Lucent Technologies
Bell Labs Innovations

DDM-2000 OC-3 Multiplexer

Release 15.3.1

Ethernet User's Guide

Lucent Technologies

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About this information product

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Purpose   This User Guide provides information for the DDM-2000 OC-3 Multiplexer (DDM-2000), Release 15.3.1. Included in this guide is information on new hardware, features, applications, and ordering as well as detailed procedural information and commands.

Reason for reissue   This is the first issue of this document and is intended to provide detailed information about Release 15.3.1 which features a DDM-2000 Ethernet enhancement. This guide should be used in conjunction with *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*, Issue 2, to support Release 15.3.1.

Safety information   This information product contains hazard statements for your safety. Hazard statements are given at points where safety consequences to personnel, equipment, and operation may exist. Failure to follow these statements may result in serious consequences.

Intended audience   This User Guide is intended primarily for telecommunications network planners, engineers, technicians, and communications network providers.

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Procedural information (tasks) in this document is intended primarily for maintenance, operation, and provisioning personnel responsible for operating and maintaining the DDM-2000 OC-3 Multiplexer.

How to use this information product

This User Guide includes procedural task chapters and supporting information (for example, safety instructions, provisionable parameters, glossary, and index).

Assumptions

This document assumes that users have an understanding of the following:

*   Basic principles of telecommunication transmission

*   Common telecommunication and system terminology (a glossary is provided in this manual to assist you)

*   Test sets and tools used in the telecommunication industry

*   Local operations and functional procedures of your company

*   Craft Interface Terminal (CIT) and personal computer (PC) operation, and common PC terminologies.

Chapter contents

The following table provides a brief description of each chapter in this document.

Table 1   Chapter contents

Chapter	Contents
Chapter 1, "Safety"	This chapter provides important safety instructions for DDM-2000.
Chapter 2, "Ethernet in DDM-2000"	This chapter provides details about the Ethernet features in DDM-2000, including applications, physical descriptions, maintenance and loopbacks, cross-connection information, technical specifications, and ordering information.
Chapter 3, "User operations tasks"	This chapter provides tasks to install and provision Ethernet features in DDM-2000.
Chapter 4, "Alarm messages and trouble clearing tasks"	This chapter provides alarm descriptions and alarm-clearing tasks, as well as supporting trouble-clearing tasks associated with DDM-2000 Ethernet.

Table 1   Chapter contents   (continued)

Chapter	Contents
Chapter 5, "Command details"	This chapter provides CIT and TL1 message details for commands associated with DDM-2000 Ethernet.
"Glossary"	Defines terms used throughout the DDM-2000 documentation.
Index	Provides detailed access to the contents of this document.

Conventions used   The following conventions are used in this document.

- `This font` indicates a command.
  Example:
  `ent-user-secu`

- *This font* indicates a document reference.
  Example, Document Title, xxx-xxx-xxx (ordering number):
  DDM-2000 OC-3 and OC-12 Multiplexers Applications, Planning, and Ordering Guide, 363-206-200R15.

- **This font** indicates buttons, icons, or menu items.
  Example:
  Configuration > Equipment

- *This font* indicates window and screen names or special emphasis.
  Example:
  The *Configure Equipment* screen appears.

- **This font** font indicates lettering designations on the backplane, shelf, and circuit packs.
  Example:
  Release the **ACO TEST** push-button on the SYSCTL when the **8.** disappears in the **IND** display.

- `This font` indicates information output by the system or displayed on the computer.
  Example:
  The response will be `/* SYSTEM TID: DDM-2000 */`.

- Underlined phrases indicate hyperlinks to other text in the document or another step in the task.
  Example: Cross-Reference (chapter-page number): "Laser safety" (1-7)

- Important messages are displayed as follows:

  Important! This is important information.

Related documentation   The following table list the documents included in the DDM-2000 documentation set.

Table 2   DDM-2000 documentation set

Comcode	Document Number	Title
109 454 066	363-206-200R15	*DDM-2000 OC-3 and OC-12 Multiplexers Applications, Planning, and Ordering Guide, 363-206-200R15*
108 725 664	363-206-285	*DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*
N/A	824-102-151	*DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*
109 536 243	363-206-204	*DDM-2000 OC-3 Multiplexer Software Releases 6, 7, 8, 9, 11 and 13 Installation Manual, 363-206-204*
109 565 606	N/A	*DDM-2000 OC-3 Multiplexer Software Release Description for Release 15.3.1* (CD-ROM)
109 565 598	N/A	*DDM-2000 OC-3 Multiplexer Software Release Description for Release 15.3.1* (Paper)
109 565 614	N/A	*DDM-2000 OC-3 Multiplexer Release 15.3.1 Customer Documentation CD-ROM*

Table 3 lists additional related documentation.

Table 3   Related documentation

Document Number	Title
365-370-300 R5.1 and later	*Metropolis® DMX Access Multiplexer Applications and Planning Guide, 365-372-300*
365-370-301 R5.1 and later	*Metropolis® DMX Access Multiplexer User Operations Guide, 365-372-301*

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Table 3   Related documentation   (continued)

365-370-302 R5.1 and later	*Metropolis® DMX Access Multiplexer Alarm Messages and Trouble Clearing Guide, 365-372-302*
365-370-306 R5.1 and later	*Metropolis® DMX Access Multiplexer TL1 Message Details, 365-372-306*
365-370-324 R3.1 and later	*Metropolis® DMXtend Access Multiplexer Applications and Planning Guide, 365-372-324*
365-370-325 R3.1 and later	*Metropolis® DMXtend Access Multiplexer User Operations Guide, 365-372-325*
365-370-326 R3.1 and later	*Metropolis® DMXtend Access Multiplexer Alarm Messages and Trouble Clearing Guide, 365-372-326*
365-370-328 R3.1 and later	*Metropolis® DMXtend Access Multiplexer TL1 Message Details, 365-372-328*
365-372-331 R2.0 and later	*Metropolis® DMXplore Access Multiplexer Applications and Planning Guide, 365-372-331*
365-372-332 R2.0 and later	*Metropolis® DMXplore Access Multiplexer User Operations Guide, 365-372-332*
365-372-333 R2.0 and later	*Metropolis® DMXplore Access Multiplexer Alarm Messages and Trouble Clearing Guide, 365-372-333*
365-372-335 R2.0 and later	*Metropolis® DMXplore Access Multiplexer TL1 Message Details, 365-372-335*

User interface to system

Users interact with the DDM-2000 OC-3 Multiplexer using a Craft Interface Terminal (CIT), which permits users to perform system operations such as administration, provisioning, fault management, and more.

Using the CIT

Procedures or tasks presented in this document expect users to be familiar with the CIT and navigating through the screens of information relating to a particular operation. The screens are designed to be straightforward and to contain all information relating to a particular operation. The tasks presented in this document rely on the information provided in the screen displays. Therefore, it is imperative that users read all the information provided in a screen before continuing an operational function.

Using tasks
To find instructions for performing a specific job, find the task in the chapter *Contents* table.

Tasks contain step-by-step instructions to accomplish a distinct user task. Tasks are found in .

Supporting tasks are referenced from multiple tasks to support a job function you are performing. Go to a supporting task only when it is referred to by another task. Supporting tasks are not to be accessed directly except by very experienced personnel.

> **Important!** Perform all steps in a task sequentially, unless that step sends you to another step or task.
>
> Unless otherwise instructed, if one task sends you to another task, you must return to the first task after you complete the second. After you have completed the first task, you have finished.

If/Then statements in a task

If …/Then … columns in a task contain only one condition that is true in a table cell under the If … column. You perform the action in the related table cell under the Then … column. You then continue to the next sequential step or as directed by the action under the Then … column.

Verifying actions

Sometimes you will be asked to verify that actions have occurred. This may take the form of a formal statement of the expected response. At other times, the instructions will merely state that the user should verify an action or response to an action. If the expected response is not observed and a specific trouble-clearing reference is not made, you should reference the chapter entitled *Trouble Clearing Tasks* in the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285* to start trouble clearing.

Documentation ordering information
This section describes how to order

- Additional copies of this document
- Electronic documentation (CD-ROMs)

ILEC/CLEC Customers

ILEC/CLEC customers should process orders through your Company Documentation Coordinator.

Commercial Customers

Commercial customers may order standard documentation or request placement on the standing order list (for reissues of any document) by mail, telephone, fax, email, or the internet.

Table 4   Ordering documentation via phone, fax, or email

From Country/Region	Telephone Numbers	Fax Numbers	Email
USA	1-888-LUCENT-8 (1-888-582-3688)	1-800-566-9568	cicorders@lucent.com (*cicorders@lucent.com*)
Canada, North American Region (NAR)	+1-317-322-6616	+1-317-322-6699	cicorders@lucent.com (*cicorders@lucent.com*)
Europe, the Middle East, and Africa (EMEA), Asia, Pacific Region, and China; Caribbean, Latin America (CALA)	+1-317-322-6416	+1-317-322-6699	intlnaorders@lucent.com (*intlnaorders@lucent.com*)

The postal address for CIC is:

Lucent Technologies

Attention: Order Entry

2855 N. Franklin Road

P.O. Box 19901

Indianapolis, IN 46219

Table 5   Ordering documentation via the Internet

Customer	Web-Site
Commercial Customers	CIC Web-Site (*http://www.lucentdocs.com*)
	Lucent Web-Site (*http://www.lucent8.com*)
Lucent Associates	CIC Employee Web-Site (*http://www.cic.lucent.com*)

Methods of payment   Lucent Associates are billed using an organization number/cost center and location code.

Commercial customers may use one of the following methods of payment:

- Check (payable to Lucent Technologies)

- Money order (payable to Lucent Technologies)

- Invoice upon receipt of a purchase order.
  (Purchase orders may be faxed or mailed using the information provided above.)

- Credit card:
  - Visa

  - MasterCard

  - American Express

For orders totaling $1000 or less, either a credit card or prepayment by check/money order is required.

Worldwide Services

Lucent Worldwide Services provides a full life-cycle of services and solutions to help you plan, design, implement, and operate your network in today's rapidly changing and complex environment.

Engineering Services

Engineering Services provide information and technical support to customers during the planning, implementation, and placement of equipment into new or existing networks. We determine the best, most economical equipment solution for a customer and help ensure equipment is configured correctly for the customer's network needs, works as specified, and is ready for installation on delivery. These services consist of the following:

- Equipment engineering

- Software engineering

- Site records

- Engineering consulting

- Additional engineering services (for example, Network Realignment, System Capacity Planning, System Health Assessment

Installation Services

Lucent Technologies offers Installation Services focused on providing the technical support and resources customers need to efficiently and cost-effectively install their network equipment. We offer a variety of

options that provide extensive support and deliver superior execution to help ensure the system hardware is installed, tested, and functioning as engineered and specified. Installation Services provides a complete flexible solution tailored to meet customers' specific needs. These services consist of the following:

- Equipment installation

- Specialized equipment installation

- Network connectivity services

- Installation support services

Technical Support

Lucent Technologies provides the following Technical Support Services:

- Remote Technical Support (RTS) - remote technical support to troubleshoot and resolve system problems.

- On-site Technical Support (OTS) - on-site assistance with operational issues and remedial maintenance.

- Repair and Replacement (R&R) - technical support services for device repair/return or parts replacement.

- Lucent OnLine Customer Support - online access to information and services that can help resolve technical support requests.

   Important! Technical Support Services are available 24 hours a day, 7 days a week.

Customers inside the United States and Canada

Technical Support Services can be reached at **1-866-LUCENT8** (866-582-3688): *Prompt 1.*

Customers outside the United States

Technical Support Services can be reached at **+1-630-224-4672**: *Prompt 2.*

Web-Site

For additional information regarding Worldwide Services, refer to the Lucent Technologies' web-site (*http://www.lucent.com/products*).

1. Click on **Browse the catalog**

2. Click on **Worldwide Services Solutions**

3. Select the desired service to display:

- Engineering and Installation
- Technical Support Services

Training This document expects a user to be familiar with the basic functions of the system before performing tasks that could damage the system, affect system operations, or impede communication traffic within the system. Understanding the descriptive material provided in this manual and attending the recommended training courses should allow you to perform the tasks necessary to operate and maintain DDM-2000.

Refer to Lucent Technologies' Training web-site (*https://training. lucent.com*) for descriptions of the training courses available for DDM-2000.

Registering for a course

To review the available courses or to enroll in a training course at one of Lucent's corporate training centers,

- Within the United States,
  – Visit Lucent Technologies' Training web-site (*https://training.lucent.com*).
  – Call **1-888-LUCENT8** (888-582-3688): *Prompt 2*.
- Outside the continental United States,
  – Visit Lucent Technologies' Training web-site (*https://training.lucent.com*).
  – Contact your in-country training representative
  – Call: **+1-407-767-2798**
  – Fax: **+1-407-767-2677**

Suitcasing

To arrange for a suitcase session at your facility,

- Within the United States, call **1-888-LUCENT8** (888-582-3688): *Prompt 2*.
- Outside the continental United States,
  – Contact your in-country training representative
  – Call: **+1-407-767-2798**
  – Fax: **+1-407-767-2677**

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How to comment   To comment on this information product, go to the Online Comment Form (*http://www.lucent-info.com/comments/enus/*) or email your comments to the Comments Hotline (*comments@lucent.com*).

1 Safety

Overview

Purpose   This chapter provides important safety instructions for DDM-2000.

Contents

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Structure of hazard statements

Overview   Hazard statements describe the safety risks relevant while performing tasks on Lucent Technologies products during deployment and/or use. Failure to avoid the hazards may have serious consequences.

General structure   Hazard statements include the following structural elements:
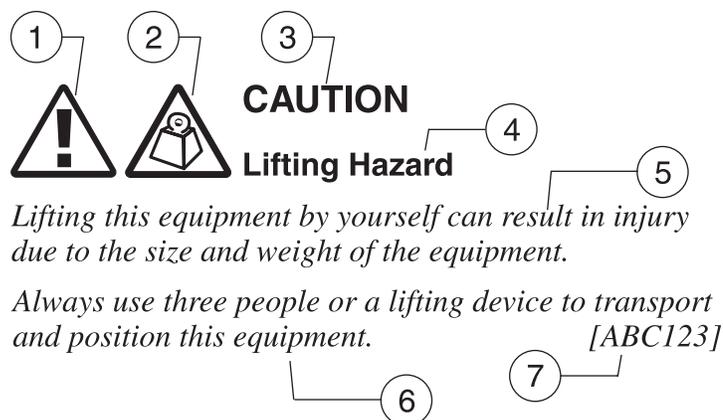
Item	Structure element	Purpose
1	Personal injury symbol	Indicates the potential for personal injury (optional)
2	Hazard type symbol	Indicates hazard type (optional)
3	Signal word	Indicates the severity of the hazard
4	Hazard type	Describes the source of the risk of damage or injury
5	Damage statement	Consequences if protective measures fail
6	Avoidance message	Protective measures to take to avoid the hazard
7	Identifier	The reference ID of the hazard statement (optional)

Signal words   The signal words identify the hazard severity levels as follows:

Signal word	Meaning
DANGER	Indicates an imminently hazardous situation (high risk) which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation (medium risk) which, if not avoided, could result in death or serious injury.
CAUTION	*When used with the personal injury symbol:* Indicates a potentially hazardous situation (low risk) which, if not avoided, may result in personal injury. *When used without the personal injury symbol:* Indicates a potentially hazardous situation (low risk) which, if not avoided, may result in property damage, such as service interruption or damage to equipment or other materials.

General notes on safety

Overview This chapter *must* be read by the responsible technical personnel before servicing the system. The most recent issue of this document must always be kept close to the equipment.

In addition to the general safety instructions in this chapter, users must also observe the specific safety instructions in the individual chapters.

The equipment complies with the current national and international safety requirements. It is provided with a high degree of operational safety resulting from many years of development experience and continuous stringent quality checks.

Potential sources of danger The equipment is safe in normal operation. There are, however, some potential sources of danger that cannot be completely eliminated. In particular, these arise during the following:

- opening of housings or equipment covers,
- manipulation of any kind within the equipment, even if it has been disconnected from the power supply,
- disconnection of optical or electrical connections,
- through possible contact with live pairs, laser light, hot surfaces, sharp edges, or components sensitive to electrostatic discharge.

Special safety instructions *Laser safety* and *handling components sensitive to electrostatic discharge (ESD)* are vitally important to the equipment. For special safety instructions concerning laser safety and electrostatic discharge, refer to sections "Laser safety" (1-7) and "Electrostatic discharge" (1-13).

General safety requirements

In order to keep the technically unavoidable residual risk to a minimum, it is imperative to observe the following rules.

- Transport, storage and operation of the unit/system must be under the *permissible conditions only*.
  See accompanying documentation and information on the unit/system.

- Installation, configuration, and disassembly must be carried out only by *expert personnel* and *with reference to the respective documentation*.
  Due to the complexity of the unit/system, the personnel requires *special training*.

- The unit/system must be operated by *expert* and *authorized users only*.
  The user must operate the unit/system only after having *read and understood* the chapter on safety and the parts of the documentation relevant to operation. For complex systems, additional training is recommended. Any obligatory training for operating and service personnel must be carried out and documented.

- The unit/system must not be operated unless it is in perfect working order.
  Any faults and errors that might affect safety must be reported *immediately* by the user to a person in responsibility.

- The unit/system must be operated only with the connections and under the environmental conditions as described in the documentation.

- Any conversions or changes to the system or parts of the system (including the software) must be carried out by qualified Lucent Technologies personnel or by expert personnel authorized by Lucent Technologies.
  All changes carried out by other persons lead to a *complete exemption from liability*.
  No components/spare parts must be used other than those recommended by the manufacturer and those listed in the procurement documents.

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- The removal or disabling of safety facilities, the clearing of faults and errors, and the maintenance of the equipment must be carried out by *specially qualified personnel only*.
  The respective parts of the documentation must be strictly observed. The documentation must also be consulted during the selection of measuring and test equipment.

- Calibrations, special tests after repairs and regular safety checks must be carried out, documented and archived.

- Non-system software is used at one's *own risk*. The use/installation of non-system software can adversely affect the normal functioning of the unit/system.

Laser safety

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System compliance   DDM-2000 complies with the following laser safety regulations and standards:

- Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) 21 CFR 1040.10 and 1040.11 as a Class I laser product

- International Electro-technical Commission (IEC) 60825-1: 2001 as a Class 1 laser product.

The following table shows the optical circuit pack laser safety specifications:

Circuit Pack	Wavelength (nm)	Output Power (mW)	Fiber Type/ Core/Cladding Diameter (μm)	Connector Type	FDA Class/IEC Hazard Level
BBG23 FEPL	1310	1.0	Single Mode (9.0/125)	SFP	I/1

General laser information   Optical fiber telecommunication systems, their associated test sets, and similar operating systems use semiconductor laser transmitters that emit infrared (IR) light at wavelengths between approximately 800 nanometers (nm) and 1600 nm. 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-IR 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. Monochromatic light is 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

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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

The optical energy emitted by laser and high-radiance LEDs in the 400-1400 nm 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 on the retina magnifying the irradiance. The irradiance of the energy that reaches the retina is approximately 105 or 100,000 times more than at the cornea and, if sufficiently intense, may cause a retinal burn.

The damage mechanism at the wavelengths used in an optical fiber telecommunications is thermal in origin, for example, damage caused by heating. Therefore, a specific amount of energy is required for a definite time to heat an area of retinal tissue. Damage to the retina 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. Optical energies above 1400 nm cause corneal and skin burns, but do not affect the retina. The thresholds for injury at wavelengths greater than 1400 nm are significantly higher that for wavelengths in the retinal hazard region.

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 I, II, lla, IIIa, lllb, or IV.

The International Electro-technical Commission (IEC) is an international standards body that writes laser safety standards under IEC-60825. Classification schemes are similar and divided into Classes 1, 1M, 2, 2M, 3B, 3R and 4. Lasers are classified according to the accessible emission limits and their potential for causing injury.

Optical fiber telecommunication systems are generally classified as Class I/1, because, under normal operating conditions, all energized laser transmitting circuit packs are terminated on optical fibers which enclose the laser energy with the fiber sheath forming a protective housing. Also, a protective housing/access panel is typically installed in front of the laser circuit pack shelves. The circuit packs themselves, however, may be FDA/CDRH Class I, IIIb, or IV or IEC Class 1, 1M,

3B, 3R or 4. State of the art Raman and EDFA optical amplifiers have now extended into the Class IV/4 designations

Laser safety precautions for optical fiber telecommunications systems

In its normal operating mode, an optical fiber telecommunication system is totally enclosed and presents no risk of eye injury. It is a Class I/1 system under the FDA/CDRH and IEC classifications.

The fiber optic cables that interconnect various components of an optical fiber telecommunication 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 density) 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 milliwatts at the near IR wavelengths and a few tens of milliwatts at the far IR 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.

Laser Radiation

CAUTION
Laser hazard

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

Use controls, adjustments, and procedures specified in this document.

**Laser safety precautions
for enclosed systems**

Under normal operating conditions, optical fiber telecommunication systems are completely enclosed. Observe the following laser safety precautions for enclosed systems:

- Because of the potential for eye damage, technicians should not stare into optical connectors or broken fibers.

- Under no circumstance shall laser/fiber optic operations be performed by a technician before satisfactorily completing laser safety training.

- Since viewing lightwave emission directly in excess of Class I/1 limits with an optical instrument such as an eye loupe greatly increases the risk of eye damage, appropriate labels must appear in plain view, in close proximity to the optical port on the protective housing/access panel of the terminal equipment.

**Laser safety precautions
for unenclosed systems**

During service, maintenance, or restoration, an optical fiber telecommunication system is considered unenclosed. Observe the following laser safety precautions for unenclosed systems:

- 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. Laser modules associated with the optical ports of laser circuit packs are typically recessed, which limits the exposure distance. Optical port shutters and automatic power reduction (APR), and automatic power shut down (APSD) are engineering controls that are also used to limit the emissions. However, technicians removing or replacing laser circuit packs should not stare or look directly into the optical port with optical instruments or magnifying lenses. (Normal eye wear or indirect viewing instruments, such as a Find-R-Scopes, are not considered magnifying lenses or optical instruments.)

- Only authorized, trained personnel shall use the optical test equipment during installation or servicing since this equipment contains semiconductor lasers. (Some examples of optical test equipment are Optical Time Domain Reflectometers [OTDRs] and Hand-Held Loss Test Sets.)

- Under no circumstances shall any personnel scan a fiber with an optical test set without verifying that all laser sources on the fiber are turned off.

- All unauthorized personnel shall be excluded from the immediate area of the optical fiber telecommunication systems during installation and service.

Consult *ANSI* Z136.2, American National Standard for Safe Use of Optical Fiber Communication Systems Utilizing Laser Diodes and LED Sources in the United States or outside the United States, IEC-60825, Part 2 for guidance on the safe use of optical fiber optic communication systems in the workplace.

Laser warning labels   The following figure shows the different types of laser warning labels.

Figure 1-1 Laser warning labels
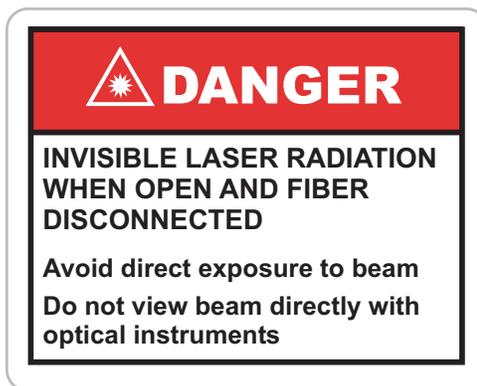
MA-metro-428

Legend

1. Laser symbol.

2. Laser classification label. This label may show only the laser class or both the laser class and the maximum output power.

3. Laser warning label.

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Electrostatic discharge

Overview Electrostatic discharge (ESD) (for example, caused by touching with the hand) can destroy semiconductor components. The correct operation of the complete system is then no longer assured.

Electrostatic discharge (ESD) warning

⚠ CAUTION

ESD hazard

Electronic components can be destroyed by electrostatic discharge.

Circuit packs must always be kept in antistatic covers. Use the original packaging if possible. Use a static ground wrist strap whenever handling circuit packs or working on the DDM-2000 system to prevent electrostatic discharge damage to sensitive components.

All semiconductor components are basically sensitive to electrostatic discharge. The electrostatic discharge can also affect the components indirectly using contacts or conductor tracks.

Electrostatic discharge (ESD) considerations This section describes the precautions required to prevent damage by electrostatic discharge.

Circuit pack handling precautions

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.

Observe the following precautions when handling circuit packs/units to prevent damage by electrostatic discharge:

- Assume all circuit packs contain solid-state electronic components that can be damaged by ESD.

- When handling circuit packs (storing, installing, 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.

- Wear working garment made of 100% cotton to avoid electrostatic discharge.

- 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.

- Store and ship circuit packs and components in their shipping packing. Circuit packs and components must be packed and unpacked only at workplaces suitably protected against buildup of charge.

- Observe all 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.

- 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. When removing circuit packs from a shelf, immediately place the circuit packs in static-safe packages.

- Whenever possible, maintain relative humidity above 20 percent.

    Important! Any connectors on the shelf interconnection panel that are not cabled should be fitted with a plastic dust cap to provide ESD protection.

Static control wrist straps

To reduce the possibility of ESD damage, the DDM-2000 shelf is equipped with an ESD grounding jack to enable personnel to ground themselves using wrist straps (Figure 1-2, "Static control wrist strap "

(1-15)), while handling circuit packs or working on the shelf. The wrist straps should be checked periodically with a wrist strap tester to ensure that they are working properly.

Figure 1-2 Static control wrist strap

To
Ground
Connection
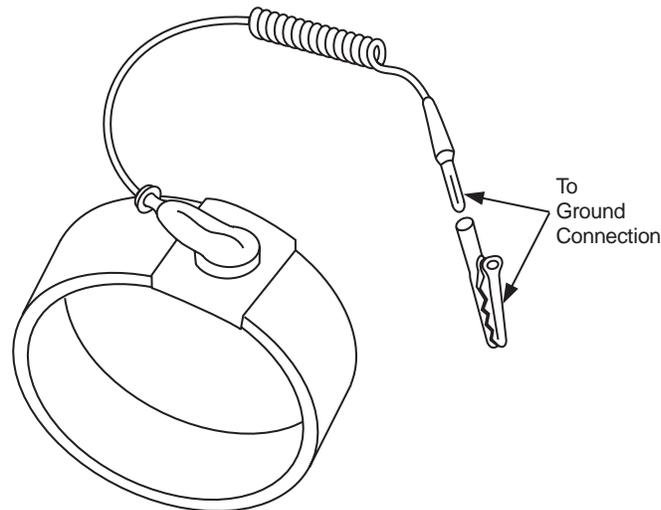
NC-USM-110

Important! The grounding jack is located on the front of the shelf, on the lower right-hand corner. Another grounding jack is also located on the rear panel.

Barred-hand symbol Circuit packs containing components that are especially sensitive to electrostatic discharge are identified by warning labels bearing the barred-hand symbol. The following figure shows the barred-hand symbol.

Figure 1-3 Electrostatic discharge warning label (barred-hand symbol)

MA-metro-429

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Save these safety instructions

READ AND UNDERSTAND ALL 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 this product.

When installing, operating, or maintaining this equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

1. Read and understand all instructions.

2. Follow all warnings and instructions marked on this product.

3. This product should be only operated from the type of power sources indicated on the marking label.

4. Connect this product only to the type of power sources recommended by Lucent Technologies. For information on the powering instructions, consult the *DDM-2000 OC-3 Multiplexer Software Releases 6, 7, 8, 9, 11 and 13 Installation Manual, 363-206-204*.

5. This equipment is suitable for mounting on a concrete or other non combustible surface only.

6. For information on proper mounting instructions, consult the *DDM-2000 OC-3 Multiplexer Software Releases 6, 7, 8, 9, 11 and 13 Installation Manual, 363-206-204*.

7. Install only equipment identified in the *DDM-2000 OC-3 Multiplexer Software Releases 6, 7, 8, 9, 11 and 13 Installation Manual, 363-206-204*. Use of other equipment may result in improper connection of circuitry leading to fire or injury to persons.

8. All metallic telecommunication interfaces (traffic ports) should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection, as applicable.

9. Do not use this product near water, for example, in a wet basement.

10. Do not place this product on an unstable cart, stand, or table.

11. Use caution when installing or modifying telecommunications lines.

12. Never install telecommunications wiring during a lightning storm.

13. Never install telecommunications connections in wet locations.

14. Never touch uninsulated telecommunications wires or terminals unless the telecommunications line has been disconnected at the network interface.

15. Never touch uninsulated wiring or terminals carrying direct current or ringing current, or leave this wiring exposed. Protect and tape uninsulated wiring and terminals to avoid risk of fire, electric shock, and injury to service personnel.

16. Never push objects of any kind into this product through 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 liquids of any kind on the product.

17. Slots and openings in the unit are provided for ventilation, to protect it from overheating. Do not block or cover these openings. This product should not be placed in a built-in installation unless proper ventilation is provided.

18. To reduce the risk of an electrical shock, do not disassemble this product. Service should be performed by trained personnel only. Opening or removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.

19. Some of the DDM-2000 family hardware modules contain FDA/CDRH Class I/IEC Class 1 single-mode laser products that are enclosed lightwave transmission systems.
    Under normal operating conditions, lightwave transmission systems are completely enclosed; however, the following precautions must be observed because of the potential for eye damage

    • Do not connect any lightwave cable or splice and stare into the optical connectors terminating the cables

    • Lightwave/lightguide operations should not be performed by a technician who has not satisfactorily completed an approved training course

- Do not use optical instruments such as an eye loupe to view a fiber or unterminated connector

- More information about laser safety can be found in the *DDM-2000 OC-3 Multiplexer Software Releases 6, 7, 8, 9, 11 and 13 Installation Manual, 363-206-204*.

20. For a unit intended to be powered from -48 V DC voltage sources, read and understand the following:

    - To be powered only by Safety Extra Low Voltage (SELV) -48 V DC sources

    - Disconnect up to two power supply connections when removing power from the system

    - This equipment must be provided with a readily accessible disconnect device as part of the building installation

    - Ensure that there is no exposed wire when the input power cables are connected to the unit

    - Installation must include an independent frame ground drop to building ground. Refer to the *DDM-2000 OC-3 Multiplexer Software Releases 6, 7, 8, 9, 11 and 13 Installation Manual, 363-206-204*.
      This symbol is marked on the product, adjacent to the ground (earth) area for the connection of the ground (earth) conductor

    - This is to be installed only in restricted access areas on Business and Customer Premises Applications in Accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA No. 70 Other installations exempt from the enforcement of the National Electrical Code may be engineered according to the accepted practices of the local telecommunications utility.

21. For a unit intended to be powered from 100-120/200-240 V AC voltage sources, read and understand the following:

    - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning

    - Do not staple or otherwise attach the power supply cord to the building surfaces

    - Do not overload wall outlets and extension cords as this can result in the risk of fire or electrical shock

- The socket outlet shall be installed near the equipment and shall be readily accessible.

- This product is equipped with a three-wire grounding type plug, a plug having a third (grounding) pin. This plug is intended to fit only into a grounding type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding type plug. Do not use a 3-to-2-prong adapter at the receptacle. Use of this type adapter may result in risk of electrical shock and/or damage to this product.

- Do not allow anything to rest on the power cord. Do not locate this product where the cord may be abused by persons walking on it.

22. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

    - When the powers supply cord or plug is damaged or frayed.

    - If liquid has been spilled into the product

    - If the product has been exposed to rain or water.

    - If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions because improper adjustment of other controls may result in damage and will often require extensive work by qualified technician to restore the product to normal operation.

    - If the product has been dropped or the cabinet has been damaged.

    - If the product exhibits a distinct change in performance.

SAVE THESE INSTRUCTIONS.

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2 Ethernet in DDM-2000

Overview

Purpose This chapter provides an overview of the Ethernet features available in DDM-2000 Release 15.3.1. The BBG23 Fast Ethernet Private Line (FEPL) circuit pack, available in this release, provides Ethernet services on the DDM-2000 OC-3 Multiplexer and can be used in a range of applications.

The following key areas are covered in this chapter:

- Features and applications for DDM-2000 Ethernet
- BBG23 FEPL circuit pack description, including maintenance and loopback information
- Performance monitoring for DDM-2000 Ethernet
- Cross-connections
- Technical specifications
- Ordering information.

This chapter is meant to complement information found in *DDM-2000 OC-3 and OC-12 Multiplexers Applications, Planning, and Ordering Guide, 363-206-200R15*. Refer to this document for general information about the DDM-2000 OC-3 Multiplexer.

See Table 2, "DDM-2000 documentation set" (xviii) for a detailed list of additional documents referenced in this chapter and throughout this guide.

Contents

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Introduction

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Overview

The BBG23 Fast Ethernet Private Line (FEPL) circuit pack is designed to provide Private Line Ethernet services on the DDM-2000 OC-3 Multiplexer (DDM-2000). The circuit pack provides up to 5 independent point-to-point services (4 electrical and one optical), with each service terminating on different endpoints. The endpoints do not have to terminate on the same SONET ring. Distances up to 100 meters are supported with both electrical and optical outputs. Distances over 100 meters must use the optical output. The BBG23 FEPL circuit pack supports VT1.5, STS-1, and STS-3c cross-connections.

The BBG23 FEPL circuit pack has a 10/100Base-TX Ethernet interface providing data transport at the rate of 10 Mbps or 100 Mbps using standard Ethernet (IEEE 802.3), standard encapsulation according to ITU G.7041 for Generic Framing Procedure (GFP), and ITU G.707 for Virtual Concatenation (VCAT).

The BBG23 FEPL circuit pack is a double-wide pack, occupying two slots and connecting on the even-numbered function slot. It can be placed in the A, B, or C Function Unit slots of the DDM-2000 OC-3 Multiplexer shelf, and it may be used with OC-3 or OC-12 OLIU circuit packs in the Main slots. Hardware protection is not available for the BBG23; however, traffic is protected via SONET 1+1 or unidirectional path switched rings (UPSR) configuration.

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Features

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Purpose   This section provides an overview of Ethernet services over SONET and Fast Ethernet Private Line Service on the DDM-2000 OC-3 Multiplexer. This service provides the following features:

- A dedicated link between two locations
- Virtual concatenation, providing more efficient bandwidth usage
- SONET transport and protection

Private Line service   The DDM-2000 Ethernet feature provides Private Line service that establishes a dedicated link between two locations. The Ethernet ports and SONET bandwidth are dedicated to the subscriber and not shared. Private line service is characterized by minimal provisioning, typically just the SONET cross-connection. A subclass, fractional Private Line is distinguished by less than Ethernet-line-rate SONET connectivity. It is a form of rate control that also improves efficiency by only consuming the required SONET bandwidth in STS-1 or VT1.5 increments.

Private Line service requires little or no Layer 2 functionality. With Fast Ethernet, the physical layer is terminated once the line rate and duplex mode are established. LAN ports may either be provisioned with these values or provisioned to autonegotiate. In addition, performance of the Fractional Private Line may be improved by enabling flow control, a Layer 2 function.

The DDM-2000 Ethernet circuit pack (BBG23 FEPL) provides up to 5 independent point-to-point services: four electrical 10/100BASE-TX and one optical 100BASE-LX. Each service can terminate on different endpoints, and do not have to terminate on the same SONET ring.

Ethernet transport overview   A DDM-2000 network accepts Ethernet frames at an ingress port and transmits them out of an egress port. The egress port is on a different network element and Ethernet frames are transmitted over a SONET network. To transport an Ethernet frame across the SONET network, the Ethernet Frame is moved between a Local Area Network (LAN) port and the SONET network.

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The following occurs to transport an Ethernet frame over a SONET network:

- The DDM-2000 accepts an Ethernet Frame at an ingress LAN Port.

- The Ethernet frame is accepted at an Ethernet LAN port, processed, and then transmitted out of the corresponding Virtual Conctatenation Group (VCG) port. For the BBG23 FEPL circuit pack, the Ethernet frame is sent directly to the GFP mapper via a VCG port.

- The generic framing procedure (GFP) mapper encapsulates the Ethernet frame into a GFP Frame.

- The Virtual Concatenator maps the Ethernet stream into one or more SONET tributaries (timeslots). This allows the network to carry traffic (Ethernet stream) at higher speeds than allowed by a single SONET tributaries (time slot). The group of virtually concatenated tributaries is referred to as a VCG.

- The VCG is then placed on SONET tributaries and transmitted over the SONET network.

The following figure shows the Ethernet processing on the 5 ports of the BBG23 FEPL circuit pack.

Figure 2-1 Ethernet processing
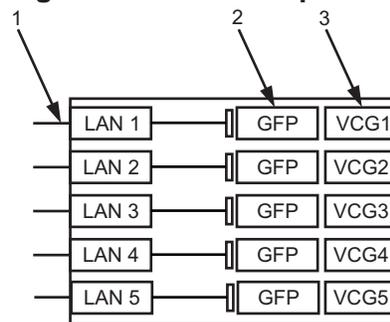
MA-DDM-023

Legend:

1. External Ethernet Port

2. Generic Framing Procedure

3. Virtual Concatenation Group

Virtual concatenation   Virtual Concatenation is a standard inverse multiplex scheme for transporting a payload using multiple channels each of which has a lower capacity than the payload to be transported. It allows finer granularity in allocating the transport bandwidth than is available in standard contiguous concatenation (for example, STS-3c). For example, an STS-1 tributary has a usable bandwidth of approximately 48.4 Mb/s. This is too slow for a 100 Mb/s Ethernet stream. If the STS-1 were carried in the 100 Mb/s stream, 51.6 Mb would be unused.

Using virtual concatenation, 2 STS-1 tributaries can provide an effective rate of approximately 96.8 Mb/s. Fewer signals can be virtually concatenated to provide sub-rate (fractional rate) service. The grouped SONET tributaries form a VCG. A VCG is treated as a single logical serial byte stream whose payload capacity equals that of the sum of the payload capacities of the constituent SONET tributaries. The following figure shows a virtual concatenation group.

Figure 2-2 Virtual concatenation group
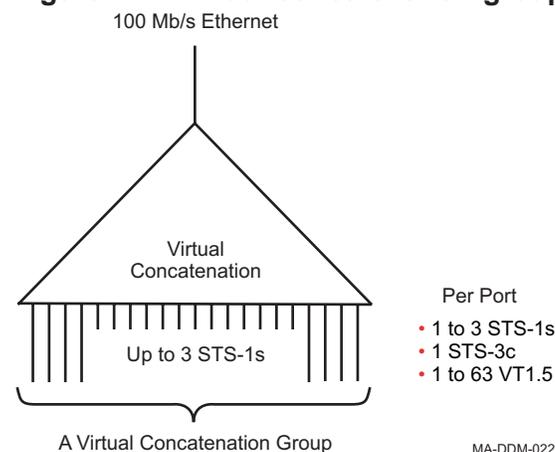
Individual tributaries in the VCG are independently transported through the SONET network in a point-to-point private line service. Only the initial and final SONET nodes perform the Virtual Concatenation. Since the VCGs are invisible to the intermediate SONET nodes, the intermediate nodes only need to transport normal SONET traffic and do not need to understand VCGs. This allows the tributaries to be transported through equipment with dedicated

bandwidth which does not handle VCGs. The following figure illustrates this.

Figure 2-3 Ethernet Point-to-Point private line
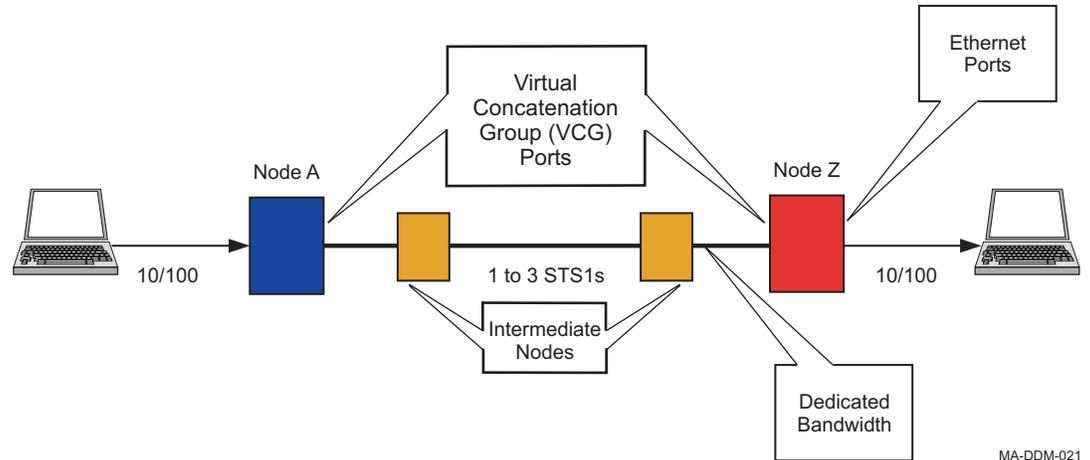
The DDM-2000 Ethernet point-to-point private line application features the following:

- All bandwidth is dedicated to a single user.

