC
LS1FP-FP-50	106932916	50	FCPC-FCPC
LS1FP-FP-100	106932924	100	FCPC-FCPC

3. Establish communication with technician at other end of the optical span.
4.  **NOTE 1:**
The optical connector labeled **OUT** is the output from the **OLIU**. The optical connector labeled **IN** is the input to the **OLIU**.
-  **NOTE 2:**
26G-U/26G2-U OLIUs and **27G-U/27G2-U OLIUs** require single-mode optical fiber; however, short multi-mode jumpers can be used for loopbacks.
-  **NOTE 3:**
Optical fibers connecting this shelf with a far end shelf should not be connected to the **OLIU** until at least 45 seconds after an optical loopback is removed.

- ⇒ **NOTE 4:**
It may take from 15 seconds to 3 minutes and 25 seconds for the **FAULT** LEDs to stop flashing after the cables are connected, depending on the setting of the OC-1 signal degrade threshold (–5 to –9).

Remove protective covers from transmit optical jumper cables and lightguide buildout(s) [LBO(s)] and clean *ST*, *FC/PC*, or *SC* connectors and LBO(s).

Reference: **DLP-527**

5. Have you determined the value of the LBOs for this span?

If **YES**, then proceed to **Step** .

If **NO**, then continue with **Step 6**.

Optical Power Measurement

Steps 6 through are used to measure optical power. Replace LBOs with 0 dB LBOs per Figure 1. Connect the optical fiber transmit cable to the **OLIU OUT** connection. Measure the optical power of the optical fiber receive cables at the other ends using an optical power meter.

6. At both ends of the optical span, replace the *ST*, *FC/PC*, or *SC* LBOs with 0 dB LBOs per Figure 1 [**DLP-503**].

7. ⇒ **NOTE 1:**
For DDM-2000 OC-3/DDM-2000 FiberReach Wideband configurations, optical fibers connect from DDM-2000 FiberReach Wideband **MAIN-1** and **MAIN-2** slots to the DDM-2000 OC-3 Multiplexer **FUNCTION UNITS A-1** and **A-2(P)**, **B-1** and **B-2(P)**, or **C-1** and **C-2(P)** slots.

- ⇒ **NOTE 2:**
This single-homed ring configuration requires that the **FN()-1 OLIU** on the OC-3 shelf connect to the **MAIN-1 OLIU** at the first FiberReach shelf from the OC-3 shelf. Intermediate FiberReach shelves on the same OC-1 ring connect from **MAIN-2 OLIU** at one FiberReach shelf to the **MAIN-1 OLIU** at an adjacent FiberReach shelf (node). The **MAIN-2 OLIU** at the last FiberReach shelf on the OC-1 ring connects to **FN()-2(P) OLIU** on the host OC-3 shelf.



NOTE 3:

A dual-homed ring configuration requires that the first FiberReach **MAIN-1 OLIU** connect to **FN()-1 OLIU** on one host OC-3 shelf. The last FiberReach **MAIN-2 OLIU** connects to the **FN()-2(P) OLIU** on the other host OC-3 shelf. Intermediate FiberReach shelves on the same OC-1 ring connect from **MAIN-2 OLIU** at one FiberReach shelf to the **MAIN-1 OLIU** at an adjacent FiberReach shelf (node).

At each end of the span, connect the optical fiber transmit cables to the **OLIU OUT** connections.

8. At each end of the span, measure the optical power of the optical fiber receive cables using an optical power meter.
9. Replace the LBO assemblies with the correct buildout assemblies per Figures 1, 2, and 3 and Tables B, C, D, E, F, G, H, I, and/or J [**DLP-503**].

Reconnect the optical fiber transmit cables at both ends.

Table B – DDM-2000 OC-3/DDM-2000 FiberReach Measured Optical Power and Required Lightguide Buildouts (LBOs)

Transmitter	Receiver			
	26G-U/26G2-U OLIU (DDM-2000 FiberReach)		27G-U/27G2-U OLIU (DDM-2000 OC-3)	
	Received Power(dBm)	LBO (dB)	Received Power(dBm)	LBO (dB)
26G-U/26G2-U OLIU (FiberReach)	0.0 to -5.0	15	0.0 to -5.0	15
	-5.0 to -10.0	10	-5.0 to -10.0	10
	-10.0 to -15.0	5	-10.0 to -15.0	5
	-15.0 to -31.0	0	-15.0 to -31.0	0
27G-U/27G2-U OLIU (DDM-2000)	0.0 to -5.0	15		
	-5.0 to -10.0	10		
	-10.0 to -15.0	5		
	-15.0 to -31.0	0		
26G2-U OLIU (DDM-2000)	0.0 to -5.0	15		
	-5.0 to -10.0	10		
	-10.0 to -15.0	5		
	-15.0 to -31.0	0		

Notes:

1. Measured power is defined to be the measured power of the light emitted from receive fiber connector at OLIU.
2. The minimum measured received power allows for optical path penalty and unallocated margin. Connector loss is not allotted for; it should already be accounted for in the optical power measurement.
3. The margin for falling within the max rx power is 1.0 dB.

Table C – In-Line Single-Mode (SM) and Multimode (MM) Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Fiber Connection	Label Color
5 dB	A2000B	106597297	ST	MM-MM	Blue
10 dB	A2000D	106597446	ST	MM-MM	Black
5 dB	A3000B	106060718	ST	SM-SM	Blue
10 dB	A3000D	106060734	ST	SM-SM	Black

Table D – Universal Single-Mode (SM) ST Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Fiber Connection	Label Color
0 dB	A3070	106795354	ST	SM-SM & MM-MM	None
5 dB	A3070B1	107406183	ST	SM-SM	Blue
10 dB	A3070D1	107406191	ST	SM-SM	Black
15 dB	A3070F1	107406209	ST	SM-SM	Green

Table E – Universal Single-Mode (SM) FC/PC Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Fiber Connection	Label Color
0 dB	A3080	106795404	FC/PC	SM-SM & MM-MM	None
5 dB	A3080B1	107406225	FC/PC	SM-SM	Blue
10 dB	A3080D1	107406233	FC/PC	SM-SM	Black
15 dB	A3080F1	107406241	FC/PC	SM-SM	Green

Table F – Universal Single-Mode (SM) SC Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Fiber Connection	Label Color
0 dB	A3060	106708951	SC	SM-SM & MM-MM	None
5 dB	A3060B1	107406142	SC	SM-SM	Blue
10 dB	A3060D1	107406159	SC	SM-SM	Black
15 dB	A3060F1	107406167	SC	SM-SM	Green

Table G – Universal Multimode (MM) ST Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Fiber Connection	Label Color
5 dB	A2070B	106795313	ST	MM-MM	Blue
10 dB	A2070D	106795321	ST	MM-MM	Black
15 dB	A2070F	106795339	ST	MM-MM	Green

Table H – Universal Multimode (MM) SC Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Fiber Connection	Label Color
5 dB	A2060B	106795271	SC	MM-MM	Blue
10 dB	A2060D	106795289	SC	MM-MM	Black
15 dB	A2060F	106795297	SC	MM-MM	Green

**Table I – DDM-2000 FiberReach Operating at an OC-3 Rate to FT-2000
LS INTFC Measured Optical Power and Required LBO**

Transmitter	Receiver					
	LAA10 OC3 (FT-2000)		LAA5 OC3 (FT-2000)		LAA10 OC3 (FT-2000)	
	Received Power (dBm)	LBO (dB)	Received Power (dBm)	LBO (dB)	Received Power (dBm)	LBO (dB)
LAA10 OC3 (FT-2000)						
LAA5 IS3 (FT-2000)					-7.0 to -34.0	0
					-14.0 to -15.0	5
					-15.0 to -34.0	0
28G Type OLIU			0.0 to -5.0	15		
	0.0 to -3.0	10	-5.0 to -10.0	10		
	-3.0 to -8.0	5	-10.0 to -15.0	5		
	-8.0 to 34.0	0	-15.0 to -30.8	0		

Notes

1. Measured power is defined to be the measured power of the light emitted from receive fiber connector at OLIU.
2. The minimum measured received power allows for optical path penalty and unallocated margin. Connector loss is not allotted for; it should already be accounted for in the optical power measurement.
3. The margin for falling within the maximum rx power is 1.0 dB.

Table J – DDM-2000 OC-3 to DDM-2000 FiberReach Operating at an OC-3 Rate Measured Optical Power and Required LBO

DDM-2000 OC-3 to DDM-2000 FiberReach Operating at an OC-3 Rate Measured Optical Power and Required LBO										
Transmitter	Receiver									
	28G-U		22F OLIU 22G-U OLIU 21G/21G-U OLIU (High/Low Power)		21G2-U OLIU 22F-U OLIU 22F2-U OLIU 22G2-U OLIU 22G3-U OLIU		21D/21D-U/ 22D-U OLIU (Controlled Env.)		21D/21D-U/ 22D-U OLIU (Uncontrolled Env.)	
	Received Power(dBm)	LBO (dB)	Received Power(dBm)	LBO (dB)	Received Power(dBm)	LBO (dB)	Received Power(dBm)	LBO (dB)	Received Power(dBm)	LBO (dB)
28G-U OLIU							0.0 to -5.0	15	0.0 to -5.0	15
			0.0 to -3.0	10			-5.0 to -10.0	10	-5.0 to -10.0	10
			-3.0 to -8.0	5			-10.0 to -15.0	5	-10.0 to -15.0	5
	0.0 to -34.0	0	-8.0 to -34.0	0	0.0 to -34.0	0	-15.0 to -33.8	0	-15.0 to -31.8	0
21G/21G-U OLIU (High Power)										
	-2.5 to -34.0	0								
21G/21G-U OLIU (Low Power)										
	-7.5 to -34.0	0								
21G2-U OLIU										
	0.0 to -34.0	0								
22F/22F-U/22F2-U OLIU										
	-8.0 to -34.0	0								
22G-U/22G2-U/22G3-U OLIU										
	0.0 to -34.0	0								
21D/21D-U/22D-U OLIU (Controlled & Uncontrolled Env.) (MM Fiber Only)										
	-14.0 to -34.0	0								

Notes:

1. Measured power is defined to be the measured power of the light emitted from receive fiber connector at OLIU.
2. The minimum measure receive power allowed for optical path penalty and unallocated margin. Connector loss is not allotted for, it should already be accounted for in the optical power measurement.
3. The margin for falling within the max rx power is 1.0 dB.

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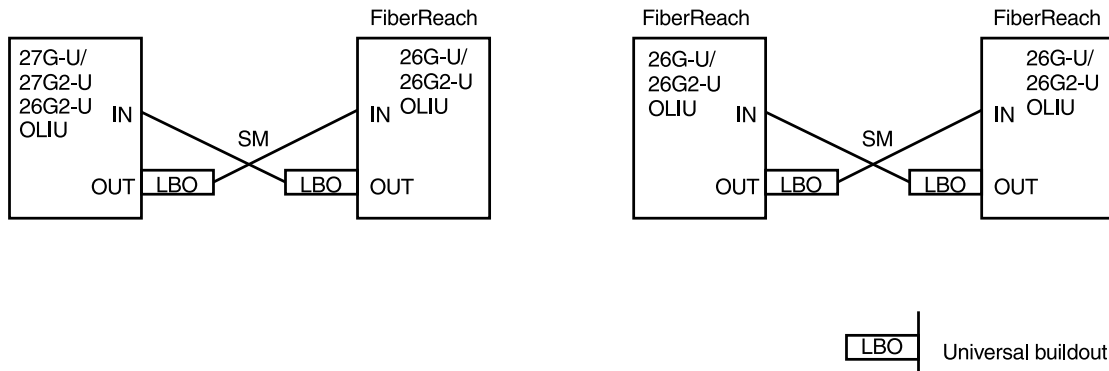
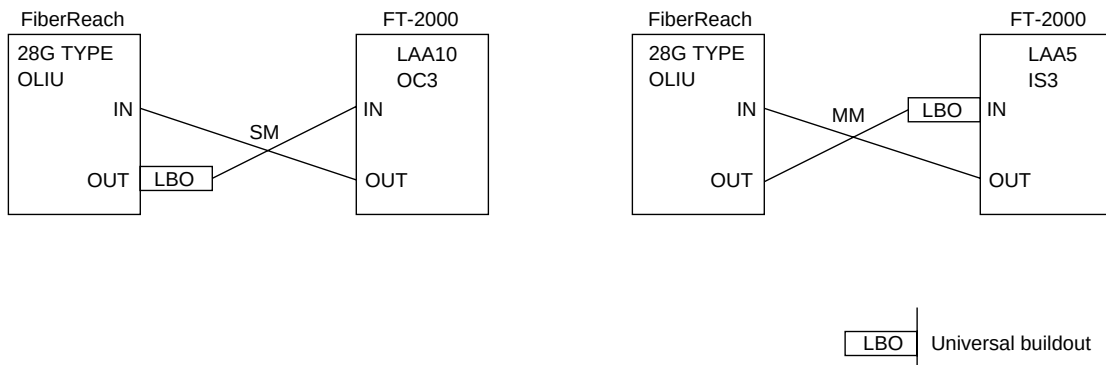


Figure 1 – DDM-2000 OC-3/DDM-2000 FiberReach Optic Connections and Line Buildouts



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Figure 2 – DDM-2000 FiberReach Operating at an OC-3 Rate to FT-2000 LS INTFC Fiber Optic Connections and Line Buildouts

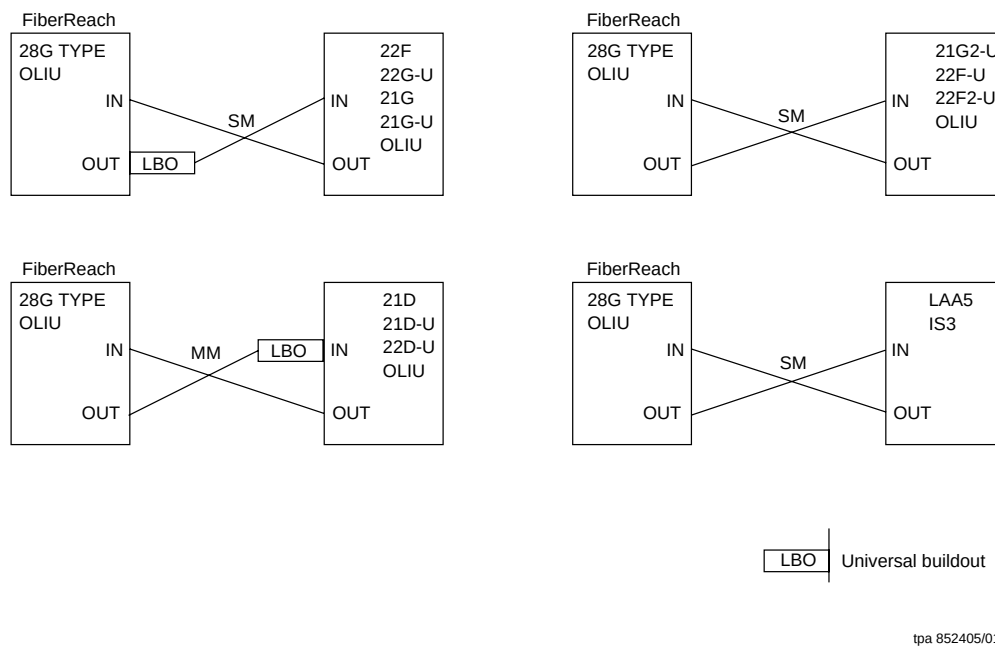


Figure 3 – DDM-2000 FiberReach Operating at an OC-3 Rate to DDM-2000 OC-3 Fiber Optic Connections and Line Buildouts

Fiber Connection

10. At far end, connect the input optical fiber to the proper **OLIU IN** (receive) connector.
11. Did **FAULT** LED go off on the far-end **OLIU**?
If **NO**, then continue with **Step 12**.
If **YES**, then proceed to **Step 13**.
12. Check optical fiber connections. Verify integrity of fiber connections by ensuring correct output at one end is connected to correct input at the other end. Replace **OLIU** with flashing LED. Continue with this procedure when trouble is cleared.
13. At near end, connect the input optical fiber(s) to the corresponding **OLIU IN** (receive) connector.

14. Did **FAULT** LED go off on the near-end **OLI**?

If **NO**, then continue with **Step 15**.

If **YES**, then proceed to **Step 16**.

15. Check optical fiber connections at both ends of the fiber. Verify the integrity of the fiber connections by ensuring **OLI** output at one end is connected to the correct **OLI** input at the other end. Verify proper systems have been connected by using the **rtrv-map-neighbor** command (Figure 5).

Fiber Verification

16. Disconnect the fiber cable from the **OUT** connector on the **OLI** at one end of the span. At the other end, verify that the associated **FAULT** LED is flashing, indicating a loss of signal. Reconnect the fiber and repeat the process for the other direction of transmission.

17. Verify proper systems have been connected by using the **rtrv-map-network** and **rtrv-map-neighbor** command to retrieve a map of the network (Figures 4 and 5).

```
Node1 95-03-27 13:09:53 DDM-2000 OC-3, R9.1.1
M  rtrv-map-network:  COMPLD
/* Network Map for Node1

=====
=====
      System Name      Comm.  Product      NE      Alarm
      (TID)           Status  Type          Type    Group
=====
=====
      Node1                DDM-2000 OC-3      DSNE      3
      Node2                FiberReach          3
      Node3                FiberReach          3

*/
```

Figure 4. Sample Report From rtrv-map-network Command

```
Node1 95-03-27 13:09:53 DDM-2000 OC-3, R9.1.1
M rtrv-map-neighbor: COMPLD
/* Neighbor Map for Node1

=====
=====
      System Name      Connected      Link
      (TID)            Through      Comm.
                               Status      Product
                               Type
=====
=====
      Node1                                DDM-2000 OC-3
      Node2      main-1      FiberReach
      Node3      main-2      FiberReach

*/
```

Figure 5. Sample Report From rtrv-map-neighbor Command

18. After all connections and tests have been made, verify optical fiber cables are placed correctly in fiber tray/rings and properly routed in bay framework. Reinstall front cover and tighten three screws.
19. Repeat this procedure for each fiber span to be connected until the end-to-end system is established.
20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Perform End-to-End OC-1 Optical Line Test

1. **⚠ WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
 - ⇒ NOTE 1:**
This test is used locally at the DDM-2000 FiberReach shelf to verify the integrity of the OC-1 fiber lines between two DDM-2000 FiberReach shelves or between a DDM-2000 FiberReach shelf and a DDM-2000 OC-3 shelf and may be performed with the DDM-2000 in service or out of service.
 - ⇒ NOTE 2:**
It is assumed that each DDM-2000 has passed the local (looped) transmission tests and a CIT is available. If these tests have not been completed, refer to the appropriate procedure and perform the tests.
 - ⇒ NOTE 3:**
This test must be performed locally at each shelf location associated with the optical span(s) being tested. See Figure 1.
-

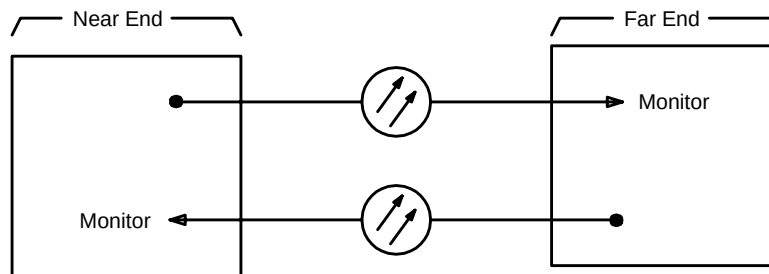


Figure 1. End-to-End Optical Line Test Monitoring

2. At test location, connect CIT to User Panel **CIT** connector and establish session.

Reference: **DLP-521**

3. **⚠ CAUTION:**
The `init-pm:reg=all` command initializes (clears) all current day and/or all current quarter-hour performance-monitoring storage registers.

⇒ **NOTE:**
If local procedures prohibit you from doing the **init-pm:reg=all** command, you may perform the following in Steps 5 and 6. Use the **rtrv-pm-line** command to obtain the line performance monitoring status report, note the readings on the Today line in the report, wait 20 seconds, and then obtain another report. There should be no change in readings from the first report.

Enter the command **init-pm:reg=all**, if allowed.

4. Wait 20 seconds.
5. Enter one of the following commands:
 - **rtrv-pm-line:main-1** if service line is being tested.
 - **rtrv-pm-line:main-2** if protection line is being tested.
 - **rtrv-pm-line:main-all** if both lines are being tested.

Response: The following CIT report will indicate the status of the equipment. The Today line should indicate that there are no errors. Other Time lines may exist with numbers greater than zero. (The "Commands and Reports" section of this manual under **RTRV-PM-LINE** describes this report.)

```

/* Line Performance Monitoring Status Report
   Last initialized:  day registers at yy-mm-dd hh:mm:ss
                    quarter hour registers at yy-mm-dd hh:mm:ss
=====
Address  Start   B2 Cv   B2 ES   B2 ES   B2 ES   B2 SES   B2 UAS
        Time
=====
address  time    nn...  nn...  nn...  nn...  nn...  nn...
.        .      .      .      .      .      .      .
.        .      .      .      .      .      .      .
-----
address  time    nn...  nn...  nn...  nn...  nn...  nn...
.        .      .      .      .      .      .      .
.        .      .      .      .      .      .      .
*/

```

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Figure 2. Sample Report From rtrv-pm-line Command

6. Has performance-monitoring report been obtained from all shelf locations associated with optical span(s) being tested?
If **NO**, then continue with **Step 7**.
If **YES**, then proceed to **Step 8**.
7. Repeat this procedure from Step 3 at other locations.
8. Did report indicate errors?
If **YES**, then continue with **Step 9**.
If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
9. Trouble may be in optical fiber and/or connections. Trouble may also be in **OLIUs**. If the report indicated trouble when the report was obtained from the near end of the span, trouble may be in the receive direction (see Figure 1). If the report indicated trouble when the report was obtained from the far end of the span, trouble may be in the transmit direction. Check optical fiber and connections. Clean optical fiber connections [**DLP-527**]. If no trouble found in the optical fibers, replace **OLIU(s)** [**DLP-523**] associated with the address indicated in the report.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

Check Local Office Alarms

1.  **CAUTION:**
This test will interrupt service if it is performed without a CIT. If done with a CIT, this test can be performed on an in-service system.

 **NOTE:**
It is assumed that you were sent here by another procedure to test the DDM-2000 FiberReach alarms.

Is a CIT available?

If **YES**, then continue with **Step 2**.
If **NO**, then proceed to **Step 5**.

2. Connect CIT to **CIT** connector on the User's Panel.

3.  **NOTE:**
The "Commands and Reports" section of this user's manual under **TEST-ALM** gives a description of the **test -alm** command.

Use the **test -alm** command to perform alarm tests. Note the audible and visual alarm indications during the test.

4. Did the DDM-2000 FiberReach shelf pass the alarm tests?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **NO**, then proceed to **Step 14**.

5.  **NOTE:**
It is assumed that the DDM-2000 FiberReach shelf is powered and running with loops at the low-speed cross-connections and that the high-speed terminations are either looped on themselves or connected in an end-to-end looped configuration. It is also assumed that protection circuit packs are installed and that no alarms or other diagnostic indications are activated.

Unseat the service **DS1/DS1PM** circuit pack in **LOW SPEED** slot **A1**, **B1**, **C1**, or **D1**.

6. Wait 30 seconds.

7. Is the minor (**MN**) alarm activated?

If **YES**, then continue with **Step 8**.

If **NO**, then proceed to **Step 13**.

8. Leave the service **DS1/DS1PM** circuit pack unseated and unseat the associated protection **DS1/DS1PM** circuit pack in **LOW SPEED** slot **A2(P)**, **B2(P)**, **C2(P)**, or **D2(P)** (1X1 protection) or **LOW SPEED** slot **D2(P)** (1X7 protection).

9. Wait 30 seconds.

10.  **NOTE:**
In some offices the critical and major alarms may be wired together if a separate critical alarm is not available. This test will also activate the critical (**CR**) alarm LED on the User Panel.

Is the **CR** or **MJ** office alarm activated?

If **YES**, then continue with **Step 11**.

If **NO**, then proceed to **Step 13**.

11. Reseat both circuit packs. Take care to avoid damaging the LEDs protruding through the openings in the faceplates.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
13. Reseat both circuit packs. Take care to avoid damaging the LEDs protruding through the openings in the faceplates.
14. The DDM-2000 FiberReach shelf has failed the alarm test. The most likely source of the problem is the alarm wiring. Check that the alarms are connected correctly. If the wiring is correct and the failure persists, refer to **Trouble Clearing: TAP-108** to clear the failure.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Check Parallel Telemetry

1.  **CAUTION:**
This test will interrupt service if it is done without a CIT. If done with a CIT, this test can be done on an in-service system.

 **NOTE:**
It is assumed that you were sent here by another procedure to test the DDM-2000 FiberReach parallel telemetry.
2. Connect a CIT to the **CIT** connector on the User Panel.
3. Refer to the "Commands and Reports" section of this user's manual under **TEST-TLM-PAR** for a description of the tests.
4. Contact the monitoring location and use the **test-tlm-par** command to perform the parallel telemetry tests as described in the "Commands and Reports" section of this manual.
5. Did the DDM-2000 FiberReach shelf pass the parallel telemetry tests?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
If **NO**, then proceed to **Step 6.**
6. The **DDM-2000** FiberReach shelf has failed the parallel telemetry alarm test. The most likely source of the problem is the telemetry wiring. Check that the telemetry is connected correctly. If the wiring is correct and the failure persists, refer to **Trouble Clearing: TAP-108** to clear the failure.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Check TBOS Serial Telemetry

1.  **NOTE 1:**
It is assumed that the DDM-2000 FiberReach shelf under test is powered and running and that no alarms or other diagnostic indicators are activated.

-  **NOTE 2:**
It is assumed that the DDM-2000 FiberReach shelf under test is connected to a serial telemetry system and that access to the central telemetry equipment is available.

Is a CIT available?

If **YES**, then continue with **Step 2**.

If **NO**, then proceed to **Step 7**.

2. Connect the CIT to the **CIT** connector on the User Panel.
3. Refer to the Commands and Reports section of this manual under **TEST-TLM-SER** for a description of the tests.
4. Contact the monitoring location and use the **test-tlm-ser** command to perform the serial telemetry tests as described in the Commands and Reports section of this manual.
5. Did the DDM-2000 FiberReach shelf pass the serial telemetry tests?

If **YES**, then continue with **Step 6**.

If **NO**, then proceed to **Step 15**.

6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
7. At the central telemetry equipment, send a message to the DDM-2000 FiberReach shelf to Lockout Switching - LS-A (Command **22**).
8. Is scan point **58** (Valid TBOS Command Received) raised?

If **YES**, then continue with **Step 9**.
If **NO**, then proceed to **Step 15**.
9. Is scan point **56** (Lockout DS1 Equipment Protection Switching) raised?

If **YES**, then continue with **Step 10**.
If **NO**, then proceed to **Step 15**.

10. At the central telemetry equipment, send a message to the DDM-2000 FiberReach shelf to Reset Switching - LS-A (Command **26**).
11. Is scan point **58** (Valid TBOS Command Received) raised?

 If **YES**, then continue with **Step 12**.
 If **NO**, then proceed to **Step 15**.
12. Is scan point **56** (Lockout DS1 Equipment Protection Switching) retired?

 If **YES**, then continue with **Step 13**.
 If **NO**, then proceed to **Step 15**.
13. The DDM-2000 FiberReach shelf has passed the serial telemetry test.
14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
15. The DDM-2000 FiberReach shelf has failed the serial telemetry test. A likely source of the trouble is the telemetry wiring. Check the connections. If the wiring is correct and the trouble persists, refer to **Trouble Clearing: TAP-108** to clear the failure condition.
16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Test Protection Switching Function

1. Is a CIT available?

If **YES**, then continue with **Step 2**.

If **NO**, then proceed to **Step 10**.

2. To test for a switch to protection using a CIT, connect the CIT to the **CIT** connector on the User Panel. Enter the command: **rtrv-state-eqpt**. The terminal will display the current protection status.
3. Use switch command: **switch-ls:address:pri>manual** to perform a switch.
4. Enter the command: **rtrv-state-eqpt** to verify the switch was done.
5. Use the command: **switch-ls:address:pri=reset** or **pri>manual** for to reset switch.
6. Enter the command: **rtrv-state-path:address** to verify the protection switch status of the VTs on the optical interface.
7. Use the command: **switch-path-vt1: :address:pri>manual** to switch any one of the paths.
8. Repeat **Step 6** to verify that the path switch occurred.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
10.  **NOTE:**
The alarm delay is provisionable from 0 to 30 seconds. This procedure assumes the alarm delay is set for the default of 2 seconds.

To test a low-speed switch to protection, unplug one of the service **DS1**, **DS1PM**, or **T1EXT** circuit packs, if installed.

Response: **NE ACTY** LED on User Panel lights. **MN** LED lights after 2 seconds.

11. Reseat the circuit pack that was removed.

Response: All LEDs go OFF after 15 seconds.

12. Repeat Step 10 for each equipped low-speed modem.

13.  **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Remove the upper **IN** fiber from either of the **OLIUs**.

Response: The **FAULT** LED on the disconnected **OLIU** begins flashing. **MN** LED lights after 2 seconds. **ACTIVE** LED remains lighted on **OLIU** with fiber disconnected.

14. Reconnect the fiber. After a few seconds, the **FAULT** LED goes out (stops flashing). The **MN** LED also goes out.

15. Remove and immediately reconnect the upper **IN** fiber from the other **OLIU**.

Response: The **FAULT** LED on the disconnected **OLIU** begins flashing. **MN** LED lights after 2 seconds. **ACTIVE** LED remains lighted on **OLIU** with fiber disconnected.

16. Reconnect the fiber. After a few seconds, the **FAULT** LED goes out (stops flashing). The **MN** LED also goes out.

17. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Condition DS1/DS1PM Circuit Pack/Port for New DS1 Service

1.  **NOTE 1:**
The commands **rtrv-alm** and **rtrv-state** may be used to check for alarms, locks, loops, and switches.
-  **NOTE 2:**
If line code (lc) parameters have been previously set using the **^set-t1** command, the circuit pack line code switch settings will have no effect. There will be no indication of improper switch settings until you try to establish service. It is recommended that a policy be established to set line coding either using the switches OR using CIT commands. Use the **rtrv-t1** command to check line code settings.

Use **rtrv-alm** command to verify that no alarms, locks, loops, or switches are present.

2. Is a new **DS1/DS1PM** circuit pack being installed?

If **YES**, then proceed to **Step 6**.

If **NO**, then continue with **Step 3**.

3.  **CAUTION 1:**
To minimize hits on in-service ports on the **DS1/DS1PM** circuit pack having a DS1 port added, it is recommended to either use a CIT to manually switch the DS1 to protection if the DS1/DS1PM circuit pack must be removed, or use the CIT to set DS1 port options without removing the circuit pack.
-  **CAUTION 2:**
*If the protection **DS1/DS1PM** circuit pack is not available for a protection switch, removing a service **DS1/DS1PM** circuit pack will interrupt service on all DS1 ports on that circuit pack. If a CIT is available, use the **rtrv-state** command to check the status of the protection switch.*
-  **CAUTION 3:**
*When a **DS1/DS1PM** is switched to protection, removal of any other **DS1/DS1PM** circuit pack or **177A Retainer Card** in the same group will result in a loss of service to the protected **DS1/DS1PM** and the removed **DS1/DS1PM** circuit pack.*

4. Use **set - t1** command to set **DS1/DS1PM** port options.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
6. Set option switches and install new **DS1/DS1PM** circuit pack.

Reference: **DLP-508**

7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Connect CIT and Establish Session

1.  **CAUTION:**
You must wear an ESD wrist strap plugged into the grounding jack on the right side of the assembly whenever working with the DDM-2000.

Connect CIT to the RS-232C **CIT** connector on the %DDM-2000 User Panel or rear CIT connector.

2. Turn on CIT and set terminal parameters as follows (consult your terminal's manual for setup procedures):
 - Full duplex
 - 8 data bits
 - 1 start bit
 - 1 stop bit
 - No flow control
 - Baud rate setting is automatically set by DDM-2000 when connection is made.

3.  **NOTE:**
To set baud rate automatically, enter two carriage returns (<cr>), two lower case "a"s (**aa**), or two upper case "A"s (**AA**). All other characters are ignored.

Enter two carriage returns.

Response: CIT prompts with:
/* Enter a shelf number from 1 to 8 */
shelf [default=1] =

4.  **NOTE:**
Entering just a carriage RETURN at the shelf prompt will connect you to the default shelf physically connected to the CIT.

Enter the shelf number and/or carriage RETURN for the shelf being accessed.

Response: CIT prompts with login <

5. ➡ **NOTE:**
Security is available to protect against unauthorized access to the system. System security requires the defaults for the privileged user logins/password to be changed and CIT and/or DCC port security to be enabled. If security is enabled on a port, users must enter a valid login and password to access the system through that port.

- ➡ **NOTE:**
The system always has three privileged user logins to minimize the chance that both users will forget their passwords at the same time. You must be logged into the system as a *privileged user* to set security; add, change, or delete logins; and to execute some commands. The default *privileged user* logins (Release 2.1 and later) are LUC01 (uppercased LUC-zero-one), LUC02 (uppercased LUC-zero-two), and LUC03 (uppercased LUC-zero-three). The default *privileged user* password is DDM-2000. For Release 2.0 and earlier, the defaults for the privileged user logins are ATT01 (uppercased ATT-zero-one), ATT02 (uppercased ATT-zero-two), and ATT03 (uppercased ATT-zero-three). The CIT login banner for Release 2.0 and earlier reads: AT&T, DDM2000 FiberReach Multiplexer, Release a.b.c.

Were you sent here from **DLP-500** to connect CIT?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
If **NO**, then continue with **Step 6.**

6. If security has been enabled, enter your login, and then enter your password when prompted.

If security has not been enabled, enter a carriage RETURN.

Response: CIT prints the following message followed by an alarm and status report:

```

/*****
*
*          LUCENT TECHNOLOGIES
*          Bell Labs Innovations
*          DDM-2000 FiberReach
*
*          Release a.b.c
*
*****/

```

▪
▪
▪

```

TID date time
M rtrv-alm:all COMPLD
/* Active Alarms and Status Report

```

7.  **NOTE:**
The system prompt may be something other than < if there is an alarm condition. (for example, if there is an MJ alarm condition on the system, the prompt will be MJ <).

-  **NOTE:**
After the prompt (<), the system will respond to commands entered. The command **set - link:pg=()** may be used to set the vertical size of the displayed page on the CIT. Page (**pg**) length may be set from 3 to 150 lines with a default length of 24 lines. The page length is set to default each time a new CIT session is started.

See the "Commands and Reports" section of this manual for a description of the command formats.

8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Establish Remote Login

1. Connect CIT and establish session with near-end DDM-2000 FiberReach shelf.

Reference: **DLP-521**

2.  **NOTE:**
The command **toggle** (CTRL T) may be used to toggle back and forth between a remote DDM-2000 terminal and the near-end terminal. If no remote session is in progress, the toggle command will be rejected.

 **NOTE:**
A remote login within a remote login or a remote login entered to the near end while a remote session is suspended by the toggle command is not allowed. (A remote session is suspended when a remote session is under way and **toggle** (CTRL T) is entered to toggle control to the near end.) A remote login will also be denied if one is already in progress at the remote site.

 **NOTE:**
If security has been enabled on the DCC port being accessed, a login and password is required to do the remote login.

 **NOTE:**
Far-end communications (*fecom*) must be enabled in the far-end shelf in order to remote login to that shelf. The command **rtrv-fecom** can be used locally at the far-end shelf to determine if *fecom* is enabled or disabled. The command **set-fecom** can be used at the far-end shelf to enable *fecom*. If security is enabled, the **set-fecom** command can be executed by privileged users only.

 **NOTE:**
At least one shelf in the network must be set as an AGNE and one DDM-2000 OC-3 shelf must be designated as a DSNE.

⇒ **NOTE:**
A remote login session may be terminated in some cases due to events in distant shelves and may not be noticeable until you begin typing in the *rlgn* session. Events such as disabling *fecom*, failure of the DCC, **init-sys** or **reset**, removing **OLIUs**, etc., may abruptly terminate a remote login session. This is normal because all the network elements must relearn the network after one of these events.

Enter command **rlgn:tid**

Where tid = the target identifier (shelf or site/shelf name) of the remote terminal.

Response: **CIT** prompts with: login <

3. ⇒ **NOTE:**
The CIT login banner for Release 2.0 and earlier reads: AT&T, DDM2000 FiberReach Multiplexer, Release a.b.c.

If security has been enabled, enter your login and password when you are prompted.

If security has not been enabled, enter a carriage RETURN.

Response: System responds with:

```

/*****
 *
 *      LUCENT TECHNOLOGIES
 *      Bell Labs Innovations
 *      DDM-2000 FiberReach
 *
 *      Release a.b.c
 *
 *****/

```

▪
▪
▪

```

TID date time
M  rtrv-alm:all COMPLD
/* Active Alarms and Status Report

```

4.  **NOTE:**
After the prompt, the remote system will respond normally to any commands entered just as if you were physically connected to the remote terminal.

See the "Commands and Reports" section of this manual for a description of the commands formats.

5.  **NOTE:**
A logout entered to the remote terminal will end the remote session and return control to the near-end CIT. A logout entered to the near-end terminal will terminate the local and remote sessions.

Use the command **logout** to log out of the remote terminal session and return control to the near-end terminal.

6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Replace Circuit Pack

1.  **CAUTION:**
*Circuit packs must not be installed or replaced if the **SYCTL** is not installed and operating normally. If the **SYCTL** is not installed and operating normally, unpredictable provisioning of the replaced/installed circuit pack can result.*
-  **CAUTION:**
Ensure that protection switching is available (protection circuit pack and/or line good and no locks, inhibits, or forced switches in effect). When available, use a CIT and a protection switch-path-vt1: command to do a protection switch.
-  **CAUTION:**
*When removing circuit packs, always remove the one without the lighted **ACTIVE LED** first. Make certain that the fibers are disconnected before removing any circuit packs.*
-  **NOTE:**
When a replacement circuit pack (except the **SYCTL**) is configured the same as the original circuit pack, it may be inserted with no further action. When a replacement circuit pack is different (different code or different switch options) from the original, the **SYCTL UPD/INIT** button must be momentarily depressed to update the inventory.

Find the circuit pack in Table A and go to the indicated step.

Table A – Circuit Pack Replacement

Circuit Pack	Step
SYCTL	Step 2
OLI	Step 4
DS1/DS1PM	Step 14
T1EXT	Step 19
HDSL	Step 22

SYSCTL

2. Refer to **DLP-501** to replace the **SYSCTL**.
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

OLIU

4.  **CAUTION:**
*This **procedure is used** to replace a **26G type OLIU** with a **26G type OLIU**. This **procedure is used** to replace a **28G type OLIU** with a **28G type OLIU**. This **procedure is not used** to perform an Out Of Service Upgrade from a **26G type OLIU** to a **28G type OLIU** [DLP-543].*
5.  **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.
 **CAUTION:**
*Ensure that protection switching is available (protection line good and no locks, inhibits, or forced switches in effect). When available, use a CIT and the **switch-path-vt1:** command to do a protection switch. The line protection switching request is unidirectional. It may be necessary to perform a **switch-path-vt1:** command at the near end and far end to switch both transmit and receive to the same line. If there are any locked cross-connections, switching of traffic cannot occur.*
 **CAUTION:**
*When removing circuit packs, always remove the one without the lighted **ACTIVE LED** first. Remove optical fiber cables before removing circuit pack and take care to avoid damage to fibers during removal or installation of the circuit pack.*
 **CAUTION:**
*Before installing **OLIUs**, ensure all optical fiber connectors and couplings have been properly cleaned [DLP-527]. Signal performance may be degraded if the connectors and couplings are not cleaned properly.*

⇒ **NOTE:**
It is assumed that the loss of the optical facility is known from office records or that a measurement has been made [DLP-514].

Use **rtrv-state-path** command to ensure service has been switched to the other line; then remove optical cables from **OLI** to be replaced.

6. Remove any universal **LBO** from **OLI** [DLP-503, Step 2].
- 7.

⇒ **NOTE:**
The **28G type OLI**s require a faceplate interconnect cable assembly, [comcode (847721271)].

Remove old **OLI**.

8. Install any universal **LBO** from **OLI** [DLP-503, Step 5].
9. Install **same type** replacement **OLI**.
Response: **FAULT** LED on **OLI** flashes.
- 10.

⇒ **NOTE:**
The **FAULT** LED on the **OLI** may flash from 15 seconds to 3 minutes and 25 seconds depending on the provisioned signal degrade threshold.

Connect optical cables to replacement **OLI**.

Response: **FAULT** LED on the **OLI** goes off.

11. If replaced **26G type OLI**, go to **Step 13**.
12. If replaced **28G type OLI**, install faceplate interconnect cable assembly, [comcode (847721271)].
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

DS1/DS1PM

14. Determine from office records the length of the DS1 cabling between the DDM-2000 and the DSX-1 cross-connect point.
- 15.

⇒ **NOTE:**
Switch 1, sections 1 through 3 (**S1-1, S1-2, S1-3**), are set according to the length of DS1 cabling between the DDM-2000 and the DSX-1 cross-connection. Switch 1, sections 4 through 7 (**S1-4, S1-5, S1-6, S1-7**), are set for the type of line coding (B8ZS or AMI) required of the DS1 signal. Switch 1, section 8 (**S1-8**) on the **BBF1/BBF1B DS1** is unused and ignored by the system. On the **BBF3 DS1PM**, **S1-8** must be set to OFF.

⇒ **NOTE:**
To set switch to ON, depress rocker or slide switch toward side labeled **ON** in the figure. To set switch to OFF, depress rocker or slide switch toward side labeled **OFF** in the figure. Refer to Table B and Figure 1 and set LBO option switches.

Table B – DS1/DS1PM Cable LBO Settings (Note)

613C (608C) Cable Length (feet)	1249C Cable Length (feet)	Other Cable dB Loss at 772 kHz	Switch S1 Settings		
			S1-1	S1-1	S1-1
0 to 133	0 to 90	0 to 0.6	OFF	OFF	OFF
>133 to 267	>90 to 180	>0.6 to 1.2	OFF	OFF	ON
>267 to 400	>180 to 270	>1.2 to 1.8	OFF	ON	OFF
>400 to 533	>270 to 360	>1.8 to 2.4	OFF	ON	ON
>533 to 655	>360 to 450	>2.4 to 2.8	ON	OFF	OFF

Note: Invalid switch settings will cause the **FAULT** LED to light and a DS1 CP failed alarm.

16.



NOTE:

If line code (lc) parameters are generally set using the **set - t1** command, the circuit pack switch settings will have no effect. The **rtrv - t1** command may be used to check line code settings.

Refer to Table C and Figure 1 and set the line code option switches, if required.

Table C – DS1/DS1PM Line Code Settings

Line Code Format	Switch S1 Settings				
	S1-4 (Port1)	S1-5 (Port2)	S1-6 (Port3)	S1-7 (Port4)	S1-8 Unused (Note)
B8ZS	OFF	OFF	OFF	OFF	OFF
AMI	ON	ON	ON	ON	

Note: Switch 1, section 8 (**S1-8**) on the **BBF1/BBF1B DS1** is unused and ignored by the system. On the **BBF3 DS1PM**, **S1-8** must be set to OFF.

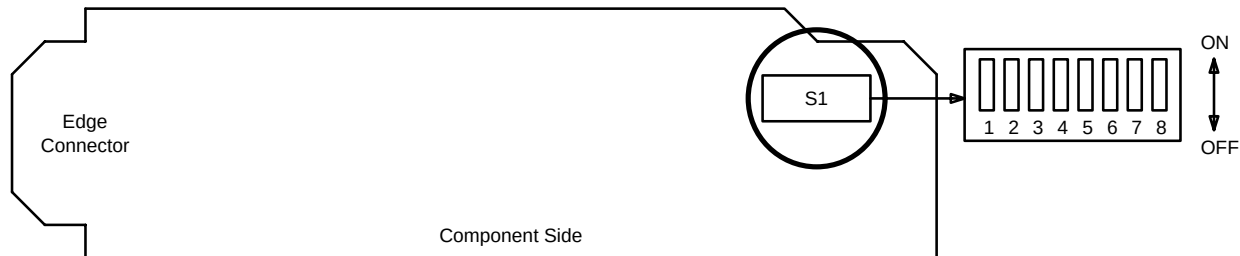


Figure 1. DS1/DS1PM Option Settings

17. **CAUTION:**
*When a **DS1/DS1PM** circuit pack is switched to protection, removal of any other **DS1/DS1PM** circuit pack in the same group will result in a loss of service to the protected **DS1/DS1PM** circuit pack and the removed **DS1/DS1PM** circuit pack.*

NOTE:
If a signal has previously been applied to the original **DS1/DS1PM** circuit pack, the **FAULT** lamp will flash when the new **DS1/DS1PM** circuit pack is installed until the signal tests good.

NOTE:
A **DS1PM** circuit pack must be replaced with the same type circuit pack to retain the proper feature applications. Also, if protection is required and **DS1PM** circuit packs are installed in the service slots, the protection circuit pack must be a **DS1PM** circuit pack.

Remove old **DS1/DS1PM** circuit pack and install replacement **DS1/DS1PM** circuit pack.

Response: **FAULT** LED on the **DS1/DS1PM** circuit pack may light (flash) for up to 40 seconds and then goes off.

18. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

T1EXT

19.



CAUTION:

In addition to primary lightning protection, an external Lightning and Surge Secondary Protection Assembly (ED-8C783-30 or equivalent) is required for T1EXT circuits used in outside plant applications.



NOTE:

To set switch to ON, depress rocker or slide switch toward side labeled **ON** in the figure. To set switch to OFF, depress rocker or slide switch toward side labeled **OFF** in the figure.

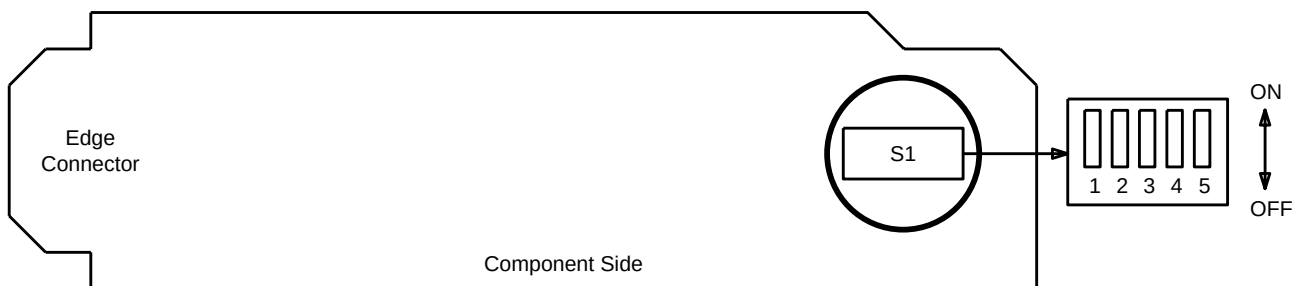


Figure 2. T1EXT Option Settings



NOTE:

It is recommended that a policy be established to set line coding either using the option switches OR using the **set - t1** command. If line code (lc) parameters are set using the **set - t1** command, the circuit pack switch settings will have no effect. The **rtrv - t1** command may be used to check line code settings.

Refer to Table D and Figure 2 and set the line code option switches, if required.

Table D – T1EXT Line Code Settings

Line Code Format	Switch S1 Settings				
	S1-1 (Port1)	S1-2 (Port2)	S1-3 (Unused)	S1-4 (Unused)	S1-5 (Unused)
B8ZS	OFF	OFF	OFF	OFF	OFF
AMI	ON	ON			

Note: Switch 1, section 3 (**S1-3**), section 4 (**S1-4**), and section 5 (**S1-5**) must be set to OFF.

20.



CAUTION:

*When a **T1EXT** circuit pack is switched to protection, removal of any other **T1EXT** circuit pack or **177A** Retainer Card in the same 1X7 protection group will result in a loss of service to the protected **T1EXT** circuit pack and the removed **T1EXT** circuit pack.*



NOTE:

If a signal has previously been applied to the original **T1EXT** circuit pack, the **FAULT** lamp will flash when the new **T1EXT** circuit pack is installed until the signal tests good.

Remove old **T1EXT** circuit pack and install replacement **T1EXT** circuit pack.

Response: **FAULT** LED on the **T1EXT** circuit pack may light (flash) for up to 40 seconds and then goes off.

21. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

BBF8 HDSL

22.



CAUTION:

In addition to primary lightning protection, an external Lightning and Surge Secondary Protection Assembly (ED-8C783-30 or equivalent) is required for HDSL circuits used in outside plant applications.

Determine circuit pack option switch settings from office records, work order, or old circuit pack settings.

23. Set **HDSL** option switches per Table E and Figure 3.

Table E – HDSL Control Switch Settings

Control Settings	Switch S1 Settings			
	S1-1	S1-2	S1-3	S1-4
Master	—	OFF	—	OFF
Slave	—	ON	—	ON
Local	OFF	—	OFF	—
Remote	ON	—	ON	—

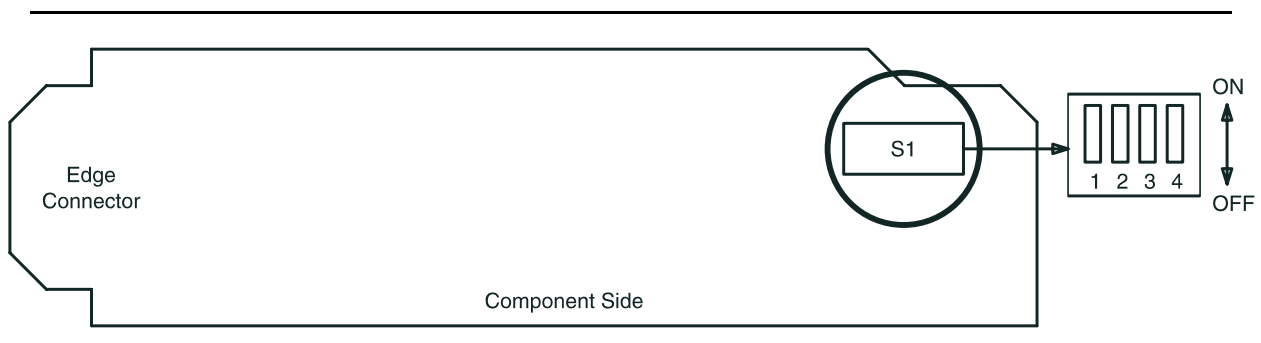


Figure 3. BBF8 HDSL Control Switch

24. If a signal has previously been applied to the original **HDSL** circuit pack, the **FAULT** LED may flash when the new **HDSL** is installed until the signal tests good.

Remove old **HDSL** and install replacement **HDSL**. **FAULT** LED on the **HDSL** flashes for about 15 seconds and then goes off.

25. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Install User Panel and Check –48 V DC Office Battery

1. Ensure ED-8C762-30, DDM-2000 FiberReach Multiplexer Wideband Shelf power cables are installed on **–48V A**, **–RTN A**, **–48V B**, and **–RTN B** connectors located on backplane of shelf. See Figure 1.
2. Obtain multimeter capable of measuring DC voltage in the 40- to 60- volt range.
3. Use multimeter to measure DC voltage at backplane power connectors. Place negative probe on **–48V A** (**–48 B**) power connector and the positive probe on **–RTN A** (**–RTN B**) power connector.

Reference: Voltage must be between –40.00 V and –60.0 V DC.

4. Was requirement met?

If **YES**, then proceed to **Step 6**.

If **NO**, then continue with **Step 5**.

5. Trouble in power feeder(s) or office battery distribution. Refer trouble to organization that installed the shelf.
6. Obtain an **ECC2 USR PNL** user panel, COMCODE 107699076. See Figure 2.
7. Are fuses installed in User Panel?

If **NO**, then proceed to **Step 9**.

If **YES**, then continue with **Step 8**.

8. Remove both of the –48 V 3-amp fuses (COMCODE 406204230) at the top of the User Panel.
9. Place the user panel into the **AUX CTL** slot and push the panel into the shelf until it is seated. Use a flat-bladed screwdriver to tighten the screw in the middle of the knob on the top front of the panel.
10. Fold down the handle and turn the knob clockwise until snug.

11.  **WARNING:**
–48 V DC is present in the fuse holders (FA and FB).

Install ONE of the –48 V fuses at the top of the User Panel.

12. Did fuse blow?

If **YES**, then continue with **Step 13**.

If **NO**, then proceed to **Step 16**.

13. Replace blown fuse.

Reference: **DLP-511**

14. Did fuse blow again?

If **YES**, then continue with **Step 15**.

If **NO**, then proceed to **Step 16**.

15. Replace User Panel and repeat this procedure from **Step 7**.

16. Is **PWR ON A** or **B** LED lighted?

If **YES**, then proceed to **Step 18**.

If **NO**, then continue with **Step 17**.

17. Replace User Panel and repeat this procedure from **Step 7**.

18. Have both fuses been checked?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 19**.

19. Install fuse in other fuse holder and repeat this procedure from **Step 12**.

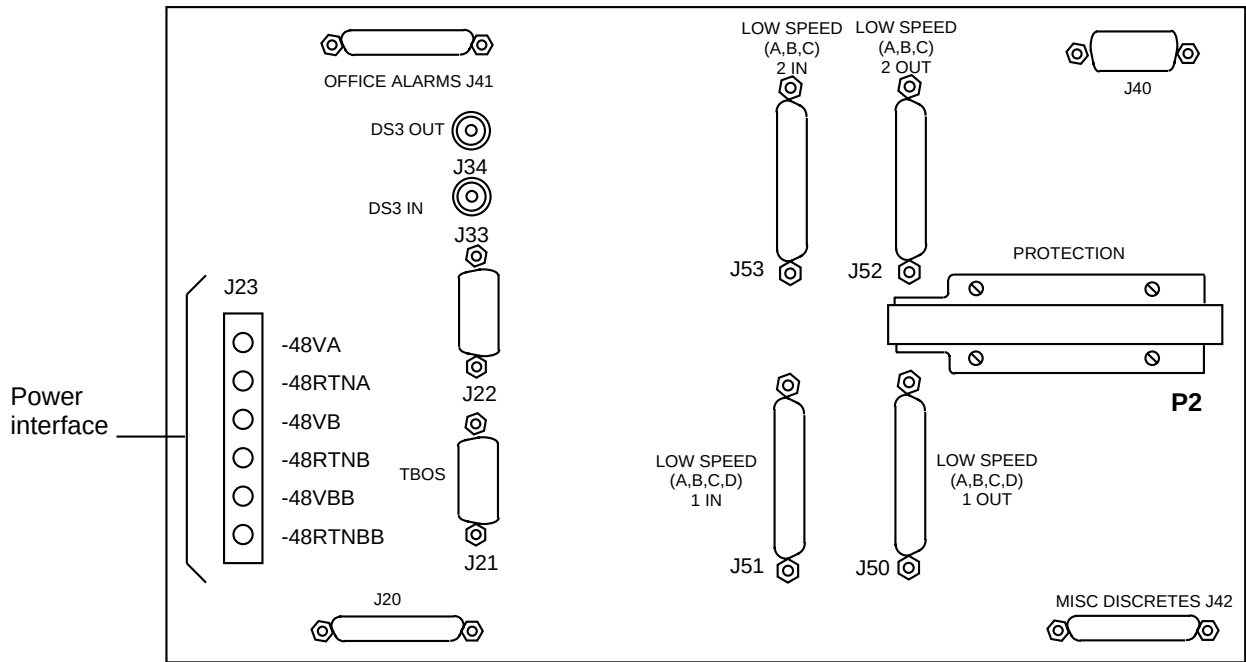


Figure 1. FiberReach Backplane Power Interface

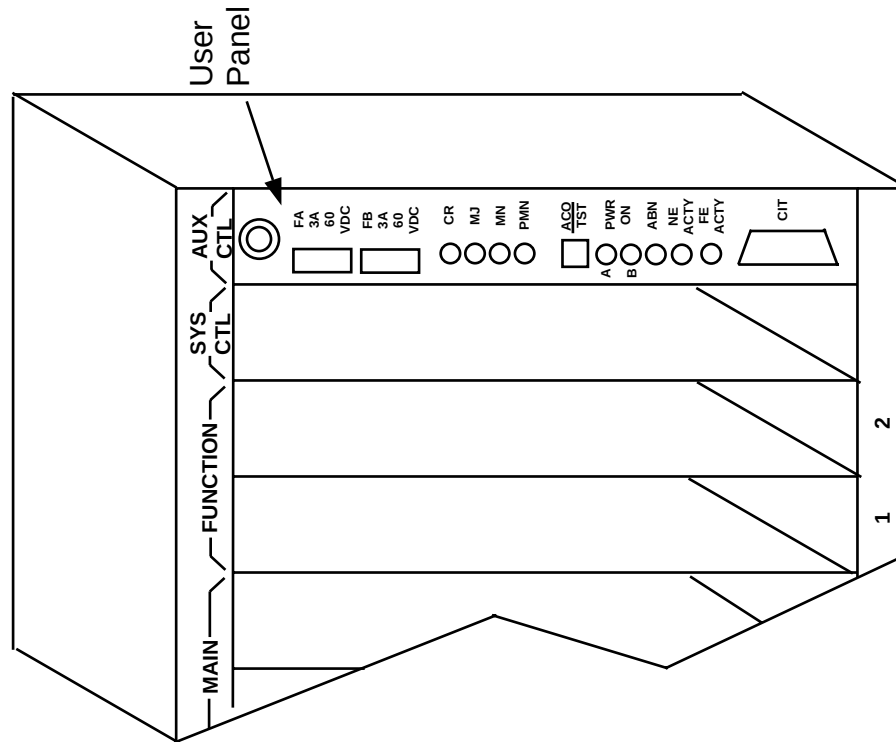


Figure 2. FiberReach ECC2 USR PNL User Panel

Install Software Generic Program New Shelf Installation Only **BBG8 SYSCTL** Installed

1.  **NOTE 1:**
This procedure is used to install a software program in a new DDM-2000 FiberReach shelf equipped only with the **BBG8 SYSCTL** controller circuit pack. The circuit pack may be new from the factory or a circuit pack used previously that may already be loaded with software. For procedures to download software to a fully equipped local in-service shelf, see **DLP-536**. For procedures to download software to a fully equipped remote in-service shelf, see **DLP-537**.

-  **NOTE 2:**
It is assumed that the **BBG8 SYSCTL** circuit pack has been installed per **DLP-501**.

Obtain the following equipment:

- (1) IBM* compatible personal computer (PC) running an *MS-DOS*[†] computer program operating system, Release 2.1 or later.
- (2) RS-232 cable to connect PC **COM** port to User panel **CIT** port.
- (3) Working copies of the new system generic program diskette(s).
- (4) Software Release Description for software being installed.

* Registered Trademark of International Business Machines Corporation

† Registered Trademark of Microsoft Corporation

2. Before beginning this procedure, the following is strongly suggested:
 - a. Become familiar with the characteristics and operating procedures of your PC and the *MS-DOS* operating system.

Reference: **DLP-533**

- b. Operate laptop PCs on AC power during download procedures.
 - c. Follow proper procedures in handling the diskette(s) (floppies).

Reference: **DLP-533**

- d. Make working copies and backup copies of the original new generic program diskettes.

Reference: **DLP-534**

- e. **Read the Software Release Description for software being installed.**
3. Before beginning the software installation, refer to the Software Release Description for the software being installed for a description of any special considerations required when installing this version of the software.
4.  **NOTE:**
Software download procedure must be initiated from *MS-DOS* environment. It should not be initiated from a windows environment.

Start *MS-DOS* operating system on the PC [**DLP-534**].

Response: PC displays the prompt (for example, *C>*, *C : /DOS>*) determined by the PC.

5. If you are going to use the PC hard disk to load software to the shelf, **copy** all files on the source diskettes(s) (floppies) to a directory on the hard disk (for example, GEN_211 for generic version 2.1.1).
6. If you are going to load the software from the hard disk, use the **cd** command to change to the appropriate hard drive directory containing the software.

If you are going to load the software from the floppies, use the appropriate *MS-DOS* command (for example, **a:** or **b:**) to go to the drive where the floppy disk will be installed.

Response: PC displays the appropriate prompt (A>, B>, C>, C : /DOS>, etc.) determined by the PC.

Comment: If you are using floppies and get a disk error message, verify the drive latch is locked and that you have the proper diskette installed in the drive.

7.  **NOTE:**
The new generic program may be on many floppy disks. If you are using the floppy disks, the PC will prompt you to insert disks as needed after the first disk is installed.

If you are using the floppy disks, insert the first (number 1) floppy disk into the PC drive.

8.  **NOTE:**
The **checkpgm** command may take up to 25 minutes to complete.

Execute the command **checkpgm** to check the version number of the program you are installing. If using floppy disks, insert each diskette when prompted.

approx. 15 min. if using hard drive approx. 25 min. if using floppy drive

Response: PC has DDM-2000 program version a.b.c

9.  **NOTE:**
The cable from the front **CIT** port on the FiberReach shelf must be connected to the **COM (COM1 or COM2)** RS-232 port of the PC.

Connect PC to **CIT** port by connecting one end of an RS-232 cable to the **COM()** port of the PC and the other end of the cable to the **CIT** port on front of User Panel.

10. **NOTE:**

The **FE ID** display on the **SYSCTL** will show one of the following preceding software installation:

- a. The letter **P** displayed in the **FE ID** display indicates that no software is installed in the **SYSCTL**. If the **P** is followed by a period (**P.**), it means that a previous download attempt has failed. New software must be downloaded locally using this procedure.
- b. Nothing displayed in the **FE ID** display indicates that either FiberReach compatible software is installed in the **SYSCTL** or the **SYSCTL** contains software that is not compatible with the FiberReach shelf. If the **CR** LED did not flash when the **SYSCTL** was installed and the **FE ID** display is blank, the **SYSCTL** contains software not compatible with the FiberReach shelf. New software must be loaded using these procedures.
- c. The letter **U** displayed in the **FE ID** display indicates unsupported **SYSCTL** switch settings for the type of shelf being equipped. Remove **SYSCTL**. Check option switch settings and reinstall **SYSCTL** [DLP-539].
- d. The letter **E** displayed in the **FE ID** display indicates that the **SYSCTL** must be replaced. Remove **SYSCTL**. Install new **SYSCTL** using procedures of **DLP-539**.
- e. The letter **F** displayed in the **FE ID** display indicates that the **SYSCTL** faceplate latch is not fully latched. Latch the faceplate. (A reset occurs after the faceplate is latched.)
- f. A flashing letter **L** displayed in the **FE ID** display indicates a low voltage condition (brownout) on the shelf. Clear trouble using **TAP-119**.

Is **FE ID** display on the **SYSCTL** blank or does it display a "P" or "P."?

If display a **P** or **P.**, then continue with **Step 11**.

If display is **BLANK**, then proceed to **Step 15**.

Letter "P" in FE ID Display

11. **⇒ NOTE:**

If floppies are being used, ensure the first (number 1) diskette is installed in floppy drive. If hard drive is being used, ensure you are in the correct directory.

Enter **term** or **term COM_n** command, where $n = 1$ or 2 . If **term** is entered without the **COM_n** option, then **COM1** will be selected by default. If after starting the terminal emulator you see the message "Can't find script <init>", disregard it.

approx. 15-45 min.

Response: Two brief messages are printed and you are instructed to Press any key to continue . . . after the second message. After you press any key, the terminal emulator is loaded and the terminal responds as follows within 2 minutes:

```
CTRM [Interface (R2.1 or later)] ready. (Type  
Alt-h for help.)  
Communications established.
```

P

```
Searching for optimal transfer rate.  
Handshake established at <baudrate> baud.
```

```
In progress . . . .
```

The dots continue to print until program installation is complete. If using floppies, insert each diskette when prompted. After installation is completed, the PC prints the following completion message:

```
ins-prog:TID COMPLD  
/* Generic program a.b.c is installed  
*/
```

The **SYSCTL** resets and the terminal is logged off the system.

12. Was response correct?
If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
If **NO**, then continue with **Step 13.**
13. If the download does not start, as indicated by the `In progress` message and rows of dots, within 2 minutes after pressing any key, try the following:
 - a. Ensure first (number 1) disk of program being installed is inserted, if using floppies.
 - b. Ensure diskette is inserted in correct drive.
 - c. Ensure the proper command was used to go to the drive with the diskette or to the proper directory containing the software.
 - d. Check for invalid COM port. Exit TERM (Alt-F2), then restart TERM using **term COM1** or **term COM2**.
 - e. If the download still does not start, change the CTRM (Interface) baud rate as follows:
 1. Momentarily depress the "Alt C" keys.
 2. Use the RETURN key to move to the "Speed" field.
 3. Press the "Space" bar until the desired rate appears.
 4. Momentarily depress the "Escape/Esc" key to activate the new baud rate.
- If the download starts and fails during its progress, refer to **Trouble Clearing: TAP-116.**
14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

FE ID Display Blank

15. Can software generic version ID be displayed by depressing the **ACO** button longer than 2 seconds?

If **YES**, then continue with **Step 16**.

If **NO**, then proceed to **Step 27**.

16.  **NOTE:**

Ensure PC is connected to the front CIT (CIT-1). If floppies are being used, ensure the first (number 1) diskette is installed in floppy drive. If hard drive is being used, ensure you are in the correct directory.

Enter **term** or **term COM_n** command, where $n = 1$ or 2 . If **term** is entered without the **COM_n** option, then **COM1** will be selected by default. If after starting the terminal emulator you see the message "Can't find script <init>", disregard it.

approx. 15-45 min.

Response: Two brief messages are printed and you are instructed to
Press any key to continue . . . after the
second message. After you press any key, the
terminal emulator is loaded and the terminal responds
as follows:

```
CTRM [Interface (R2.1 or later)] ready. (Type  
Alt-h for help.)  
Communications established.
```

17.  **NOTE:**

The default shelf is the shelf physically connected to the PC. To set baud rate automatically, enter two carriage returns (<cr>), two lower case "a"s (**aa**), or two upper case "A"s (**AA**). All other characters are ignored.

Enter two carriage returns.

Response: PC prompts with:

```
/* Enter a shelf number from 1 to 8 */  
shelf [default] =
```

18. Was response correct?

If **YES**, then proceed to **Step 20**.

If **NO**, then continue with **Step 19**.

19. **⇒** NOTE:

CIT mult cabling creates a serial chain of network elements (NE)s to which a single CIT can connect and address any NE in the chain. The NE directly connected to the CIT defines the head of this chain.

Proceeding from the CIT at the head of the chain to the end of the chain, communication will stop at the first point where an NE with a **BBG8 SYSCTL** immediately follows an NE with a **BBG5 SYSCTL**.

The CIT will be unable to communicate with the NE having the **BBG8 SYSCTL** and all NEs further along the chain.

Check PC to **CIT** port connections. Make sure the cable is connected between the PC **COM()** port and the **CIT** port on the FiberReach shelf. Check CTRM (Interface) setup and make sure the **comm** port selected matches the port (**COM()**) on the PC that is connected to the **CIT** port on the shelf. Check if CIT bay mult cabling is connected to this shelf but not terminated at another shelf.

Repeat this procedure from **Step 16**.

20. **⇒** NOTE:

The CIT login banner for Release 2.0 and earlier reads: AT&T,
DDM2000 FiberReach Multiplexer, Release a.b.c.

Enter the shelf number for the shelf being used for new program download.

Response: PC responds with:

```
login<
password<

/*****
*
*          LUCENT TECHNOLOGIES
*      Bell Labs Innovations
*      DDM-2000 FiberReach
*
*          Release a.b.c
*
*****/

.
.
.

TID date time
M  rtrv-alm: all COMPLD
/* Active Alarms and Status Report
```

21. NOTE:

After the system prompt (<), the system will respond normally to commands entered. The Commands and Reports section of this manual gives a description of the commands.

Use **rtrv-ne** command to retrieve the name (*tid*) of the shelf having new program installed or see **TID** in response above.

22. If floppies are being used, ensure the first (number 1) diskette is installed in floppy drive. If hard drive is being used, ensure you are in the correct directory.

23. Enter the command **ins-prog:tid**

Where tid = the target identifier (shelf name) for the DDM-2000 shelf having the new program installed.

Response: /* Testing For Program Installation... */

After several seconds, the PC prints a Caution! message followed by the prompt:

Execute? y/n =.

24. Was response correct?

If **YES**, then continue with **Step 25**.

If **NO**, then do **Trouble Clearing: TAP-116**.

25. Enter a *y* or *yes* and a carriage return to execute the program.

approx. 15-45 min.

Response: **ABN** and **NE ACTY** LEDs light on User Panel and a **P** is displayed in **SYSCTL FE ID** display in the shelf receiving the program. PC starts download and prints the following message:

p

Searching for optimal transfer rate.
Handshake established at <baudrate> baud.

In progress

The dots continue to print until program installation is complete. If floppy disks are being used, insert each diskette when prompted. After installation is completed, the PC prints the following completion message:

```
ins-prog:TID COMPLD
/* Generic program a.b.c is installed
*/
```

The **SYSCTL** resets, and the terminal is logged off the system. The LEDs go off on the User Panel and **SYSCTL**.

26. Was response correct?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.

If **NO**, then do **Trouble Clearing: TAP-116**.

FE ID Display Blank (No Response)

27. Enter **term** or **term COM n** command, where $n = 1$ or 2 . If **term** is entered without the **COM n** option, then **COM1** will be selected by default. If after starting the terminal emulator you see the message "Can't find script <init>", disregard it.

approx. 15-45 min.

Response: Two brief messages are printed and you are instructed to Press any key to continue . . . after the second message. After you press any key, the terminal emulator is loaded and the terminal responds as follows:

```
CTRM [Interface (R2.1 or later)] ready. (Type  
Alt-h for help.)  
Communications established.
```

28. Unplug and reseal the **SYSCTL** and immediately push and hold the **FE SEL** and **UPD/INIT** buttons at the same time until a **P** appears in the **FE ID** display (approximately 15 seconds).

approx. 15-45 min.

Response: PC starts download and prints the following message:

p

Searching for optimal transfer rate.
Handshake established at <baudrate> baud.

In progress

- 、 The dots continue to print until program installation is complete. If using the floppy disks, insert each diskette when prompted. After installation is completed, the PC prints the following completion message:

```
ins-prog:TID COMPLD
/* Generic program a.b.c is installed
*/
```

The **SYSCTL** resets and the terminal is logged off the system.

29. Was response correct?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 30.**

30. Check that the DDM-2000 is connected to the PC through the **COM** port. If it is not, reconnect the PC to DDM-2000 using the **COM** port and repeat the procedure.

If the download still does not start, as indicated by the `In progress` message and rows of dots, within 2 minutes after the **P** appears in the **FE ID** display, change the CTRM (Interface) baud rate as follows and repeat this procedure: if the baud rate is currently set to 9600, change it to 4800 or if the baud rate is currently set to 4800, change it to 9600. The baud rate is changed by:

1. Momentarily depress the "Alt C" keys.
2. Use the RETURN key to move to the "Speed" field.
3. Press the "Space" bar until the desired rate appears.
4. Momentarily depress the "Escape/Esc" key to activate the new baud rate.

If the download starts and fails during its progress, refer to **Trouble Clearing: TAP-116**.

Make VT1.5 (DS1) or STS1 Cross-Connections Using CIT Single/Dual Homing OC3/OC1 Ring Configuration

1.  **NOTE 1:**
This procedure may also be found in the DDM-2000 OC-3 User/Service Manual, Volume 2.
-  **NOTE 2:**
If you are not familiar with doing cross-connections using the CIT commands, it is strongly suggested that you read *Cross-Connection Provisioning* in the "Administration and Provisioning" section of this manual. Also, read the description of the following commands in the "Commands and Reports" section of this manual and the DDM-2000 OC-3 manual: **ent-crs-sts1** (OC-3 only), **ent-crs-vt1**, **rtrv-crs-sts1** (OC-3 only), **rtrv-crs-vt1**, **dlt-crs-sts1** (OC-3 only), and **dlt-crs-vt1**.
-  **NOTE 3:**
You will have to log in to more than one node in each ring to get a complete map of the network using the **rtrv-map-network** and **rtrv-map-neighbor** command. If a drawing of the network is not provided with the work order, it is recommended that you draw a simple schematic of the network before making cross-connections.

Make a simple drawing of the network and list the TID of each node and how they are connected to each other. Figure 1 shows an example of a simple schematic.

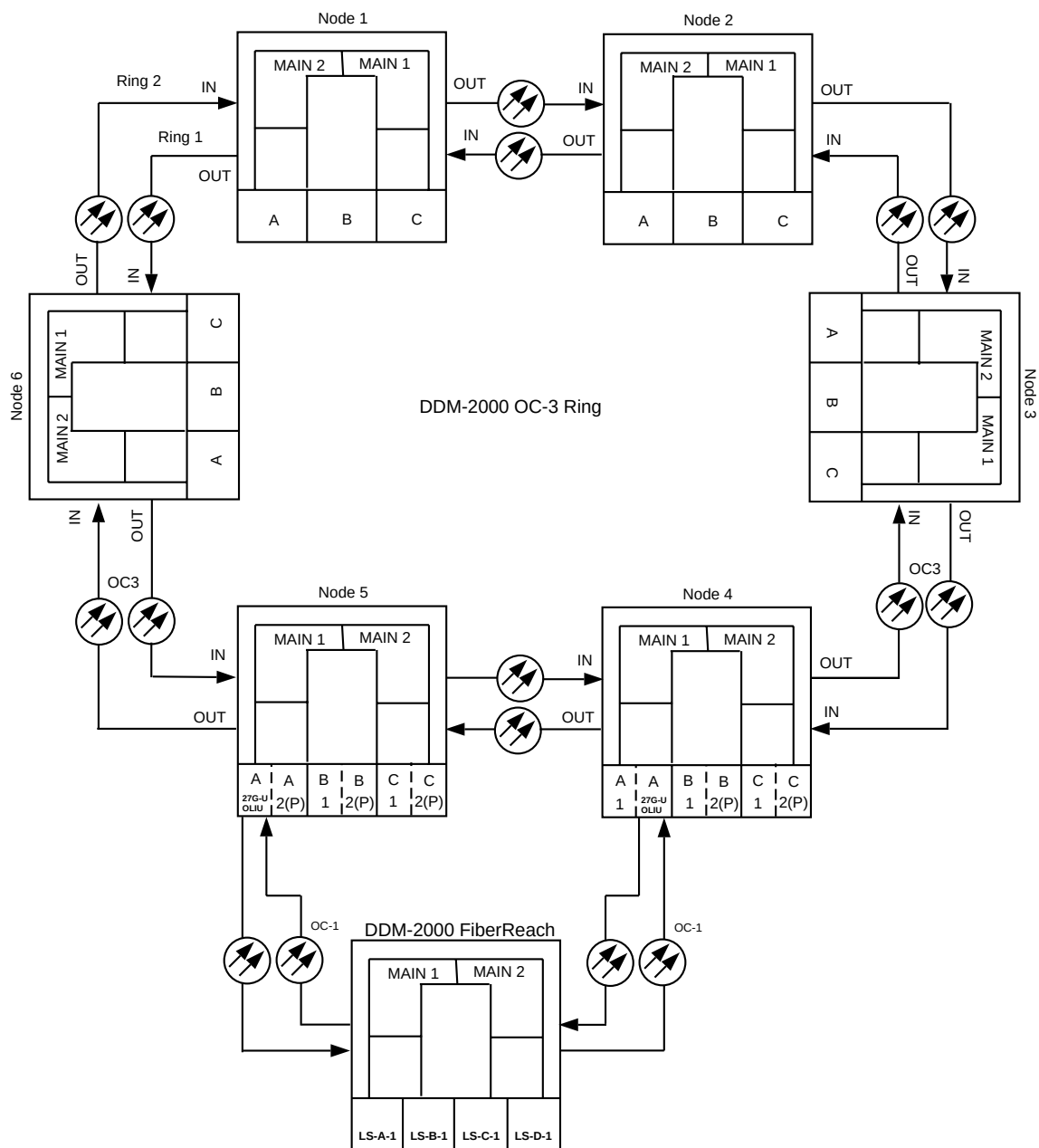


Figure 1. Sample Network Schematic

Log in to any node in each ring in the network and use the **rtrv-map-network** and/or **rtrv-map-neighbor** command to retrieve a map of the network which lists all the systems and how they are connected to each other.

Sample output reports are shown in Figures 2 and 3:

```
Node5 95-03-27 13:09:53 DDM-2000 OC-3, R9.1.1
M  rtrv-map-network:  COMPLD
/* Network Map for Node5

=====
=====
      System Name      Comm.  Product      NE      Alarm
      (TID)           Status  Type         Type     Group
=====
=====
      Node5                DDM-2000 OC-3      DSNE      3
      Node4                DDM-2000 OC-3              3
      Node3                DDM-2000 OC-3              3
      Node2                DDM-2000 OC-3              3
      Node1                DDM-2000 OC-3              3
      Node6                DDM-2000 OC-3              3
      Node7                FiberReach              3

* /
```

Figure 2. Sample Report From **rtrv-map-network** Command

```

Node7 95-03-27 13:09:53 FiberReach, R2.1.1
M  rtrv-map-neighbor: COMPLD
/* Neighbor Map for Node7

=====
=====
System Name      Connected  Link
(TID)            Through   Comm.
                                Status
                                Product
                                Type
=====
=====
Node7                                FiberReach
Node5      main-1                    DDM-2000 OC-3
Node4      main-2                    DDM-2000 OC-3

*/

```

Figure 3. Sample Report From rtrv-map-neighbor Command

2. Verify system configuration is same as specified on work order or circuit order. For example, see Figures 4 through 12.
3.  **NOTE:**
Cross-connections consist of drop and pass-through connections. For example in Figure 4, drop connections are made at Nodes 1, 4, 5, and the FiberReach node. Pass-through cross-connections are made at Nodes 2, 3, and 6. Also, cross-connections must be made in all interconnected rings, including other DDM-2000 OC-3 rings, DDM-2000 OC-12 rings, and FT-2000 OC-48 rings, as required.

From work order or circuit order, determine the terminating (drop) nodes for the service being established.

4. From work order, circuit order, and the sketch made in Step 1, determine the pass-through nodes for the service being established.
5. From work order or circuit order, determine the host OC-3 node(s) that connects to the OC-1 FiberReach ring(s).

6.  **NOTE:**
The **cct** parameter of the **ent-crs-vt1** command specifies the cross-connect type. The valid values are **two-way**, **dc**, and **locked**. Two-way applies to add/drop, hairpin, OX1 ring, and pass-through connections. The **dc** parameter applies to dual ring interconnection (DRI) applications. The **locked** parameter supports non-path-switched DS1 applications where a DS1 is cross-connected to a specified channel in a specified direction of the ring interface (Figure 12). Provisioned AIS or unequipped signal is transmitted in the other direction around the ring but is not alarmed at any pass-through nodes or the other terminating node with locked cross-connections present for the same channel. Any signal received in the same channel from the other ring interface is ignored.

Determine the cross-connect type (**cct**) to be made at each node for the service being established.

7.  **NOTE:**
In dual homing configurations (Figures 4 and 5), **OLIU** circuit packs must be installed in the correct slots in the host OC-3 nodes to support the direction of traffic required. For example in Figure 4, for traffic to be routed between Node 1 and the FiberReach system, the **27G-U/27G2-U OLIU** must be installed in **FUNCTION UNITS (FN) GROUP A, B, or C, slot 1** of Node 5 and **FUNCTION UNITS GROUP A, B, or C, slot 2(P)** of Node 4. This is required because traffic entering Node 5, slot **FN-A-1** from the FiberReach shelf, is automatically connected to the **MAIN-1 OLIU** when cross-connections are made. Traffic entering slot **FN-A-2(P)** is automatically connected to the **MAIN-2 OLIU**.

In single homing configurations (Figure 6), the **27G-U/27G2-U OLIU** in **FUNCTION UNITS (FN) GROUP A, B, or C, slot 1** of the OC-3 shelf must be connected to the **MAIN-1 OLIU** in the FiberReach shelf. The **27G-U/27G2-U OLIU FUNCTION UNITS (FN) GROUP A, B, or C, slot 2(P)** of the OC-3 shelf must be connected to the **MAIN-2 OLIU** in the FiberReach shelf.

Use the **rtrv-eqpt** command at each node in the network to verify that each shelf is properly equipped for the service being established. Ensure that **OLIU** circuit packs are installed in the correct slots in the host OC-3 nodes.

8. ➤ **NOTE 1:**
Cross-connections supporting DS1 services may be either STS1 or VT1.5 cross-connections in DDM-2000 OC-3. Only VT1.5 cross-connections are allowed in DDM-2000 FiberReach. In an OC-3 shelf, use VT1.5 cross-connections for DS1 services if you expect to cross-connect only a portion of the VT1.5 signals in the STS-1 channel. If STS1 cross-connections are made at an OC-3 shelf, there is a fixed mapping of all 28 VT1.5 cross-connections to a specific shelf group [see **ent-crs-sts1** command (OC-3 only)].
- **NOTE 2:**
The following commands may be used to delete, enter, and retrieve cross-connections: **dlt-crs-vt1**, **dlt-crs-sts1** (OC-3 only), **ent-crs-vt1**, **ent-crs-sts1** (OC-3 only), and **rtrv-crs-vt1**. and **rtrv-crs-sts1** (OC-3 only). See the "Commands and Reports" section of each system manual for a description of commands.
- **NOTE 3:**
In ring configurations, you should use the following rules in establishing cross-connections in each ring:
1. All terminating drop connections (including DRI drop and continue, if present) from the same STS-1 timeslot must be provisioned the same, either all VT1.5 or STS-1.
 2. If all 28 VT1.5s (DS1s) in an STS-1 are being passed through at a node in a VT1.5 path-switched ring, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the pass-through node in the future, you should provision the pass-throughs as VT1.5 cross-connections. Provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted to 28 VT1.5 cross-connects to drop DS1s at a later time.
 3. On STS-1 path-switched rings, all nodes in the ring must be provisioned as STS-1 cross-connections.

From work order or circuit order, determine the cross-connections [STS-1 (OC-3 only) or VT1.5] to be made at each node [pass-through, terminating (drop), and host OC-3 node(s)] associated with the kind of service being established.

9. Starting at one of the terminating nodes for the DS1 circuit being established, use the **rtrv-crs-()**: command at each node in the ring to verify that the cross-connections specified on the work order or circuit order may be made. For example, if the DS1 #1 low speed port in the **DS1** circuit pack in slot #1 of LOW SPEED group A (a-1-1) is to be connected to timeslot m-1-1-1 and the **rtrv-crs-vt1** command shows that the cross-connection is already established, you should determine from office records if this port is already in-service before continuing with this procedure.

If cross-connections are already assigned or improperly assigned, refer trouble to the organization responsible for facility design. Improperly assigned cross-connections may have to be deleted using the **dlt-crs-()** commands.

10.  **NOTE:**
Channel state provisioning provides IS, AUTO, and NMON states for VT channels similar to the port states for DS1 ports. When a cross-connection is made to a point of termination, the channel is in the AUTO state and alarming is disabled. The channel must receive a good signal from either ring to cause the channel to transition to in-service (IS).

At all nonterminating pass-through nodes in the network, use the **ent-crs-vt1**: or **ent-crs-sts1**: (OC-3 only) command to provision pass-through connections. [For example, to make the DS1 pass-through cross-connection for channel m-1-1-1, use the **ent-crs-vt1:m-1-1-1,m-1-1-1:cct=twoway** command. To make pass-through cross-connections for STS-1 #1 in an OC-3 shelf, use the **ent-crs-sts1:m-1,m-1:cct=twoway** command.]

11. At both terminating (drop) nodes of the circuit being established, use the **ent-crs-vt1**: command to make the terminating cross-connections (for example, Node 1 and FiberReach node in Figure 4, **ent-crs-vt1:m-1-1-1,a-1-1:cct=twoway**)
12. At the host OC-3 ring node sites, make proper cross-connections. For example in Figure 4, at Node 5, if VT1.5 channel #1, VTG #1, STS #1 from the MAIN 1 OLIU is to be cross-connected to function group A, OC-1 line #1, then the command **ent-crs-vt1:m-1-1-1,a-1-1-1:cct=twoway** would be used to make the cross-connection.
13. Use the **rtrv-crs-vt1**: or **rtrv-crs-sts1**: (OC-3 only) command to verify that the proper connections have been made. If an improper cross-connection is made, use the **dlt-crs-vt1**: or **dlt-crs-sts1**: (OC-3 only) command to delete the improper cross-connection and reenter the cross-connection.

14. After all cross-connections are made, use the **rtrv-alm:** command to verify no alarms are present.
 15. If ne-acty inc. VT AIS, inc. STS1 AIS, inc. VT unequipped, or inc. STS1 unequipped alarms are present, look for missing or improperly made cross-connections. Use **TAP-118** to locate missing cross-connections, if required.
-

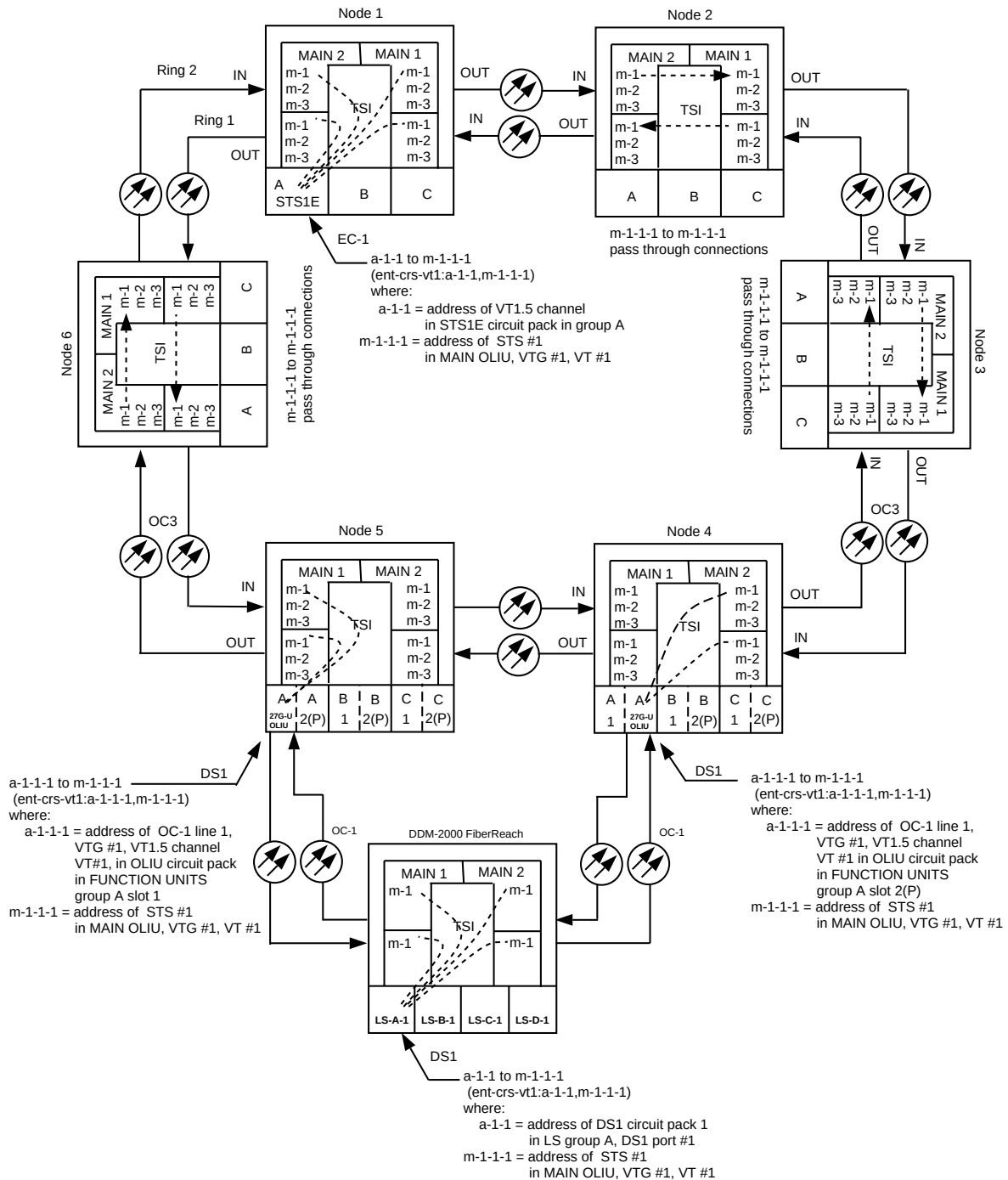


Figure 4. Example of Dual Homing OC-3/OC-1 Cross-connections

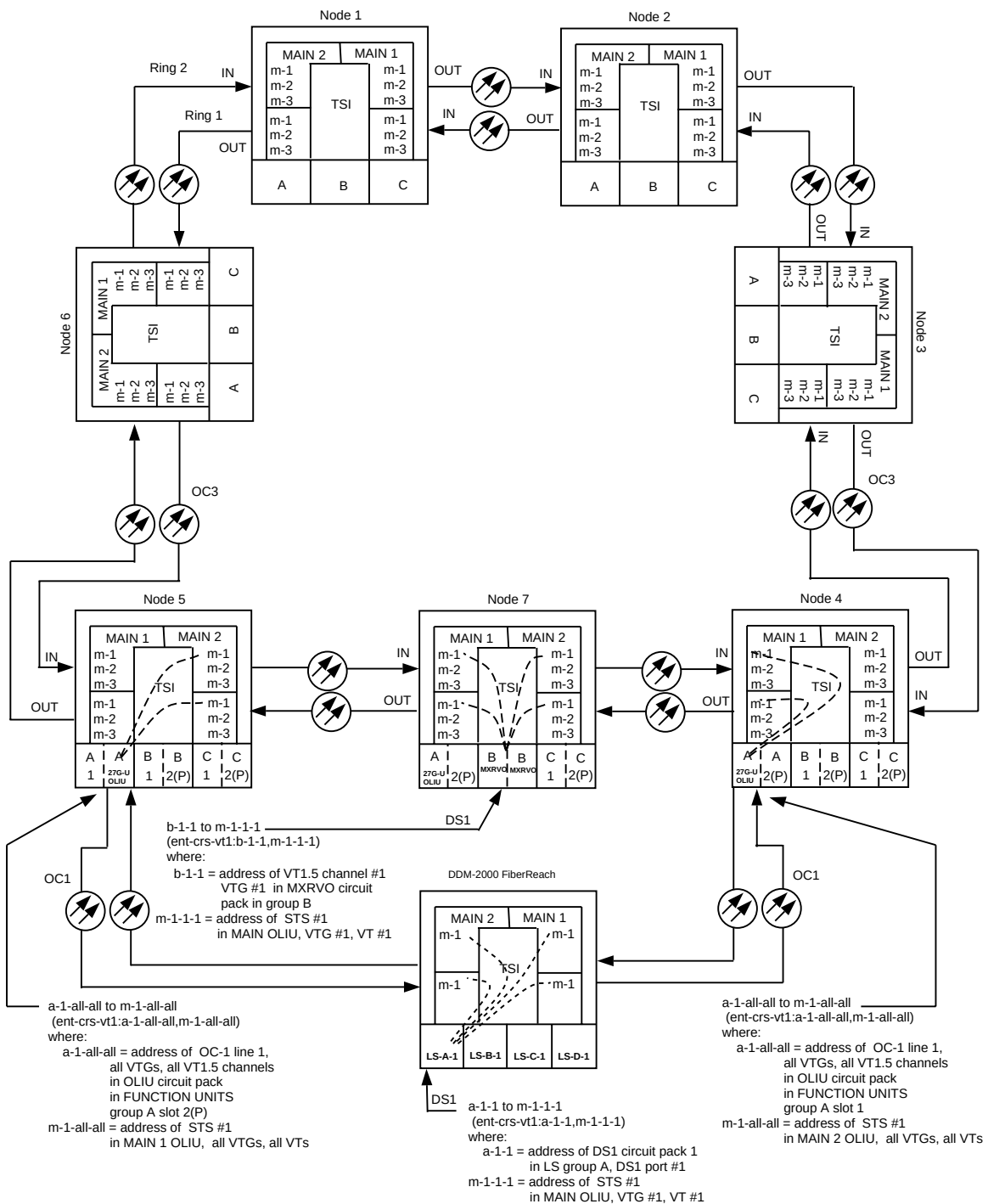


Figure 5. Example of Dual Homing OC-3/OC-1 Cross-connections

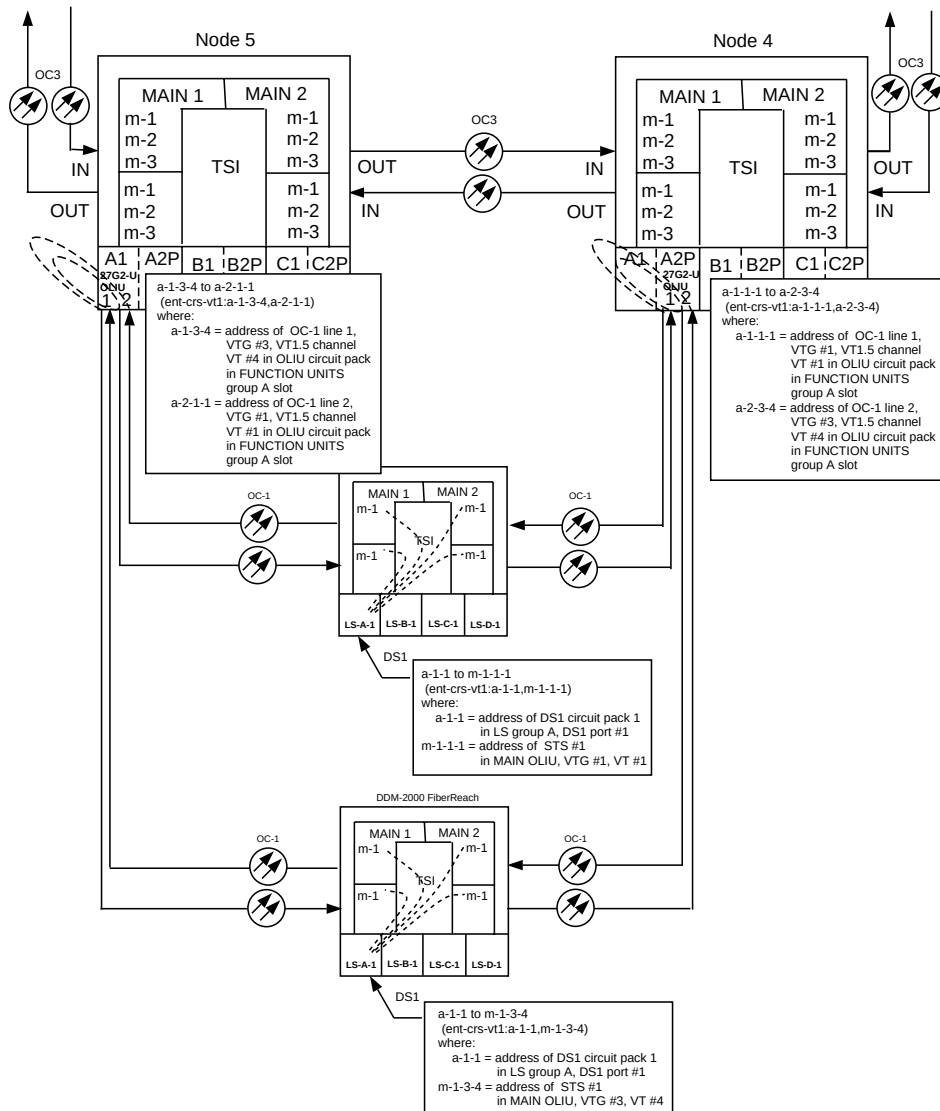


Figure 6. Example of Dual Homing Intra-Function Unit OC-3/OC-1 Cross-connections

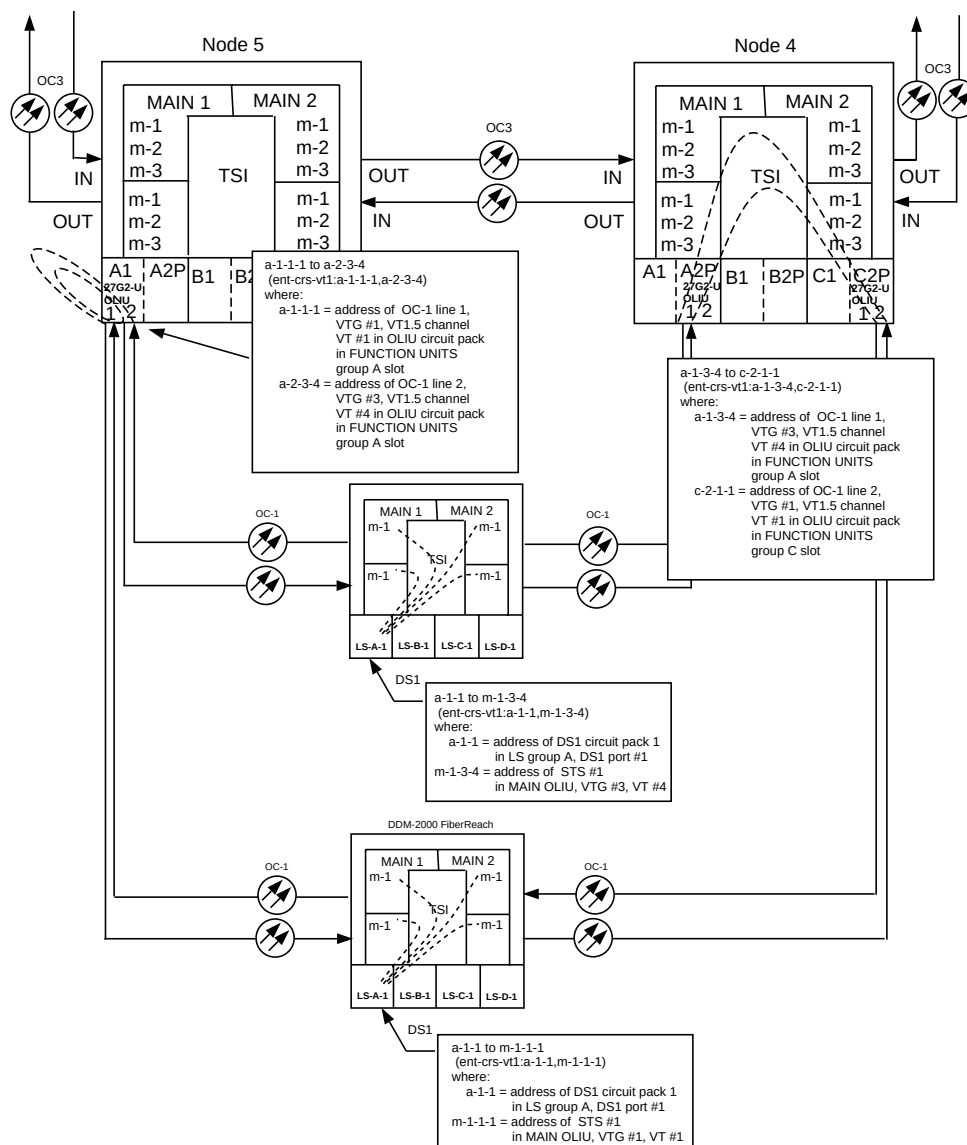


Figure 7. Example of Dual Homing Intra- and Inter-Function Unit OC-3/OC-1 Cross-connections

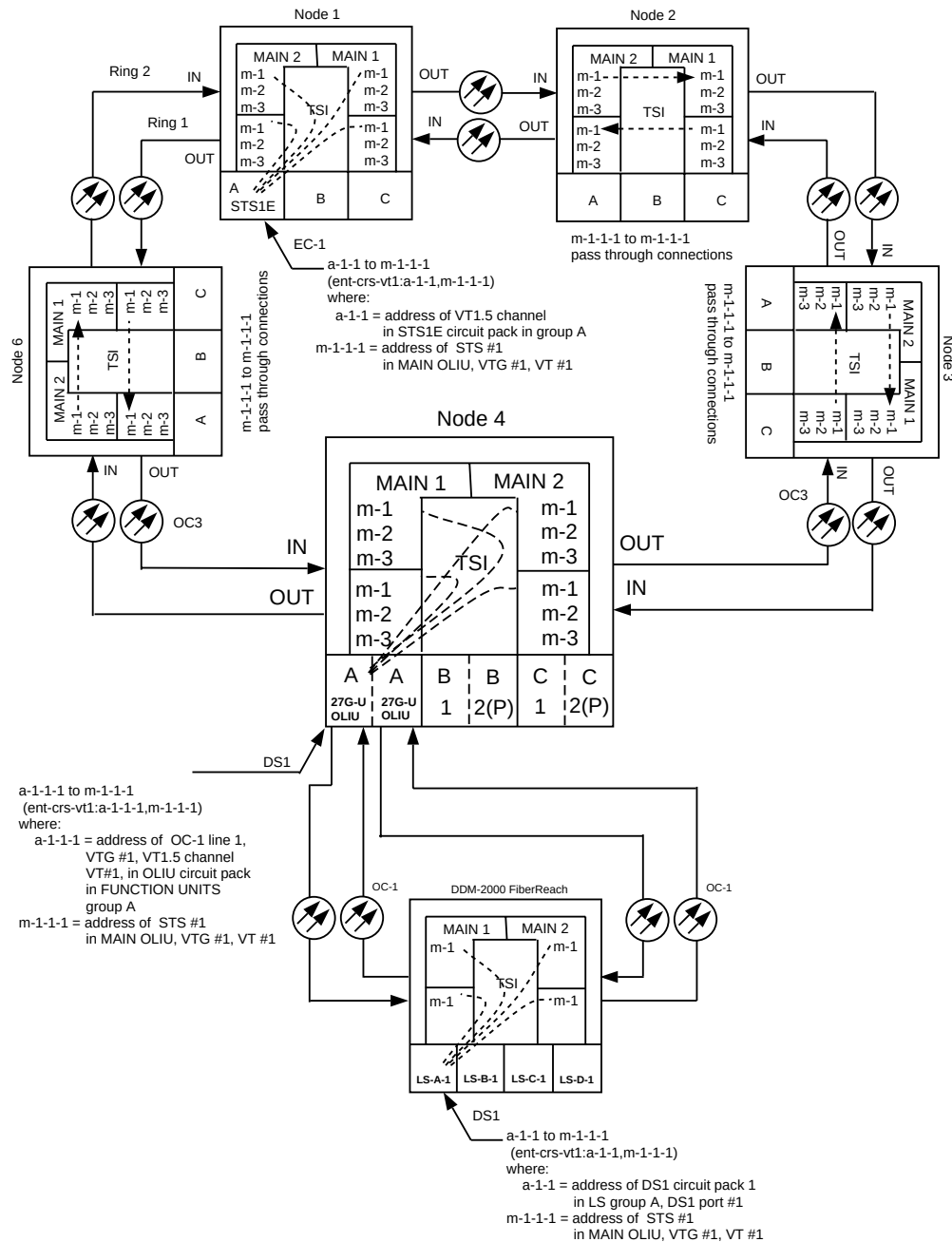


Figure 8. Example of Single Homing OC-3/OC-1 Cross-connections

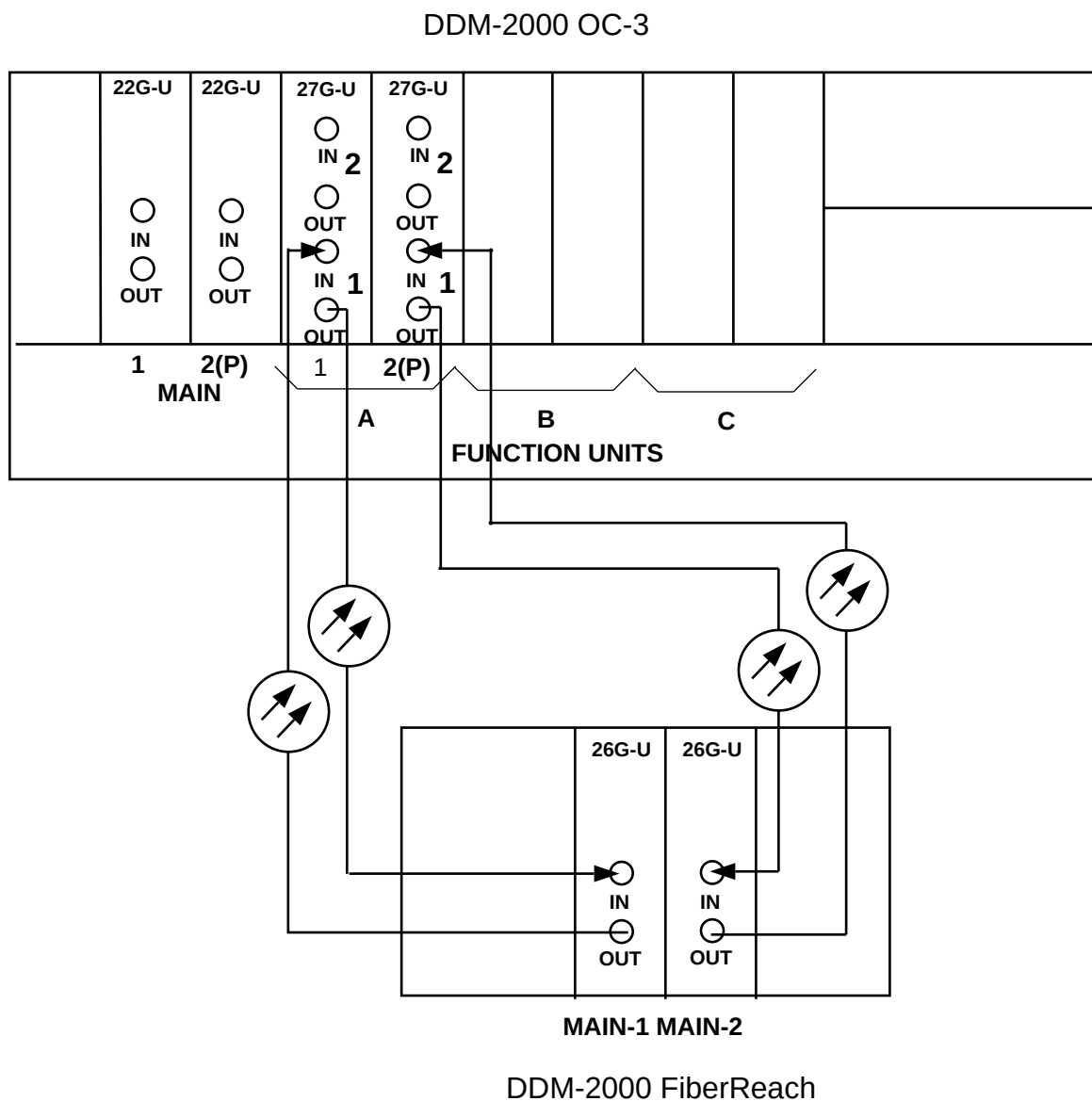


Figure 9. Example of Single Homing Intra-Function Unit OC-3/OC-1 Cross-connections