- 10 Mb and 100 Mb partial and full-rate services are supported as follows:

  – Full rate 10 Mb carried by 1 STS-1 or 7 VT1.5s of service. Full Rate 100 Mb carries 2 or 3 STS-1s or 1 STS-3c of service. (2 STS-1s gives worst case 97% of full rate).

  – Sub-rate 10 Mb carried by 1 to 7 VT1.5s of service. Sub-rate 100 Mb carries 1 STS-1 or 1 to 63 VT1.5s of service.

- Flow control and buffering is used to moderate sub-rate services.

- SONET protection is used to protect the service.

An additional feature of virtual concatenation is the ability to mix traffic within a single STS-1. In the following diagram, a mix of 4 VT1.5 signals carrying Fast Ethernet service (in Group C) and 2 DS-1

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signals (in Group A) carrying other traffic can be mixed within a
single STS-1, transported, and separated at the far end.

Figure 2-4 Virtual concatenation with mixed traffic
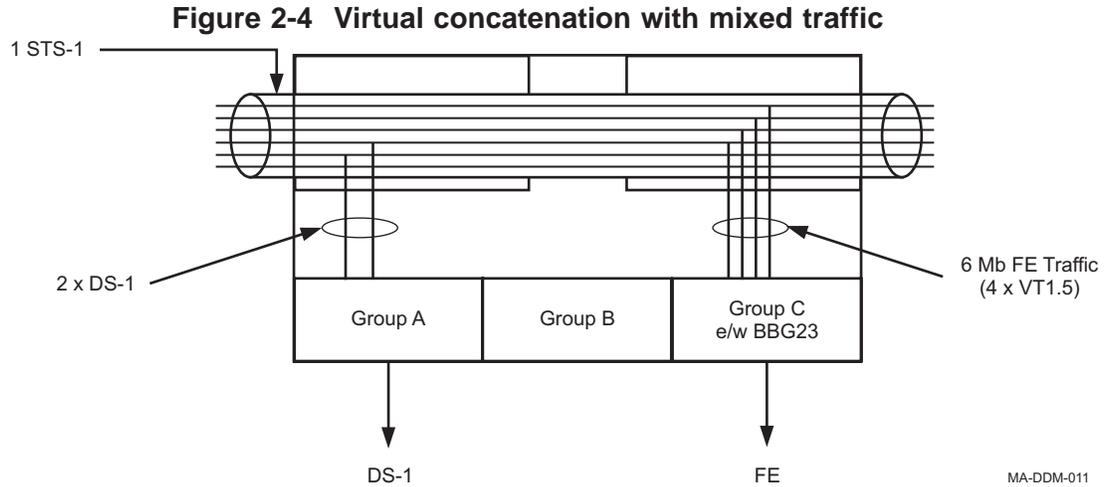
Virtually concatenated signals are expressed as a base rate and a
multiplier, separated by a dash. For example an **STS-1-3v** is used to
represent 3 STS-1 signals virtually concatenated. Similarly, a
VT1.5-2v represents 2 virtually concatenated VT1.5 signals.

Differential delay buffers

Because the individual tributaries of a virtual concatenation group can
take different paths through the SONET network, they may experience
different delays through the network. VCG ports use differential delay
buffers to accommodate up to 32 milliseconds of differential delay in
the Ethernet circuit pack.

The BBG23 Ethernet circuit pack has a differential delay buffer to
allow for longer response times to flow control requests. Buffer
storage is autonomously assigned by the software to allow maximum
usage of the memory available. Each VCG port can buffer 64
kilobytes of Ethernet frames in the ingress direction and 200 kilobytes
in the egress direction.

Generic framing procedure

Generic Framing Procedure (GFP) is used to encapsulate Ethernet
frames for transport over a SONET network. The DDM-2000 uses
frame-based GFP with the core header and no optional extension
headers or Frame Check Sequence (FCS). To encapsulate an Ethernet
frame, the Ethernet preamble and Start of Frame Delimiter (SFD)
fields are removed from the frame. A Type header and check (tHEC)

is added to the Ethernet frame creating a GFP payload. The GFP payload is then scrambled and a Core header is added. The GFP frame is then sent to the Virtual Concatenator.

In the opposite direction when the GFP Mapper receives a GFP frame from the Virtual Concatenator, it removes the Core Header and, using the Core header error check (cHEC) field, performs a Header Error Check. If the header is correct, the payload area of the GFP is then descrambled and the Type field and tHEC in the GFP header are checked for correctness. The Ethernet frame is extracted and the Preamble and SFD are added.

The GFP mapper at the far end of the network inserts idle GFP frames when there are no Ethernet frames to send. The near end GFP Mapper discards any idle GFP frames it receives over the SONET network. The idle GFP frames are not forwarded to the LAN port.The GFP Mapper contains GFP queues that are used to store Ethernet frames while they are being processed.

The Generic Framing Procedure is defined in ITU-T G.7041/Y.1303 and ANSI T1X1.105 Sections 7.3.2 and 7.3.3.

SONET transport and protection

The BBG23 FEPL circuit pack contains LAN and VCG ports. The LAN ports connect to external Ethernet equipment. The VCG ports connect to the OLIUs via the GFP Mappers and VCGs. The OLIUs contain the hardware that perform the SONET cross-connections and process traffic at the SONET tributary level. All tributaries are transported as standard SONET frames with embedded Ethernet frames or Virtual Concatenation Groups. Connections to the SONET network can be configured to provide SONET layer protection.

Ethernet frames are transported and protected by SONET 1+1 point-to-point tributaries or UPSR. See "Applications" (2-11) for additional details about network topologies and protection.

Flow control

If the external equipment at the destination of an Ethernet connection cannot handle the rate of traffic being sent to it, it may be desirable to apply back pressure across the network to slow down the external source of the Ethernet traffic. This cross-network back pressure can only work well, however, when the source of the traffic can be identified unambiguously. Only the Ethernet Private Line Service offers this opportunity.

Flow control is enabled or disabled at the LAN port. When provisioned for end-to-end flow control, the BBG23 FEPL circuit pack sends a flow control request across the SONET network immediately upon receiving a flow control request from external equipment. The BBG23 circuit pack does not buffer data while waiting for far-end equipment to respond to end-to-end flow control requests.

After a flow control request is received, the BBG23 FEPL circuit pack buffers frames instead of sending them to the equipment that generated the flow control request. Each port has its own latency buffer. A latency buffer can store 16ms of traffic that allows the equipment to be about 1000 miles apart (2000 miles round trip).

Autonegotiation

In the autonegotiation process, a LAN port advertises its acceptable parameters, compares these with the advertised parameters of its link partner, and then agrees upon a set of parameters with the link partner. IEEE 802.3 allows the line rate, duplex mode, and flow control mode to be auto-negotiated. A LAN port not configured to support autonegotiation will use the provisioned values for these parameters.

The BBG23 FEPL circuit pack supports autonegotiation. The feature may be set to on or off via a CIT or TL1 command. When autonegotiation is enabled, any of the parameters (line rate or flow control mode) may be provisioned to auto or set to a specific value. The LAN port only advertises the provisioned values for those parameters that are not provisioned to auto.

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Applications

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Purpose   This section provides an overview of the various Ethernet private line applications available using the BBG23 FEPL circuit pack. This includes application configurations using DDM-2000 OC-3 shelves in combination with other Lucent Technologies' *Metropolis*® products.

Circuit pack features   The BBG23 FEPL circuit pack on the DDM-2000 OC-3 Multiplexer supports the following key features:

- Jumbo Frames - A frame size of 9614 supported on the BBG23 FEPL circuit pack.

- Generic Framing Procedure (GFP) - GFP is used to encapsulate Ethernet frames for transport over a SONET network. DDM-2000 uses frame-based GFP with core overhead and no optional extension headers or Frame Check Sequence (FCS).

- 100BASE-FX - Speeds of up to 100 Mbps optical transport are available with the BBG23 FEPL circuit pack.

- STS-1 and VT1.5 VCAT - Virtual concatenation (VCAT) is the inverse multiplex scheme used to transport a payload using multiple channels. The BBG23 FEPL circuit pack employs this concatenation method to provide finer granularity in allocating bandwidth transport.

Network topology and configuration   Network topologies consist of two layers: the packet layer and the underlying SONET layer. Packet networks can be created over a variety of SONET topologies, and have different properties as a result. Private Line services use a point-to-point packet topology, but may be carried over a SONET ring, which is configured with some type of protection.

The following network topologies are supported with DDM-2000 Ethernet:

- Point-to-point

- Point-to-Multipoint (with other *Metropolis*® products).

Additional network topologies, such as hub applications are possible with other Lucent SONET products that provide switched Ethernet services.

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Supported applications

The DDM-2000 Ethernet feature supports the following applications:

- LAN interconnect

- LAN extension

- ISP access

- Internet access

- Video distribution.

These applications are supported in point-to-point and point-to-multipoint applications. The following sections explain the network topologies that support these applications.

Point-to-Point application

The point-to-point topology is used to join two nodes. For example, a business may connect to an ISP via a point-to-point connection. Because of its simplicity, point-to-point configurations have a variety of protection options available. They may use any of the SONET layer protection mechanisms.

The BBG23 FEPL circuit pack provides a Fast Ethernet point-to-point private line application over a SONET ring or linear application. The following figure shows a typical DDM-2000 ring application. OC-3 or OC-12 OLIUs can be used in the Main slots of the DDM-2000 OC-3 Multiplexer shelf. Node A and Node C contain the BBG23 FEPL circuit packs. A private line Ethernet link (dotted line) is established

between these two nodes. The remaining nodes simply pass the traffic through the ring and provide SONET ring protection.

Figure 2-5   Point-to-Point private line application
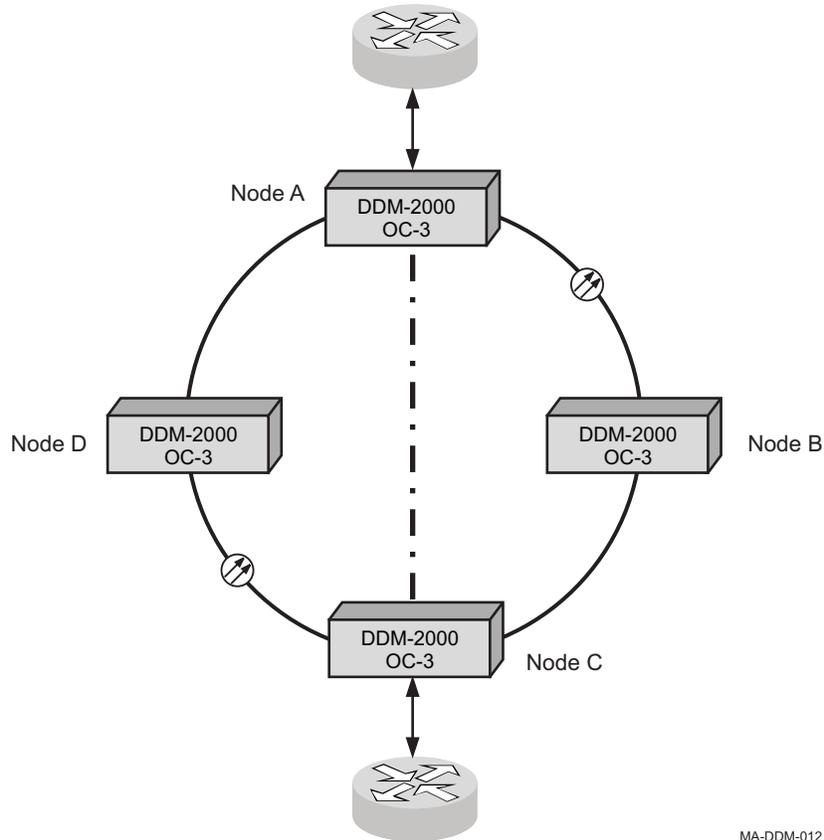
MA-DDM-012

Metropolis ® DMX*plore* and *Metropolis* ® DMX*tend* shelves may also be used in this configuration. They may be pass-through nodes or terminate point-to-point Private Line Ethernet connections.

Point-to-Multipoint application

In a multipoint network, all points converse with each other. The location in the middle of the point-to-multipoint connections can provide external switching to enable the outer locations to converse with each other. This may be used in many applications.

Multiple DDM-2000 shelves containing the BBG23 FEPL circuit packs can be terminated on a single port on a *Metropolis* ® DMX or *Metropolis* ® DMX*tend*. The following figure shows this application. Ethernet traffic from several DDM-2000 shelves is routed through a single port on the *Metropolis* ® DMX equipped with an Ethernet

service circuit pack. Layer 2 provisioning is done at the *Metropolis* ®
DMX, with minimum provisioning needed at the DDM-2000 shelves.

Figure 2-6 Point-to-Multipoint application
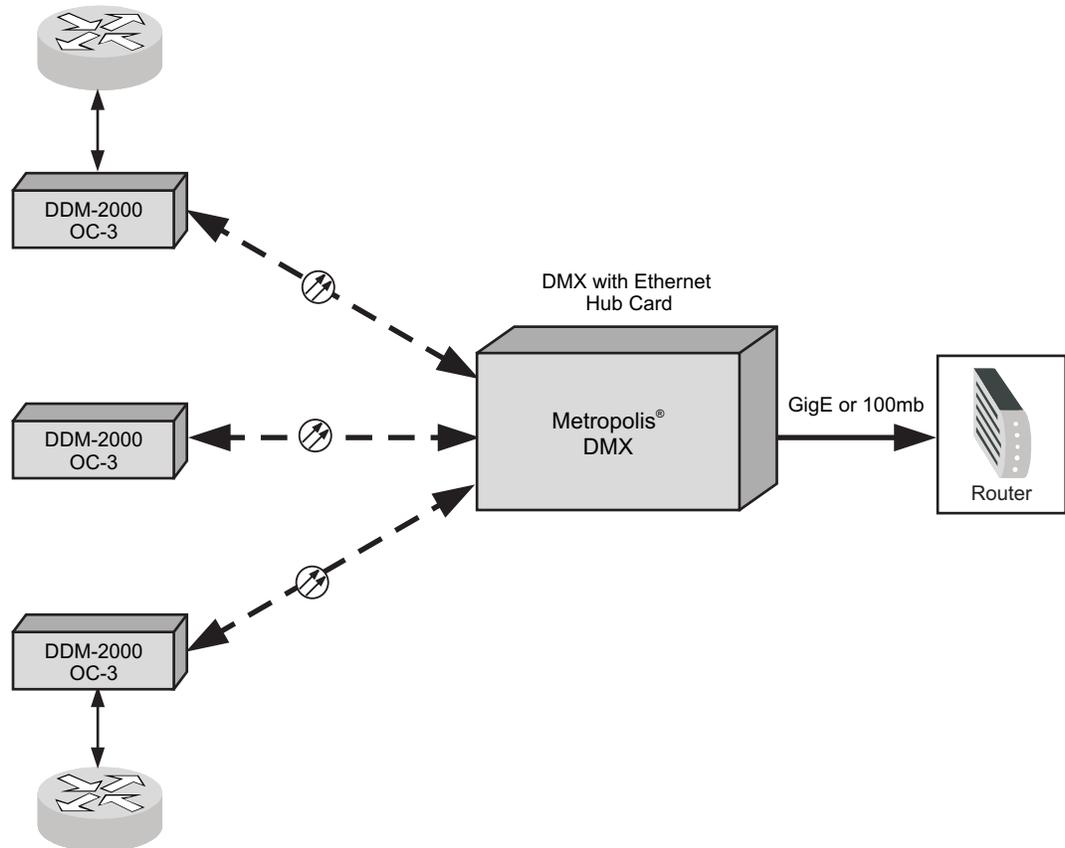
DMX = Metropolis® DMX Access Multiplexer

MA-DDM-014

Like the point-to-point application, *Metropolis* ® DMX*plore* and
Metropolis ® DMX*tend* shelves may also be used in this configuration
in place of or with the DDM-2000 OC-3 shelves.

Bandwidth availability   The DDM-2000 shelf loaded with the BBG23 FEPL circuit pack has
an ingress bandwidth of approximately 100 or 155 Mb, depending
upon which Function Slots on the DDM-2000 shelf are used. A
maximum capacity of 2 or 3 STS-1s or 63 VT1.5s per port is
available, supported with either OC-3 or OC-12 OLIUs in the Main
slots. With OC-3 OLIUs in the Main slots, users can select from 3
STS-1s (or 84 VT1.5s) of traffic to provision for the BBG23 FEPL
circuit pack. With OC-12 OLIUs in the Main slots, users can select

from 7 STS-1s of traffic (or 196 VT1.5s) for provisioning. The
following figure shows maximum ingress and egress bandwidth on the
BBG23 FEPL circuit pack.

Figure 2-7   Bandwidth availability

MA-DDM-015
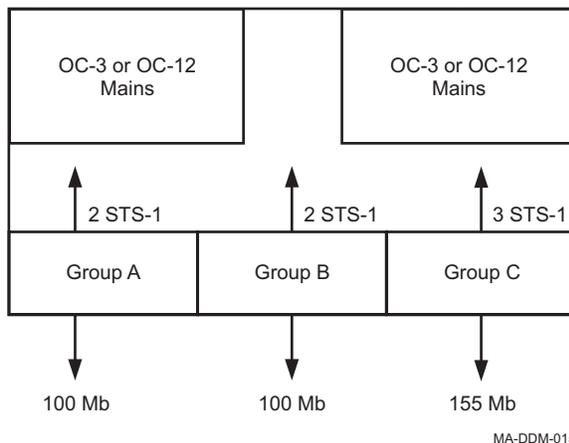
The following table shows typical provisioning for Function Units on
the DDM-2000 OC-3 shelf equipped with BBG23 FEPL circuit packs.

Table 2-1   BBG23 Bandwidth availability

BBG23 in Groups A and/or B	BBG23 in Group C
2 STS-1 Capacity: • 4 FE 10 Mb at 7 VT1.5 (VT1.5-7v) • 1 FE 100 Mb at STS-1 *OR* • 1 FE 100 Mb at STS1-2v	3 STS-1 Capacity: • 4 FE 10 Mb at 7 VT1.5 (VT1.5-7v) • 1 FE 100 Mb at STS1-2v *OR* • 1 FE 100 Mb at 63 VT1.5 (VT1.5-63v)

Note that only one type of service can be provisioned per port. For
example, if STS-1 service is provisioned for Port 1 on the BBG23
FEPL circuit pack, then VT1.5 service will not be supported on that
port. VT1.5 service may be provisioned on another port on the same
BBG23 FEPL circuit pack.

BBG23 FEPL circuit pack description

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Purpose   This section provides details on the BBG23 FEPL circuit pack.

The BBG23 Fast Ethernet Private Line (FEPL) circuit pack provides private line Ethernet services on DDM-2000. The circuit pack is double-wide (covering two slots). It fits into Function Slots A, B, or C on the DDM-2000 shelf, connecting to the backplane in the even-numbered function slot. The 5 ports are located on the front of the circuit pack. The four electrical ports are numbered 1 through 4 and the single optical port is numbered port 5. **Fault** and **Active** LEDs indicate the status of the circuit pack. The following figure shows the faceplate of the BBG23 FEPL circuit pack.

Figure 2-8   BBG23 FEPL circuit pack faceplate
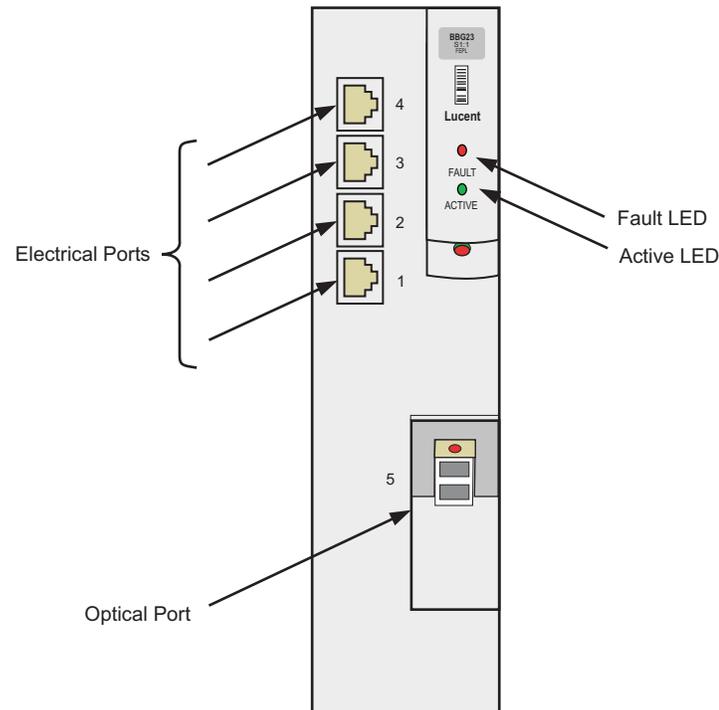
The BBG23 FEPL circuit pack fits into any Function Slot on the DDM-2000 shelf. Software detects insertion of the circuit pack in Slots `a2`, `b2` or `c2`.

The BBG23 FEPL circuit pack provides point-to-point (Ethernet Private Line Service) data transport at the 10/100 Mb/s rate. The

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circuit pack supports generic framing procedure (GFP) encapsulation and VT1.5 or STS-1 virtual concatenation on 5 VCG ports. STS-1, STS-3c, and VT1.5 modes are available. The circuit pack modes are user-provisionable. All provisioning information is stored on the DDM-2000 system controller (SYSCTL) and in the EEPROM on the BBG23 circuit pack.

The 10/100Base-TX port carries either 10 or 100 Mbps service, regardless of whether full bandwidth is cross-connected to the corresponding VCG. The ports auto-negotiate speed (100 Mbps) and flow control when interfacing with other 802.3-compliant devices over twisted pair media. The ports support the full duplex mode only.

Provisionable levels of alarms are available for the Ethernet LAN port and VCG ports.

Provisionable port parameters

The BBG23 FEPL circuit pack provides provisionable Ethernet and VCG port parameters. The following tables list the provisionable port parameters for each type of port.

Table 2-2   Provisionable Ethernet port parameters

Parameter	Description	Values
epmode	Ethernet port monitoring mode	auto (default), nmon
eppm	Ethernet port performance monitoring for LAN and VCG ports	disable (default), enable
autoneg	global autonegotiation flag (Not applicable for the optical port, Port 5)	enable (default), disable
fcmd	flow control mode (Not applicable for the optical port, Port 5)	auto (default), enable, disable, drop
lnrate	line rate	auto (default), 10M, 100M

Table 2-2   Provisionable Ethernet port parameters (continued)

Parameter	Description	Values
mdix	crossover mode (Not applicable for the optical port, Port 5)	auto (default), mdi, mdix
almlvl	alarm level	cr (default), mj, mn, na
mtu_size	maximum packet size (Size of payload in the Ethernet frame)	1500 through 9614 (default is 1500)
admin	enable or disable all frames to and from a port	enable (default), disable

Table 2-3   Provisionable VCG port parameters

Parameter	Description	Values
almlvl	alarm level	cr (default), mj, mn, na
gfp_fcs	send and check GFP frame check sequence	disable (default), enable
vcat	Insert and monitor H4 byte on a single tributary cross-connection	disable , enable (default)

VCG port parameters   The VCG port state is computed from the state of the SONET tributaries and is not independently provisionable. The following table highlights the port states for the VCG port based on the set state of the tributaries. Note that individual tributaries can be set to different states on a single port. The table shows how the VCG port state is computed from one or multiple tributary states. For example, if at

least one tributary is set to **AUTO** and one tributary is set to **IS**, then the VCG port state is **AUTO**.

Table 2-4   VCG port states

If SONET Tributary State(s) are set to...	*Then VCG Port State is...*
AUTO	AUTO
NMON	NMON
IS	IS
AUTO, NMON	AUTO
AUTO, IS	IS
NMON, IS	IS

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Maintenance

Purpose This section reviews the maintenance features available with the BBG23 FEPL circuit pack.

Maintenance philosophy The maintenance philosophy available for the DDM-2000 OC-3 Multiplexer extends to the BBG23 FEPL circuit pack. Single-ended maintenance allows for operation and maintenance of all remote DDM-2000 shelves from a single shelf. Three-tiered operations procedures for the DDM-2000 OC-3 Multiplexer are built on three levels of system information and control, spanning operations needs from summary-level status to detailed reporting. Refer to *DDM-2000 OC-3 and OC-12 Multiplexers Applications, Planning, and Ordering Guide, 363-206-200R15*, for details on the DDM-2000 maintenance philosophy.

BBG23 FEPL maintenance features The BBG23 FEPL circuit pack includes a red **Fault** LED and green **Active** LED on the faceplate. When the red **Fault** LED is illuminated, it shows that DDM-2000 has isolated a failure to this circuit pack. A flashing **Fault** LED shows that an incoming signal to the BBG23 FEPL circuit pack has failed. A solid green **Active** LED shows the pack is active.

Additionally DDM-2000 reports any alarms generated by the BBG23 FEPL circuit pack. Alarms are retrieved via the `rtrv-alm` CIT command.

Maintenance access In addition to direct shelf access to the BBG23 FEPL circuit pack, the DDM-2000 CIT provides access to activities such as loopbacks, provisioning, peformance monitoring, and reports for the circuit pack. DDM-2000 has both front and rear CIT ports, compatible with the EIA-232-D standard. Users can perform these maintenance functions locally or remotely via CIT commands.

A remote operations system (OS) interface to DDM-2000 includes several types of interfaces including TL1/X.25 interface and TCP/IP. Users can perform provisioning and maintenance functions locally or remotely via TL1 commands on the OS interface.

Refer to Chapter 5, "Command details" for a list of new and changed CIT and TL1 commands to support the BBG23 FEPL circuit pack.

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Loopbacks

Overview   DDM-2000 supports facility and terminal electronic loopbacks. An additional FELAN loopback for the ports on the BBG23 FEPL circuit pack is available in Release 15.3.1.

Loopback commands   Loopbacks are controlled using CIT or TL1 commands. Loopbacks are initiated with the `opr-lpbk` command and released using the `rls-lpbk` command.

Active port loopbacks are indicated by a continuously lighted **MN/ABN** LED on the user panel.

FELAN loopback   A terminal loopback on a port of the BBG23 FEPL circuit pack can be established with the `opr-lpbk-fe` command and released with the `rls-lpbk-fe`. The terminal loopback is set and an incoming signal is received and returned to the transmitter in the opposite direction. The following figure shows this loopback.

Figure 2-9 FELAN terminal loopback
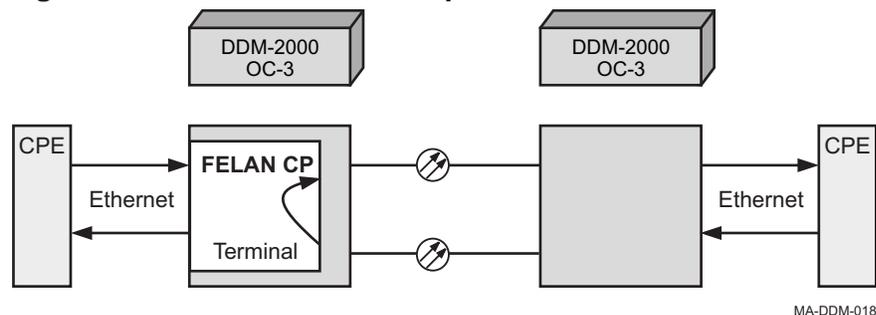
Refer to <u>Chapter 3, "User operations tasks"</u> for details on operating this loopback on the DDM-2000 shelf.

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Performance monitoring

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Purpose	This section reviews performance monitoring parameters available for the BBG23 FEPL circuit pack. Both Ethernet and SONET performance monitoring is available. Current and historical performance monitoring data is stored on the system controller.
Ethernet performance monitoring	Separate Ethernet performance monitoring counts are collected for the ingress and egress directions of the BBG23 FEPL circuit pack. The following figure shows the ingress and egress directions for the LAN and WAN ports on the BBG23 FEPL circuit pack.

Figure 2-10 BBG23 ingress and egress LAN and WAN ports
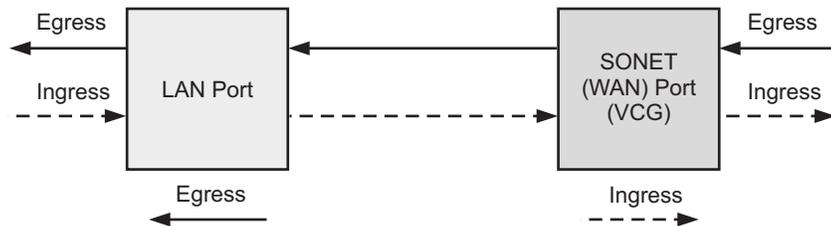
MA-DDM-017

Performance monitoring counts for ingress and egress directions are retrieved based on `shelf:slot::LAN port number`. Ingress and Egress performance monitoring counts are described in the following tables:

Table 2-5   Ingress (LAN) port performance monitoring counts

Count	Definition	Conditions Monitored
EDFE	Dropped Ethernet frames due to errors	• FCS status (CRC) and alignment indication • Oversized frames • Jabber frames • Received fragments (frames under 64 bytes with good CRC) • Received bad fragments (frames under 64 bytes with bad CRC) • MAC receive error

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Table 2-5   Ingress (LAN) port performance monitoring counts   (continued)

Count	Definition	Conditions Monitored
EINB	Incoming number of bytes	• Bytes received (good only)
EINF	Incoming number of frames	• Frames received (good only)
EONB	Outgoing number of bytes	• Bytes transmitted
EONF	Outgoing number of frames	• Frames transmitted

Table 2-6   Egress (WAN) port performance monitoring counts

Count	Definition	Conditions Monitored
EDFE	Dropped Ethernet frames due to errors	• FCS status (CRC) and alignment indication • Oversized frames • Jabber frames • Received fragments (frames under 64 bytes with good CRC) • Received bad fragments (frames under 64 bytes with bad CRC) • MAC receive error
EINB	Incoming number of bytes	• Bytes received (good only)
EINF	Incoming number of frames	• Frames received (good only)

**Table 2-6   Egress (WAN) port performance monitoring
counts   (continued)**

Count	Definition	Conditions Monitored
EONB	Outgoing number of bytes	• Bytes transmitted
EONF	Outgoing number of frames	• Frames transmitted

All Ethernet counts are inhibited during the following conditions:

- Loss of frame delineation
- Loss of signal
- Loss of multiframe
- Local terminal loopback in progress.

Performance monitoring bins

The following performance monitoring bins are supported on the
DDM-2000:

- 1 current 15-minute bin
- 1 current 24-hour bin
- 32 history 15-minute bins
- 1 history 24 hour bin.

Performance monitoring history and current counts are stored in one
current 24-hour bin and one history 24-hour bin. After 24 hours, the
current bin becomes the history bin and the current bin is cleared.

**SONET performance
monitoring**

SONET performance monitoring includes counts for SONET
tributaries as well as STS-1 and VT1.5 tributaries of a virtual
concatenation group (VCG).

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Reports

Overview Reports provide parameters and status information for a range of equipment and conditions on the DDM-2000 shelf. The BBG23 FEPL circuit pack is included in any applicable report. Reports are retrieved using CIT or TL1 commands and are displayed at the CIT.

Types of reports The following reports are available from the DDM-2000 CIT and will include details about any BBG23 FEPL circuit pack on the shelf:

- Alarms and statuses
- Performance monitoring, including performance status reports
- History log
- Provisioning
- Equipment list
- Security log
- Equipment State List

Refer to for procedural information regarding retrieving reports.

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Cross-connections

Purpose
This section provides details on cross-connections supported by the BBG23 FEPL circuit pack.

Supported cross-connections
The BBG23 FEPL circuit pack supports two-way cross-connections which are bidirectional cross-connections between a channel on a SONET path-protected ring and a VCG. 1+1 application. Cross-connections are made by specifying the SONET rate (VT1.5 or STS-n) and the endpoint address identifiers (AIDs) for each end of the point-to-point service. Pass-through cross-connections are made at intermediary nodes between each endpoint.

Cross-connection rates
Three rates of cross-connections are available on the BBG23 circuit pack. Cross-connections are supported using OC-3 or OC-12 OLIUs in the DDM-2000 OC-3 Multiplexer shelf. The following signals can be cross-connected:

- VT1.5

- STS-1

- STS-3c

Note that only one type of service can be provisioned per port on the BBG23 FEPL circuit pack.

The circuit pack has a maximum capacity of approximately 100 Mb or 150 Mb, depending upon which Function Slot is used on the DDM-2000 shelf. When the BBG23 FEPL circuit pack is loaded into Function slots A or B, up to 2 STS-1s of service may be provisioned. When the BBG23 FEPL circuit pack is loaded into Function Slots C, up to 3 STS-1s of service can be accommodated. Only one type of service (VT1.5, STS-1, or STS-3c) can be provisioned on each port.

When the port is provisioned for VT1.5 service, 1 to 63 VT1.5s (in Slot C) or 56 VT1.5s (in Slots A or B) may be used and assigned to any VCG. When the circuit pack is provisioned for STS-1 (concatenation) mode, each VCG can use 1 (STS-1v) or 2 (STS-2v) tributaries in slot A or B, or 3 tributaries in slot C. When provisioned for STS-3c (concatenation) mode, only 1 STS-3c can be used. The maximum port rate is 63 VT1.5 signals, 3 STS-1 signals, or 1 STS-3c. The STS-3c is only supported when using the OC-12 29G-U OLIU in the Main slots.

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See "Cross-connection matrix" (2-28) for details on supported cross-connections including valid AIDs.

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Cross-connection matrix

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Purpose   This section provides details about cross-connections supported with the BBG23 Fast Ethernet Private Line (FEPL) circuit pack. Two-way cross-connections are supported with either OC-3 or OC-12 OLIUs in the Main slots.

VT1.5 Cross-connections   The following table provides details of supported VT1.5 cross-connections using the BBG23 circuit pack, including valid Address Identifiers (AIDs).

Table 2-7   Supported two-way Ethernet VT1.5 add/drop cross-connections (OC-12 OLIU and OC-3 OLIU)

OC-12 OLIU					
From		To			
Address1	Port Type Application	Address2	Port Type Application	CCT value	Type
{a,b}-{1-5}-{1-56}	FEPL	m-{1-12}-{1-7}-{1-4}	HS UPSR	twoway	add-drop
c-{1-5}-{1-63}	FEPL	m-{1-12}-{1-7}-{1-4}	HS UPSR	twoway	add-drop
OC-3 OLIU					
From		To			
Address1	Port Type Application	Address2	Port Type Application	CCT value	Type
{a,b}-{1-5}-{1-56}	FEPL	m-{1-3}-{1-7}-{1-4}	HS UPSR	twoway	add-drop
c-{1-5}-{1-63}	FEPL	m-{1-3}-{1-7}-{1-4}	HS UPSR	twoway	add-drop

STS-1 cross-connections   The following table provides details of supported STS-1 cross-connections using the BBG23 circuit pack, including valid AIDs.

Table 2-8   Supported two-way Ethernet STS-1 add/drop cross-connections (OC-12 OLIU and OC-3 OLIU)

OC-12 OLIU					
From		To			
Address1	Port Type Application	Address2	Port Type Application	CCT value	Type
{a,b}-{1-5}-{1-2}	FEPL	m-{1-12}	HS UPSR	twoway	add-drop

....

Table 2-8   Supported two-way Ethernet STS-1 add/drop cross-connections (OC-12 OLIU and OC-3 OLIU)   (continued)

c-{1-5}-{1-3}	FEPL	m-{1-12}	HS UPSR	twoway	add-drop
OC-3 OLIU					
From		To			
Address1	Port Type Application	Address2	Port Type Application	CCT value	Type
{a,b}-{1-5}-{1-2}	FEPL	m-{1-3}	HS UPSR	twoway	add-drop
c-{1-5}-{1-3}	FEPL	m-{1-3}	HS UPSR	twoway	add-drop

STS-3c cross-connections   The following table provides details of supported STS-3c cross-connections using the BBG23 circuit pack, including valid AIDs. This cross-connection is only supported with the OC-12 OLIU (29G-U only) circuit pack in the Main slots.

Table 2-9   Supported two-way Ethernet STS-3c add/drop cross-connections (OC-12 OLIU)

OC-12 OLIU					
From		To			
Address1	Port Type Application	Address2	Port Type Application	CCT value	Type
c-{1-5}-1	FEPL	m-{1,4,7,10}	HS UPSR	twoway	add-drop

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Ordering

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Purpose   This section provides ordering details for the BBG23 FEPL circuit pack and cables.

Ordering details   The following tables provide ordering details for the BBG23 FEPL circuit pack and associated cables.

Table 2-10   BBG23 FEPL circuit pack ordering

Comcode	Description	Apparatus Code
109505800	BBG23 Fast Ethernet Private Line (FEPL) Circuit Pack, -48 V	BBG23
109527812	SFP Optical Connection circuit module, multilayer	100BASE-LX-I1

The following table lists cables available with the BBG23 FEPL circuit pack.

Table 2-11   BBG23 FEPL circuit pack cable ordering

Length (Feet)	Comcode	Description	GR-1089 Compliant? (See Note)
8	848994760	10/100T Ethernet Cable Assembly -8 ft./3 m.	yes
20	848994778	10/100T Ethernet Cable Assy - 20 ft/6 m	yes
35	848994786	10/100T Ethernet Cable Assy - 35 ft/11 m	yes
50	848994794	10/100T Ethernet Cable Assy - 50 ft/15 m	yes
75	848994893	10/100T Ethernet Cable Assy - 75 ft/23 m	yes
100	848994802	10/100T Ethernet Cable Assy - 100 ft /30 m	yes
125	848994810	10/100T Ethernet Cable Assy - 125 ft/38 m	yes

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Table 2-11   BBG23 FEPL circuit pack cable ordering (continued)

Length (Feet)	Comcode	Description	GR-1089 Compliant? (See Note)
150	848994828	10/100T Ethernet Cable Assy - 150 ft/46 m	yes
175	848994836	10/100T Ethernet Cable Assy - 175 ft/53 m	yes
200	848994844	10/100T Ethernet Cable Assy - 200 ft/61 m	yes
225	848994851	110/100T Ethernet Cable Assy - 225 ft/69 m	yes
250	848994869	10/100T Ethernet Cable Assy - 250 ft/76 m	yes
275	848994877	10/100T Ethernet Cable Assy - 275 ft/84 m	yes
300	848994885	10/100T Ethernet Cable Assy - 300 ft/91m	yes
8	109561282	10/100T Ethernet Cable Assembly -8 ft./3 m.	no
20	109561290	10/100T Ethernet Cable Assy - 20 ft/6 m	no
35	109561308	10/100T Ethernet Cable Assy - 35 ft/11 m	no
50	109561316	10/100T Ethernet Cable Assy - 50 ft/15 m	no
75	109561324	10/100T Ethernet Cable Assy - 75 ft/23 m	no
100	109561332	10/100T Ethernet Cable Assy - 100 ft /30 m	no
125	109561340	10/100T Ethernet Cable Assy - 125 ft/38 m	no
150	109561357	10/100T Ethernet Cable Assy - 150 ft/46 m	no
175	109561365	10/100T Ethernet Cable Assy - 175 ft/53 m	no

Table 2-11   BBG23 FEPL circuit pack cable ordering (continued)

Length (Feet)	Comcode	Description	GR-1089 Compliant? (See Note)
200	109561373	10/100T Ethernet Cable Assy - 200 ft/61 m	no
225	109561381	110/100T Ethernet Cable Assy - 225 ft/69 m	no
250	109561399	10/100T Ethernet Cable Assy - 250 ft/76 m	no
275	109561407	10/100T Ethernet Cable Assy - 275 ft/84 m	no
300	109561415	10/100T Ethernet Cable Assy - 300 ft/91m	no

Notes:

1. GR-1089 compliant cables include two ferrites and are shielded and grounded at both ends. Non-compliant cabling is solid shielded CAT5 cabling. Standard CAT5 LAN cabling may also be used if GR-1089 compliance is not required. Both crossover and straight-through wiring is supported.