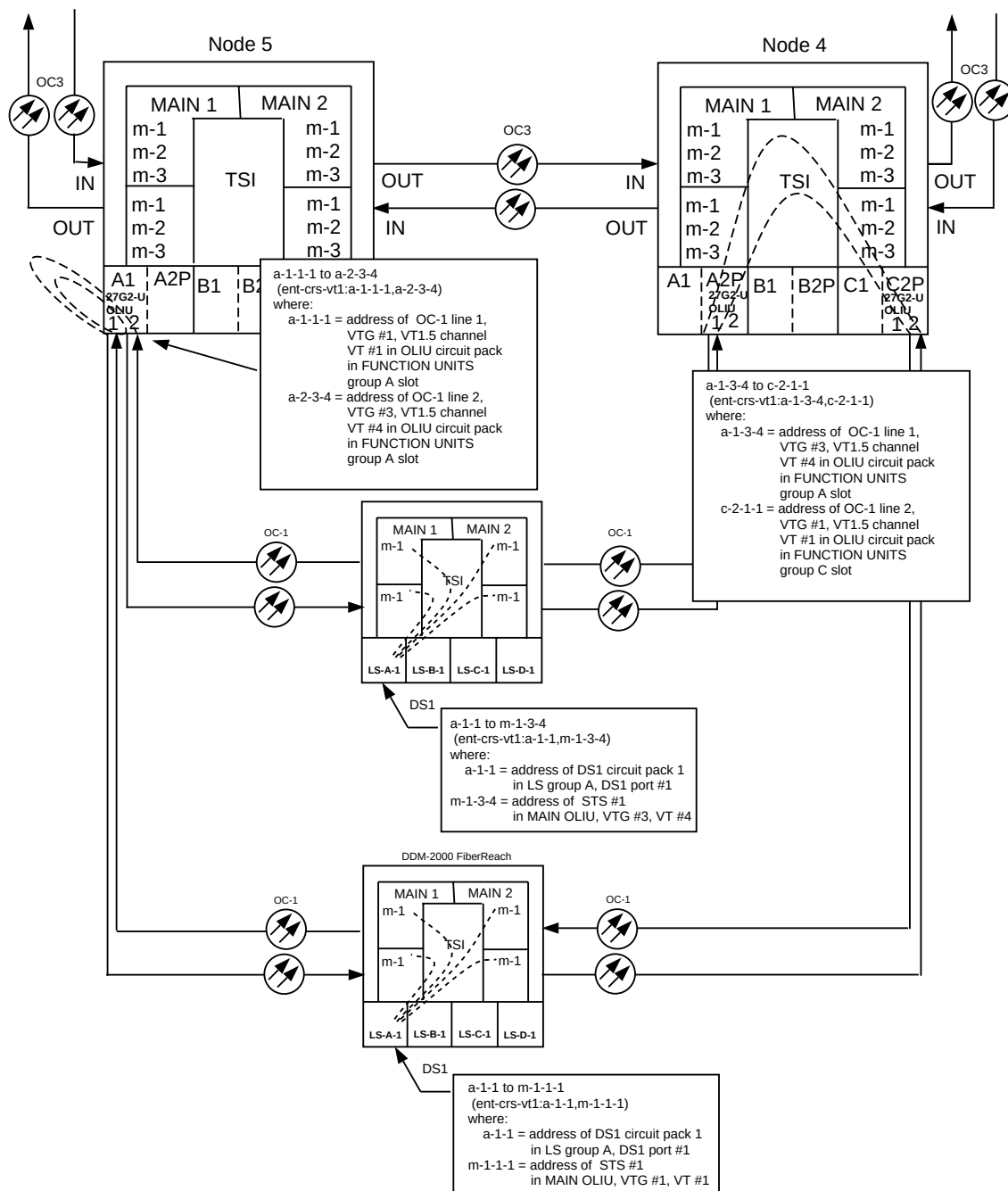


Figure 11. Example of Single Homing Intra-Ring Hairpin OC-3/OC-1 Cross-connections

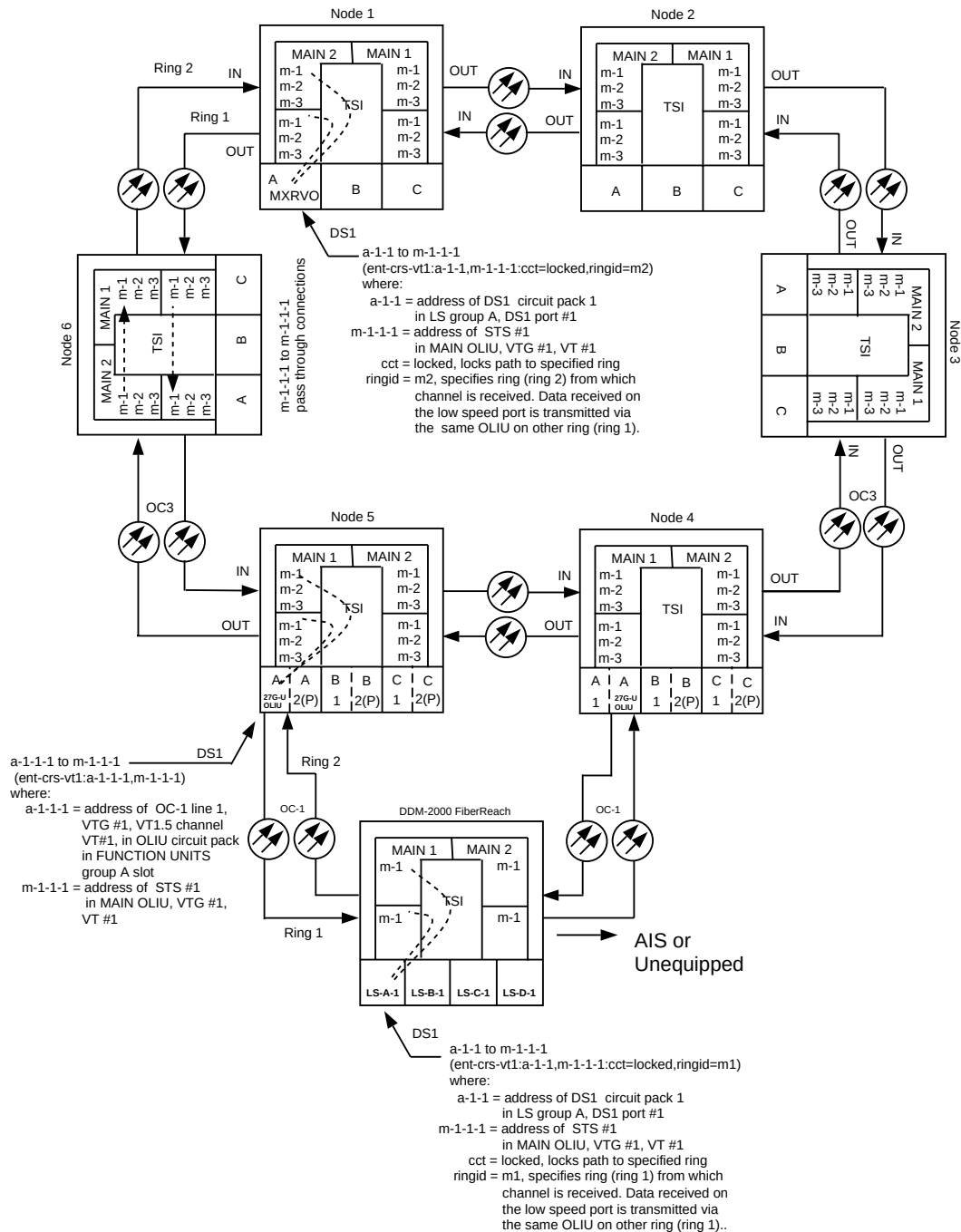


Figure 12. Example of Locked Cross-connections

Clean Optical Fibers, Connectors, and Lightguide Buildouts (LBOs)

1.  **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

 **NOTE:**
All optical fiber connectors (ST[®], FC/PC, and SC types), lightguide buildouts, and buildout blocks or equivalent should be cleaned before making initial connections or reconnections per the following instructions. Only the components being assembled at this particular time should be cleaned.

Keep all dust caps and plugs in place until time to make connections.

Clean optical fibers and connectors on **OLI** or LBOs.

If **26G-U/26G2-U OLI** using universal LBOs, go to **Step 2**.

If in-line **LBOs**, go to **Step 10**.

If **lightguide fibers**, go to **Step 16**.

2. Remove lightguide connector from buildout (if necessary).
3. Remove LBO from buildout block by unlocking tab and pushing in and turning in counter-clockwise direction (if necessary).

Reference: **DLP-503**

4. Clean the end and the sides of the connectors, buildouts, and blocks with a lint-free, optical quality tissue dampened with isopropyl alcohol.
5. Carefully wipe the connector, buildouts, and blocks again with a clean, dry, lint-free optical quality tissue.
6. Blow any lint or dust from the connectors, buildouts, and blocks using canned air held at least 3 inches (8 cm) away.
7. Clean the inside of the block using a pipe cleaner moistened with isopropyl alcohol.

8. Blow any lint or dust from inside the block, using canned air at least 3 inches (8 cm) away.

9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

10. Is LBO 0 dB or attenuated?

If **0 dB LBO**, go to **Step 11**.

If **attenuated LBO**, go to **Step 14**.

11. Clean LBO by placing a pipe cleaner, moistened with isopropyl alcohol, inside LBO and rotating the pipe cleaner.

12. Blow any lint or dust from inside the LBO, using canned air at least 3 inches (8 cm) from LBO.

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.  **CAUTION:**
Attenuated LBO has lens. Do not use pipe cleaner.

Clean LBO by canned air only. Blow any lint or dust from inside LBO, using canned air at least 3 inches (8 cm) from LBO.

15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16. Clean fiber-end face and sides of connector with lint-free, optical quality tissue moistened with isopropyl alcohol.

17. Carefully wipe fiber-end face and sides of connector again with clean, dry, lint-free optical quality tissue.

18. Blow any lint or dust from fiber-end face and sides of connector using canned air at least 3 inches (8 cm) from connector.

19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Make VT1.5 (DS1) or STS1 Cross-Connections Using CIT Stand Alone OC3/OC1 Ring Configuration

1.  **NOTE 1:**
This procedure may also be found in the DDM-2000 OC-3 User/Service Manual, Volume 2.
-  **NOTE 2:**
If you are not familiar with doing cross-connections using the CIT commands, it is strongly suggested that you read *Cross-Connection Provisioning* in the "Administration and Provisioning" section of this manual. Also, read the description of the following commands in the "Commands and Reports" section of this manual: **ent-crs-vt1**,
-  **NOTE 3:**
You will have to login to more than one node in each ring to get a complete map of the network using the **rtrv-map-network** and **rtrv-map-neighbor** command. If a drawing of the network is not provided with the work order, it is recommended that you draw a simple schematic of the network before making cross-connections.

Make a simple drawing of the network and list the TID of each node and how they are connected to each other. Figure 1 shows an example of a simple schematic.

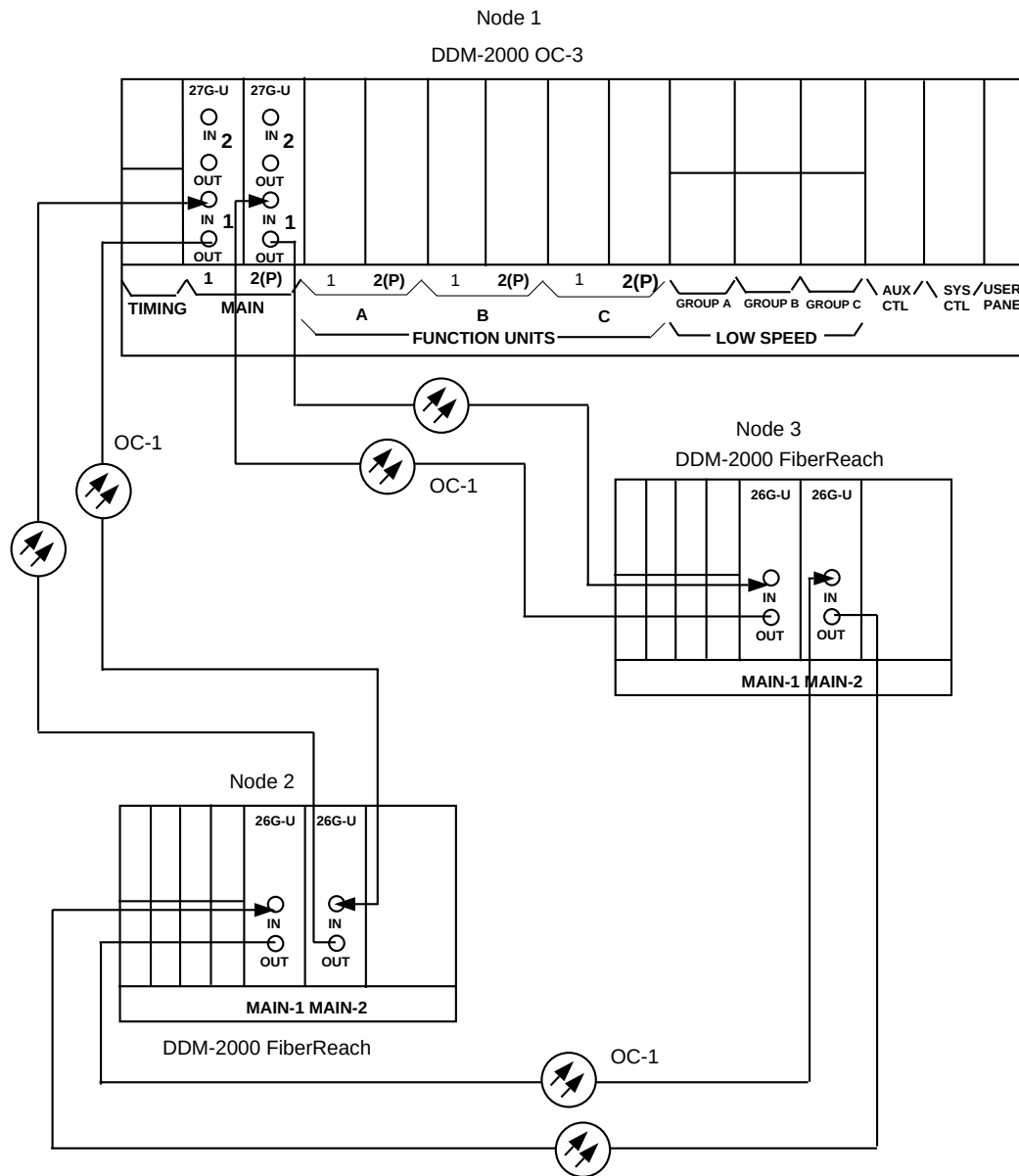


Figure 1. Sample Network Schematic

Log in to any node in the ring and use the **rtrv-map-network** and/or **rtrv-map-neighbor** command to retrieve a map of the network which lists all the systems and how they are connected to each other.

Sample output reports are shown in Figures 2 and 3:

```
Node1 95-03-27 13:09:53 DDM-2000 OC-3, R9.1.1
M  rtrv-map-network:  COMPLD
/* Network Map for Node1

=====
=====
System Name      Comm.  Product      NE      Alarm
(TID)            Status Type          Type      Group

=====
=====
Node1            DDM-2000 OC-3  DSNE      3
Node2            FiberReach     3
Node3            FiberReach     3

* /
```

Figure 2. Sample Report From rtrv-map-network Command

```
Node1 95-03-27 13:09:53 DDM-2000 OC-3, R9.1.1
M  rtrv-map-neighbor: COMPLD
   /* Neighbor Map for Node1

=====
=====
      System Name      Connected      Link
      (TID)            Through      Comm.
                                   Status      Product
                                   Status      Type
=====
=====
      Node1                                DDM-2000 OC-3
      Node2                main-1          FiberReach
      Node3                main-2          FiberReach

*/
```

Figure 3. Sample Report From rtrv-map-neighbor Command

2. Verify system configuration is same as specified on work order or circuit order.
3. From work order or circuit order, determine the terminating (drop) nodes for the service being established.

4.  **NOTE 1:**
Cross-connections consist of drop and pass-through connections. For example in Figure 4, drop connections are made at Nodes 1 and 2. Pass-through cross-connections are made at Node 3. In Figure 5, pass-through cross-connections are made at Node 1.

-  **NOTE 2:**
If all 28 VT1.5s (DS1s) in the STS-1 are being passed through at the OC-3 host node, then the cross-connection may be provisioned as either a pass-through STS-1 or VT1.5. However, if you anticipate dropping VT1.5s from the OC-3 node in the future, you should provision the OC-3 as VT1.5 cross-connections. Provisioning now as a VT1.5 cross-connect will avoid a hit on traffic if the STS-1 cross-connect has to be converted to 28 VT1.5 cross-connects to drop DS1s at a later time.

From work order, circuit order, and the sketch made in Step 1, determine the pass-through nodes for the service being established.

5. Use the **rtrv-eqpt:** command at each node to verify that each shelf is properly equipped for the service being established.

6.  **NOTE:**
The following commands may be used to delete, enter, and retrieve cross-connections: **dlt-crs-vt1**, **ent-crs-vt1**, and **rtrv-crs-vt1**. See the "Commands and Reports" section of this manual for a description of commands.

From work order or circuit order, determine the cross-connections to be made at each node associated with the DS1 service being established.

7. Starting at one of the terminating nodes for the DS1 circuit being established, use the **rtrv-crs-vt1:** command at each node in the ring to verify that the cross-connections specified on the work order or circuit order may be made. For example, if the DS1 #1 low speed port in the **DS1** circuit pack in slot #1 of LOW SPEED group A (a-1-1) is to be connected to timeslot m-2-1-1 and the **rtrv-crs-vt1** command shows that the cross-connection is already established, you should determine from office records if this port is already in-service before continuing with this procedure.

If cross-connections are already assigned or improperly assigned, refer trouble to the organization responsible for facility design. Improperly assigned cross-connections may have to be deleted using the **dlt-crs-vt1** commands.

8.  **NOTE:**
Channel state provisioning provides IS, AUTO, and NMON states for VT channels similar to the port states for DS1 ports. When a cross-connection is made to a point of termination the channel is in the AUTO state and alarming is disabled. The channel must receive a good signal from either ring to cause the channel to transition to in-service (IS).

At all nonterminating nodes in the network, use the **ent-crs-vt1:** command to provision pass-through connections. [For example, in Figure 4, node 3, to make the DS1 pass-through cross-connection for channel m-1-1-1, use the **ent-crs-vt1:m-1-1-1,m-1-1-1:cct=twoway** command.

9. At the terminating (drop) nodes of the circuit being established, use the **ent-crs-vt1:** command to make the terminating cross-connections. For example, in Figure 4, at Node 1, if DS1 port #1, circuit pack #1 in **FUNCTION GROUP A** is cross-connected to VT1.5 channel #1, VTG #1, STS #1, OC1 line 2, then the command **ent-crs-vt1:a-1-1,m-2-1-1:cct=twoway** would be used to make the cross-connection. At Node 2 in Figure 4, the command **ent-crs-vt1:m-1-1-1,a-1-1:cct=twoway** would be used to make the cross-connection.
10. Use the **rtrv-crs-vt1:** command to verify that the proper connection has been made. If an improper cross-connection is made, use the **dlt-crs-vt1:** command to delete the improper cross-connection and reenter the cross-connection.
11. After all cross-connections are made, use the **rtrv-alm:** command to verify no alarms are present.
12. If ne-acty inc. VT AIS, inc. STS1 AIS inc. VT unequipped, or inc. VT unequipped alarms are present, look for missing or improperly made cross-connections. Use **TAP-118** to locate missing cross-connections, if required.

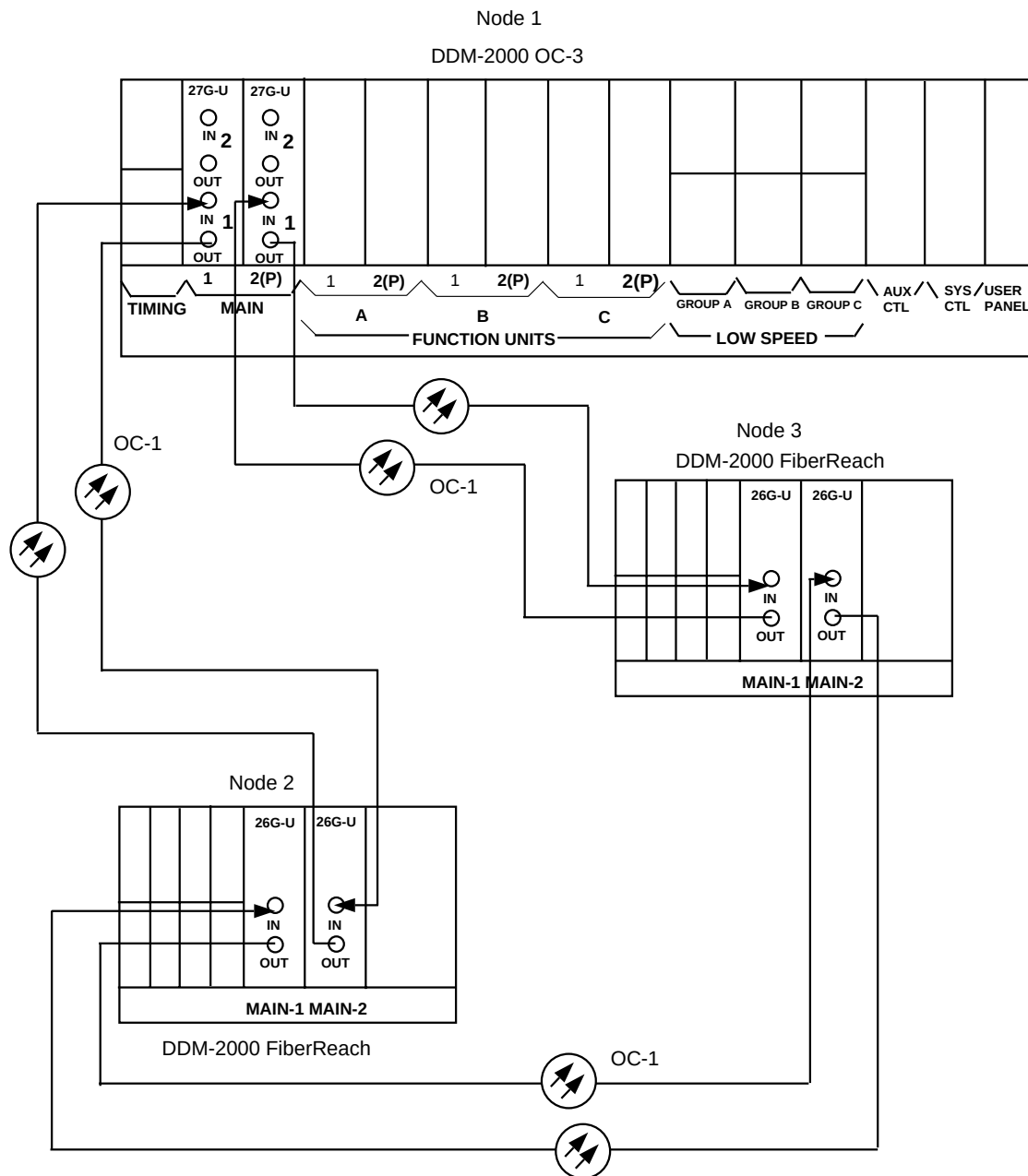


Figure 4. Example of Stand Alone OC-3/OC-1 Cross-connections

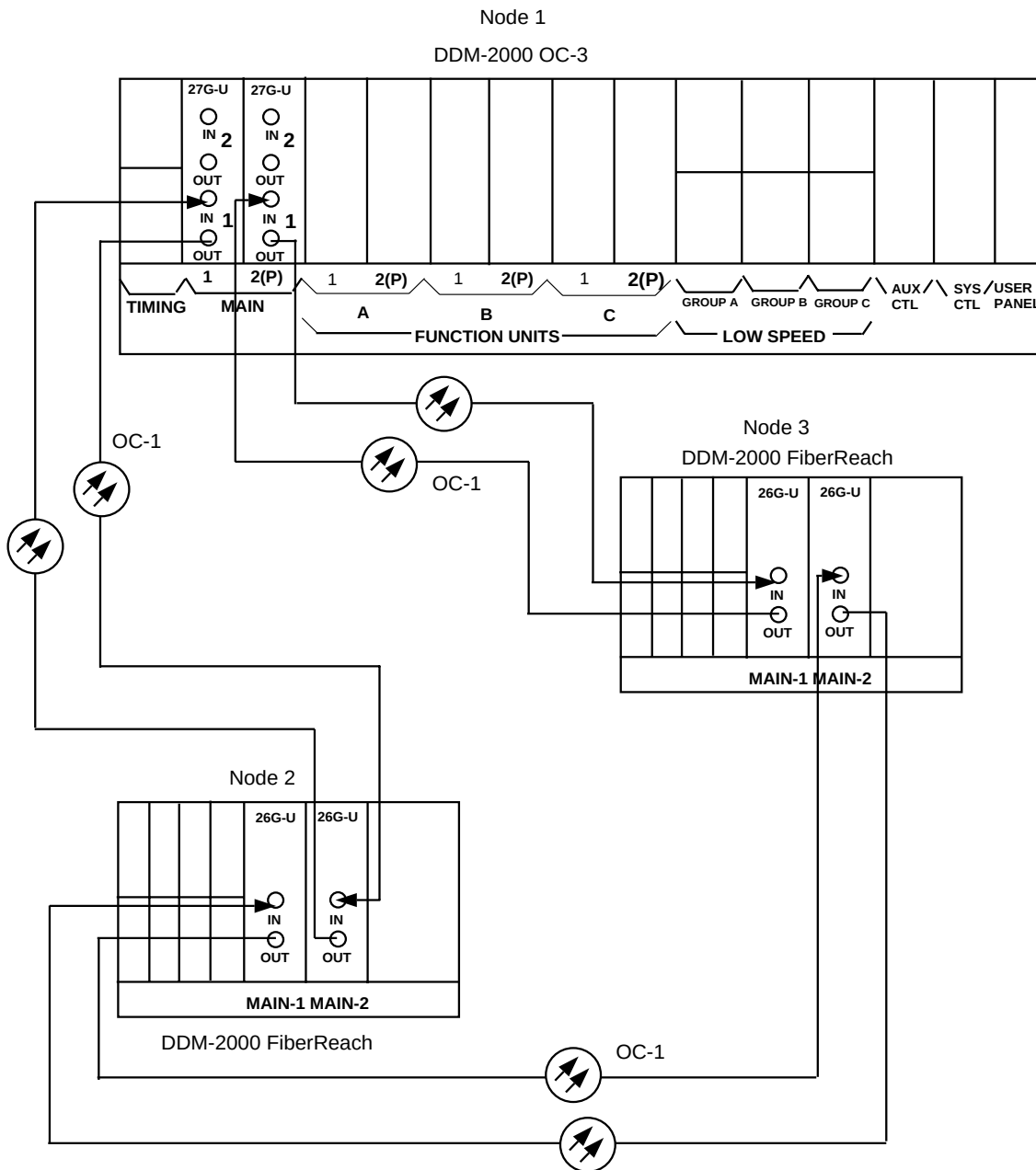


Figure 5. Example of Stand Alone OC-3/OC-1 Cross-connections

Check 197A BATTERY LOAD TEST SET

1. Obtain **197A BATTERY LOAD TEST SET**. See Figure 1.

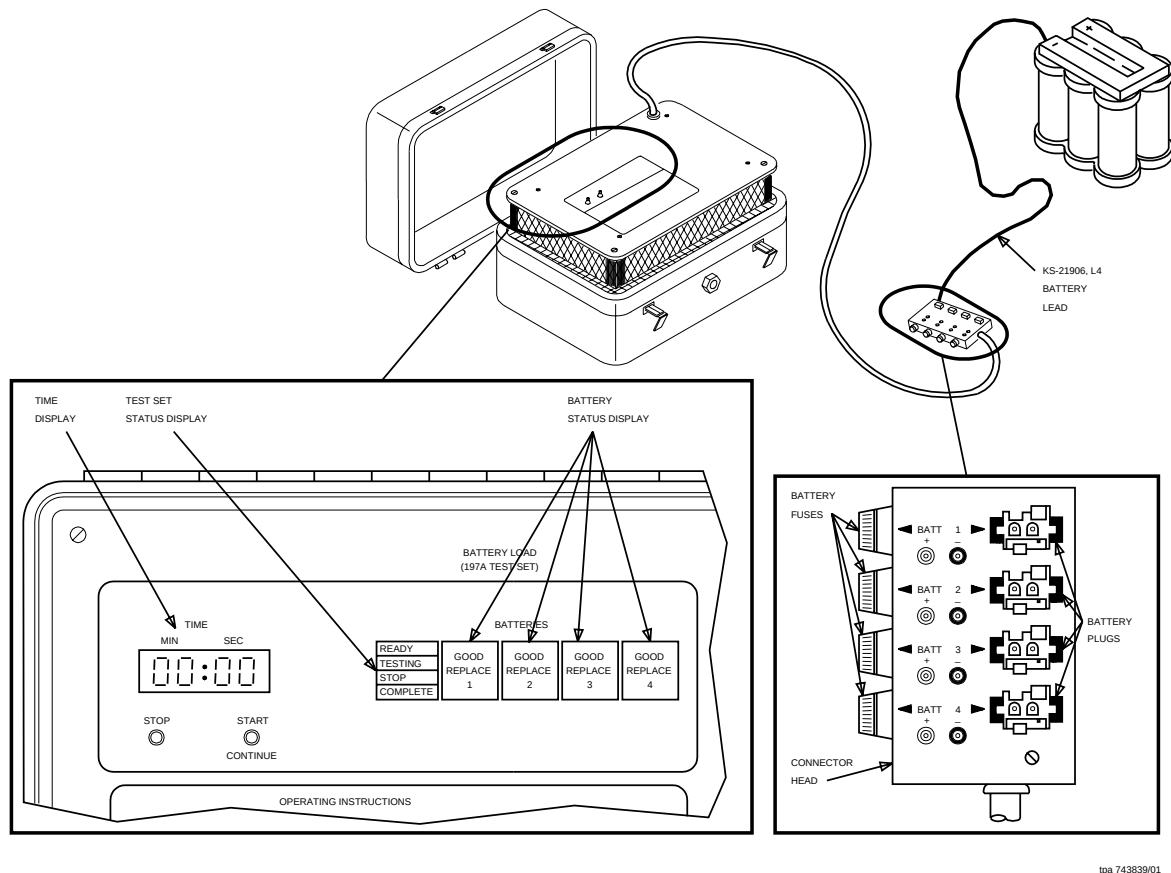


Figure 1. 197A Battery Load Test Set Arrangement

2. Remove cover from test set.
3. At test connector head, verify battery fuse holders each contain a 20 Amp fast-blow fuse.
4. Obtain one KS-21906, L4 battery.

5.  **NOTE:**
Under normal conditions, when the first battery is connected, the following occurs: (a) Test set **TIME** display indicates **00 MIN: 00 SEC**; (b) status display indicates which test set **BATT** plug that battery is connected to, status of the battery (**GOOD** or **REPLACE**), and the **READY** indicator lights; and (c) test set fan operates.

At test set connector head, connect battery lead to **BATT 1, 2, 3, or 4** plug being tested.

6.  **WARNING:**
Damage will occur if test set is operated without fan operating.

Does test set fan operate?

If **YES**, then proceed to **Step 15**.

If **NO**, then continue with **Step 7**.

7. Connect battery lead to remaining **BATT** plugs, one at a time, and note if fan operates.
8. Did test set fan operate for any **BATT** plug connection?

If **YES**, then proceed to **Step 11**.

If **NO**, then continue with **Step 9**.

9.  **NOTE:**
The test set is intended to test fully charged batteries. Before new batteries or replacement batteries are tested, a minimum of two days must have passed between the time the batteries were put on high rate charge and this test is made.

Disconnect lead. Using a different battery pack, connect battery lead to any **BATT** plug.

10. Does test set fan operate?

If **YES**, then proceed to **Step 15**.

If **NO**, then proceed to **Step 35**.

11. On test set connector head, remove battery lead and check for blown fuse(s).
12. Is fuse(s) blown?

If **YES**, then continue with **Step 13**.

If **NO**, then proceed to **Step 14**.

13. Replace fuse(s) and repeat from Step 5.

14.  **NOTE:**
Test set may be used for testing using one, two, three, or all four **BATT** plug positions.

There is a defective test set or connector head. Note defective **BATT** plug position(s). Continue with test procedures using remaining **BATT** plugs.

15. Does test set **TIME** display indicate **00 MIN:00 SEC** without blinking?

If **YES**, then continue with **Step 16**.

If **NO**, then proceed to **Step 35**.

16. Does status display indicate which battery was connected, status (**GOOD** or **REPLACE**) of the battery, and is **READY** indicator lighted?

If **YES**, then continue with **Step 17**.

If **NO**, then proceed to **Step 35**.

17. Does status display indicate **GOOD** or **REPLACE**?

If **YES**, then proceed to **Step 19**.

If **NO**, then continue with **Step 18**.

18.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

Battery pack is defective. Ensure that **TESTING** indicator is not lighted (**READY** indicator lighted), unplug and set aside defective battery pack, and repeat from Step 5.

19. Have **TIME** display and **STATUS** indicators been tested for each good **BATT** plug position?

If **YES**, then proceed to **Step 21**.

If **NO**, then continue with **Step 20**.

20.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

Ensure that **TESTING** indicator is not lighted. (**READY** indicator lighted).
Unplug battery pack and repeat from Step 5.

21.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

Depress test set **START/CONTINUE** button.

22. Does test set **TESTING** indicator light, **READY** indicator go off, and **TIME** display start counting time?

If **YES**, then proceed to **Step 24**.

If **NO**, then continue with **Step 23**.

23.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

There is a defective test set. Depress **STOP** button, unplug battery, and return test set for repair.

24. Depress test set **STOP** button.

25. Does test set **STOP** indicator light and **TIME** display stop counting time?

If **YES**, then proceed to **Step 27**.

If **NO**, then continue with **Step 26**.

26.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

There is a defective test set. Allow test to run for 15 minutes as shown on **TIME** display. When **COMPLETE** indicator lights, unplug battery, and return test set for repair.

27.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

Depress test set **START/CONTINUE** button.

28. Does test set **TESTING** indicator light, **STOP** indicator go off, and **TIME** display start counting time?

If **YES**, then continue with **Step 29**.

If **NO**, then proceed to **Step 34**.

29. Allow test set to run for 15 minutes as shown on **TIME** display.

30. During 15-minute test period, does test set show **REPLACE**?

If **YES**, then continue with **Step 31**.

If **NO**, then proceed to **Step 32**.

31. Note that battery being used is defective.

32. After 15 minutes, does **COMPLETE** indicator light?

If **YES**, then continue with **Step 33**.

If **NO**, then proceed to **Step 34**.

33. Unplug battery. Store connector head in test set cover. Reinstall cover.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

34.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

Defective test set. Depress **STOP** button, unplug battery, and return test set for repair.

35. There is a defective test set. Return for repair.

Operate FE SEL Pushbutton on SYSCTL

1.  **NOTE 1:**
The **FE SEL** pushbutton on the **SYSCTL** can be used to display the near-end and far-end alarm/status condition. The 7-segment **FE ID** display indicates which site/shelf conditions are currently being displayed on the local User Panel. When the 7-segment display is blank, a composite of the local and far-end alarm and status conditions is displayed on the User Panel.

-  **NOTE 2:**
When the **FE SEL** pushbutton is pushed for the first time, the **FE ID** display shows **L.** and the User Panel LEDs show the conditions of the local shelf only. Subsequent button pushes allow display of alarm and status conditions at the local site or one of the remote sites.

Each time the **FE SEL** button is pushed again within 15 seconds, the **FE ID** display increments to display the next higher **SITE** address in the same alarm group. The User Panel LEDs show the composite alarm and status condition of the shelves in the same alarm group at that site. If the local DDM-2000 FiberReach Multiplexer cannot communicate with another site due to a failure, then all LEDs on the user panel will be illuminated when the **FE ID** display shows that site number. After cycling through the sites, "**L.**" and the conditions of the local shelf are again displayed.

When the **FE SEL** is released and not pushed again for 15 seconds, or if the **ACO/TEST** pushbutton is pushed, the **FE ID** display will go blank and the User Panel will return to the composite display.

Momentarily press and release the **FE SEL** pushbutton until the required **SITE** address and conditions are displayed.

2. Note the alarm LEDs displayed on the local User Panel. You have **15 seconds** to observe the alarm indications.
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Retrieve Generic Software Version ID

1. Is a CIT available?

If **YES**, then continue with **Step 2**.

If **NO**, then proceed to **Step 4**.

2. Connect CIT to User Panel and establish session.

Reference: **DLP-521**

3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4.  **NOTE:**

When the **ACO** button is depressed, all LEDs and the 7-segment display on the **SYSCTL** light. If the **ACO** button is released within 2 seconds, the LED test completes and the 7-segment display and all LEDs will revert to normal operation. If the **ACO** button is depressed longer than 2 seconds, the 7-segment display goes blank for 2 seconds and then each digit of the generic software version code is scrolled through the display. The LEDs remain lighted while the code is being displayed. When the **ACO** button is released, the LEDs remain lighted until the full software version code is displayed. If the **ACO** button is still depressed when the software version code has completed cycling, the display goes blank for 2 seconds and starts cycling through the software version code again. This continues as long as the **ACO** button is depressed. When the **ACO** button is released, the cycle will complete and the display and all LEDs go to normal operation.

Depress and hold (for longer than 2 seconds) the **ACO** button on the User Panel.

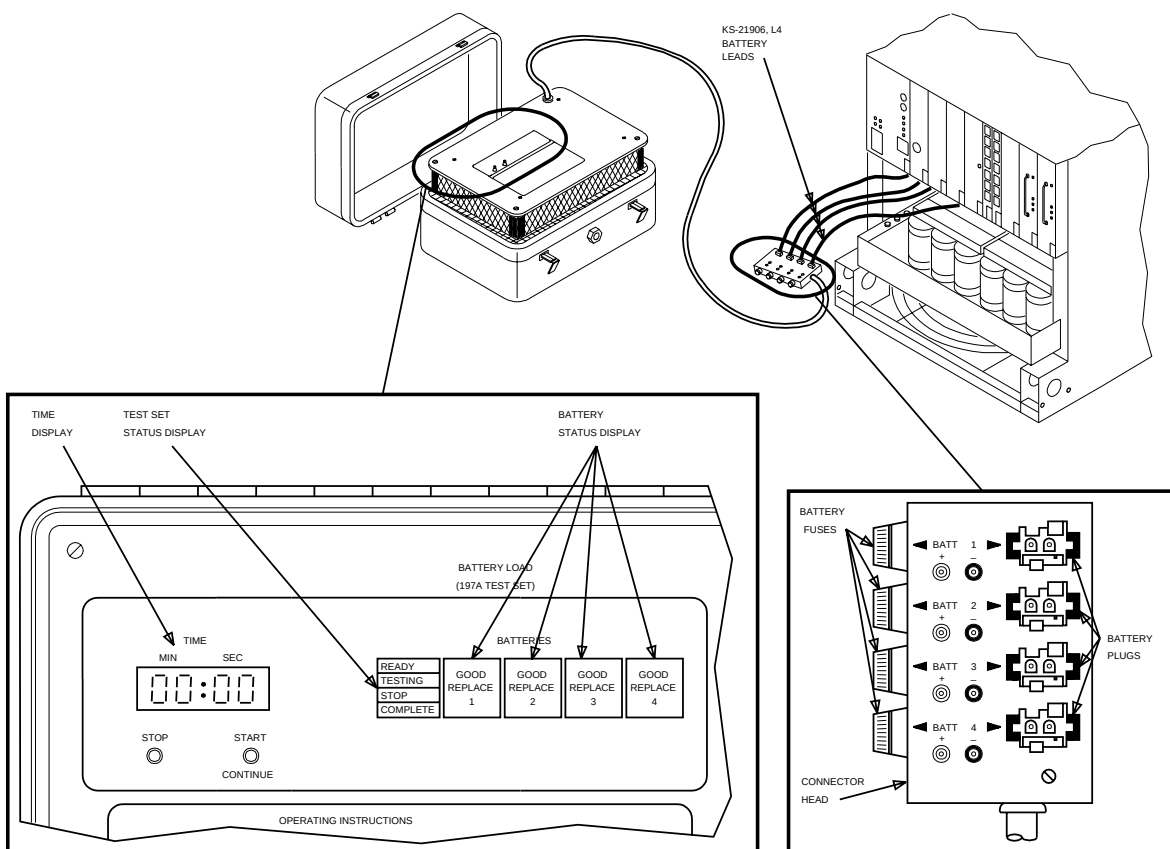
Response: All LEDs and the 7-segment display light. The display goes blank for 2 seconds and then scrolls through the full software version code.

5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Perform Test of RT Batteries Using 197A BATTERY LOAD TEST SET

-  **CAUTION:**
Service interruption will occur if batteries are disconnected and AC power is not available.

Obtain **197A BATTERY LOAD TEST SET (197A)** and place near batteries to be tested (Figure 1).



lpa 769169/01

Figure 1. 197A Battery Load Test Set Test Connections

2.  **NOTE:**
The **197A** test set is intended to test batteries that are fully charged. A minimum of two days must be allowed between the time the batteries (new or replacement) are put on high rate charge and this test is made. After testing is completed, the batteries must be put on high rate charge using the **337A BATTERY CHARGER**.

Remove cover from **197A** test set.

3. Check **197A** test set for proper operation (if not already performed).

Reference: **DLP-529**

4. Ensure that system(s) associated with batteries to be tested has AC power available (**PMN** or **P/M** indicator on **BCU** circuit pack not lighted).
5. On **337A BATTERY CHARGER** associated with batteries to be tested, is **HIGH RATE CHG/ON** indicator lighted?

If **YES**, then continue with **Step 6**.

If **NO**, then proceed to **Step 7**.

6. Batteries are on high charge and may require up to 24 hours to charge. Do not perform this procedure until **HIGH RATE CHG/ON** indicator on **BATTERY CHARGER** goes off.

7.  **CAUTION:**
Service interruption will occur if batteries are disconnected and AC power is not available.

Disconnect battery leads of batteries to be tested from battery shelf.

8.  **NOTE:**
Under normal conditions, when the first battery is connected, the following occurs: (a) The test set **TIME** display indicates **00 MIN:00 SEC**; (b) the status display indicates which test set **BATT** plug the battery is connected to, status of the battery (**GOOD** or **REPLACE**), and the **READY** indicator lights; and (c) test set fan operates.

At test set connector head (Figure 1), connect battery leads (up to four) to **BATT 1, 2, 3, and 4** plugs.

9.  **NOTE:**
If status display does not indicate battery number of battery status, **BATT** fuse may be blown, connector head or test set may be defective, or battery pack is defective.

Does test set display indicate **REPLACE** for all batteries being tested?

If **YES**, then continue with **Step 10**.

If **NO**, then proceed to **Step 12**.

10. Replace all batteries and connect good batteries to battery shelf.
11. Place batteries on high charge by depressing **HIGH RATE CHG/ACTIVATE** pushbutton on **BATTERY CHARGER** and repeat from Step 6.
12.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

-  **NOTE:**
This test must run for a full 15 minutes to be valid or until all batteries indicate **REPLACE**. The **STOP** button should only be used if a problem occurs during the test, if the test is to be terminated early because of loss of AC power, or all batteries indicate **REPLACE**. The **START/CONTINUE** button is used to continue the test if no problem is found.

Depress **197A** test set **START/CONTINUE** button.

Response: At **197A** test set, **TESTING** indicator is lighted, **READY** indicator is off, and **TIME** display is counting time.

13.  **NOTE:**
If one, two, or three, but not all, batteries show **REPLACE** during the test period, the remaining batteries still must be tested for the full 15 minutes.

Does test set show **REPLACE** for all batteries within the 15-minute test period shown on **TIME** display?

If **YES**, then continue with **Step 14**.

If **NO**, then proceed to **Step 15**.

14.  **DANGER:**
*A high discharge current is present at connector head if **TESTING** indicator is lighted. Batteries must not be connected or disconnected when **TESTING** indicator is lighted.*

Depress test set **STOP** button. Proceed to **Step 17**.

Response: **STOP** indicator on test set lights

15. After 15 minutes, the test set **COMPLETE** indicator lights.
16. Is any **REPLACE** indicator on test set lighted?
- If **YES**, then continue with **Step 17**.
If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
17. Unplug and set aside all defective batteries.
18. Install and connect replacement batteries to battery shelf. Reconnect any remaining good batteries to battery shelf.
19. Place batteries on high charge by depressing **HIGH RATE CHG ACTIVATE** pushbutton on **BATTERY CHARGER** and repeat from Step 6.

Introduction to the PC

General

This DLP provides a brief introduction to the PC. It includes proper handling and storage of diskettes and some of the important procedures you should follow when working with your PC. This DLP is a brief review of PC concepts. Refer to your PC user's guide for a complete description.

Anatomy of a PC

PCs vary in physical appearance and size, most *IBM*^{*} compatible PCs consist of three basic parts — a main unit, a monitor, and a keyboard. Note that some PCs, particularly portables, integrate the keyboard, monitor, and main unit into a briefcase-size package. The DDM-2000 FiberReach generic program may be installed with either a desktop PC or a portable PC. The diskettes may be either 3½ inch floppy disks or 5¼-inch floppy disks.

Main Unit

The main unit of the PC contains the CPU (central processing unit), disk drive(s), and memory, among other things. All main units have some common features which include:

- ON/OFF Switch — This switch is used to switch the PC **ON** or **OFF**. It is usually located on the back of the PC, near where the AC power cord plugs into the PC.
- Serial Port — This is the port which the PC uses to communicate with the customer equipment. When using the PC to install a new generic program to a DDM-2000 FiberReach shelf, the COM1 port must be used. Refer to your PC documentation to determine which port is the COM1 port. There are two types of serial port connectors:
 - 25-pin RS-232 connector (male)
 - 9-pin connector (male).

* Registered trademark of International Business Machines Corporation.

If your PC has the 9-pin connector, you will need a serial port adapter which converts the 9-pin connector to a 25-pin connector. This is a cable which has a 9-pin connector on one end and a 25-pin male connector on the other end.

- **Parallel Port** — This port is used to connect to some printers.
- **Disk Drives** — PCs come in several basic types, some of which are as follows:
 - **Single floppy disk, no hard disk** — This type PC is the most basic configuration. The PC has a single floppy disk drive, with no hard (fixed) disk. The floppy drive is referred to as drive **A**.
 - **Dual floppy disk, no hard disk** — This type PC is identified by the two floppy disk drives installed. One floppy drive is referred to as drive **A**. The second is referred to as drive **B**.
 - **Single floppy disk with hard disk** — This type PC has a single floppy disk drive and a hard disk, which can typically store 10 or more megabytes of data. The single floppy disk drive is referred to as drive **A**, and the hard disk is usually referred to as drive **C**.

Other combinations of floppy and hard drives are possible but all that is required is a single floppy drive as a minimum. The procedures in this manual for installing a new generic program indicate using drive **A**.

Monitor

The monitor, sometimes called a display screen, may be either monochrome or color.

Keyboard

The keyboard is used to enter commands. This section reviews some of the features of the keyboard and points out some of the special keys.

The keyboard is divided into two different sections:

- *Typewriter section* — This area has the alphanumeric keys that resemble the layout of a typewriter. In particular, you should locate the **ENTER** key (sometimes referred to as **RETURN**). This key is located on the right side of the typewriter section. It usually has the word **ENTER** or **RETURN** printed on the key. When you are asked to select **<ENTER>** or **RETURN**, you should momentarily depress that key, or equivalent.
- *Special Keys* — The keyboard has many special keys which are interpreted differently by various software packages. Locate the **CANCEL** or **DELETE** key. These keys may be used to abort a command.

Rebooting the PC

Occasionally, you may have to reboot the PC. There are three ways to accomplish this:

- Power **ON/OFF** switch — If the PC is **OFF**, you should set the **ON/OFF** switch to the **ON** position. If the PC is already **ON**, it is preferable to reset it using one of the following two methods:
- **RESET** button — Not all PCs have a **RESET** button. But if yours does, it provides an easy way to reset the PC. Alternatively, the following method may work.
- Hold down the **CTRL**, **ALT**, and **DELETE** keys all at the same time.

If **RESET** or **CTRL**, **ALT**, and **DEL** keys are not effective, turn **OFF** the PC; wait a few seconds; and turn it back **ON**. Rebooting the PC clears all data you had in memory. If the time of day clock is not indicating the current time and date, set the time of day clock.

Diskettes — Care and Handling

Diskettes are sometimes called floppy disks, or floppies for short. Diskettes are similar to cassette tapes — magnetically encoded information is stored on the diskette for later retrieval. By adhering to the following guidelines, you will increase the useful life of your diskettes:

DO:

- Keep the diskette in a protective envelope when not in use.
- Keep the diskette in a dry place.
- Keep the diskettes away from magnetic fields or objects (for example, magnetic screwdriver).

DO NOT:

- Touch any of the exposed surfaces of the diskette itself or handle it by the edge of the jacket. Very tiny scratches, fingerprints, or dust can ruin a diskette.
- Bend a diskette.
- Write on a diskette label with a ballpoint pen or pencil. Use a felt-tipped pen instead. Write the label before applying it to the diskette if possible.
- Erase the diskette label with a pencil eraser. The dust may destroy the diskette. Instead, place a new label over the old one.

Inserting Diskettes

You should ***never*** remove or insert a diskette while the disk drive indicator light is on. (The computer turns the indicator light on to let you know that it is reading or writing from the disk.) Always wait for the indicator light to go off before opening the disk drive door. Failure to do this may result in damaging the diskette or loss of data on the diskette. Insert a diskette into a disk drive as follows:

1. Open the diskette drive door.
2. Gently insert the diskette with the label facing up and the notch on the left, if provided.
3. Slide the diskette in as far as it will go, but do not force it. You may hear a click when the diskette is all the way in.



CAUTION:

Do not attempt to force the diskette into the drive.

If resistance is felt or it does not slide in easily, remove the diskette and insert it again.

4. Close (latch) the disk drive door.

When you are instructed to insert a diskette into a drive, it is implied that you should open the door, slide the diskette in all the way, and close (latch) the door.

Removing Diskettes

Wait for the indicator light on the disk drive to go off. Open the disk drive door. The diskette may pop out for easy removal. (Opening up a disk drive door is similar to ejecting a cassette from a cassette recorder.) After the diskette has been removed, place it into its protective envelope or storage facility.