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Technical specifications

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Purpose This section provides technical specifications for the BBG23 FEPL circuit pack.

Electrical specifications The BBG23 Fast Ethernet Private Line circuit (FEPL) pack provides 1 port for optical 100BASE-LX transport at 100 Mbps using standard Ethernet IEEE 802.3, standard encapsulation according to ANSI T1X1.5/2000-024R4 (ITU G.7041), and standard STS-1 or VT1.5 virtual concatenation according to ITU G.707. The BBG23 FEPL also provides 4 electrical ports for the 10/100BASE-TX interfaces. These electrical ports transmit at 10/100 Mbps using standard Ethernet IEEE 802.3, standard encapsulation according to ANSI T1X1.5/2000-024R4 (ITU G.7041), and standard STS-1 and VT1.5 virtual concatenation according to ITU G.707. The BBG23 FEPL electrical interfaces can transmit signals across spans as long as 100 meters. The BBG23 FEPL is an unprotected pack.

The BBG23 FEPL circuit pack is designed specifically to support Fast Ethernet Private Line applications. Each BBG23 FEPL circuit pack can support 5 private lines. The BBG23 FEPL can also support STS-3c cross connections instead of virtual concatenation.

The Ethernet interfaces comply with the following transmission standard:

- standard IEEE 802.3, Section 25 for 10/100 Mb autonegotiation (including flow control and full-duplex transmission).

Format specifications The BBG23 FEPL circuit pack complies with the following formatting standards:

- Maximum frame size, including any added VLAN tags, is 9636 bytes
- transparent to standard IEEE 802.1Q VLANs
- Ethernet to SONET Mapping, G.7041 (GFP) and G.707 (Virtual Concatenation)
- Protection (SONET)

Allowed optics DDM-2000 utilizes small form-factor pluggable (SFP) optics on the BBG23 FEPL circuit packs. To ensure proper optical performance, mechanical fit, compliance with EMC, and compliance with laser

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safety standards, the Lucent specified SFP transceivers listed in the table below must be used.

Only the Lucent specified SFP transceiver listed below is compatible with DDM-2000 software and the BBG23 FEPL circuit pack. If non-Lucent specified SFP transceivers are installed in DDM-2000, the system will reject that transceiver, and that optical port will become inoperable (until approved parts are installed).

Apparatus Code	Comcode	Description
100BASE-LX-I1 Optical	109527812	Optical Fast Ethernet TRCVR, intermediate reach

Performance monitoring

Performance monitoring capabilities are available on the electrical and optical ports of the BBG23 FEPL circuit pack. A detailed list of monitored parameters can be found in "Performance monitoring" (2-22).

100BASE-LX optical Ethernet specifications

Optical specifications

The following are the 100BASE-LX system specifications:

- Optical Line Rate: 125 MBd +/- 50 ppm
- Optical Line Coding: 4B/5B

Operating range

The table below shows the operating range for the 100BASE-LX optical Ethernet interface. A 100BASE-LX compliant transceiver supports 10 μm fiber media type

Table 2-12   100BASE-LX operating range

Fiber Type	Minimum Range (meters)
10 μm SMF	2 to 10,000

Transmitter specifications

The 100BASE-LX transmitter meets the specifications defined in IEEE 802.3. The table below describes some of the optical transmit specifications for 100BASE-LX.

Table 2-13   100BASE-LX transmit specifications

Description	10 µm SMF	Unit
Transmitter type	Longwave Laser	
Signaling speed (range)	125 +/- 50 ppm	Mbd
Wavelength (range)	1260 to 1360	nm
RMS spectral width (max)	7.7	nm
Average launch power (max)	-8	dBm
Average launch power (min)	-15	dBm
Average launch power of OFF transmitter (max)	-45	dBm
Extinction ratio (min)	10	dB

Receiver specifications

The 100BASE-LX receiver meets the specifications defined in IEEE 802.3. The table below shows some of the 100BASE-LX optical receiver specifications.

Table 2-14   100BASE-LX receive specifications

Description	62.5 µm	Unit
Signaling speed (range)	125 +/- 50 ppm	Mbd
Wavelength (range)	1260 to 1360	nm
Average receive power (max)	-8	dBm
Receive sensitivity (for 10^{-12} BER)	-25	dBm

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Link budgets   The worst-case power budget and link penalties for a 100BASE-LX channel are shown in the table below. The budges include an allowance for -12 dB reflection at the receiver.

Table 2-15   100BASE-LX link budgets and penalties

Parameter	10 µm SMF	Unit
Measurement wavelength for fiber	1310	nm
Nominal distance	10	km
Available power budget	10	dB
Maximum Channel Insertion Loss (Note 1)	6.0	dB
Allocation for penalties (Note 2)	4.0	dB

Notes:

1. Maximum channel insertion loss is based on cable attenuation at the target distance and nominal measurement length. Channel insertion loss also includes the loss for connectors, splices, and other passive components.

2. The allocation for penalties is the difference between the available power budget and the channel insertion loss; insertion loss difference between nominal and worst-case operating wavelength is considered a penalty.

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3   User operations tasks

Overview

Purpose This chapter includes tasks necessary to provision Ethernet features in DDM-2000, including installing packs, and provisioning ports and setting cross-connections. Additional tasks such as managing performance monitoring and operating loopbacks are included in this chapter.

This chapter is meant to complement information found in *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*. Refer to this document for general information about the DDM-2000 OC-3 Multiplexer.

See Table 2, "DDM-2000 documentation set" (xviii) and Table 3, "Related documentation" (xviii) for a detailed list of documents referenced in this chapter and throughout this guide.

Contents

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Before You Begin

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Before you begin   Prior to performing all tasks in this chapter,

1. If not previously completed, install Release 15.3.1 software on the DDM-2000 OC-3 Multiplexer shelf. Refer to *DDM-2000 OC-3 Multiplexer Software Release Description for Release 15.3.1* for detailed procedures on installing or upgrading software.

2. Connect and establish a CIT session. Refer to *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP) , 363-206-285*, for detailed procedures on connecting to the CIT and establishing a session.

Required equipment   All tasks in this chapter require that the following equipment is available:

*   CIT with an established session

*   Wrist Strap

    Important! If additional equipment is required to perform a specific task, that additional equipment is listed in that task.

Note that both CIT and TL1 commands associated with carrying out tasks are listed in this chapter. CIT commands are followed by equivalent TL1 commands listed in parentheses. Example: `set-felan` (`ed-eport`), where `ed-eport` is the equivalent TL1 command to the `set-felan` CIT command.

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Install BBG23 Fast Ethernet Private Line (FEPL) circuit pack

Overview   Use this task to install the BBG23 Fast Ethernet Private Line (FEPL) circuit pack.

Privilege level   You must log in as a Privileged, General, Maintenance, or Reports Only user to complete this task.

Required and optional equipment   The BBG23 FEPL circuit pack is required for this procedure. An additional SFP is optional equipment. Use only the following Lucent Approved Class 1 SFP transceiver in the BBG23 FEPL circuit pack.

Apparatus Code/Comcode	Description
100Base-FX-I1 109527812	100 Mb/s optical Fast Ethernet SFP TRCVR

Refer to "Install pluggable optics module" (3-9) as needed for additional information on handling pluggable optics modules.

Before you begin   Prior to performing this task:

1. Refer to "Required equipment" (3-3) and "Before you begin" (3-3) in this chapter.

2. Refer to "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

3. Obtain the work instructions for this task.

4. Ensure that the circuit pack is available for installation.

5. If required, ensure that correct pluggable optics modules are available for installation in the BBG23 FEPL circuit pack.

Task   Complete the following steps to install the BBG23 FEPL circuit pack.

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1   Determine the Function Unit slot (A2, B2, or C2) being equipped with the circuit pack.

The BBG23 FEPL circuit pack may be installed in any of the Function groups.

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2 Ensure all optical fiber connectors and couplings are properly cleaned, if required.

> **Important!** Signal performances may be degraded if the connections and couplings are not cleaned properly.

> **Reference:** "Clean optical fibers, dual LC adapters and LC lightguide buildouts (LBOs)" (3-11)

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3 **Important!** Pluggable optics modules are shipped with a water-tight process plug installed into the optical ports to maintain cleanliness during storage and/or transportation. It is recommended that the process plug be kept in place to maintain cleanliness until the optical fiber is connected. With proper care and handling, cleaning the pluggable optics modules should not be necessary.

If required, clean any pluggable optics module(s) being used.

> **Reference:** "Clean pluggable optics module" (3-17)

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4 Open the faceplate latch and seat the circuit pack in Function Unit slot A2, B2, or C2 by applying steady pressure to the faceplate latch.

> **Result:** The **FAULT** LED on the circuit pack lights. After approximately 30 seconds, the **ACTIVE** LED lights and the **FAULT** LED goes off.

....

5 If required, install pluggable optics module.

> **Reference:** "Install pluggable optics module" (3-9)

....

6 Enter the command `rtrv-eqpt` (`rtrv-eqpt`) to verify the presence of the BBG23 FEPL circuit pack in the equipment list.

> **Result:** The equipment list is displayed.

....

7 Enter the command `rtrv-alm` (`rtrv-alm`) to verify that no alarms are present for the ports where the circuit pack is installed.

....

Result: The alarm report is displayed.

....

8 If required, provision the circuit pack and/or port parameters.

Important! When a new Ethernet circuit pack is installed, Ethernet PM reporting is disabled for each port and VCG. If changes are required, refer to "Enable/Disable BBG23 FEPL circuit pack performance monitoring (PM) settings" (3-37).

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Provision BBG23 FEPL circuit pack for LAN port/VCGs for service

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Overview   Use this task to provision BBG23 FEPL circuit pack/LAN ports/VCGs for service.

> **Important!** BBG23 FEPL circuit pack ports are provisioned for the type of service being provided. This procedure shows you how to access the parameters being provisioned, not how the parameters should be provisioned. Refer to your work instructions for parameter values.

Privilege level   You must log in as a Privileged or General user to complete this task.

Before you begin   Prior to performing this task:

1. Refer to "Required equipment" (3-3) and "Before you begin" (3-3) in this chapter.

2. Obtain work instructions for this task.

3. Ensure circuit pack(s) is installed. If the circuit pack is not installed, refer to "Install BBG23 Fast Ethernet Private Line (FEPL) circuit pack" (3-4) .

4. If required, ensure appropriate pluggable optics module(s) is installed. "Install pluggable optics module" (3-9)

Task   Complete the following steps to provision the Ethernet circuit pack/LAN ports/VCGs.

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1   Enter the command `rtrv-alm` (rtrv-alm) to verify that no alarms are present for the ports where the circuit pack is installed.

> **Result:** The alarm report is displayed.

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2   Select and provision the parameters, according to your work instructions.

> **Important!** Only one type of service (VT1.5, STS-1, or STS3c) can be provisioned per port˙. Multiple ports on a single BBG23 FEPL circuit pack can be provisioned with different services.

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Reference:

- "Provision Ethernet LAN port parameters" (3-20)
- "Provision VCG parameters" (3-24)

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3 If required, repeat task from Step 2 to provision additional LAN
ports/VCGs.

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Install pluggable optics module

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Overview Use this task to install a pluggable optics module in a BBG23 FEPL circuit pack.

Privilege level You must log in as a Privileged, General, Maintenance, or Reports Only user to complete this task.

Required equipment Use only the following Lucent Approved Class 1 SFP transceiver.

Apparatus Code/Comcode	Description
100Base-LX-I1 109527812	100 Mb/s optical Fast Ethernet SFP TRCVR

Before you begin Prior to performing this task:

1. Refer to "Required equipment" (3-3) and "Before you begin" (3-3) in this chapter.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

3. Obtain work instructions for this task.

4. Ensure that correct optics module(s) is available for installation.

Task Complete the following steps to install a pluggable optics module in a circuit pack that has already been installed.
....

1

> **Important!** Pluggable optics modules are shipped with a water-tight process plug installed into the optical ports to maintain cleanliness during storage and/or transportation. It is recommended that the process plug be kept in place to maintain cleanliness until the optical fiber is connected. With proper care and handling, cleaning the pluggable optics modules should not be necessary.

If required, clean the pluggable optics module.

....

> **Reference:** "Clean pluggable optics module" (3-17)

....

2 Remove the water-tight process plug from the optics module and orient/line up the optics module's LC connector with the LC connector label on the circuit pack faceplate marked **IN** and **OUT** (do not insert optics module). Then replace the water-tight process plug.

....

3 Insert the pluggable optics module in the required socket of the circuit pack faceplate, then wiggle the optics module to verify that it is locked in the socket.

....

4 Enter the `rtrv-eqpt` (`rtrv-eqpt`) command to verify the state of the circuit pack.

> **Result:** The equipment list is displayed.
>
> If response is not correct, replace the optics module. If the optics module fails when inserted, , replace the newly-installed optics module. Each optics module has unique internal data for warranty purposes. If this data for any reason is not unique, both optics modules with the duplicated information will be declared failed. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

....

5 Enter the command `rtrv-alm` (`rtrv-alm`) to verify that no alarms are present for the ports where the circuit pack is installed.

> **Result:** The alarm report is displayed.

....

6 Do you wish to provision circuit pack and/or port parameters for service at this time?

If...	Then...
Yes,	"Provision BBG23 FEPL circuit pack for LAN port/VCGs for service" (3-7).
No,	STOP! END OF TASK.

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Clean optical fibers, dual LC adapters and LC lightguide buildouts (LBOs)

Overview   This task describes the Lucent recommended method for the cleaning and inspection of optical connectors using specific tools and materials that have been proven to be effective in the assembly and testing of optical transmission equipment.

Required equipment   The following table lists required and recommended equipment for proper cleaning:

Product	Model/ Description	Comcode	ITE #	Installation Order #
Optical Fiber Scope	Noyes OFS 300-200X	408197028	ITE-7129	33712900
2.5mm Universal adapter cap	For use with the Noyes OFS 300-200X	408197044	ITE-7129D1	33712901
1.25mm Universal adapter cap	For use with the Noyes OFS 300-200X	408197069	ITE-7129D2	33712902
Video Fiber Scope*	Noyes VFS-1	TBD	TBD	TBD
CLETOP Cleaning Cassette	Type A Reel	901375154	ITE-7137	33713700
CLETOP Cleaning Cassette Replacement Reel	Type A Reel	901375014	ITE-7137 D1	33713701
Luminex Stick port cleaners	1.25 mm	901375030	ITE-7134	33713400
Luminex Stick port cleaners	2.5 mm	901375022	ITE-7135	33713500
Luminex Cloth	5.5″ x 5.5″	408201226	R6033	23603300

* This equipment may not be necessary at all locations. It is to be used when the ports need to be verified for cleanliness. If care is exercised when cleaning fibers, the video scope may not be needed.

Note: The equipment and material listed above has been tested and is proven effective when used in conjunction with this procedure. Substitution of equipment or materials is at the discretion of the user and is not recommended.

Related information   A course on connector cleaning and the connector inspection process
is now offered through Lucent Technologies Learning and
Performance Center, Course Code: LMC200H *Understanding Fiber
Optic Cleaning, Inspection and Testing*. To learn more about this
course, consult your local Lucent Account Representative.

The procedure that follows utilizes the *Dry* method for connector
cleaning. This method utilizes a dry double clean wipe using the
CLETOP cleaning cassette.

This procedure is recommended for connector ferrules 2.5 mm and
1.25 mm in diameter associated with ST, SC, FC, and LC connectors.
The ferrule of a fiber optic connector consists of a ceramic or
stainless steel cylinder with a hole located longitudinally down the
center of its axis, allowing enough tolerance for a fiber to pass
through.

All optical connectors should be cleaned prior to being connected.
Keep the protective ferrule dust cap on the connector until initiating
the cleaning process.

> **Important!** It is critical that connector faces are clean and free
> from particular contamination to assure proper performance and
> reliability of lightwave systems. With the modern high-speed,
> high-power, and wider-bandwidth optical transmission systems,
> clean connectors along the optical path are essential for
> successful operation.

Before you begin   Prior to performing this task and its Supporting Elements (SE):

1. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13)
   in Chapter 1, "Safety".

2. Obtain the work instructions for this task.

Task   Refer to the following supporting elements to complete this
procedure.

....

1   To clean the optical fibers, refer to "Clean optical fibers" (3-14).

....

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....

2 To clean the fiber adapters and LBOs, refer to <u>"Clean fiber adapters
and circuit pack connectors" (3-16)</u>.

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3 - 1 3

Clean optical fibers

Overview   Use this task to clean optical fibers.

Task   The following cleaning procedure is acceptable for field service/installation activities.

1   Remove the dust cap from the connector ferrule, thus exposing the connector endface.

2   If a CLETOP cassette cleaner is not available, proceed to Step 6. Otherwise, hold the CLETOP cassette cleaner in the palm of your hand with the cassette shutter door facing up.

Rotate the cassette lever all the way down with your thumb. Do not release the lever. The lever advances the ″dry″ Luminex cleaning cloth inside the case and simultaneously opens the shutter. The CLETOP cassette shutter door is now open and ready for cleaning the connector.

....

3   Insert and press the connector ferrule endface perpendicular against the cleaning cloth in the first of two slots of the cleaner.

Drag it down (in the direction indicated by the arrows on the cleaner). Make certain not to release the lever of the cassette.

....

4   Lift the connector from the first slot and rotate it 90 degrees and repeat the downward motion using the second slot. Be sure the ferrule is pressed snug against the cleaning cloth while dragging the ferrule to assure the proper cleaning action.

....

5   Release the cassette lever allowing the shutter door to close to its initial position. Proceed to Step 7.

....

6   Wrap a Luminex cleaning cloth around the ferrule and rotate the connector housing, cleaning the outside periphery of the ferrule.

Follow this by folding an unused portion of the cloth over the end of the ferrule endface and then with light pressure from the thumb, slightly drag the cloth from the center of the ferrule to the edge while rotating the connector 360 degrees. If the Luminex cleaning cloth is not available, a cleanroom optic wipe can be used. The Luminex cleaning cloth is washable and can be used multiple times; optic wipes are single use and disposable.

....

7   Inspect the connector for cleanliness. If necessary, repeat the cleaning process.

E ND OF S TEPS
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Clean fiber adapters and circuit pack connectors

Overview   Use this task to clean fiber adapters and circuit pack connectors.

> **Important!** Do not attempt to clean ports equipped with yellow lightguide buildout (LBO) attenuators. Attenuators contain a thin glass lens that is extremely fragile. The LBO will be damaged if cleaned using this method.

Task   During testing and/or trouble shooting activities it may be necessary to clean the optical buildout adapter or the circuit pack connector. The following procedure is recommended.

1   Insert the appropriate CLETOP stick cleaner (2.5 mm for SC, ST, and FC connectors, 1.25 mm for LC connectors) into the adapter rotating the stick 360 degrees while inserting. Push/rotate stick until the stick cleaner makes contact with the connector. Apply slight pressure upon contact and rotate stick 360 degrees at least three (3) times.

2   Remove the stick cleaner rotating it upon removal.

3   Using a dry CLETOP stick cleaner of appropriate diameter, repeat the above cleaning procedure. This procedure will clean the side walls of the adapter and the endface of the circuit pack connector.

4   Gently insert the Video Fiber Scope probe into the port until the fiber ferrule comes into view.

5   Verify that the fiber ferrule is clean. Repeat Step 1 through Step 3 if the fiber does not meet the requirements specified.

E N D   O F   S T E P S

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Clean pluggable optics module

....

Overview   This task describes the Lucent recommended method for cleaning *uninstalled* pluggable optics modules using specific tools and materials that have been proven to be effective in the assembly and testing of optical transmission equipment.

> **Important!** Pluggable optics modules are shipped with a water-tight process plug installed into the optical ports to maintain cleanliness during storage and/or transportation. It is recommended that the process plug be kept in place to maintain cleanliness until the optical fiber is connected. With proper care and handling, cleaning the pluggable optics modules should not be necessary.

> Because a major source of contamination is often a contaminated mating connector, it is extremely important to clean the connector ferrule end surface each time before making connections. To clean the connector ferrule end surface, refer to "Clean optical fibers, dual LC adapters and LC lightguide buildouts (LBOs)" (3-11).

Required equipment   The following equipment is required to perform this task.

- CLETOP stick cleaner (1.25 mm for LC connectors)
- Canned dry nitrogen or air (electronics grade)
- Stereo zoom scope with coaxial illumination (200x)

Before you begin   Prior to performing this task, refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task   Complete the following steps to clean a pluggable optics module.
....

1   Remove the protective process plug from the pluggable optics module. Keep the process plug clean until reinstalled later, if required.

....

....

2 ⚠️ **CAUTION**

Corrosive substance hazard

If the canned dry nitrogen or air is held upside down, inert gas may be released onto the connector surface. The inert gas leaves contamination on the connector surface that cannot be removed.

When performing this step hold the canned dry nitrogen or air upright.

While holding the canned dry nitrogen or air, position the tip of the nozzle extension as close as possible, but not close enough to make physical contact, to the sleeve inside the port receptacle and make three consecutive short blows (approximately one second each).

....

3 Using the stereo zoom scope, visually inspect the optics module. If required, repeat Step 2 up to two more times then go to the next step.

....

4 **CAUTION**

Equipment damage

Do not perform this step on the receive (RX) port. The receive (RX) port contains a lens for focusing a wide input. The lens is more easily scratched than cleaned.

This step should only be performed on the transmit (TX) port if the air blows did not work.

If required, insert a CLETOP stick into the transmit (TX) port sleeve until vertical force can be applied to the fiber stub end surface. Rotate the CLETOP stick five full rounds.

....

5 Using the stereo zoom scope, visually inspect the optics module. If required, repeat Step 4.

....

6 **Important!** It is recommended that the process plug be installed into the optical ports on the pluggable optics module to maintain cleanliness until the optical fiber is connected.

....

If required, reinstall the process plug into the optical ports to maintain cleanliness.

E ND OF S TEPS

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Provision Ethernet LAN port parameters

Overview   This procedure provides instructions for provisioning Ethernet LAN ports.

Privilege level   You must login as either a Privileged or General user to complete this task.

Before you begin   Prior to performing this task, refer to "Before you begin" (3-3) and "Required equipment" (3-3) in this chapter and you must have complete work instructions for this task that detail:

- The network configuration and the terminating Ethernet nodes.
- The values to be set for each parameter.

Procedure   Use this procedure as a reference for provisionable LAN port parameters.

....

1   Enter the set-felan (ed-eport) command to provision service. See Table 3-1, "SET-FELAN command provisionable parameters" (3-21) as reference to provision the necessary LAN port parameters from your work instructions.

> **Important!** Some of the parameters may have already been provisioned from earlier procedures for establishing service.

....

2   Enter the rtrv-felan (rtrv-eport) command to verify the provisioning parameters set.

> **Result:** The FELAN Port parameters are displayed at the CIT. Verify that the parameters set are identical to your work instructions.

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SET-FELAN command parameters   The following table lists the provisionable parameters for the `set-felan` command:

Table 3-1   SET-FELAN command provisionable parameters

Parameter	Description
address	The function unit slot address of the FELAN port of the BBG23 FEPL circuit pack.
epmode	Ethernet **Port Monitoring Mode** may have one of the following values: • Auto (default value) • IS (in service) • nmon (not monitored)
eppm	**Ethernet Port PM Enable** Performance Monitoring parameter may have one of the following values: • enable • disable (default) This parameter controls whether Ethernet performance monitoring is enabled or disabled for the specified Ethernet port. If enabled, ingress and egress performance monitoring parameters are gathered. Table 2-5, "Ingress (LAN) port performance monitoring counts" (2-22) and Table 2-6, "Egress (WAN) port performance monitoring counts" (2-23) list the parameters that are collected.
fcmd	**Flow Control Mode** may have one of the following values: • enabled (Enable Transmit & Receive) • disabled (Disable Transmit & Receive) • auto - autonegotiate (default value) • drop - Disable end-to-end flow-control Transmit & Receive Enabled and disabled only control Network-element controlled (local) flow-control. Both enabled and disabled still allow Customer Equipment controlled end-to-end flow-control. Drop both disables Network-element-controlled flow-control and drops end-to-end flow-control messages. Auto does not apply to the optical port (Port 5). The initial value on Port 5 is enabled.

....

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Table 3-1   SET-FELAN command provisionable parameters   (continued)

Parameter	Description
lnrate	Port **Provisioned Line Rate** may be assigned one of the following values: • 10M (Fixed 10 Mbps line rate) • 100M (Fixed 100 Mbps line rate) • AUTO (default value [auto negotiates the port rate]) This parameter does not pertain to the optical port (Port 5) on the BBG23 FEPL circuit pack.
admin	**Port Administration Control**. This parameter is used to enable/disable a port. It will enable/disable all frames to and from a port. Values: • enabled - Enables frames to/from port (default value). • disabled - Disables frames to/from port.
almlvl	**Incoming Signal Failure Alarm Level**. This parameter sets the alarm level for an incoming signal failure or autonegotiation failure and may have one of the following values: • cr (Critical Alarm - default value) • mj (Major Alarm) • mn (Minor Alarm) • na (No Alarm)
mtu_size	The MTU size parameter specifies the Maximum Transmission Unit (MTU) size (in bytes) supported on the port. The MTU size is the size of the payload in the Ethernet frame, excluding Source and Destination Address, Type and CRC field. MTU size must be an integer. The range is 1500 (default) to 9614.
autoneg	**Auto-Negotiation** may have one of the following values: • enabled - Enables autonegotiation (default value) • disabled - Disables autonegotiation If fcmd or lnrate is set to AUTO, the system will set them as follows: fcmd = enabled, lnrate = 100M. This parameter does not pertain to the optical port (Port 5) on the BBG23 FEPL circuit pack.

Table 3-1   SET-FELAN command provisionable parameters   (continued)

Parameter	Description
mdix	**Automatic Crossover**. This parameter sets the crossover mode for the port. Values: • auto - Automatic Crossover (default) The system determines if crossover is needed, then automatically sets the port to AUTOMDIX or AUTOMDI mode. • mdix - Manually set to MDIX: RJ-45 TXP/TXN pins are transmit RJ-45 RXP/RXN pins are receive • mdi - Manually set to MDI: RJ-45 TXP/TXN pins are receive RJ-45 RXP/RXN pins are transmit This parameter does not pertain to the optical port (Port 5) on the BBG23 FEPL circuit pack.

□

Provision VCG parameters

....

Overview	This procedure provides instructions for provisioning virtual concatenation groups (VCGs).
Privilege level	You must login as either a Privileged or General user to complete this task.
Before you begin	Prior to performing this task, refer to "Before you begin" (3-3) and "Required equipment" (3-3) in this chapter and you must have complete work instructions for this task that detail:

- The network configuration and the terminating Ethernet nodes.
- The values to be set for each parameter.

Note also that the port cannot be in service when provisioning VCG parameters.

Procedure	Use this procedure as a reference for provisioning VCG parameters.

....

1 Enter the `set-vcg` (`ed-vcg`) command to provision VCG parameters. Refer to Table 3-2, "SET-VCG command provisionable parameters" (3-25) as a reference to provision the necessary parameters from your work instructions.

> **Important!** Some of the parameters may have already been provisioned from earlier procedures for establishing service.

....

2 Enter the `rtrv-vcg` (`rtrv-vcg`) command to verify the provisioning parameters set.

> **Result:** The VCG Port parameters are displayed at the CIT. Verify that the parameters set are identical to your work instructions.

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**SET-VCG command
parameters**

The following table lists the provisionable parameters for the `set-vcg` command:

Table 3-2   SET-VCG command provisionable parameters

Parameter	Description
address	Address of the VCG port of the BBG23 FEPL circuit pack.
almlvl	**Incoming Signal Failure Alarm Level**. This parameter sets the alarm level for an incoming signal failure and may have one of the following values: • cr (Critical Alarm - default value) • mj (Major Alarm) • mn (Minor Alarm) • na (No Alarm)
gfp_fcs	**GFP Frame Check Sequence**. This parameter controls the handling of the GFP FCS field for the specified VCG. The valid values are • enabled • disabled (default)
vcat	**Virtual Concatenation Mode**. Specifies whether H4 is inserted/monitored for the specified VCG. It has effect only when a single trib, not VT, is cross-connected to the VCG, to allow interworking with non-VCAT equipment. Valid values are • enabled (default) • disabled

Establish 10/100 Fast Ethernet private line service on SONET ring

....

Overview   This procedure provides examples for configuring point-to-point ring-protected fast Ethernet private line service using the BBG23 FEPL circuit pack at a DDM-2000 shelf.

Figure 3-1, "Two point-to-point 10/100-FE private line services, two VT1.5s" (3-30) illustrates two protected point-to-point private line services using VT1.5 cross-connections.

Figure 3-2, "Point-to-Point 10/100-FE private line service, three STS-1s" (3-30) illustrates protected point-to-point private line service using three STS-1 cross-connections.

This procedure uses CIT commands to illustrate the detailed provisioning parameters. If you prefer, you can use the TL1 commands at an OS interface (in parentheses after each CIT command) to perform the provisioning in this procedure.

> **Important!** With the main slots equipped with OC-3 or OC-12 OLIU circuit packs, the total capacity that can be cross-connected is 2 STS-1s (if the BBG23 circuit pack is in Function A or B) or 3 STS-1s (if the BBG23 circuit pack is in Function C).

Privilege level   You must login as either a Privileged or General user to complete this task.

Before you begin   Prior to performing this task, refer to "Before you begin" (3-3) and "Required equipment" (3-3) in this chapter and you must have complete work instructions for this task that detail:

- The network configuration and the terminating Ethernet nodes.

- The shelf slots, circuit packs, ports, and VCGs being provisioned.

- The number and type of cross-connections to be made at each node.

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Procedure   Use this procedure as an example for configuring fast Ethernet
private line service. See Figures that follow this procedure for
examples.

....

1   Use the CIT to log into one of the terminating nodes, if not already
performed.

....

2   At the CIT, enter the command `rtrv-map-network`
(`rtrv-map-network`) to retrieve a node-to-node listing of every node
in the network.

> **Important!** If a drawing of the network is not provided with the
> work instructions, it is recommended that you draw a simple
> diagram of the ring (indicating node-to-node connections) and list
> each node's TID.
>
> This command may take several minutes to complete depending
> on the size of the network.
>
> **Result:** The Network Map is displayed at the CIT.

....

3   Verify that the system configuration is the same as specified on your
work instructions.

....

4   From your work instructions, determine the circuit pack, port, and
cross-connections to be made at each node associated with the service
to be established.

....

5   Verify that the BBG23 FEPL circuit pack has been installed into the
required Function slot at each DDM-2000 shelf providing Ethernet
service.

> **Reference:** "Install BBG23 Fast Ethernet Private Line
> (FEPL) circuit pack" (3-4)

....

6   *Provision LAN Ports:*

Refer to your work instructions for LAN port settings. Enter the
`rtrv-felan` (`rtrv-eport`) command to verify that the LAN
provisioning parameters settings match the work instructions. If

....

required, use the command `set-felan` (`ed-eport`) to provision parameters.

> **Reference:** "Provision Ethernet LAN port parameters" (3-20)

....

7 *Provision VCGs:*

Refer to your work instructions for VCG groups. Enter the `rtrv-vcg` (`rtrv-vcg`) command to verify the parameters set match the work instructions. If required, use the `set-vcg` (`ed-vcg`) CIT command to provision the WAN (VCG) port parameters.

> **Reference:** "Provision VCG parameters" (3-24)

....

8 *Establish SONET Cross-Connections:*

Determine the necessary cross-connections to be made at each terminating and non-terminating node in the network.

> **Important!** The BBG23 FEPL circuit pack supports tributary rates of VT1.5 and STS-1 VCAT or STS-3c cross-connections independently to each VCG. From 1 to 56 VT1.5s (if the BBG23 is in Slots A or B) or 1 to 63 VT1.5s (if the BBG23 is in Slot C) may be assigned to any VCG. Any VCG may be assigned 1 or 2 STS-1s (if the BBG23 is in Slots A or B) or 3 STS-1s (if the BBG23 is in Slot C). Only 1 STS-3c may be assigned to the BBG23 FEPL circuit pack. Cross-connections may be made to the BBG23 FEPL circuit pack when main slots are equipped with OC-3 or OC-12 OLIU circuit packs.

....

9 One at a time at each *non* terminating node in the network, use the `ent-crs-sts1` (`ent-crs-sts1`), `ent-crs-vt1` (`ent-crs-vt1`), or `ent-crs-sts3c` (`ent-crs-sts3c`) commands to provision the two-way pass-through cross-connections.

> **Important!** Note that cross-connections at the terminating nodes are two-way add/drop and cross-connections at the non terminating nodes are two-way pass-through.

....

Reference: "Cross-connections for Ethernet" (3-32)

....

10 One at a time at each terminating node in the network, use the CIT
`ent-crs-sts1` (`ent-crs-sts1`), `ent-crs-vt1` (`ent-crs-vt1`), or
`ent-crs-sts3c` (`ent-crs-sts3c`) commands to provision the
add/drop cross-connections.

Reference: "Cross-connections for Ethernet" (3-32)

....

11 From the CIT, enter the `rtrv-crs-vt1` (`rtrv-crs-vt1`),
`rtrv-crs-sts1` (`rtrv-crs-sts1`), or `rtrv-crs-sts3c`
(`rtrv-crs-sts3c`) commands to verify that the proper
cross-connections have been made.

....

12 After all cross-connections are made and verified, enter the `rtrv-alm`
(`rtrv-alm`) command to verify no alarms are present.

Result: The alarm report is displayed.

....

13 If alarms are present, look for missing or improperly made
cross-connections.

Reference: *DDM-2000 OC-3 Multiplexer TARP Release 13
and Later User/Service Manual (TOP), 363-206-285* and
Chapter 4, "Alarm messages and trouble clearing tasks".

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**Figure 3-1 Two point-to-point 10/100-FE private line services, two
VT1.5s**

DDM-2000
Node A

DDM-2000
Node B

OUT   IN

IN   OUT

M 2   M 1

OC-3   OC-3

M 2   M 1

OC-3   OC-3

FN
A   FN
B   BBG23

VT1.5 Cross-Connections

ent-crs-vt1:m-2-1-1, c-1-1;

ent-crs-vt1:m-1-3-2, c-1-2;

Pass-Through Cross-Connections

ent-crs-vt1:m-2-1-1, m-2-1-1;

ent-crs-vt1:m-1-3-2, m-1-3-2;

Example: Two point-to-point private line services, VT1.5

DDM-2000
Node C

M 1   M 2

OC-3   OC-3

OUT

IN

FN
A   BBG23   FN
C

VT1.5 Cross-Connections

ent-crs-vt1:m-2-1-1, b-2-1;

ent-crs-vt1:m-1-3-2, b-2-2;
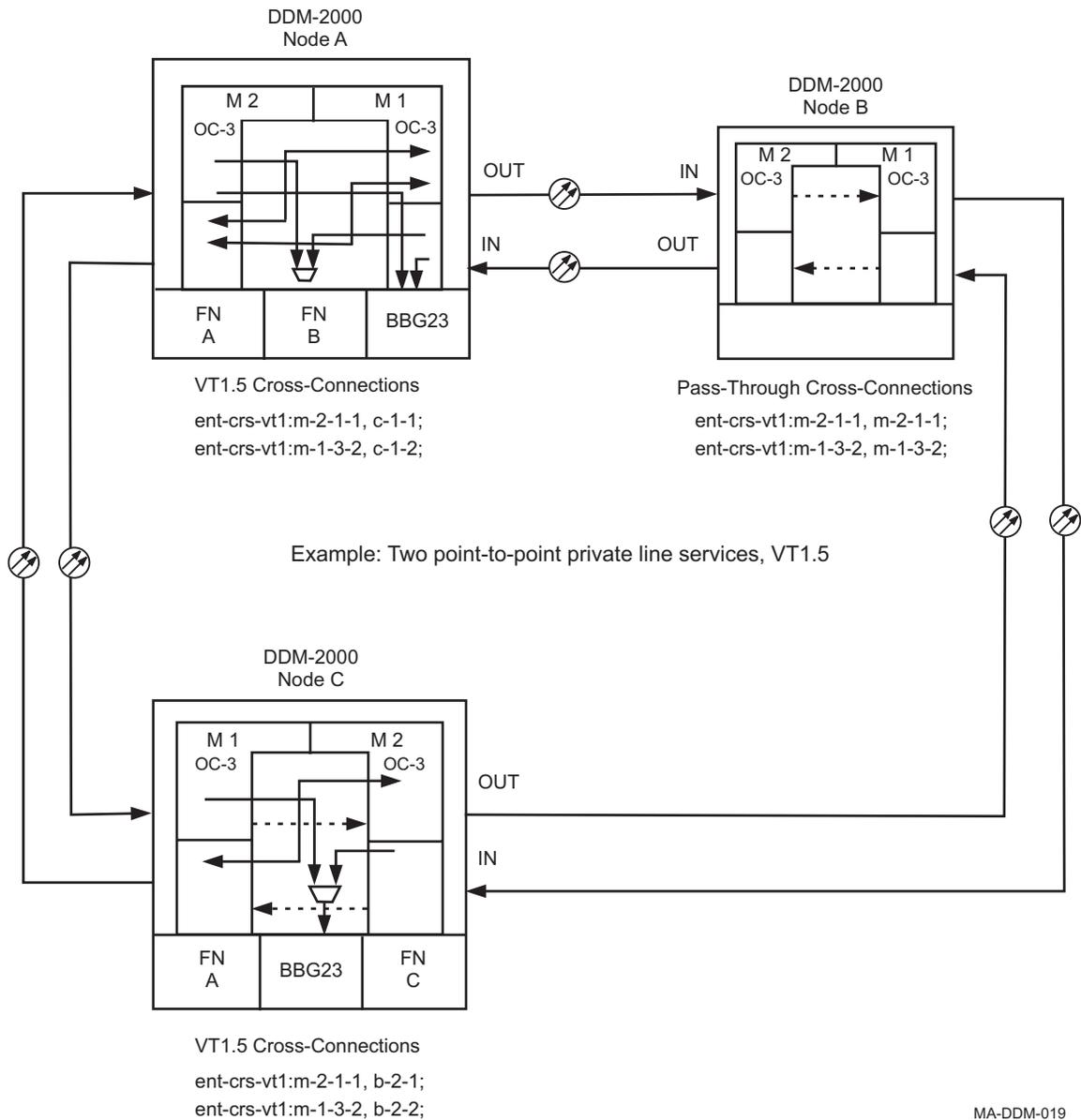
MA-DDM-019

Figure 3-2 Point-to-Point 10/100-FE private line service, three STS-1s

DDM-2000
Node A

DDM-2000
Node B

M 2
OC-12

M 1
OC-12

OUT   IN

IN   OUT

M 2
OC-12

M 1
OC-12

FN
A

FN
B

BBG23

STS-1 Cross-Connections

ent-crs-sts1:m-1, c-3-1;
ent-crs-sts1:m-2, c-3-2;
ent-crs-sts1:m-5, c-3-3;

Pass-Through STS-1 Cross-Connections

ent-crs-sts1:m-1, m-1;
ent-crs-sts1:m-2, m-2;
ent-crs-sts1:m-5, m-5;

Example: Two point-to-point private line services, three STS-1s

DDM-2000
Node C

M 1
OC-12

M 2
OC-12

OUT

IN

FN
A

FN
B

BBG23

STS-1 Cross-Connections

ent-crs-sts1:m-1, c-2-1;
ent-crs-sts1:m-2, c-2-2;
ent-crs-sts1:m-5, c-2-3;

MA-DDM-020

Cross-connections for Ethernet

Cross-Connections for Ethernet

The BBG23 FEPL circuit pack supports VT1.5, STS-1, and STS-3c cross-connections for Ethernet services on the DDM-2000 OC-3 Multiplexer.

One to three STS-1s may be assigned to each of the 5 VCGs up to the total capacity of 2 STS-1s for the circuit pack (if the BBG23 is in Function Slots A or B) or 3 STS-1s (if the BBG23 is in Function Slot C). One STS-3c may be assigned to one of the 5 VCGs in Slot C.

From 1 to 63 VT1.5 signals may be assigned to each VCG, until a total equaling 2 STS-1s (if the BBG23 is in Function Slots A or B) or 3 STS-1s (if the BBG23 is in Function Slot C) is reached.

Ports may be provisioned until all the available STS-1 equivalent bandwidth (including VT1.5s) is used.

Important rules for cross-connections

Ethernet cross-connections tie together VCG tributaries in two or more Ethernet circuit packs through SONET STS-1 tributaries. For example, a cross-connection of m-3 to b-3-3 at Node A, and a cross-connection of m-1 to c-1-3 at Node B ties b-3-3 (VCG1, tributary 3) at Node A to c-1-3 (VCG1, tributary 3) at Node B.

When more than one VCG tributary is being cross-connected to provide an Ethernet service, the order in which the VCG tributaries are connected must be the same at both ends of a span. See examples below.

For multiple VCG STS1 tributary cross-connections, it is strongly suggested that VCG tributary cross-connections begin at VCG STS1 tributary #1, then VCG tributary #2, and so forth to the last cross-connection. It is also suggested that the VCG tributary cross-connections be made in an increasing (ascending) order at *each* end of the span as shown in the example that works.

This example works:

NODE A	NODE B
m-1 <-> a-3-1	m-1 <-> c-2-1
m-2 <-> a-3-2	m-2 <-> c-2-2

This example does not work:

NODE A	NODE B
m-1 <-> a-3-1	m-1 <-> b-2-2
m-2 <-> a-3-2	m-2 <-> b-2-1

For the BBG23 FEPL circuit pack, transmission would not be established, but no alarm is raised to indicate a tributary mismatch.

Cross connect type (cct)

The BBG23 FEPL circuit pack supports two-way cross-connections (`twoway`). The command parameter requests a two-way add/drop or pass-through cross-connection be established between the source and destination in a ring. This is the default and only supported cross-connect type for Ethernet service on the BBG23 FEPL circuit pack.

There is no pairing of SONET-protected cross-connections and any available VCG can be used.

Two-way cross-connections may be made to *all* 5 VCGs. One to three STS-1s may be assigned to each of the VCGs up to the total capacity of 2 or 3 STS1s for the circuit pack (depending upon its location in the DDM-2000 shelf). One STS-3c may be assigned to only one of the VCGs.

When VT Virtual Concatenation is set to the maximum, 84 VT1.5s (with the BBG23 FEPL circuit pack in Slot C) or 56 VT1.5s (with the BBG23 FEPL circuit pack in Slot A or B) may be used with up to 63 assigned to any VCG. With an OC-12 OLIU circuit pack in the Main Slot, 196 VT1.5s may be used with up to 63 assigned to any VCG.

For additional details on capacity and cross-connection restrictions, refer to "Cross-connections" (2-26).

□

Perform Ethernet loopback transmission test

Overview

⚠️ **CAUTION**

Service disruption hazard

Executing this command may affect service. This command creates a terminal loopback at the specified interface.

This command should only be used during pre-service testing of facilities and during fault diagnostics. The loopback request remains active until released; for example, by command, or until overridden by an NE initialization or repowering.

Use this task to perform an Ethernet loopback transmission test. It is assumed that the Ethernet point-to-point service has been configured using the procedures in this chapter.

> **Important!** Only a terminal loopback may be performed on the LAN interface. The loopback is towards the optical fiber, as shown in the following diagram.

Figure 3-3 FELAN terminal loopback
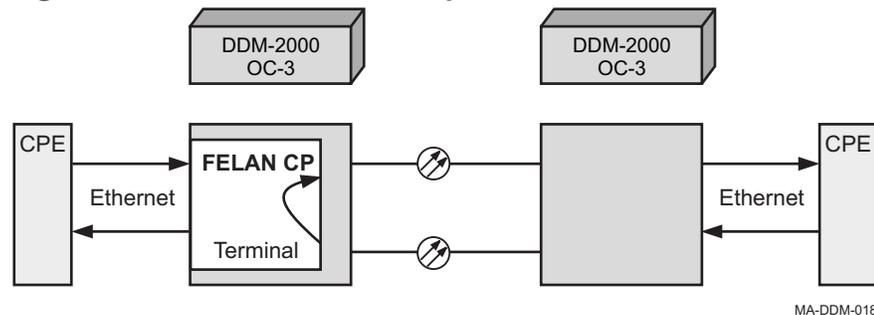
Privilege level   You must login as a General or Privileged user to complete this task.

Before you begin   Prior to performing this task, refer to "Before you begin" (3-3) and "Required equipment" (3-3) in this chapter and you must have complete work instructions for this task that detail:

- The shelf slots, circuit packs, ports that are being tested.

You must have an Ethernet test set capable of applying the external test signal required for this task.

The following rules apply for this test:

- Only out-of-service testing may be performed.

- Only one loopback is allowed on a circuit pack.

Procedure   Use the following procedure to perform the loopback test:
....

1   Use the CIT to log into the local DDM-2000 shelf with a BBG23 FEPL circuit pack installed.

....

2   Review the following test set considerations:

- Set the Destination Address to "Broadcast" (all Fs [FFFFFFFF}).

- Provision the test set data frames for the type of provisioned service being tested.

- Set the transmission mode to send a single packet.

....

3   Use the `set-felan` (`ed-eport`) command to disable flow control on the source port used so that pause frames do not get generated.

....

4   Connect the far end port to the Ethernet test set and start sending traffic to the other unterminated port.

....

5   Enter the `opr-lpbk-fe` (`opr-lpbk-fe`) command with a valid AID to begin the loopback on the circuit being tested.

> **Result:** A warning appears asking you to confirm executing this command. Enter **Yes** to execute the command. The loopback is executed.

....

6   Verify traffic is being received at the source node Ethernet test set.

....

7   To release the loopback, enter the `rls-lpbk-fe` (`rls-lpbk-fe`) command with the same AID entered to execute the loopback.

....

Result: The established loopback on the FELAN interface is released. Repeat this procedure for all circuits being tested.

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Enable/Disable BBG23 FEPL circuit pack performance monitoring (PM) settings

....

Overview   Use this task to enable or disable performance monitoring for Ethernet and VCG Ports on the BBG23 FEPL circuit pack.

When performance monitoring is enabled, counts are collected for the ingress and egress on the BBG23 FEPL circuit pack. See Table 2-5, "Ingress (LAN) port performance monitoring counts" (2-22) and Table 2-6, "Egress (WAN) port performance monitoring counts" (2-23) for a list of the parameters that are collected.

Privilege level   You must log in as a Privileged, General, or Maintenance user to enable performance monitoring and reporting parameters.

Before you begin   Prior to performing this task, refer to "Before you begin" (3-3) and "Required equipment" (3-3) in this chapter.

Task   Perform the following steps to enable performance monitoring reporting.

....

1   From the CIT, enter the `set-felan` (`ed-eport`) command. To enable performance monitoring, select `enable` for the Ethernet port performance monitoring (`eppm`) parameter.

> **Reference:** "Provision Ethernet LAN port parameters" (3-20).

....

2   From the CIT, enter the `rtrv-felan` (`rtrv-eport`) command to verify that the `eppm` parameter has been set to `enable`.

> **Result:** The FELAN Provisioning Report is displayed on the CIT.

....

3   Performance monitoring begins on the BBG23 FEPL circuit pack as soon as the `set-felan` (`ed-eport`) command is successfully completed. You may initialize the PM registers if needed.

> **Reference:** "Initialize performance monitoring (PM) registers" (3-38)

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Initialize performance monitoring (PM) registers

Overview   **Important!** Executing this procedure will reset and clear the PM register(s) selected. Ensure you want to execute this procedure before continuing.

Use this task to initialize all current 15-minute and/or current 1-day PM registers. PM registers for the *previous* 15-minute and *previous* 1-day time periods are not affected.

Privilege level   You may log in as a Privileged, General, or Maintenance user to complete this task.

Before you begin   Prior to performing this task, refer to "Before you begin" (3-3) and "Required equipment" (3-3) in this chapter.

Task   Perform the following steps to initialize (clear) the current 15-minute and/or current 1-day PM registers.

1   Which register do you wish to initialize?

If ...	Then...
current 15-minute registers	Continue with Step 2.
current 1-day registers	Proceed to Step 4.
current 15-minute and current 1-day registers	Proceed to Step 6.

2   From the CIT, enter the command `init-pm (init-reg)`, specifying `qh` for the register (`reg`) parameter. If the `reg` parameter is not specified in the command input syntax, you may select the quarter-hour register from the menu.

        Result: All current 15-minute PM registers are cleared. PM registers for the *previous* 15-minute time periods are not affected.

3   STOP! END OF TASK.

....

4   From the CIT, enter the command `init-pm (init-reg)`, specifying
`day` for the `reg` parameter. If the `reg` parameter is not specified in the
command input syntax, you may select the day register from the CIT
menu.

> **Result:** All current 1-day PM registers are cleared. PM
> registers for the *previous* 1-day time periods are not
> affected.

....

5   STOP! END OF TASK.

....

6   From the CIT, enter the command `init-pm (init-reg)`, specifying
`all` for the `reg` parameter. If the `reg` parameter is not specified in the
command input syntax, you may select all from the CIT menu.

> **Result:** All current 15-minute and current 1-day PM
> registers are cleared. PM registers for the *previous*
> 15-minute and *previous* 1-day time periods are not affected.

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View FEPL performance monitoring report

Overview	Use this task to view performance monitoring reports for data associated with the BBG23 FEPL circuit pack.
Privilege level	You must log in as a Privileged, General, Maintenance, or Reports Only user to view performance monitoring reports.
Before you begin	Prior to performing this task, refer to "Before you begin" (3-3) and "Required equipment" (3-3) in this chapter.
Task	Perform the following steps to view PM reports.

1 From the CIT, enter the `rtrv-pm-fepl` (`rtrv-epm`) command.

> **Result:** The FEPL Performance Monitoring Status Report is displayed on the CIT screen. The report indicates the start time of the data collection and when the PM registers were last initialized, as well as PM data for all ports on the BBG23 FEPL circuit pack.

E ND OF S TEPS

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View reports

....

Overview   Use this task as reference for viewing the following reports that are accessible from the CIT:

- Equipment Lists
- Equipment State List
- Path Protection Switch State List
- Alarm and Status List
- History Log
- Security Log

Privilege level   You must log in as a Privileged, General, Maintenance, or Reports Only user to complete this task.

Before you begin   Prior to performing this task, refer to "Before you begin" (3-3) and "Required equipment" (3-3) in this chapter.

Task   Use the sections in this task as reference for viewing reports that are accessible from the CIT.

....

1   Reference the sections in this procedure to view the desired reports.
E N D   O F   S T E P S
....

Equipment lists   The Equipment Lists show the address identifiers (AIDs), circuit pack type, hardware codes and version information for one or more slots on the DDM-2000 shelf.

The CIT command rtrv-eqpt (rtrv-eqpt) is used to obtain the Equipage and Version Report. The report is displayed at the CIT.

Equipment State lists   The Equipment State Report shows status/state information for circuit packs on the DDM-2000 shelf.

The CIT command rtrv-state-eqpt (rtrv-state-eqpt) is used to obtain the Equipment State Report. The report is displayed at the CIT.

Path protection switch state report   The Path Protection Switch State Report displays the signal path state information for path-protected signals dropped at the local DDM-2000 shelf. Any application that is path-protected is reported.

....

The CIT command `rtrv-state-path` (`rtrv-state-path`) is used to obtain the Path Protection Switch State Report. The report is displayed at the CIT. The report may be filtered by address.

Alarm and status list   The Alarm and Status List shows detailed information about the active alarms and status conditions on the local DDM-2000 shelf.

The CIT command `rtrv-alm` (`rtrv-alm`) is used to obtain the Alarm and Status List. The report is displayed at the CIT. The report may be filtered by Alarm Level.

History log   The History Report displays an event-history report about the local DDM-2000 shelf. The report contains up to 500 events, listed in last-in, first-out order. The entries are date- and time-stamped.

The CIT command `rtrv-hsty` (`rtrv-hsty`) is used to obtain the History Report. The report is displayed at the CIT.

Security log   The Security Configuration Report shows all CIT and DCC port security and timeout information. The report also lists users who are logged into the DDM-2000 shelf via the CIT and DCC ports. A separate section of the report lists users who are logged in via the X.25 PVCs and/or SVCs.

The CIT command `rtrv-secu` (`rtrv-cid-secu`) is used to obtain the Security Configuration Report. The report is displayed at the CIT.

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4   Alarm messages and trouble clearing tasks

Overview

Purpose   This chapter contains the alarm list, alarm descriptions, and alarm trouble clearing tasks for the DDM-2000 OC-3 Multiplexer.

This chapter is meant to complement information found in *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*. Refer to this document for general information about the DDM-2000 OC-3 Multiplexer.

See Table 2, "DDM-2000 documentation set" (xviii)for a detailed list of documents referenced in this chapter and throughout this guide.

Contents

Alarm list

Alarm list with alarm levels

Overview   This section provides a list of alarms/conditions and the associated alarm level(s).

Alarm list   **Important!** The alarm level for certain alarms is provisionable. In the table below, a bold **X** identifies the default alarm level for alarm messages that have provisionable levels. If there are multiple levels listed, yet there is no bold **X**, the alarm level for that alarm or condition is determined by the provisioning of the equipment.

Table 4-1   **DDM-2000, Release 15.3.1 alarm list**

Alarm/Condition Name	Alarm/Condition Level				Go to
	CR	**MJ**	**MN**	**SC**[1]	
CP removed	X		X		"Clear ″CP removed″ alarm" (4-20)
FE-LAN loopback (to fiber)				X	"Clear ″FE-LAN loopback (to fiber)″ condition" (4-22)
FEPL CP failed	X		X		"Clear ″FEPL CP failed″ alarm" (4-24)
FEPL Optical Module failed	**X**	X	X	X	"Replace FEPL optical module" (4-53).
FEPL Optical Module removed	**X**	X	X	X	"Clear ″FEPL Optical Module removed″ alarm" (4-26).
illegal CP type	X				"Clear ″illegal CP type″ alarm" (4-28)
inc. FE-LAN ANM	**X**	X	X	X	"Clear ″inc. FE-LAN ANM″ alarm" (4-30)
inc. FE-LAN LOS	**X**	X	X	X	"Clear ″inc. FE-LAN LOS″ alarm" (4-33)
inc. STS-1 LOM				X	"Clear ″inc. LOM″ condition" (4-35)

Table 4-1   DDM-2000, Release 15.3.1 alarm list   (continued)

Alarm/Condition Name	Alarm/Condition Level				Go to
	CR	MJ	MN	SC[1]	
inc. STS-1 SQM				X	"Clear ″inc. SQM″ condition" (4-38)
inc. VCG failed	**X**	X	X	X	"Clear ″inc. VCG failed″ alarm" (4-41)
inc. VCG LFD				X	"Clear ″inc. VCG LFD″ condition" (4-45)
inc. VCG LOA				X	"Clear ″inc. VCG LOA″ condition" (4-47)
inc. VT1 LOM				X	"Clear ″inc. LOM″ condition" (4-35)
inc. VT1 SQM				X	"Clear ″inc. SQM″ condition" (4-38)

Notes:

1. SC (standing condition) indicates a reported event (often user initiated). Standing conditions are not alarms. However, they are included in the CIT *Active Alarms and Status Report*.

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Alarm descriptions

CP removed

CP removed   A 10/100 Fast Ethernet Private Line (FEPL) circuit pack was removed from the shelf.

Alarm Data	Value/Meaning
Alarm Level(s)	Critical (CR), Minor (MN)
Source Address	Slot Slot 2 of the function unit slot pair is alarmed.
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	CR = SA MN = NSA
Description	CP removed
Likely Cause	An FEPL circuit pack carrying service was removed from the shelf - CR (SA). An FEPL circuit pack that was not carrying service (no cross-connections present) was removed from the shelf - MN (NSA).
Visible Indication	Lighted **CR** or **MN** LED on SYSCTL faceplate.
Action	Proceed to "Clear ″CP removed″ alarm" (4-20).

FE-LAN loopback (to fiber)

FE-LAN loopback (to fiber)   A loopback is active on the specified Fast Ethernet LAN port.

Alarm Data	Value/Meaning
Alarm Level(s)	Abnormal (Standing Condition)
Source Address	Ethernet 10/100 LAN Port (FEPL)
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	NSA
Description	FE-LAN loopback (to fiber)
Likely Cause	User performed the **opr-lpbk-fe:** command.
Visible Indication	Lighted **ABN** LED on SYSCTL faceplate.
Action	Proceed to "Clear ″FE-LAN loopback (to fiber)″ condition" (4-22).

FEPL CP failed

....

FEPL CP failed   Internal equipment failure of the specified 10/100 Fast Ethernet
Private Line (FEPL) circuit pack or communications problem between
the FEPL circuit pack and the System Controller (SYSCTL) circuit
pack was detected.

Alarm Data	Value/Meaning
Alarm Level(s)	Critical (CR), Minor (MN)
Source Address	Slot Slot 2 of the function unit slot pair is alarmed.
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	CR = SA MN = NSA
Description	FEPL CP failed
Likely Cause	An FEPL circuit pack carrying service failed - CR (SA). An FEPL circuit pack that was not carrying service (no cross-connections present) failed - MN (NSA).
Visible Indication	Lighted **CR** or **MN** LED on SYSCTL faceplate and a continuously lighted **FAULT** LED on the failed FEPL circuit pack.
Action	Proceed to "Clear ″FEPL CP failed″ alarm" (4-24).

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FEPL Optical Module failed

FEPL Optical Module failed   Internal equipment failure of the specified FEPL optical module or communications problem between the FEPL optical module and the System Controller (SYSCTL) circuit pack was detected.

Alarm Data	Value/Meaning
Alarm Level(s)	Critical (CR), Major (MJ), Minor (MN), Not Alarmed (Standing Condition) (provisionable) CR is the default level.
Source Address	Ethernet 10/100 LAN Port (FEPL) Slot 2 of the function unit slot pair is alarmed.
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	SA
Description	FEPL Optical Module failed
Likely Cause	An FEPL optical module failed.
Visible Indication	Lighted **CR**, **MJ**, or **MN** LED on SYSCTL faceplate, and a flashing **FAULT** LED on the circuit pack.
Action	Proceed to "Replace FEPL optical module" (4-53).

FEPL Optical Module removed

FEPL Optical Module removed

Specified FEPL optical module was removed from the circuit pack.

Alarm Data	Value/Meaning
Alarm Level(s)	Critical (CR), Major (MJ), Minor (MN), Not Alarmed (Standing Condition) (provisionable)
	CR is the default level.
Source Address	Ethernet 10/100 LAN Port (FEPL)
	Slot 2 of the function unit slot pair is alarmed.
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	SA
Description	FEPL Optical Module removed
Likely Cause	An FEPL optical module was removed from the circuit pack.
Visible Indication	Lighted **CR**, **MJ**, or **MN** LED on SYSCTL faceplate, and a flashing **FAULT** LED on the circuit pack.
Action	Proceed to "Clear "FEPL Optical Module removed" alarm" (4-26).

illegal CP type

illegal CP type   An unknown or unsupported circuit pack is present in a slot.

Alarm Data	Value/Meaning
Alarm Level(s)	Critical (CR)
Source Address	Slot
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	SA
Description	illegal CP type
Likely Cause	An unknown or unsupported circuit pack type was inserted into the slot.
Visible indication	Lighted **CR** LED on SYSCTL faceplate and a continuously lighted **FAULT** LED on the alarmed circuit pack.
Action	Proceed to "Clear "illegal CP type" alarm" (4-28).

inc. FE-LAN ANM

....

inc. FE-LAN ANM   Incoming Auto Negotiation Mismatch (ANM) is detected on the
FE-LAN port. Indicates that a signal is received but the FE-LAN port
is unable to negotiate mutually acceptable transmission options for
line rate and/or flow control mode.

Alarm Data	Value/Meaning
Alarm Level(s)	Critical (CR), Major (MJ), Minor (MN), Not Alarmed (Standing Condition) (provisionable) CR is the default level.
Source Address	Ethernet 10/100 LAN Port (FEPL)
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	SA
Description	inc. FE-LAN ANM
Likely Cause	The line rate and/or flow control mode on the local FE-LAN port and the interfacing customer LAN port do not match.
Visible Indication	Lighted **CR**, **MJ**, or **MN** LED on SYSCTL faceplate and a flashing **FAULT** LED on the FEPL circuit pack.
Action	Proceed to "Clear ″inc. FE-LAN ANM″ alarm" (4-30).

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inc. FE-LAN LOS

....

inc. FE-LAN LOS   Indicates a loss of signal (LOS) at an input of the local FE-LAN port.
This condition indicates that at least 128 consecutive zeros were
detected in the Ethernet signal received by the local FE-LAN port.

Alarm Data	Value/Meaning
Alarm Level(s)	Critical (CR), Major (MJ), Minor (MN), Not Alarmed (Standing Condition) (provisionable) CR is the default level.
Source Address	Ethernet 10/100 LAN Port (FEPL)
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	SA
Description	inc. FE-LAN LOS
Likely Cause	Disconnected LAN cable or fiber, or failure/removal of interfacing customer LAN equipment.
Visible Indication	Lighted **CR**, **MJ**, or **MN** LED on SYSCTL faceplate and a flashing **FAULT** LED on the FEPL circuit pack.
Action	Proceed to "Clear ″inc. FE-LAN LOS″ alarm" (4-33).

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inc. STS-1 LOM
....

inc. STS-1 LOM   The system has detected a loss of multiframe (LOM).

Alarm Data	Value/Meaning
Alarm Level(s)	Not Alarmed (Standing Condition)
Source Address	STS-1 Channel (within OC-3/OC-12)
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	NSA
Description	inc. STS-1 LOM
Likely Cause	Circuit failure in an Ethernet circuit pack (near end [NE] or far end [FE]) that terminates the associated VCG. May be caused by a misrouted STS-1.
Visible Indication	None.
Action	Proceed to "Clear ″inc. LOM″ condition" (4-35).

....

inc. STS-1 SQM

....

inc. STS-1 SQM   The system has detected a sequence number mismatch (SQM) in an incoming STS-1 tributary. The accepted sequence number differs from the expected sequence number.

Alarm Data	Value/Meaning
Alarm Level(s)	Not Alarmed (Standing Condition)
Source Address	STS-1 Channel (within OC-3/OC12)
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	NSA
Description	inc. STS-1 SQM
Likely Cause	VCG tributary provisioning error at the near end or far end.
Visible Indication	None.
Action	Proceed to "Clear "inc. SQM" condition" (4-38).

inc. VCG failed

....

inc. VCG failed   Indicates a failure condition in an incoming virtual concatenation
group (VCG). The failure of any VT1.5 or STS-1 tributary in the
VCG causes a VCG failure.

Alarm Data	Value/Meaning
Alarm Level(s)	Critical (CR), Major (MJ), Minor (MN), Not Alarmed (Standing Condition) (provisionable) CR is the default level.
Source Address	VCG
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	SA
Description	inc. VCG failed
Likely Cause	Cross-connection error in one or more VT1.5 or STS-1 tributaries in the VCG.
Visible Indication	Lighted **CR**, **MJ**, or **MN** LED on SYSCTL faceplate.
Action	Proceed to "Clear ″inc. VCG failed″ alarm" (4-41).

inc. VCG LFD

....

inc. VCG LFD   A loss of frame delineation (LFD) has been detected in an incoming virtual concatenation group (VCG).

Alarm Data	Value/Meaning
Alarm Level(s)	Not Alarmed (Standing Condition)
Source Address	VCG
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	NSA
Description	inc. VCG LFD
Likely Cause	The far-end Ethernet circuit pack does not support the ITU-T G.7041/Y.1303 Generic framing procedure (GFP).
Visible Indication	None.
Action	Proceed to "Clear ″inc. VCG LFD″ condition" (4-45).

inc. VCG LOA

....

inc. VCG LOA   One or more VT1.5 or STS-1 tributaries that compose a virtual concatenation group (VCG) are out of multiframe alignment because of an excess delay difference.

Alarm Data	Value/Meaning
Alarm Level(s)	Not Alarmed (Standing Condition)
Source Address	VCG
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	NSA
Description	inc. VCG LOA
Likely Cause	A VT1.5 or STS-1 tributary in the VCG is routed over a path that exceeds the allowed delay difference.
Visible Indication	None.
Action	Proceed to "Clear ″inc. VCG LOA″ condition" (4-47).

....

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inc. VT1 LOM

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inc. VT1 LOM   The system has detected a loss of multiframe (LOM).

Alarm Data	Value/Meaning
Alarm Level(s)	Not Alarmed (Standing Condition)
Source Address	VT1.5 Channel (within OC-3/OC12)
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	NSA
Description	inc. VT1 LOM
Likely Cause	Circuit failure in an Ethernet circuit pack (near end [NE] or far end [FE]) that terminates the associated VCG. May be caused by a misrouted VT1.5.
Visible Indication	None.
Action	Proceed to "Clear ″inc. LOM″ condition" (4-35).

inc. VT1 SQM

....

inc. VT1 SQM   The system has detected a sequence number mismatch (SQM) in an incoming VT1.5 tributary. The accepted sequence number differs from the expected sequence number.

Alarm Data	Value/Meaning
Alarm Level(s)	Not Alarmed (Standing Condition)
Source Address	VT1.5 Channel (within OC-3/OC12)
Date Detected	month-day that condition was detected
Time Detected	hour:minute:second that condition was detected
Effect on Service (Srv)	NSA
Description	inc. VT1 SQM
Likely Cause	VCG tributary provisioning error at the near end or far end.
Visible Indication	None.
Action	Proceed to "Clear ″inc. SQM″ condition" (4-38).

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Trouble clearing tasks

Clear ″CP removed″ alarm

Overview   This procedure is used to clear a `CP removed` alarm indicated by a lighted Critical (**CR**) or Minor (**MN**) LED on the SYSCTL faceplate, and reported as Critical or Minor in the CIT *Active Alarms and Status Report*.

Before you begin   Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task   Complete the following steps to clear a `CP removed` alarm.

1   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

2   Locate the `CP removed` alarm in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

3   Using office records, determine if the required slot should contain a circuit pack.

....

4   Do office records show that the required slot should contain a circuit pack?

If...	Then...
Yes	Obtain the missing circuit pack and install it into the required slot. Refer to the appropriate task in Chapter 3, "User operations tasks".
No	Momentarily press the **UPD/INIT** button on the SYSCTL circuit pack or use the upd (upd) command to remove the circuit pack from the equipment list. This system update clears all current CP removed alarms.

....

5   Use the rtrv-alm (rtrv-alm) command to obtain the *Active Alarms and Status Report*.

> **Result:** The CP removed alarm is no longer present.

....

6   Are there any alarms listed?

If...	Then...
Yes	Proceed to the appropriate task to clear the alarm.
No	STOP! END OF TASK.

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Clear ″FE-LAN loopback (to fiber)″ condition

Overview   This procedure is used to clear an `FE-LAN loopback <to fiber>` condition indicated by a lighted Abnormal (**ABN**) LED on the SYSCTL faceplate, and reported as abnormal in the CIT *Active Alarms and Status Report*. The condition indicates that a user initiated an FE-LAN port terminal loopback.

Before you begin   Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task   Complete the following steps to clear an `FE-LAN loopback <to fiber>` condition.

....

1   Use the `rtrv-alm` (rtrv-alm) command to obtain the *Active Alarms and Status Report*.

....

2   Locate the `FE-LAN loopback <to fiber>` condition in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

....

3   Use the `rls-lpbk-fe` (`rls-lpbk-fe`) command to release the FE-LAN terminal loopback.

....

4   Use the `rtrv-alm` (rtrv-alm) command to obtain the *Active Alarms and Status Report*.

....

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                                                                                 Issue 1 , December 2004

Trouble clearing tasks
Clear "FE-LAN loopback (to fiber)"
condition

Alarm messages and trouble clearing tasks

Result: The `FE-LAN loopback <to fiber>` condition is no longer present.

....

5   Are there any alarms listed?

If...	Then...
Yes	Proceed to the appropriate task to clear the alarm.
No	STOP! END OF TASK.

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4 - 2 3

Clear ″FEPL CP failed″ alarm

Overview This procedure is used to clear an `FEPL CP failed` alarm indicated by a lighted Critical (**CR**) or Minor (**MN**) LED on the SYSCTL faceplate, and reported as Critical or Minor in the CIT *Active Alarms and Status Report*.

Before you begin Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task Complete the following steps to clear a `FEPL CP failed` alarm.

....

1 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

2 Locate the `FEPL CP failed` alarm in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

....

3   ⚠ **CAUTION**
            Service disruption hazard

Disconnecting cables and/or replacing circuit packs may disrupt service.

Before taking action, determine the extent of service disruption caused by disconnecting cables or replacing a circuit pack. Then, perform the action(s) deemed appropriate in light of the traffic being carried and the nature of the failure.

....

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Disengage the affected 10/100 Fast Ethernet Private Line (FEPL) circuit pack completely from the shelf.

1. Release the faceplate latch.

2. Extract the circuit pack from the shelf, fully disconnecting it from the backplane, and therefore removing power.
   Result: The **ACTIVE** and **FAULT** LED on the pack extinguish.

3. Re-seat the circuit pack in the shelf and wait approximately 5 minutes.

....

4 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

5 Is the `FEPL CP failed` alarm still present?

If...	Then...
Yes	Continue with the next step.
No	STOP! END OF TASK.

....

6 Replace the affected FEPL circuit pack.

      Reference: "Replace FEPL circuit pack" (4-49)

....

7 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

8 Is the `FEPL CP failed` alarm still present?

If...	Then...
Yes	Contact your next level of support.
No	STOP! END OF TASK.

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4 - 2 5

Clear ″FEPL Optical Module removed″ alarm

Overview   This procedure is used to clear an `FEPL Optical Module removed` alarm indicated by a lighted Critical (**CR**), Major (**MJ**), or Minor (**MN**) LED on SYSCTL faceplate, a continuously lighted port LED on the empty optical module socket, and a flashing **FAULT** LED on the circuit pack. The alarm is reported as Critical, Major, Minor, or Not Alarmed (SC) in the CIT *Active Alarms and Status Report*.

Before you begin   Prior to performing this task:

1.   Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2.   Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task   Complete the following steps to clear an `FEPL Optical Module removed` **alarm**.

1   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

2   Locate the `FEPL Optical Module removed` alarm in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

3   Using office records, determine if the required socket should contain an FEPL optical module.

....

4 Do office records show that the required socket should contain an FEPL optical module?

If...	Then...
Yes	Obtain the missing FEPL optical module and install it into the required socket.
	Refer to the appropriate task in Chapter 3, "User operations tasks".
No	Momentarily press the **UPD/INIT** button on the SYSCTL circuit pack or use the upd (upd) command to remove the FEPL optical module from the equipment list.

....

5 Use the `rtrv-alm` (`rtrv-alm`) command to obtain the *Active Alarms and Status Report*.

> **Result:** The `FEPL Optical Module removed` alarm is no longer present.

....

6 Are there any alarms listed?

If...	Then...
Yes	Proceed to the appropriate task to clear the alarm.
No	STOP! END OF TASK.

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4 - 2 7

Clear ″illegal CP type″ alarm

Overview This procedure is used to clear an `illegal CP type` alarm indicated by a lighted Critical (**CR**) LED on the SYSCTL faceplate, and reported as Critical in the CIT *Active Alarms and Status Report*.

Before you begin Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task Complete the following steps to clear an `illegal CP type` alarm.

1 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

2 Locate the `illegal CP type` alarm in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

3 Disengage the required circuit pack completely from the shelf.

1. Release the latch.

2. Extract the circuit pack from the shelf, fully disconnecting it from the backplane, and therefore removing power.
    The **ACTIVE** and **FAULT** LEDs on the circuit pack extinguish.

3. Re-seat the circuit pack in the shelf.

4 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

5   Is the `illegal CP type` alarm still present?

If...	Then...
Yes	Continue with Step 6.
No	Proceed to Step 10.

....

6   Use the `rtrv-eqpt` (`rtrv-eqpt`) command to obtain the *Equipage and Version Report* and verify the correct circuit pack type and version information.

....

7   Remove the required circuit pack. If desired, install the correct circuit pack.

....

8   Use the `rtrv-alm` (`rtrv-alm`) command to obtain the *Active Alarms and Status Report*.

....

9   Is the `illegal CP type` alarm still present?

If...	Then...
Yes	Contact your next level of support.
No	Continue with Step 10.

....

10   Are there any alarms listed?

If...	Then...
Yes	Proceed to the appropriate task to clear the alarm.
No	STOP! END OF TASK.

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Clear ″inc. FE-LAN ANM″ alarm

Overview This procedure is used to clear an `inc. FE-LAN ANM` alarm indicated by a lighted Critical (**CR**), Major (**MJ**), or Minor (**MN**) LED on the SYSCTL faceplate and reported as Critical, Major, Minor, or Not Alarmed (SC) in the CIT *Active Alarms and Status Report*.

Before you begin Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task Complete the following steps to clear an `inc. FE-LAN ANM` alarm.

1 Use the `rtrv-alm` (rtrv-alm) command to obtain the *Active Alarms and Status Report*.

2 Locate the `inc. FE-LAN ANM` alarm in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

3 Use the `rtrv-felan` (`rtrv-eport`) command to obtain the *FELAN Provisioning Report*.

4 Record the following information about the required local FE-LAN port:

- Flow Control Mode (as provisioned)
- Flow Control Mode Operation (actual)
- Line Rate (as provisioned)
- Line Rate Operation (actual)

5 Follow local procedures and determine the provisioned and actual line rate and flow control mode at the interfacing customer LAN port.

Trouble clearing tasks
Clear "inc. FE-LAN ANM" alarm

Alarm messages and trouble clearing tasks

....

6   Does the *actual* line rate and flow control mode match on both the local FE-LAN port and the interfacing customer LAN port?

If...	Then...
Yes	Proceed to Step 8.
No	Continue with Step 7.

....

7   Follow local procedures to determine if provisioning changes are required at the local FE-LAN port or the interfacing customer LAN port.

If provisioning changes are required at the...	Then...
local FE-LAN port,	Use the **set-felan:** command to provision the *Flow Control Mode* and/or *Line Rate* parameters as required to match the interfacing customer LAN port.
interfacing customer LAN port,	Follow local procedures to resolve the provisioning conflicts.

....

8   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

9   Is the `inc. FE-LAN ANM` alarm still present?

If...	Then...
Yes	Continue with the next step.
No	STOP! END OF TASK.

....

Trouble clearing tasks
Clear "inc. FE-LAN ANM" alarm

Alarm messages and trouble clearing tasks

....

10   Use the `set-felan` (`ed-eport`) command to provision the *Ethernet Port Monitoring Mode* parameter as **auto**.

> **Result:**   When the local FE-LAN port detects a good incoming signal, the port will transition from the AUTO state to the IS (In service) state.

....

11   Use the `rtrv-alm` (`rtrv-alm`) command to obtain the *Active Alarms and Status Report*.

....

12   Is the `inc. FE-LAN ANM` alarm still present?

If...	Then...
Yes	Contact your next level of support.
No	STOP! END OF TASK.

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Clear ″inc. FE-LAN LOS″ alarm

....

Overview This procedure is used to clear an `inc. FE-LAN LOS` alarm indicated by a lighted Critical (**CR**), Major (**MJ**), or Minor (**MN**) LED on the SYSCTL faceplate and reported as Critical, Major, Minor, or Not Alarmed (SC) in the CIT *Active Alarms and Status Report*.

Before you begin Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task Complete the following steps to clear an `inc. FE-LAN LOS` alarm.
....

1 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

2 Locate the `inc. FE-LAN LOS` alarm in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

....

3 Using office records, determine if the FE-LAN port is supposed to be in service.

If the FE-LAN port is...	Then...
supposed to be in service,	Continue with Step 4.
not supposed to be in service,	Momentarily press the **UPD/INIT** button on the SYSCTL circuit pack or use the upd (upd) command to update the FE-LAN port state. Then proceed to Step 8.

....

Trouble clearing tasks
Clear "inc. FE-LAN LOS" alarm

Alarm messages and trouble clearing tasks

4   Check local cable connections between the shelf and the interconnecting equipment for faulty connections or damage and repair/replace as necessary.

5   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

6   Is the `inc. FE-LAN LOS` alarm still present?

If...	Then...
Yes	Continue with Step 7.
No	STOP! END OF TASK.

7   **Important!** A likely cause of the alarm is a failure at the interfacing customer LAN equipment or a problem with cabling/wiring between the local FE-LAN port and the interfacing customer LAN equipment.

Follow local procedures to isolate and clear the trouble.

8   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

9   Is the `inc. FE-LAN LOS` alarm still present?

If...	Then...
Yes	Contact your next level of support.
No	STOP! END OF TASK.

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Clear ″inc. LOM″ condition

Overview This procedure is used to clear the following `inc. LOM` conditions reported as Not Alarmed (SC) in the CIT *Active Alarms and Status Report*.

- `inc. STS-1 LOM`

- `inc. VT1 LOM`

Loss of multiframe (LOM) occurs when a VT1.5 or STS-1 tributary is misconnected within the circuit.

Before you begin Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task Complete the following steps to clear an `inc. LOM` condition.

1 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

2 Locate the `inc. LOM` condition in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

3 Using circuit layouts and/or other office records, determine the circuit path through the network and the other network element where the VT1.5/STS-1 timeslot is terminated.

4 Using local procedures at the other terminating network element, check for incomplete or incorrect cross-connections and provision cross-connections as necessary.

5 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

6 Is the `inc. LOM` alarm still present?

If...	Then...
Yes	Continue with Step 7.
No	STOP! END OF TASK.

....

7 Using local procedures at each network element the circuit passes through, check for incomplete or incorrect pass-through cross-connections and provision pass-through cross-connections as necessary.

....

8 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

9 Is the `inc. LOM` alarm still present?

If...	Then...
Yes	Continue with Step 10.
No	STOP! END OF TASK.

....

10 Use the `reset (reset)` command to reset the SYSCTL circuit pack.

....

11 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

12 Is the `inc. LOM` condition still present?

If...	Then...
Yes	Contact your next level of support.
No	STOP! END OF TASK.

....

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Clear ″inc. SQM″ condition

....

Overview   This procedure is used to clear the following `inc. SQM` conditions reported as Not Alarmed (SC) in the CIT *Active Alarms and Status Report*.

- `inc. STS-1 SQM`

- `inc. VT1 SQM`

Before you begin   Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task   Complete the following steps to clear an `inc. SQM` condition.

....

1   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

2   Locate the `inc. SQM` condition in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

....

3   Using circuit layouts and/or other office records, identify the other network element where the alarmed VT1.5/STS-1 tributary is terminated.

....

4   At both terminating network elements, use the `rtrv-crs-vt1` (`rtrv-crs-vt1`) or `rtrv-crs-sts1` (`rtrv-crs-sts1`) command to obtain the *Cross-Connection Map Report*.

....

5   **Important!** When STS-1 and VT1.5 tributaries are cross-connected to VCG tributaries to provide Ethernet service, the same SONET STS-1 or VT1.5 must be connected to the same VCG tributary number.

....

It is strongly recommended that cross-connections to VCG tributaries be made in ascending order (for example, begin at VCG tributary #1, then VCG tributary #2, and so forth) at each terminating network element.

Compare the VCG tributary cross-connections at each terminating network element.

If the VCG tributaries at each terminating network element were...	Then...
cross-connected in sequence,	proceed to Step 9
not cross-connected in sequence,	Continue with Step 6.

6   At the local or far end network element, use the appropriate `dlt-crs` (`dlt-crs-rr`) and `ent-crs` (`ent-crs-rr`) commands as required so that the VCG tributaries are added in sequence at both terminating network elements.

7   Use the `rtrv-alm` (`rtrv-alm`) command to obtain the *Active Alarms and Status Report*.

8   Is the `inc. SQM` condition still present?

If...	Then...
Yes	Continue with Step 9.
No	STOP! END OF TASK.

9   Use the `reset` (`reset`) command to reset the SYSCTL circuit pack.

10 Use the `rtrv-alm` (`rtrv-alm`) command to obtain the *Active Alarms and Status Report*.

....

11 Is the `inc. SQM` condition still present?

If...	Then...
Yes	Contact your next level of support.
No	STOP! END OF TASK.