Copy Diskettes and Make Backups

General

If you are using new generic program diskettes for the first time, there are two things that you should do:

1. Create a working copy.
2. Make backup copies.

Before installing the program, it is a good idea to make backup copies of the working copy. If the working copy is ever lost or damaged, you will have a backup copy and will not have to create a new working copy from the original.

Create a Working Copy

The diskette(s) sent to you contains the new generic program software. However, before you can install this new program, you have to load the *MS-DOS*^{*} operating system software. (If you are not sure how to do this, instructions are given in the "Starting *MS-DOS* Software" section.) The new generic program software requires *MS-DOS* software (Release 2.1 or later).

To load the version of *MS-DOS* software, you can copy the *MS-DOS* onto the first diskette, and then copy the new generic program software to that diskette also. Once you have done that, simply insert that diskette into the drive and reboot the PC. The new diskette(s) that you create will be your working copy of the new generic program. The original diskette(s) that you received should be stored in a clean, dry place.

You will need the following to create a working copy:

- The *MS-DOS* software disk with Release 2.1 or later
- A blank diskette(s) (This will become the working copy)
- The original diskette(s) containing the new generic program.

* Registered trademark of Microsoft Corporation.

There are three steps required in creating a working copy:

1. Start *MS-DOS* software.
2. Format a new diskette(s).
3. Copy the original diskette(s) that you received with your package to the working diskette(s).

Starting *MS-DOS* Software

Insert your copy of the *MS-DOS* diskette into drive **A**, close the door, and reboot or turn on the PC. The disk drive indicator light will come on, and the PC may print out diagnostic results on the monitor. In addition, the memory size may be printed out as the memory tests are run. Typical memory sizes are 256K, 512K, and 640K. When *MS-DOS* software is ready, a prompt (for example, **A>**) appears on the display screen. This is how *MS-DOS* software lets you know it is ready for you to type a command. You are now ready to format the blank disk(s).

Formatting a New Diskette

You will need a blank diskette(s). It is a good practice to label diskettes so that you can keep track of them. You should prepare a label for the diskette(s) marked as Lucent Technologies DDM-2000 FiberReach Release a.b.c - working copy. The a.b.c is the release version that you are copying.



WARNING:

Do not write on diskette label using a ballpoint pen or pencil.

When the prompt **A>** appears, type the following command, and then press **<ENTER>**. (If you make a mistake while entering this command, you can press the **BACKSPACE** key, or equivalent, which will erase one character at a time.)

format a:/s <ENTER>

You will see a message similar to the following: (the exact wording of the message may vary depending on which PC you are using:)

```
Insert new diskette for drive A:
and strike any key when ready
```

Now open the drive door and remove the *MS-DOS* diskette. Place the *MS-DOS* diskette in its envelope, and set it aside for the time being.

Next, insert the blank diskette into the drive and close the door. Depress any key on the keyboard to begin formatting. After you depress a key, a message similar to the following will appear:

```
Formatting...
```

You will see the disk drive indicator light come on. The formatting process takes several minutes. When the formatting is complete, a message appears to tell you that the format is complete. In addition, you will see several lines of messages about total disk space available. Finally, you will be prompted to format another disk with the following message:

```
Format another (Y/N)?
```

If you do not need to format another disk, type **n** and **<ENTER>**. The system will respond with a prompt **A>** display.

Remove the diskette from the disk drive and place it in a protective envelope or storage location. If you have not already done so, label the diskette(s) as Lucent Technologies DDM-2000 FiberReach Release a.b.c - working copy. You are now ready to copy the files from the original diskette(s) to the working copy diskette(s).

Copying Files — General

The process of copying files from one diskette to another varies slightly depending on whether you have one or two floppy disk drives.

If you have a dual floppy PC, *MS-DOS* software refers to one disk drive as drive **A** and the other disk drive as drive **B**. If you have a single floppy PC (one floppy drive, with or without a hard disk), *MS-DOS* software treats the floppy disk drive as both drive **A** and drive **B**. The hard disk is usually referred to as drive **C**.

To do the new generic program installation using floppy diskettes, all the following files must be on a single diskette:

CHECKPGM.EXE CRTM.EXE CTRM.INI CTRM.SCR GENERIC.0
PCLOAD.EXE README TERM.BAT STAGE_1.0 STAGE_10.0

The remaining files similar to the following can be on the same diskette or on another diskette:

GENERIC.1 GENERIC.2 GENERIC.3 GENERIC.4 GENERIC.5 ...
GENERIC0.0 GENERIC0.1 GENERIC0.2 ...

To do the new generic program installation using the PC hard disk, all the files listed in the README file must be on the hard disk in the directory from which you will do the installation.

To read the contents of the README file, use the **more < README** command. To list the files on the hard disk or floppy diskette, use the **dir/p** command.

Copying Files — Hard Disk System

Set up your hard disk so that when you turn on your computer, it starts up using the hard disk instead of the *MS-DOS* system diskette. When prompt **C:>** appears, type the following commands:

```
mkdir ngp <ENTER>  
cd ngp <ENTER>
```

Insert the original generic program diskette in drive **A**, and close the door. Type the following command:

```
copy a:*. * <ENTER>
```

This command tells *MS-DOS* software to copy all of the files from the **A** drive to the **C** drive (hard disk). Open the drive door, and remove the original diskette from the drive. Repeat this procedure for all diskettes.

Copying Files — Single Floppy System

If you have a single floppy system (with or without a hard disk), insert the original new generic program diskette into drive **A**, and close the door. Type the following command after the prompt:

```
copy a:*. * b: <ENTER>
```

This command tells *MS-DOS* software to copy all of the files from drive **A** to drive **B**. Since there is no drive **B** physically installed, *MS-DOS* software will pretend that there is one. It does this by copying a file from drive **A** (as much as it can fit) into the PC's memory. It then displays the following message:

```
Insert diskette for drive B:  
Strike any key when ready...
```

Open the drive door, and remove the original diskette from the drive. Insert the working copy diskette into the drive, and close the door. Depress any key. The *MS-DOS* software now copies the file from the PC memory to the working copy diskette which you inserted into drive **A**. When the copy is complete, it will display the following message:

```
Insert diskette for drive A:  
Strike any key when ready...
```

Open the drive door, and remove the working copy diskette from the drive. Insert the original diskette into the drive, and close the door. Depress any key. The *MS-DOS* software now begins where it left off. This process repeats until the entire diskette has been copied. In summary:

- When you are prompted to insert diskette for drive **A**, insert the original diskette into the floppy drive.
- When you are prompted to insert diskette for drive **B**, insert the working copy diskette into the floppy drive.
- Repeat until the prompt **A>** appears on the display screen.

When the process is complete, the prompt **A>** will be displayed on the screen. Repeat this procedure for all original diskettes. Before using the diskette(s) to install the new program, it is a good idea to make backup copies of the working copy. If the working copy is ever lost or damaged, you will have a backup copy and will not have to create a new working copy from the original(s).

Making Backups — Single Floppy System

Insert the *MS-DOS* diskette into drive **A**. Type:

diskcopy a: b: <ENTER>

A message similar to the following appears:

Insert SOURCE diskette in drive A:
Strike any key when ready

Wait for the disk drive indicator light to go off. Remove the *MS-DOS* disk from drive **A** and insert the working copy diskette (the source) into the drive. Press any key. The disk drive indicator light will come on to indicate that the copying is in progress. The *MS-DOS* software copies as much of the diskette as it can into the PC's memory and then displays the following message:

Insert TARGET diskette in drive A:
Strike any key when ready

Remove the working copy (source) diskette, insert the new (target) diskette, and press any key. It is not necessary to preformat the new diskette; the *diskcopy* command will do this for you. Depending on the amount of memory in your computer, you may be prompted to repeat this several times. When the copy is complete, the following message will appear:

Copying complete
Copy another (Y/N)?

If you wish to make additional backups, type **y** and follow the same instructions. If you are done, type an **n** and **<ENTER>**. When the prompt **A>** appears, wait for the disk drive indicator light to go OFF and remove floppy. Label the backup floppy with an appropriate label (for example, Lucent Technologies DDM-2000 FiberReach Release a.b.c - working copy backup).

Copying Files — Dual Floppy System

Insert the first original new generic program diskette into drive **A** and close the door. Insert the formatted copy diskette into drive **B** and close the door. Type the following command:

```
copy a:*. * b: <ENTER>
```

The files from the original diskette will be copied to the working diskette one at a time. When the process is complete, the prompt **A>** will be displayed on the screen. Repeat the procedure for all remaining original diskettes. Label all diskettes.

Making Backups — Dual Floppy System

Insert the *MS-DOS* diskette into drive **A**. Type in the following command:

```
diskcopy a: b: <ENTER>
```

A message similar to the following is displayed:

```
Insert SOURCE diskette in drive A:
Insert TARGET diskette in drive B:
Strike any key when ready
```

Wait for the disk drive indicator light to go off. Remove the *MS-DOS* disk from drive **A** and insert the working copy diskette (the source). Insert a new diskette into drive **B** (the target). It is not necessary to preformat the new diskette; the disk copy command will do this for you. Press any key when ready.

The disk drive indicators on both the **A** and **B** drives will light, indicating that the copying is in progress. Do not open a drive door while the disk drive indicator light is on. When copying is complete, a message similar to the following appears:

```
Copying complete
Copy another (Y/N)?
```

If you wish to make additional backups, type **y** and follow the same instructions. If you are done, type **n** and **<ENTER>**. When the prompt **A>** appears, wait for the disk drive indicator light to go OFF and remove both floppies. Label the backup floppy with an appropriate label (for example, Lucent Technologies DDM-2000 FiberReach Release a.b.c - working copy backup).

UNUSED

Install New Software Generic Program In-Service System Local Shelf Download

1.  **NOTE 1:**
This procedure is used to install a new software program in a local in-service DDM-2000 FiberReach shelf. For procedures to download software in a new shelf (initial installation), see **DLP-525**. For procedures to download software to a remote shelf (using **ins-prog** or **cpy-prog** command), see **DLP-537**.

Verify that no DCC failures or transmission failures (OC-1 LOS, flashing **OLIUFault** LEDs, etc.) are present on the network element or system receiving the program.

2.  **CAUTION:**
*Transmission configuration information for in-service systems is stored on the **26-Type OLIU** circuit pack in **MAIN** slot 1. In some instances (for example, during some upgrades, system tests, or training classes), if the system is in service and a version of software is being installed that is not compatible with the current transmission configuration, it may be necessary to remove the **OLIUFault** circuit pack in **MAIN** slot 1 to force the system to run the software you are trying to download. If both **OLIUFault** circuit packs are not installed, removal of the only **OLIUFault** circuit pack will cause service interruption. Also, if locked cross-connections are present on ring **m1**, service interruption will occur on those cross-connections.*

⇒ NOTE:

The following step is recommended to protect against a loss of service because of inadvertently loading incompatible software. But, if you are **sure** that you want to load incompatible software, you may elect to remove the **OLI** in **MAIN** slot **1** and allow the software to download without having to force the system to run the software.

Before performing this procedure, it is strongly suggested that both **OLI** circuit packs be installed in the shelf and the **switch-path-vt1:m1-1-all,pri=manual** command be used to switch traffic to the **MAIN-2 OLI** circuit pack if not already **ACTIVE**. Use **rtrv-state-path:** and **rtrv-state-egpt:** commands **at both ends** of the line to verify that the **MAIN-2 OLI** circuit pack is **ACTIVE**. Use the **switch-sync:s=main-1,pri=manual** command to switch timing source to the **MAIN-2 OLI** circuit pack if not already **ACTIVE**. Use the **rtrv-sync:** command to verify that the **MAIN-2 OLI** circuit pack is **ACTIVE**.

3. Obtain the following equipment:

- (1) IBM* compatible personal computer (PC) running an *MS-DOS*[†] computer program operating system, Release 2.1 or later.
- (2) RS-232 cable to connect PC **COM** port to User panel **CIT** port.

⇒ NOTE:

The PC may be connected to the front CIT port or remotely through a dial-up modem.

- (3) Working copies of the new system generic program diskette(s).
- (4) Software Release Description for software being installed.

* Registered Trademark of International Business Machines Corporation

† Registered Trademark of Microsoft Corporation

4. Before beginning this procedure, the following is strongly suggested:
 - a. Become familiar with the characteristics and operating procedures of your PC and the *MS-DOS* operating system.

Reference: **DLP-533**

- b. Follow proper procedures in handling the diskette(s) (floppies).

Reference: **DLP-533**

- c. Make working copies and backup copies of the original new generic program diskettes.

Reference: **DLP-534**

- d. **Read the Software Release Description for software being installed.**
5. Before beginning the software installation, refer to the Software Release Description for the software being installed for a description of any special considerations required when installing this version of the software.

6. **NOTE:**

Prior to Release 2.1, only one **ins-prog:** per CTRM session is permitted. After using the **ins-prog:tid** command to download software to one shelf, you must exit CTRM (Alt F2) and re-execute CTRM before starting a second **ins-prog:** command. If CTRM is not exited, it will stop running if a second **ins-prog:** is started within the same CTRM session. The PC will not respond or return any message and the **ins-prog:** will not progress.

Start *MS-DOS* operating system on the PC [**DLP-534**], if not already started.

Response: PC displays the prompt (for example, C>, C:/DOS>) determined by the PC.

7. If you are going to use the PC hard disk to load software to the shelf, **copy** all files on the source diskettes(s) (floppies) to a directory on the hard disk (for example, GEN_211 for generic version 2.1.1).
8. If you are going to load the software from the hard disk, use the **cd** command to change to the appropriate hard drive directory containing the software.

If you are going to load the software from the floppies, use the appropriate *MS-DOS* command (for example, **a:** or **b:**) to go to the drive where the floppy disk will be installed.

Response: PC displays the appropriate prompt (A>, B>, C>, C: /DOS>, etc.) determined by the PC.

Comment: If you are using floppies and get a disk error message, verify the drive latch is locked and that you have the proper diskette installed in the drive.

9.  **NOTE:**
The new generic program may be on many floppy disks. If you are using the floppy disks, the PC will prompt you to insert disks as needed after the first disk is installed.

If you are using the floppy disks, insert the first (number 1) floppy disk into the PC drive.

10. NOTE:

The **checkpgm** command may take up to 25 minutes to complete.

Execute the command **checkpgm** to check the version number of the program you are installing. If using floppy disks, insert each diskette when prompted.

approx. 15 min. if using hard drive approx. 25 min. if using floppy drive

Response: PC has DDM-2000 program version a.b.c

11. NOTE:

The cable from the **CIT** port on the DDM-2000 FiberReach shelf must be connected to the **COM (COM1 or COM2)** RS-232 port of the PC.

Connect PC to **CIT** port by connecting one end of an RS-232 cable to the **COM()** port of the PC and the other end of the cable to the front **CIT** port.

12. NOTE:

The **FE ID** display on the **SYSCTL** will show one of the following preceding software installation:

- a. The letter **P** displayed in the **FE ID** display indicates that no software is installed in the **SYSCTL**. If the **P** is followed by a period (**P.**), it means that a previous download attempt has failed and a new software download will have to be attempted either locally or remotely using the **ins-prog:tid** or **cpy-prog:tid** command. If there is no period (**P**) the software can only be downloaded locally using this procedure.
- b. Nothing displayed in the **FE ID** display indicates that either FiberReach compatible software is installed in the **SYSCTL** or the **SYSCTL** contains software that is not compatible with the FiberReach shelf. If the **SYSCTL** was replaced and the **CR** LED did not flash when the **SYSCTL** was installed and the **FE ID** display is blank, the **SYSCTL** contains software not compatible with the FiberReach shelf. New software must be loaded using these procedures.
- c. The letter **C** displayed in the **FE ID** display indicates that software is installed in the **SYSCTL**, but it will not support the current shelf transmission configuration.
- d. The letter **U** displayed in the **FE ID** display indicates unsupported **SYSCTL** switch settings for the type of shelf being equipped. Remove **SYSCTL**. Check option switch settings and reinstall **SYSCTL** [DLP-501].
- e. The letter **E** displayed in the **FE ID** display indicates that the **SYSCTL** must be replaced. Replace the **SYSCTL** [DLP-501].
- f. The letter **F** displayed in the **FE ID** display indicates that the **SYSCTL** faceplate latch is not fully latched. Latch the faceplate. (A reset occurs after the faceplate is latched.)
- g. A flashing letter **L** displayed in the **FE ID** display indicates a low voltage condition (brownout) on the shelf. Clear trouble using **TAP-119**.

Does the **FE ID** display on the **SYSCTL** display a "**P**" or "**P.**"?

If **YES**, then continue with **Step 13**.

If **NO**, then proceed to **Step 18**.

Letter "P" in FE ID Display

13.  NOTE 1:
If floppies are being used, ensure the first (number 1) diskette is installed in floppy drive. If hard drive is being used, ensure you are in the correct directory.
-  NOTE 2:
If a "P." was displayed in the **FE ID** display, unseat and then reseal the **SYSCTL** and immediately push and hold the **FE SEL** and **UPD/INIT** buttons at the same time until a "P" appears in the **FE ID** display.

Enter **term** or **term COM_n** command, where $n = 1$ or 2 . If **term** is entered without the **COM_n** option, then **COM1** will be selected by default. If after starting the terminal emulator you see the message "Can't find script <init>", disregard it.

approx. 15-45 min.

Response: Two brief messages are printed and you are instructed to Press any key to continue . . . after the second message. After you press any key, the terminal emulator is loaded and the terminal responds as follows within 2 minutes:

```
CTRM [Interface (R2.1 or later)] ready. (Type  
Alt-h for help.)
```

```
Communications established.
```

```
p
```

```
Searching for optimal transfer rate.  
Handshake established at <baudrate> baud.
```

```
In progress . . . .
```

The dots continue to print until program installation is complete. If using floppies, insert each diskette when prompted. After installation is completed, the PC prints the following completion message:

```
ins-prog:TID COMPLD  
/* Generic program a.b.c is installed  
*/
```

The **SYSCTL** resets and the terminal is logged off the system.

14. Was response correct?
If **YES**, then continue with **Step 15**.
If **NO**, then proceed to **Step 16**.
15. Did the letter "**C**" appear in the **FE ID** display?
If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **YES**, then proceed to **Step 32**.
16. If the download does not start, as indicated by the `In progress` message and rows of dots, within 2 minutes after pressing any key, try the following:
 - a. Ensure first (number 1) disk of program being installed is inserted, if using floppies.
 - b. Ensure diskette is inserted in correct drive.
 - c. Ensure the proper command was used to go to the drive with the diskette or to the proper directory containing the software.
 - d. Check for invalid COM port. Exit TERM (Alt-F2), then restart TERM using **term COM1** or **term COM2**.
 - e. If the download still does not start, change the CTRM (Interface) baud rate as follows:
 1. Momentarily depress the "Alt C" keys.
 2. Use the RETURN key to move to the "Speed" field.
 3. Press the "Space" bar until the desired rate appears.
 4. Momentarily depress the "Escape/Esc" key to activate the new baud rate.

If the download starts and fails during its progress, refer to **Trouble Clearing: TAP-116**.

17. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
18. Is the **FE ID** display on the **SYSCTL** display blank?
If **YES**, then continue with **Step 19**.
If **NO**, then proceed to **Step 31**.

FE ID Display Blank

19. Have you installed a new **SYSCTL** using procedures of **DLP-501** and there is no response from the system?

If **NO**, then continue with **Step 20**.

If **YES**, then proceed to **Step 38**.

20. **⇒ NOTE:**

Ensure PC is connected to the front CIT (CIT-1). If floppies are being used, ensure the first (number 1) diskette is installed in floppy drive. If hard drive is being used, ensure you are in the correct directory.

Enter **term** or **term COM_n** command, where $n = 1$ or 2 . If **term** is entered without the **COM_n** option, then **COM1** will be selected by default. If after starting the terminal emulator you see the message "Can't find script <init>", disregard it.

approx. 15-45 min.

Response: Two brief messages are printed and you are instructed to
Press any key to continue . . . after the
second message. After you press any key, the
terminal emulator is loaded and the terminal responds
as follows:

CTRM [Interface (R2.1 or later)] ready. (Type
Alt-h for help.)
Communications established.

21. **⇒** NOTE:

The default shelf is the shelf physically connected to the PC. To set baud rate automatically, enter two carriage returns (<cr>), two lower case "a"s (aa), or two upper case "A"s (AA). All other characters are ignored.

Enter two carriage returns.

Response: PC prompts with:

```
/* Enter a shelf number from 1 to 8 */  
shelf [default] =
```

22. Was response correct?

If **YES**, then proceed to **Step 24**.

If **NO**, then continue with **Step 23**.

23. **⇒** NOTE:

CIT mult cabling creates a serial chain of network elements (NE)s to which a single CIT can connect and address any NE in the chain. The NE directly connected to the CIT defines the head of this chain.

Proceeding from the CIT at the head of the chain to the end of the chain, communication will stop at the first point where an NE with a **BBG8 SYSCTL** immediately follows an NE with a **BBG5 SYSCTL**. The CIT will be unable to communicate with the NE having the **BBG8 SYSCTL** and all NEs further along the chain.

Check PC to **CIT** port connections. Make sure the cable is connected between the PC **COM()** port and the **CIT** port on the DDM-2000. If the rear **CIT** port is being used on the DDM-2000, make sure a null modem is installed on the port. Check CTRM setup and make sure the **comm** port selected matches the port (**COM()**) on the PC that is connected to the **CIT** port on the shelf. Check if CIT bay mult cabling is connected to this shelf but not terminated at another shelf.

Repeat this procedure from **Step 20**.

24. NOTE:

The CIT login banner for Release 2.0 and earlier reads: AT&T,
DDM2000 FiberReach Multiplexer, Release a.b.c.

Enter the shelf number for the shelf being used for new program download.

Response: PC responds with:

```
login<
password<

/*****
*
*          LUCENT TECHNOLOGIES          *
*      Bell Labs Innovations            *
*      DDM-2000 FiberReach              *
*
*          Release a.b.c                *
*
*****/

.
.
.

TID date time
M  rtrv-alm: all COMPLD
/* Active Alarms and Status Report
```

25. NOTE:

After the system prompt (<), the system will respond normally to commands entered. The Commands and Reports section of this manual gives a description of the commands.

Use **rtrv-ne** command to retrieve the name (*tid*) of the shelf having new program installed or see TID in response above.

26. If floppies are being used, ensure the first (number 1) diskette is installed in floppy drive. If hard drive is being used, ensure you are in the correct directory.

27. Enter the command **ins-prog:tid**

Where tid = the target identifier (shelf name) for the FiberReach shelf having the new program installed.

Response: /* Testing For Program Installation... */

After several seconds, the PC prints a Caution! message followed by the prompt:

Execute? y/n =.

28. Was response correct?

If **YES**, then continue with **Step 29**.

If **NO**, then do **Trouble Clearing: TAP-116**.

29. Enter a *y* or *yes* and a carriage return to execute the program.

approx. 15-45 min.

Response: **ABN** LED lights on User Panel and a **P** is displayed in **SYSCTL FE ID** display in the shelf receiving the program. PC starts download and prints the following message:

P

Searching for optimal transfer rate.
Handshake established at <baudrate> baud.

In progress

The dots continue to print until program installation is complete. If floppy disks are being used, insert each diskette when prompted. After installation is completed, the PC prints the following completion message:

```
ins-prog:TID COMPLD
/* Generic program a.b.c is installed
*/
```

The **SYSCTL** resets, and the terminal is logged off the system. The LEDs go off on the User Panel and **SYSCTL**.

30. Was response correct?

If **YES**, then continue with **Step 31**.

If **NO**, then do **Trouble Clearing: TAP-116**.

31. Did the letter "**C**" appear in the **FE ID** display?

If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **YES**, then proceed to **Step 32**.

Letter "C" in FE ID display

32.  **CAUTION:**
*If the system is in service and is forced to run the current software that is displaying a **C**, service interruption may result.*

 **NOTE:**
Indications are that there may be a problem with the version of software you are installing or you are trying to install a version of software that will not support the system transmission configuration that you have. Under normal upgrade procedures, this indication should not occur. But, if you are downloading an older version of software or upgrading to a new version of software which has major changes or is incompatible with the version that you have, this indication will occur. You can *force* the system to run the current software or back out of this procedure by loading another version of software.

You must decide if you want the system to run this current version of software that has been loaded or if you want to download another version (original version or new version) of software.

Do you want to run the current version of software in the **SYSCTL**?

If **YES**, then continue with **Step 33**.

If **NO**, then proceed to **Step 35**.

33. To *force* the system to run the current software, perform the following:
- Ensure that an **OLI**U circuit pack is installed in the **MAIN-2** slot.
 - Remove the **OLI**U circuit pack from the **MAIN-1** slot, if not already removed.
 - Reset (unplug and reseal) the **SYSCTL** to force it to run the current software.
 - After the current software is up and running (no alarm LEDs lighted or you can log into the shelf), reinstall the **MAIN-1 OLI**U circuit pack.
34. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

35. Exit CTRM (Alt-F2), if required (prior to Release 2.1, only one install program procedure per CTRM session is permitted), and find a new version of software to install.
36. If another **SYSCTL** containing different software is to be installed, use the procedures of **DLP-538** to "Replace **SYSCTL**".

If new software is to be downloaded from the PC, continue with **Step 37**.

37. **⇒ NOTE:**
Ensure PC is connected to the front CIT (CIT-1). If floppies are being used, ensure the first (number 1) diskette is installed in floppy drive. If hard drive is being used, ensure you are in the correct directory.

Enter **term** or **term COM_n** command, where $n = 1$ or 2 . If **term** is entered without the **COM_n** option, then **COM1** will be selected by default. If after starting the terminal emulator you see the message "Can't find script <init>", disregard it.

approx. 15-45 min.

Response: Two brief messages are printed and you are instructed to
Press any key to continue . . . after the
second message. After you press any key, the
terminal emulator is loaded and the terminal responds
as follows:
CTRM [Interface (R2.1 or later)] ready. (Type
Alt-h for help.)
Communications established.

38. Unplug and reseal the **SYSCTL** and immediately push and hold the **FE SEL** and **UPD/INIT** buttons at the same time until a **P** appears in the **FE ID** display (approximately 15 seconds).

approx. 15-45 min.

Response: PC starts download and prints the following message:

p

Searching for optimal transfer rate.
Handshake established at <baudrate> baud.

In progress

The dots continue to print until program installation is complete. If using the floppy disks, insert each diskette when prompted. After installation is completed, the PC prints the following completion message:

```
ins-prog:TID COMPLD
/* Generic program a.b.c is installed
*/
```

The **SYSCTL** resets and the terminal is logged off the system.

39. Was response correct?
If **YES**, then continue with **Step 40**.
If **NO**, then proceed to **Step 41**.
40. Did the letter "**C**" appear in the **FE ID** display?
If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.
If **YES**, then proceed to **Step 32**.

41. Check that the DDM-2000 is connected to the PC through the **COM** port. If it is not, reconnect the PC to DDM-2000 using the **COM** port and repeat the procedure.

If the download still does not start, as indicated by the `In progress` message and rows of dots, within 2 minutes after the **P** appears in the **FE ID** display, change the CTRM (Interface) baud rate as follows and repeat this procedure: if the baud rate is currently set to 9600, change it to 4800 or if the baud rate is currently set to 4800, change it to 9600. The baud rate is changed by:

1. Momentarily depress the "Alt C" keys.
2. Use the RETURN key to move to the "Speed" field.
3. Press the "Space" bar until the desired rate appears.
4. Momentarily depress the "Escape/Esc" key to activate the new baud rate.

If the download starts and fails during its progress, refer to **Trouble Clearing: TAP-116**.

Install New Software Generic Program In-Service System Remote Shelf Download

1. Before beginning the software installation, refer to the "Software Installation and Upgrade Procedure" section of the Software Release Description. This section contains a description of any special considerations required when installing this version of software.

2.



NOTE:

This procedure uses the `cpy-prog` or `ins-prog` commands to install a new software program in a remote in-service DDM-2000 OC-1 shelf. It is assumed that the local shelf has already been upgraded and the software is running normally or has been installed as a dormant copy. For procedures to download software in a new shelf (initial installation), see **DLP-525**. For procedures to download software locally to a shelf, see **DLP-536**.



NOTE:

If upgrading from earlier software releases to Release 2.2, after the first shelf is upgraded, single-ended operations will not be available and major alarms (section `DCC channel failed`) will exist until all shelves are upgraded. The node farthest away should be upgraded first, working back to the local node. See Table A.

Verify that no DCC failures or transmission failures (OC-1 LOS, flashing **OLIUFault** LEDs, etc.) are present on the network element or system receiving the program.

3. Use `rtrv-fecom/set-fecom` command to verify/enable far-end communications (fecom).

Table A – DDM-2000 OC-1 Inservice Software Upgrade Compatibility (Note)

Current Release	Upgrade to*
	2.2
1.0.n	U†
2.0.n	U†
3.1.n	U†

Note: All DDM-2000 FiberReach shelves in a subnetwork should be using Release 2.2 software, and the DDM-2000 OC-3 host shelf should be using Release 11.1 software.

- * When doing an upgrade, it is recommended that the latest point release of software be used, if possible.
- U Requires local software download only to upgrade the system.
- † Incompatible OSI stack requires special considerations. See LTP 824-102-144, *Lucent Technologies 2000 Product Family, Multi-Vendor Operations, Interworking Guide*, Issue 1, for special considerations.

4.

⇒ **NOTE:**

If you want to load new software to a remote shelf (if allowed) directly **from a PC**, use the `ins-prog: tid` command where the TID entered is that of the remote shelf where you want to install the new software. After using the `ins-prog: tid` command to download software to one shelf, you must exit term (Alt F2) and re-execute term before starting a second `ins-prog:` command. If term is not exited, it will stop running if a second `ins-prog:` is started within the same term session. The PC will not respond or return any message and the `ins-prog:` will not progress.

⇒ **NOTE:**

If remote software downloading is allowed and you want to load new software to a remote site via the DCC **from a local shelf** which already contains the new software, log in (either locally or remotely) to the shelf containing the new software, and then enter the `cpy-prog: tid` command (where `tid` = the tid of the shelf in which you want to install the software). [The tid is the name given to a shelf (network element) using the `set-ne:` command.] The `cpy-prog: tid` command will only copy

software from a local controller to a remote controller; it is not used to download software from a PC.

⇒ **NOTE:**
The download time will be longer (even without excessive DCC traffic) when there are additional spans between the source and target network elements. To minimize the download time and reduce DCC traffic, it is recommended that multi-span software downloading be avoided by remotely logging into the nearest shelf of the same type and remotely downloading the new program from that shelf.

⇒ **NOTE:**
When upgrading from releases without synchronization messaging to releases with this feature, it is suggested to upgrade first the shelves which are provisioned for "external timed" or "external mult" timed. This is to prevent timing "holdover" conditions at nodes that derive timing from the OC-3 line.

⇒ **NOTE:**
If you are using a PC operating in a *Windows* environment, you must **exit Windows** and restart your PC in *MS-DOS* mode before performing these download procedures. For example, if your PC is running *Windows 95* you must exit *Windows* by clicking on the **Start** button, then **Shut Down**, then **Restart the computer in MS-DOS mode**.

Obtain equipment, check software, and connect PC for download.

Reference: DLP-566

5. Are you using **ins-prog** or **cpy-prog** command to download software to far-end shelf?

If **CPY-PROG**, then continue with **Step 6**.

If **INS-PROG**, then proceed to **Step 13**.

- 6.

⚠ **CAUTION:**
Only one cpy - prog procedure at a time should be performed in the same maintenance subnetwork. Simultaneous cpy - prog procedures in the same network may fail.

Connect and establish session with local shelf being used as a source for the new remote program download.

Reference: DLP-521

7. Enter the command `cpy-prog:tid`

Where `tid` = the target identifier (shelf name) for the remote DDM-2000 shelf receiving the new program.

Response: `/* Testing For Program Installation . . . */`

After several seconds, the PC prints a Caution! message followed by the prompt:

Execute? `y/n =.`

8. Was response correct?

If **YES**, then continue with **Step 9**.

If **NO**, then do **Trouble Clearing: TAP-116**.

9. Enter a `y` or `yes` and a carriage return to execute the program. Software download may take up to 20 minutes. .

Response: **ABN** LED lights on User Panel. A "**P**." is displayed in **SYSC TL FE ID** display in the far-end shelf receiving the program (for uncompressed executing copy download, not if dormant copy is being loaded). At DDM-2000 shelves connected directly to the shelf receiving the program, **MJ** and **NE ACTY** LEDs light on User Panel. At other shelves in the same control system, **MJ** and **FE ACTY** LEDs light on User Panel. Download begins and the following message is displayed:

`In progress . . . .`

The dots continue to print until program installation is complete. After installation is completed, the PC prints the following completion message:

`ins-prog:TID COMPLD
/* Generic a.b.c is installed */`

The LEDs go off on the User Panel and **SYSC TL**.

10. Was response correct?

If **YES**, then proceed to **Step 26**.

If **NO**, then continue with **Step 11**.

11. Wait approximately 10 minutes for network to stabilize then repeat this procedure from Step 7. If the second attempt to download software fails, then do **Trouble Clearing: TAP-116**. You may have to go to the remote site.

12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

13.



NOTE:

The **FE ID** display on the remote **SYSCTL** must show one of the following preceding software installation. Other conditions represent failure conditions or conditions that will not allow a remote software download.

- A. The letter (**P**.) displayed in the **FE ID** display indicates that a previous software download has failed and you can only download software locally. Try again to download software from same shelf. If there is no period after the (**P**), the software can only be downloaded locally using the procedures of **DLP-532**.
- B. Nothing displayed in the **FE ID** display indicates that compatible software is installed in the **SYSCTL**, and you may download software remotely if remote software downloading is permitted for this release.

Ensure PC is connected to the front CIT (CIT-1). If floppies are being used, ensure the first (number 1) diskette is installed in floppy drive. If hard drive is being used, ensure you are in the correct directory.

14. Enter term or term COM n command, where $n = 1$ or 2. If term is entered without the COM n option, then **COM1** will be selected by default. If after starting the terminal emulator you see the message "Can't find script <init>," disregard it.

Response: Two brief messages are printed and you are instructed to Press any key to continue . . . after the second message. After you press any key, the terminal emulator is loaded and the terminal responds as follows:

Interface ready. (Type Alt-h for help.)
Communications established.

15.



NOTE:

The default shelf is the shelf physically connected to the PC. To set baud rate automatically, enter two carriage returns (<cr>), two lowercased "a"s (aa), or two uppercased "A"s (AA). All other characters are ignored.

Enter two carriage returns.

Response: PC prompts with:

```
/* Enter a shelf number from 1 to 8 */  
shelf [default] =
```

16. Was response correct?

If **YES**, then proceed to **Step 19**.

If **NO**, then continue with **Step 18**.

17. Check PC to **CIT** port connections. Make sure the cable is connected between the PC **COM()** port and the **CIT** connector on the DDM-2000. If the rear **CIT** connector is being used on the DDM-2000, make sure a null modem is installed on the port. Check term setup and make sure the com port selected matches the port (**COM()**) on the PC that is connected to the **CIT** port on the shelf.

Exit term (Alt-F2) and repeat this procedure from Step 14.

18. Enter the shelf number for the local shelf being used for new program download.

Response: PC responds with:

```
login<
password<

/*****
*          Lucent Technologies          *
*      DDM-2000 FiberReach Multiplexer  *
*                                         *
*                                         *
*          Release a.b.c                *
*                                         *
*****/

*
*
*

TID date time
M  rtrv-alm: all COMPLD
/* Active Alarms and Status Report
```

- 19.

⇒ **NOTE:**
After the system prompt (<), the system will respond normally to commands entered. The "Commands and Reports" section of this manual gives a description of the commands.

Use `rtrv-map-network` command to retrieve the name (*tid*) of the remote shelf having new program installed.

20. Enter the command `ins-prog:tid`

Where *tid* = the target identifier (shelf name) for the far-end DDM-2000 shelf having the new program installed.

Response: `/* Testing For Program Installation... */`

After several seconds, the PC prints a Caution! message followed by the prompt:

Execute? y/n =.

21. Was response correct?

If **YES**, then continue with **Step 22**.

If **NO**, then do **Trouble Clearing: TAP-116**.

22. Enter a *y* or *yes* and a carriage return to execute the program. Software download may take up to 45 minutes.

Response: **ABN** LED lights on User Panel. A "**P.**" is displayed in **SYSCTL FE ID** display in the far-end shelf receiving the program (for uncompressed executing copy download, not if dormant copy is being loaded).

Searching for optimal transfer rate.
Handshake established at <baudrate> baud.

In progress

The dots continue to print until program installation is complete. If floppy disks are being used, insert each diskette when prompted. After installation is completed, the PC prints the following completion message:

```
ins-prog:TID COMPLD
/* Generic a.b.c is installed */
```

The **SYSCTL** resets, and the terminal is logged off the system.
The LEDs go off on the User Panel and **SYSCTL**.

23. Was response correct?

If **YES**, then proceed to **Step 26**.

If **NO**, then continue with **Step 24**.

24. Wait approximately 10 minutes for the network to stabilize, exit term, then repeat this procedure from **Step 14**. If the second attempt to download software fails, do **Trouble Clearing: TAP-116**. You may have to go to the remote site.

25. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

26. Wait approximately 5 minutes; then verify communications can be reestablished with far-end shelf using `rtrv-map-network` command. Verify that *Comm. Status* is good (not *FAILED*), as indicated by a blank in the report.

27. Is communication status good between local and remote shelf?

If **YES**, then proceed to **Step 29**.

If **NO**, then continue with **Step 28**.

28. Dispatch technician to remote site and perform local software download procedures.

Reference: **DLP-532**

29. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Condition T1EXT Circuit Pack/Port for New T1 Service



CAUTION:

In addition to primary lightning protection, an external Lightning and Surge Secondary Protection Assembly (ED-8C783-30 or equivalent) is required for T1EXT circuits used in outside plant applications.

1.  **NOTE 1:**
The commands **rtrv-alm** and **rtrv-state** may be used to check for alarms, locks, loops, and switches.
-  **NOTE 2:**
If line code (lc) parameters have been previously set using the **set-t1** command, the circuit pack line code switch settings will have no effect. There will be no indication of improper switch settings until you try to establish service. It is recommended that a policy be established to set line coding either using the switches OR using CIT commands. Use the **rtrv-t1** command to check line code settings.

Use **rtrv-alm** command to verify that no alarms, locks, loops, or switches are present.

2. Is a new **T1EXT** circuit pack being installed?

If **YES**, then proceed to **Step 6**.

If **NO**, then continue with **Step 3**.

3.  **CAUTION:**
To minimize hits on in-service ports on the T1EXT circuit pack having a T1 port added, it is recommended to either use a CIT to manually switch the T1 to protection if the T1EXT circuit pack must be removed, or use the CIT to set T1 port options without removing the circuit pack.



CAUTION:

Removing a service T1EXT circuit pack that does not have an associated protection T1EXT circuit pack installed will interrupt service on all T1 ports on that circuit pack.

4. Use **set-t1** command to set **T1EXT** port options.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6. Set option switches and install new **T1EXT** circuit pack.

Reference: **DLP-507**

7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Install BBG8 SYSCTL New Shelf

1.  **NOTE:**
This procedure is used for installing the **SYSCTL** in a new shelf for the first time (initial shelf turnup). For procedures to replace an in-service **SYSCTL**, refer to **DLP-501**.

Set **SYSCTL** switch **S1** sections **S1-1**, **S1-2**, and **S1-3** to **OFF**, **OFF**, **OFF**, respectively, to set the product (shelf) type. See Figure 1.

2. Set TBOS termination switch **S2-1** to **ON**.
3. Set **SYSCTL** switch section **S2-2** to **OFF** and switch sections **S2-3**, **S2-4**, **S2-5**, **S2-6**, **S2-7**, and **S2-8** to **ON**.

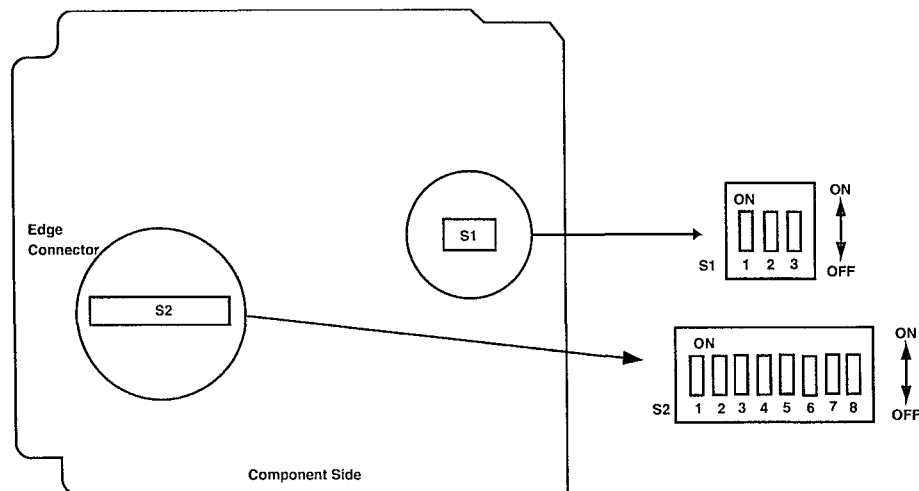


Figure 1. SYSCTL Option Settings

4.  **NOTE:**
Steps 5 and 6 must be performed without unnecessary delays.
Familiarize yourself with these steps before continuing with the procedure.

Read Steps 5 and 6 before proceeding.

5.  **CAUTION:**
*Take care to avoid damaging the LEDs that protrude through the opening in the faceplate of the **SYSCCTL**.*

 **NOTE 1:**
The **UPD/INIT** pushbutton on the **SYSCCTL** is recessed to prevent its accidental operation. You will need a small pointed object such as a ballpoint pen to operate it.

 **NOTE 2:**
Ignore the **MJ**, **MN**, and **NE ACTY** LEDs on the User Panel.

Read the remainder of Steps 5 and 6 before installing the SYSCTL, then seat the SYSCTL.

If the following responses do not occur, proceed to **Step 7**.

Response: **FAULT** LED on **BBG8 SYSCTL** lights and **ABN** LED on the User Panel lights after approximately 5 seconds. **MJ** and **NE** LEDs may light or flash briefly. **FAULT** LED on the **SYSCTL** goes off after approximately 5 seconds. **ABN** LED goes off after approximately 15 seconds. Approximately 1 minute and 30 seconds after the **ABN** LED goes off, the **CR** LED on the User Panel begins to flash.

6. Momentarily depress the **UPD/INIT** button on the **SYSCTL** while the **CR** LED is flashing (**you have 10 SECONDS** to do this).

If the following responses do not occur, continue with **Step 7**.

Response: **CR** LED on the User Panel stops flashing when the **UPD/INIT** button is pressed.

ABN LED on the User Panel lights after approximately 15 seconds. **ABN** LED goes off after approximately 30 seconds. Approximately 1 minute and 45 seconds after the **ABN** LED goes off, the **CR** LED on the User Panel flashes again. **DO NOT** depress **UPD/INIT** pushbutton again when the **CR** LED flashes.

Initialization may take 2-3 minutes.

7. NOTE:

FiberReach compatible software must be installed in the **BBG8 SYSCTL**. When the **SYSCTL** is installed for the first time, one of the following indications will be displayed in the **FE ID** display. Displayed letters or conditions indicate one of the following:

- a. Nothing displayed in the **FE ID** display indicates that either FiberReach compatible software is installed in the **SYSCTL** or the **SYSCTL** contains software that is not compatible with the FiberReach shelf. If the **CR** LED did not start flashing in Step 5 and the **FE ID** display is blank, the **SYSCTL** contains software not compatible with the FiberReach shelf. New software must be loaded using the procedures of **DLP-525**.
- b. The letter **P** displayed in the **FE ID** display indicates that no software is installed in the **SYSCTL**. If the letter **P** is followed by a period (**P.**), it means that a previous download attempt has failed and a new software download will have to be attempted.
- c. The letter **U** displayed in the **FE ID** display indicates that **SYSCTL** Switch **S1** is not set properly for the type of shelf being equipped. Repeat this procedure from Step 1 to correct switch settings.
- d. The letter **E** displayed in the **FE ID** display indicates that the **SYSCTL** must be replaced. Replace the **SYSCTL** and repeat this procedure.
- e. The letter **F** displayed in the **FE ID** display indicates that the **SYSCTL** faceplate latch is not fully latched. Latch the faceplate. (A reset occurs after the faceplate is latched.)
- f. A flashing letter **L** displayed in the **FE ID** display indicates a low voltage condition (brownout) on the shelf. Use **TAP-119** to clear brownout condition.

Did the letter "**P**" or "**P.**" appear in the **FE ID** display?

If **YES**, then continue with **Step 8**.

If **NO**, then proceed to **Step 10**.

8. Find **SYSCTL** with proper software and repeat this procedure, or install new software using the procedures of **DLP-525**.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
10. If FiberReach compatible software is installed, you can retrieve the generic software version ID by depressing the **ACO** button longer than 2 seconds and observing version code on the **FE ID** display. If the software version is not the correct version, you must find a **SYSCTL** with the correct software or install new software using the procedures of **DLP-525**.

If software that is not compatible with the FiberReach shelf is installed in the **SYSCTL** and you cannot retrieve the software version (no response), you must find a **SYSCTL** with the correct software or install new software using the procedures of **DLP-525**.

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Install BBF8 HDSL Circuit Packs



CAUTION:

In addition to primary lightning protection, an external Lightning and Surge Secondary Protection Assembly (ED-8C783-30 or equivalent) is required for HDSL circuits packs used in outside plant applications.

1. Take care to avoid damaging the LEDs that protrude through the opening in the faceplate of the **DS1/DS1PM** circuit pack.



NOTE:

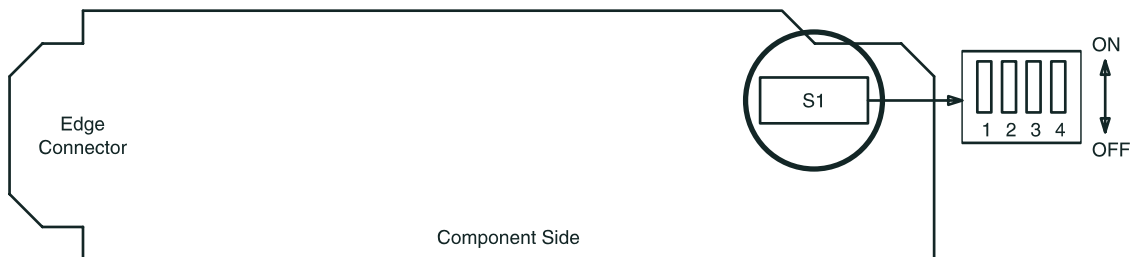
To set switch to ON, depress rocker or slide switch toward side labeled **ON** in the figure. To set switch to OFF, depress rocker or slide switch toward side labeled **OFF** in the figure.

Refer to Figure 1 and Table A and set option switches.

Table A – HDSL Control Switch Settings

Control Settings	Switch S1 Settings			
	S1-1	S1-2	S1-3	S1-4
Master	—	OFF	—	OFF
Slave	—	ON	—	ON
Local	OFF	—	OFF	—
Remote	ON	—	ON	—

Figure 1 – BBF8 HDSL Control Switch



2.



NOTE:

A maximum of three **BBF8 HDSL** circuit packs, including a protection circuit pack, can be installed in one FiberReach if **28G type OLIUs** are used.

Seat **HDSL** circuit pack in required slot of **LOW SPEED** group being equipped.

Response: **FAULT** LED on **HDSL** circuit pack lights and may remain lighted for about 40 seconds and then goes off.

3. Repeat this procedure from Step 1 for each service **HDSL** circuit pack being installed.

4.



NOTE:

One protection **HDSL** circuit pack may be installed in slot **8(P)** of each **LOW SPEED** group being equipped.

If required, refer to Figure 1 and Table A, and set option switches on protection **HDSL** circuit pack.

5. If required, install protection **HDSL** circuit pack into slot **8(P)** of low-speed group being equipped.

6. Install **177A** Retainer Cards into all unequipped service DS1 **LOW SPEED** slots.

7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Obtain Equipment, Check Software, Prepare and Connect PC for Software Download

1. Obtain the following equipment:
 - a. IBM¹ compatible personal computer (PC) running an MS-DOS² computer program operating system, Release 2.1 or later.
 - b. RS-232 cable to connect PC **COM** port to User Panel **CIT** port.
 - ⇒ **NOTE:**
The PC may be connected to either the front or rear CIT port, or remotely through a dial-up modem. If connected to the rear CIT port, a null modem is required between the RS- 232 cable and the rear **CIT** port.
 - c. Working copies of the new system generic program diskette(s).
 - d. Software Release Description for software being installed.
2. Before beginning the software installation procedure, the following is strongly suggested:
 - a. Become familiar with the characteristics and operating procedures of your PC and the *MS-DOS* operating system.

Reference: DLP-533
 - b. Operate laptop PCs on AC power during download procedures.
 - c. Follow proper procedures in handling the diskette(s) (floppies).

Reference: DLP-533
 - d. Make working copies and backup copies of the original new generic program diskettes.

Reference: DLP-534

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2. Corporation Registered Trademark of Microsoft Corporation

- e. Read the Software Release Description for software being installed.
3. Before beginning the software installation, refer to the Software Release Description for the software being installed for a description of any special considerations required when installing this version of the software.
- 4.

⇒ **NOTE:**

If you are using a PC operating in a Windows³ environment, you must **exit** *Windows* and restart your PC in *MS-DOS* mode before performing these download procedures. For example, if your PC is running *Windows 95*; you must exit *Windows* by clicking on the **Start** button, then **Shut Down**, then **Restart the computer in MS-DOS mode**.

Start *MS-DOS* operating system on the PC [DLP-534].

Response: PC displays the prompt (for example, C>, C:\DOS>) determined by the PC.

5. If you are going to use the PC hard disk to load software to the shelf, copy all files on the source diskettes(s) (floppies) to a directory on the hard disk (for example, GEN_1301 for generic version 13.0.1).
6. If you are going to load the software from the hard disk, use the cd command to change to the appropriate hard drive directory containing the software.

If you are going to load the software from the floppies, use the appropriate *MS-DOS* command (for example, **a:** or **b:**) to go to the drive where the floppy disk will be installed.

Response: PC displays the appropriate prompt (A>, B>, C>, C:\DOS>, etc.) determined by the PC.

Comment: If you are using floppies and get a disk error message, verify the drive latch is locked and that you have the proper diskette installed in the drive.

3. Registered Trademark of Microsoft Corporation.

7.



NOTE:

The new generic program may be on many floppy disks. If you are using the floppy disks, the PC will prompt you to insert disks as needed after the first disk is installed.

If you are using the floppy disks, insert the first (number 1) floppy disk into the PC drive.

8.



NOTE:

The checkpgm command may take up to 25 minutes to complete.

Execute the command checkpgm to check the version number of the program you are installing. If using floppy disks, insert each diskette when prompted.

approx. 15 min. if using hard drive approx. 25 min. if using floppy drive

Response: PC has DDM-2000 program version a.b.c.

9.



NOTE:

The shelf rear access CIT port is configured for a modem. A null modem is required to use this port with the PC.



NOTE:

The cable from the CIT port on the DDM-2000 must be connected to the **COM (COM1 or COM2)** RS-232 port of the PC. If a "**P**" or "**d**" is displayed in the **FE ID** display, the PC must be connected to the front **CIT** port.