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Clear ″inc. VCG failed″ alarm

....

Overview   This procedure is used to clear an `inc. VCG failed` alarm indicated by a lighted Critical (**CR**), Major (**MJ**), or Minor (**MN**) LED on the SYSCTL faceplate and reported as Critical, Major, Minor, or Not Alarmed (SC) in the CIT *Active Alarms and Status Report*.

Before you begin   Prior to performing this task:

1.   Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2.   Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task   Complete the following steps to clear an `inc. VCG failed` alarm.

....

1   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

2   Are there other inc. OCN, STSN, or VT1.5 alarms in the alarm list?

If...	Then...
Yes	Proceed to the appropriate task in the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285* to clear the alarm. Then continue with Step 3.
No	Continue with Step 5.

....

3   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

Trouble clearing tasks
Clear "inc. VCG failed" alarm

Alarm messages and trouble clearing tasks

4   Is the `inc. VCG failed` alarm still present?

If...	Then...
Yes	Continue with Step 5.
No	STOP! END OF TASK.

5   Are there other inc. LOM, inc. SQM, or inc. VCG conditions in the alarm list?

If...	Then...
Yes	Proceed to the appropriate task to clear the condition. Then continue with Step 6.
No	Continue with Step 8.

6   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

7   Is the `inc. VCG failed` alarm still present?

If...	Then...
Yes	Continue with Step 8.
No	STOP! END OF TASK.

8   Use the `reset (reset)` command to reset the SYSCTL circuit pack.

9   Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

Trouble clearing tasks
Clear ″inc. VCG failed″ alarm

Alarm messages and trouble clearing tasks

....

10 Is the `inc. VCG failed` alarm still present?

If...	Then...
Yes	Continue with Step 11.
No	STOP! END OF TASK.

....

11 Locate the `inc. VCG failed` alarm in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

....

12 ⚠ **CAUTION**

Service disruption hazard

Disconnecting cables and/or replacing circuit packs may disrupt service.

Before taking action, determine the extent of service disruption caused by disconnecting cables or replacing a circuit pack. Then, perform the action(s) deemed appropriate in light of the traffic being carried and the nature of the failure.

Disengage the affected FEPL circuit pack completely from the shelf.

1. Release the latch.

2. Extract the circuit pack from the shelf, fully disconnecting it from the backplane, and therefore removing power.
    The **ACTIVE** and **FAULT** LED on the circuit pack extinguish.

3. Re-seat the FEPL circuit pack in the shelf.

....

13 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

14 Is the `inc. VCG failed` alarm still present?

If...	Then...
Yes	Continue with Step 15.

....

Trouble clearing tasks
Clear ″inc. VCG failed″ alarm

Alarm messages and trouble clearing tasks

If...	Then...
No	STOP! END OF TASK.

....

15   ⚠ **CAUTION**

Service disruption hazard

Disconnecting cables and/or replacing circuit packs may disrupt service.

Before taking action, determine the extent of service disruption caused by disconnecting cables or replacing a circuit pack. Then, perform the action(s) deemed appropriate in light of the traffic being carried and the nature of the failure.

Replace the near-end FEPL circuit pack.

> **Reference:**   "Replace FEPL circuit pack" (4-49)

....

16   Use the `rtrv-alm` (rtrv-alm) command to obtain the *Active Alarms and Status Report*.

....

17   Is the `inc. VCG failed` alarm still present?

If...	Then...
Yes	Contact your next level of support.
No	STOP! END OF TASK.

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Clear ″inc. VCG LFD″ condition

....

Overview This procedure is used to clear an `inc. VCG LFD` condition reported as Not Alarmed (SC) in the CIT *Active Alarms and Status Report*.

Before you begin Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task Complete the following steps to clear an `inc. VCG LFD` condition.
....

1 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

2 Locate the `inc. VCG LFD` condition in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

....

3 **Important!** The Ethernet circuit packs at both terminating network elements must support standard Generic Framing Procedure (GFP) encapsulation (ITU G.7041) for Ethernet over SONET mapping.

Using office records, verify that the Ethernet circuit packs at both terminating network elements support standard Generic Framing Procedure (GFP) encapsulation (ITU G.7041).

If required, replace the near-end or far-end Ethernet circuit pack.

> **Reference:** "Replace FEPL circuit pack" (4-49)

....

4 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

Trouble clearing tasks
Clear ″inc. VCG LFD″ condition

Alarm messages and trouble clearing tasks

....

5 Is the `inc. VCG LFD` alarm still present?

If...	Then...
Yes	Contact your next level of support.
No	STOP! END OF TASK.

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Clear ″inc. VCG LOA″ condition

....

Overview This procedure is used to clear an `inc. VCG LOA` condition reported as Not Alarmed (SC) in the CIT *Active Alarms and Status Report*.

Before you begin Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) in Chapter 1, "Safety".

Task Complete the following steps to clear an `inc. VCG LOA` condition.

....

1 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

2 Locate the `inc. VCG LOA` condition in the *Active Alarms and Status Report* and note the corresponding *Source Address*.

....

3 **Important!** Because individual VCG tributaries can take different paths through the SONET network, they may experience different delays through the network. The VCGs use differential delay buffers to accommodate for differential delay.

Follow local procedures to reengineer the circuit path of the affected tributary through the SONET network to reduce differential delay.

> **Reference:** *DDM-2000 OC-3 and OC-12 Multiplexers Applications, Planning, and Ordering Guide, 363-206-200R15*
>
> *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*

....

4 Use the `rtrv-alm (rtrv-alm)` command to obtain the *Active Alarms and Status Report*.

....

Trouble clearing tasks
Clear "inc. VCG LOA" condition

Alarm messages and trouble clearing tasks

---

5 Is the `inc. VCG LOA` condition still present?

If...	Then...
Yes	Contact your next level of support.
No	STOP! END OF TASK.

E N D   O F   S T E P S

□

Replace FEPL circuit pack

....

Overview Use this task to replace a 10/100 Fast Ethernet Private Line (FEPL) circuit pack.

Required equipment Use only the following Lucent Approved Class 1 SFP transceivers.

Apparatus Code/Comcode	Description
100Base-LX-I1 109527812	Optical Fast Ethernet TRCVR, Intermediate Reach

Before you begin Prior to performing this task:

1. Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*.

2. Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) information in Chapter 1, "Safety".

3. Ensure that an FEPL circuit pack is available for replacement.

4. If required, ensure that a correct FEPL optical module is available for replacement.

5. Obtain the work instructions for this task.

Task Complete the following steps to replace a 10/100 Fast Ethernet Private Line (FEPL) circuit pack.

....

1

Important! The FEPL circuit pack may be equipped with a single pluggable FEPL optical module.

If required, remove the optical cables from the circuit pack.

....

2

Important! It is recommended that process plugs be installed into the optical port to maintain cleanliness until the optical fiber is connected.

If the circuit pack is equipped with an FEPL optical module, install process plugs into the optical port on the FEPL optical module to maintain cleanliness.

....

....

3   If required, remove the FEPL optical module from the circuit pack. Slide the metal loop on the end of the module to the left. Using the metal loop, pull the module out to remove it from the socket. Install a dust cover on the unequipped socket.

....

4   Remove the circuit pack by grasping the inner edge of the locking-lever, and applying a constant pressure, pull the lever forward and remove the circuit pack.

....

5   Ensure all optical fiber connectors and couplings are properly cleaned.

> **Important!** Signal performance may be degraded if the connections and couplings are not cleaned properly.

> **Reference:** "Clean optical fibers, dual LC adapters and LC lightguide buildouts (LBOs)" (3-11)

....

6   **Important!** FEPL optical modules are shipped with a water-tight process plug installed into the optical ports to maintain cleanliness during storage and/or transportation. It is recommended that the process plug be kept in place to maintain cleanliness until the optical fiber is connected. With proper care and handling, cleaning the FEPL optical modules should not be necessary.

If required, clean the FEPL optical module.

> **Reference:** "Clean pluggable optics module" (3-17)

....

7   Seat the replacement circuit pack in the vacated function unit slot.

> **Result:** **FAULT** LED on the circuit pack lights. After approximately 30 seconds, the **ACTIVE** LED lights and the **FAULT** LED may go off.

....

8   **Important!** The FEPL circuit pack may be equipped with a single pluggable FEPL optical module.

....

If required, perform the following to install the FEPL optical module; otherwise, verify that the unused socket is equipped with a dust cover.

1. Remove the water-tight process plug from the FEPL optical module and orient/line up the FEPL optical module with the required socket on the circuit pack faceplate (do not insert FEPL optical module). Then replace the water-tight process plug.

2. Insert the FEPL optical module in the required socket of the circuit pack faceplate, then wiggle the FEPL optical module to verify that it is locked in the socket.

....

9   If required, reconnect the optical cables.

> **Result: FAULT** LED goes off.

....

10   Use the `rtrv-eqpt` (`rtrv-eqpt`) command to obtain the *Equipage and Version Report* and verify that the new circuit pack and FEPL optical module (if equipped) is recognized by the system.

....

11   Use the `rtrv-alm` (`rtrv-alm`) command to obtain the *Active Alarms and Status Report*.

....

12   Are there any alarms listed for the newly installed circuit pack?

If...	Then...
Yes	Proceed to the appropriate task to clear the alarm.
No	Continue with Step 13.

....

13   Do you wish to change any circuit pack and/or port parameters?

If...	Then...
Yes	Refer to the appropriate task in Chapter 3, "User operations tasks".
No	STOP! END OF TASK.

....

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E N D   O F   S T E P S
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Lucent Technologies

Replace FEPL optical module

....

Overview   Use this task to replace an FEPL optical module in a circuit pack.

Required equipment   Use only the following Lucent Approved Class 1 SFP transceivers.

Apparatus Code/Comcode	Description
100Base-LX-I1 109527812	Optical Fast Ethernet TRCVR, Intermediate Reach

Before you begin   Prior to performing this task:

1.   Connect the CIT and establish a session with the network element. Refer to the *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285.*

2.   Refer to "Laser safety" (1-7) and "Electrostatic discharge" (1-13) information in Chapter 1, "Safety".

3.   Ensure that the correct FEPL optical module is available for replacement.

4.   Obtain work instructions for this task.

Task   Complete the following steps to replace an FEPL optical module.
....

1   Remove the optical cables from the required FEPL optical module.

....

2   **Important!** It is recommended that process plugs be installed into the optical ports on the FEPL optical modules to maintain cleanliness until the optical fiber is connected.

Install process plugs into the optical ports on the FEPL optical module to maintain cleanliness.

....

3   To remove the FEPL optical module from the circuit pack, slide the metal loop on the end of the module to the left. Using the metal loop, pull the module out to remove it from the socket. Install a dust cover on the unequipped socket.

....

....

4 Ensure all optical fiber connectors and couplings are properly cleaned.

> **Important!** Signal performance may be degraded if the connections and couplings are not cleaned properly.

> **Reference:** "Clean optical fibers, dual LC adapters and LC lightguide buildouts (LBOs)" (3-11)

....

5 **Important!** FEPL optical modules are shipped with a water-tight process plug installed into the optical ports to maintain cleanliness during storage and/or transportation. It is recommended that the process plug be kept in place to maintain cleanliness until the optical fiber is connected. With proper care and handling, cleaning the FEPL optical modules should not be necessary.

If required, clean the replacement FEPL optical module.

> **Reference:** "Clean pluggable optics module" (3-17)

....

6 Remove the water-tight process plug from the replacement FEPL optical module and orient/line up the FEPL optical module with the required socket on the circuit pack faceplate (do not insert FEPL optical module). Then replace the water-tight process plug.

....

7 Insert the replacement FEPL optical module in the required socket of the circuit pack faceplate, then wiggle the FEPL optical module to verify that it is locked in the socket.

....

8 Reconnect the optical cables.

....

9 Use the `rtrv-eqpt` (`rtrv-eqpt`) command to obtain the *Equipage and Version Report* and verify that the new FEPL optical module is recognized by the system.

....

10 Use the `rtrv-alm` (rtrv-alm) command to obtain the *Active Alarms and Status Report*.

....

....

11 Are there any alarms associated with the newly installed FEPL optical module?

If...	Then...
Yes	Proceed to the appropriate task to clear the alarm.
No	Continue with Step 12.

....

12 Do you wish to change any port parameters?

If...	Then...
Yes	Refer to the appropriate task in Chapter 3, "User operations tasks".
No	STOP! END OF TASK.

E N D   O F   S T E P S
....

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5   Command details

Overview

Purpose   This chapter contains all the Craft Interface Terminal (CIT) and Transaction Language 1 (TL1) command details for new and changed commands used with the DDM-2000 OC-3 Multiplexer Ethernet feature.

This chapter is divided into the following two sections:

- CIT Commands - This section lists software commands that are entered at the local CIT terminal on the DDM-2000 shelf. Users must be logged into the local DDM-2000 or remotely logged into another DDM-2000 on the same data communication channel (DCC) to execute these commands.

- TL1 commands - This section lists software commands that can be entered via a TL1/X.25 or TCP/IP interface on the DDM-2000 shelf, which is used to report alarms, status conditions, and performance-monitoring data to a remote operations system (OS). This interface also handles provisioning, security and other tasks, and is the functional equivalent to the CIT interface.

This chapter is meant to complement CIT command information found in *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*, and TL1 command information found in *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*.

Refer to these documents for additional commands available for the DDM-2000 OC-3 Multiplexer.

Contents

CIT command details

Overview of CIT commands

Purpose   This section provides the new and/or updated CIT commands. Commands that are not significantly updated are not reproduced in their entirety in this document. Additional denial/error messages are included in Table 5-1, "New and updated CIT commands" (5-4) with a reference to the original document.

New and updated commands

Table 5-1   New and updated CIT commands

CIT Command	Details	Reference
APPLY	Additional denial message. The command will be denied if IMA LAN software is copied	*DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*
CNVT-CRS	An attempt to convert a cross-connection to a VCG port of a BBG23 FEPL circuit pack will be denied. The denial message is: SNVS /* Status, Not in Valid State */ /* Cross connect cannot be converted. */	*DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*
CPY-PROG	Additional denial message. Command will be denied if IMA LAN software is copied	*DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*
DLT-CRS-STS1	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"DLT-CRS-STS1" (5-7)
DLT-CRS-STS3c	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"DLT-CRS-STS3C" (5-12)

Table 5-1   New and updated CIT commands   (continued)

CIT Command	Details	Reference
`DLT-CRS-VT1`	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"DLT-CRS-VT1" (5-15)
`INS-PROG`	Additional denial message. Command will be denied if IMA LAN software is copied.	*DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*
`OPR-LPBK-FE`	New command for R15.3.1	"OPR-LPBK-FE" (5-60)
`RTRV-ALM`	New alarms added for Ethernet include the following: • `inc. FE-LAN ANM/inc. FELAN ANM clrd` • `inc. FE-LAN LOS/inc. FELAN LOS clrd` • `FEPL Optical Module removed/FEPL Optical Module removed clrd` • `FEPL Optical Module failed/FEPL Optical Module failed clrd` • `FEPL CP failed/FEPL CP failed clrd` • `inc. STS-1 LOM/inc. STS-1 LOM clrd` • `inc. STS-1 SQM/inc. STS-1 SQM clrd` • `inc. VCG failed/inc. VCG failed clrd` • `inc. VCG LFD/inc. VCG LFD clrd` • `inc. VCG LOA/inc. VCG LOA clrd` • `inc. VT1 LOM/inc. VT1 LOM clrd` • `inc. VT1 SQM/inc. VT1 SQM clrd`	Chapter 4, "Alarm messages and trouble clearing tasks" and *DDM-2000 OC-3 Multiplexer TARP Release 13 and Later User/Service Manual (TOP), 363-206-285*
`RTRV-FELAN`	New command for R15.3.1	"RTRV-FELAN" (5-80)

Table 5-1   New and updated CIT commands   (continued)

CIT Command	Details	Reference
RLS-LPBK-FE	New command for R15.3.1	"RLS-LPBK-FE" (5-62)
RTRV-CRS-STS1	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RTRV-CRS-STS1" (5-64)
RTRV-CRS-STS3c	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RTRV-CRS-STS3c" (5-68)
RTRV-CRS-VT1	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RTRV-CRS-VT1" (5-71)
RTRV-EQPT	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RTRV-EQPT" (5-75)
RTRV-PM-FEPL	New command for R15.3.1	"RTRV-PM-FEPL" (5-83)
RTRV-STATE-EQPT	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RTRV-STATE-EQPT" (5-86)
RTRV-VCG	New command for R15.3.1	"RTRV-VCG" (5-98)
SET-FELAN	New command for R15.3.1	"SET-FELAN" (5-101)
SET-VCG	New command for R15.3.1	"SET-VCG" (5-105)

DLT-CRS-STS1

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.

The input parameters are:

Table 5-2   `DLT-CRS-STS1` **Input Parameters**

Parameter	Description
Address1 and Address2	These are the addresses of the two STS-1 channels, or one STS-1 channel and one DS3/EC-1/OC-3 port DS3/EC-1/OC-3/MXRVO/ TMUX (in Release 13.0) port or OC-1 line DS3 port (in Release 3.1 and later) 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*.
	Valid OC-3 STS-1 Addresses:
	`{m,c}-{1-3}, {a,b,c}-{a,b}-{1-2}`
	If the shelf is equipped with 24-type OLIUs in its Main units, the valid STS-1 Addresses are:
	`m-{1-12}, c{1-3}, {a,b,c}, {a,b}-{1-2}`
	If the shelf is equipped with 29-type OLIUs in its Main units, the valid STS-1 Addresses are:
	`m-{1-12}, c-{1-3}, {a,b,c,} {a,b}-{1,2}`
	If Function Unit slot C contains an FEPL (BBG23) circuit pack, the valid Function Unit Addresses for that slot are:
	`c-{1,2,3,4,5}-{1,2,3}`
	If Function Unit slots A and/or B contain an FEPL (BBG23) circuit pack, the valid Function Unit Addresses for those slots are:
	`{a,b}-{1,2,3,4,5}-{1,2}`

Table 5-2 DLT-CRS-STS1 **Input Parameters   (continued)**

Parameter	Description
cct	CrsType specifies the cross-connection type. This parameter is available with all OC-3 ring releases. The valid values are:
	• twoway - Two-way (default) cross-connections apply to terminating, hubbing, add/drop, and pass-through, hairpin, 0x1 DS3 and 0x1 ring configurations. This is the default value. In 0x1 ring configurations, two-way cross-connections support dual- and single-homed OC-1 and, beginning with Release 15.0, OC-3 ring applications. For more information, refer to ent-crs-sts1 command documentation. NOTE: For 24G-U OLIU circuit packs, STS-1 pass-through cross-connections will be deleted *only* if the STS-1 contains STS-1 AIS in both directions. Adjacent shelves should have idle set to ais (via the set-necommand) to insure AIS is inserted on STS-1 channels that are not cross-connected.
	• dc - Drop and continue connections support dual ring applications. Drop and continue connections are only allowed if the function unit address is equipped with the STS1E or 22-type OLIU low-speed circuit packs. Drop and continue connections are not allowed if the function unit address is equipped with the FEPL circuit pack.
	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.

ERROR RESPONSES *Address1, Address 2*, and *CrsType* must match an existing STS-1 cross-connection or execution of the command will complete with the following message:

SNVS

/* Status, Not in Valid State*/

/* The specified STS-1 cross-connection does not exist.*/

In linear systems, if the cross-connect mode is set to default (crs=*default*), as provisioned by the set-ne command, this command will be denied with the following message:

```
SNVS

/* Status, Not in Valid State*/

/* System provisioned for default cross-connections by the
CrsMode parameter in the set-ne command. */
```

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

rtrv-ne

set-ne

□

DLT-CRS-STS3C

....

NAME   DLT-CRS-STS3C: Delete Cross-Connection STS-3c

INPUT FORMAT   DLT-CRS-STS3C:*Address1, Address2* [:cct=*CrsType*];

DESCRIPTION   CAUTION: Execution of this command may affect service.

This command deletes STS-3c cross-connections. STS-3c signals are identified by the first STS-1 address in the STS-3c signal. The following chart shows the mapping for STS-3c addresses to the internal STS-1 signal structure:

Table 5-3   STS-3c Mapping

Interface	Address	Internal STS-1 #s
Main	m-1	1,2,3
	m-4	4,5,6
	m-7	7,8,9
	m-10	10,11,12
FN-C	c-1	1,2,3 (29-type in Main)
FN-C	c-{1,2,3,4,5}-1	1,2,3 (BBG23 in FN-C)

This command is available with OC-12 ring releases. This command can be used in an OC-3 shelf if it is equipped with 24-type OLIU circuit packs in its Main unit slots. The only valid cross-connect type for this equipage is Twoway for pass-through cross-connections. Starting with OC-3 Release 15.0, if the shelf is equipped with 29-type OLIU circuit packs in its Main unit slots, the valid cross-connect type

....

is `Twoway`, which supports pass-through or add-drop for 0X1 (depending on the shelf's equipage).

Table 5-4   `DLT-CRC-STS3C` **Input Parameters**

Parameter	Description
Address1 and Address2	These are the addresses of the two STS-3c channels that are to be deleted.
	Valid connections are listed below. Where items appear in braces {}, any one (and only one) of these items may be used to form the address.
	`m-{1,4,7,10} to m-{1,4,7,10}`
	Allowed if the OC-3 shelf is equipped with 24-type or 29-type OLIU circuit packs in its Main unit slots.
	`m-{1,4,7,10} to c-1`
	Allowed with 29G-U in Main and 22-type in function slots.
	`m-{1,4,7,10} to c-{1,2,3,4,5}-1`
	Allowed with 29G-U in Main and FEPL (BBG23) circuit pack in Function Unit slot C.
	`m-1 to C-{1-5}-1`
	For pass through signals, Address1 and Address2 must be the identical time slot.
cct	CrsType specifies whether the cross-connection is two-way. The valid value is:
	`twoway` - Two-way applies to add-drop (in OC-3 applicable to 0X1 application only) and pass through cross-connections. Twoway is the default value.
	The *cct* parameter is an optional parameter if the cross-connection type to be deleted is `twoway`.

ERROR RESPONSES

Address1, Address 2, and *CrsType* must match an existing STS-3c cross-connection or execution of the command will complete with the following message:

```
SNVS

/* Status, Not in Valid State*/

/* The specified STS-3 cross-connection does not exist.*/
```

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. */
```

After entering this command, the following confirmation message is displayed:

```
/* Caution! Execution of this command may affect service.
You have selected the dlt-crs-sts3c command with these
parameters:

Address1 = address

Address2 = address

CrsType = value */

Execute? (y/n or CANcel/DELete to quit) =
```

RELATED COMMANDS

ent-crs-sts3c

rtrv-crs-sts3c

☐

DLT-CRS-VT1

....

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 OC-3 system.

The input parameters are:

Table 5-5   `DLT-CRS-VT1` **Input Parameters**

Parameter	Description

Address1 and Address2	These are the addresses of the two VT1.5 channels, or one VT1.5 channel and one DS1 or ″internal″ DS1 (within the BBG20 TMUX circuit pack in OC-3 Release 13.0 and later) 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 Linear Addresses:
	`{m,c}-{1-3,all}-{1-7,all}-{1-4,all}`,
	`{a,b}-{1-2}-(1-7,all}-{1-4,all}`,
	`{a,b,c}-{1-7,all}-{1-4,all}`
	
	Valid Ring Addresses:
	`m-{1-3,all},{1-7,all},{1-4,all}`
	`{a,b,c}-{1-7,all}-(1-4,all}`,
	`a-{1,2,all}-{1-7,all}-{1-4,all}`,
	`b-{1,2,all}-{1-7,all}-{1-4,all}`,
	`c-{1-3,all}-{1-7,all}-{1-4,all}`

....

Table 5-5 `DLT-CRS-VT1` **Input Parameters (continued)**

Parameter	Description
Address1 and Address2 (continued)	The T1EXT (BBF6) circuit pack (OC-3 Release 15.0) 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 shelf is equipped with 24-type or 29-type OLIUs in Main unit slots, valid OC-12 Main unit Addresses are: `m-{1-12}-{1-7,all}-{1-4,all}`
	If the shelf is equipped with BBG23 FEPL circuit packs in function slots A and/or B, valid addresses for those slots are:
	`{a,b}-{1,2,3,4,5}-{1-56}`
	If the shelf is equipped with BBG23 FEPL circuit packs in function slot C, valid addresses for that slot are:
	`c-{1,2,3,4,5}-{1-63}`

Table 5-5   DLT-CRS-VT1 **Input Parameters   (continued)**

Parameter	Description
cct	CrsType specifies the cross-connection type. The valid values are:
	twoway - Two-way cross-connections apply to add/drop, hairpin, and 0x1 ring configurations, add/drop and pass-through cross-connections only. Two-way is the default value.
	dc - Drop and continue connections support dual ring applications. Not allowed if the function unit address is equipped with the FEPL (BBG23) circuit pack.
	locked - Locked cross-connections support nonpath-switched DS1 or T1 drop applications. Not allowed if the function unit address is equipped with the FEPL (BBG23) circuit pack. Locked cross-connections are only allowed if the function unit address is equipped with the MXRVO or BBG20 TMUX (in Release 13.0 and later) interface.
	If the address includes the value *all*, the value for *cct* applies to every cross-connection within the range of the addresses.

ERROR RESPONSES   *Address1, Address 2*, and *CrsType* 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 cannot be deleted.*/

In linear systems, if the cross-connect mode is set to default (crs= *default)* as provisioned by the set-ne command, this command will be denied with the following message:

SNVS

/* Status, Not in Valid State*/

```
/* System provisioned for default cross-connections by the
CrsMode parameter in the set-ne command. */
```

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
```

If *CrsType* is used and the command is entered with one or more addresses that cannot be processed or an address 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

...*/
```

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:

```
/* Status, Not in Valid State */

/* Both main slots must be equipped with compatible OLIU
packs. */
```

After entering this command, the following confirmation message is displayed:

....

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/* 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) =

RELATED COMMANDS   ent-crs-vt1

rtrv-crs-vt1

rtrv-ne

set-ne

ENT-CRS-STS1

....

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 and function unit slots and may be applied to OC-3 systems with various arrangements, including hubbing, add/drop, terminating STS-1, and rings.

All cross-connections require the presence of OLIU circuit packs in the Main slots. In ring applications, 22-type, 24-type, 29-type or 27-type OLIU circuit packs must be present in order to establish STS-1 cross-connections. The 27-type OLIU is available in OC-3 Release 9.0 and later ring releases. The 24-type OLIU is available in OC-3 Release 11.0 and later ring releases for Main units only.

The 29-type OLIU is available in OC-3 Release 15.0 and later ring releases for Main units only.

The 27G2-U or 26G2-U OLIU circuit packs are required in order to establish OC-1 pass-through cross-connections within a function unit and OC-1 0x1 cross-connections between function units and OC-1 hairpin local drop cross-connections (in Release 11.0 and later) and 26G2-U OLIU hairpin support (in Release 13.0 and later).

In linear applications, 22-type, 21G, or 21D OLIU circuit packs may be used to establish STS-1 cross-connections. Additionally, in linear applications, cross-connections may only be entered if *crs=manual*, as set by the set-ne command.

The 24G-U OC-12 interface circuit pack will allow up to three STS-1s to be STS or VT cross-connected. The remaining STS-1 channels (if any) will have to continue as STS-1 ring pass-through cross-connects, otherwise the request will be denied as specified later in this document.

Any of the 12 STS-1s on the OC-12 (29G-U) interface circuit pack can be selected for STS-1 cross-connection to Function Units or Pass-Through STS-1 cross-connections.

Up to 7 STS-1 channels can be cross-connected on the OC-12 ring.

The input parameters are:

....

Table 5-6 ENT-CRS-STS1 **Input Parameters**

Parameter	Description
Address1 and Address2	These are the addresses of the two STS-1 channels or one STS-1 channel and one DS3/EC-1/OC-3/OC-1/MXRVO or TMUX (in Release 13.0 and later). For STS-1 ring pass-through traffic, *Address1 and Address2*must be the same time slot. Valid addresses are listed on the following pages.
cct	CrsType specifies the cross-connection type. The valid values are: twoway - Twoway cross-connections apply to terminating, hubbing, add/drop, pass-through, hairpin, 0x1 DS3 configurations and 0x1 ring Twoway is the default value. The 0x1 ring configurations support both dual and single homed OC-1 and, beginning with Release 15.0, OC-3 applications. Starting with Release 9.1, 0x1 ring configurations include main-to-function unit, and function unit-to-function unit interconnections. See the following pages for detailed listings of allowed equipage combinations and corresponding valid addresses. Also starting with Release 9.1, pass-through cross-connections within function units equipped with 27G2-U OLIUs may be established. Starting with Release 11.0, hairpin local drop cross-connections may be used to drop path-protected traffic from an OC-1 ring terminating on a pair of 27G2-U OLIU circuit packs in a function unit to DS1 ports or to STS-1 channels on an OC-3/IS-3 or STS1E facility. The pair of 27G2-U OLIUs in a single function unit can support a mix of hairpin local drop cross-connections and main-to-FN 0x1 or FN-to-FN 0x1 cross-connections.

Table 5-6 ENT-CRS-STS1 **Input Parameters (continued)**

Parameter	Description
cct (cont)	Starting with Release 13.0, hairpin local drop cross-connections may be used to drop path-protected traffic from an OC-1 ring terminating on a pair of 26G2-U OLIU circuit packs in a function unit slot to DS1 ports in a different function unit or to STS-1 channels on an OC-3/IS-3 or STS1E facility.
	Also, starting with OC-3 Release 13.0, a two-way STS-1 hairpin cross-connect is available between a function unit with a linear OC-3 interface or EC-1 port and another function unit with an EC-1/DS3 or OC-3 linear port.
	A 0x1 DS3 cross-connection is established when the addressed function unit contains one or two BBG19 circuit packs. In this case, the addressed STS-1 channel received by the OLIU in Main-1 is connected to the DS3 port in slot 1 of the addressed function unit and the addressed STS-1 received by the OLIU in Main-2 is connected to the DS3 port in slot 2 of the addressed function unit. One of the function slots may be unequipped. Also starting with OC-3 Release 15.0 and when using 22-type OLIUs in Fn slots, if a 0X1 application is desired, this requires provisioning the OC-3 interface(s) with 0X1 application type using the set-oc3command.

Table 5-6   `ENT-CRS-STS1` **Input Parameters   (continued)**

Parameter	Description
cct (cont)	`dc` - Drop and continue cross-connections support dual ring interworking applications. Drop and continue connections are only allowed if the function unit address is equipped with the STS1E or 22-type OLIU low-speed circuit packs. is equipped with the 3STS1E, 21-type OLIU or 3DS3 circuit packs. Drop and continue connections are not allowed if the function unit address is equipped with the FEPL circuit pack.
	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 CrsType is not `locked`or `dc`, the RingId is not requested and is not displayed in confirmation messages. If the CrsType is not `locked` or `dc`, and RingId is entered, the system will ignore any value entered for RingId.
ring	This parameter is available with all ring releases. RingId is the ring identification for drop and continue or locked connections.
	For `dc` type connections, it specifies which ring rotation will be continued as well as dropped at this network element. 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.
	The *ring* parameter is not allowed if the function unit address is equipped with the FEPL circuit pack.

In linear releases, shelves may be placed into the default or manual cross-connect mode using the `set-ne` command. If no cross-connect mode is specified, each shelf will be in default mode, which provides a fixed mapping between STS-1 signals embedded in the OC-3 line signal and the STS-1s associated with signals terminating on the shelf. When the manual cross-connect mode is selected, the cross-connect map may be changed by the user. All cross-connections must be entered by the user with this `ent-crs-sts1` command.

In linear releases, shelves may be placed into the default or manual cross-connect mode using the `set-ne` command. If no cross-connect mode is specified, each shelf will be in default mode, which provides a fixed mapping between STS-1 signals embedded in the OC-3 line signal and the STS-1s associated with signals terminating on the shelf. When the manual cross-connect mode is selected, the cross-connect map may be changed by the user. All cross-connections must be entered by the user with this `ent-crs-sts1` command.

Valid default and manual cross-connection addresses are listed on the following pages. To successfully perform any cross-connection, the user must equip the Main slots with 22-type, 21D, 21G, or 27-type OLIU circuit packs. For additional examples and restrictions on cross-connections, refer to the ″Cross-Connection Provisioning″ information located in Chapter 8.

Default Linear Release Cross-Connect Addresses

`m-1 to a`	Default when function group A is equipped with DS3, STS1E, or MXRVO circuit packs
`m-2 to b`	Default when function group B is equipped with DS3, STS1E, or MXRVO circuit packs
`m-3 to c`	Default when function group C is equipped with DS3, STS1E, or MXRVO circuit packs
`m-1 to a-1`	Default when function group A is equipped with OLIU circuit packs
`m-2 to b-2`	Default when function group B is equipped with OLIU circuit packs

m-3 to c-3	Default when function group C is equipped with OLIU circuit packs

For DDM-2000 OC-3, manual cross-connections may be entered if the cross-connect mode is set to manual *crs=manual*, as provisioned by the set-ne command. 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.

Manual Linear Release Cross-Connect Addresses

m-{1-3} to {a,b,c}	Allowed when function groups A and/or B and/or C are equipped with DS3, STS1E, or MXRVO circuit packs
{a,b} to c-{1-3}	Allowed when function groups A and/or B are equipped with DS3, STS1E, or MXRVO and when function group C is equipped with OLIU circuit packs.
m-{1-3} to {a,b}-{1,2}	Allowed when function groups A and/or B are equipped with OLIU circuit packs
{a,b}-{1,2} to c-{1-3}	Allowed when function groups A or B and C are equipped with OLIU circuit packs. No more than 1 STS-1 channel may be routed between function groups A and C, and no more than 1 STS-1 channel may be routed between function groups B and C.
m-{1-3} to c-{1-3}	Allowed when function group C is equipped with OLIU circuit packs

In DDM-2000 OC-3 ring releases and FiberReach 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 {a,b,c}	Allowed when Main slots are equipped with 22-type OLIU circuit packs, and function groups A and/or B and/or C are equipped with DS3 (BBG4, BBG4B, and BBG19), STS1E, MXRVO, or TMUX circuit packs
m-{1,2} to {a,b,c}	Allowed when Main slots are equipped with 27-type OLIU circuit packs, and function groups A and/or B and/or C are equipped with DS3 (BBG4, BBG4B, and BBG19), STS1E, MXRVO, or TMUX circuit packs
m-{1-12} to {a,b,c}	Allowed when Main slots are equipped with 24-type or 29-type OLIU circuit packs, and function groups A and/or B and/or C are equipped with DS3 (BBG4, BBG4B, and BBG19), STS1E, MXRVO, or TMUX circuit packs
m-{1-12} to {a,b}-{1,2,3,4,5}-{1,2}	Allowed when Main slots are equipped with 24-type or 29-type OLIU circuit packs, and function groups A and/or B are equipped with FEPL (BBG23) circuit packs
m-{1-12} to c-{1,2,3,4,5}-{1,2,3}	Allowed when Main slots are equipped with 24-type or 29-type OLIU circuit packs, and function group C is equipped with an FEPL (BBG23) circuit pack

m-{1-3} to {a,b}-{1,2,3,4,5}-{1-2}	Allowed when Main slots are equipped with 22-type OLIU circuit packs, and function groups A and/or B are equipped with FEPL (BBG23) circuit packs
m-{1-3} to c-{1,2,3,4,5}-{1,2,3}	Allowed when Main slots are equipped with 22-type OLIU circuit packs, and function group C is equipped with FEPL (BBG23) circuit
m-{1-3} to a-{1,2}	For rings Release 9.0 and later, allowed when Main slots are equipped with 22-type OLIU circuit packs, and function group A is equipped with 22-type circuit packs
m-{1-3} to b-{1,2}	Allowed when Main slots are equipped with 22-type OLIU circuit packs, and function group B is equipped with 22-type circuit packs
m-{1-12} to {a,b}-{1,2}	Allowed when Main slots are equipped with 24-type OLIU circuit packs, and function groups A and/or B are equipped with 22-type circuit packs
m-{1-12} to c-{1-3}	Allowed when Main slots are equipped with 24-type OLIU circuit packs, and function group C is equipped with 22-type circuit packs

Ring Release Cross-Connect Addresses (Continued)

m-{1-12} to {a,b}-{1,2}	Allowed when Main slots are equipped with 29-type OLIU circuit packs, and function groups A and/or B are equipped with 22-type circuit packs (Group 4 shelves or earlier)
m-{1-3} to c-{1-3}	Allowed when Main slots are equipped with 22-type circuit packs, and function group C is equipped with 22-type circuit packs
m-{1-3} to m-{1-3}	Allowed to cross-connect pass-through signals when Main slots are equipped with 22-type circuit packs. *Address1* and *Address2* must be the identical time slot.
m-{1,2} to {m- [1,2}	Allowed to cross-connect pass-through signals when Main slots are equipped with 27-type OLIU circuit packs. *Address1* and *Address2* must be the identical time slot.
{a,b,c}-{1,2} to {a,b,c}-{1,2}	Allowed to cross-connect pass-through signals when function unit slots are equipped with 27G2-U OLIU circuit packs. *Address1* and *Address2* must be the identical time slot.
m-{1,12}to m-{1,12}	Allowed to cross-connect pass-through signals when Main slots are equipped with 24-type or 29-type OLIU circuit packs. *Address1* and *Address2* must be the identical time slot.

Ring Release Cross-Connect Addresses (Continued)

`m-{1-3} to {a,b,c}-{1,2}`	Allowed when Main slots are equipped with 22-type circuit packs, and function groups A and/or B and/or C are equipped with 27-type OLIU circuit packs.
`m-{1-12} to {a,b,c}-{1,2}`	Allowed when Main slots are equipped with 24-type or 29-type OLIU circuit packs, and function groups A and/or B and/or C are equipped with 27-type OLIU circuit packs.
`m-{1,2} to {a,b,c}-{1,2}`	Allowed when Main slots are equipped with 27-type OLIU circuit packs, and function groups A and/or B and/or C are equipped with 27-type OLIU circuit packs.
`m-{1-3}to {a,b,c}-1`	Allowed when Main slots are equipped with 22-type circuit packs, and function groups A and/or B and/or C are equipped with 26-type OLIU circuit packs. .
`m-{1-12}to {a,b,c}-1`	Allowed when Main slots are equipped with 24-type or 29-type OLIU circuit packs, and function groups A and/or B and/or C are equipped with 26-type OLIU circuit packs
`m-{1,2} to {a,b,c}-1`	Allowed when Main slots are equipped with 27-type OLIU circuit packs, and function groups A and/or B and/or C are equipped with 26-type OLIU circuit packs.

m-{1,2} to {a,b}-{1,2}	Allowed when Main slots are equipped with 27-type OLIU circuit packs, and function groups A and/or B are equipped with 22-type OLIU circuit packs.
m-{1,2}to c-{1-3}	Allowed when Main slots are equipped with 27-type OLIU circuit packs, and function group C is equipped with 22-type OLIU circuit packs.
{a,b}-{1,2} to c-{1,2}	Allowed when both addressed function unit slots are equipped with 27G2-U OLIU circuit packs. In this situation, a function unit to function unit OC-1 0x1 cross-connection is established.
{a,b}-{1,2}to c-{1-3}	Starting with Release 11.0, allowed when the addressed low-speed port in function groups A or B is equipped with 27G2-U OLIU circuit packs and when function group C is equipped with 22-type OLIU circuit packs.
{a,b}-{1,2}to c-{1,2}	Starting with Release 11.0, allowed when the addressed low-speed port in function groups A or B is equipped with 22-type OLIU circuit packs and when function group C is equipped with 27G2-U OLIU circuit packs.

Ring Release Cross-Connect Addresses (Continued)

{a,b}-{1,2} to c	Starting with Release 11.0, allowed when the addressed low-speed port in function groups A or B is equipped with 27G2-U OLIU circuit packs and when function group C is equipped with MXRVO, TMUX (in release 13.0), or STS1E low-speed circuit packs.
{a,b} to c-{1,2}	Starting with Release 11.0, allowed when the addressed low-speed port in function groups A or B are equipped with MXRVO, TMUX (in release 13.0), or STS1E low-speed circuit packs and when function group C is equipped with 27G2-U OLIU circuit packs.
{a,b}-1 to c-{1-3}	Starting with Release 13.0, allowed when the addressed low-speed port in function groups A or B is equipped with 26G2-U OLIU circuit packs and when function group C is equipped with 22-type OLIU circuit packs.
{a,b}-{1,2} to c-1	Starting with Release 13.0, allowed when the addressed low-speed port in function groups A or B are equipped with 22-type OLIU circuit packs and when function group C is equipped with 26G2-U OLIU circuit packs.

`{a,b}-1 to c`	Starting with Release 13.0, allowed when the addressed low-speed port in function groups A or B is equipped with 26G2-U OLIU circuit packs and when function group C is equipped with MXRVO, TMUX, or STS1E low-speed circuit packs.
`{a,b} to c-1`	Starting with Release 13.0, allowed when the addressed low-speed port in function groups A or B are equipped with MXRVO, TMUX, or STS1E low-speed circuit packs and when function group C is equipped with 26G2-U OLIU circuit packs.
`{a,b} to c-{1-3}`	Starting with Release 13.0 allowed when function groups A and/or B are equipped with DS3, STS1E, and when function group C is equipped with 22-type OLIU circuit packs. {a,b}to c Starting with Release 13.0 allowed when function groups A and/or B are equipped with DS3, STS1E, and when function group C is equipped with STS1E circuit packs. .
`{a,b}-{1,2} to c-{1-3}`	Starting with Release 13.0 allowed when function groups A or B and C are equipped with 22-type OLIU circuit packs. No more than 1 STS-1 channel may be routed between function groups A and C, and no more than 1 STS-1 channel may be routed between function groups B and C.

{a,b}-{1,2} to c	Starting with Release 13.0 allowed when function groups A or B are equipped with 22-type OLIU circuit packs and function group C is equipped with DS3 or STS1E circuit packs

ERROR RESPONSES

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. */

When using 29-type OLIUs in Main and 22-type OLIUs in Fn slots, if a 0X1 application is desired, this requires provisioning the OC-3 interface(s) with 0X1 application type using the set-oc3 command.

If this command is invoked using addresses where active STS-3c cross-connections or active STS-1 cross-connections within the STS-3c address 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 cross-connection request is to an STS1E low-speed interface, the EC-1 port state cannot be set to NMON or the following denial message will be displayed:

```
SNVS

/* Status, Not in Valid State */

/*EC-1 port is in NMON state */
```

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. */
```

Starting with Release 11.0, 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 */
```

Starting with Release 13.0, 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 or 26G2-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 or 26G2-U OLIU circuit packs. */
```

In DDM-2000 OC-3 R15.3, if the VT1.5 cross-connect command is issued to a FEPL Ethernet port that already has an existing STS-1 or STS-3c cross-connect, the following denial message will be displayed:

```
/* Status, Already Cross Connected */
```

If more than 63 VT1.5 are cross-connected to an FEPL Ethernet port in FN slot C, or more than 56 VT1.5 are cross-connected to an FEPL Ethernet port in FN slot A or B, the following error message will be returned:

```
/* cross-connect capacity is not available */
```

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 */
```

In linear systems, if the cross-connect mode is set to default *crs=default*, as provisioned by the set-ne command, this command will be denied with the following message:

```
SNVS

/* Status, Not in Valid State */

/* System provisioned for default cross-connections by the
CrsMode parameter in the set-ne command
```

If the maximum number of STS-1s (3) has already been reached when the user attempts to provision an additional STS-1 cross-connect to be dropped; which would exceed the allowed STS-1 bandwidth, the request will be denied and the following denial message displayed:

```
SNVS

/* Status, Not in Valid State */

/* Cross connect capacity is not available
```

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 */
```

Service may be lost when a tributary is added to a VCG of a BBG23 FEPL circuit pack until end-to-end provisioning of a VCG is complete

....