Connect PC to CIT port by connecting one end of an RS-232 cable to the **COM()** port of the PC and the other end of the cable to the front or rear DDM-2000 CIT port.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Rear Access to the Wall DT Cabinet

1. Remove the four attachment screws from the front of the Wall DT as show in Figure 1.

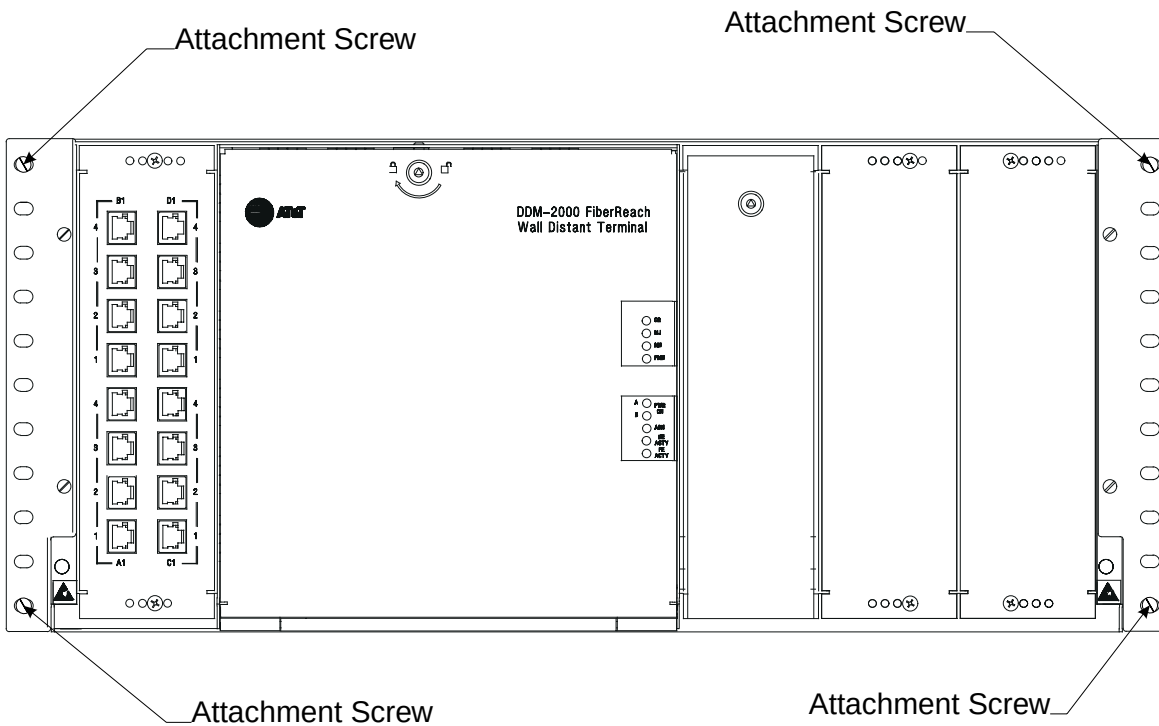


Figure 1. Wall DT Cabinet — Front View

2. With both hands on the bottom of the Wall DT, carefully lift up on the Wall DT so the pivot point leaves the service position, and slide the Wall DT forward until the pivot point reaches the rotation position. Allow the pivot point to drop down into the rotation position, and rotate the Wall DT 90 degrees until the backplane is in the up position (see Figure 2).

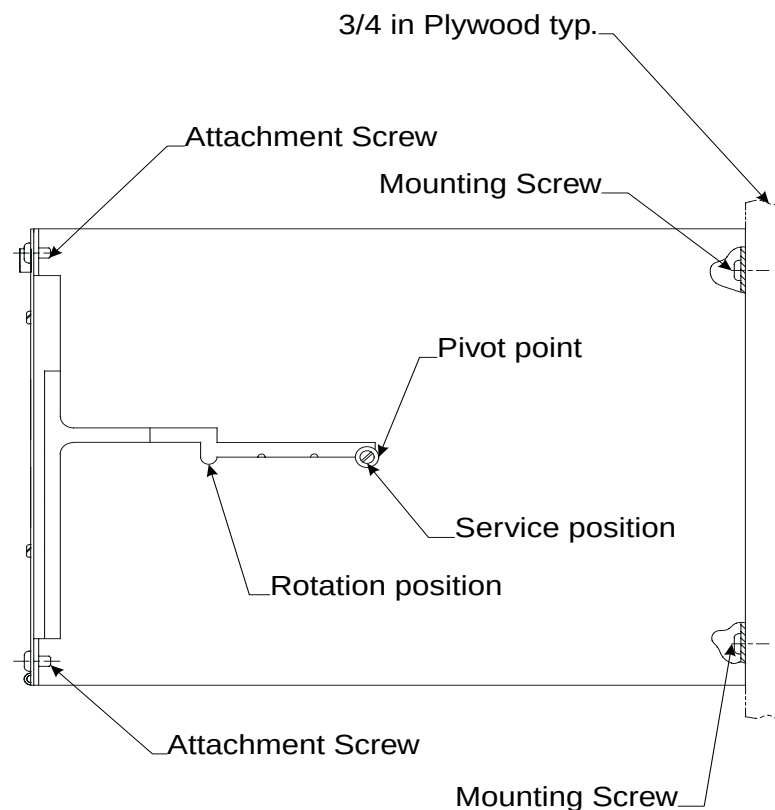


Figure 2. Wall DT Cabinet — Bottom View

- **NOTE:**
Make sure that there are no circuit packs stored loose in the shelf, and that all operating circuit packs are securely latched in position.
- **NOTE:**
Never leave the Wall DT unattended in the rotated position. Always return it to the service position and reinstall at least the top attachment screws.
- **NOTE:**
When ever sliding or rotating the Wall DT make sure that both the optical fiber and DS1 cabling are not crimped or stressed in any way.

3. Carefully rotate the Wall DT 90 degrees until the Wall DT is in the normal position. With both hands on the bottom of the Wall DT, carefully lift up on the Wall DT so the pivot point leaves the rotation position, and slide the Wall DT back until the pivot point reaches the service position. Allow the pivot point to drop down into the service position (see Figure 2).



NOTE:

When ever sliding or rotating the Wall DT make sure that both the optical fiber and DS1 cabling are not crimped or stressed in any way.

4. Reinstall the four attachment screws that were removed from the front of the Wall DT in Step 1.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Out Of Service Upgrade From 26G type to 28G type OLIU Circuit Packs

1.  **CAUTION:**
This procedure requires a complete initialization of the system. All software settable features will need to be reentered. If office records are not available, all the settings listed [DLP-511] will need to be recorded, so the settings can be reentered at the end of this procedure. The cross-connections will most probably change. The new cross-connections must be available from the provisioning center.

2.  **WARNING:**
Unterminated optical connectors may emit invisible laser radiation. Avoid direct exposure to the beam. Do not view beam with optical instruments. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

-  **CAUTION 1:**
*Before installing **28 G type OLIUs**, ensure all optical fiber connectors and couplings have been properly cleaned [DLP-527]. Signal performance may be degraded if the connectors and couplings are not cleaned properly.*

-  **CAUTION 2:**
*If optical fiber cables are routed beneath the **OLIUs**, be careful not to pinch or crush the fibers when the **OLIUs** are inserted.*

-  **NOTE 1:**
The DDM-2000 FiberReach shelf operating at an OC-3 rate requires **28G type OLIUs** in the **MAIN** slots. Two **OLIUs** are required.

-  **NOTE 2:**
The red **FAULT** LED flashes when no signal is present to the **OLIUs**.

-  **NOTE 3:**
The **28G type OLIUs** require a faceplate interconnect cable assembly, [comcode (847721271)].

-  **NOTE 4:**
When using the following procedures to install the **28G type OLIUs**, if the responses are not correct, check all connections. If connections are correct, replace the **28G type OLIU** that has the wrong response.

3. Remove all **DS1/T1** signals from system *[NTP-005]*.
4. Use the **upd:** command to reflect the change and clear associated alarms.
5. Use the **DLT-CRS-VT1** command to delete all cross-connections.
6. Remove all circuit packs from the FiberReach shelf, except the **SYSCTL** circuit pack.
7. Use the **upd:** command to delete the circuit packs removed from the equipment list and clear associated alarms.
8. Use the **init-sys:all** command to initialize provisionable parameters to their default values.

Install the **28G type OLIU** into required **MAIN-1** slot.

Response: **FAULT** LED and **ACTIVE** LED lights. **FAULT** LED begins flashing after about 10 seconds. The **MJ** (fecom enabled) or **MN** (fecom disabled) LED will light.

9. Install the second **28G type OLIU** into **MAIN-2** slot. The FiberReach requires two **28G type OLIUs** for operation.

Response: **FAULT** LED and **ACTIVE** LED lights. **FAULT** LED begins to flash after about 10 seconds. (The **FAULT** LED may go off for a few seconds before starting to flash.)

10. Install the Faceplate Interconnection Cable Assembly (see Figure 1).
-

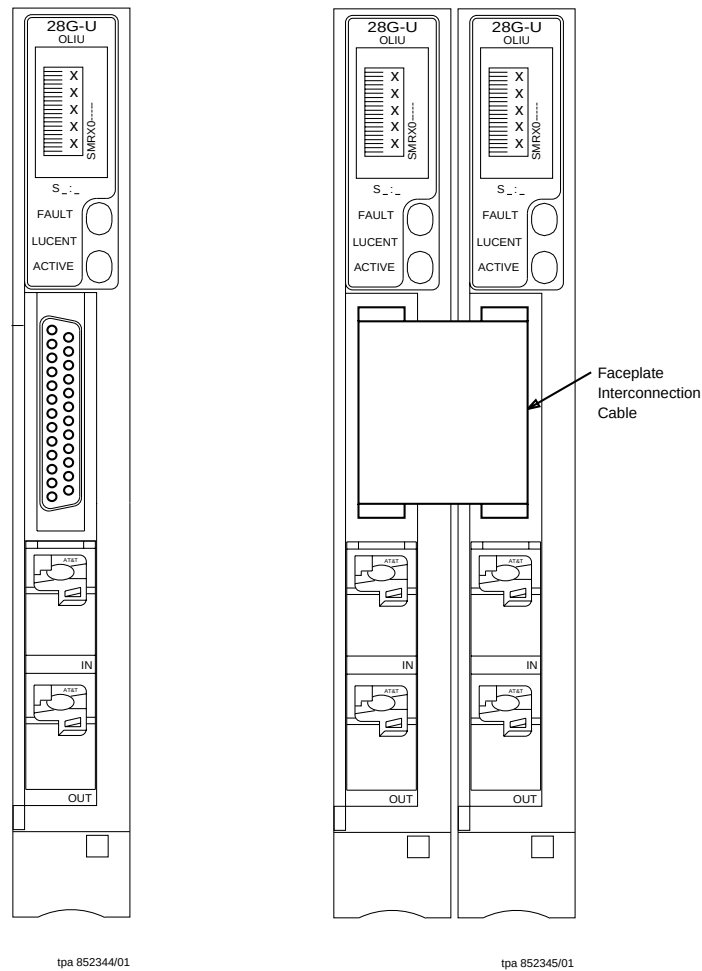


Figure 1. 28G type OLIU Circuit Pack — 28G type OLIU Pair with Faceplate Interconnect Cable Assembly [comcode (847721271)]

11. Reinsert the **Low Speed** circuit packs.
12. Reenter Software Settable features [*DLP-512*].
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Operation and Maintenance (TOP) Narrowband Shelf

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Operation and Maintenance (TOP) Narrowband Shelf Overview

This section supports operation and maintenance of the DDM-2000 FiberReach Narrowband Shelf. It includes the following five separate tabs:

- Acceptance — Yellow tab
- System Turnup/Circuit Order — Orange tab
- Operation — Green tab
- Trouble Clearing — Red tab
- Detailed Level Procedures — Blue Tab

TOP Section Organization

The **Acceptance** tab covers procedures to check the shelf or system after the shelf has been equipped or after the system has been established.

The **System Turnup/Circuit Order** tab includes procedures for the following:

- a. Equipping (turning up) a shelf in a looped back condition for the first time
- b. Establishing an end-to-end system after the shelf has been equipped
- c. Establishing initial end-to-end DS1/T1 service
- d. Adding or discontinuing DS1/T1 service to an in-service system
- e. Adding a new shelf to existing configurations
- f. Upgrading software to a new release. ([Refer to *SLC*[®]-2000 User Service Manual 363-208-001 (NTP-074)])
- g. Establishing single-homed or dual-homed FiberReach access via DDM-2000 OC-3 backbone ring
- h. Establishing stand-alone FiberReach access via DDM-2000 OC-3 host
- i. Changing protection configuration from 1X1 to 1X7 or 1X7 to 1X1 (out of service).

The **Operation** tab covers procedures for operating the system, such as connecting and using the craft interface terminal (CIT), displaying alarm and status conditions, installing a new generic program, etc.

The **Trouble Clearing** tab covers alarms and trouble reports.

The **Detailed Level Procedures** (DLP) tab contains all of the DLPs, beginning with DLP-500, used in this manual.

How to Use This TOP Section

To find the instructions for performing acceptance, system turnup/circuit order, operation, or trouble clearing tasks, proceed as follows:

1. Find your job in the Task Index under the appropriate colored tab and go to the referenced procedure (for example, **Acceptance IXL-001**). Or you may use the Master Task Index (**IXL-001**) in this introduction.
2. Turn to the indicated director level, detail level, or trouble-clearing procedure.

Procedures in this TOP are of three types:

- a. Non-Trouble-Clearing Procedures (**NTP**) — a director level procedure that lists normal work items to perform other than trouble clearing.
- b. Trouble Analysis Procedure (**TAP**) — a director level procedure that contains step-by-step trouble-clearing instructions to locate and/or fix troubles.
- c. Detailed Level Procedures (**DLP**) — detailed step-by-step instructions.

All procedures in each section of this TOP are in numerical order, regardless of the type of procedure (see Table 1). Table 1, which lists all the procedures used in this TOP, is provided as a reference only. It should not be used alone in finding instructions for performing tasks.

3. Perform all the items in the director level procedure in the indicated order unless it sends you to another director-level procedure. When you complete a director-level procedure, you have finished the task. Where more detailed information is required, you will be sent to a **DLP-()**. You may also be sent to a DLP by another Detailed Level Procedure. All DLPs are in the DLP tab section of this manual.
4. **IMPORTANT:** Unless otherwise directed, when you complete a DLP, you **MUST** return to the procedure that sent you there.
5. **IMPORTANT:** Unless otherwise directed, if one director-level procedure sends you to another director-level procedure, you should not return to the first director level procedure after you complete the second.
6. Sometimes you will be asked to verify that things have occurred. This may take the form of a formal statement of the expected response. At other times, the instructions will merely state *verify that ...*.

If the expected response is not observed and a specific trouble clearing reference is not made, you should reference the trouble analysis procedures under the **Trouble Clearing** tab to clear the trouble.

7. When performing tests or procedures using a CIT and system commands, you should refer to the "Commands and Reports" section of this manual for a description of the command, its parameters, and the output messages associated with the command.
8. If a procedure refers to software releases, for example Release 2 or later, it refers to all releases with a numerical value of 2 or higher.

9. If you need assistance in clearing a trouble after completing all the applicable trouble-clearing procedures in this section, contact your local or regional maintenance assistance group. The telephone number for the Lucent Technologies Regional Technical Assistance Center (RTAC) is **1-800-225-RTAC**.

Circuit packs being returned for repair should be sent to the following address:

Lucent Technologies
Returned Goods Dept.
7725 West Reno Avenue
Oklahoma City, OK 73126-0060

Screen Display and Panel Stamping Fonts

The procedures in this manual use a monospace font to identify actual text on a screen or a response displayed from the system. A **bold** font identifies panel stamping such as alarm names or circuit pack names. Also, the **bold** font is used throughout this manual for emphasis.

DDM-2000 FiberReach Installation

LTP 363-206-310, *DDM-2000 FiberReach Multiplexer Installation Manual*, is available for customers planning to install the equipment themselves. To acquire this manual, refer to "How to Order Documents" in the **About This Document** tab.

Lucent Technologies recommends that **ONLY** designated Lucent Technologies cables be used with DDM-2000 FiberReach. Failure to use these cables will void the product warranty.

Safety Instructions

Product Safety Labels

These instructions involve lasers, lightwave optical cable and connectors, and precautions when handling circuit packs to prevent damage from electrostatic discharge. The appropriate user/service manual contains admonishments in the form of **DANGERS**, **WARNINGS**, and **CAUTIONS** that must be followed at all times.

These admonishments have the following definitions:

- **DANGER** indicates the presence of a hazard that *will* cause death or severe personal injury if the hazard is not avoided.
- **WARNING** indicates the presence of a hazard that *can* cause death or severe personal injury if the hazard is not avoided.
- **CAUTION** indicates the presence of a hazard that *will* or *can* cause minor personal injury or property damage if the hazard is not avoided. The caution is also used for property-damage-only accidents. This includes equipment damage, loss of software, or service interruption.



The alert symbol appears throughout these products and the appropriate user/service manual to alert the user to the presence of important operating and maintenance (servicing) instructions for the DDM-2000 FiberReach.

Electrostatic Discharge (ESD) Considerations



CAUTION:

Industry experience has shown that all integrated circuit packs can be damaged by static electricity that builds up on work surfaces and personnel. The static charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

The following precautions should be observed when handling circuit packs in order to prevent damage by ESD:

- Assume all circuit packs contain solid state electronic components that can be damaged by ESD. Use only Lucent Technologies manufactured UL-recognized circuit packs specified in the appropriate user/service manual in this system.
- When handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane, always wear a grounded wrist strap or wear a heel strap and stand on a grounded, static-dissipating floor mat. If a static-dissipating floor mat is used, be sure that it is clean.
- Handle all circuit packs by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.
- Observe warning labels on bags and cartons. Whenever possible, do not remove circuit packs from antistatic packaging until ready to insert them into slots.
- If possible, open all circuit packs at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats. If a static-dissipating table mat is used, be sure that it is clean.
- Always store and transport circuit packs in static-safe packaging. Shielding is not required unless specified.
- Keep all static-generating materials such as food wrappers, plastics, and Styrofoam[®] containers away from all circuit packs. Upon removal from the bay, immediately put circuit packs into static-safe packages.
- Whenever possible, maintain relative humidity above 20 percent.

* Registered trademark of the Dow Chemical Company.

To reduce the possibility of ESD damage, shelves are equipped with grounding jacks to enable personnel to ground themselves using wrist straps (see Figure 2) while handling circuit packs or working on a shelf(s). The jacks for connection of wrist straps are located at the lower right-hand corner of each shelf and are labeled. When grounding jacks are not provided, an alligator clip adapter enables connection to bay frame ground.

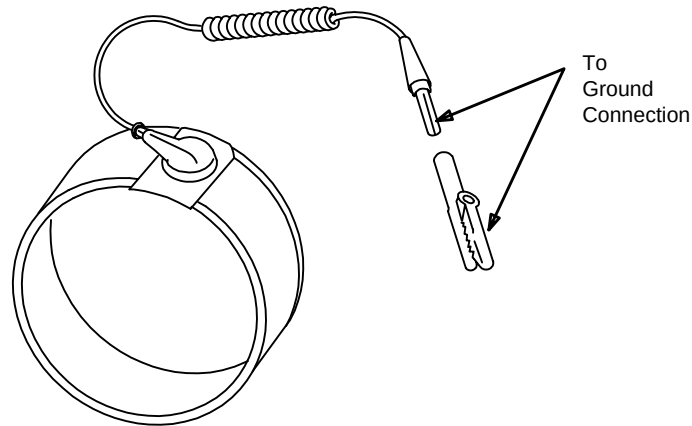


Figure 1. Static Control Wrist Strap

General Safety Instructions

GENERAL SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.
3. Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.
4. Slots and openings in this product's back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided. For information on proper ventilation requirements, consult the "Equipment Installation Considerations" section of LTP 363-206-310, *DDM-2000 FiberReach Multiplexer Installation Manual*.
5. This product should be operated only from the type of power source indicated on the marking label. For information on proper electrical distribution and power requirements, refer to the "Power" and "Technical Specifications" sections of the appropriate user/service manual.
6. Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.
7. To reduce the risk of electrical shock, do not disassemble this product. Service should be performed by trained personnel only. Opening or removing covers and/or circuit packs may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.



CAUTION:

Disconnect two (2) power connections when removing power from the system.

8. Use only Lucent Technologies manufactured UL-recognized circuit packs. Recognized circuit packs are listed in the appropriate user/service manual.

SAVE THESE INSTRUCTIONS.

Installation Safety Instructions

INSTALLATION SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Installation and maintenance procedures must be followed and performed by trained personnel only.
3. All DS1 interfaces should not leave the building premises unless connected to telecommunication devices providing primary or secondary protection, as applicable.
4. For information on proper mounting instructions, consult LTP 363-206-310, *DDM-2000 FiberReach Multiplexer Installation Manual*.
5. Never install telecommunication wiring during a lightning storm.
6. Never install telecommunication connections in wet locations.
7. Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the DS1 interface.
8. Use caution when installing or modifying telecommunication lines.

SAVE THESE INSTRUCTIONS.

Master Task Index

Operation and Maintenance

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Accept DDM-2000 FiberReach Narrowband Shelf.	Acceptance: NTP-002
Clear CDTU Failure Alarm	Trouble Clearing: TAP-104
Clear CONFIG Failure Alarm	Trouble Clearing: TAP-106
Clear CU Stuck Relay Alarm	Trouble Clearing: TAP-107
Clear DSXBIU Failure Alarm	Trouble Clearing: TAP-102
Clear DT Failure Alarm.	Trouble Clearing: TAP-108
Clear PCU Failure Alarm	Trouble Clearing: TAP-105
Clear RGU Failure Alarm	Trouble Clearing: TAP-103
Clear <i>SLC</i> -2000 NBS System Alarms; DT Server Alarms; NE, MJ, and DIGROUP or MN Alarms at HDT.	Trouble Clearing: TAP-101
Determine <i>SLC</i> -2000 DT Circuit Arrangement.	Detailed Level Procedure: DLP-513
End-to-End Testing.	Detailed Level Procedure: DLP-512
Install –48 V DC PCU (AUA432)	Detailed Level Procedure: DLP-502
Install and Test Channel Units	System Turnup: NTP-005
Install CDTU (AUA421).	Detailed Level Procedure: DLP-506
Install Channel Units.	Detailed Level Procedure: DLP-504
Install DSXBIU (FHB2).	Detailed Level Procedure: DLP-505
Install RGU (AUA413).	Detailed Level Procedure: DLP-503
Maintenance Philosophy	Trouble Clearing: TAD-100
Perform End-to-End System Tests	System Turnup: NTP-004

FIND YOUR JOB IN THE LIST BELOW. THEN GO TO

Perform <i>SLC</i> -2000 NBS MLT Channel Test	Detailed Level Procedure: DLP-511
Perform Visual Inspection of the Drop Terminal Blocks	Detailed Level Procedures: DLP-501
Perform Visual Inspection of the Electronics Compartment	Detailed Level Procedures: DLP-500
Set Options on SPQ810 DT Server for Use with FR NBS	Detailed Level Procedure: DLP-508
Test ONU Drops 1-24 (Shelf 1) 1-24 (Shelf 2)	Detailed Level Procedure: DLP-507
Turn Up Narrowband Shelf	System Turnup: NTP-003
Rear Access to the Wall DT Cabinet	Detailed Level Procedure: DLP-514
Perform Visual Inspection of the STAC Cabinet	Detailed Level Procedures: DLP-515

Numerical List of TOP Procedures

Table 1. Numerical List of TOP Procedures (Note)

Acceptance Tab	
IXL-001	Acceptance Task Index
NTP-002	Accept DDM-2000 FiberReach Narrowband Shelf
System Turnup/Circuit Order Tab	
IXL-001	Task Index - System Turnup/Circuit Order
NTP-003	Turn Up Narrowband Shelf Rack Mount System
NTP-004	Perform End-to-End Tests
NTP-005	Install and Test Channel Units
Operations Tab	
IXL-001	Task Index
Trouble Clearing Tab	
IXL-001	Task Index
TAD-100	Maintenance Philosophy
TAP-101	Clear SLC-2000 NBS System Alarms; DT Server Alarms; NE, MJ, and DIGROUP or MN Alarms at HDT
TAP-102	Clear DSXBIU Failure Alarm
TAP-103	Clear RGU Failure Alarm
TAP-104	Clear CDTU Failure Alarm
TAP-105	Clear PCU Failure Alarm
TAP-106	Clear CONFIG Failure Alarm
TAP-107	Clear CU Stuck Relay Alarm
TAP-108	Clear DT Failure Alarm

See note at end of table.

Table 1. Numerical List of TOP Procedures (Contd) (Note)

Detailed Level Procedures (DLP) Tab	
DLP-500	Perform Visual Inspection of the Electronics Compartment
DLP-501	Perform Visual Inspection of the Drop Terminal Blocks
DLP-502	Install -48 V DC PCU (AUA432)
DLP-503	Install RGU (AUA413)
DLP-504	Install Channel Units
DLP-505	Install DSXBIU (FHB2)
DLP-506	Install CDTU (AUA421)
DLP-507	Test ONU Drops 1 - 24 (Shelf 1) 1 - 24 (Shelf 2)
DLP-508	Set Options on SPQ810 DT Server For Use With FR NBS
DLP-509	Unused
DLP-510	Unused
DLP-511	Perform <i>SLC</i> -2000 NBS MLT Channel Test
DLP-512	End-to-End Testing
DLP-513	Determine <i>SLC</i> -2000 DT Circuit Arrangement
DLP-514	Rear Access to the Wall DT Cabinet
DLP-515	Perform Visual Inspection of the STAC Cabinet

Table 1 is provided as a reference only, and should not be used alone in finding instructions for performing tasks.

Task Index
Acceptance

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Accept NBS Acceptance: NTP-002

Accept DDM-2000 FiberReach Narrowband Shelf (NBS)

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

General

Acceptance tests of the NBS are performed to ensure that proper installation procedures have been performed.

For *SLC*[®]-2000¹, Release 4.4 or later, and for FiberReach Wide Band Shelf Release 2.0 and higher, the NBS is powered by -48 V DC.

The acceptance tests generally assume the following:

- Accurate and concise system designations and office records are available
- There is an operational *SLC*-2000 DT server
- Any trouble found and not corrected during testing is referred to the responsible installation group
- The test equipment to be used is available, properly tested, and properly calibrated.

1. Obtain the following equipment:

- 216-C tool (COMCODE 102450574) if required
- Digital multimeter (DMM) with an accuracy of 1.0% and an AC/DC input impedance of ≥ 1 megohm.

2. Verify the NBS enclosure is securely mounted.

3. Perform visual inspection of the electronics compartment. **DLP-500**

4. Perform visual inspection of the drop terminal blocks. **DLP-501**

1. Registered trademark of Lucent Technologies Inc.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5. Verify –48 V DC power at the NBS. Measure voltage on the PCU at test points **–48VDC** and **–48VDC RETURN**.

Requirement: –42 to –60 V DC.

DLP-502

-
- 6. STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
-

Task Index
System Turnup/Circuit Order

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Turn Up Narrowband Shelf Rack Mount System Circuit Order: NTP-003
Perform End-to-End System Test Circuit Order: NTP-004
Install and Test Channel Units Circuit Order: NTP-005

Turn Up Narrowband Shelf Rack Mount System

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Summary

This NTP is used to install the common units in the narrowband shelf (PCU, RGU, DSXBIU and CDTU [if equipped]). It also provides references to the system end-to-end tests (NTP-004).

1. Verify that the acceptance procedures in NTP-002 have been performed.
 2. Verify that the required circuit packs to be installed are available.
 3. Determine that the facility DS1 between the Release 4.4 or later SLC-2000 DT server and NBS has been connected.
 4. Obtain the equipment listed below:
 - 216-C tool (COMCODE 102450574) if required
 - DMM (digital multimeter) with an AC (true rms) and DC meter accuracy of 1.0% and an AC and DC input impedance of ≥ 1 megohm.
-



CAUTION:

An electrostatic discharge wrist strap, with a minimum resistance of 250K Ω , should be worn when handling circuit packs to prevent possible damage to the circuit packs. Before using the wrist strap, check it for opens, shorts, and minimum resistance value. If the strap does not pass these checks, it should not be used.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

5. Unlock the electronics compartment door using the 216-C tool,(if required).

6. Install –48 V DC PCU (AUA432).	DLP-502

7. Install RGU (AUA413/AUA423).	DLP-503

8. Install DSXBIU .	DLP-505

 **NOTE:**
At this point, the NE and the FAIL indicator on the DSXBIU will be lit. All other circuit packs should not have any indicators.

9. If only the **FAIL** indicator is lit, repeat DLP-505.

10. Install CDTU (AUA421).	DLP-506

11. Verify that the DS1 signal is present at the DT.

-
12. Turn-up the DSX-1 links to the *SLC-2000*.
-

13. Perform end-to-end tests when required.	NTP-004

14. Install channel units.	DLP-504

15. Update office records.

16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Perform End-to-End System Tests

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Summary

This NTP is used to test the system from the local digital switch (LDS) to the drop terminal block at the NBS (Figure 1). This is accomplished by placing a POTS channel unit in slots one and six of channel unit shelf one and slots seven and twelve of channel unit shelf two.

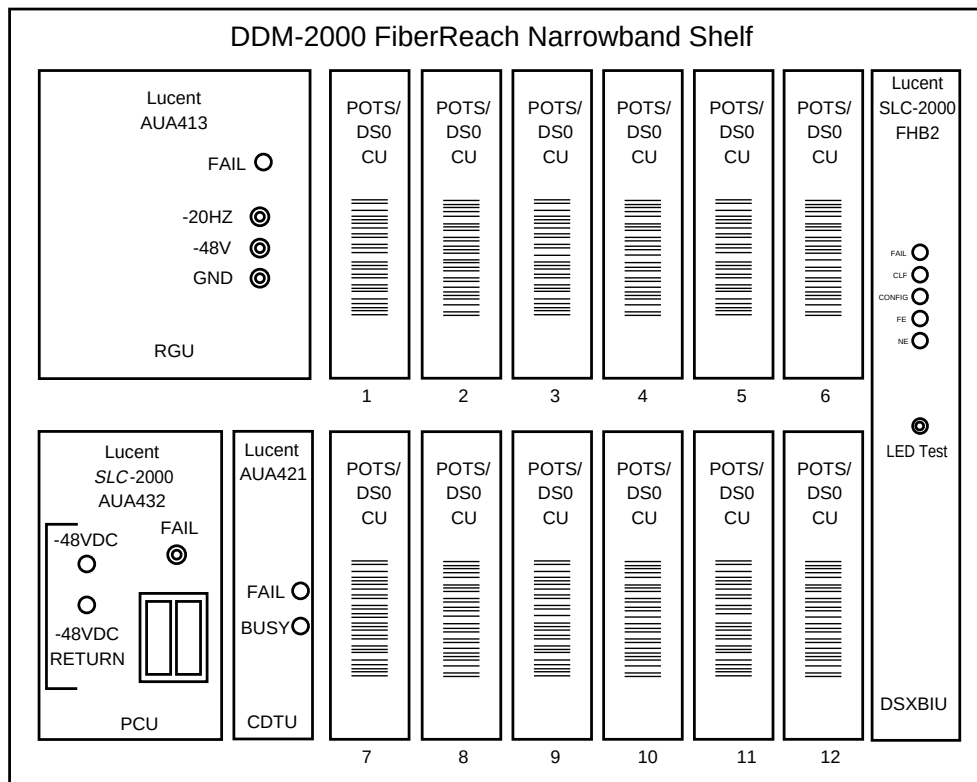


Figure 1 – Narrowband Shelf

DDM-2000 FIBERREACH NARROWBAND SHELF

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

At the LDS

1. Verify that the directory numbers and POTS type of service (loop-start) are assigned to the Logical Line Numbers (LLNs) that are associated with drops 1-24 on shelf 1, and drops 1-24 on shelf 2 of the NBS.
-
2. Verify that there are no alarms associated with the NBS and the SLC-2000 under test.

At the SLC-2000

3. Verify that the T0 cross connections associated with the channel unit slots under test have been made. (Refer to 363-208-003, *SLC-2000 Access System Command and Message Manual*.)
-
4. Verify that the narrowband shelf acceptance procedures (NTP-002) and turnup procedures (NTP-003) have been performed.

At the NBS

5. Verify that there are no visual alarms present on the NBS.
-
6. Verify that the POTS channel units to be installed in slots 1thru 6 and 7 thru 12 are available.
-
7. Remove the Outer NBS enclosure.
-
8. Open electronics compartment door using a 216-type tool (if required).
-
9. Connect your ESD wrist strap to the ESD ground jack located at the lower right front of the NBS enclosure.
-
10. Insert POTS channel units.
-
11. Test NBS drops 1-24 (Shelf 1) and 1-24 (Shelf 2).
-

DLP-507

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

12. Check the narrowband shelf indicators by pressing the LED **TEST** button on the DSXBIU.

Requirement: All LEDs light on the DSXBIU. The FAIL LED lights on the PCU, RGU, POTS Channel Units (CUs) and CDTU (if equipped).

-
13. Verify the alarm reporting system by partially removing the **RGU**.

- **CONFIG** and **NE** LED lights on the DSXBIU.
- **FE** and **MJ** alarms at the NBS.

-
- 14. STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
-

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

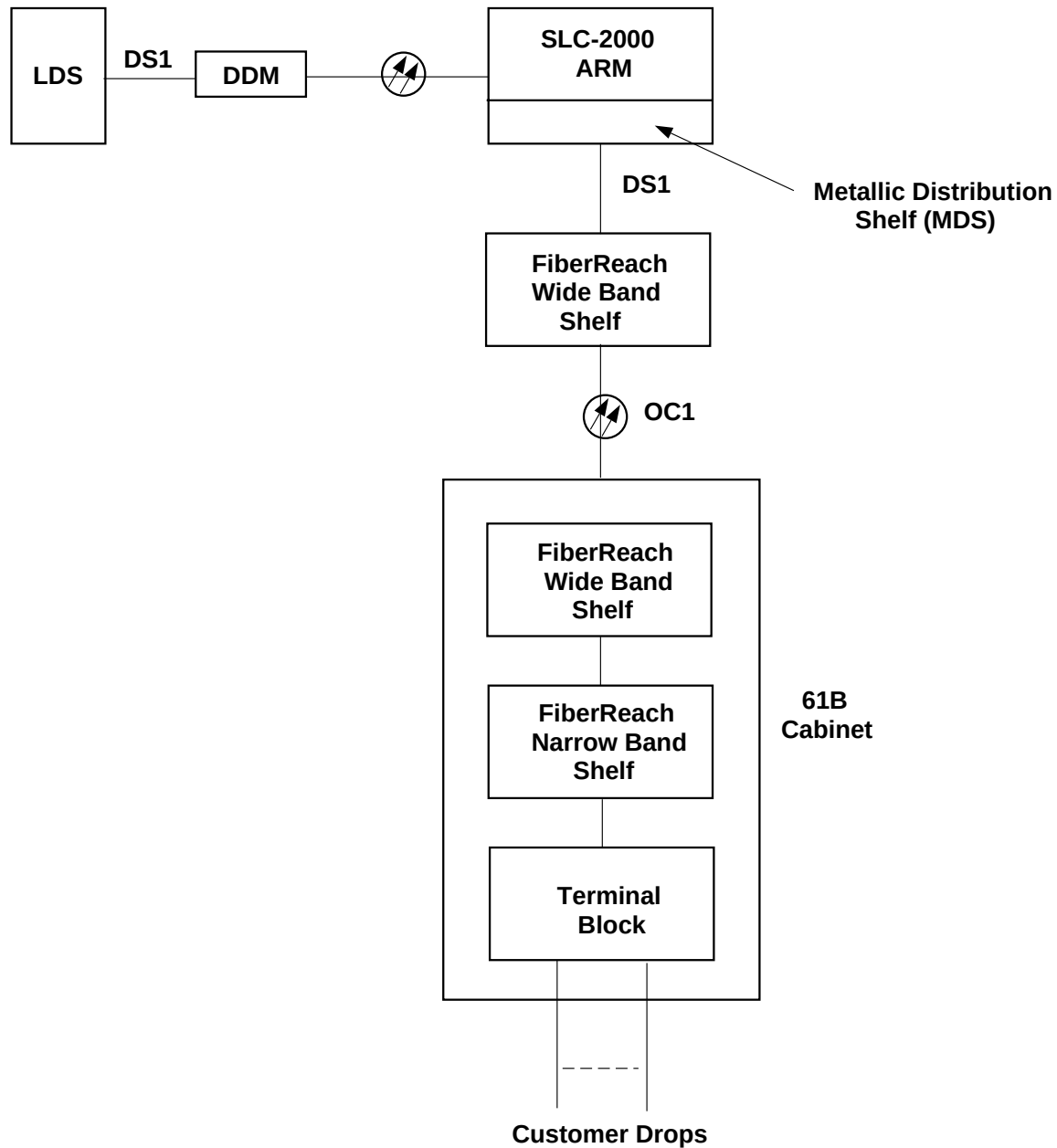


Figure 2 – Basic System Block Diagram

DDM-2000 FIBERREACH NARROWBAND SHELF

Install and Test Channel Units

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Summary

The procedures associated with this NTP tell how to install and test channel units.

These procedures assume the following:

- The acceptance and turn-up procedures in this manual have been completed.
- There are no alarms present on the system.
- All T0 cross-connections are made at the SLC-2000. For more information, refer to the *SLC-2000 Access System Command and Message Manual*.
- The circuits being tested are wired or conditioned for service at the local digital switch (LDS).

Channel Unit Options

Refer to 363-208-001, the *SLC-2000 Access User/Service Manual*, for setting channel unit options.

DO ITEMS BELOW IN ORDER LISTED FOR DETAILS, GO TO

Add Channel Units

To add additional service to an existing NBS, the appropriate channel unit(s) must be installed in the NBS, provisioning must be done at the HDT site, and end-to-end testing performed. Channel units may be added without interrupting existing service.

Channel Unit Installation and Testing Procedures

-
1. Install Channel Units	DLP-504
-
2. STOP. YOU HAVE COMPLETED THIS PROCEDURE.	
-

Task Index Operation

Perform Visual Inspection of the Electronics Compartment.	Detailed Level Procedure: DLP-500
UNUSED	Detailed Level Procedure: DLP-501
Install -48 V DC PCU (AUA432)	Detailed Level Procedure: DLP-502
Install RGU (AUA413/AUA423).	Detailed Level Procedure: DLP-503
Install Channel Units.	Detailed Level Procedure: DLP-504
Install DSXBIU (FHB2)	Detailed Level Procedure: DLP-505
Install CDTU (AUA421).	Detailed Level Procedure: DLP-506
Test ONU Drops 1-24 (Shelf 1) 1-24 (Shelf 2)	Detailed Level Procedure: DLP-507
Set Options on SPQ810 DT Server for Use with FR NBS	Detailed Level Procedure: DLP-508
UNUSED	Detailed Level Procedure: DLP-509
UNUSED	Detailed Level Procedure: DLP-510
Perform <i>SLC-2000</i> NBS MLT Channel Test	Detailed Level Procedure: DLP-511
End-to-End Testing.	Detailed Level Procedure: DLP-512
Determine <i>SLC-2000</i> DT Server Arrangement	Detailed Level Procedure: DLP-513
Rear Access to the Wall DT Cabinet	Detailed Level Procedure: DLP-514
Perform Visual Inspection of the STAC Cabinet.	Detailed Level Procedure: DLP-515

Task Index Trouble Clearing

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Maintenance Philosophy	TAD-100
Clear <i>SLC</i> -2000 NBS Alarms; DT Server Alarms; NE, MJ, and DIGROUP or MN Alarms at HDT	TAP-101
Clear DSXBIU Failure Alarm	TAP-102
Clear RGU Failure Alarm	TAP-103
Clear CDTU Failure Alarm	TAP-104
Clear PCU Failure Alarm	TAP-105
Clear CONFIG Failure Alarm	TAP-106
Clear CU Stuck Relay Alarm	TAP-107
Clear DT Failure Alarm.	TAP-108

Maintenance Philosophy

GENERAL

The SLC-2000 NBS provides up to 48 POTS or special service circuits, up to 40 ISDN lines, or a combination of both.

ALARMS

The SLC-2000 Server unit (*SPQ810/811* SLC-2000 Server) in the SLC-2000 and the DSXBIU in the NBS provide summary alarms for the NBS. The PCU, RGU, CDTU, and DSXBIU at the NBS, and the NBS Server at the RT, all have a FAIL indicator that lights when the circuit pack fails. The SLC-2000 Server provides an alarm interface between the SLC-2000 Carrier System and the Narrow Band Shelf (includes the SLC-2000 Server and Wide Band Shelf interface unit at the RT).

Trouble should be cleared in the SLC-2000 carrier system before attempting to clear NBS system trouble. A SLC-2000 trouble will light alarms on other common units (VTUs, MXRVOs, MDCs, PTUs, etc.) and can be isolated using the user interface panel (UIP) *retrieve-alarms* and *retrieve-faults* commands. Mechanized loop testing (MLT) tests can determine the status of a channel in the NBS. The test will return a DC signature that indicates whether the facility link between the SLC-2000 and NBS is good or bad and indicates possible trouble on the customer drop (off hook, foreign voltage on drop, etc.). MLT test access will be denied on any digroup that has a digroup alarm caused by a carrier system trouble.

The following is a summary of SLC-2000 Server and DSXBIU faceplate alarm indicators.

SLC-2000 Server Alarm Summary

FAIL	The SLC-2000 Server pack has failed self-diagnostic tests.
CLF	Communication with the NBS is lost.
SLC-2000	Trouble with equipment in the NBS.
CONFIG	Placement of a channel unit in the wrong slot or an error in the SLOT ALLOCATION option setting on the SLC-2000 Server channel unit. Correct placement or SLOT ALLOCATION option setting to clear CONFIG alarm. If the SLC-2000 Server is installed per work order, record the digroup channel unit equipage and refer the trouble to the engineering center. If CONFIG and SLC-2000 are both on, the channel unit installation trouble is at the NBS.

DSXBIU Alarm summary

FAIL	The DSXBIU pack has failed self-diagnostic tests.
NE	Trouble with equipment in the NBS.
CLF	Communication with the SLC-2000 Server is lost.
FE	Trouble with SLC-2000 Server.
CONFIG	Placement of a channel unit in the wrong slot or an error in the SLOT ALLOCATION switch setting on the SLC-2000 Server channel unit. Correct channel unit placement or SLOT ALLOCATION option setting to clear CONFIG alarm. If CONFIG and FE are both on, the channel unit installation trouble is at the RT. If CONFIG and NE are both on, the channel unit installation trouble is at the SLC-2000. Note: The CONFIG LED on DSXBIU will flash while a software download is in progress. This is not considered a trouble condition.

TROUBLE ANALYSIS PROCEDURES

A general knowledge of how the SLC-2000 system and DDM-2000 FiberReach NBS system function and what alarm LED indications mean will aid in performing TAPs (trouble analysis procedures). TAPs in this volume generally assume the following:

- The system is equipped with the plug-ins required to make an operating system.
- There may be a single cause for multiple trouble indications.
- Only a single trouble cause is assumed to exist.
- The trouble cause is not caused by a carrier system failure.

In case of an alarmed system failure, the craftsperson is first directed to the SLC-2000 by an examination of **FE** (far end), digroup (A, B, C, or D) indicator, and **MJ** and **MN** indication at the CO equipment. Then the SLC-2000 Server alarm indicators provide further trouble isolation information.

When maintenance for the system is the responsibility of a remote maintenance center, the center will respond to the initial system alarm and dispatch personnel to the appropriate location (CO or RT) to clear trouble. MLT test results may direct the craftsperson to the NBS site.

A craftsperson can connect a craft interface terminal (CIT) at a CO DDM/*SLC*-2000 node and remotely log in to the *SLC*-2000 RT and retrieve a fault and alarm list. The fault list can identify several fault conditions at the NBS.

SLC-2000 NBS system trouble clearing normally begins at the *SLC*-2000 using TAP-101.

Trouble clearing is based on replacement of plug-ins. Any options on replacement plug-ins must be set per the appropriate facility record. Whenever replacement of a plug-in does not cure the trouble, the original plug-in should be returned to operation.

The time interval between when a trouble is cleared and when the alarm LEDs go off is usually less than 35 seconds.

There are several indications that the craftsperson may use to determine whether an error has been made during system maintenance:

- A new circuit pack (CP) is installed in the RT at turn-up or during maintenance. The CP's FAIL indicator (LED) should be observed to ensure that it lights momentarily, then goes off. The absence of this indication should cause the craftsperson to check for proper CP type, option settings, and location.

- A misplaced or missed SLC-2000 Server should always cause the **CONFIG** indicator to light if the circuit pack placement/setting is in conflict with the SLC-2000 Server installation rules.
- If the **FAIL** LED stays on following the replacement of a common unit, the CP is probably failed, is installed in the wrong position, contains incorrectly set options, or another circuit pack/wiring trouble may cause the trouble.

The following procedure may be used when a problem is indicated (as above) following replacement of a unit. A simple verification of craft personnel error may be made as follows: While observing the **FAIL** LED on the unit just replaced, depress the **DSXBIU LED TEST** switch or the **UIP LED TEST** switch (SLC-2000 Access System). If the **FAIL** LED on the replaced CP does not light, a craftsman error of the type listed above is indicated.



CAUTION:

An electrostatic discharge wrist strap, with a minimum resistance of 250K ohms, should be worn and connected to a suitable ground when handling circuit packs to prevent possible damage to the circuit packs. Before using the wrist strap, check it for opens, shorts, and minimum resistance value. If the strap does not pass these checks it should not be used. To avoid possible personal injury while using the wrist strap, do not connect it to the power shelf or adjacent portions of the RT frame. The RT fan unit has an ESD GRD jack for wrist strap connection.

CUSTOMER TROUBLE REPORTS

A customer trouble report is generally an unalarmed trouble and usually indicates a channel unit problem or distribution facility problem.

Single-party, multiparty, and test service trouble reports are first received at the repair service bureau (RSB). The RSB uses MLT to test the circuit if it is available. The result of the MLT is a DC signature that indicates the status of the NBS and drop pair health using the SLC-2000 Server at the RT and the channel and drop test unit (CDTU) at the NBS. The pair gain test controller (PGTC), extended test controller (XTC) PGTC emulation mode, or test bus control unit (TBCU) can test the NBS channel unit and report its results to the MLT system. If the MLT test result reports a problem, a trouble report is initiated to the proper repair force and trouble analysis procedures begin at the RT or NBS depending on the result. If the MLT test result finds no trouble with the NBS system, a replacement of the COT channel unit (if universal) is performed first. Then if the trouble is still present, a replacement of the RT/NBS channel unit is made.

Special service trouble reports are received at the special services center (SSC). The NBS can provide 2-wire locally switched special services, coin service,

4-wire special services, and data service. The **Channel Unit Installation** tab in the *SLC-2000 Access System User/Service Manual*, LTP 363-208-001, contains procedures to install and test channel units for a *SLC-2000* system host. These procedures can be used to clear in-service special service troubles by performing the tasks to add channel service for the type of channel unit that has trouble. These procedures will clear the trouble conditions if the host system is causing the problem. Procedures in this document will clear troubles caused by the NBS system. Customer equipment, drop pairs, or central office (or network) equipment can also cause the trouble condition.

CONCLUSION

When procedures in this document do not locate the trouble, an obscure trouble or multiple troubles are assumed to exist. The necessary schematic drawings (SDs), circuit descriptions (CDs), etc., should be available to assist in locating an obscure wiring problem.

Clear *SLC-2000* NBS System Alarms; DT Server Alarms; NE, MJ, and DIGROUP or MN Alarms at HDT

General

This procedure is used to clear DDM-2000 FiberReach NBS trouble reports when the DT Carrier System is working normally (no alarm indicators on power shelf equipment and other common units except the MJ or MN and possible Digroup alarms). The FiberReach System feature includes the DT Server *SPQ810/811* unit, a DDM-2000 FiberReach OC1 transport ring, and the DT equipment. CO-to-RT carrier system trouble conditions will cause the DT Server or DSXBIU displays to flash when the carrier system fails. The CLF lamp on the DT and the CLF lamp on the DSXBIU will light when the carrier system fails. This procedure is intended to clear trouble reports for a single NBS and starts at the remote terminal (RT) or NBS site. Central office (CO) equipment alarms caused by the NBS feature trouble are typically FE, MJ, DIGROUP or MN. If there are no alarms but there are customer trouble reports, start trouble clearing at the RT unless mechanized loop testing (MLT) test results indicate otherwise. The DT Server and the DSXBIU alarms provide a summary of all trouble conditions and may light the same indicators for different events. It is easy to determine the cause of a single event by indicators on other NBS circuit packs. For multiple trouble conditions, you may clear one trouble and the DSXBIU alarms may change or remain on because of the other event document 363-208-202 provides procedures to clear NBS troubles from a *SLC-2000* system. Refer to Table A in this section to identify alarm and fault messages associated with FITL distribution modes.

⇒ **NOTE:**
The AUA406, AUA408, and SPQ810/811 DT Servers are not supported in *SLC-2000* NBS configurations.

⇒ **NOTE:**
This procedure may direct you to replace the DSXBIU in the NBS or a DT Server at a *SLC-2000* HDT. If you replace the DSXBIU, the system may start to download software into the new DSXBIU. You can verify this by observing that the CONFIG light flashes on the DSXBIU. Wait for the flashing to end. The

download takes about 4 hours. Wait for the download to complete before proceeding to the next step.

1. Is trouble on a single NBS or DT Server, or associated with a shelf 1 or shelf 2), or single digroup?

If **NBS** or **DT** Server, then continue with **Step 2**.

If **otherwise**, then use LTP 363-208-001, *SLC-2000 User Service Manual* to clear multiple channel trouble.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Comment: Events such as a broken distribution fiber cable may cause the CLF indicator to be lit.

2. If you are at the RT, continue with **Step 3**; if you are at the DT or NBS, proceed to **Step 7**; if you are at the central office, go to the RT unless MLT test results indicate otherwise.
3. Press the **LED TEST** button and verify that all DT Server indicators light. Quickly replace the DT Server circuit pack if they do not.

Comment: **For SLC-2000 HDTs**, the **INCOMP** LED on the MDC circuit pack will light and the DT Server's LEDs will not light if the shelf is configured for **METL**. If a replacement DT Server's LEDs do not light, verify that the shelf is configured for **FITL** using the user interface panel (UIP) **SET-DISTN** command. If necessary, remove both **MDC** packs in the shelf (upper or lower section) and change the distribution mode to **FITL**. Then reseal the **MDC** packs and repeat the LED test.

⇒ NOTE:

Verify that the **OUIDSX** option switch on the server is set appropriately.

⇒ NOTE:

Refer to Table A for the *SLC-2000* HDT user interface panel (UIP) alarm and fault messages associated with **FITL** distribution. Refer to Table B for the *SLC-2000* UIP alarm and fault messages associated with LED indicators at the *SLC-2000* HDT and the *SLC-2000* NBS. To view alarm or fault messages, press the UIP **Escape** button. Then press the **Scroll Menu** down arrow until **RETRIEVE-ALARMS: <ent>** or **RETRIEVE-FAULTS:**

<ent> is displayed. Then press **Scroll** Menu down arrow to scroll through the messages.

Table A – SLC-2000 UIP Alarm and Fault Messages Associated with FITL Distribution Mode (Notes)

UIP Alarm Messages		
Severity	Message	Meaning
MJ or MN	{aid} rcvd FITL YEL	Yellow alarm received from NBS
MN	{aid} rcvd MISC	MISC alarm received from NBS
MN	{aid} DT CU failed	CU failed at NBS (Note 1)
MN	{aid} ISDN slot err	ISDN CU placement violation in NBS (Note 2)
MN	{aid} power alarm	Power source failure (Note 3)
ABN	{aid} dnld abort	DSXBIU software download/installation failed
ABN	{aid} downloading	DSXBIU software downloading/installation in progress
MN	{aid} batt chrg fail	DT battery charger failed
MN	{aid} isdn cnflt	NBS ISDN CU placement violation (Note 4)
UIP Fault Messages		
Severity	Message	Meaning
MJ or MN	{aid} biu failed	DSXBIU plu-in failed
MN or MN, NE	{aid} DT CLF	RT-to-NBS carrier-line-failure
MN	{aid} datalink fail	RT-to-NBS ESF datalink failed-
MN	{aid} cu failed	CU failed in NBS

Continued on Next Page

Table A — SLC-2000 UIP Alarm and Fault Messages Associated with FITL Distribution Mode (Notes) (Continued)

UIP Alarm Messages		
Severity	Message	Meaning
MJ or MN	{aid} biu failed	DSXBIU plugin failed
MJ or MN, NE	{aid} DT CLF	RT-to-NBS carrier-line-failure
MN	{aid} datalink fail	RT-to-NBS ESF datalink failed
MN	{aid} cu failed	CU failed in NBS
MN	{aid} door open	DT door(s) open
MJ or MN	{aid} rgu failed	DT ringing generator failed
MN	{aid} pcu failed	DT power converter unit failed
MN	{aid} cdtu failed	DT channel & drop-test unit failed
MN, NE	{aid} config	DT Server configuration error
MJ or MN, NE	{aid} failed	DT Server failed
MN	{aid} incompat	Incompatible CU in NBS
MN	{aid} rcvd misc	MISC alarm received from NBS

Notes:

- The general syntax of UIP messages: Alarm-severity: which end: AID message.
- Each error message will print a circuit pack address identifier {aid}. For FITL error messages, the AID will generally begin with the characters 'dt', with the exception of errors involving the DT Server, which may begin with 'cu' (referencing the MDS CU slot holding the server).
- Note that the DT Server's DT LED will also light when the error is reported by the NBS.
- The NE Activity is indicated where the cause of the message calls for corrective action starting at the RT.
- In the following notes, the SLC-2000 FITL system enhanced alarm reporting is when the SLC-2000 HDT, DT Server and the NBS DSXBIU operation supports the enhanced alarms.
 1. The {aid} reported is of the associated DT Server if the SLC-2000 FITL system operation does not support enhanced alarms. See the *SLC-2000 HDT Software Release 4 Required Circuit Packs for Specific DT Features* table in Chapter 3.
 2. This message is displayed whenever NBS reports ISDN channel unit placement violation.
 3. This message is displayed in those versions of the SLC-2000 NBS that do not support enhanced alarms.
 4. This message is displayed whenever SLC-2000 HDT determines ISDN channel unit placement violation at the NBS.