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After entering this command, the following confirmation message is displayed. The *RingId* parameter is displayed in the confirmation message only if the *CrsType* parameter is set to dc or locked.

```
/* Caution! Network cross-connections are affected by this
command. You have selected the ent-crs-sts1 command with
these parameters:

Address1 = address

Address2 = address

CrsType = value

RingId = value */

Execute? (y/n or CANcel/DELete to quit) =
```

RELATED COMMANDS   dlt-crs-sts1

rtrv-crs-sts1

rtrv-ne

set-ne

☐

ENT-CRS-STS3C

....

NAME   `ENT-CRS-STS3C`: Enter Cross-Connection STS-3c

INPUT FORMAT `ENT-CRS-STS3C:`*Address1, Address2*`:[:cct=`*CrsType*`]`;

DESCRIPTION   This command sets bidirectional STS-3c cross-connections between main-1 and main-2 (using the 24-type or 29-type OLIU circuit packs), or between main and function unit slots (using the 29-type OLIUs in main unit slots and 22-type OLIUs in the function unit slots) to support the STS-3c 0X1 application.

In linear OC-3 releases, the STS-3c cross-connection is an optional feature that requires a special license from Lucent Technologies. This feature must first be enabled via the `set-feat`command before the cross-connection request takes place.

This command can be used in an OC-3 shelf ONLY if the shelf is equipped with 24-type or 29-type OLIU circuit packs in its Main units. The only allowed cross-connect type is *Twoway*.

This command can be used in an OC-3 shelf ONLY if the shelf is equipped with 24-type or 29-type OLIU circuit packs in its Main units. The only allowed cross-connect type is *Twoway*.

When using the 24-type OLIU in Main, the only *Twoway* cross-connect allowed is Pass-Through. When using the 29-type OLIU in Main, the only *Twoway* cross-connects allowed are Pass-Through and Add-Drop (for 0X1). All other cross-connect types are not valid at this time.

Special licensing is not required for STS-3c cross-connects in OC-3 ring shelves that are equipped with 24G-U or 29-type OLIUs in their Main unit slots.

The STS-3c signals are identified (addressed) by using the first STS-1 address contained in each STS-3c signal. The following chart shows the mapping of STS-3c addresses to the internal STS-1 structure:

Table 5-7   STS-3c Mapping

Interface	Address	Internal STS-1 #s

....

Table 5-7   STS-3c Mapping   (continued)

Main	m-1	1,2,3
	m-4	4,5,6
	m-7	7,8,9
	m-10	10,11,12
FN-C	c-1	1,2,3 (29-type in Main)
FN-C	c-{1,2,3,4,5}-1	1,2,3 (BBG23 in FN-C)

The input parameters are:

Table 5-8   ENT-CRS-STS3C Input Parameters

Parameter	Description
Address1 and Address2	These are the addresses of the two STS-3c channels that are to be cross-connected
	Valid manual cross-connections are listed below. When items appear in braces {}, any one (and only one) of these items may be used to form the address.
	`m- {1,4,7,10} to m-{1,4,7,10}`
	Allowed to cross-connect Twoway (pass-through) signals if the OC-3 shelf is equipped with 24-type or 29-type OLIU circuit packs in its Main unit slots. Address1 and Address2 must be the identical time-slot.
	`m-{1,4,7,10} to c-1`
	(Group 4 shelf or earlier, with 29G-U in Main). Allowed for STS-3c OX1 application only.
	`m-{1,4,7,10} to c-{1,2,3,4,5}-1`
	(Group 4 shelf or earlier, with 29G-U in Main). Allowed if an FEPL (BBG23) circuit pack is in function slot C.

Table 5-8   `ENT-CRS-STS3C` **Input Parameters   (continued)**

Parameter	Description
cct	CrsType specifies the cross-connection type. The only valid value is: `twoway` - Two-way cross-connections apply to add-drop (for 0X1 applications, using the 28G-U or 29G-U OLIU in Main and 22-type OLIU in Function) and pass through cross-connections, using the 29-type OLIUs in Main. Twoway is the default value.

ERROR RESPONSES   Starting with OC-3 Release 15.0, if this command is issued with a *cct* parameter equal to *twoway* for add-drop (Address1 is different from Address2), and if the application parameter in the `set-oc3` command is set to 1 + 1: The following denial message will be displayed.

```
SNVS

/* Status, Not in Valid State*/

/* Invalid cross-connection request. */
```

When using 29-type OLIUs in Main and 22-type OLIUs in Fn slots, if a 0X1 application is desired, this requires provisioning the OC-3 interface(s) with 0X1 application type using the `set-oc3` command.

If this command is invoked using addresses where active STS-3c cross-connections or active STS-1 cross-connections within the STS-3c address 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 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 */
```

The following denial message will be displayed if both MAIN slots are not equipped:

```
SNVS
```

```
/* Status, Not in Valid State */
```

```
/* Both main slots must be equipped */
```

In DDM-2000 OC-3 R15.3, if the STS-3c cross-connect command is issued to a FEPL Ethernet port that already has an existing VT1.5 or STS-1 cross-connect, the following denial message will be displayed:

```
SACC
```

```
/* Status, Already Cross Connected */
```

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. */
```

After entering this command, the following confirmation message is displayed.

```
/* Caution! Network cross-connections are affected by this
command. You have selected the ent-crs-sts3c command with
these parameters:
```

```
Address1 = address
```

```
Address2 = address
```

```
CrsType = value */
```

```
Execute? (y/n or CANcel/DELete to quit) =
```

RELATED COMMANDS `set-feat`

`rtrv-feat`

`set-oc3`

`rtrv-oc3`

dlt-crs-sts3c

rtrv-crs-sts3c

rtrv-crs-sts1

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ENT-CRS-VT1

....

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 between Main and function unit slots and may be applied to OC-3 systems with various arrangements.

All cross-connections require the presence of OLIU circuit packs in the Main slots.The 22-type, 24-type, 29-type or 27-type OLIU circuit packs must be present in order to establish VT1.5 cross-connections. Additionally, in linear systems, cross-connections may only be entered if *crs=manual*, as set by the `set-ne` command.

The 27-type OLIU circuit pack is available with OC-3 Release 9 software, and later ring releases. The 24-type OLIU circuit pack is available with OC-3 Release 11.0 software and later ring releases. The 29-type OLIU circuit pack is available with OC-3 Release 15.0 software and later ring releases.

The 24G-U OC-12 interface circuit pack will allow up to three STS-1s to be VT cross-connected; the remaining STS-1 channels (if any) will have to continue as STS-1 ring pass-through cross-connects.

Any of the 12 STS-1s on the 29-type OC-12 interface can be selected for VT cross- connection to Function Units or for Pass-Through cross-connections. Up to 196 VT1.5 channels can be add-drop cross-connected from the OC-12 ring to Fn Unit groups on the OC-12 ring.

VT1.5 cross-connects to a-3-x-y and b-3-x-y cannot be established.

27G2-U or 26G2-U OLIU circuit packs must be used to establish OC-1 pass-through cross connections within a function unit, OC-1 0x1 cross connections within and between function unit slots, and OC-1 hairpin local drop cross-connections. (26G2-U support is available in Release 13.0 and later.)

Starting with Release 15.0, the IMA LAN (BBF9) circuit pack will be supported and allowed in the Low Speed slots of an OC-3 shelf.

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Each IMA LAN circuit pack occupies 2 adjacent Low-Speed DS1 slots; the pack can use up to 8 VT1.5 channels and will be addressed as two Quad-DS1 circuit packs.

Up to three IMA LAN circuit packs can be installed in a DDM-2000 OC-3 Low Speed group (a, b, and/or c) when the associated Function Unit is equipped with the BBG2B MXRVO. Only one IMA LAN circuit pack is allowed in a Low Speed group if the associated Function Unit is equipped with a BBG2 MXRVO pack.

The following lists the different Low Speed slot combinations that this circuit pack can use:

ls-{a,b,c}-{1 & 2}

ls-{a,b,c}-{2 & 3}

ls-{a,b,c}-{3 & 4}

ls-{a,b,c}-{5 & 6}

ls-{a,b,c}-{6 & 7}

Mixing of the IMA LAN circuit pack with other Low Speed packs is allowed.

High Speed OLIUs (such as 22-, 24-, or 29-type) can be used with the IMA LAN circuit pack.

Eah OC-3 signal contains three STS-1 signals. Each STS-1 signal contains seven VT Groups of signals. Each VT Group contains four VT1.5 signals, and each VT1.5 signal corresponds to an individual DS1 or T1 port.

In a 27-type OLIU pack, each of the two OC-1 signals contains 1 STS-1 signal.

The input parameters are:

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Lucent Technologies

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Table 5-9 `ENT-CRS-VT1` **Input Parameters**

Parameter	Description
Address1 and Address2	These are the addresses of the two VT1.5 channels or one VT1.5 channel and one DS1 or "internal DS1 (within the BBG20 TMUX circuit pack) port that are to be cross-connected. For VT1.5 ring pass-through traffic, *Address1 and Address2* must be the same time slot. Valid addresses are listed on the following pages. All cross-connections are bidirectional.
cct	CrsType specifies the cross-connection type. This parameter is available with all OC-3 ring releases. The valid values are: `twoway` - Twoway cross-connections apply to add/drop, and 0x1 ring configurations. In linear configurations, Twoway applies to add/drop, hairpin, point-to-point and pass-through cross connections. The 0x1 ring configurations support both dual and single homed OC-1. Starting with Release 9.1, OC-1 0x1 ring configurations include Main-to-function unit, function unit-to-function unit, and intra-function unit interconnections. See the following pages for detailed listings of allowed equipage combinations and corresponding valid addresses. Starting with Release 9.1, pass-through cross-connections within function units equipped with 27G2-U OLIU circuit packs may be established. Starting with Release 11.0, hairpin local drop cross-connections may be used to drop path protection switched traffic from an OC-1 ring terminating on a pair of 27G2-U OLIUs in a function unit slot to DS1 ports or to VT1.5 channels on an OC-3/IS-3 or STS1E facility. The pair of 27G2-U OLIUs in a single function unit can support a mix of hairpin local drop cross-connections and Main-to-FN 0x1 or FN-to-FN 0x1 cross-connections.

Table 5-9 `ENT-CRS-VT1` **Input Parameters (continued)**

Parameter	Description
cct (cont)	Starting with Release 13.0, hairpin local drop cross-connections may be used to drop path protection switched traffic from an OC-1 ring terminating on a pair of 26G2-U OLIUs in a function unit slot to DS1 ports in the same or a different function unit or to VT1.5 channels on an OC-3/IS-3 or STS1E facility.
	Starting with Release 13.0, the TMUX (BBG20) circuit pack will be allowed in the function unit slots of an OC-3 system. All types of VT1.5 cross-connections that are supported for the MXRVO interface will also be supported for the TMUX interface.
	Starting with Release 13.0, VT1.5 cross-connects 3 and 4 will not be allowed for the HDSL (BBF8) circuit pack.
	Starting with OC-3 with Release 15.0, 0X1 ring configurations support dual homed OC-3 ring applications.
	Also starting with Release 15.0, the IMA LAN (BBF9) circuit pack will be supported and allowed in the Low Speed slots of an OC-3 shelf. VT1.5 cross-connections between main and low-speed ports will be supported. Hairpin cross-connections between IMA LAN ports and other low-speed or function unit ports are not supported.
	`Twoway` is the default value for *cct*. Starting with OC-3 Release 15.0 and when using 22-type OLIUs in Fn slots, if a 0X1 application is desired, this requires provisioning the OC-3 interface(s) with 0X1 application type using the `set-oc3` command.

Table 5-9 `ENT-CRS-VT1` **Input Parameters   (continued)**

Parameter	Description
cct (cont)	`dc` - Drop and continue connections are allowed only from Main to function unit. Drop and continue connections support dual ring applications. Drop and continue connections are only allowed if the function unit address is equipped with the STS1E or OC-3 OLIU low-speed interface. Drop and continue connections are not allowed if the function unit address is equipped with the FEPL circuit pack.
	`locked` - Locked cross-connections support nonpath-switched DS1 drop applications. Locked cross-connections are only allowed if the function unit address is equipped with the MXRVO or TMUX interfaces.
	Locked cross-connections are applicable to the IMA LAN interfaces as well.
	Locked cross-connections are not allowed if the function unit address is equipped with the FEPL circuit pack.
	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.

Table 5-9 `ENT-CRS-VT1` **Input Parameters (continued)**

Parameter	Description
ring	RingId is the ring identification for drop and continue or locked cross-connections.
	For `dc` type connections, this parameter specifies which ring rotation will be continued as well as dropped at this network element. 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.
	The *ring* parameter is not allowed if the function unit address is equipped with the FEPL circuit pack.

All VT drop and continue cross-connections in a network element must be assigned to the same ring. The assigned value will be set to the ring specified in the first completed drop and continue cross-connection. If *cct* is set to `dc`, this parameter is only prompted for if this is the first assignment. The user may continue to enter the RingId value for other drop and continue connections but the value must agree with the value set by the first drop and continue connection. If the CrsType is `locked`, the RingId is always prompted for and is displayed in confirmation messages. If the CrsType is not `dc` or `locked`, the RingId is not prompted for and it is not displayed in confirmation messages. If the CrsType is not `dc` or `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 22-type, 24-type, 29-type or 27-type OLIU circuit packs. For linear systems, cross-connections may be entered if *crs=manual*, as set by the set-ne command. To successfully perform any cross-connection, the user must equip the Main slots with 26, 28-type (Starting with Release 2.2 and 3.1) or 29-type (Starting with Release 4.0) OLIU circuit packs. Where items appear in braces { }, any one (and only one) of these items may be used to form the address. The value `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 Release Cross-Connection Addresses

`m-{1-3}-{1-7,all}-{1-4,all} to {a,b,c}-{1-7,all}-{1-4, all}`	Allowed when the addressed low-speed (LS) port is equipped with a DS1 or STS1E low-speed, or TMUX circuit pack and the Main slots are equipped with 22-type OLIU circuit packs. This address is also applicable for HDSL circuit packs, although only 2 DS1 interfaces may be specified in the address.
`m-{1-3}-{1-7,all}-{1-4,all} to {a,b,c}-{1,2}-{1-7,all}- {1-4,all}`	Allowed when the addressed low-speed (LS) port is equipped with a 27-type OLIU, and the Main slots are equipped with 22-type OLIU circuit packs.
`m-{1-12}-{1-7,all}-{1-4, all} to {a,b,c}-{1,2}-{1-7, all}-{1-4,all}`	Allowed when the addressed low-speed (LS) port is equipped with a 27-type OLIU, and the Main slots are equipped with 24-type or 29-type OLIU circuit packs.
`m-{1,2}-{1-7,all}-{1-4,all} to {a,b,c}-{1-7,all}-{1-4, all}`	Allowed when the addressed low-speed (LS) port is equipped with a DS1 or STS1E low-speed, or TMUX circuit pack and the Main slots are equipped with 27-type OLIU circuit packs.
`m-{1-12}-{1-7,all}-{1-4, all} to {a,b,c}-{1-7,all}- {1-4,all}`	Allowed when the addressed low-speed (LS) port is equipped with a DS1 or STS1E low-speed, or TMUX circuit pack and the Main slots are equipped with 24-type or 29-type OLIU circuit packs.

Ring Release Cross-Connection Addresses (Continued)

`m-{1,2}-{1-7,all}-{1-4,all} to {a,b,c}-{1,2}-{1-7,all}-{1-4,all}`	Allowed when the addressed low-speed (LS) port is equipped with a 27-type OLIU circuit pack and the Main slots are equipped with 27-type OLIU circuit packs.
`m-{1-3,all}-{1-7,all}-{1-4,all} to m-{1-3,all}-{1-7,all}-{1-4,all}`	For ring releases, when the Main slots are equipped with 22-type OLIUs, these addresses provide pass-through cross-connections. The two VT1.5 channel addresses must be the same.
`m-{1,2}-{1-7,all}-{1-4,all} to m-{1,2}-{1-7,all}-{1-4,all}`	For ring releases, when the Main slots are equipped with 27-type OLIUs, these addresses provide pass-through cross-connections. The two VT1.5 channel addresses must be the same.
`{a,b,c}-{1,2}-{1-7,all}-{1-4,all} to {a,b,c}-{1,2}-{1-7,all}-{1-4,all}`	For ring releases, when the addressed function unit slots are equipped with 27G2-U OLIU circuit packs, these addresses provide either pass-through or intra-function unit 0x1 cross-connections. Pass-through cross-connections are established when the two VT1.5 channel addresses are the same. Intra-function unit 0x1 cross-connections are established when the function unit portion of the addresses are the same but the STS-1 numbers are different.

Ring Release Cross-Connection Addresses (Continued)

m-{1-12}-{1-7,all}-{1-4, all} to m-{1-12}-{1-7,all}-{1-4,all}	For ring releases, when the Main slots are equipped with 24-type or 29-type OLIUs, these addresses provide pass-through cross-connections. The two VT1.5 channel addresses must be the same.
m-{1-3}-{1-7,all}-{1-4,all} to a-{1,2}-{1-7,all}-{1-4, all}	For rings Release 9.0 and later, allowed when function group A is equipped with 22-type OLIU circuit packs.
m-{1-3}-{1-7,all}-{1-4,all} to b-{1,2}-{1-7,all}-{1-4, all}	Allowed when function group B is equipped with 22-type OLIU circuit packs.
m-{1-12}-{1-7,all}-{1-4, all} to {a,b}-{1,2}-{1-7, all}-{1-4,all}	Allowed when function groups A and/or B is equipped with 22-type OLIU circuit packs and Main slots are equipped with 24-type or 29-type OLIUs.
m-{1-3,all}-{1-7,all}-{1-4, all} to c-{1-3}-{1-7,all}-{1-4,all}	Allowed when function group C is equipped with 22-type OLIU circuit packs.
m-{1-12}-{1-7,all}-{1-4, all} to c-{1-3}-{1-7,all}-{1-4,all}	Allowed when function group C is equipped with 22-type OLIU circuit packs and Main slots are equipped with 24-type or 29-type OLIUs.
m-{1-12}-{1-7}-{1-4} to {a,b}-{1,2,3,4,5}-{1-56}	Allowed when Main slots are equipped with 24-type or 29-type OLIU circuit packs, and function groups A and/or B are equipped with FEPL (BBG23) circuit packs
m-{1-12}-{1-7}-{1-4} to c-{1,2,3,4,5}-{1-63}	Allowed when Main slots are equipped with 24-type or 29-type OLIU circuit packs, and function group C is equipped with on FEPL (BBG23) circuit pack

Ring Release Cross-Connection Addresses (Continued)

m-{1-3}-{1-7}-{1-4} to {a,b}-{1,2,3,4,5}-{1-56}	Allowed when Main slots are equipped with 22-type OLIU circuit packs, and function groups A and/or B are equipped with FEPL (BBG23) circuit packs
m-{1-3}-{1-7}-{1-4} to c-{1,2,3,4,5}-{1-63}	Allowed when Main slots are equipped with 22-type OLIU circuit packs, and function group C is equipped with an FEPL (BBG23) circuit pack
{a,b}-{1,2}-{1-7,all}-{1-4, all} to c-{1-3}-{1-7,all}-{1-4,all}	Allowed when the addressed low-speed port in function groups A or B are equipped with 22-type OLIU circuit pack and when function group C is equipped with 22-type OLIU circuit pack.
{a,b}-{1,2}-{1-7,all}-{1-4, all}to c-{1-3}-{1-7,all}-{1-4,all}	Starting with Release 11.0, allowed when the addressed low-speed port in function groups A or B are equipped with 27G2-U OLIU circuit packs and when function group C is equipped with 22-type OLIU circuit packs.
{a,b}-{1,2}-{1-7,all}-{1-4, all}to c-{1,2}-{1-7,all}-{1-4,all}	Starting with Release 11.0, allowed when the addressed low-speed port in function groups A or B are equipped with 22-type OLIU circuit packs and when function group C is equipped with 27G2-U OLIU circuit packs.

`{a,b}-1-{1-7,all}-{1-4,` `all}to c-{1-3}-{1-7,all}-{1` `-4,all}`	Starting with Release 13.0, allowed when the addressed low-speed port in function groups A or B are equipped with 26G2-U OLIU circuit packs and when function group C is equipped with 22-type OLIU circuit packs.
`{a,b}-{1,2}-{1-7,all}-{1-4,` `all}to c-1-{1-7,all}-{1-4,` `all}`	Starting with Release 13.0, allowed when the addressed low-speed port in function groups A or B are equipped with 22-type OLIU circuit packs and when function group C is equipped with 26G2-U OLIU circuit packs.
`{a,b}-{1,2}-{1-7,all}-{1-4,` `all}to c-{1,2}-{1-7,all}-{1` `-4,all}`	Allowed when the addressed low-speed port in function groups A or B are equipped with 27G2-U OLIU circuit pack and when function group C is equipped with 27G2-U OLIU circuit pack. In this situation, function unit to function unit OC-1 0x1 cross-connections are established.
`{a,b}-{1-7,all}-{1-4,all}to` `c-{1-3}-{1-7,all}-{1-4,all}`	Allowed when the addressed low-speed port in function groups A or B are equipped with MXRVO or STS1E low-speed, or TMUX circuit packs and when function group C is equipped with 22-type OLIU circuit pack.
`{a,b}-{1,2}-{1-7,all}-{1-4,` `all}to c-{1-7,all}-{1-4,` `all}`	Allowed when the addressed low-speed port in function groups A or B are equipped with 22-type OLIU circuit pack and when function group C is equipped with MXRVO or STS1E low-speed, or TMUX circuit packs.

Ring Release Cross-Connection Addresses (Continued)

`{a,b}-{1-7,all}-{1-4,all}to` `c-{1-7,all}-{1-4,all}`	Allowed when the addressed low-speed port in function groups A or B are equipped with MXRVO or STS1E low-speed, or TMUX circuit packs and when function group C is equipped with STS1E circuit pack.
`{a,b}-{1-7,all}-{1-4,all}to` `c-{1-7,all}-{1-4,all}`	Allowed when the addressed low-speed port in function groups A or B are equipped with STS1E low-speed circuit packs and when function group C is equipped with MXRVO, STS1E low-speed, or TMUX circuit packs.
`{a,b}-{1,2}-{1-7,all}-{1-4,` `all}to c-{1-7,all}-{1-4,` `all}`	Starting with Release 11.0, allowed when the addressed low-speed port in function groups A or B are equipped with 27G2-U OLIU circuit packs and when function group C is equipped with MXRVO, STS1E low-speed, or TMUX circuit packs.
`{a,b}-{1-7,all}-{1-4,all}to` `c-{1,2}-{1-7,all}-{1-4,all}`	Starting with Release 11.0, allowed when the addressed low-speed port in function groups A or B are equipped with MXRVO or STS1E low-speed or TMUX (in Release 13.0) circuit packs and when function group C is equipped with 27G2-U OLIU circuit packs.

`{a,b}-1-{1-7,all}-{1-4, all}to c-{1-7,all}-{1-4, all}`	Starting with Release 13.0, allowed when the addressed low-speed port in function groups A or B are equipped with 26G2-U OLIU circuit packs and when function group C is equipped with MXRVO, STS1E low-speed, or TMUX circuit packs.
`{a,b}-{1-7,all}-{1-4,all}to c-1-{1-7,all}-{1-4,all}\`	Starting with Release 13.0, allowed when the addressed low-speed port in function groups A or B are equipped with MXRVO, STS1E low-speed, or TMUX circuit packs and when function group C is equipped with 26G2-U OLIU circuit packs.
`{a,b,c}-1-{1-7,all}-{1-4, all}to{a,b,c}-{1-7,all}-{1-4,all}`	Starting with Release 13.0, allowed when the addressed 'from' port in function group A, B, or C is equipped with 26G2-U OLIU circuit packs and when the corresponding low-speed slots are equipped with DS1 or DS1PM circuit packs. This case is distinguished by having the same function group in both the source and destination addresses. A path-protected hairpin local drop connection is established between the ring terminating on the 26G2-U OLIU circuit packs and DS1/DS1PM ports in the same fn group, using the MXRVO functionality on the 26G2-U OLIU circuit packs.
`m-{1-3}-{1-7,all}-{1-2, all}to{a,b,c}-{1-7,all}-{1-2,all}`	Starting with Release 13.0, when addressing ports on a BBF8, only port numbers 1 and 2 are valid. Specifying *all* selects ports 1 and 2 only

m-{1-3}-{1-7,all}-{1-4, all}to{a,b,c}-{1-7,all}-{1-4,all}	Allowed when equipped with 22-type OLIUs in Main Unit slots, and the addressed Low Speed slots are equipped with IMA LAN (BBF9) circuit packs.
m-{1-12}-{1-7,all}-{1-4, all}to{a,b,c}-{1-7,all}-{1-4,all	1 Allowed when equipped with 24/29-type OLIUs in Main Unit slots, and the addressed Low Speed slots are equipped with IMA LAN (BBF9) circuit packs.
m-{1,2}-{1-7,all}-{1-4, all}to{a,b,c}-{1-7,all}-{1-4,all}	Allowed when equipped with 27-type OLIUs in Main Unit slots, and the addressed Low Speed slots are equipped with IMA LAN (BBF9) circuit packs.

The T1EXT (BBF6) circuit pack (OC-3 Release 15.0) 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.

ERROR RESPONSES   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 linear systems, if the cross-connect mode is set to default *crs=default*, as provisioned by the set-ne command, this command will be denied with the following message:

SNVS

```
/* Status, Not in Valid State */
```

```
/* System provisioned for default cross-connections by the
CrsMode parameter in the set-ne command
```

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 using 29-type OLIUs in Main and 22-type OLIUs in Fn slots, if a 0X1 application is desired, this requires provisioning the OC-3 interface(s) with 0X1 application type using the set-oc3 command.

If this command is invoked using addresses where active STS-3c cross-connections or active STS-1 cross-connections within the STS-3c address 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 cross-connection request is to a 27-type interface, and either OC-1 line at the specified address is in the NMON state, the following warning will be displayed:

```
/* Cross-connect may use an OC-1 line that is in the NMON
state */
```

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 */
```

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 or 26G2-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 or 26G2-U OLIU circuit packs. */
```

In DDM-2000 OC-3 R15.3, if the VT1.5 cross-connect command is
issued to a FEPL Ethernet port that already has an existing STS-1 or
STS-3c cross-connect, the following denial message will be displayed:

```
/* Status, Already Cross Connected */
```

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 the maximum number of STS-1s (3) has already been reached when
the user attempts to provision an additional STS-1 cross-connect to be
dropped; which would exceed the allowed STS-1 bandwidth, the
request will be denied and the following denial message displayed:

```
SNVS

/* Status, Not in Valid State */

/* Cross connect capacity is not available
```

If the cross-connect request is for a drop and continue connection and
the Ring identification does not agree with the assigned value (defined

---

by the first drop and continue connection), the request is denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* Invalid cross-connection request */
```

If the shelf is equipped with 24G-U OLIU packs in both Main slots and the maximum number of STS-1s has already been reached (that is, 3 STS-1s already have VT cross-connects) when the user attempts to provision VT-1.5 cross connects within an additional STS-1, the request will be denied with the following message:

```
SNVS
/* Status, Not in Valid State */
/* Cross connect capacity is not available. */
```

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 */
```

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

*/
```

Service may be lost when a tributary is added to a VCG of a BBG23 FEPL circuit pack until end-to-end provisioning of a VCG is complete

After entering this command, the following confirmation message is displayed. If CrsType is not dc or locked, *RingId* is not displayed in

the confirmation message only if the *CrsType* parameter is set to dc or locked.

```
/* 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 dc or 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

rtrv-ne

rtrv-ne

☐

OPR-LPBK-FE
....

NAME   `OPR-LPBK-FE`: Operate Loopback-FE

INPUT FORMAT   `OPR-LPBK-FE:`*Address*[`:lpbktype=` *LoopbackType*];

DESCRIPTION   Execution of this command may affect service.

This command executes a loopback on a FELAN interface towards the optical fiber (terminal).

Only the terminal loopback can be set. The loopback remains in place until it is released by the `rls-lpbk-fe` command.

Table 5-10   `OPR-LPBK-FE` **Input Parameters**

Parameter	Description
Address	Address of FELAN port to be looped back. Valid FELAN Addresses: `{a,b,c}-{1-5,all}`
lpbktype	Loopbacktype specifies whether the loopback is terminal or facility and must be specified as terminal. The valid value is: `terminal` - terminal loopback directed towards the high-speed facility. This is a default value. No other value is allowed.

If a slot is determined to have the wrong circuit pack type for the command, the following message is displayed:

`/*Address not equipped for FELAN */`

`/* Enter low-speed FELAN port address: {a,b,c}-{1-5} */`

If the FELAN port is already in loopback, the following message is displayed:

`/* Address already in loopback*/`

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, 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-fe command with these
parameters:
```

```
Loopbacktype=loopbacktype
```

```
Address=address */
```

```
Execute? (y/n or CANcel/DELete to quit) =
```

RELATED COMMANDS   rls-lpbk-fe

....

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RLS-LPBK-FE

....

NAME   RLS-LPBK-FE: Release Loopback-FE

INPUT FORMAT   RLS-LPBK-FE:*Address*[:lpbktype= *LoopbackType*];

DESCRIPTION   This command releases a previously established loopback on a
FELAN interface.

The input parameters are:

Table 5-11   RLS-LPBK-FE **Input Parameters**

Parameter	Description
Address	Address of FELAN port(s) where a loopback is to be released. Valid FELAN Addresses: `{a,b,c}-{1-5,all}`
lpbktype	Loopbacktype specifies whether the loopback is terminal or facility and must be specified as terminal. The valid value is: `terminal` - terminal loopback directed towards the high-speed facility. This is a default value. No other value is allowed.

If the user attempts to release a loopback at a valid address where no
loopback has been established, the attempt will be denied and the
following denial message displayed:

`/* Status, Requested Operation Failed */`

`/* Specified loopback does not exist. */`

If the user attempts to release a loopback with an invalid *facility*
parameter (facility) the following denial message is displayed:

`/* Input, Data Not Valid, invalid LPBKTYPE */`

If the user attempts to release a loopback at with an otherwise valid
address but for which the corresponding equipment is not present, the
following denial message is displayed:

`/* Equipage, Not Equipped */`

....

RELATED COMMANDS   opr-lpbk-fe

☐

RTRV-CRS-STS1

....

NAME   RTRV-CRS-STS1: Retrieve Cross-Connection STS-1

INPUT FORMAT   RTRV-CRS-STS1*[:Address]*;

DESCRIPTION

This command retrieves STS-1 cross-connections within a DDM-2000 OC-3 system, as set by the ent-crs-sts1 command.

For OC-3 linear releases, STS-3c cross-connections are possible between Main slots and FN-C slots, and will also be displayed in this report. The STS-3c mode must be set to enabled using the set-oc3 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.

Note: STS-3c cross-connections are an optional feature that requires a special license from Lucent Technologies.

This report also indicates if any VT1.5 cross-connections exist. A VT1.5 cross-connection map report, obtained by using the RTRV-CRS-VT1 command, will show the specific VT1.5 cross-connections.

....

The input parameters are the following.

Table 5-12 RTRV-CRS-STS1 **Input Parameters**

Parameter	Description
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.
	Valid Linear Addresses:
	`all,{a,b,c},{m-c}-{1-3,all},{a,b}-{1-2,all},`
	Valid Ring Addresses:
	`all,{m-c}-{1-3,all},b-{1,2,all}, a-{1,2,all}`
	If the shelf is equipped with 24-type OLIUs in its Main units, the valid addresses are:
	`m-{1-12,all}`
	If the shelf is equipped with 29-type (starting with OC-3 Release 15.0) OLIUs in its Main units, the valid addresses are:
	`m-{1-12,all}, c-{1-3,all},{a,b}-{1,2, all}`
	If Function Unit slot C contains an FEPL (BBG23) circuit pack, the valid Function Unit Addresses for that slot are:
	`c-{1,2,3,4,5}-{1,2,3}`
	If Function Unit slots A and/or B contain an FEPL (BBG23) circuit pack, the valid Function Unit Addresses for those slots are:
	`{a,b}-{1,2,3,4,5}-{1,2}`

The output report appears as follows.

```
/* Cross-Connection Map Report

=========================================================

Address Address Cross Connect Ring Id 1 2 Type

=========================================================

---------------------------STS-3C--------------------
```

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```
m-10 m-1 twoway

----------------------------STS-1---------------------

m-1 a twoway m1

m-2 b-1 twoway -

-----------VT1.5 Cross-Connection----------------

a c-1 twoway m1

*/
```

Note: Starting with OC-3 Release 13.0 each cross-connection is reported only once (not once in each direction).

The above report lists both STS-1 and STS-3c cross connections (if applicable) in separate sections. 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 the function unit).

Also the STS-3c section within the OC-3 report is applicable if the main unit slots are equipped with OC-12 interfaces (24G-U or 29G-U OLIU circuit packs).

The output parameters are:

Address 1	Address1 is the address of a STS-1 channel.
Address 2	Address2 is the address of a STS-1 channel.
Cross Connect Type	This parameter is available with all ring releases.
	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 DS3 and 0X1 ring configurations. For detailed information on the mentioned cross-connection types, refer to `ent-crs-sts1` command page.

Ring Id	This parameter is available with all ring releases. This column identifies the ring for drop and continue connections, specifying which ring will be continued as well as dropped at the network element.
	The valid values are:
	`m1, m2.`

This report indicates if any VT1.5 or STS-3c cross-connections exist. A VT1.5 cross-connection map report, obtained by using the `rtrv-crs-vt1` command, will show the specific VT1.5 cross-connections.

RELATED COMMANDS   dlt-crs-sts1

ent-crs-sts1

rtrv-crs-vt1

☐

RTRV-CRS-STS3c

....

NAME   RTRV-CRS-STS3c: Retrieve Cross-Connection STS-3c

INPUT FORMAT   RTRV-CRS-STS3c *[:Address]*;

DESCRIPTION

This command retrieves STS-3c cross-connections within a DDM-2000 system, as set by the ent-crs-sts3c command.

This command can be used in an OC-3 shelf if it is equipped with 24-type OLIU circuit packs in its Main unit slots. The only valid cross-connect type for this equipage is Twoway for pass-through cross-connections. Starting with OC-3 Release 15.0, if the shelf is equipped with 29-type OLIU circuit packs in its Main unit slots, the valid cross-connect type is Twoway, which supports pass-through or add-drop for 0X1 (depending on the shelf's equipage).

Note: If slots 1 and 2 are equipped with different pack types (for example, during an upgrade), this 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 the following.

Table 5-13 RTRV-CRS-STS3c **Input Parameters**

Parameter	Description
Address	The address of one or more STS-3c channels for which cross-connections are to be reported. The default address is all STS-3c channels in the system.
	If the OC-3 shelf is equipped with 24-type OLIU circuit packs in its Main unit slots, the valid Main Unit Addresses are: m-{1,4,7,10,all},
	If the OC-3 shelf is equipped with 29-type OLIU circuit packs in its Main unit slots, the valid Main and Function Unit Addresses are: m-{1,4,7,10,all},
	If Function Unit slot C does not contain an FEPL (BBG23) circuit pack, the valid Function Unit Address is: c-1
	If Function Unit slot C contains an FEPL (BBG23) circuit pack, The valid Function Unit Address is: c-{1,2,3,4,5}-1

The output report appears as follows.

```
/* Cross-Connection Map Report

========================================================

Address Address Cross Connect Ring for

1 2 Type Drop&Cont

========================================================

---------STS-3C-------

m-1 m-1 twoway -

m-4 m-4 twoway -

---------STS-1--------

m-7 VT1.5 Cross-Connection
```

```
m-10 c-1 twoway -

m-11 c-2 twoway -

m-12 c-3 dc m1
```

The output report shows the STS-3c 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 report also shows the STS-1 channels (if applicable) in a separate section. The STS-1 channels are listed in the same order as described for the STS-3c channels.

The output parameters are:

Address 1	Address1 is the address of a STS-3c channel.
Address 2	Address2 is the address of a STS-3c channel.
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 DS3 and 0X1 ring configurations.
	For detailed information on the mentioned cross-connection types, refer to the `ent-crs-sts1` page.
Ring Id	This parameter is available with all ring releases.
	This column identifies the ring for drop and continue connections, specifying which ring will be continued as well as dropped at the network element. The valid values are:
	`m1, m2`.

RELATED COMMANDS   ent-crs-sts3c

dlt-crs-sts3c

rtrv-crs-sts1

RTRV-CRS-VT1

....