Table B – SLC-2000 UIP Alarm and Fault Messages Associated with FITL Distribution Mode (Notes)

UIP Alarm Messages		LED Indicators	
Severity	Message	SLC-2000 HDT	NBS (DSXBIU)
MJ or MN	{aid} rcvd FITL YEL	Server — DT	—
MN	{aid} rcvd MISC	Server — DT	Ne
MN	{aid} DT CU failed	Server — DT	Ne
MN	{aid} ISDN slot err	—	Ne/Config
MN	{aid} power alarm	Server — DT	Ne
ABN	{aid} dnld abort	—	—
ABN	{aid} downloading	Server — DT (Flashing)	All LEDs Flashing
MN	{aid} isdn cnflt	MDC — Incomp, Server DT/Config	NC/Config
UIP Fault Messages		LED Indicators	
Severity	Message	SLC-2000 HDT	NBS (DSXBIU)
MJ or MN	{aid} biu failed	Server — DT	FAIL
MJ or MN, NE	{aid} DT CLF	Server — CLF	—
MN	{aid} datalink fail	Server — DT	CLF/Fe
MN	{aid} cu failed	—	Slot Alloc (Flashing)/Fe
MN	{aid} door open	Server — DT	—
MJ or MN	{aid} rgu failed	Server — DT	Ne
MN	{aid} pcu failed	Server — DT	Ne
MN	{aid} cdtu failed	Server — DT	Ne
MN, NE	{aid} config	MDC — incomp	CLF
MJ or MN, NE	{aid} failed	MDC — fail	CLF
MN	{aid} incompat	MDC — incomp, Server — DT/config	Ne/config
MN	{aid} rcvd misc	Server — DT	Ne
The CONFIG lamp on DSXBIU will flash on download.			

4. Examine the DT Server alarms and perform the item below for the lit indicators.

FAIL

Replace DT Server with same option settings.

CLF

- If the **DT** indicator is also on, the fiber facility and transmission from the NBS to the RT are OK. The problem is in the transmit section of the RT (DT Server or NBS) or receive section of the WBS complex.
- To clear the **CLF** with or without the **DT** alarm, perform the following list in the order given. If a replacement circuit pack does not clear the trouble, reinsert the original pack and continue with the next item:
 1. Refer to the Wide Band Trouble Clearing procedures for correcting facility troubles.
 2. Replace the DT Server (see Note 2 in the General section of this TAP).
 3. Proceed to the NBS/WBS and correct any WBS alarms.
 4. Replace the DSXBIU (see TAP-102).
 5. If all steps above were completed and the CLF alarm does not clear, use local procedures to repair fiber or T1 facility and/or wiring troubles.

DTT

Trouble is with the NBS equipment. Proceed to NBS site and go to **Step 7**.

Comment: The DT indicator will flash if the DSXBIU software at the NBS site is in the process of being updated.

CONFIG

Placement of a channel unit in the wrong slot. This alarm should not be lit when troubleshooting the *SLC-2000* NBS feature because this indicator lights during craft personnel activity with an DT Server or CIT at the RT or when a channel unit is installed at the RT or NBS. The **CONFIG** indicator should not be left lit when working with channel units at the RT. If **CONFIG** and **DT** are both lit, the channel unit installation trouble is at the NBS. If only **CONFIG** and no other indicators are lit, check RT and NBS for channel unit conflict.

Comment: Refer to the NBS slot restrictions and alarm information of this document.

5. Was trouble cleared at the RT?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then proceed to NBS and continue with **Step 7.**

6. On **DSXBIU**, are any indicators lit?

If **YES**, then continue with **Step 8.**

If **NO**, then do **TAP-102.**

7. Are any indicators on the **PCU** or **RGU** lit?

If **YES**, then do **TAP-105** or **TAP-103.**

If **NO**, then continue with **Step 9.**

8. Press the **LED TEST** button on the DSXBIU and verify that all **DSXBIU**, **PCU**, **RGU**, and **CDTU** indicators light (quad channel unit **BUSY** LEDs may also light). Quickly replace any circuit pack if any of its indicators do not light. Replace the DSXBIU if the replacement circuit pack indicators do not light (see Note 2 in the General section of this TAP).

Comment: The AUA432 PCU FAIL indicator will not light if the input power to the PCU is not available.

9. At NBS, is **FAIL** indicator lit on any circuit pack?

If **YES**, then continue with **Step 11.**

If **NO**, then proceed to **Step 13.**

10. Replace circuit pack with **FAIL** indicator lit. If more than one FAIL indicator is on, replace the following circuit packs with FAIL lit in the following order:

- **PCU** or **RGU** — Use **TAP-105** and **TAP-103** procedures to replace these circuit packs.
- **DSXBIU** (see **TAP-102**).
- **CDTU** (see **TAP-104**).
- Any channel unit with **FAIL** lit.

11. Did NBS trouble clear?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue with **Step 13.**

12. Examine the **DSXBIU** alarms, and perform the item below for the lit indicators:

FAIL

Replace **DSXBIU**.

NE and **FAIL**

Replace the circuit pack with **FAIL** lit. The links are down and the clock has been lost. The T1 facility has been broken.

NE and no other alarms on any circuit pack

An **NE** and no other NBS alarms can be caused by any combination of the following events:

- Miscellaneous alarm closure. Clear trouble that caused alarm.
- RGU.
- May be caused by failure of a channel unit. A channel unit failure will not cause alarms at the COT and is typically found from a customer trouble report. Remove channel units one at a time to find bad channel unit.



WARNING:

Removing a channel unit will interrupt service if the channel is busy.

CLF

- If the **FE** indicator is also on, the fiber or T1 facility and transmission from the RT to the NBS are OK, and the trouble is in the transmit section from the NBS or the receive section at the RT.
- To clear the **CLF** with or without **FE** alarm, perform the following list in the order given. If a replacement circuit pack does not clear the trouble, reinsert the original pack and continue with the next item:
 1. Clear any alarms on Wide Band Shelf.
 2. Replace the DSXBIU (see Note 2 in the General section of this TAP).
 3. Replace the DT Server (see Note 2 in the General section of this TAP).

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4. If the CLF alarm does not clear, use local procedures to repair fiber or T1 facility and/or wiring troubles.

FE

If only the **FE** DSXBIU indicator is on, the trouble is in the data link between the NBS and RT. Replace the following units:

- DT DSXBIU (see Note 2 in the General section of this TAP).
- Proceed to the RT if trouble did not clear, and quickly replace the DT Server (with same option settings).

CONFIG

Placement of a channel unit in the wrong slot — This NBS alarm should not be lit when troubleshooting the DDM-2000 FiberReach NBS feature because this indicator lights during craft personnel activity with an DT Server or the CIT at the RT or when a channel unit is installed at the RT or NBS. If **CONFIG** and **NE** are both lit, the channel unit installation trouble is at the NBS. If **CONFIG** and **FE** are both lit, the channel unit installation trouble is at the RT. If only **CONFIG** and no other indicators are lit, first check RT and NBS for channel unit conflict. Then verify that the NBS contains the DSXBIU if an AUA94 ISDN channel unit is used. The "**CONFIG** and **NE**" alarm pair does not light for a *SLC-2000* HDT.

Comment: If an AUA94 ISDN channel unit is installed in a valid ISDN slot of an NBS that contains a quad POTS channel unit in slot 6 or slot 12, the **NE** and **CONFIG** LEDs on the DSXBIU will light. In addition, the **FAIL** LED on the AUA94 channel unit will light. To clear this incompatibility alarm, you must remove the ISDN channel unit. You then must remove the quad POTS channel unit to clear timeslots for the ISDN D channels (either 23 or 24). After this, you may reinsert the ISDN channel unit without generating an alarm. The last channel unit inserted generating the incompatibility alarm must be removed first.

14. If the trouble condition could not be cleared by circuit pack replacement, refer to the appropriate schematic drawing for NBS channel bank, or appropriate applications schematic) to correct NBS wiring trouble.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear DSXBIU Failure Alarm

Summary

This procedure tells how to clear an DSXBIU failure alarm. As a stimulus to perform this procedure, you have retrieved an DT failure alarm message from the CIT port in the *SLC-2000* host and observed a **FAIL** LED indication on the DSXBIU at the NBS site. You could also have been directed to go to the NBS site by the surveillance center. If both the **FAIL** and **NE** lamps are on, we have facility problems. If the **FAIL** lamp only is on, we have a bad board.

1. Remove the NBS outer cover.
2. Open the electronics compartment door using the 216-type tool (if required).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the electronics compartment.
4. Verify that the **FAIL** LED on the DSXBIU is lit.
5. Remove the failed DSXBIU.
6. Locate the DSXBIU to be installed and inspect the unit for damage.
7. Install the replacement DSXBIU.

Within one minute, the **FAIL** LED begins to quickly flash (two times/second) to indicate that the software is being downloaded. The LED should flash for approximately six minutes.



NOTE:

If the ONU is not communicating with the HDT, the **CONFIG** LED will flash slowly.

8. Is the **FAIL** LED extinguished?

If **YES**, then continue with **Step 11**.

If **NO**, then proceed to **Step 10**.

9. Has the replacement unit that was installed in **Step 8** been replaced while performing this trouble procedure?

If **YES**, escalate to next level of support.

If **NO**, replace unit by repeating this procedure starting at **Step 5**.

10. Press **LED TEST** button on DSXBIU.

Requirement: All indicators light on DSXBIU and the NBS.

If all indicators do not light, replace the DSXBIU by repeating this procedure starting at **Step 5**.

11. Remove your wrist strap, secure the electronics compartment, and replace the ONU outer cover.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear RGU Failure Alarm

Summary

This procedure tells how to clear an DSXBIU failure alarm. As a stimulus to perform this procedure, you have retrieved an DT failure alarm message from the CIT port in the SLC-2000 host and observed a **FAIL** LED indication on the DSXBIU at the NBS site. You could also have been directed to go to the NBS site by the surveillance center. If both the **FAIL** and **NE** lamps are on, we have facility problems. If the **FAIL** lamp only is on, we have a bad board.

1. Remove the NBS outer cover.
2. Open the electronics compartment door using the 216-type tool (if required).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the electronics compartment.
4. Verify that the **FAIL** LED on the RGU is lit.
The **NE** LED on the DSXBIU is also lit.
5. Is rightmost fuse blown on the faceplate of the PCU?

If **YES**, replace fuse and repeat **Step 4**.

If **NO**, proceed to **Step 6**.



CAUTION:

Before removing the RGU, unlatch the unit and wait 1 minute for capacitors to discharge.

6. Remove the failed RGU.
7. Locate the RGU to be installed and inspect the unit for damage.
8. Install the replacement RGU.

9. Is the **FAIL** LED extinguished?

If **YES**, then continue with Step **11**.

If **NO**, then proceed to Step **10**.

10. Has the replacement unit that was installed in **Step 8** been replaced while performing this trouble procedure?

If **YES**, escalate to next level of support.

If **NO**, replace unit by repeating this procedure starting at **Step 6**.

11. Press **LED TEST** button on DSXBIU.

Requirement: **FAIL** LED lights on RGU.

If LED does not light, replace the RGU by repeating this procedure starting at **Step 6**.

12. Measure RGU AC and DC ringing voltages between **–20 Hz** and **GND**.

Requirement: AC ringing voltage: 75 to 85 V AC RMS
DC ringing voltage: –42 to –70 V DC.

13. Measure RGU DC voltage between **–48V** and **GND**.

Requirement: DC voltage: –42 to –60 V DC.

14. Were RGU voltage requirements met?

If **YES**, continue with **Step 15**.

If **NO**, replace the RGU by repeating this procedure from **Step 6**.

15. Remove your wrist strap, secure the electronics compartment, and replace the ONU outer cover.

16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear CDTU Failure Alarm

Summary

This procedure tells how to clear an DSXBIU failure alarm. As a stimulus to perform this procedure, you have retrieved a DT failure alarm message from the CIT port in the *SLC-2000* host and observed a **FAIL** LED indication on the DSXBIU at the NBS site. You could also have been directed to go to the NBS site by the surveillance center. If both the **FAIL** and **NE** lamps are on, we have facility problems. If the **FAIL** lamp only is on, we have a bad board.

1. Remove the NBS outer cover.
2. Open the electronics compartment door using the 216-type tool (if required).
3. Connect your electrostatic discharge wrist strap to the ESD ground jack located at the lower left front of the electronics compartment.
4. Verify that the **FAIL** LED on the CDTU is lit.
The **NE** LED on the DSXBIU is also lit.
5. Is rightmost fuse (3.0A) blown on the faceplate of the PCU?

If **YES**, replace fuse and repeat **Step 4**.

If **NO**, proceed to **Step 6**.

6. Remove the failed CDTU.
7. Locate the CDTU to be installed and inspect the unit for damage.
8. Install the replacement CDTU.
9. Is the **FAIL** LED extinguished?

If **YES**, then continue with **Step 11**.

If **NO**, then proceed to **Step 10**.

10. Has the replacement unit that was installed in **Step 8** been replaced while performing this procedure?

If **YES**, escalate to next level of support.

If **NO**, replace unit by repeating this procedure starting at **Step 6**.

11. Press **LED TEST** button on DSXBIU.

Requirement: **FAIL** and **BUSY** LEDs light on CDTU.

If LEDs do not light, replace the CDTU by repeating this procedure starting at **Step 6**.

12. Remove your wrist strap, secure the electronics compartment, and replace the ONU outer cover.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear PCU Failure Alarm

SUMMARY:

This procedure tells how to clear an PCU failure alarm. As a stimulus to perform this procedure, you have retrieved an alarm message from the the *SLC-2000* host that indicates a problem at the NBS. You could also have been directed to go to the NBS site by the surveillance center or you could have observed a **FAIL** LED indication on the PCU at the NBS site.

1. Remove the NBS outer cover.
2. Open the electronics compartment door using the 216-type tool (if required).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the electronics compartment.
4. Verify that the **FAIL** LED on the PCU is lit.



CAUTION:

Before removing the PCU, unlatch the unit and wait 1 minute for capacitors to discharge.

5. Remove the failed PCU.
6. Locate the PCU to be installed and inspect the unit for damage.
7. Check for a blown fuse.
8. Ensure that fuses are installed in fuse holder on faceplate.
9. Install the replacement PCU.
10. Is the **FAIL** LED extinguished?

If **YES**, then continue with **Step 12**.

If **NO**, then proceed to **Step 11**.

11. Has the replacement unit that was installed in **Step 9** been replaced while performing this procedure?

If **YES**, escalate to next level of support.

If **NO**, replace unit by repeating this procedure starting at **Step 5**.

12. Press **LED TEST** button on DSXBIU.

Requirement: **FAIL** LED lights on PCU.

If LED does not light, replace the PCU by repeating this procedure starting at **Step 5**.

13. Measure voltage at test points **–48VDC** and **–48VDC RETURN**.

Requirement: **–42 to –60 V DC**.

14. Were PCU voltage requirements met?

If **YES**, continue with **Step 15**.

If **NO**, replace PCU by repeating this procedure from **Step 5**.

15. Remove your wrist strap, secure the electronics compartment, and replace the ONU outer cover.

16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear CONFIG Failure Alarm

Summary

This procedure tells how to clear an **CONFIG** failure alarm. As a stimulus to perform this procedure, you have observed a **CONFIG** LED indication on the **DSXBIU**. This alarm indicates a configuration problem at the NBS. It may be caused by one of the following:

- Channel unit installed in an invalid slot
- Unsupported channel unit installed
- Invalid common circuit pack installed
- Incorrect configuration/mode set for the type of channel unit installed
- Other configuration conflicts



NOTE:

The **CONFIG** LED will flash when a software installation is in progress. This is not an alarm indication.

1. Remove the NBS outer cover.
2. Open the electronics compartment door using the 216-type tool (if required).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the electronics compartment.
4. Verify that the **CONFIG** and **NE** LEDs are lighted on the DSXBIU.
5. Using the circuit order list for this NBS, check the following:
 - Correct channel unit is installed in the correct slot.
 - Correct common units are installed.
 - Ringing generator is latched in place.
 - Channel and drop test unit is latched in place (if equipped).
6. When the trouble is cleared, remove your wrist strap, secure the electronics compartment, and replace the NBS outer cover.

7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear CU Stuck Relay Alarm

SUMMARY

This procedure tells how to clear an DSXBIU failure alarm. As a stimulus to perform this procedure, you have retrieved an DT failure alarm message from the CIT port in the *SLC-2000* host and observed a **FAIL** LED indication on the DSXBIU at the NBS site. You could also have been directed to go to the NBS site by the surveillance center. If both the **FAIL** and **NE** lamps are on, we have facility problems. If the **FAIL** lamp only is on, we have a bad board.

1. Remove the NBS outer cover.
2. Open the electronics compartment door using the 216-type tool (if required).
3. Connect your electrostatic discharge wrist strap to the ESD ground jack located at the lower left front of the electronics compartment.
4. Locate the channel unit that has the stuck relay.
5. Verify that none of the up to four drops assigned to this unit are busy.
6. Replace and test the channel unit (**NTP-005**).
7. Verify that the CU stuck relay alarm has cleared.



NOTE:

The CDTU may also cause the channel unit stuck relay alarm.

8. If stuck relay alarm does not clear, replace CDTU.
9. When the trouble is cleared, remove your wrist strap, secure the electronics compartment, and replace the ONU outer cover.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Clear DT Failure Alarm

Summary

This procedure tells how to clear an DSXBIU failure alarm. As a stimulus to perform this procedure, you have retrieved a DT failure alarm message from the CIT port in the *SLC-2000* host and observed a **FAIL** LED indication on the DSXBIU at the NBS site. You could also have been directed to go to the NBS site by the surveillance center. If both the **FAIL** and **NE** lamps are on, we have facility problems. If the **FAIL** lamp only is on, we have a bad board. This alarm will more than likely indicate a fault in other system facilities. However, if you go to the NBS, use the following procedure as a guide.

1. Remove the NBS outer cover.
2. Open the electronics compartment door using the 216-type tool (if required).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the electronics compartment.
4. Check the LEDs on the DSXBIU and the other NBS circuit packs. Change faulty circuit pack.
5. When the trouble is cleared, remove your wrist strap, secure the electronics compartment, and replace the NBS outer cover.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Perform Visual Inspection of the Electronics Compartment

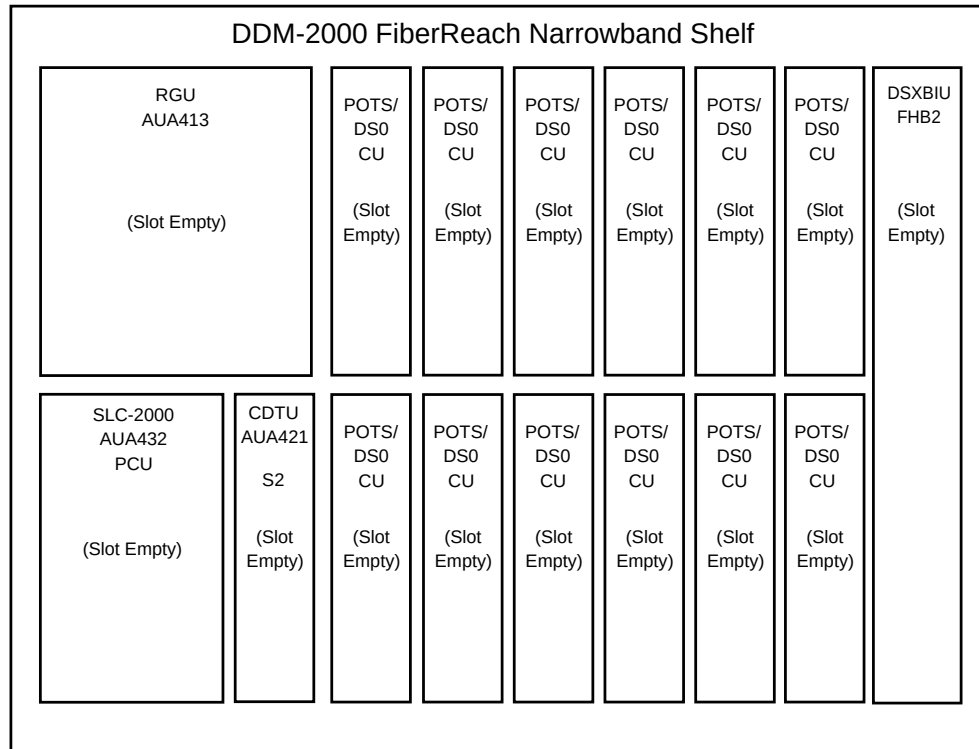
1. Open the electronics compartment door using the 216-type tool (if required).
2. Verify that no plug-in units are installed in the NBS slots (Figure 1).
3. Remove any units that are installed.
4. Verify that NBS is tightly secured and free of defects or damage.
5. If problems exist, contact responsible installation group or call **1-800-255-RTAC**.
6. Verify that there are no broken, bent, or misaligned contacts on the backplane connectors.
7. If problems exist, contact responsible installation group.
8. Is one channel unit plug-in of any type available?

If **YES**, then continue with **Step 9**.

If **NO**, then proceed to **Step 13**.

9. Check for a misaligned or bowed shelf by inserting a channel unit into slot 1 of NBS shelf.

10. Remove the channel unit.
11. Repeat Step 9 and Step 10 for slots 6, 7, and 12 of the shelf.
12. Secure the electronics compartment door using the 216-type tool (if required).
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**



tpa 843648/06

Figure 1 – DDM-2000 FiberReach Narrowband Shelf

UNUSED

Install –48 V DC PCU (AUA432)

Summary

This procedure tells how to install the 48 V DC PCU in the PCU slot on the NBS.

1. Remove the outer ONU enclosure and open the electronics compartment door using the 216-type tool (if required).
2. Locate the mounting location for the PCU on the NBS (Figure 1).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the ONU enclosure.
4. Locate the PCU to be installed.
5. Inspect the unit for damage.

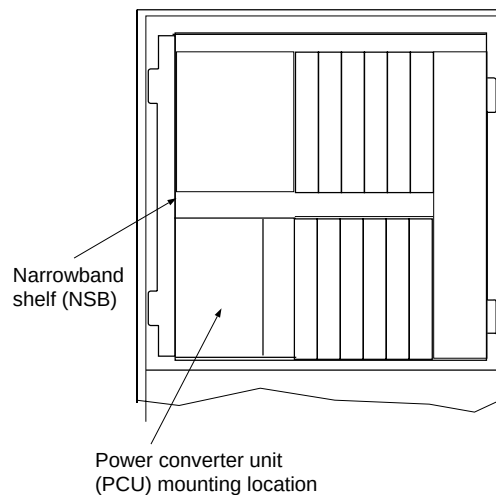


Figure 1 – Front View of Narrowband Shelf

6. Ensure that fuses are installed in fuse holder on faceplate (Figure 2).
7. Install unit in PCU slot.
8. Is **FAIL** indicator lit on PCU?

If **YES**, continue with **Step 9**.

If **NO**, proceed to **Step 12**.



CAUTION:

Before removing the PCU from the narrowband shelf, unlatch the unit and wait 1 minute for capacitors to discharge.

9. Replace PCU.
10. Is **FAIL** indicator lit?

If **YES**, continue with **Step 11**.

If **NO**, proceed to **Step 12**.

11. Contact the responsible installation group to locate and repair wiring troubles.
12. Measure voltage at test points **–48VDC** and **–48VDC RETURN** (Figure 2).
Requirement: **–42 V to –60 V DC**.
13. Were PCU voltage requirements met?

If **YES**, proceed to **Step 14**.

If **NO**, replace PCU and repeat this procedure from **Step 10**.

14. If you are not continuing with the turn up procedure, disconnect your wrist strap, secure the electronics compartment door, and replace the ONU enclosure.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

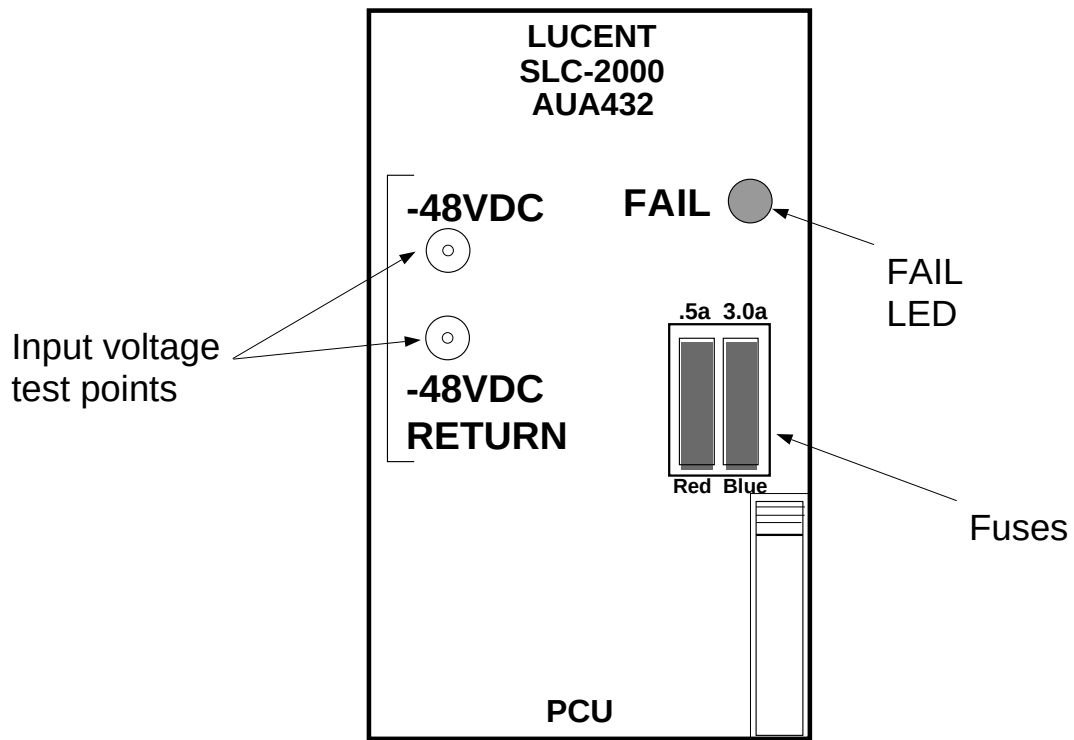


Figure 2 – -48 V DC AUA432 PCU

Install RGU (AUA413/AUA423)

Summary

This procedure tells how to install the ringing generator unit (RGU) in the RGU slot on the NBS.

1. Open the electronics compartment door using the 216-type tool (if required).
2. Locate the mounting location for the RGU on the NBS (Figure 1).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the NBS enclosure.
4. Locate the RGU to be installed.
5. Inspect the unit for damage.

Ringling generator unit
(RGU) mounting location

Narrowband
shelf (NBS)

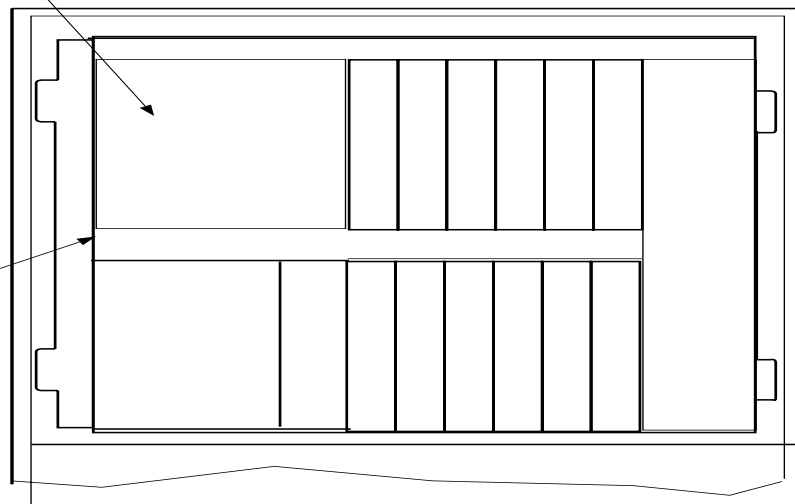


Figure 1 – Front View of Narrowband Shelf

DDM-2000 FIBERREACH NARROWBAND SHELF

6. Install unit in RGU slot.
7. Is **FAIL** indicator lit on RGU?

If **YES**, continue with **Step 8**.

If **NO**, proceed to **Step 11**.



CAUTION:

Before removing the RGU from the narrowband shelf, unlatch the unit and wait 1 minute for capacitors to discharge.

8. Replace the RGU.
9. Is **FAIL** indicator lit?

If **YES**, continue with **Step 10**.

If **NO**, proceed to **Step 11**.

10. Contact the responsible installation group to locate and repair wiring troubles.
11. Measure RGU AC and DC ringing voltages between **–20 Hz** and **GND**.
Requirement: AC ringing voltage: 75 to 85 V AC RMS
DC ringing voltage: –42 to –70 V DC.
12. Measure RGU DC voltage between **–48V** and **GND**.
Requirement: DC voltage: –42 to –60 V DC.
13. Were RGU voltage requirements met?

If **YES**, proceed to **Step 14**.

If **NO**, replace RGU and repeat this procedure from **Step 9**.

14. If you are not continuing with the turn up procedure, disconnect your wrist strap, secure the electronics compartment door, and replace the NBS enclosure.

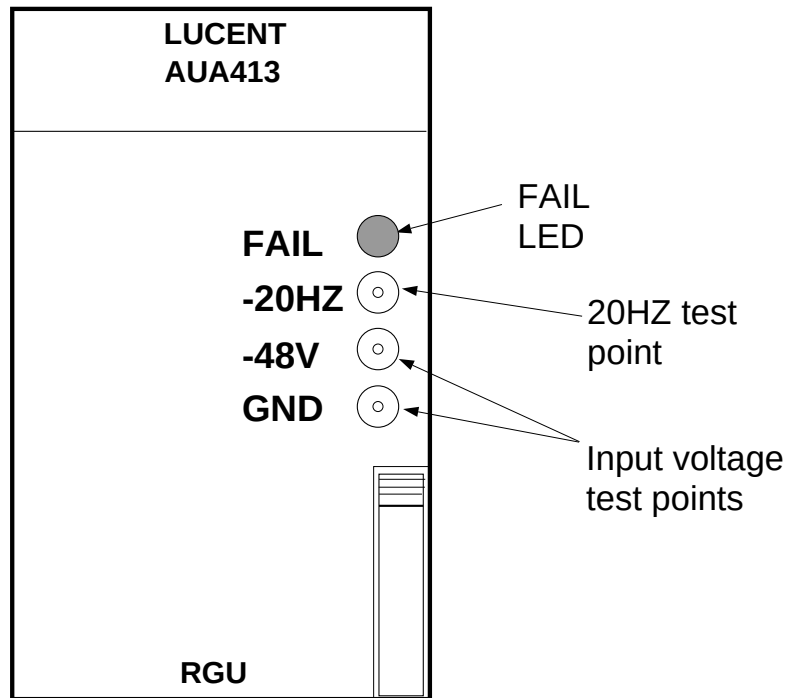


Figure 2 – AUA413 RGU

Install Channel Units

Summary

This procedure tells how to install channel units in the NBS (Figure 1).

➡ **NOTE:**
Before performing this procedure, verify that the the following common units (DSXBIU,PCU, RGU, and CDTU [optional]) are installed in NBS and the CLF lamp is cleared.

1. Open the electronics compartment door using the 216-type tool (if required).
2. Connect your ESD wrist strap to the ESD ground jack located at the lower right front of the ONU enclosure.

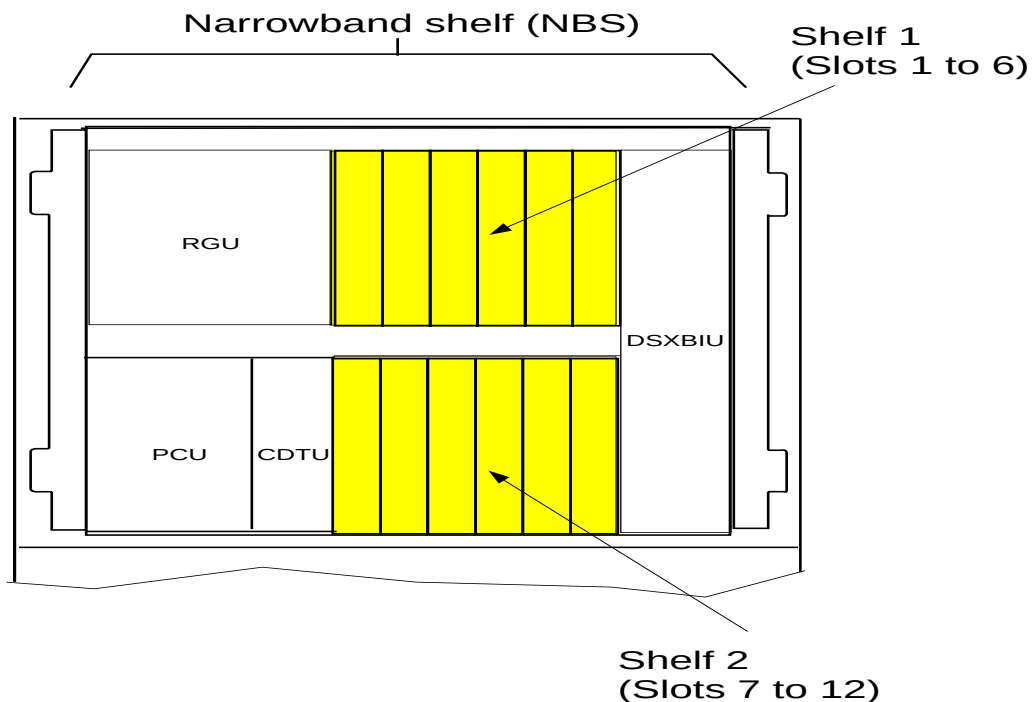


Figure 1 – Front View of Narrowband Shelf

DDM-2000 FIBERREACH NARROWBAND SHELF

3. Locate the two channel unit shelves in the NBS (Figure 1).
4. From work order, determine the shelf and the channel unit slot for the channel unit to be installed.
5. Install the channel unit in the appropriate shelf and slot.

Normally, there will be no alarms. But if the **NE** LED lights on the DSXBIU or the **NE** and the **CONFIG** LEDs light on the DSXBIU, the following trouble-clearing steps should be performed:

- If only the **NE** LED is lit, replace the channel unit.
 - If both **NE** and **CONFIG** lamps are lit, the channel unit just installed is not compatible with the system configuration. Remove the incompatible channel unit and verify the assignment with the work order.
6. Repeat Step 5 for each channel unit to be installed.
 7. Update records per local practice.
 8. Perform channel unit tests as required by referring to **NTP-005**.
 9. If you are not continuing with the turn up procedure, disconnect your wrist strap, secure the electronics compartment door, and replace the ONU enclosure.
 10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Install DSXBIU (FHB2)

Summary

This procedure tells how to install the DSXBIU in the DSXBIU slot on the NBS.

1. Remove the outer ONU enclosure and open the electronics compartment door using the 216-type tool (if required).
2. Locate the mounting location for the DSXBIU on the NBS (Figure 1).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the ONU enclosure.
4. Locate the DSXBIU to be installed.
5. Inspect the unit for damage.

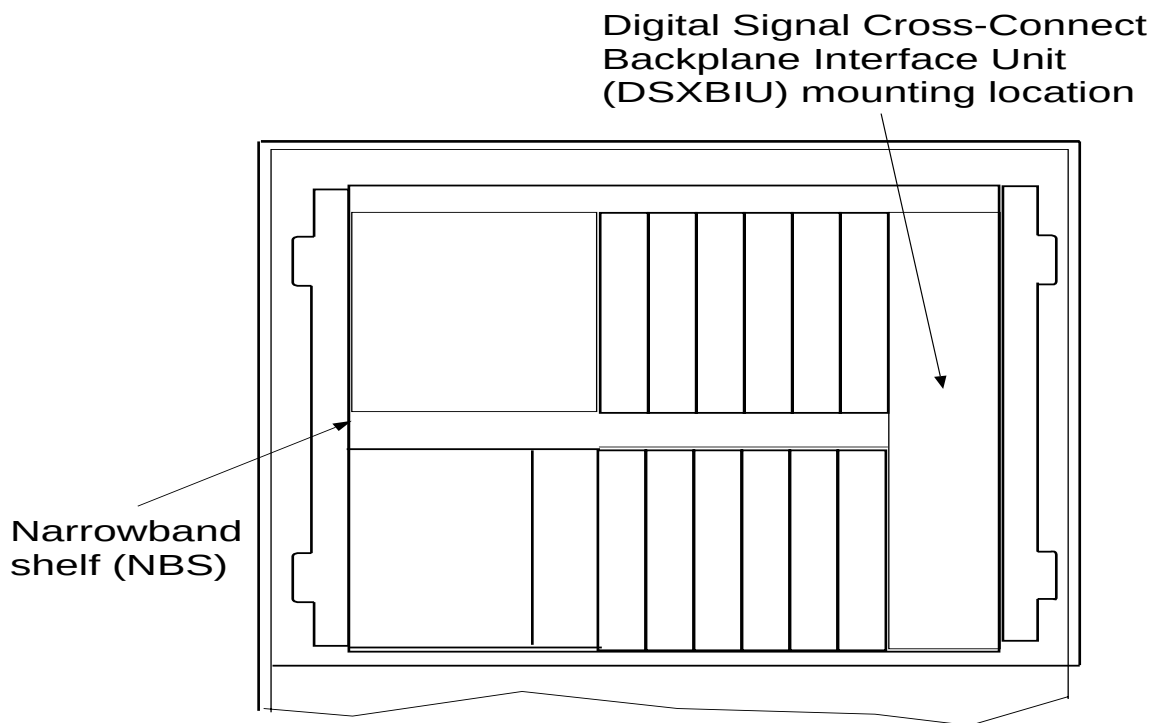


Figure 1 – Front View of Narrowband Shelf

6. Install unit in DSXBIU slot.
7. Wait 30 seconds for initialization. The **FAIL** and the **NE** light should be lit.
8. Is only the **FAIL** indicator lit on DSXBIU?

If **YES**, continue with **Step 9**.

If **NO**, proceed to **Step 12**.

9. Replace the DSXBIU.
10. Is **FAIL** indicator still the only light lit on DSXBIU?

If **YES**, continue with **Step 11**.

If **NO**, proceed to **Step 12**.

11. Replace the original DSXBIU and perform the following to clear condition indicator:
 - Replace PCU.
12. Press **LED TEST** pushbutton on DSXBIU (Figure 2).

Response: All LEDs light on the DSXBIU, PCU, RGU, and CDTU.



NOTE:

The LEDs stay lit for approximately 10 to 15 seconds after LED Test pushbutton is released.

13. Do all indicators light?

If **YES**, then continue with **Step 14**.

If **NO**, replace circuit pack(s) that contain indicators that do not light and repeat LED test.

If **NO RESPONSE**, replace DSXBIU and repeat from **Step 7** of this procedure.

If **NO** or **NO RESPONSE** after replacement, contact the responsible installation group to clear wiring trouble.

14. If you are not continuing with the turn up procedure, disconnect your wrist strap, secure the electronics compartment door, and replace the NBS enclosure.

15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

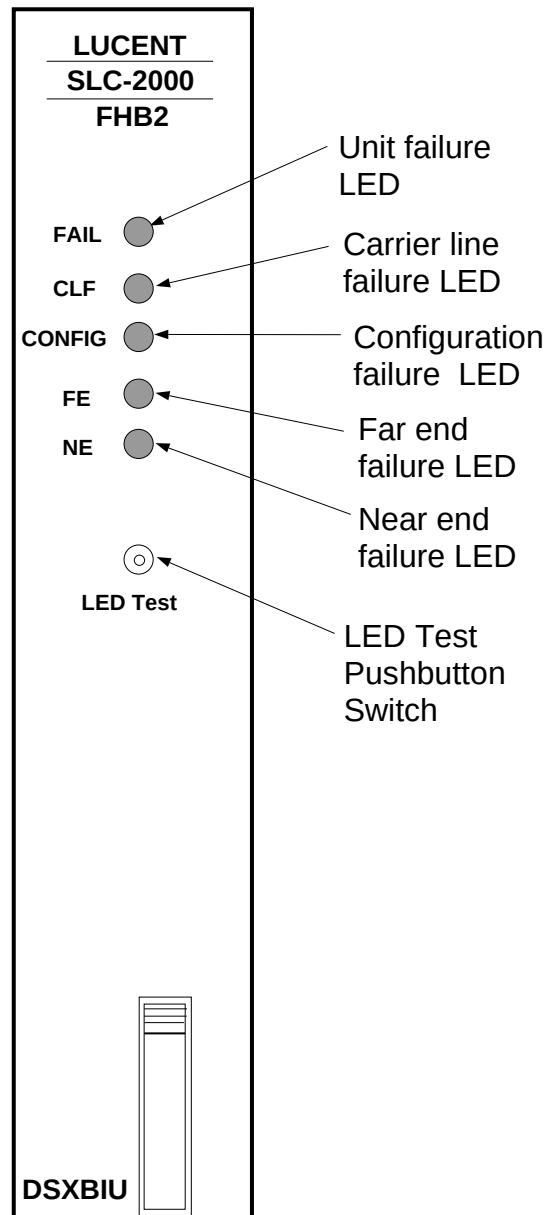


Figure 2 – Faceplate of DSXBIU

Install CDTU (AUA421)

Summary

This procedure tells how to install the CDTU in the CDTU slot on the NBS.

1. Remove the outer NBS enclosure and open the electronics compartment door using the 216-type tool (if required).
2. Locate the mounting location for the CDTU on the NBS (Figure 1).
3. Connect your ESD wrist strap to the ESD ground jack located at the lower left front of the NBS enclosure.
4. Obtain the CDTU to be installed.

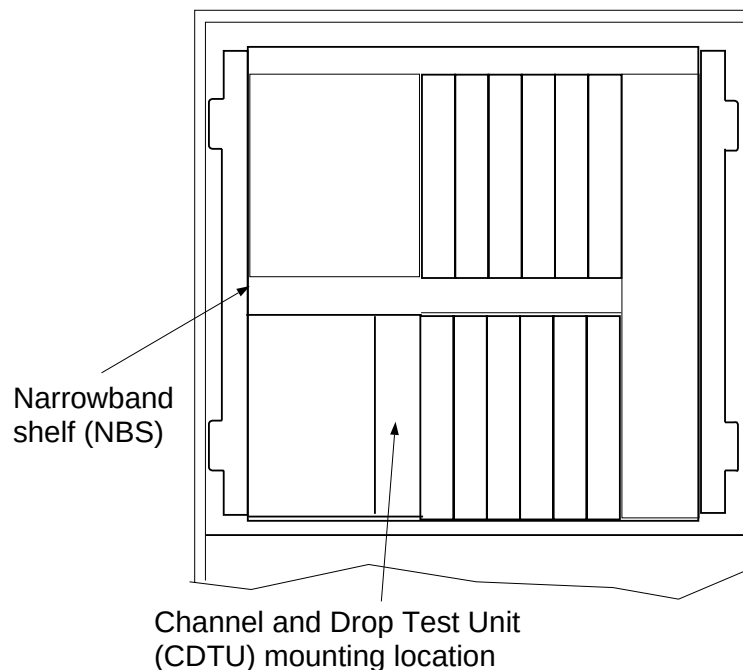


Figure 1 – Front View of Narrowband Shelf

5. Inspect the unit for damage.
6. Install unit in CDTU slot.
7. Is **FAIL** indicator lit on CDTU (Figure 2)?

If **YES**, continue with **Step 8**.

If **NO**, proceed to **Step 11**.

8. Replace the CDTU.
9. Is **FAIL** indicator lit?

If **YES**, continue with **Step 10**.

If **NO**, proceed to **Step 11**.

10. Replace the original CDTU. Contact the responsible installation group to locate and repair wiring trouble.
11. Press **LED TEST** on DSXBIU and verify that the **CDTU** indicators light.



NOTE:

The LEDs stay lit for approximately 10 to 15 seconds after LED Test pushbutton is released.

12. Do both indicators light?

If **YES**, proceed to **Step 17**.

If **NO**, continue with **Step 13**.

13. Replace the CDTU and repeat LED test.
14. Do both indicators light?

If **YES**, proceed to **Step 17**.

If **NO**, continue with **Step 15**.

15. Replace DSXBIU and repeat LED test.
16. Do both indicators light?

If **YES**, proceed to **Step 17**.

If **NO**, contact responsible installation group to clear wiring trouble.

17. If you are not continuing with the turn up procedure, disconnect your wrist strap, secure the electronics compartment door, and replace the NBS enclosure.
18. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

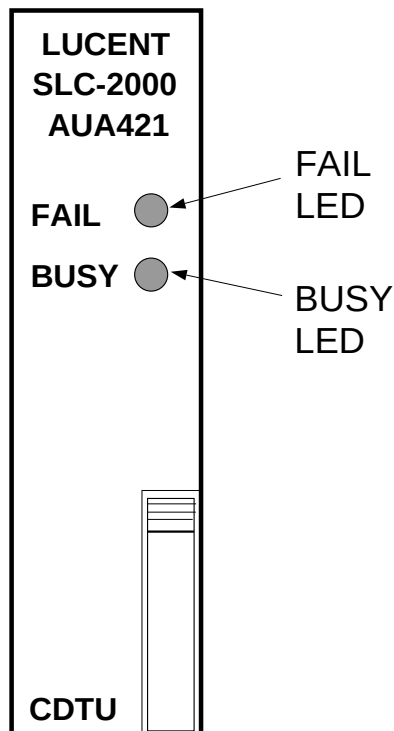


Figure 2 – AUA421 CDTU

Test NBS Drops 1-24 (Shelf 1) 1-24 (Shelf 2)

Summary

This procedure uses SPQ 400 QUAD POTS channel units to test the channel facility from the local digital switch (LDS) to the drop TB1 or comparable access block. The loop-start function is used for this test. At the local digital switch (LDS), verify that the channel service and telephone number assignments have been made for the drops (1-24 [Shelf 1] and 1-24 [Shelf 2]) being tested. At the NBS, locate the channel unit slots on the narrowband shelves and connections on TB1 or comparable access block. Connect a test telephone with the ringer set for bridged ringing to the drop terminal connections. Make dialing, ringing, talking, and ring-trip tests on each of the four drops.

1. At the LDS, verify that the logical line number (LLN) is assigned to the proper type of service and that there is an assigned telephone number for the circuit under test.
2. At the HDT, verify that the T0 cross-connects are provisioned.
3. At the NBS, remove the outer enclosure and open the electronics compartment door using a 216-C tool.
4. Connect your electrostatic discharge wrist strap to the ESD ground jack located at the lower left front of the NBS enclosure.
5. Locate slot 1 on shelf 1 of the NBS (Figure 1).

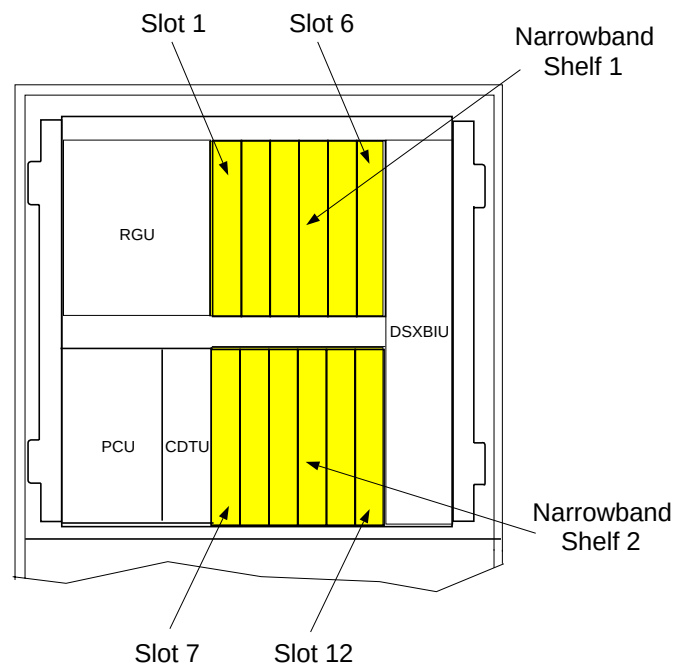


Figure 1 – Front View of Narrowband Shelf

6. Locate the channel unit to be installed.

Comment: One channel unit can provide service for four drops.

7. Install the channel unit in slot 1 of shelf 1.

Normally, there will be no alarms. But if the **NE** LED lights on the DSXBIU or the **NE** and the **CONFIG** LEDs light on the DSXBIU, the following trouble-clearing steps should be performed:

- If only the **NE** LED is lit, replace the channel unit.
- If both **NE** and **CONFIG** lamps are lit, the channel unit just installed is not compatible with the system configuration. Remove the incompatible channel unit and verify the assignment with the work order.

8. Locate the drop terminal access door on the side of the NBS (Figure 2).
9. Access the telephony field TB1 by turning the two nylon fasteners one-quarter of a turn in the clockwise direction (Figure 2).

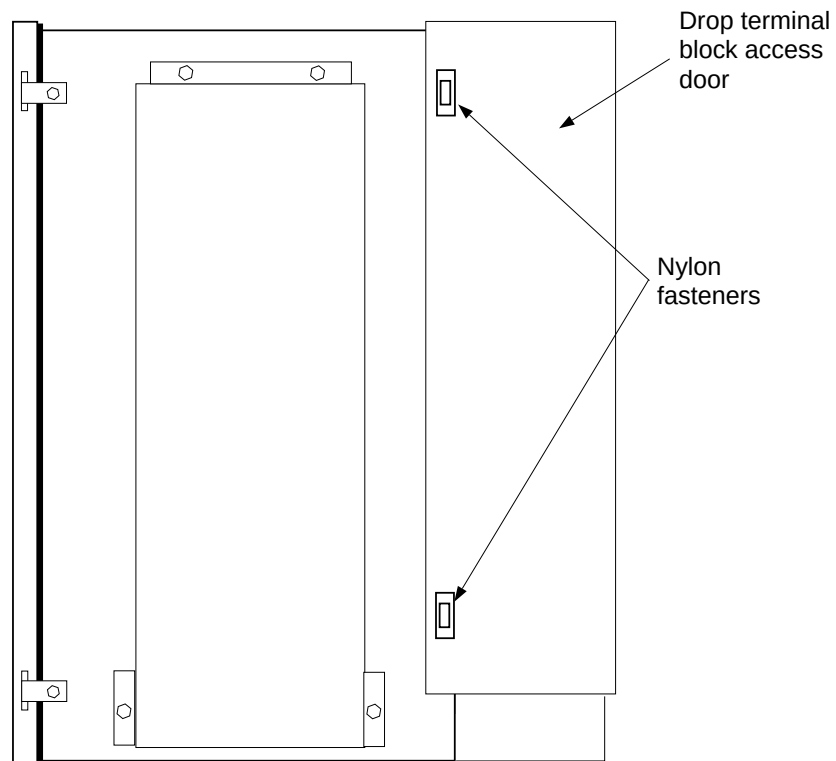


Figure 2 – Side View of NBS Enclosure

10. Locate TB1 (Figure 3).
11. Set the test telephone for bridged ringing.

12. Connect the test telephone to the tip (white) and ring (orange) terminals of **CU1,A** (Figure 3).

⇒ **NOTE:**
The terminal block designation **CU1,A** through **CU1,D** corresponds to the four drops coming from the channel unit mounted in slot 1. Likewise, **CU6,D** corresponds to the fourth drop coming from the channel unit mounted in slot 6; **CU7,A** corresponds to the first drop coming from the channel unit mounted in slot 7; and **CU12,D** corresponds to the fourth drop coming from the channel unit mounted in slot 12. The terminal assignments for all 12 shelf slots are shown on the inside of the drop terminal block access door.

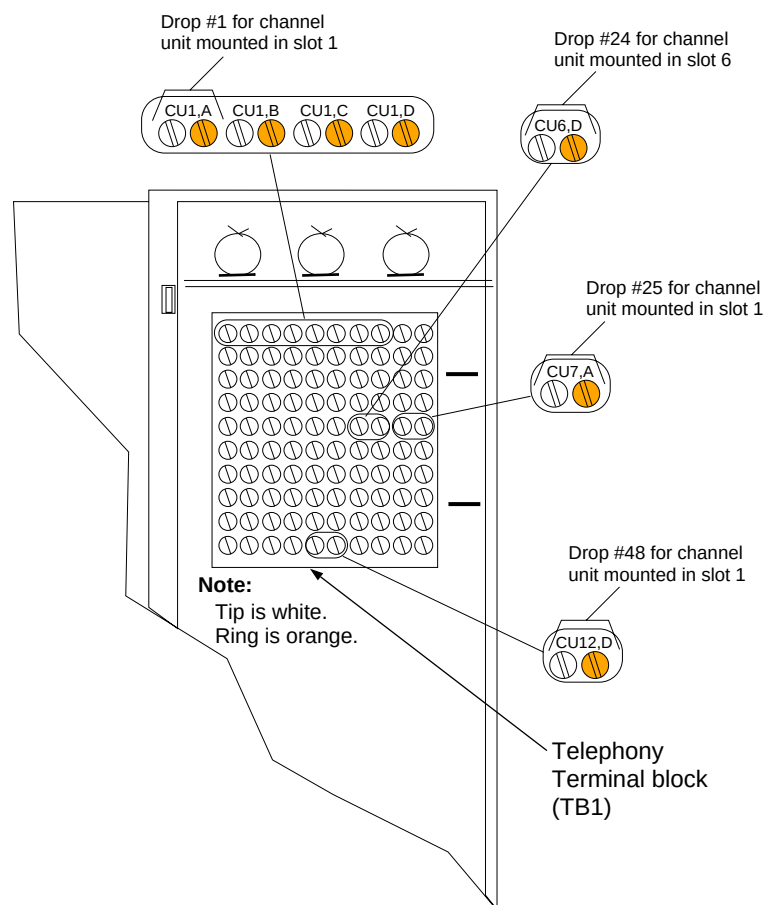


Figure 3 – Location of TB1 Terminals

13. Get a volt-ohm-meter (VOM) and condition it to measure DC volts.

14. Connect the (+) red lead of the VOM to the tip conductor and the (–) black lead to the ring conductor of the test telephone.

Requirement: –48.0 V DC for POTS or loop-start *SPOTS*

15. Does the VOM indicate –48.0 V DC?

If **YES**, then proceed to **Step 19**.

If **NO**, then continue with **Step 16**.

16. Check test connections and verify you are set up for loop-start function. If the indication is still not –48.0 V DC, replace the channel unit.

17. Does the VOM indicate –48.0 V DC?

If **YES**, then proceed to **Step 19**.

If **NO**, then continue with **Step 18**.

18. Use enclosure drawings to check wiring. Look for a tip and ring reversal between the NBS backplane and TB1. Verify the LDS channel and number assignments. Correct the problem before continuing with the next step.

19. Lift the test telephone handset off the hook.

20. Does the meter indicate between –4 and –15 V DC?

If **YES**, then proceed to **Step 24**.

If **NO**, then continue with **Step 21**.

21. Has the channel unit been replaced for this test (off hook voltage check)?

If **YES**, then proceed to **Step 23**.

If **NO**, then continue with **Step 22**.

22. Check the test connections and correct them if needed. If the indication is not -4 to -15 V DC, replace the channel unit and repeat from **Step 16**.

23. Use enclosure drawings to check wiring. Look for a tip and ring reversal between the NBS backplane and TB1. Verify the LDS channel and number assignments. Correct the problem before continuing with the next step.

24. Is dial tone present?

If **YES**, then proceed to **Step 28**.

If **NO**, then continue with **Step 25**.

25. Has the channel unit been replaced for this test (check dial tone)?

If **YES**, then proceed to **Step 27**.

If **NO**, then continue with **Step 26**.

26. Check test connections and correct them if needed. If no dial tone is present, replace the channel unit and repeat from **Step 16**.

27. Use enclosure drawings to check wiring. Look for a tip and ring reversal between the NBS backplane and TB1. Also check T0 cross connects and verify the LDS channel and number assignments. Correct the problem before continuing with the next step.

28. From the test telephone, make a talk test by dialing a test number.

29. Was the call completed with normal transmission quality in both directions?

If **YES**, then proceed to **Step 33**.

If **NO**, then continue with **Step 30**.

30. Has the channel unit been replaced for this test (talk test)?

If **YES**, then proceed to **Step 32**.

If **NO**, then continue with **Step 31**.

31. Replace the channel unit and repeat from **Step 16**.

32. Use enclosure drawings to check wiring. Look for a tip and ring reversal between the NBS backplane and TB1. Also check T0 cross connects and verify the LDS channel and number assignments. Correct the problem before continuing with the next step.

33. While watching the VOM, put the handset on the hook.

34. After 3 seconds, does the meter indicate -48.0 V DC ?

If **YES**, then proceed to **Step 36**.

If **NO**, then continue with **Step 35**.

35. Replace the channel unit and repeat from **Step 16**.

36. Have someone dial or you dial the telephone number of the test telephone.

37. Does the test telephone ring normally?

If **YES**, then proceed to **Step 39**.

If **NO**, then continue with **Step 38**.

38. At the LDS, verify that the correct directory number has been assigned to LLN under test. After the problem has been resolved, repeat from **Step 36**.

39. Lift the telephone handset during the silent period of the ringing cycle.

40. Does the ringing trip normally?

If **YES**, then proceed to **Step 42**.

If **NO**, then continue with **Step 41**.

41. Replace the channel unit and repeat from **Step 16**.

42. Is this the last drop to be tested?

If **YES**, then proceed to **Step 44**.

If **NO**, then continue with **Step 43**.

43. Disconnect the test telephone and remove the VOM leads from TB1. Verify the channel service and telephone number assignments for the next drop to be tested. Repeat this procedure from **Step 6** for drops 24, 25, and 48.

44. Disconnect the test telephone, remove the VOM leads from TB1, secure the drop terminal access door, electronics compartment door, and outer enclosure.

45. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Set Options on SPQ810/811 DT Server For Use With FR NBS

General

The SPQ810/811 DT Server is used to provide support for the FiberReach NBS. Each NBS supports a total of 48 tip-ring pairs which are assigned by provisioning the DT server to each DSX-1 signal feeding a V - DT in the NBS (see Figures 1 and 2) to any one of the following two modes:

Quad Mode: In this state, the DSXBIU continuously attempts to find or frame-up on the DS1 input, establish the message link, alarm any DS1 faults, and provide service to a set of six channel unit slots in the NBS. You can provision the quad mode for 24- or 12- line service, supporting 24 or 12 tip-ring pairs, respectively.

Octet Mode: In this state, the DSXBIU continuously attempts to find or frame-up on the DS1 input, establish the message link, alarm any DS1 faults, and provide service to a set of three channel unit slots in the NBS. In the octet mode, each channel unit slot can support eight time slots (DS0s) instead of the four time slots (DS0s) supported in the quad mode. The octet mode allows the use of the maximum number of ten ISDN lines per quadrant in the NBS when using the SPQ494 quad ISDN channel units along with the AUA94 dual ISDN channel units. You can provision the octet mode for 24-line service only. In octet mode, each server supports 12 tip-ring pairs only.

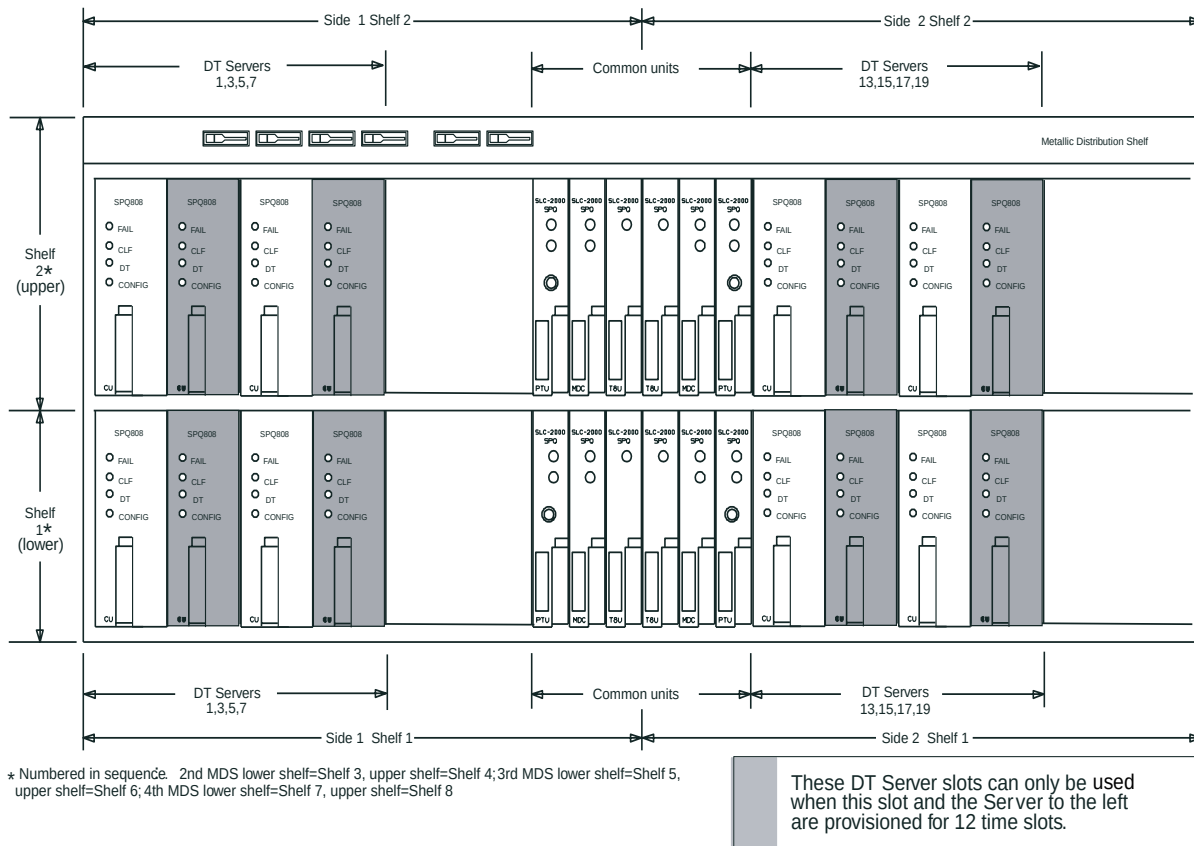


Figure 1 – MDS Assembly -- 12- and 24-Line FITL Configuration (Release 4.4)

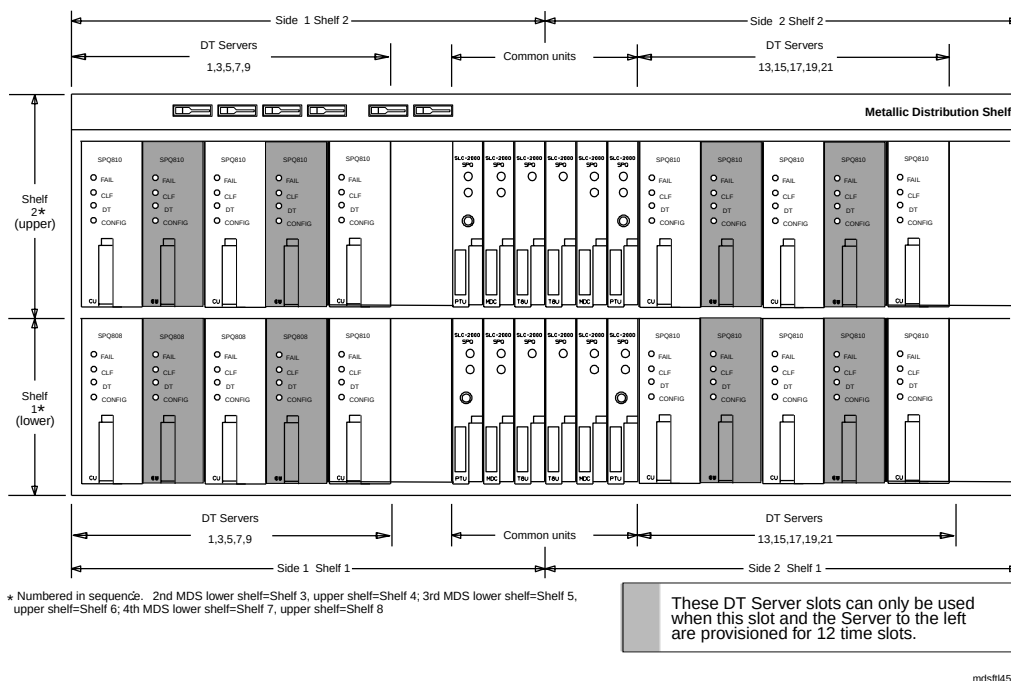


**Figure 2 – MDS Assembly -- 12- and 24-Line FITL Configuration
(Release 4.5 or Later)**

The following is a list of DT Server alarm indicators:

FAIL	The DT Server pack has failed self-diagnostic tests.
CLF	Communication with the NBS is lost.
DT	Trouble with equipment in the NBS.
CONFIG	Placement of a channel unit in the wrong slot or an error in the SLOT ALLOCATION option setting on the DT Server channel unit. Correct placement or SLOT ALLOCATION option setting to clear CONFIG alarm. If the DT Server is installed per work order, record the digroup channel unit equipage and refer the trouble to the engineering center. If CONFIG and DT are both on, the channel unit installation trouble is at the NBS.

1. The SPQ810/811 DT Server (Figure 3) is being connected to a WBS.
2. Set the **OU/DSX** option to **DSX**.
3. Set the **B/Z** option to **B** unless the ZCS option line coding format is desired.
4. Set the DSX equalization **TRANS-0,1,2** options as required (see Table A).
5. Refer to DLP-616 of the *SLC-2000 Access System User/Service Manual* for details on further provisioning and installation of the DT server.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table A — Equalization Option Settings

Trans- 2	1	0	Distance to DSX-1 (Feet) (Note)
OFF	OFF	ON	0 to 132
OFF	ON	OFF	133 to 265
OFF	ON	ON	266 to 398
ON	OFF	OFF	399 to 532
ON	OFF	ON	533 to 655

Note: These distances are for ABAM cable used in the central office. Refer to document 915-710-115 for calculations for other types of cable used for collocated RT and T1 extension applications.

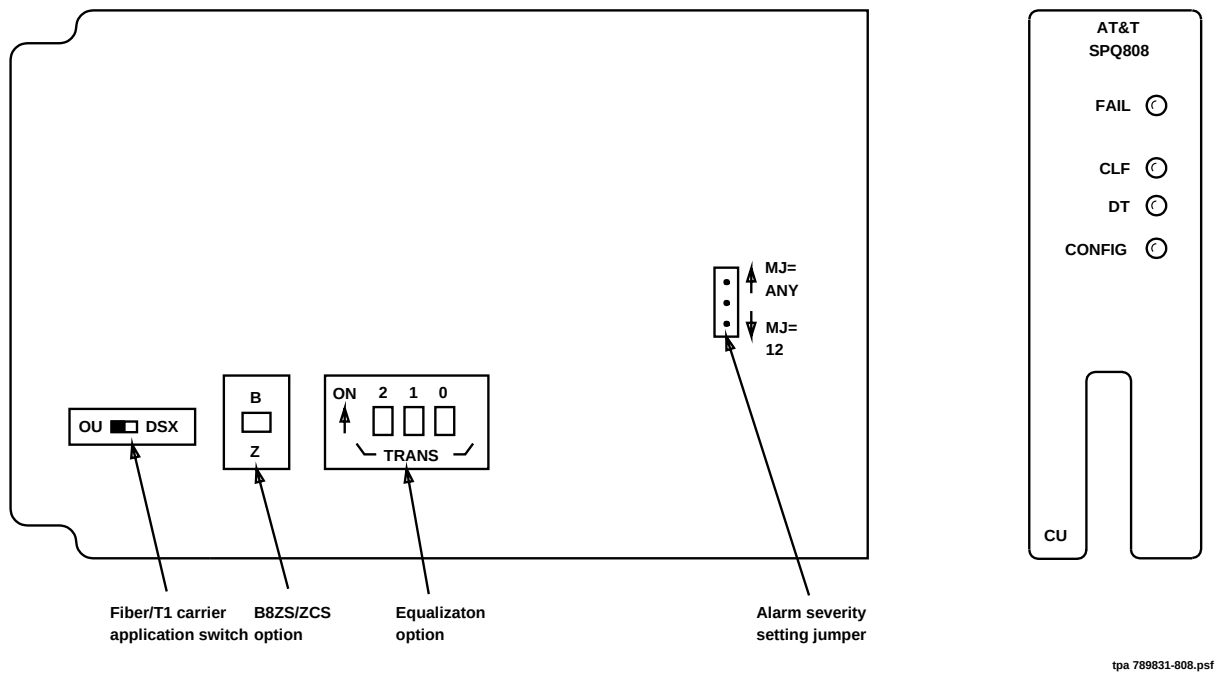


Figure 3 – SPQ810/811 Option Switches

UNUSED

UNUSED

Perform *SLC-2000* NBS MLT Channel Test

Summary

Channel testing for NBS circuits is supported by MLT using a DC test pair connected to the RT via PairGain test controller (PGTC), test bus control unit (TBCU), or a derived DC test PairGain provided by a remote measurement unit (RMU) capable of returning a DC delta signature provided by the DT Server at the RT. The extended test controller (XTC) is supported only when connected in the PGTC emulation mode and the special features of the XTC are unavailable.

Channel testing for the NBS circuits in an integrated *SLC-2000* access system is supported by MLT but not XTC or PGTC. The test bus control unit (TBCU) connects the DC test pair or RMU to perform the bypass test as previously mentioned.

When a channel test is performed, the MLT identifies the circuit as being served by a *SLC* Carrier System. Then two tests are initiated. The first test performs channel unit functional tests, and the second test bypasses the carrier system [using a DC test pair or remote measurement unit (RMU)] and returns a DC delta signature from the DT Server that indicates the result of the attempted channel tests performed by the CDTU at the NBS.

MLT has no means of obtaining metallic access to the copper drop which connects to the NBS. This situation is handled by having the CDTU in the NBS measure the characteristics of the copper drop, then reporting the results using DC programmable signatures. When a test is run, the DT Server at the RT returns a DC signature (Table A) to the MLT. A DC signature with 44K ohms or less Tip-to-Ring indicates a good HDT to NBS facility. A DC signature of 1000K ohms or more Tip-to-Ring indicates a failure condition associated with the HDT to NBS facility; trouble clearing should begin at the HDT site. A DC signature of less than 24K ohms may indicate a trouble condition at the NBS or customer equipment/wiring. A failed DC signature indicates the RT unit has failed or the signal between the RT and NBS is bad.

1.



NOTE:

After a fullx or loopx test, a channel test from STV should be performed.

Perform the MLT test on the NBS circuit reported to have trouble but do not perform the tone test.

Comment: You should note the results of the DC tests during the loop test phase of the channel test.

Comment: If you perform the tone test, the results will be intermittent return tones.

2. Refer to Table A and perform the appropriate action according to the result of the MLT test signature.
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table A. SLC-2000 DT Feature DC Signatures for Drop Tests

DC Signature (Resistance T-R) (Ohms)	Indication	Dispatch To
15K-24K	HDT/NBS link up and NBS common equipment failure or NBS not equipped for testing	NBS
24K-34K	HDT/NBS link up and FEMF on drop	NBS
34K-44K	HDT/NBS link up and drop test OK	As indicated by channel test
44K-54K	HDT/NBS link up and drop open	NBS
54K-64K	HDT/NBS link up and resistive fault	NBS
64K-74K	HDT/NBS link up and receiver off hook (ROH)	NBS or customer premises
74K-86K	HDT/NBS link up and hazardous potentials on drop	NBS
>1000K	HDT/NBS link down	HDT

End-to-End Testing

Summary:

At CO equipment, determine channel and directory number of channel being tested. At *SLC-2000* NBS, determine corresponding channel. At NBS, connect a test telephone set with ringer connected for bridged ringing to channel being tested. Make talking, dialing, ringing, and ring-trip tests on at least one channel per NBS.

1. Establish communication between craft personnel at the NBS and CO.
2. At the CO equipment, select a channel slot to be tested and determine/assign directory number of channel. Inform craft personnel at the NBS of channel selected.
- 3.



NOTE:

Test telephone set should be connected for bridged ringing. Test calls should be made from protector block.

At NBS, install a single-party channel unit (*SPQ 400/440*) into the channel unit slot that coincides with the channel being tested and temporarily connect a test telephone set to the channel.

Response: CO test line and NBS telephone are connected.

4. At NBS, lift handset and check for dial tone.
5. Is dial tone present at NBS?

If **YES**, then proceed to **Step 9**.

If **NO**, then continue with **Step 6**.

6. Request CO personnel to review line assignment to ensure correct test number. If line assignment is correct, check test connections at NBS and correct if needed. If dial tone is still not present, replace NBS channel unit and check for dial tone.

7. Is dial tone present at NBS?

If **YES**, then proceed to **Step 9**.

If **NO**, then continue with **Step 8**.

8. Use CO and NBS schematic drawings (SDs) to check wiring. Use office drawings to check CO wiring. Look for tip and ring reversal between NBS protector block terminal; also check COT channel appearance and office equipment if universal. If any alarms exist in DT Server or DSXBIU, correct them and continue until dial tone is present.

9. At NBS, dial local MDF or CO number and make talk tests.

10. Was call completed with transmission in both directions?

If **YES**, then proceed to **Step 14**.

If **NO**, then continue with **Step 11**.

11. Replace NBS channel unit and repeat talk tests (then replace COT channel unit if universal).

12. Was call completed with transmission in both directions?

If **YES**, then proceed to **Step 14**.

If **NO**, then continue with **Step 13**.

13. Use CO and NBS schematic drawings (SDs) to check wiring. Use office drawings to check CO wiring. Look for tip and ring reversal between NBS protector block terminal; also check COT channel appearance and office equipment if universal. Correct wiring and repeat **Step 9** until communication is good in both directions.

14. At CO, dial test line number to ring telephone at NBS.

15. At NBS, does test telephone ring normally?

If **YES**, then proceed to **Step 19**.

If **NO**, then continue with **Step 16**.

16. Check for tip and ring reversal.

If **OK**, then continue with **Step 17**.

If **NOT OK**, then proceed to **Step 18**.

17. Verify that the RGU FAIL indicator is not lit and ringing voltage is present (see DLP-508 for requirements). Then replace, one at a time: NBS channel unit first and then CO channel unit. Repeat this procedure from **Step 4** after each replacement.

18. Correct tip and ring reversal error at CO and NBS, and repeat from Step **14**.

19. At NBS, lift telephone handset during ringing.

20. At NBS, does ringing trip normally?

If **YES**, then proceed to **Step 22**.

If **NO**, then continue with **Step 21**.

21. Verify that the RGU FAIL indicator is not lit and ringing voltage is present (see DLP-508 for requirements). Then replace, one at a time: NBS channel unit first and then CO channel unit. Repeat this procedure from **Step 4** after each replacement.

22. At NBS, get volt-ohm-milliammeter (VOM) and condition it to measure DC volts.

23. Make sure test call is established and held between CO and NBS.

24. At NBS, connect (+) red lead of VOM to tip terminal and (–) black lead to ring terminal of DT test telephone.

25. At NBS, does meter indicate between 4 V and 15 V DC?

If **YES**, then proceed to **Step 31**.

If **NO**, then continue with **Step 26**.

26. Check NBS test connections and correct them if needed.

27. At NBS, does meter now indicate between 4 V and 15 V DC?

If **YES**, then proceed to **Step 31**.

If **NO**, then continue with **Step 28**.

28. Replace NBS channel unit for channel being tested. If meter still does not indicate between 4 V and 15 V, replace CO channel unit.

29. At NBS, does meter now indicate between 4 V and 15 V DC?

If **YES**, then proceed to **Step 31**.

If **NO**, then continue with **Step 30**.

30. Use CO and NBS SDs to check wiring. Check CO wiring.

31. At NBS, disconnect VOM meter.

32. Is this the last designated channel unit slot to be tested?

If **YES**, then continue with **Step 33**.

If **NO**, then repeat from **Step 2**.

33. Is MLT type testing available for use in testing channels?

If **NO**, then proceed to **Step 42**.

If **YES**, then continue with **Step 34**.

34. Request that Repair Service Bureau or Local Test Desk perform necessary MLT type channel tests.

35. Did tests pass?

If **YES**, then proceed to **Step 41**.

If **NO**, then continue with **Step 36**.

36. Check test connections and correct them if needed. Replace NBS channel unit (if universal, replace COT channel unit) and repeat **Step 34**.

37. Did tests pass?

If **YES**, then proceed to **Step 41**.

If **NO**, then continue with **Step 38**.

38. Make sure MLT interface equipment is working properly and that you are using proper procedures. Repeat **Step 34** and then proceed to **Step 39**.

39. Did tests pass?

If **YES**, then proceed to **Step 41**.

If **NO**, then continue with **Step 40**.

40. Use office drawings and CO SDs to check wiring. Check for tip and ring reversal between CO channel appearance and office equipment, as well as between NBS protector block connect terminal. Correct wiring problem, repeat **Step 34** until tests pass, and then proceed to **Step 41**.

41. Is this the last designated channel unit slot to be tested with MLT type system?

If **YES**, then continue with **Step 42**.

If **NO**, then proceed to **Step 34**.

42. At NBS, remove test telephone. At CO, remove test line.

43. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

These steps can be used to find the relationships between remote terminal (RT) digroup channel positions and the associated *SLC*-2000 NBS equipment. See Figures 1 and 2 to find the RT circuit of interest. Use Table A to find the carrier system channel circuit of interest and the associated channel positions in the associated *SLC*-2000 NBS drop channel protectors at the NBS.

Figure 1 – First Metallic Distribution Shelf Assembly, Fiber Distribution (Release 4.4)

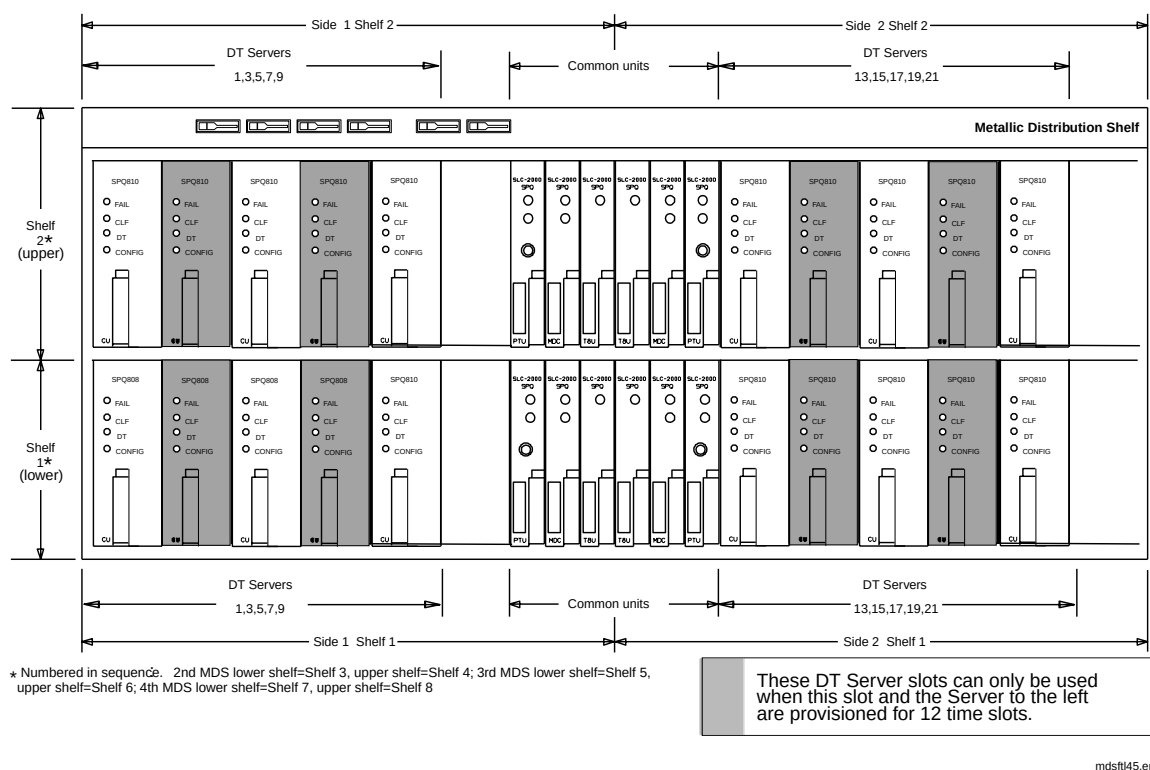


Figure 2 – First Metallic Distribution Shelf Assembly, Fiber Distribution (Release 4.5 or Later)

1. Refer to Table A to determine channel time slots served by DT channel unit slots and the associated drop protectors.
2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table A — SLC-2000 FITL TR-08 Channel Time Slots Served by the DT Channel Unit Slots

DT Server Slot (lines/DT)	Channel Time Slots Served					
	DTCU 1(7)	DTCU 2(28)	DTCU 3(9)	DTCU 4(10)	DTCU 5(11)	DTCU 6(12)
CU 1 (24 lines)	1-4	5-8	9-12	13-16	17-20	21-24
CU 5	25-28	29-32	33-36	37-40	41-44	45-48
CU 13	49-52	53-56	57-60	61-64	65-68	69-72
CU 17	73-76	77-80	81-84	85-88	89-92	93-96
CU 1 (12 lines)	1-4	5-8	9-12	—	—	—
CU 3	13-16	17-20	21-24	—	—	—
CU 5	25-28	29-32	33-36	—	—	—
CU 7	37-40	41-44	45-48	—	—	—
CU 13	49-52	53-56	57-60	—	—	—
CU 15	61-64	65-68	69-72	—	—	—
CU 17	73-76	77-80	81-84	—	—	—
CU 19	85-88	89-92	93-96	—	—	—
DT drop protector	1-4	5-8	9-12	13-16	17-20	21-24
CIT AIDs* dropID#	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4

* The craft interface terminal (CIT) access identifier (AID) has the syntax of

dt dp-shelf#-physical slot # in HDT-physical slot in DT-dropID#

where:

shelf# is the digital loop carrier (DLC) system or shelf number {1-8}

Physical slot # in HDT is the slot for the DT Server {1,3,5,7,13,15,17,19}

physical slot in DT is the physical slot in the DT {1-6}

dropID# is the channel number in the DT slot {1-4} as given above.

Rear Access to the Wall DT Cabinet

1. Remove the four attachment screws from the front of the Wall DT as show in Figure 1.

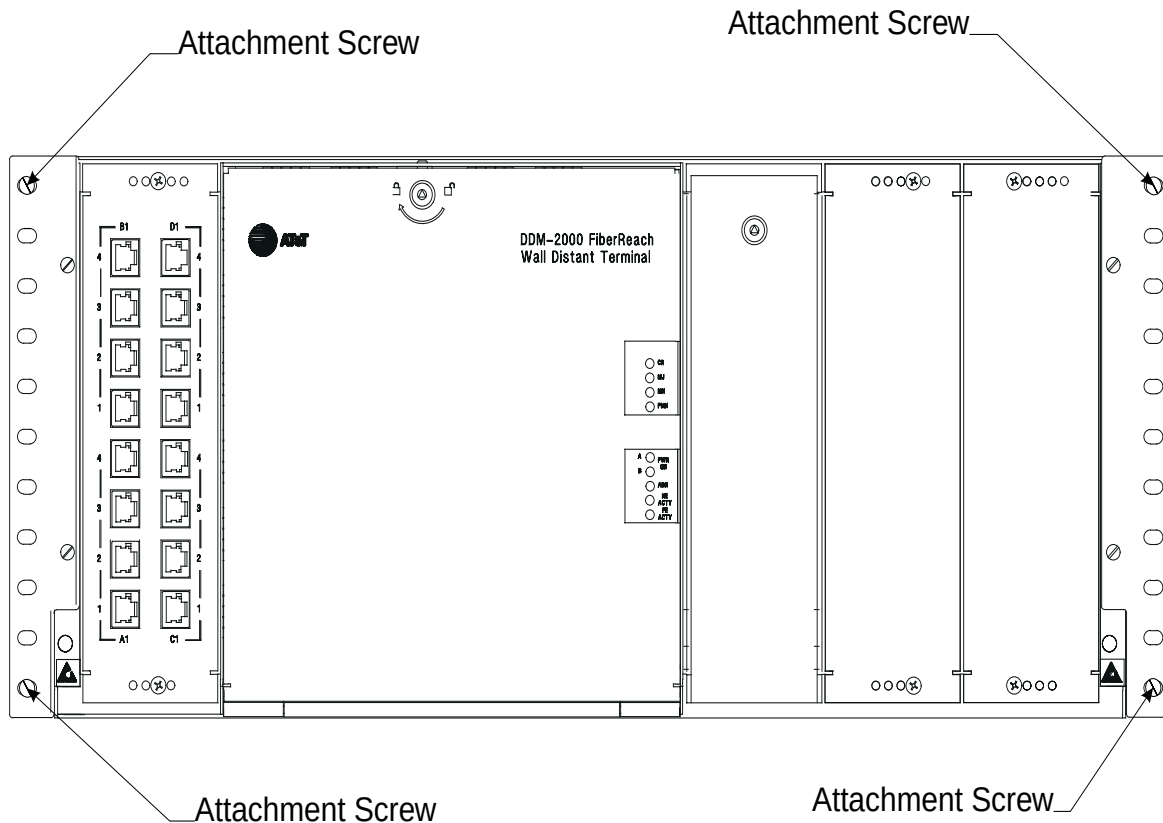


Figure 1 – Wall DT Cabinet — Front View

2. With both hands on the bottom of the Wall DT, carefully lift up on the Wall DT so the pivot point leaves the service position, and slide the Wall DT forward until the pivot point reaches the rotation position. Allow the pivot point to drop down into the rotation position, and rotate the Wall DT 90 degrees until the backplane is in the up position (see Figure 2).

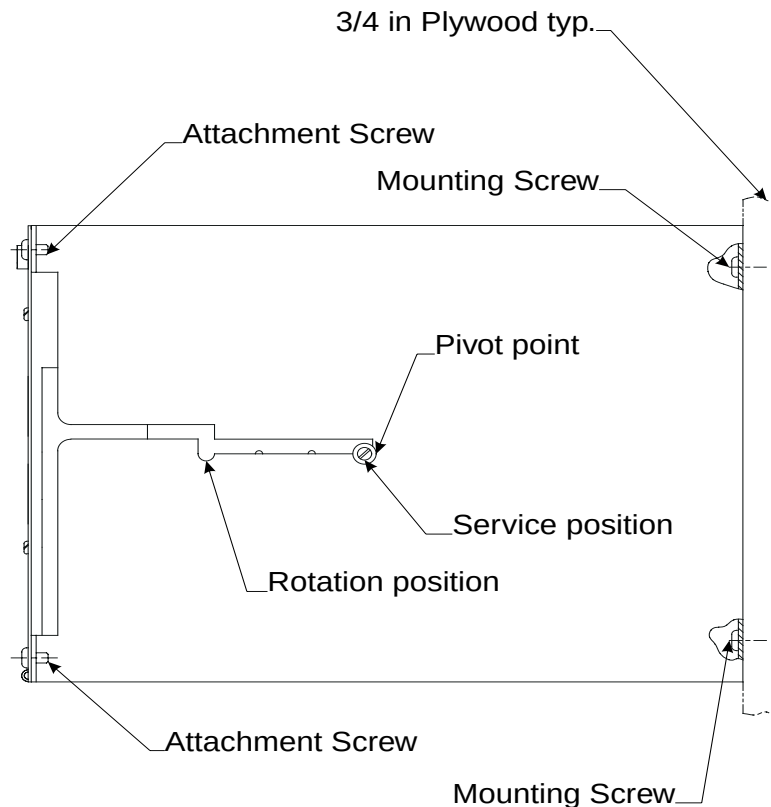


Figure 2 – Wall DT Cabinet — Bottom View

- **NOTE:**
Make sure that there are no circuit packs stored loose in the shelf, and that all operating circuit packs are securely latched in position.
- **NOTE:**
Never leave the Wall DT unattended in the rotated position. Always return it to the service position and reinstall at least the top attachment screws.



NOTE:
When ever sliding or rotating the Wall DT make sure that both the optical fiber and DS1 cabling are not crimped or stressed in any way.

3. Carefully rotate the Wall DT 90 degrees until the Wall DT is in the normal position. With both hands on the bottom of the Wall DT, carefully lift up on the Wall DT so the pivot point leaves the rotation position, and slide the Wall DT back until the pivot point reaches the service position. Allow the pivot point to drop down into the service position (see Figure 2).



NOTE:

When ever sliding or rotating the Wall DT make sure that both the optical fiber and DS1 cabling are not crimped or stressed in any way.

4. Reinstall the four attachment screws that were removed from the front of the Wall DT in Step 1.

Perform Visual Inspection of the STAC Cabinet

1. Verify that the STAC Cabinet is not damaged (see Figure 1).
2. If problems exist, contact responsible installation group.
3. Verify that there are no broken, bent, or misaligned contacts on the backplane connectors.
4. If problems exist, contact responsible installation group.
5. Is one channel unit plug-in of any type available?

If **YES**, then continue with **Step 9**.

If **NO**, then proceed to **Step 12**.

6. Check for a misaligned or bowed shelf by inserting a channel unit in the leftmost and rightmost channel unit slots of top shelf. Remove the channel unit.
7. Check for a misaligned or bowed shelf by inserting a channel unit in the leftmost and rightmost channel unit slots of bottom shelf.
8. Remove the channel unit.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

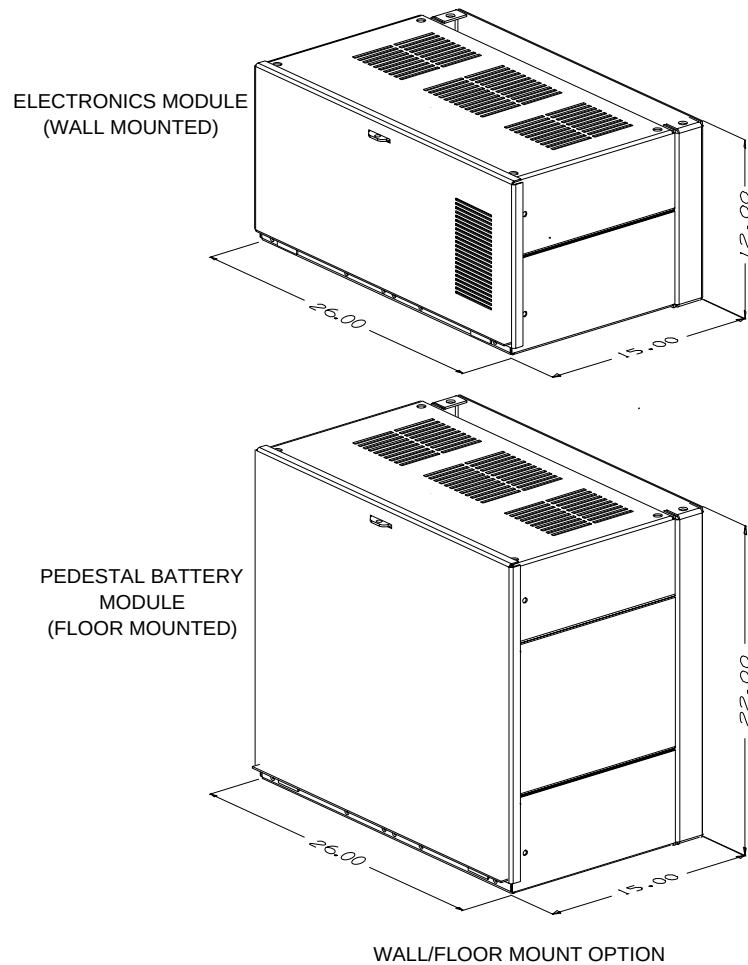
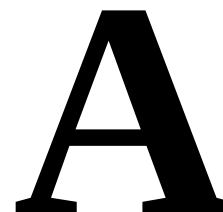


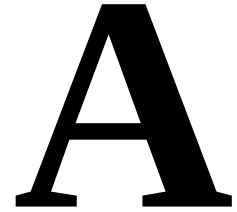
Figure 1 – DDM-2000 FiberReach STAC Cabinet



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A SONET Overview



Overview

This section briefly describes the Synchronous Optical Network (SONET).

History

In the early 1980's, the American National Standards Institute (ANSI) recognized the need for an optical signal standard for future broadband transmission. The ANSI T1X1 subcommittee began working on optical signal and interface standards in 1984. In 1985, Bellcore proposed a network approach to fiber system standardization to T1X1. The proposal suggested a hierarchical family of signals whose rates would be **integer multiples** of a basic modular signal. The proposal further suggested a synchronous multiplexing technique, leading to the coining of the term *Synchronous Optical NETWORK* (SONET).

The International Telephone and Telegraph Consultative Committee (CCITT) first showed interest in 1986. Conferences held through 1987 and 1988 resulted in coordinated specifications for both the American National Standard (SONET) and the CCITT-International Standard, Synchronous Digital Hierarchy (SDH). Approval of both sets of standards occurred in late 1988.

Basic Purpose

The basic purpose of SONET is to provide a standard synchronous optical hierarchy with sufficient flexibility to accommodate digital signals that currently exist in today's network as well as those planned for the future.

SONET currently defines standard rates and formats and optical interfaces. These and other related issues continue to evolve through the ANSI committees. SONET ultimately will permit an optical midspan meet in a multivendor environment.

The American National Standard defines the following:

- Optical parameters (*ANSI** T1.106-1988)
- Electrical parameters (*ANSI* T1.102-1993 Draft)
- Multiplexing schemes to map existing digital signals (for example, DS1, DS2, and DS3) into SONET payload signals (*ANSI* T1.105-1991)
- Criteria for optical line automatic protection switch (APS) (*ANSI* T1.105-1991)
- Overhead channels to support standard operation, administration, maintenance, and provisioning (OAM&P) functions (*ANSI* T1.105-1991).

Technical Overview

SONET Signal Hierarchy

The SONET signal hierarchy is based on a basic "building block" frame called the synchronous transport signal - level 1 (STS-1), as shown in Figure A-1 on the following page. The STS-1 frame has a reoccurring rate of 8000 frames per second. Each frame is 125 microseconds.

The STS-1 frame consists of:

- 90 columns (each column is an 8-bit byte)
- 9 rows.

The STS-1 frame is transmitted serially starting from the left with row 1 column 1 on through column 90, then row 2 column 1 through 90, continuing on, row-by-row, until all 810 bytes (9 X 90) of the STS-1 frame have been transmitted.

Since each STS-1 frame consists of 810 bytes and each byte has 8 bits, the frame contains 6480 bits a frame. There are 8000 STS-1 frames per second, at the STS-1 signal rate of 51,840,000 (6480 X 8000) bits a second.

The first three columns in each of the nine rows carry the SECTION and LINE overhead bytes. Collectively, these 27 bytes are referred to as transport overhead.

The remainder of the frame, columns 4 through 90, is reserved for payload signals (for example, DS1, DS3, and path overhead) and is referred to as the STS-1 synchronous payload envelope (STS-1 SPE). The optical counterpart of the STS-1 is the optical carrier level 1 signal (OC-1), which is the result of a direct optical conversion. The electrical counterpart of the STS-1 is the electrical carrier level 1 signal (EC-1).

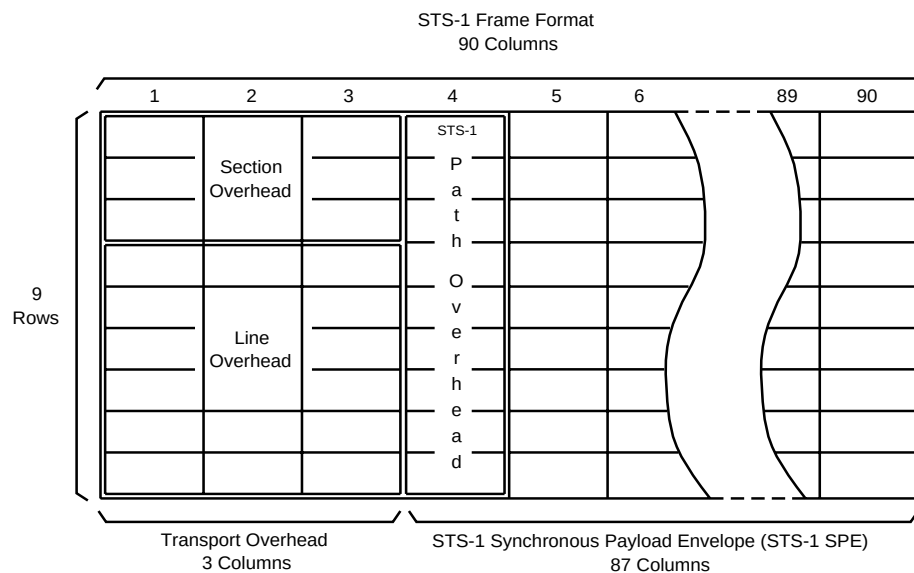


Figure A-1. SONET STS-1 Frame — Simplified Version

SONET Layers

SONET divides its processing functions into three layers. These three layers are associated with equipment that reflects the natural divisions in network spans.

Figure A-2 shows these defined layers in a signal path. They include:

- **SECTION and Section Terminating Equipment** - the transmission spans between lightwave terminating equipment and the regenerators. The spans between the regenerators are also considered sections. Section terminating equipment provides regenerator functions and terminates the section overhead to provide single-ended operations and section performance monitoring.
- **LINE and Line Terminating Equipment** - the transmission span between terminating equipment (STS-1 cross-connections) that provides line performance monitoring. If there are no intervening repeaters, the line terminating equipment also functions as section terminating equipment.
- **STS-1 and VT Path and Path Terminating Equipment** - the transmission span for an end-to-end tributary (DS1 or DS3) signal that provides functions including signal labeling and path performance monitoring for signals as they are transported through a SONET network. STS-1 path terminating equipment can also provide cross-connections for lower rate (that is, DS1) signals. A virtual tributary (VT) is a sub-DS3 payload and is described later in more detail.

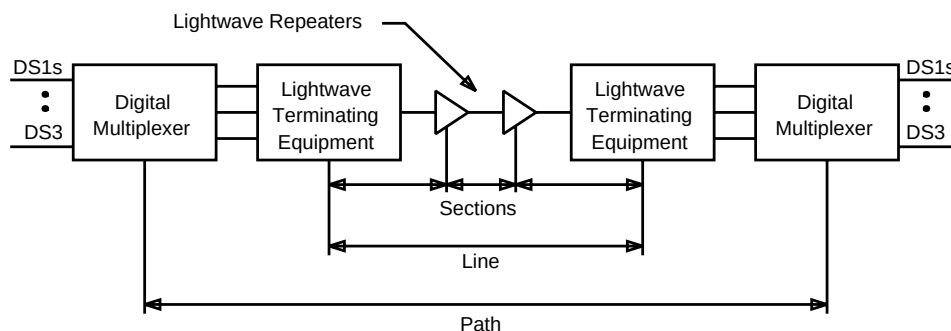


Figure A-2. Section, Line, and Path Definitions

Each SONET layer has a set of overhead bytes as shown in Figure A-3. These bytes carry information used by various network elements.

- **Section Overhead** contains information that is used by all SONET equipment including repeaters.
- **Line Overhead** is used by all SONET equipment except repeaters.
- **Path Overhead** is carried within the payload envelope.
 - **STS-1 path overhead** remains with the STS-1 SPE until its asynchronous signal is extracted (for example, DS-3) or until its individual VT1.5 signals are demultiplexed.
 - **VTN (N= 1.5, 2, 3, or 6) path overhead** remains with the VTN until its asynchronous signal is extracted.

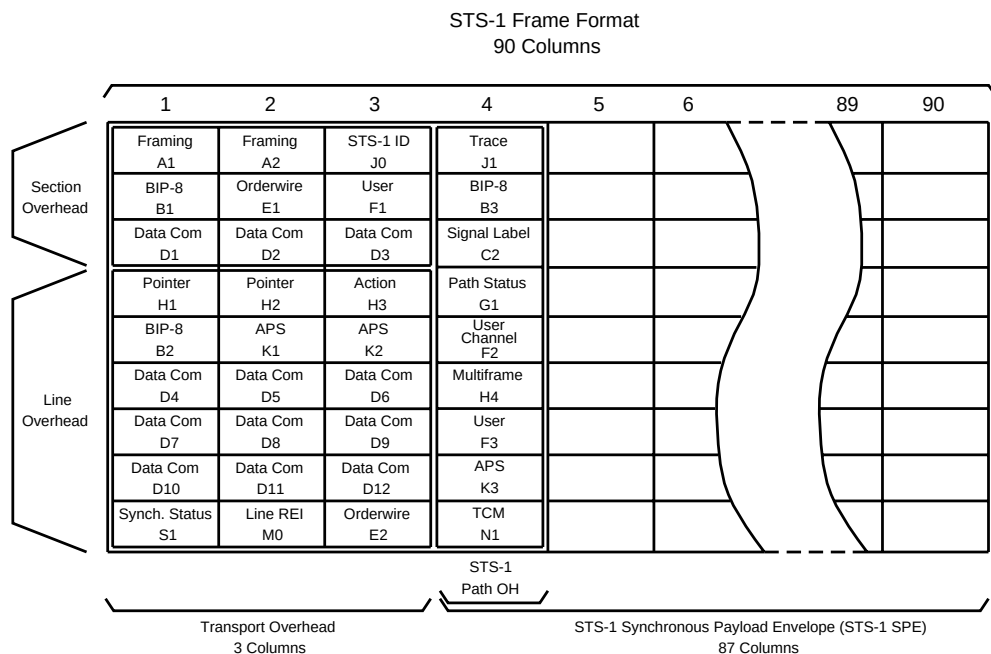


Figure A-3. SONET Frame Format

SONET Frame Structure

The following pages provide more detailed information on the function of various overhead bytes for each SONET layer.

Section Overhead

- Framing (A1, A2)
 - Provides framing for each STS-1.
- STS-1 ID (J0)
 - Provides the order of appearance in a byte-interleaved STS-*N* frame; for example, STS-1 #1, STS-1 #2.....STS-1 #48. In future applications, this byte will provide a section trace function. For information on STS-*N* signals, see the "Higher Rate Transport" part of this section.
- Section Bit-Interleaved Parity (BIP-8) (B1)
 - Provides SECTION performance monitoring and is calculated over all bits of the previous STS-*N* frame. Defined only for STS-1 #1 of an STS-*N* signal.
- Section Orderwire (E1)
 - Provides a local orderwire for voice communication channel between section terminating network elements, such as repeaters. Defined only for STS-1 #1 of an STS-*N* signal.
- Section User Channel (F1)
 - Set aside for the user's purpose. Defined only for STS-1 #1 of an STS-*N* signal.
- Section Data Communications Channel (D1, D2, D3)
 - Is a 192 kb/s message-based channel. Used for alarms, maintenance, control, monitoring, and other communication needs between section terminating equipment. Defined only for STS-1 #1 of an STS-*N* signal.

Line Overhead

- Line Pointer (H1, H2)
 - Two bytes indicate the offset in bytes between the pointer action byte (H3) and the first byte (J1) of the STS-1 synchronous payload envelope (SPE).
- Pointer Action (H3)
 - One byte is allocated for frequency justification.
- Line Bit-Interleaved Parity (BIP-8) (B2)
 - This byte is for line performance monitoring. This byte is provided in all STS-1 signals within an STS-*N* signal.
- Line Automatic Protection Switching (APS) (K1, K2)
 - Two bytes used for APS signaling between line level entities. In addition, bits 6, 7, and 8 of K2 are used for line alarm indication signal (AIS) and line far-end receive failure (FERF). Defined only for STS-1 #1 of an STS-*N* signal.
- Line Data Communications Channel (D4 - D12)
 - Is a 576 kb/s message-based channel.
- Synch. Status (S1)
 - In STS-1 #1, the S1 byte is for synchronization status messages, and only bits 5 through 8 are used.
- Line REI (M0)
 - The M0 byte is for STS-1 line far-end block error (FEBE), and only bits 5 through 8 are used.
- Line Orderwire (E2). Defined only for STS-1 #1 of an STS-*N* signal.
 - One byte is allocated to be used as an express orderwire between line terminating equipment.

Path Overhead

There are two types of path overheads:

- STS-1 path overhead
- VT path overhead.

STS-1 Path Overhead

The STS-1 path overhead is assigned to and remains with the STS-1 SPE until the payload is extracted and is used for functions that are necessary to transport all synchronous payload envelopes.