NAME   RTRV-CRS-VT1: Retrieve Cross-Connection VT1.5

INPUT FORMAT   RTRV-CRS-VT1*[:Address]*;

DESCRIPTION

This command retrieves VT1.5 signal cross-connections within a DDM-2000 OC-3 system, as set by the ent-crs-vt1 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 parameters are:

Table 5-14   `RTRV-CRS-VT1` **Input Parameters**

Parameter	Description
Address	Following is the list of valid addresses:
	Valid Linear Addresses:
	`{m,c}-{1-3,all}-{1-7,all}-{1-4,all}`,
	`{a,b}-{1-2}-(1-7,all}-{1-4,all}`
	`{a,b,c}-{1-7,all}-{1-4,all}`
	Valid Ring Addresses:
	`m-{1-3,all},{1-7,all},{1-4,all}`
	`{a,b,c}-{1-7,all}-{1-4,all}`,
	`a-{1,2,all}-{1-7,all}-{1-4,all}`,
	`b-{1,2,all}-{1-7,all}-{1-4,all}`,
	`c-{1-3,all}-{1-7,all}-{1-4,all}`
	The T1EXT (BBF6) circuit pack (OC-3 Release 15.0) 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 shelf is equipped with 24-type or 29-type (starting with OC-3 Release 15.0) OLIUs in its Main units, valid VT1.5 Addresses are:
	`m-{1-12,all}-{1-7,all}-{1-4,all}`
	If Function Unit slot C contains an FEPL (BBG23) circuit pack, the valid Function Unit Addresses for that slot are: `c-{1,2,3,4,5}-{1-63}`
	If Function Unit slots A and/or B contain an FEPL (BBG23) circuit pack, the valid Function Unit Addresses for those slots are:
	`{a,b}-{1,2,3,4,5}-{1-56}`

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-1-7-4 c-2-7-1 twoway -

m-2-1-2 c-1-1-2 twoway m1

m-2-6-1 b-6-1 dc m2

m-2-6-3 b-6-3 dc m2

m-3-2-4 c-2-4-1 twoway -

*/
```

NOTE: Starting with OC-3 Release 13.0 each cross-connection is reported only once (not once in each direction).

The output parameters are:

Address 1	Address1 is the address of a VT1.5 channel or DS1 port.
Address 2	Address2 is the address of a VT1.5 channel or DS1 port.
Cross Connect Type	This parameter specifies the cross connection type. It also specifies whether the cross-connection is two-way (twoway), drop and continue (dc), or locked (locked).
	Two-way applies to add/drop and pass-through configurations, and also applies to add/drop, hairpin and 0x1 ring configurations. In linear configurations, twoway applies to hubbing, add/drop, point-to-point and pass-through cross-connections.
Ring Id	This column identifies the ring for drop and continue, and locked connections.

The report shows the current state of VT1.5 cross-connections in the NE. When the address of multiple VT1.5 channels or DS1 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.

The report will also indicate if any STS-1 cross-connections exist. An STS-1 cross-connection map report, obtained by using the

....

`rtrv-crs-sts1` command, shows the specific STS-1 cross-connections.

RELATED COMMANDS   dlt-crs-vt1

ent-crs-vt1

rtrv-crs-sts1

rtrv-state-path

□

RTRV-EQPT

....

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).

The input parameter is:

Table 5-15   RTRV-EQPT **Input Parameters**

Parameter	**Description**
Address	Address identifies one or more slot(s). The default is all slots.
	Valid Slot Addresses: `all`, `main-{1,2,all}`, `fn-all`,
	`fn-{a,b,c}-{1,2,all}`, `ls-all`, `tg-{1,2,all}`,
	`ls-{a,b,c}-{1-8,all}`, `sysctl`, `auxctl`, `shelf`

A sample output report appears as follows.

....

```
/* Equipage and Version Report
=============================================================================
Slot      Circuit    Apparatus  Series   CLEI        ECI       Serial
Address   Pack       Code       Number   Code        Code      Number
=============================================================================
tg-1       TGS       BBF2B      S1:1     SNPQAJCAAA  680153    93MV01616399
tg-1       TGS       BBF2B?     S1:1     SNPQAJCAAA  680153    93MV01614899
-----------------------------------------------------------------------------
main-1     OLIU      22G-U      S1:1     SNTRFBXDAA  200320    95MV01154769
main-2     OLIU      22G-U      S1:1     SNTRFBXDAA  200320    95MV01154769
-----------------------------------------------------------------------------
fn-a-1    MXRVO      BBG2       S2:2     SNTMXRTLAA  607033    95MV01486659
fn-a-2    MXRVO      BBG2       S1:1     SNCMAAOAAA  663667    95MV01486659
fn-b-1    MXRVO                          SNT1BRTLAA  607??
fn-b-2    MXRVO                          SNCMAAOAAA  663??
fn-c-1    DS3        BBG4       S1:1     SNCMAABBAR  663938    95MV11065997
fn-c-2     -          -          -        -           -
-----------------------------------------------------------------------------
ls-a-1     DS1       BBF1B      S3:4     SNCLAA1AAB  682891    95MV01412359
ls-a-2     DS1       BBF1B      S3:4     SNCLAA2AVB  609811    95MV01412359
ls-a-3     DS1       BBF1B      S1:2     SNCLRY2AVB  609811    95MV01412135
ls-a-4     -          -          -        -           -
ls-a-5     -          -          -        -           -
ls-a-6     -          -          -        -           -
ls-a-7     -          -          -        -           -
ls-a-8     DS1PM     BBF3       S1:1     SNPQAM4AAA  6824891   95MV01468356
ls-b-1     -          -          -        -           -
ls-b-2     -          -          -        -           -
ls-b-3     -          -          -        -           -
ls-b-4     -          -          -        -           -
ls-b-5     -          -          -        -           -
ls-b-6     -          -          -        -           -
ls-b-7     -          -          -        -           -
ls-b-6     -          -          -        -           -
ls-c-1     LAN       BBF9       S1:1     SNPQAM3BBA  6824???   95MV01468356
ls-c-2     LAN       BBF9       S1:1     SNPRB4NBBA  6844???   95MV01468356
ls-c-3     -          -          -        -           -
ls-c-4     -          -          -        -           -
ls-c-5     -          -          -        -           -
ls-c-6     -          -          -        -           -
ls-c-7     -          -          -        -           -
ls-c-8     -          -          -        -           -
-----------------------------------------------------------------------------
sysctl    SYSCTL     bbg8       S1:1     SNCL3G1AAB  205071    95MV00000059
-----------------------------------------------------------------------------
```

```
auxctl    OHCTL        bbg9      S1:1     SNCL3V2RAB  205061  95MV78000059
shelf                  ED-8C724-30,G3 or earlier
     ----------------------------------------------------------------
```

Starting with OC-3 Release 15.0, the Low Speed slots of the DDM-2000 OC-3 shelf will support the IMA LAN circuit pack.

If an OC-3 shelf is equipped with the IMA LAN pack and knowing that this pack occupies two consecutive Low Speed slots, this report lists the LAN pack in 2 consecutive lines as shown in the sample report.

Also starting with OC-3 Release 15.0, the Low Speed slots of the DDM-2000 OC-3 shelf will support the T1EXT circuit pack.

Note: When using the T1EXT (BBF6) circuit pack(s) in OC-3 shelves, the function unit must be equipped with the BBG2B enhanced MXRVO circuit packs (in both Function slots).

Starting with OC-3 Release 15.3.1, the Function Unit slots of the DDM-2000 OC-3 shelf will support the BBG23 FEPL Fast Ethernet Private Line circuit pack. This example shows the equipage of a BBG23. Even though the faceplate of the circuit pack covers both slots of the function unit, the pack is reported as occupying slot 2 since that is where connection from the pack to the backplane is made. The BBG23 may have a removable optical module (SFP) installed in port 5 of the circuit pack, in which case extra information is output. See the following table for mapping SFP data to columns of the existing report.

Table 5-16   BBG23 SFP Data Mapping

SFP Data	Report Column
Name	Circuit Pack
Qual	Apparatus Code
Mfg ID	Series Number
CLEI Code	CLEI Code
Empty	ECI Code
Commercial Code	Serial Number
Data Code	Apparatus Code (2nd Line)
Prod ID	CLEI Code (2nd Line)

The output parameters are:

Address	This is the address of the slot. An address of *shelf* requests information about the group id for the shelf.
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.
Qual	Module qualifier. (100BASE-FX).
MfgID	Manufacturer ID. Four-character ASCII code.
Commercial Code	12-digit hexadecimal number.
Prod ID	10-digit hexadecimal number.

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 and 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 "?".

RELATED COMMANDS   rtrv-state-eqpt

☐

RTRV-FELAN

....

NAME	`RTRV-FELAN`: Retrieve FELAN parameters' settings
INPUT FORMAT	`RTRV-FELAN:`*Address*;
DESCRIPTION	This command displays the data associated with the FEPL (BBG23) circuit pack for a specific address, as set by the `set-felan` command.

This command is available starting with OC-3 Release 15.3.1, and it is applicable only to the FEPL (BBG23) circuit pack.

The input parameter is:

Table 5-17   `RTRV-FELAN` **Input Parameters**

Parameter	Description
Address	Address of FELAN port on the FEPL circuit pack. Valid Addresses:`{a,b,c}-{1-5,all}, all`

The output report appears as follows:

```
/* FELAN Provisioning Report
=================================================================================
Addr Epmode Eppm Fcmd Fcmdo Lnrate Lnrateo mdix mdixo Autoneg Admin Almlvl Mtu_size
=================================================================================
addr epmode eppm fcmd fcmdo lnrate lnrateo mdix mdixo autoneg admin almlvl mtu_size
 .     .     .    .    .     .      .       .    .     .       .     .     .
=================================================================================
*/
```

The output parameters are:

Address	Address of the Function Unit slot(s) equipped with the FEPL pack Valid Addresses: `{a,b,c}-{1-5}`

....

epmode	Ethernet port monitoring Mode. When a port is provisioned in the AUTO state, it will automatically transition to the in-service (IS) state upon detection on the port of a valid input. epmode has the following values: `auto, nmon, is`
eppm	Ethernet Port and VCG port PM enable. This parameter controls whether Ethernet performance monitoring is enabled for the specified Ethernet and VCG port. Eppm has the following values: `enable, disable`
fcmd	Flow Control Mode. fcmd has the following values: • `ENABLE` - Enable Transmit & Receive flow control • `DISABLE` - Disable Transmit & Receive flow control • `Auto` - Autonegotiate (default value) • `Drop` - Disable end-to-end flow control Transmit & Receive
lnrateo	Operational Line Rate. If the addressed circuit pack is not present, or autonegotiation is incomplete, a "?" is reported. Otherwise the negotiated rate is reported Lnrate has the following values: • `auto` - Automatically negotiate line rate (default value) • `100M` - Fixed 100 Mbps line rate • `10M` - Fixed 10 Mbps line rate
admin	Port administration control. This parameter is used to enable/disable a port. This will disable all frames to and from the port. Admin has the following values: `enable` (default value) `disable`

almlvl	Alarm Level. This parameter sets the alarm level for an incoming signal failure, autonegotiation failure, and may have one of the following values: • `cr` - Critical Alarm (default value) • `mj` - Major Alarm • `mn` - Minor Alarm • `na` - No Alarm
mtu_size	MTU size (in bytes). This parameter specifies the MTU (Maximum Transmission Unit) size supported on the port addressed by *Address* This is the size of the payload in the Ethernet frame, excluding Source and Destination Address, Type/Length, and CRC field. *mtu_size* must be an integer in the range of 1500 to 9614. The default value of mtu_size is 1500.

This command may only be executed if the shelf is equipped with FEPL (BBG23) circuit packs in the addressed Function Unit slots, otherwise the following denial message is displayed:

```
EQWT

/* EQuipage, Wrong Type */

/* Specified AID slot(s) are not equipped with proper
hardware. */
```

RELATED COMMANDS   set-felan

☐

....

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RTRV-PM-FEPL

....

NAME   RTRV-PM-FEPL: Retrieve Performance Monitoring data for the FEPL pack

INPUT FORMAT   RTRV-PM-FEPL[:*Address*];

DESCRIPTION   This command displays the performance monitoring data associated with the FEPL circuit pack. This command is available starting with OC-3 Release 15.3.1, and it is applicable only to the FEPL (BBG23) circuit pack.

NOTE: If the PM Mode (eppm) parameter is set to on by the set-felan command, this report will display the performance data associated with the FEPL pack; otherwise no data will be displayed in the report.

This command may only be executed if the shelf is equipped with FEPL circuit packs in the Function Unit slots, otherwise the following denial message is displayed:

EQWT

/* EQuipage, Wrong Type*/

/* Specified AID slot(s) are not equipped with proper hardware. */

The input parameter is:

Table 5-18   RTRV-PM-FEPL Input Parameter

Address	This is the address of the FELAN port on the FEPL circuit pack.
	Valid Addresses:
	{a,b,c}-{1-5,all},all

The output report appears as follows:

....

```
/* FEPL Performance Monitoring Status Report
Last initialized:  day registers at 70-01-01 00:01:28
                   quarter hour registers at 70-01-01 00:01:28
=======================================================================
Addr   Dirn   Start   EDFC    EDFE    EINB    EINF  Time    EONB    EONF
=======================================================================
A-1    fe     19:00    1       2       3       4
*/
```

The output parameters are:

Parameter	Description
Addr	Address of FELAN VCG port of FEPL pack in a Function Unit slot Valid Addresses: {a,b,c}-{1-5}
Start	This indicates the time on the system clock when the data collection started.
Dirn	This indicates the direction from which the data packets are received. This parameter can have one of the following values: FE - This indicates that data shown resulted from monitoring the MAC Packets incoming from the facility side. VCG - This indicates that data shown resulted from monitoring the MAC Packets incoming from the High Speed (SONET) side.
EDFC	Count of dropped Ethernet frames due to congestion.
EDFE	Count of dropped ethernet frames due to errors.
EINB	Incoming number of bytes.
EINF	Incoming number of frames.
EONB	Outgoing number of bytes
EONF	Outgoing number of frames.

Any counts that are large enough to overflow the internal register size (value greater than 1,073,741,823) are displayed as the maximum allowable value appended with the ″>″ character.

RELATED COMMANDS   set-felan

RTRV-STATE-EQPT

....

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.

This command is used with all ring releases and should be used instead of the rtrv-state command with all later linear releases.

The input parameter is:

Table 5-19   RTRV-STATE-EQPT **Input Parameter**

Parameter	Description
Address	Address identifies one or more slots. The default is all for all slots in the system. Valid OC-3 Addresses: all, main-{1,2,all}, fn-all, fn-{a,b,c}-{1,2,all}, ls-all, tg-{1,2,all}, ls-{a,b,c}-{1-8,all} If the shelf is equipped with IMA, LAN (BBF9) circuit packs, the valid Low Speed Addresses are: ls-{a,b,c}-{1-7,all) If the shelf is equipped with BBG23 FEPL circuit pack, valid addresses are: fn-{a,b,c}-2

An output report appears on the following page.

....

```
/* 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

   .           .           .           .             .
*/
```

The output parameters are:

Table 5-20 RTRV-STATE-EQPT **Output Parameters**

Address	This is the address of a slot.
Circuit Pack	Circuit pack is the circuit pack name. A hyphen (-) means not applicable or not equipped.
	If the shelf is equipped with the IMA LAN pack and knowing that this pack occupies two consecutive Low Speed slots, this report lists the LAN pack in 2 consecutive lines.
	For the IMA LAN circuit pack, LAN will be printed in this column.

Table 5-20   RTRV-STATE-EQPT **Output Parameters   (continued)**

Port State(s)	The state of the signal, from the DSX for DS-1, LAN, DS-3, or EC-1 signals is reported.Port State *(p)* may be blank or have on of the following values:
	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 *inservice* 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 *inservice* - state when a signal is detected.
	-(Hyphen) - Not applicable (not equipped). 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:

Table 5-20   RTRV-STATE-EQPT **Output Parameters   (continued)**

Switch State (continued)	*active*
	For OC-N lines in a 1+1 line-protected configuration, active means the signal being received on this line is selected by the near end protection switch and the signal being transmitted on this line is selected by the far end. For ring applications, each OLIU in the main slots For ring applications, each OLIU in the main-b slots and the TSI in the tsi slots 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 function units. 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.
	With the addition of pass-through cross-connections in function units the above discussion applies to OLIUs in function unit slots supporting such cross-connections. For IMA LAN, the *Switch State* is always active
	active-fn
	For a main OLIU slot, For a main OLIU slot in ring applications, For a TSI slot in ring applications, 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 function units.
	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.

Table 5-20 RTRV-STATE-EQPT **Output Parameters   (continued)**

Switch State (continued)	*active-tx* For the function unit's OC-3 lines, the signal being transmitted is selected by the far end, but the received signal is not selected by the near end protection switch. *active-rx* For the function unit's OC-3 lines, the signal being received on this line is selected by the near end protection switch, but the signal being transmitted is not selected by the far end. *active-?* For the function unit's OC-3 lines, the protection line is failed in the receive direction. The state of the protection line in the transmit direction is unknown; the signal transmitted on the protection line *might* be selected by the far end. *standby* The circuit pack or optical line is not currently active. -(Hyphen) Not applicable or not equipped. For ring applications because of pass-through connections, the switch state will always be active for both main OLIUs. For function units provisioned for pass-through, path-protected hairpin local drop, or 0x1 ring applications, the switch state will always be active for both OLIUs.

Table 5-20 RTRV-STATE-EQPT **Output Parameters (continued)**

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.
	For 1X1 or 1+1 protected packs, the Switch Priority is displayed for both packs. The Switch Priority displayed for one pack is displayed for the other.
	Switch priority may be one of the following:
	inhibit
	No protection switches will be done until the switch is reset.
	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.
	K1/K2 byte failure
	This occurs when the system cannot determine the protection switching state of the far end due to a failure of the automatic protection switching channel (K1/K2 bytes of the SONET line overhead on the protection line).

Table 5-20   `RTRV-STATE-EQPT` **Output Parameters   (continued)**

Switch Priority (continued)	*APS-protection line signal failure*
	Automatic protection switching has occurred due to a protection line signal failure.
	APS-service line signal failure
	Automatic protection switching has occurred due to a service line signal failure.
	APS-signal failure
	Automatic protection switching has occurred due to a signal failure.
	APS-signal degrade
	Automatic protection switching has occurred due to a signal degrade.
	APS-pack failure
	Automatic protection switching has occurred due to a circuit pack failure.
	APS-Fn failure
	Automatic protection switching has occurred in Main-x because of a failure in Fn-x, where there was at least one local drop cross-connect between Fn-x and Fn-y (Main-x did not fail in this case).

Table 5-20   RTRV-STATE-EQPT **Output Parameters**   **(continued)**

Switch Priority (continued)	NOTE: Starting with OC-3 Release 11.0, This switch priority may be the result of failing or removing a 27G2-U OLIU in Fn-X-1/2, where a a local Hairpin Add-Drop cross-connect is established between Fn-X and Fn-Y. For example, if Main-1 had a 0X1 cross-connect with Fn-a-1, and one or more local Hairpin Add-Drop cross-connects were established between Fn-a and Fn-c; and Fn-a-1 CP fails, resulting in a Path Protection switch from Fn-a-1 to Fn-a-2. Also a switch from Main-1 to Main-2 for the Add-Drop cross-connect into Fn-c is caused. Running this command in this event will result in displaying Main-1 as "-" and Main-2 as "active-fn" for "Switch State". "Switch Priority" will list "APS-Fn failed" for Main-1 and "-" for Main-2. For Fn-a-1, "Switch State" will list "-", while "Switch Priority" will list "APS-pack failed".

The output report for the APS Pack Failure appears as follows:

```
/* Equipment State Report
=========================================================
Address    Circuit   Port      Switch    Switch
           Pack      State(s)  State     Priority
=========================================================

tg-1       TGS                 active    -
tg-2       TGS                 standby   -
---------------------------------------------------------

main-1     OLIU                active    APS-Fn failure
main-2     OLIU                active-fn APS-Fn failure
---------------------------------------------------------

fn-a-1     OLIU                active    APS-pack failed

fn-a-2     OLIU                active-fn APS-pack failed

fn-b-1     MXRVO               active
fn-b-2     MXRVO               standby
fn-c-1     MXRVO               active
fn-c-2     MXRVO               standby
---------------------------------------------------------

ls-b-1     LAN       iiii      active    -
ls-b-2     LAN       aaaa      active    -
ls-c-1     DS1       iiii      active    -
ls-c-2     DS1       iaaa      active    -
ls-c-3     DS1       aiia      active    -
ls-c-4     DS1       iani      active    -
ls-c-5     DS1       iiii      active    -
ls-c-6     DS1       iaaa      active    -
ls-c-7     -         -         -         -
ls-c-8     DS1       -         standby   -

*/
```

The above example assumes that the shelf's Low Speed slots ″b-1″ and ″b-2″ are equipped with the IMA LAN circuit pack and some of the DS1 ports are In Service.

Switch Priority (continued)	*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. *APS-wait to restore* Automatic protection switching has occurred, but the service line is now good and service will revert back to its original source after a specified period of time. *manual* Traffic has been manually switched to protection. - (Hyphen) No manual or automatic switch requests are active. For the IMA LAN circuit pack, *Switch Priority* is always *(-)* Hyphen. For ring applications, the switch priority in this report applies only to the equipment switching of the main OLIUs TSIs to function unit signals. See the `rtrv-state-path` command for path protection switching information. The state of the timing reference is reported in the `rtrv-sync` command.

The following example shows a `RTRV-STATE-EQPT` command for a DDM-2000 OC-3 system in a ring configuration, with a FEPL Ethernet pack in Function Slot C. Note that only the fn-c-2 shows the port status for the two slot wide FEPL pack. The fn-c-1 does not replicate the same port status, to ease readability. For the FEPL Ethernet pack, the port state displayed is for all 5 ports. Each port goes in-service only when both LAN side and VCG side go in-service.

....

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```
/* Equipment State Report
===========================================================

Address    Circuit    Port      Switch      Switch
           Pack       State(s)   State       Priority
===========================================================

tg-1       TGS                   active      -
tg-2       TGS                   standby
-----------------------------------------------------------

main-1     OLIU                  active      APS-Fn failure
main-2     OLIU                  active-fn   APS-Fn failure
-----------------------------------------------------------

fn-a-1     OLIU                  active      APS-pack failed

fn-a-2     OLIU                  active-fn   APS-pack failed

fn-b-1     MXRVO                 active
fn-b-2     MXRVO                 standby
fn-c-1     FEPL       ----       -
fn-c-2     FEPL       aiiaa      active
-----------------------------------------------------------

ls-c-1     DS1        iiii       active      -
ls-c-2     DS1        aaaa       active      -
ls-c-3     DS1        aiia       active      -
ls-c-4     DS1        iaaa       active      -
ls-c-5     DS1        iani       active      -
ls-c-6     DS1        iiii       active      -
ls-c-7     -          -          -           -
ls-c-8     DS1        -          standby     -

*/
```

RELATED COMMANDS   rtrv-alm

rtrv-state-path (Rings only)

rtrv-sync

set-state-t1

set-state-t3

switch-fn

switch-line

switch-ls

switch-sync

upd

☐

RTRV-VCG

....

NAME   `RTRV-VCG`: Retrieves VCG parameters' settings

INPUT FORMAT   `RTRV-VCG` [:*Address*];

DESCRIPTION   This command displays the data associated with the FEPL (BBG23) circuit pack VCG port(s) for a specific address, as set by the `set-vcg` command.

This command is available starting with OC-3 Release 15.3.1, and it is applicable only to the FEPL (BBG23) circuit pack.

The input parameter is:

Table 5-21 `RTRV-VCG` **Input Parameter**

Address	This is the address of the VCG port on the FEPL circuit pack.
	Valid Addresses:
	`{a,b,c}-{1-5,all}, all`

The output report appears as follows:

```
/* VCG Provisioning report

===================================================

Address Vcgrate Vcgsz Vmode Almlvl Gfp_fcs Vcat

===================================================

address vcgrate vcgsz vmode almlvl gfp_fcs vcat

===================================================

*/
```

The output parameters are:

Address	Address of the VCG port of FEPL pack in a Function Unit slot.
	Valid Addresses:`{a,b,c}-{1-5}`

....

vcgrate	Rate used on the addressed VCG. *vcgrate* will be displayed as ″?″ if no tributaries are cross-connected to the addressed VCG. Possible values are: VT1, STS1, STS3C.
vcgsz	This value represents the number of VT1.5's, STS1's or STS3C's provisioned for the VCG, depending on vcgrate. *Vcgsz* may be zero if no tributaries are cross-connected to the addressed VCG.
vmode	VCG Monitoring Mode. This will be displayed as ″?″ if no tributaries are cross-connected to the addressed VCG. Valid values are as follows: • `auto` - automatic. • `is` - in service. • `nmon` - not monitored.
alm	Alarm Level. This parameter sets the alarm level for an incoming signal failure, and may have one of the following values: • `cr` - Critical Alarm (initial value) • `mj` - Major Alarm • `mn` - Minor Alarm • `na` - No Alarm
gfp_fcs	GFP FCS (Frame Check Sequence). This parameter controls the handling of the GFP FCS field for the specified VCG. Values for GFP FCS are: • `enable` - When interworking with equipment that supports the GFP FCS, *gfp_fcs* should be set to `enable`. • `disable` - When interworking with current DMX family network elements, *gfp_fcs* should be set to `disable`.

vcat	Virtual Concatenation Mode. This parameter controls whether H4 is inserted/monitored for the specified VCG. It has effect only when a single trib, not VT, is cross-connected to the VCG, to allow interworking with non-VCAT equipment. Values for Virtual Concatenation Mode are: • `enable` (initial value) - Insert/monitor H4. • `disable` - do not insert/monitor H4.

ERROR RESPONSES

This command may only be executed if the shelf is equipped with FEPL (BBG23) circuit packs in the addressed Function Unit slots, otherwise the following denial message is displayed:

```
EQWT

/* Equipage, Wrong Type */

/* Specified AID slot(s) are not equipped with proper
hardware. */
```

RELATED COMMANDS   set-vcg

□

SET-FELAN

....

NAME   SET-FELAN: Set parameters for FEPL (BBG23) Ethernet ports

INPUT FORMAT   SET-FELAN:*Address: epmode=Epmode, eppm=Eppm, fcmd=Fcmd, lnrate=Lnrate, admin=Admin, alm=Alm, mtu_size=Mtu_size, autoneg=Autoneg, mdix=Mdix*;

DESCRIPTION   This command is available starting with OC-3 Release 15.3.1, and it is applicable only to the FEPL (BBG23) circuit pack.

This command controls the settings of the FEPL ethernet ports' internal parameters.

The input parameters for this command are:

Table 5-22   SET-FELAN **Input Parameters**

Address	Address of the Function Unit slot(s) equipped with the FEPL pack. Valid Addresses: `{a,b,c}-{1-5}`
epmode	Ethernet port monitoring Mode. When a port is provisioned in the AUTO state, it will automatically transition to the in-service (IS) state upon detection on the port of a valid input. Epmode has the following values: `auto` (default) `nmon`
eppm	Ethernet Port and VCG port PM enable. This parameter controls whether Ethernet performance monitoring is enabled for the specified Ethernet and VCG port. Eppm has the following values: `enable` `disable` (default)

....

Table 5-22 SET-FELAN **Input Parameters (continued)**

fcmd	Flow Control Mode. Fcmd has the following values: • ENABLE - Enable Transmit & Receive flow control • DISABLE - Disable Transmit & Receive flow control • Auto - Autonegotiate (default value) • Drop - Disable end-to-end flow control Transmit & Receive Note: The value of *fcmd* cannot be changed while the state of the FELAN port and VCG port at *Address* are both In Service (is). Note: ENABLE and DISABLE control only Network-element controlled (local) flow-control: both ENABLE and DISABLE still allow Customer-Equipment-controlled end-to-end flow-control. DROP both disables Network-element-controlled flow-control and drops end-to-end flow-control messages. The value AUTO does not apply to optical port (port 5) on the BBG23, so the initial port 5 value is ENABLE.
lnrate	Line Rate. Inrate has the following values: • auto - Automatically negotiate line rate (default value) • 100M - Fixed 100 Mbps line rate • 10M - Fixed 10 Mbps line rate Note: The value of lnrate cannot be changed while the state of the FELAN port and VCG port at Address are both in Service (is).
admin	Port administration control. This parameter is used to enable/disable a port. This will disable all frames to and from the port. Admin has the following values: enable (default) disable

Table 5-22 SET-FELAN **Input Parameters (continued)**

almlvl	Alarm Level. This parameter sets the alarm level for an incoming signal failure, autonegotiation failure, and may have one of the following values: • cr - Critical Alarm (default value) • mj - Major Alarm • mn - Minor Alarm • na - No Alarm
mtu_size	MTU size (in bytes). This parameter specifies the MTU (Maximum Transmission Unit) size supported on the port addressed by *Address*.This is the size of the payload in the Ethernet frame, excluding Source and Destination Address, Type/Length, and CRC field. mtu_size must be an integer in the range of 1500 to 9614. The default value of mtu_size is 1500. Note: The value of *mtu_size* cannot be changed while the state of the FELAN port and VCG port at *Address* are both In Service (is).
autoneg	Autonegotiation. This parameter specifies whether autonegotiation is enabled on a port. The valid values are: • enable - Default value. Autonegotiation enabled. • disable - Autonegotiation disabled. If fcmd or inrate parameters are set to AUTO, the system will set them as follows: fcmd = ENABLE inrate = 100M Note: This parameter does not pertain to the optical port (port 5) on the BBG23 circuit pack.

Table 5-22   SET-FELAN **Input Parameters   (continued)**

mdix	Crossover. This parameter sets the crossover mode for the port. The valid values are:
	• auto - (Default value). Automatic crossover is enabled. The system determines if crossover is needed, then sets the port to AUTOMDIX or AUTOMDI mode.
	• mdix - RJ-45 TXP/TXN pins are transmit, RJ-45 RXP/RXN pins are receive.
	• mdi - RJ-45 TXP/TXN pins are receive, RJ-45 RXP/RXN pins are transmit.
	Note: This parameter does not pertain to the optical port (port 5).

This command may only be executed if the shelf is equipped with FEPL (BBG23) circuit packs in the addressed Function Unit slots, otherwise the following denial message is displayed:

EQWT

/* Equipage, Wrong Type */

/* Specified AID slot(s) are not equipped with proper hardware. */

The value of *lnrate, fcmd, or mtu_size* cannot be changed if the state of the FELAN port and the VCG port at Address are both in the In Service state. If the user attempts to change any of these values, while the FELAN port and VCG port *at Address* are both in the In Service state the command will complete with the following message displayed:

/* Status, Not in Valid State */

/* parameter(s) cannot be changed in IS port */

RELATED COMMANDS   rtrv-felan

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SET-VCG

....

NAME   SET-VCG: Set parameters for FEPL (BBG23) Virtual Concatenation Group (VCG) ports

INPUT FORMAT   SET-VCG:*Address*:alm=*Alm*,gfp_fcs=*Gfp_fcs*,vcat=*Vcat*;

DESCRIPTION   This command is available starting with OC-3 Release 15.3.1, and it is applicable only to the FEPL (BBG23) circuit pack.

This command controls the settings of the FEPL VCG ports' internal parameters.

The input parameters for this command are:

Table 5-23   SET-VCG **Input Parameters**

Address	Address of VCG port of FEPL pack in a Function Unit slot. Valid Addresses:{a,b,c}-{1-5,all}
alm	Alarm Level. This parameter sets the alarm level for an incoming signal failure, and may have one of the following values: • cr - Critical Alarm (initial value) • mj - Major Alarm • mn - Minor Alarm • na - No Alarm

....

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Table 5-23 `SET-VCG` **Input Parameters (continued)**

gfp_fcs	GFP FCS (Frame Check Sequence). This parameter controls the handling of the GFP FCS field for the specified VCG.
	Values for GFP FCS are:
	• `enable` - When interworking with equipment that supports the GFP FCS, *gfp_fcs* should be set to `enable`.
	• `disable` - (initial value). When interworking with current DMX family network elements, *gfp_fcs* should be set to `disable`.
	Note: The value of *gfp_fcs* cannot be changed while the state of the FELAN port and VCG port at *Address* are both In Service.
vcat	Virtual Concatenation Mode.
	This parameter controls whether H4 is inserted/monitored for the specified VCG. It has effect only when a single trib, not VT, is cross-connected to the VCG, to allow interworking with non-VCAT equipment.
	Values for Virtual Concatenation Mode are:
	• `enable` (initial value) - Insert/monitor H4.
	• `disable` - do not insert/monitor H4.
	Note: The value of *vcat* cannot be changed while the state of the FELAN port and VCG port at *Address* are both In Service.

ERROR RESPONSES
This command may only be executed if the shelf is equipped with FEPL (BBG23) circuit packs in the addressed Function Unit slots, otherwise the following denial message is displayed:

`EQWT`

`/* EQuipage, Wrong Type */`

`/* Specified AID slot(s) are not equipped with proper hardware. */`

The value of *gfp_fcs* and/or *vcat* cannot be changed unless either the FELAN port or VCG port at *Address* are not in the In Service state. If the user attempts to change the value of *gfp_fcs* and/or *vcat* while the

FELAN port or VCG port at *Address* is in the In Service state the command will complete with the following message displayed:

```
/* parameter(s) cannot be changed on IS port */
```

RELATED COMMANDS   rtrv-vcg

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TL1 message details

Overview of TL1 messages

Purpose   This section provides the new and/or updated TL1 messages.
Messages that are not significantly updated are not reproduced in their
entirety in this document. Additional denial/error messages are
included in Table 5-24, "New and updated TL1 messages" (5-108)
with a reference to the original document.

**New and updated
messages**

Table 5-24   New and updated TL1 messages

TL1 Command	Details	Reference
APPLY	Additional denial message. The command will be denied of IMA LAN software is copied.	*DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*
CNVT-CRS	Additional denial message. The *aid* in the input command must point to slots equipped with circuit packs that support VT1.5 cross-connection. If an NE receives a CNVT-CRS command with *aid* values that do not conform to this equipage requirement, or if one of the *aid* points to a VCG of a BBG23 FEPL circuit pack, then the following error response is returned: ENSI /* Equipage, Not Equipped for Setting specified Information. */	*DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*
CPY-PROG	Additional denial message. The command will be denied of IMA LAN software is copied.	*DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*

Table 5-24   New and updated TL1 messages   (continued)

TL1 Command	Details	Reference
DLT-CRS-rr	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"DLT-CRS-rr" (5-112)
ED-EPORT	New command for R15.3.1	"ED-EPORT" (5-120)
ED-VCG	New command for R15.3.1	"ED-VCG" (5-127)
ENT-CRS-rr	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"ENT-CRS-rr" (5-132)
OPR-LPBK-rr	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"OPR-LPBK-rr" (5-157)
REPT DBCHG	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"REPT DBCHG" (5-164)
RLS-LPBK-rr	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RLS-LPBK-rr" (5-175)

Table 5-24   New and updated TL1 messages   (continued)

TL1 Command	Details	Reference
RTRV-ALM	New alarms added for Ethernet include the following: • inc. FE-LAN ANM/inc. FELAN ANM clrd • inc. FE-LAN LOS/inc. FELAN LOS clrd • FEPL Optical Module removed/FEPL Optical Module removed clrd • FEPL Optical Module failed/FEPL Optical Module failed clrd • FEPL CP failed/FEPL CP failed clrd • inc. STS-1 LOM/inc. STS-1 LOM clrd • inc. STS-1 SQM/inc. STS-1 SQM clrd • inc. VCG failed/inc. VCG failed clrd • inc. VCG LFD/inc. VCG LFD clrd • inc. VCG LOA/inc. VCG LOA clrd • inc. VT1 LOM/inc. VT1 LOM clrd • inc. VT1 SQM/inc. VT1 SQM clrd	Chapter 4, "Alarm messages and trouble clearing tasks" and *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*
RTRV-CRS-rr	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RTRV-CRS-rr" (5-181)
RTRV-EPM	New command for R15.3.1	"RTRV-EPM" (5-190)
RTRV-EPORT	New command for R15.3.1	"RTRV-EPORT" (5-197)
RTRV-EQPT	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RTRV-EQPT" (5-206)

Table 5-24   New and updated TL1 messages   (continued)

TL1 Command	Details	Reference
RTRV-STATE-EQPT	Updated command for R15.3.1. AIDs added to support the BBG23 FEPL circuit pack.	"RTRV-STATE-EQPT" (5-224)
RTRV-VCG	New command for R15.3.1	"RTRV-VCG" (5-235)

□

DLT-CRS-rr

....

NAME   `DLT-CRS`: Delete Cross-Connection <type>

The `DLT-CRS-rr` command is available beginning in DDM-2000, Release 15.3.1.

This command is available for DDM-2000 Multiplexers, starting with:

OC-3 Release 6.1 (for linear systems)

OC-3 Release 7.0, 7.1, OC-12 Release 3.1 (for rings)

FiberReach Release 1.0.

INPUT FORMAT   `DLT-CRS`-*modifier:tid*:*src_aid*:*dest_aid*:*ctag*;

DESCRIPTION

`DLT-CRS-rr` command can be initiated by a TL1 user to request the NE to take down VT-1.5 and STS1 (in FiberReach Wideband Shelf release 2.2, 3.1 and later releases), STS-3c (in FiberReach Wideband Shelf Release 3.1 and later releases), STS-1/STS-3c/VT-1.5 cross-connections in the DDM-2000 OC-3 and STS-1/STS-3c cross-connections in DDM-2000 OC-12 Add/Drop or Ring systems. Cross-connections in the DDM-2000 family of products are always two-way in the sense that a single command takes care of both the transmit and receive directions.

Refer to the `ENT-CRS-rr` command description for details on the restrictions on cross-connections in the the NE Add/Drop Rings Terminal for Path Protection Switched Rings.

When the NE receives an `DLT-CRS-rr` command, it will take down the cross-connections of the requested level (STS-1/STS-3c/VT-1.5) between the *aid* specified in the input command.

....

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The following are input parameters:

Table 5-25 `DLT-CRS` **Input Parameters**

Parameter	Description
modifier	n DDM-2000 OC-3 R6.1, 7.0, 7.1, 11.0, OC-12 R3.1 and FiberReach R1.0, this is the message modifier for the `DLT-CRS-rr` message and may have only one of the following values:
	• STS1 - This specifies that an STS-1 cross-connection be taken down. Applicable in DDM-2000 OC-3 and OC-12 ring and linear releases, and FiberReach Wideband Shelf release 2.2, 3.1 and later releases (when equipped with the 28-type or 29-type OLIU in Main slots).
	• STS3C - This specifies that an STS-3c cross-connection be taken down. This is applicable in DDM-2000 OC-12 releases starting from 5.0 and DDM-2000 OC-3 releases starting from 11.0 and FiberReach Wideband Shelf releases starting with 3.1. (Applicable only when the shelf is equipped with 28-type or 29-type OLIU circuit packs in its Main unit slots, and 22-type OLIU circuit packs in its function unit slots.)
	• VT1 - This specifies that a VT-1.5 cross-connection be taken down. Applicable in DDM-2000 OC-3 ring and linear releases and DDM-2000 FiberReach Wideband Shelf (WBS) rleases. (The 26-type OLIU circuit packs available in Release 2.2 and later releases; and 28-type and 29-type OLIU circuit packs - available in R3.1 and R4.0 and later - must be used to establish VT1.5 cross-connects).
tid	Target Identifier. This is the name of the network element to which the command is addressed. *tid* is a required parameter.

Table 5-25 `DLT-CRS` **Input Parameters** **(continued)**

Parameter	Description
src_aid	In DDM-2000 OC-3 R6.1, 7.0, 7.1, 11.0, OC-12 R3.1 and FiberReach R1.0, Source access identifier. The *src_aid*is a required parameter and must address a valid STS-1/STS-3c/VT-1.5 channel of the NE in order to be accepted. For the valid *aid* for FiberReach, OC-3 and OC-12 systems, see appropriate CIT command: DLT-CRS-VT1, DLT-CRS-STS1, DLT-CRS-STS3c. In DDM-2000 OC-3 R6.1, 7.0, OC-12 R3.1 and FiberReach R1.0, ALL is not allowed in the *src_aid* for this command.
dest_aid	In DDM-2000 OC-3 R6.1, 7.0, 7.1, 11.0, OC-12 R3.1 and FiberReach R1.0, Destination access identifier. The *dest_aid* is a required parameter and must address a valid STS-1/STS-3c/VT-1.5 channel of the NE in order to be accepted. For the valid *aid* for FiberReach, OC-3 and OC-12 systems, see appropriate CIT command: DLT-CRS-VT1, DLT-CRS-STS1, DLT-CRS-STS3c. In DDM-2000 OC-3 R6.1, 7.0, OC-12 R3.1 and FiberReach R1.0, ALL is not allowed in the *dest_aid* for this command
ctag	Correlation Tag. This is included in the command by the user and is repeated by the NE in the response to allow the user to associate the command and response messages.