- STS-1 Path Trace (J1)
 - Repetitively transmits a 64 byte, fixed length, string so that an STS-1 path receiving terminal can verify its continued connection to the intended transmitter.
- STS-1 Path Bit-Interleaved Parity (BIP-8) (B3)
 - Provides each STS-1 path performance monitoring. This byte is calculated over all bits of the previous STS-1 SPE before scrambling.
- STS-1 Path Signal Labels (C2)
 - Indicates the construction of the STS-1 SPE. A value of 00000000 indicates an unequipped STS-1 SPE. Values for various payload mappings are defined in TR-NWT-000253, Issue 2.
- STS-1 Path Status (G1)
 - Conveys the STS-1 path terminating status, far end block errors (FEBE), and yellow alarm signal conditions back to an originating STS-1 path terminating equipment.
- STS-1 Path User Channel (F2, F3)
 - User communication channel between Path elements.
- VT Multiframe Indicator (H4)
 - Provides a general multiframe indicator for VT-structured payloads.
- STS-1 Path Automatic Protection Switching (K3)
 - Path Automatic Protection Switching
- TCM - Tandem Connection Maintenance (N1)
 - Bits 1-4 used for incoming error monitoring. Bits 5-8 used as communications channel.

VT Path Overhead

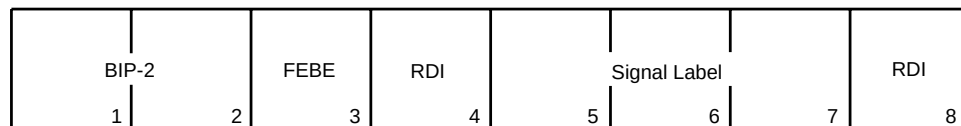
There is one byte of VT path overhead called V5. It occurs on every fourth frame; that is, 2000 times a second.

This byte provides for VT paths the same functions that B3, C2, and G1 provide for STS paths, namely:

- Error checking
- Signal label
- Path status.

The bit assignments of the VT path overhead are specified in the following list and are illustrated in Figure A-4:

- Bits 1 and 2 are used for error performance monitoring (BIP-2).
- Bit 3 is a VT path far-end-block-error (FEBE) indication that is sent back toward an originating VT PTE when errors are detected by the BIP-2.
- Bit 4 and Bit 8 are used for remote defect indication (RDI)
- Bits 5 through 7 provide a VT signal label.



VT Path Signal Label Coding:

0 0 0	Unequipped
0 0 1	Equipped-Nonspecific

Figure A-4. VT Path Overhead Byte

SONET Multiplexing Procedure

SONET has provisions for multiplexing asynchronous DS1s, synchronous DS1s, and asynchronous DS3s. Refer to Figures A-5 and A-6.

The first stage in multiplexing is mapping the input DS1 or DS3 tributary. In the case of DS1 inputs, three time slots (DS0s) are added to the incoming signal thus becoming a VT1.5. An asynchronous DS1 that fully meets the specified rate is mapped into the VT1.5 SPE as clear channel input since no framing is needed.

- Each VT1.5 carries a single DS1 payload.
- Four VT1.5s are bundled into a VT group (VT-G).
- Seven VT-Gs are byte-interleaved into an STS-1 frame.

The VT-G to-STS-1 multiplex is a simple byte-interleaving process, so individual VT signals are easily observable within the STS-1. Thus, cross-connections and add/drop can be accomplished without the back-to-back multiplexing/multiplexing steps required by asynchronous signal formats. The structured VTs are now multiplexed into the STS-1 SPE, and the path, line, and section overhead are added. The final multiplexing, as shown in Figure A-5, provides the scrambled STS-*N* signal to the optical conversion stage.

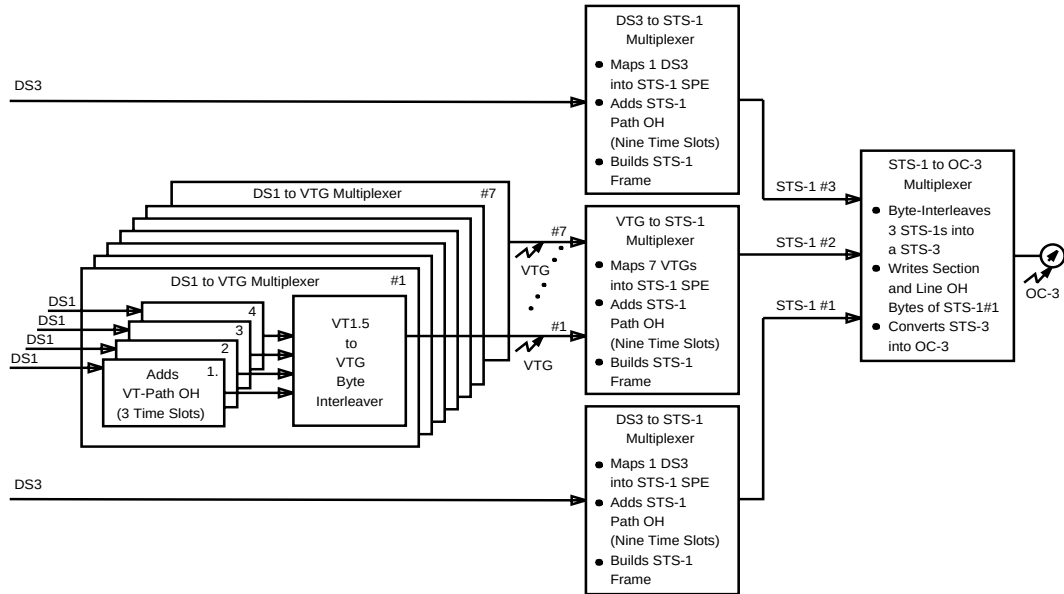


Figure A-5. SONET Multiplexing Procedure

SONET Demultiplexing Procedure

As shown in Figure A-6, demultiplexing is the inverse of multiplexing. The unscrambled STS-1 signal from the optical conversion stages is processed to extract the section and line overhead and accurately locate the SPE. The next stage processes the path overhead and demultiplexes the VTs. A standard DS3 signal will be provided to the asynchronous network after path overhead processing. For DS1 signals, the individual DS1 VTs are then processed to extract VT overhead and, via the VT pointer, accurately locate the DS1 SPE. Finally, desynchronization of the DS1 SPE provides a standard DS1 signal to the asynchronous network.

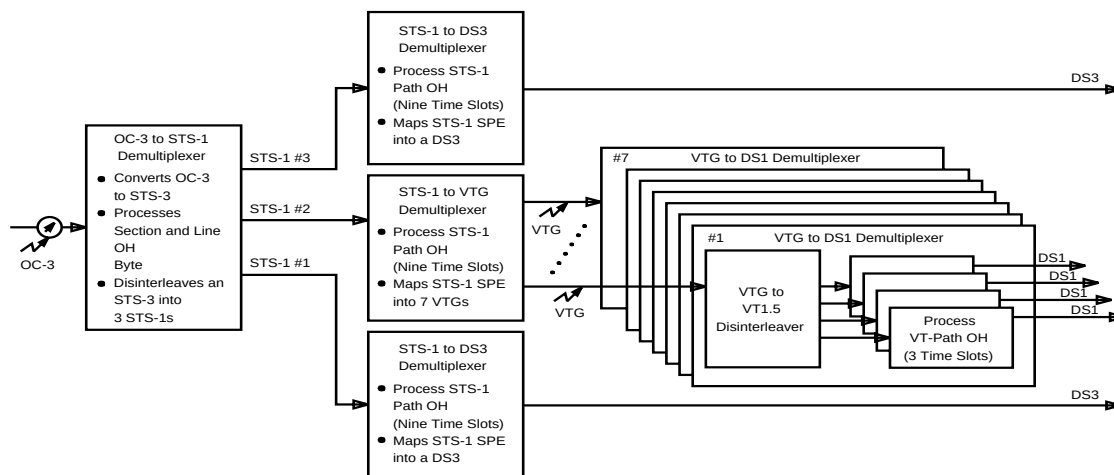


Figure A-6. SONET Demultiplexing Procedure

Two key points should be noted at this time. First, the SONET frame is a fixed time (125 μ s) and no bit-stuffing is used. Second, as shown in Figure A-7, the synchronous payload envelope can *float* within the frame using byte-stuffing. This is to permit compensation for small variations in frequency between the clocks of the two systems that may occur if the systems are independently timed (plesiochronous timing). The SPE can also drift across the 125- μ s frame boundary. SONET STS pointers are used to locate the SPE relative to the transport overhead.

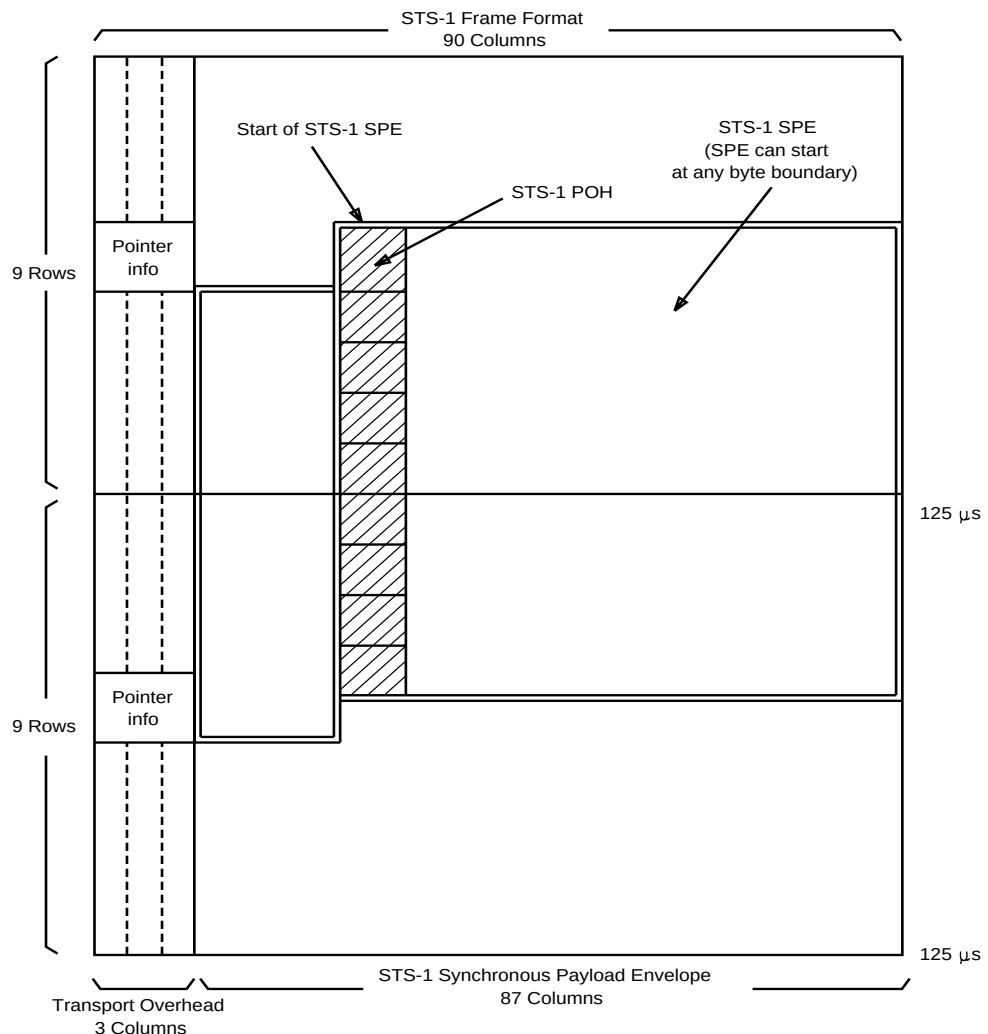


Figure A-7. STS-1 Synchronous Payload Envelope in Interior of STS-1 Frame

SONET Digital Multiplexing Schemes

Asynchronous Multiplexing

Currently, fiber optic facilities are primarily used to carry DS3 signals. The DS3 signal consists of a combination of the following payload signals:

- 28 DS1s
- 14 DS1Cs
- 7 DS2s.

Typically, 28 DS1 signals are multiplexed into a DS3 signal, using an M13 format. Refer to Figure A-8. M13 format is a process that includes bit-interleaving four DS1 into a DS2 signal and then bit-interleaving seven DS2 signals into a DS3. The DS3 rate is not a direct multiple of the DS1 or the DS2 rates due to the bit-stuffing synchronization technique used in asynchronous multiplexing.

Identification of DS0s contained in any DS-*N* signal, except DS1, is complex and DS0s cannot be directly extracted. Thus, an asynchronous DS3 signal must be demultiplexed down to the DS1 level to access and cross-connect DS0 and DS1 signals.

Another disadvantage of the M13 format is there is no end-to-end overhead channel for use by OAM&P groups.

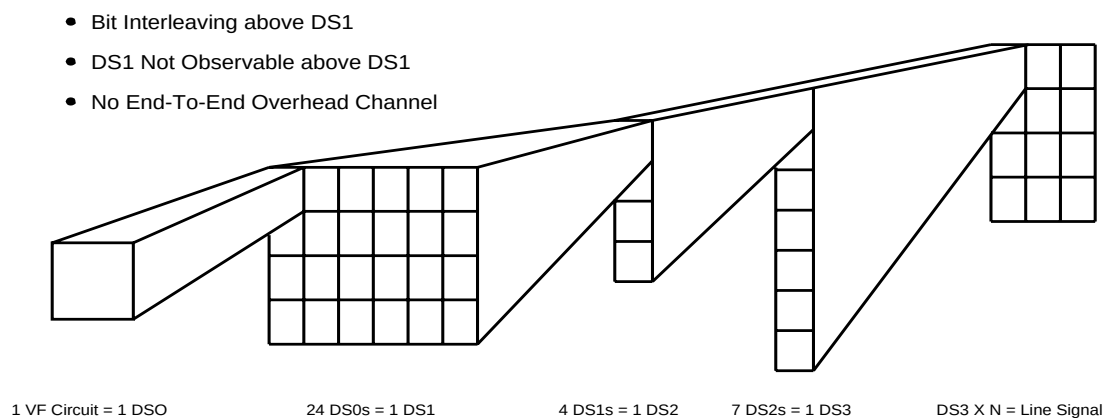


Figure A-8. Asynchronous Multiplexing

Synchronous Multiplexing

SONET's method of *byte-interleaving* DS1s to a higher signal rate permits economical extraction of a single DS1 without the need to demultiplex the entire STS-1 SPE. In addition, SONET provides overhead channels for use by OAM&P groups.

In SONET, a single asynchronous DS3 signal is mapped into an STS-1 SPE (Figure A-9).

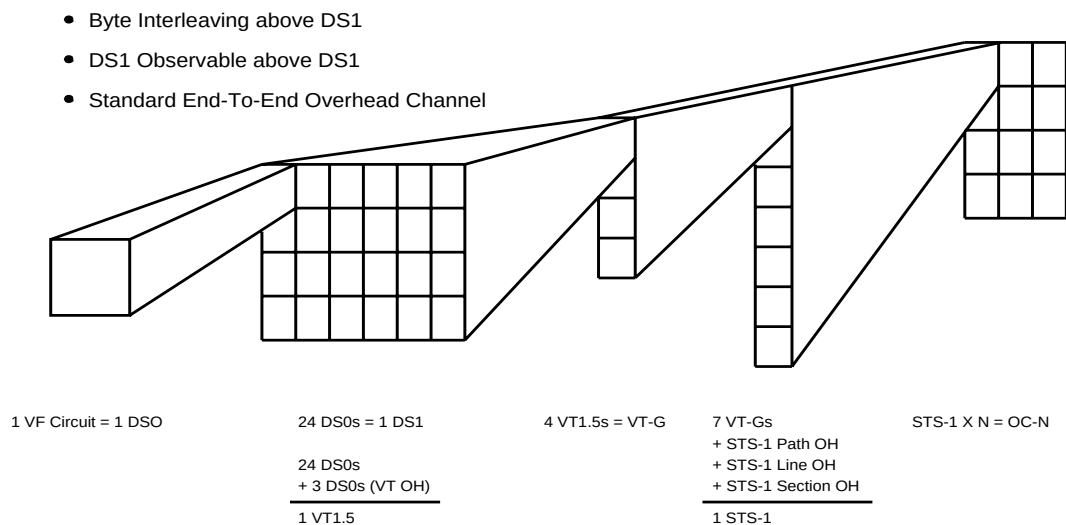


Figure A-9. Synchronous Multiplexing

Virtual Tributary Signals

Sub-DS3 asynchronous signals (DS1, DS1C, DS2 and E1) are *byte-interleaved* into a digital signal called a virtual tributary (VT). The VT is a structure designed for the transport and switching of sub-DS3 payloads. Like the STS-1 signal, the VT signal has a floating pointer that allows each VT SPE to move within the VT structure. There are four sizes of virtual tributaries (VT1.5, VT2, VT3, VT6). Higher rate payloads are transported as one or more concatenated STS-1 signals.

Concatenated Mode

For services requiring multiples of the STS-1 rate, STS-1 path payloads may be shared to create a single broadband payload called a concatenated STS-*N*c (OC-*N*c). STS-1 signals are mapped into an STS-*N*c SPE and transported as a concatenated STS-*N*c signal. This STS-*N*c signal can be carried by an STS-*N* or OC-*N* (or higher level) line signal.

The STS-*N* signal is multiplexed, switched, and transported through the network as a single entity. A concatenation indicator, used to show that the STS-1s of the STS-*N*c signal are linked together, is contained in the STS-1 payload pointer of all but the first STS-1. The line and section overhead is sent on the first STS-1 and the payload pointer for the first STS-1 is applied to all STS-1 signals in the concatenated signal.

Figure A-10 shows an example of an STS-3c SPE. It consists of 3 x 87 columns and 9 rows of bytes. The order of transmission is row by row, from left to right.

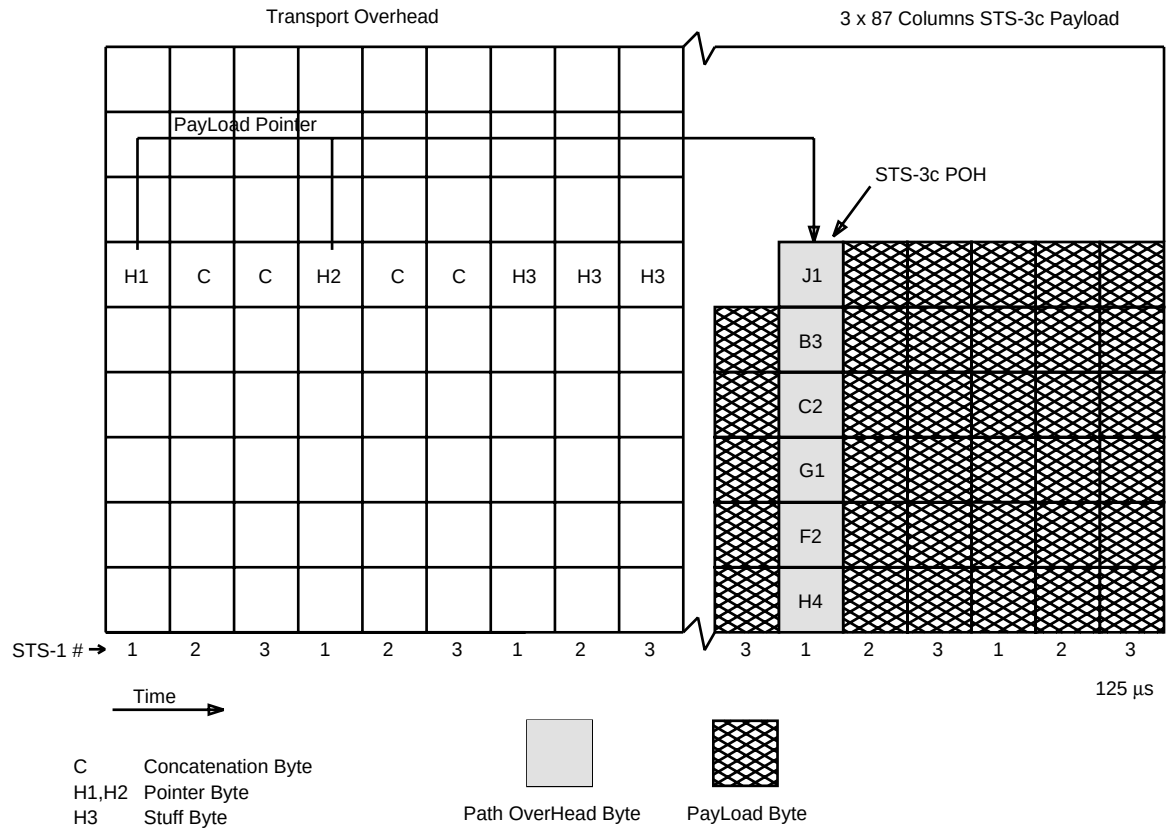


Figure A-10. STS-3c Concatenated Payload

SONET Interface

The SONET interface (Figure A-11) provides the optical midspan meet between SONET network elements. A SONET network element is the hardware and software that processes one or more layers of the SONET signal.

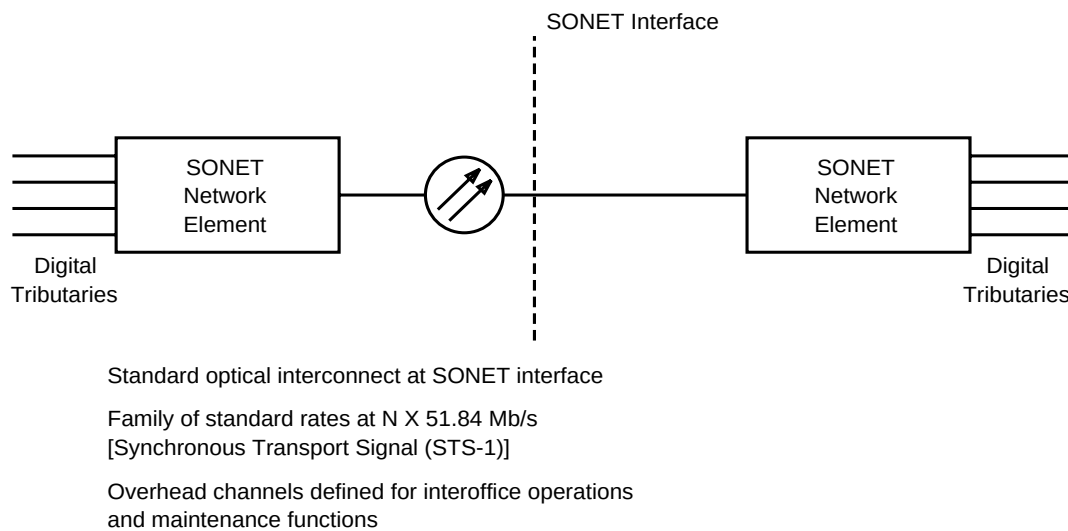


Figure A-11. SONET Interface

SONET Payloads

Table A-1 shows the digital signals that can be transported as SONET payloads.

Table A-1. SONET Payloads

Input	Equivalent		SONET	
Tributary	Channels	Rate	Signal	Rate
DS1	24 DS0s	1.544 Mb/s	VT1.5	1.728 Mb/s
E1 (CEPT)	32 DS0s	2.048 Mb/s	VT2	2.304 Mb/s
DS1C	48 DS0s	3.152 Mb/s	VT3	3.456 Mb/s
DS2	96 DS0s	6.312 Mb/s	VT6	6.912 Mb/s
DS3	672 DS0s	44.736 Mb/s	STS-1	51.840Mb/s
DS4NA	2016 DS0s	139.624 Mb/s	STS-3c	150.336Mb/s
ATM		149.76 Mb/s	STS-3c	150.336Mb/s
FDDI		125.00 Mb/s	STS-3c	150.336Mb/s
Future payloads		up to 150 Mb/s		
Future broadband payloads		Greater than 150 Mb/s		

DS1 and DS3 signals are the most important of these signals in the current network. Broadband payloads, such as asynchronous transfer mode (ATM) and fiber distributed data interface (FDDI), with rates of 150 Mb/s and higher, are also important. Other payloads may be defined for specific applications.

Higher Rate Transport

Higher rate SONET signals are created by byte-interleaving N STS-1 to form an STS- N signal. The STS- N is then scrambled and converted to an optical carrier - level N (OC- N) signal. The OC- N has a line rate of exactly N times the OC-1 signal (see Table A-2).

Table A-2. SONET Transport Rates

OC Level	Line Rate (Mb/s)	Capacity
OC-1	51.84	28 DS1s or 1 DS3
OC-3	155.52	84 DS1s or 3 DS3s
OC-9	466.56	252 DS1s or 9 DS3s
OC-12	622.08	336 DS1s or 12 DS3s
OC-18	933.122	504 DS1s or 18 DS3s
OC-24	1244.16	672 DS1s or 24 DS3s
OC-36	1866.24	1008 DS1s or 36 DS3s
OC-48	2488.32	1344 DS1s or 48 DS3s

Conclusion

The intent of this section is to present a short overview of SONET. More detailed expositions can be found in various literature. An excellent description of SONET can be found in Reference 3.

REFERENCES

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2. CCITT Recommendations G.707, G.708, G.709.
3. R. Ballert and Y. C. Ching, •SONET: Now It's the Standard Optical Network,• *IEEE Communications Magazine*, Vol. 27, No. 3 (March 1989): 8-15.
4. ANSI T1.102-1993 Draft •American National Standard for Telecommunications - Digital Hierarchy Electrical Interface Specifications. •

Glossary

0x1

See Ring (0x1) Low Speed Interface.

1+1

The 1+1 protection switching architecture protects against failures of the optical transmit/receive equipment and their connecting fiber facility. One bidirectional interface (two fibers plus associated OLIUs on each end) is designated "service", and the other is designated "protection". In each direction, identical signals are transmitted on the service and protection lines ("dual-fed"). The receiving equipment monitors the incoming service and protection lines independently, and selects traffic from one line (the "active" line) based on performance criteria and technician/OS control. In 1+1 both service and protection lines could be active at the same time. Also referred to as linear (1+1) low speed interface.

1xN, 1x1

1xN protection switching pertains to circuit pack protection that provides a redundant signal path through the DDM-2000 (it does not cover protection switching of an optical facility; see "1+1"). In 1xN switching, a group of N service circuit packs share a single spare protection circuit pack. 1x1 is a special case of 1xN, with N=1. In 1x1 only one is active at a time.

A

ABN

Abnormal (status condition)

ACO

Alarm Cutoff — A pushbutton switch available on the user panel that can be used to retire an audible office alarm.

ACO/TST

Alarm Cutoff and Test — The name of a pushbutton on the user panel.

Active

Active identifies a 1+1 protected OC-N line which is currently selected by the receiver at either end as the payload carrying signal or a 1x1 or 1xn protected circuit pack that is currently carrying service. (See Standby.)

ADM

Add/Drop Multiplexer.

AIS

Alarm Indication Signal — A code transmitted downstream in a digital network that shows that an upstream failure has been detected and alarmed.

AMI

Alternate Mark Inversion — A line code that employs a ternary signal to convey binary digits, in which successive binary ones are represented by signal elements that are normally of alternating, positive and negative polarity but equal in amplitude, and in which binary zeros are represented by signal elements that have zero amplitude.

ANSI

American National Standards Institute

APS

Automatic Protection Switch

ARM

Access Resource Manager

AS&C

Alarm, Status, and Control

ASCII

American Standard Code for Information Interchange — A standard 8-bit code used for exchanging information among data processing systems and associated equipment.

ASN.1

Abstract Syntax Notation 1

ATM

Asynchronous Transfer Mode

Auto

Automatic — One possible state of a DS1 or DS3 port. In this state, the port will automatically be put "in service" if a good signal is detected coming from the DSX panel.

Automatic Protection Switch

A protection switch that occurs automatically in response to an automatically detected fault condition.

Automatic Synchronization Reconfiguration

A feature that allows another synchronization source to be automatically selected and the synchronization source provisioning to be automatically reconfigured in the event of a synchronization source failure or network synchronization change, for example, a fiber cut.

AUXCTL

Auxiliary Control — The name of the slot to the left of the SYSCTL slot on the DDM-2000 OC-3 and FiberReach wideband shelves and to the right of the SYSCTL slot on the DDM-2000 OC-12 shelf.

Available Time

In performance monitoring, the 1-second intervals.

B

B3ZS

Bipolar 3-Zero Substitution — A line coding method that replaces a string of three zeros with a sequence of symbols having some special characteristic.

B8ZS

Bipolar 8-Zero Substitution — A line coding method that replaces a string of eight zeros with a sequence of symbols having some special characteristic.

Backbone Ring

A host ring.

BDFB

Battery Distribution and Fuse Bay.

BER

Bit Error Ratio — The ratio of bits received in error to the total bits sent.

BIP

Bit Interleaved Parity — A method of error monitoring over a specified number of bits, that is, BIP-3 or BIP-8.

BITS

Building Integrated Timing Supply — A single clock that provides all the DS1 and DS0 synchronization references required by clocks in a building.

BRI

Basic Rate Interface

Broadband

Any communications channel with greater bandwidth than a voice channel; sometimes used synonymously with wideband.

C

CC

Clear Channel — A provisionable mode for the DS3 output that causes parity violations not to be monitored or corrected before the DS3 signal is encoded.

CCITT

International Telephone and Telegraph Consultative Committee — An international advisory committee under United Nations' sponsorship that has composed and recommended for adoption worldwide standards for international communications. Recently changed to the International Telecommunications Union - Telecommunications Standardization Sector (ITU-TSS).

CEV

Controlled Environment Vault

CD-ROM

Compact Disk, Read Only Memory

CDTU

Channel and Drop Test Unit

Channel

A logical signal within a port. For example, for an EC-1 port, there is one STS-1 channel and sometimes 28 VT1.5 channels. See Port.

Channel State Provisioning

A feature that allows a user to suppress reporting of alarms and events during provisioning by supporting multiple states (automatic, in-service and not monitored) for VT1.5 and STS-1 channels. See Port State Provisioning.

CIT

Craft Interface Terminal

CLF

Carrier Line Failure Status

CLK

Clock

CMOS

Complementary Metal Oxide Semiconductor

CO

Central Office

COACH

A system of on-line support tools aimed at providing product news and bulletins, diagnostic services, compatibility information, and on-line documents.

CP

Circuit Pack

CPE

Customer Premises Equipment

CR

Critical (alarm status)

CSA

Carrier Serving Area

CSU

Channel Service Unit

CS&O

Customer Support and Operations

CV

Coding Violation (a performance-monitoring parameter)

CVFE

Coding Violation Far-End — An indication returned to the transmitting terminal that an errored block has been detected at the receiving terminal.

D

DACS III-2000

Digital Access and Cross-Connect System that provides clear channel switching at either the DS3 or the STS-1 rates, eliminating the need for manual DSXs.

DACS IV-2000

Digital Access and Cross-Connect System that provides electronic DS3/STS-1 or DS1/VT1.5 cross-connect capability, eliminating the need for manual DSXs.

DCC

Data Communications Channel — The embedded overhead communications channel in the DCE Data Communications Equipment — In a data station, the equipment that provides the signal conversion and coding between the data terminal equipment (DTE) and the line. The DCE may be separate equipment or an integral part of the DTE or of intermediate equipment. A DCE may perform other functions usually performed at the network end of the line.

DDM-1000

Lucent's Dual DS3 Multiplexer — A digital multiplexer that multiplexes DS1, DS1C, or DS2 signals into a DS3 signal or a 90 Mb/s or 180 Mb/s optical signal.

DDM-2000

Lucent's next generation network multiplexers that multiplex DS1, DS3, or EC-1 inputs into EC-1, OC-1, OC-3, or OC-12 outputs.

Default Provisioning

The parameter values that are preprogrammed as shipped from the factory.

Demultiplexing

A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

DEMUX

Demultiplexer - "the DEMUX direction" is from the fiber toward the DSX.

Digital Multiplexer

Equipment that combines by time-division multiplexing several digital signals into a single composite digital signal.

DLC

Digital Loop Carrier

DPLL

Digital Phase-Locked Loop

DRI

Dual Ring Interworking. Two ring networks interconnected at two common nodes.

Drop and Continue

A technique that allows redundant signal appearances at two central offices in a DRI network, allowing protection against central office failures.

DS1

Digital Signal Level 1 (1.544 M/bs)

DS1 Circuit Pack

The DS1 interface circuit pack interfaces to the DSX-1 panel.

DS3

Digital Signal Level 3 (44.736 M/bs)

DS3 Circuit Pack

The DS3 circuit pack interfaces to the DSX-3 panel.

DSn

Digital Signal Rate n — One of the possible digital signal rates at DDM-2000 OC-3 and OC-12 interfaces: DS1 (1.544 Mb/s) or DS3 (44.736 Mb/s).

DSX

Digital Cross-Connect Panel — A panel designed to interconnect equipment that operates at a designated rate. For example, a DSX-3 interconnects equipment operating at the DS3 rate.

DT

Distant Terminal

DTE

Data Terminating Equipment — That part of a data station that serves as a data source (originates data for transmission), a data sink (accepts transmitted data), or both.

Dual 0x1 Cross-Connection

In a single-homed application, the DDM-2000 OC-3/OC-12 Multiplexer uses a dual 0x1 cross-connection to map the VT1.5 channels between the DDM-2000 FiberReach OC-1 and the DDM-2000 OC-3/OC-12 rings. This dual 0x1 architecture means that the VT1.5 path switching is one in the DDM-2000 FiberReach and not in the host DDM-2000. Individual DS1 signals within an STS-1 can therefore be dropped to DDM-2000 OC-3 shelves at several nodes around the ring. See Single 0x1.

Dual Homing

In DDM-2000 FiberReach, a network topology in which two OC-3 shelves serve as DDM-2000 FiberReach Multiplexer hosts supporting up to twelve OC-1 rings. Each DDM-2000 FiberReach Multiplexer ring is interconnected between the two separate hosts. Two *SLC-2000* Access Systems serving as DDM-2000 FiberReach hosts can support up to four OC-1 rings. See Single Homing."

E

EC-1, EC-n

Electrical Carrier — The basic logical building block signal with a rate of 51.840 Mb/s for an EC-1 signal and a rate of n times 51.840 Mb/s for an EC-n signal. An EC-1 signal can be built in two ways: A DS1 can be mapped into a VT1.5 signal and 28 VT1.5 signals multiplexed into an EC-1 (VT1.5 based EC-1), or a DS3 can be mapped directly into an EC-1 (DS3 based EC-1).

ECI

Equipment Catalog Item — The bar code number on the faceplate of each circuit pack used by some inventory systems.

EEPROM

Electrically Erasable Programmable Read-Only Memory

EIA

Electronic Industries Association

EMC

Electromagnetic Compatibility

EMI

Electromagnetic Interference

EOOF

Excessive Out of Frame

EPROM

Erasable Programmable Read-Only Memory

EQ

Equipped (memory administrative state)

ES

Errored Seconds — A performance monitoring parameter. ES "type A" is a second with exactly one error; ES "type B" is a second with more than one and less than the number of errors in a severely errored second for the given signal. ES by itself means the sum of the type A and type B ESs.

ESD

Electrostatic Discharge

ESF

Extended Super Frame (format for DS1 signal)

EST

Environmental Stress Testing

F

FCC

Federal Communications Commission

FDDI

Fiber Distribution Data Interface

FE

Far-End. Any other network element in a maintenance subnetwork other than the one the user is at or working on. Also called remote.

FE-ACTY

Far End Activity — An LED on the user panel.

FEBE

Far End Block Error — An indication returned to near-end transmitting node that an errored block has been detected at the far end.

FE ID

Far End Identification — The 7-segment display on the faceplate of the SYSCTL circuit pack.

FEPROM

Flash EPROM — A new technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

FERF

Far-End-Receive Failure — An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure.

FE SEL

Far End Select — An LED on the user panel.

FIT

Failures in /10ud hours of operation.

Free Running

An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

FT-2000

Lucent's SONET OC-48 lightwave system.

Function Unit

Refers to any one of a number of different circuit packs that can reside in the A, B, or C function unit slots on the DDM-2000 OC-3 Multiplexer, or in the A, B, C, or D function unit slots of the DDM-2000 OC-12 Multiplexer.

G

GCNS-2000

Lucent's Gigabit Cell Network Switch.

GNE

Gateway Network Element — A network element that has an active X.25 link.

GR

Bellcore General Requirement

Group

The eight slots that may be equipped.

GTP

General Telemetry Processor

GUI

Graphical User Interface

H

Hairpin Routing

A cross-connection between Function Units; for example, Function Unit C to Function Units A or B. Cross-connections go through Main, but no bandwidth or time slots are taken from the backbone ring. Eliminates need for another shelf.

HDSL

High Data Rate Digital Subscriber Line.

HECI

Humans Equipment Catalog Item

Holdover

An operating condition of a network element in which its local oscillator is not locked to any synchronization reference but is using storage techniques to maintain its accuracy with respect to the last known frequency comparison with a synchronization reference.

I

IC

Internal Clock. Used in synchronization messaging.

ID

Identifier. See shelf ID and site ID.

IEC

International Electrotechnology Commission

IMF

Infant Mortality Factor

INC

Incoming Status

INCM

A parallel telemetry point used to indicate incoming low-speed failures.

I/O

Input/Output

IP

Internetwork Protocol

IR

Intermediate Reach. A term used to describe distances of from 15 to 40 km between optical transmitter and receiver without regeneration. See long reach.

IS

In Service — One possible state of a DS1, DS3, or EC-1 port. Other possible states are "auto" (automatic) and "nmon" (not monitored).

IS

Intermediate System

ISI

Intershell Interface

ISDN

Integrated Services Digital Network

IS-3

An intraoffice short reach proprietary interface provided by the 21D/21D-U and 22D-U optical line interface units.

ISO

International Standards Organization. See OSI.

ITU-TSS

International Telecommunication Union - Telecommunication Standardization Sector

IVHS

Intelligent Vehicle Highway System

J

Jitter

Timing jitter is defined as short-term variations of the significant instants of a digital signal from their ideal positions in time.

L

LAN

Local Area Network

LAPD

Link Access Procedure "D"

LBO

Line Build Out — An equalizer network between the DDM-2000 OC-3 and OC-12 Multiplexers and the DSX panel. It guarantees the proper signal level and shape at the DSX panel.

LCN

Local Communications Network

LEC

Local Exchange Carrier

LED

Light Emitting Diode — Used on a circuit pack faceplate to show failure (red) or service state. It is also used to show the alarm and status condition of the system.

Line Timing

The capability to directly derive clock timing from an incoming OC-N signal while providing the user the capability to provision whether switching to an alternate OC-N from a different source (as opposed to entering holdover) will occur if the OC-N currently used as the timing reference for that NE becomes unsuitable as a reference. For example, intermediate nodes in a linear network are line timed. See Loop Timing.

Local

See Near-End.

Locked Cross-Connection

This is a variation of the ring cross-connection that allows the user to lock the path selector to a specified rotation of the ring. Any signal received from the other rotation of the ring is ignored.

LOF

Loss of Frame — A failure to synchronize to an incoming signal.

Loop Timing

Loop timing is a special case of line timing. It applies to NEs that have only one OC-N interface. For example, terminating nodes in a linear network are loop timed. See Line Timing.

LOP

Loss of Pointer — A failure to extract good data from an STS-1 payload.

LOS

Loss of Signal — The complete absence of an incoming signal.

LR

Long Reach. A term used to describe distances of 40 km or more between optical transmitter and receiver without regeneration. See intermediate reach.

LS

Low Speed

M

Main

Slots on the DDM-2000 shelf in which the OLIU circuit packs are installed.

Maintenance Subnetwork

A maintenance subnetwork consists of a CO (or gateway network element), a local DDM-2000 and all remote DDM-2000s connected via SONET DCC that are enabled.

Midspan Meet

The capability to interface between two lightwave terminals of different vendors. This applies to high-speed optical interfaces.

MD

Mediation Device

MJ

Major Alarm

MM

Multimode

MML

huMan-Machine Language defined by ITU-TSS, formerly CCITT.

MN

Minor Alarm

MPEG

Moving Picture Experts Group

MSDT

Multi-Services Distant Terminal

MTBF

Mean Time Between Failures

MTBMA

Mean Time Between Maintenance Activities

Multiplexing

The process of combining several distinct digital signals into a single composite digital signal.

Mult

Multiplying. The cascading of signals in a bay. In the MULT mode, the DS1 external reference can be cascaded to other shelves in a bay using Mult cables. Normally starting with the bottom shelf (Number 1) and working towards the top of the bay.

MUX

Multiplex

MXBIU

Multiplexer and Backplane Interface Unit

MXRVO Circuit Pack

The MXRVO circuit pack multiplexes seven VT-G signals from the DS1 circuit packs to an STS-1 signal for connection to the OLIU circuit packs.

N

NE

Near-End. The network element the user is at or working on. Also called local.

NE

Network Element — The basic building block of a telecommunications equipment within a telecommunication network that meets SONET standards. Typical internal attributes of a network element include: one or more high- and low-speed transmission ports, built-in intelligence, synchronization and timing capability, access interfaces for use by technicians and/or operation systems. In addition, a network element may also include a time slot interchanger.

NE-ACTY

Near End Activity — An LED on the user panel.

NEBS

Network Equipment-Building System

nm

Nanometer (10⁻⁹ meters)

NMA

Network Monitoring and Analysis — An operations system designed by Bellcore which is used to monitor network facilities.

NMON

Not Monitored — A provisioning state for equipment that is not monitored or alarmed.

Node

In SONET a node is a line terminating element.

Non-Revertive

A protection switching mode in which, after a protection switch occurs, the equipment remains in its current configuration after any failure conditions that caused a protection switch to occur clear or after any external switch commands are reset. (See Revertive.)

NRZ

Nonreturn to Zero

NSA

Not Service Affecting

NSAP

Network Services Access Point — An address that uniquely identifies a network element. Used for DCC subnetwork communication using the OSI protocol.

NTF

No Trouble Found

O

OAM&P

Operations, Administration, Maintenance, and Provisioning

OC, OC-n

Optical Carrier — The optical signal that results from an optical conversion of an STS signal; that is, OC-1 from STS-1 and OC-n from STS-n.

OC-1

Optical Carrier Level 1 Signal (51.84 Mb/s)

OC-3

Optical Carrier Level 3 Signal (155 Mb/s)

OC-3c (STS-3c)

Optical Carrier Level 3 Concatenated Signal — Low-speed broadband signal equivalent to three STS-1s linked together with a single path overhead.

OC-12

Optical Carrier Level 12 Signal (622 Mb/s)

OHCTL

The overhead controller circuit pack provides user access to the SONET overhead channels.

OLIU

Optical Line Interface Unit

OOF

Out of Frame

OOL

Out of Lock

Operations Interface

Any interface that provides information on the system performance or control. These include the equipment LEDs, user panel, CIT, office alarms, and all telemetry interfaces.

OPS/INE

Operations System/Intelligent Network Element

OS

Operations System — A central computer-based system used to provide operations, administration, and maintenance functions.

OS-GNE

Operations System - Gateway Network Element

OSI

Open Systems Interconnection — Referring to the OSI reference model, a logical structure for network operations standardized by the International Standards Organization (ISO).

OSGNE

Operations System Gateway Network Element -- An OSGNE serves as a single interface to the OS for NEs in the same subnetwork using X.25 interfaces.

OSP

Outside Plant

P

Pass Through

Paths that are cross-connected directly across an intermediate node in a ring network.

P-bit

Performance Bit

PC

Personal Computer

PCU

Power Conversion Unit

PID

Program Identification

PINFET

Positive Intrinsic Negative Field Effect Transistor

PJC

Pointer Justification Count

Plesiochronous Network

A network that contains multiple maintenance subnetworks, each internally synchronous and all operating at the same nominal frequency, but whose timing may be slightly different at any particu-

lar instant. For example in SONET networks, each timing traceable to their own Stratum 1 clock are considered plesiochronous with respect to each other.

PLL

Phased-Locked Loop

PM

Performance Monitoring — Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

PMN

Power Minor Alarm

POH

Path Overhead

POP

Points of Presence

Port

The physical, electrical, or optical interface on a system. For example, DS1, DS3, EC-1, OC-3, and OC-12. See Channel.

Port State Provisioning

A feature that allows a user to suppress alarm reporting and performance monitoring during provisioning by supporting multiple states (automatic, in-service and not monitored) for low speed ports. See Channel State Provisioning.

POTS

Plain Old Telephone Service

Proactive Maintenance

Refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending signal fail or signal degrade defect (for example, performance monitoring).

Protection Line

As defined by the SONET standard, the protection line is the pair of fibers (one transmit and one receive) that carry the SONET APS channel (K1 and K2 bytes in the SONET line overhead). On a DDM-2000 OC-3 system, a *protection* line is a pair of fibers that terminate on an OLIU circuit pack in the **main-2**, **fn-a-2**, **fn-b-2**, or **fn-c-2** slot. (See "Service Line.")

PRM

Performance Report Message

PROTN

Protection

Product Family 2000

Lucent's line of SONET standard network products providing total network solutions.

PRS

Primary Reference Source

PSU

Power Supply Unit

PVC

Permanent Virtual Circuit

PWR

Power

R**RAM**

Random Access Memory

Reactive Maintenance

Refers to detecting defects/failures and clearing them.

Remote

See Far-End.

REN

Ringer Equivalent Number

Revertive

A protection switching mode in which, after a protection switch occurs, the equipment returns to the nominal configuration (that is, the service equipment is active, and the protection equipment is standby) after any failure conditions that caused a protection switch to occur clear or after any external switch commands are reset. (See "Non-Revertive.")

RGU

Ringing Generator Unit

Ring

A configuration of nodes comprised of network elements connected in a circular fashion. Under normal conditions, each node is interconnected with its neighbor and includes capacity for transmission in either direction between adjacent nodes. Path switched rings use a head-end bridge and tail-end switch. Line switched rings actively reroute traffic over a protection line.

Ring (0x1) Low Speed Interface

Formerly referred to as dual 0x1 or single 0x1. In ring applications, the DDM-2000 OC-3 and OC-12 Multiplexers use a 0x1 interface meaning both fibers carry service as opposed to a linear (1+1) low speed interface where one fiber is used for service and the other for protection. See 1+1.

RPP

Reliability Prediction Procedure — Described in Bellcore TR-NWT-00032.

RT

Remote Terminal — An unstaffed equipment enclosure that may have a controlled or uncontrolled environment.

RTAC

Lucent Regional Technical Assistance Center (1-800-225-RTAC)

RZ

Return to Zero

S

SA

Service Affecting

SCADA

Supervisory Control and Data Acquisition

SD

Signal Degrade

SDH

Synchronous Digital Hierarchy

Self-Healing

Ring architecture in which two or more fibers are used to provide route diversity. Node failures only affect traffic dropped at the failed node.

SEFS

Severely Errored Frame Seconds

SEO

Single-Ended Operations — The maintenance capability that provides remote access to all DDM-2000 systems from a single location over the DCC.

Service Line

On a DDM-2000 system, a service (or "working") line is a pair of fibers (one transmit and one receive) that terminate on an OLIU circuit pack in the **main-1**, or **fn-a-1**, or **fn-b-1**, or **fn-c-1** slot. As defined by the SONET standard, the SONET APS channel is not defined on a service (or "working") line. (See "Protection Line.")

SES

Severely Errored Seconds — This performance monitoring parameter is a second in which a signal failure occurs, or more than a preset amount of coding violations (dependent on the type of signal) occurs.

SF

Super Frame (format for DS1 signal)

SID

System Identification

Single 0x1 Cross-Connection

In a dual-homed application, the DDM-2000 OC-3/OC-12 Multiplexer uses a single 0x1 cross-connection to map the VT1.5 channels between the DDM-2000 FiberReach OC-1 and the DDM-2000 OC-3/OC-12 rings. This single 0x1 architecture maps low speed to high speed on a specified ring rotation. The high speed to low speed drop is made on the same specified ring with no path switching. Protection is provided at the VT1.5 end points. See Dual 0x1.

Single Homing

In DDM-2000 FiberReach, a network topology in which a single OC-3 shelf serves as a DDM-2000 FiberReach Multiplexer host supporting up to six OC-1 rings. A SLC-2000 Access System serving as a host can support up to two OC-1 rings. See Dual Homing.

Site ID

A switch settable parameter with values of from 1 to 8. Displayed on SYSCTL circuit pack to indicate to which site the user panel alarms and LEDs apply.

SLIM

Subscriber Loop Interface Module

SM

Single Mode

SONET

Synchronous Optical Network

SPE

Synchronous Payload Envelope

SPOTS

Super POTS

SQU

Sync Quality Unknown. Used in synchronization messaging.

SRD

Software Release Description

Standby

Standby identifies a 1+1 protected OC-N line which is not currently selected by the receiver at either end as the payload carrying signal, or a 1x1 or 1xn protected circuit pack that is not currently carrying service. (See Active.)

Star Topology

For DDM-2000 FiberReach, this refers to a configuration of multiple point-to-point OC-1 extensions from a single DDM-2000 OC-3/OC-12 Multiplexer.

Status

The indication of a short-term change in the system.

STS, STS-n

Synchronous Transport Signal — The basic logical building block signal with a rate of 51.840 Mb/s for an STS-1 signal and a rate of n times 51.840 Mb/s for an STS-n signal.

STS-1 SPE

STS-1 Synchronous Payload Envelope — A 125-microsecond frame structure composed of STS path overhead and the STS-1 payload.

STS-3c

Synchronous Transport Level 3 Concatenated Signal. See OC-3c.

Subnetwork

Group of SONET network elements that share a SONET data communications channel.

Synchronization Messaging

SONET synchronization messaging is used to communicate the quality of network timing, internal timing status, and timing states throughout a subnetwork.

SYSCTL

The system controller circuit pack that provides overall administrative control of the terminal.

T

T1EXT

T1 Carrier Extension Circuit Pack

T1X1 and T1M1

The ANSI committees responsible for telecommunications standards.

TA

Bellcore Technical Advisory

TABS

Telemetry Asynchronous Byte Serial (Protocol)

TCA

Threshold-Crossing Alert — A condition set when a performance-monitoring counter exceeds a user-selected threshold. A TCA does not generate an alarm but is available on demand through the CIT and is shown on TBOS and causes a message to be sent to NMA via the X.25/TL1 interface.

TCVCXO

Temperature-Compensated Voltage-Controlled Crystal Oscillator — A highly stable and accurate clock source used in the DDM-2000 TGS circuit pack.

TGS

The timing generator circuit pack generates clock signals for distribution to the transmit circuits. It operates in the free-running, line-timing, phase-lock, and holdover modes.

TID

Target Identifier — The Bellcore name for the system name.

TL1

Transaction Language 1 — A Bellcore machine-to-machine communications language that is a subset of ITU-TSS, formerly CCITT's, human-machine language.

TLB

Timing Looped Back. Used in synchronization messaging.

TOP

Task Oriented Practice

TR

Bellcore Technical Requirement

TSA

Time Slot Assignment

TSI

Time Slot Interchange

TSO

Technical Support Organization — Supports RTAC and the customers.

U

UAS

Unavailable Seconds. In performance monitoring, the count of seconds in which a signal is declared failed or, in which, 10 consecutively severely errored seconds (SES) occurred, until the time when 10 consecutive non-SES occur.

Unidirectional

A protection switching mode in which the system at each end of an optical span monitors both service and protection lines and independently chooses the best signal (unless overridden by an equipment failure or by an external request, such as a forced switch or lockout). In a system that uses unidirectional line switching, both the *service* and *protection* lines may be *active* simultaneously, with one line carrying traffic in one direction and the other line carrying traffic in the other direction. The K1 and K2 bytes in the SONET line overhead are used to convey to the far end which line the near end receiver has chosen, so that an "active" indication may be made at the far end.

UOC

Universal Optical Connector — Receptacles on the faceplate of some OLIUs that accept ST[®], SC, or FC connectors.

UPD/INIT

A pushbutton on the user panel.

V

V-DT

Virtual-distant terminal

VF

Voice Frequency

VLSI

Very Large Scale Integration — Refers to very complex state of the art integrated circuits.

V-MSDT

Virtual multi-services distant terminal

VM

Violation Monitor — A mode of the DS3 circuit pack in which it will monitor but not remove P-bit parity violations on the DS3 signal received from the fiber.

VMR

Violation, Monitor, and Removal — A mode of the DS3 circuit pack in which it will monitor and remove P-bit parity violations on the DS3 signal received from the fiber.

VONU

Virtual Optical network unit

VT

Virtual Tributary — A structure designed for transport and switching of a sub-DS3 payload.

VT1.5

A 1.728 Mb/s virtual tributary

VT-G

Virtual Tributary Group — A 9-row by 12-column SONET structure (108 bytes) that carries one or more VTs of the same size. Seven VT groups (756 bytes) are byte-interleaved within the VT-organized STS-1 synchronous payload envelope.

W

WAN

Wide Area Network

Z

Zero Code Suppression

A technique used to reduce the number of consecutive zeros in a line-codes signal (B3ZS for DS3 signals and B8ZS for DS1 signals).

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