OUTPUT FORMAT Refer to the `RTRV-HDR OUTPUT FORMAT` section. The requirements listed there apply to this command also.

OUTPUT PARAMETERS Refer to the `RTRV-HDR OUTPUT FORMAT` section. The requirements listed there apply to this command also.

EXAMPLE INPUT/OUTPUT
The following DDM-2000 OC-3 example takes down a two-way (add/drop) cross-connection between an STS-1 channel in the high speed OC-n line ("m-2") and a low speed port ("b"):

```
dlt-crs-sts1:ATT-PF-2000-3:m-2,b:123456;

IP 123456

<

ATT-PF-2000-3 93-11-26 16:42:11

M 123456 COMPLD

;
```

The following example takes down a two-way pass-through cross-connection for the VT-1.5 channel in the high speed OC-3 lines ("m-1-5-4") in an OC-3 Path Switched Ring.

```
dlt-crs-vt1:ATT-PF-2000-3:m-1-5-4,m-1-5-4:

IP Z89abc

<

ATT-PF-2000-3 93-11-26 16:53:22

M 123456 COMPLD

;
```

The following example takes down a drop-and-continue cross-connection between a low speed port ("b-6-2") and a VT-1.5 channel in the high speed OC-n line ("m-1-1-1") from Ring 1:

```
dlt-crs-vt1:ATT-PF-2000-3:b-6-2,m-1-1-1:654321;

IP 654321

<

ATT-PF-2000-3 93-11-26 16:54:33

M 654321 COMPLD

;
```

The following example takes down a STS-3c pass-through two-way cross-connection between the two STS-3c *aid*, "m-7" and "m-7" on its high speed OC-12 line interface in a DDM-2000 OC-3 ring system:

```
dlt-crs-sts3c:ATT-PF-2000-3:m-7,m-7:654321;

IP 654321
```

```
<

ATT-PF-2000-3 93-11-26 16:54:33

M 654321 COMPLD

;

IP 123456

<

ATT-PF-2000-3 93-11-26 16:42:11

M 123456 COMPLD

;
```

ERROR RESPONSES   Refer to the ERROR RESPONSES section of the RTRV-HDR command
in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers
Operations Systems Engineering Guide, 824-102-151*. The error
responses listed there also apply to this command.

In addition to the non-message-specific error found in SRD Section
2.4.4 and Appendix Section C.3.1, the following error responses are
those that the NE checks for each condition.

In DDM-2000 OC-12 R5.0, if a the system receives an DLT-CRS-rr
command with a command code modifier other than *STS3C*, *STS1*,
or*VT1*, the following error response is returned:

```
sid date time

M ctag DENY

ICNV

/* Input, Command Not Valid, invalid modifier */

;
```

If the NE receives an DLT-CRS-rr command without a *src_aid* value
or with a *src_aid* or *dest_aid* value that is inconsistent with the
modifier specified in the input command, the following error response
is returned to the user:

```
sid date time

M ctag DENY

IIAC
```

```
/* Input, Invalid Access Identifier, AID is missing wrong
or inconsistent with modifier*/
```

```
;
```

If the NE receives an otherwise valid `DLT-CRS-rr` command for which the system does not support cross-connection between the *src_aid* and *dest_aid* parameters values then the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IDNV
```

```
/* Input, Data Not Valid, cross connection not supported
between the specified AIDs*/
```

```
;
```

If the NE receives an otherwise valid `DLT-CRS-rr` command but at least one of the *aid* in the input command is currently cross connected to an *aid* other than the other *aid* specified in the input command then the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IDNV
```

```
/* Input, Data Not Valid, the specified cross-connection
does not exist and cannot be deleted*/
```

```
;
```

If the NE receives an otherwise valid `DLT-CRS-rr` command but for which, the cross-connection cannot be deleted because the cross-connect mode of the system is not currently set to *manual*, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
SNVS
```

```
/* Status, Not in Valid State, currently provisioned for
default cross-connections */
```

```
;
```

Users may not delete an STS-1 pass-through cross-connect through a 24G-U OLIU only if the STS-1 contains AIS in both directions. Adjacent shelves should have *idle* set to *ais* to insure AIS is inserted on STS-1 channels that are not cross-connected.) 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 and the following error response is returned to the user:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, The specified path must be
in the AIS state to delete the cross-connect*/

;
```

If the NE receives an otherwise valid `DLT-CRS-rr` command but for which the DDM-2000 is not properly equipped, the following error response is returned:

```
sid date time

M ctag DENY

ENSI

/* Equipage, Not equipped for Setting specified
information */

;
```

The following list provides some sample cases, where the above error would result:

DDM-2000 OC-3, OC-12 or FiberReach WBS system receives an otherwise valid cross-connection command, but the slot pair addressed by at least one of the *aids* in the input command is equipped with a mix of incompatible circuit packs.

In DDM-2000 OC-3 R15.0 or FiberReach R4.0 and later,if this command with a command code modifier STS1 or VT1 is received by the NE while a software download is in progress to an IMA LAN circuit pack associated with that VT1 or VT-structured STS1, the following error message will be returned:

```
sid date time
```

```
M ctag DENY

SNVS

/* Status, Not in Valid State,*/

IMA LAN software download IP */

;
```

In DDM-2000 OC-3 R11.0 and later, if this command is received by the NE while a mix of incompatible packs exists in the main group, i.e. during upgrade, the following error message will be returned:

```
sid date time
```

SNVS

```
/* Status, Not in Valid State, both main slots must be
equipped with compatible OLIU packs */

;
```

RELATED TL1 MESSAGES   ent-crs-rr, rtrv-crs-rr

□

ED-EPORT
....

NAME ED-EPORT: Edit Ethernet Port

The ED-EPORT command is available beginning in DDM-2000, Release 15.3.1.

LOGIN PRIVILEGE This command is available to users with Privileged and General access.

INPUT FORMAT ED-EPORT:*tid*:*aid*:*ctag*:::*spec_block*;

DESCRIPTION The ED-EPORT command modifies (edits) the properties of an Ethernet port.

Execution of this command, whether successful or denied, will be recorded in the Security log.

The ED-EPORT command generates a REPT DBCHG message.

Table 5-26 ED-EPORT **Input Parameters**

Parameter	Description
tid	Target Identifier. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* for the input parameter syntax and description of this parameter.
aid	Access Identifier. This is the address of a FEPL AID. Refer to the "Cross-connection matrix" (2-28) for valid AIDs.
ctag	Correlation Tag. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* command for the input parameter syntax and description of this parameter.
spec_block	Specific Block. The spec_block parameters are defined in the following table.

....
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Table 5-27 `ED-EPORT` **Input *spec_block* Parameters**

Parameter	Description
epmode	Ethernet port monitoring Mode. When a port is provisioned in the AUTO state, it will automatically transition to the in-service (IS) state upon detection on the port of a valid input. Epmode has the following values: • `AUTO` (Initial value) • `NMON`
eppm	Ethernet Port and VCG port PM enable. This parameter controls whether Ethernet performance monitoring is enabled for the specified Ethernet and VCG port. It has the following values: • `ENABLE` • `DISABLE` (Initial value)
fcmd	Flow control mode. It has the following values: • `ENABLE` - Enable Transmit & Receive • `DISABLE` - Disable Transmit & Receive • `AUTO` - Auto-negotiate (Initial value) • `DROP` - Disable end-to-end flow-control Transmit & Receive. Note: ENABLE and DISABLE only control Network-element controlled (local) flow-control; both ENABLE and DISABLE still allow Customer Equipment controlled end-to-end flow control. DROP both disables Network-element controlled flow-control and drops end-to-end flow-control messages. The value AUTO does not apply to optical port (port 5) on the BBG23, so the initial port 5 value is ENABLE.

Table 5-27 `ED-EPORT` **Input *spec_block* Parameters (continued)**

Parameter	Description
lnrate	Line Rate. It has the following values: • `AUTO` (Initial value) • `10M` • `100M` Note: This parameter only applies to electrical ports (1-4).
admin	Port administration control. This parameter is used to enable/disable a port. This will disable all frames to and from the port.
almlvl	Alarm Level. This parameter sets the alarm level for an incoming signal Failure and may have one of the following values: • `cr` - Critical Alarm (initial value) • `mj` - Major Alarm • `mn` - Minor Alarm • `na` - No Alarm
mtu_size	MTU size (in bytes). This parameter specifies the MTU (Maximum Transmission Unit) size supported on the port, addressed by the `aid`. This is the size of the payload in the Ethernet frame, excluding Source and Destination Address, Type/Length, and CRC field. Note: mtu_size must be an integer in the range of 1500 to 9614. The default value of mtu_size is 1500.

Table 5-27   `ED-EPORT` **Input *spec_block* Parameters (continued)**

Parameter	Description
autoneg	Autonegotiation. This parameter specifies whether autonegotiation is enabled on a port. Valid values are: • `ENABLE` - (Initial value) autonegotiation enabled. • `DISABLE` - autonegotiation disabled. If fcmd or lnrate parameters are set to AUTO when autoneg is set to DISABLE, then the system will set them as follows: fcmd = ENABLE lnrate = 100M Note: The autoneg parameter does not pertain to the optical port (port 5) on the BBG
mdix	Crossover. This parameter sets the crossover mode for the port. Valid values are: • `AUTO` - (Initial value) automatic crossover is enabled. The system determines if crossover is needed, then sets the port to AUTOMDIX or AUTOMDI mode. • `MDIX` - RJ-45 TXP/TXN pins are transmit, RJ-45 RXP/RXN pins are receive. • `MDI` - RJ-45 TXP/TXN pins are receive, RJ-45 RXP/RXN pins are transmit. Note: The mdix parameter does not pertain to the optical port (port 5).

OUTPUT FORMAT   If the NE fully complies with the `ED-EPORT` request, the following normal completion response is returned:

```
sid date time

M ctag COMPLD

;
```

| OUTPUT PARAMETERS | Refer to the OUTPUT PARAMETERS section of the `RTRV-HDR` command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The output parameters listed there also apply to this command. |

EXAMPLE INPUT/OUTPUT

```
ED-EPORT:TID123:a-1:123456:::epmode=NMON;

TID123 00-01-01 08:00:00

M 123456 COMPLD

;
```

ERROR RESPONSES

Refer to the ERROR RESPONSES section of the `RTRV-HDR` command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The error responses listed there also apply to this command.

If the user enters an AID that is not valid for circuit pack, the following error response is returned:

```
sid date time

M ctag DENY

IIAC

/* Input, Invalid Access Identifier, AID is missing, wrong
or inconsistent with modifier */

;
```

If the specified parameter value does not have a valid value, the following error response is displayed:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, one or more input parameters not
valid with specified circuit pack */

;
```

If the network element receives an ED_EPORT with an invalid AID value, the following error response is returned:

```
sid date time

M ctag DENY
```

```
IIAC

/* Input, Invalid Access Identifier */

;
```

If any of the fcmd, lnrate, or mtu_size parameters are changed while epmode and vmode for the AID is IS, the following error response is returned:

```
sid date time

M ctag DENY

SNVS

/* parameter(s) cannot be changed on IS port */

;
```

If a parameter appears more than once within a single command, the following error response is returned:

```
sid date time

M ctag DENY

IISP

/* Input, Invalid Systax or Punctuation, parameter(s)
multiply defined */

;
```

If the slot of the specified AID is empty, the following error response is returned:

```
sid date time

M ctag DENY

ENEQ

/* Equipage, Note EQuipped */

;
```

If the slot of the specified AID does not contain a BBG23 FEPL circuit pack, the following error response is returned:

```
sid date time

M ctag DENY

ENSI
```

```
/* Equipage, Not equipped for Setting specified
Information */

;
```

RELATED TL1 MESSAGES   rtrv-vcg, rtrv-eport, rtrv-eqpt

☐

ED-VCG

....

NAME ED-VCG: Edit Virtual Concatenation Group

The ED-VCG command is available beginning in DDM-2000, Release 15.3.1.

LOGIN PRIVILEGE This command is available to users with Privileged and General access.

INPUT FORMAT ED-VCG:*tid*:*aid*:*ctag*:::*spec_block*;

DESCRIPTION The ED-VCG command is used to modify (edit) the properties of a virtual concatenation group (VCG).

Execution of this command, whether successful or denied, will be recorded in the Security log.

The ED-VCG command generates a REPT DBCHG message.

Table 5-28 ED-VCG **Input Parameters**

Parameter	Description
tid	Target Identifier. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* for the input parameter syntax and description of this parameter.
aid	Access Identifier. This is the address of a VCG AID. Refer to the "Cross-connection matrix" (2-28) for valid AIDs.
ctag	Correlation Tag. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* command for the input parameter syntax and description of this parameter.
spec_block	Specific Block. The spec_block parameters are defined in the following table.

....

Table 5-29 `ED-VCG` **Input** *spec_block* **Parameters**

Parameter	Description
almlvl	Alarm Level.
	This parameter sets the alarm level for an incoming signal Failure and may have one of the following values:
	• `cr` - Critical Alarm (initial value)
	• `mj` - Major Alarm
	• `mn` - Minor Alarm
	• `na` - No Alarm
gfp_fcs	GFP FCS (Frame Check Sequence).
	This parameter controls the handling of the GFP FCS field for the specified VCG.
	Values for GFP FCS are:
	• `enable` - When interworking with equipment that supports the GFP FCS, *gfp_fcs* should be set to `enable`.
	• `disable` (initial value) - When interworking with current DMX family network elements, *gfp_fcs* should be set to `disable`.
	NOTE: The value of *gfp_fcs* cannot be changed while the state of the FELAN port and VCG port for *aid* are both In Service.

Table 5-29   ED-VCG **Input** *spec_block* **Parameters**   **(continued)**

Parameter	Description
vcat	Virtual Concatenation Mode.
	This parameter controls whether H4 is inserted/monitored for the specified VCG. It has effect only when a single trib, not VT, is cross-connected to the VCG, to allow interworking with non-VCAT equipment.
	Values for Virtual Concatenation Mode are:
	• enable (initial value) - Insert/monitor H4.
	• disable - Do not insert/monitor H4.
	Note: The value of *vcat* cannot be changed while the state of the FELAN port and VCG port for *aid* are both In Service.

OUTPUT FORMAT   If the NE fully complies with the ED-VCG request, the following normal completion response is returned:

```
sid date time

M ctag COMPLD

;
```

OUTPUT PARAMETERS   Refer to the OUTPUT PARAMETERS section of the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151.* The output parameters listed there also apply to this command.

EXAMPLE INPUT/OUTPUT
```
ED-VCG:TID123:c-2:123456:::vcat=DISABLE;

TID123 00-01-01 08:00:00

M 123456 COMPLD

;
```

ERROR RESPONSES   Refer to the ERROR RESPONSES section of the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers*

Operations Systems Engineering Guide, 824-102-151. The error responses listed there also apply to this command.

If the user enters an AID that is not valid for circuit pack, the following error response is returned:

```
sid date time

M ctag DENY

IIAC

/* Input, Invalid Access Identifier, AID is missing, wrong
or inconsistent with modifier */

;
```

If the user enters a parameter that is not valid for circuit pack, the following error response

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, one or more input parameters not
valid with specified circuit pack */

;
```

The *gfp_fcs* or *vcat* parameters cannot be changed while port is in service. If either of the *gfp_fcs* or *vcat* parameter is changed while *epmode* and *vmode* for the AID are IS, the following error response is returned:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, parameter(s) cannot be
changed on IS port */

;
```

If a parameter is multiply defined, (appears more than once within a single command), the following error response is returned:

```
sid date time

M ctag DENY
```

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```
IISP

/* Input, Invalid Syntax or Punctuation, parameter(s)
multiply defined */

;
```

If the slot of the specified AID is empty, the following error response is returned:

```
sid date time

M ctag DENY

ENEQ

/* Equipage, Not EQuipped */

;
```

If the slot of the specified AID does not contain a BBG23 FEPL circuit pack, the following error response is returned:

```
sid date time

M ctag DENY

ENSI

/* Equipage, Not equipped for Setting specified
Information */

;
```

RELATED TL1 MESSAGES   rtrv-vcg, rtrv-eqpt

ENT-CRS-rr

....

NAME   `ENT-CRS-rr`: Establish an STS-1/STS-3c/VT1.5 cross-connection

This command is available for DDM-2000 Multiplexers, starting with:

OC-3 Release 6.1 (for linear systems)

OC-3 Release 7.0, 7.1, OC-12 Release 3.1 (for rings)

FiberReach Release 1.0.

INPUT FORMAT   In all DDM-2000 OC-3 linear releases up to and including R6.2, DDM-2000 OC-3 ring releases up to and including R7.0, DDM-2000 OC-12 linear releases up to and including R2.2, and DDM-2000 OC-12 ring releases up to and including R3.0, the following input format will be used:

`ENT-CRS-`:*modifier*:*tid*:*src_aid*:*dest_aid*:*ctag [:[cct]:[spec_block]]*;

In all DDM-2000 OC-3 linear release 8.0 and later, DDM-2000 OC-3 ring release 7.1 and later, DDM-2000 OC-12 linear release 4.0 and later, DDM-2000 OC-12 ring release 3.1 and later, and DDM-2000 FiberReach release 1.0 and later the following input format will be used:

`ENT-CRS-`:*modifier*:*tid*:*src_aid*:*dest_aid*:*ctag [::[cct]:[spec_block]]*;

DESCRIPTION   The `ENT-CRS-rr` command can be initiated by a user to request to establish STS-1/STS-3c/VT-1.5 cross-connections in FiberReach systems, STS-1/STS-3c/VT-1.5 cross-connections in the DDM-2000 OC-3 and STS-1/STS-3c cross-connections only in DDM-2000 OC-12 Add/Drop or Ring systems. Different types of cross-connections, *Drop* (including hairpin), *Drop and Continue*, *pass-through*, and *locked* (but all of them two-way in the DDM-2000 family of products in the sense that a single command takes care of both transmit and receive directions) can be established by setting the appropriate parameters in the input command line.

Starting with DDM-2000 OC-3 Release 15.0, with 29-type OLIUs in the mains, any of the 12 STS-1s in the OC-12 interface can be selected for STS-1 or VT1.5 cross-connection to Function Units or Pass-Through STS-1 cross-connections

Up to 12 STS-1s can be cross-connected as Pass-Through on OC-12 Ring.

....

Up to 7 STS-1 channels or 196 VT1.5s (Group 4 shelves and earlier)

Any of the 12 STS-1s on the 29G-U OC-12 interface can be selected for VT cross- connections to Function Units or for Pass-Through cross-connections. Up to 196 VT1.5 channels can be add-drop cross-connected from the OC-12 ring to Fn unit groups on the OC-12 ring.

The STS-3c cross-connects between 29G-U OLIUs in Mains and 22 OLIUs in the Function Units are allowed for 0X1 application only. The Group 4 shelf can support such cross-connect to the Function Group C only.

Special licensing is not required for STS-3c cross-connects in OC-3 ring shelves that are equipped with 24G-U or 29-type OLIUs in Mains.

When the Network Element (NE) receives an ENT-CRS-rr command, it will establish a STS-1/STS-3c/VT-1.5 cross-connection according to the parameter settings in the command.

The established cross-connections will remain in effect until modified (for example, by a DLT-CRS-rr TL1 and a subsequent ENT-CRS-rr TL1 command, or by the appropriate DDM-2000 CIT command).

Starting with Rel 15.0, the IMA LAN (BBF9) circuit pack will be supported in the Low Speed slots of DDM-2000 OC-3 shelf.

Each IMA LAN circuit pack occupies 2 adjacent Low-Speed DS1 slots, the pack can use up to 8 VT1.5 channels and will be addressed as two quad-DS1 circuit packs.

Up to three IMA LAN circuit packs can be installed in a DDM-2000 OC-3 Low speed group (a, b and/or c) when associated Function Unit is the BBG2B MXRVO. In Group 3 and Group 4 shelves if the MXRVO is BBG2 only one IMA LAN can be supported.

> **Important!** In Group 4 or earlier shelf, the BBG2 MXRVO can not support more than one IMA LAN (BBF9) in the the Low Speed slots of corresponding Function Group. If an attempt is made install additional BBF9 , the performance of other Low Speed interface in that function group may be adversely affected.

The following lists different Low Speed slot combinations that the IMA LAN circuit pack can use:

ls-{a,b,c}-{1 & 2}

ls-{a,b,c}-{2 & 3}

ls-{a,b,c}-{3 & 4}

ls-{a,b,c}-{5 & 6}

ls-{a,b,c}-{6 & 7}

Mixing of IMA LAN circuit pack with other Low Speed packs is allowed. High speed OLIUs (22, 24, 27 or 29-type) can be used with the IMA LAN circuit pack.

Starting with Rel 15.3, the FEPL (BBG23) circuit pack will be supported in the Function Units of DDM-2000 OC-3 shelf. Cross-connections involving the BBG23 are supported as defined in the Cross-connect Provisioning Matrix.

Either 10 Mbps or 100 Mbps Ethernet service can be carried over any single 10/100BASE-T port, whether or not full bandwidth is cross-connected to its corresponding VCG. 100 Mbps Ethernet service can be carried over the 100BASE-FX port, whether or not full bandwidth is cross-connected to its corresponding VCG. Each port may independently use one of the following SONET mappings: STS1, STS3c, STS1-xv where x=1-3, or VT1.5-xv, where x=1-63. Two-way cross-connections are the only supported cross-connects for all ports.

Note that service may be lost when a tributary is added to a VCG until end-to-end provisioning of a VCG is complete.

The following are input parameters:

Table 5-30 ENT-CRS **Input Parameters**

Parameter	Description
modifier	In DDM-2000 OC-3 R6.1, 7.0, 7.1, 11.0, OC-12 R3.1 and FiberReach R1.0, this is the command modifier for the ENT-CRS-rr message and may have only one of the following values: • STS1 - This specifies that an STS-1 cross-connection be established. Applicable in DDM-2000 OC-3 and OC-12 ring and linear releases. • STS3C - This specifies that an STS-3c cross-connection be established. This is applicable in DDM-2000 OC-12 releases starting from 5.0 and DDM-2000 OC-3 releases starting from 11.0. • VT1 - This specifies that a VT-1.5 cross-connection be established. Applicable in DDM-2000 OC-3 ring and linear releases and DDM-2000 FiberReach Wideband Shelf (WBS) releases.
tid	Target Identifier. This is the name of the network element to which the command is addressed. The *tid* is a required parameter.
src_aid	Source access identifier. The *src_aid* is a required parameter and must address a valid STS-1/STS-3c/VT-1.5 channel or a port of the NE in order to be accepted. For the valid *aids* for FiberReach, OC-3 and OC-12 systems, see appropriate CIT command: DLT-CRS-VT1, DLT-CRS-STS1, DLT-CRS-STS3c. The value ALL is not allowed in the *src_aid* for this command.

Table 5-30   `ENT-CRS` **Input Parameters   (continued)**

Parameter	Description
dest_aid	Destination access identifier. The *dest_aid* is a required parameter and must address a valid STS-1/STS-3c/VT-1.5 channel or port of the NE in order to be accepted. For the valid *aids* for NE, see appropriate CIT command: `DLT-CRS-VT1`, `DLT-CRS-STS1`, `DLT-CRS-STS3c`. In DDM-2000 OC-3 R6.1, 7.0, OC-12 R3.1 and FiberReach R1.0, the value `ALL` is not allowed in the *dest_aid* for this command
ctag	Correlation Tag. This is included in the command by the user and is repeated by the NE in the response to allow the user to associate the command and response messages.

Table 5-30 ENT-CRS **Input Parameters   (continued)**

Parameter	Description
cct	Cross-connection type. This parameter specifies the type of cross-connection be requested and will be null or have one of the following values: 2WAY This value is allowed only for linear systems. This requests a two-way add/drop cross-connection between the source and destination be established (this is the default value for linear systems); valid for DDM-2000 OC-3, and OC-12 systems. 2WAYPR This value is allowed only for ring systems. This requests two-way add/drop or pass-through cross-connection between the source and destination in a path switched ring be established (this is the default value for ring systems); valid for DDM-2000 OC-3, OC-12 and FiberReach system Starting with DDM-2000 OC-3 Release 15.0, *2WAYPR* add/drop cross-connect type for an STS-3c can only be selected while the *APPLICATION* parameter in the ENT-rr command is set to *0X1*.

Table 5-30   ENT-CRS **Input Parameters   (continued)**

Parameter	Description
cct (continued)	Starting with Release 15.0, the IMA LAN (BBF9) circuit pack will be supported in the Low Speed slots of OC-3 shelf. It is also applicable to FiberReach shelf starting with Release 4.0. All type of VT1.5 cross-connects that are supported for other DS1 circuit packs will also be supported for the IMA LAN.
	Starting with Release 15.0 and FiberReach Release 4.0, this type of cross-connect is applicable to IMA LAN (BBF9) circuit pack.
	2WAYBR
	This value is allowed only for ring systems. This requests a Drop-and-Continue cross-connection between the source and destination be established; valid for DDM-2000 OC-3 and OC-12 systems. Not allowed if *src_aid* or *dest_aid* refers to a port on the FEPL circuit pack.
	COV
	This value is allowed only in OC-12 release 5.0 and beyond ring systems, when the *modifier* is *STS3C*.
	This requests that two independent STS-3c signals received from the two receive fibers of a single OC-3 or IS-3 LS interface be added independently to the two directions of a single STS-3C channel (timeslot) in the OC-12 ring.

Table 5-30   ENT-CRS **Input Parameters   (continued)**

Parameter	Description
cct (continued)	RTV
	This value is allowed only in OC-12 release 5.0 and beyond ring systems, when the *modifier* is *STS3* .
	This requests that two independent STS-3c signals received from the two directions of a single STS-3c channel on the OC-12 ring be dropped independently to the two transmit fibers of a single OC-3 or IS-3 LS interface while also continuing those signals on the ring.
	LOCKED
	This value is allowed only in the DDM-2000 ring systems (OC-3 Release 9, FiberReach R1.0 and after). This requests that a single channel received from only one rotation of the path switched ring (determined by the *RING spec_block* parameter) addressed by the *src_aid* or *dest_aid* be dropped independently to the low-speed channel addressed by the other *aid* in the input command. This *cct* is not allowed in OC-12 systems. Not allowed if *src_aid* or *dest_aid* refers to a port on the FEPL circuit pack.
	Starting with Release 15.0 and FiberReach Release 4.0, this type of cross-connect is applicable to IMA LAN (BBF9) circuit pack.

If the *cct* cct value is null, the default value of *2way* will be used if the NE addressed by the *tid* in the input command is a linear system and *2waypr* if it is a ring system.

2WAY will be supported in DDM-2000 OC-3 R6.1 and OC-12 R2.1 and in all later linear releases. *COV*, and *RTV* will be supported in DDM-2000 OC-12 R5.0 and all later ring releases.

2WAYPR and *2WAYBR* will be supported in DDM-2000 OC-3 R7.1 and OC-12 R3.1 and in all later ring releases.

BLOCKED will be supported in DDM-2000 OC-3 R9.0 and in all later ring releases.

2WAYPR and *BLOCKED* will be supported in DDM-2000 FiberReach R1.0 and in all later ring releases.

COV and RTV will be supported in DDM-2000 OC-12 R5.0 and all later ring releases.

Table 5-31   `ENT-CRS-rr` **Input *spec_block* Parameters**

spec_block	Specific block. This parameter field is used for most basic capabilities of the `ENT-CRS-rr` command, as specified in Bellcore TR-199, Issue 2. Parameters set within the specific block are positionally independent and are set using a construct of: *PARAMETER=value* in a comma-separated list. Furthermore, each parameter listed below will appear at most once within the specific block for a single `ENT-CRS-rr` command.
	For each of the parameters below there is listed one or more parameter values. The use of the term "null" in the descriptions below, implies that the parameter does not appear in the command.
	Since the *2WAYBR* and *BLOCKED* cross-connections can be set up from either of the two rings that make up a complete path switched ring, the user will be required to specify the ring to set up the drop from. In DDM-2000 OC-3 and FiberReach rings, the main-1 receive fiber has been designated to carry Ring 1 and the main-2 receive fiber has been designated to carry Ring 2. In DDM-2000 OC-12 rings, the main-b-1 receive fiber has been designated to carry Ring 1 and the main-b-2 receive fiber has been designated to carry Ring 2.

Table 5-31 `ENT-CRS-rr` **Input *spec_block* Parameters (continued)**

spec_block (continued)	RING
	In DDM-2000 OC-3 R7.0, 7.1 and FiberReach 1.0, if the *cct* is *2WAYBR* or *BLOCKED*, then this specific block parameter must be specified. It must have one of the following two values:
	M1
	Specifies that the cross-connection must be set up for Ring 1 to drop-and-continue.
	M2
	Specifies that the cross-connection must be set up for Ring 2 to drop-and-continue.

OUTPUT FORMAT   Refer to the `RTRV-HDR OUTPUT FORMAT` section. The requirements listed there apply to this command also.

OUTPUT PARAMETERS   Refer to the `RTRV-HDR OUTPUT PARAMETERS` section. The requirements listed there apply to this command also.

EXAMPLE INPUT/OUTPUT   The following DDM-2000 OC-3 example established a two-way (add/drop) cross-connection between an STS-1 channel in the high speed OC-n line (″m-2″) and a low speed port (″b″):

`ent-crs-sts1:ATT-PF-2000-3:m-2,b:123456;`

`IP 123456`

`<`

`ATT-PF-2000-3 93-11-26 16:42:11`

`M 123456 COMPLD`

`;`

The following example DDM-2000 OC-3 (ring system earlier than R7.1) establishes a two-way pass-through cross-connection for the VT-1.5 channel in the high speed OC-3 lines (″m-2-5-4″) in a DDM-2000 OC-3 Path Switched Ring.

`ent-crs-vt1:ATT-PF-2000-3:m-2-5-4,m-2-5-4:Z89abc:2waypr`

```
IP Z89abc

<

ATT-PF-2000-3 93-11-26 16:53:22

MZ89abc COMPLD

;
```

The same command will have the following input format in OC-3 Releases7.1 and beyond. Notice that there are 2 colons between the ctag of Z89abc and the cct of 2waypr.

```
ent-crs-vt1:ATT-PF-2000-3:m-2-5-4,m-2-5-4:Z89abc::2waypr
```

The following DDM-2000 OC-3 (ring system earlier than R7.1) example establishes 2WAYBRcross-connection between a low speed port ("b-6-2") and a VT-1.5 channel in the high speed OC-3 line ("m-1-1-1") from Ring 1:

```
ent-crs-vt1:ATT-PF-2000-3:b-6-2,m-1-1-1:654321:2waybr:ring=m1;

IP 654321

<

ATT-PF-2000-3 93-11-26 16:54:33

M 654321 COMPLD

;
```

The same command will have the following input format in OC-3 Releases 7.1 and beyond

```
ent-crs-vt1:ATT-PF-2000-3:b-6-2,m-1-1-1:654321:2waybr:ring=m1;
```

If there had been another *VT1 2WAYBR* path already established in this OC-3 system with the *Ring* parameter set to *m2*, the command would not have *COMPLD* at the DDM-2000. A *DENY* would have resulted instead.

The following example establishes an STS-3c pass-through cross-connection between the STS-3c channels in the OC-12 interfaces in the main slots occupying STS-1 time slots mb-7, mb-8, and mb-9:

```
ent-crs-sts3c:ATT-PF-2000-3:m-7,m-7:654321::2waypr;

IP 654321

<

ATT-PF-2000-3 93-11-26 16:54:33
```

```
M 654321 COMPLD
```

```
;
```

If there had been no OC-12 interfaces in both main slots or if any of mb-7, mb-8, or mb-9 were already involved in another cross-connection, then the command would not have completed.

The following OC-3 (ring system starting from release 11.0) example establishes a pass-through STS-3c cross-connection between the STS-3c channels in the OC-12 interfaces in the main slots occupying STS-1 time slots mb-7, mb-8 and mb- 9: 8

```
ent-crs-sts3c:ATT-PF-2000-3:mb-7,mb-7:654321::2waypr;
```

```
IP 654321
```

```
<
```

```
ATT-PF-2000-3 93-11-26 16:54:33
```

```
M 654321 COMPLD
```

```
;
```

The following example establishes an STS-3c add/drop cross-connection between the OC-3 interface in the function slot ″b″ and the STS-3c channel in the high speed OC-12 line (″mb-10″) in a DDM-2000 OC-12 ring system:

```
ent-crs-sts3c:ATT-PF-2000-3:mb-10,b-1:654321::2waypr;
```

```
IP 654321
```

```
<
```

```
ATT-PF-2000-3 93-11-26 16:54:33
```

```
M 654321 COMPLD
```

```
;
```

If there had been no OC-3 interface in the function slot ″b″ or if any of mb-10, mb-11, mb-12, b-1, b-2, and b-3 were already involved in another cross-connection, or if the OC-3 interface had been set up for an application other than 0X1, then the command would not have completed.

The following example establishes an STS-1 add/drop cross-connection between the FEPL Fast Ethernet Private Line interface port 5, trib 1 (″a-5-1″) in the function slot ″a″ and the STS-1

channel in the high speed OC-3 line (″m-1″) in a DDM-2000 OC-3 ring system:

```
ent-crs-sts1:ATT-PF-2000-3:m-1,a-5-1::654321::2waypr;

IP 654321

<

ATT-PF-2000-3 93-11-26 16:54:33

M 654321 COMPLD

;
```

The following example establishes an STS-1 add/drop cross-connection between the FEPL Fast Ethernet Private Line interface port 1, trib 3 (″c-1-3″) in the function slot ″c″ and the STS-1 channel in the high speed OC-12 line (″m-12″) in a DDM-2000 OC-3 ring system:

```
ent-crs-sts1:ATT-PF-2000-3:m-12,c-1-3::654321::2waypr;

IP 654321

<

ATT-PF-2000-3 93-11-26 16:54:33

M 654321 COMPLD

;
```

The following example establishes an STS-3c add/drop cross-connection between the FEPL Fast Ethernet Private Line interface port 1, trib 1 (″c-1-1″) in the function slot ″c″ and the STS-1 channel in the high speed OC-3 line (″m-1″) in a DDM-2000 OC-3 ring system:

```
ent-crs-sts3c:ATT-PF-2000-3:m-1,c-1-1::654321::2waypr;

IP 654321

<

ATT-PF-2000-3 93-11-26 16:54:33

M 654321 COMPLD

;
```

Note: The sts3c cross-connection is supported in function slot "c" only.

ERROR RESPONSES   Refer to the ERROR RESPONSES section of the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The error responses listed there also apply to this command.

In addition to the non-message-specific error found in SRD Section 2.4.4 and Appendix Section C.3.1, the following error responses are those that the NE checks for each condition.

If the NE receives an ENT-CRS-rr command with the same parameter specified more than once (with the exception of DDM-2000 OC-3, OC-12 and FiberReach ring systems in which the source and destinations must be the same and both the source and destination aids must point to main slots for pass-through cross-connections), the following error response is returned:

```
sid date time

M ctag DENY

IISP

/* Input, Invalid Syntax or Punctuation, parameter(s)
multiply defined */

;
```

If DDM-2000 OC-3 (R11.0) receives an ENT-CRS-rr command with a command code modifier other than *STS1* or *VT1*, the following error response is returned:

```
sid date time

M ctag DENY

ICNV

/* Input, Command Not Valid, invalid modifier */

;
```

If DDM-2000 OC-3 receives an ENT-CRS-rr command with a command code modifier other than *STS3C*, *STS1*, or *VT1*, the following error response is returned:

```
sid date time

M ctag DENY

ICNV
```

```
/* Input, Invalid Syntax or Punctuation, parameter(s)
multiply defined */
```

```
;
```

If DDM-2000 OC-3 or FiberReach shelf receives an `ENT-CRS-rr` command with a command code modifier *STS1* or *VT1* when a software download is in progress to an IMA LAN pack associated with that VT1 or the VT cross-connected STS1 , the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
SNVS
```

```
/* Status, Not in Valid State, IMA LAN software download
IP */
```

```
;
```

If the NE receives an `ENT -CRS-rr` command without a *src_aid* or *dest_aid*value or with a *src_aid* or *dest_aid* value that does not identify either a single STS-1/STS-3c/VT-1.5 channel in the high speed OC-n line or a single low speed port or channel, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IIAC
```

```
/* Input, Invalid Access Identifier, AID is missing wrong
or inconsistent with the modifier*/
```

```
;
```

If a DDM-2000 OC-3 (R6.1) system receives an `ENT-CRS-VT1` command with either the *src_aid* or *dest_aid* value pointing to a VT1 channel of a STS1E CP while the corresponding STS1 port is in the *NMON* state, the following error response is returned:

```
;
```

```
sid date time
```

```
M ctag DENY
```

```
SNVS
```

```
/* Status, Not in Valid State, EC1 port is in OOS state */
```

;

If a DDM-2000 OC-3 (R9.0) system receives an `ENT-CRS-VT1` command with either the *src_aid* or *dest_aid* value pointing to a VT1 channel on an OC-1 line while the corresponding OC-1 line is in the *NMON* state, the following error response is returned:

;

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, one of the addressed
channels is on a line in a valid state */

;
```

If a DDM-2000 OC-3 (R15.0) system receives an `ENT-CRS-VT1` command with either the *src_aid* or *dest_aid* value pointing to a VT1 channel in the STS-1 A3 or B3, the following error response is returned:

;

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, Vt1.5 crossconnects to a-3
or b-3 are not valid*/

;
```

If a DDM-2000 OC-3 (R15.0) system with T1EXT (BBF6) circuit packs in Low Speed slots, receives a valid `ENT-CRS-VT1` command with either the *src_aid* or *dest_aid* value pointing to a VT1 channel other than 1 or 2 in the T1EXT (BBF6), the following error response is returned:

;

```
sid date time

M ctag DENY

ENSI
```

....

```
/* Equipage, Not equipped for Setting specified
information */
```

```
;
```

In DDM-2000 OC-3 R6.1, if a linear DDM-2000 receives an ENT-CRS-rr command with a *cct* value other than null or *2WAY*, the following error response is returned:

```
;
```

```
sid date time
```

```
M ctag DENY
```

```
IDNV
```

```
/* Input, Data Not Valid, invalid CCT */
```

```
;
```

In DDM-2000 OC-3 R9.0, if a ring DDM-2000 system system receives an ENT-CRS-rr command with a *cct*value other than null, *2WAYPR, 2WAYBR, or LOCKED*, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IDNV
```

```
/* Input, Data Not Valid, invalid CCT */
```

```
;
```

In DDM-2000 OC-3 7.0, 7.1 and OC-12 R3.1, if a ring system receives an ENT-CRS-rr command with a *cct*value set to *2WAYPR*, but the source and destination AIDs representing two different HS time slots of the ring, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IDNV
```

```
/* Input, Data Not Valid, Pass-through grooming not
allowed */
```

```
;
```

The term *Pass-through grooming*refers to cross-connecting a timeslot of a ring received at a ring node to a different timeslot of the same

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ring in the transmit direction of the same ring node. For example, cross-connecting the VT, m-1-1-1 to anything other than m-1-1-1 will be considered pass-through grooming, whereas cross-connecting the VT m-1-1-1 to m-1-1-1 will not be considered pass-through cross-connection.

In DDM-2000 OC-3 7.0, 7.1 and OC-12 R3.1, if a ring system receives an `ENT-CRS-rr` command with a *cct*value set to *2WAYBR* but without the *RING* parameter set in the *spec_block*, the following error response is returned:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, RING parameter must be set when
CCT is 2WAYBR */

;
```

In DDM-2000 OC-3 R6.1, if a ring system receives an `ENT-CRS-rr` command with a *cct* value set to *2WAYBR* or *LOCKED* but without the *RING* parameter set in the *spec_block*, the following error response is returned:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, RING parameter must be set when
CCT is 2WAYBR or LOCKED */

;
```

In DDM-2000 OC-3 R7.0, 7.1 and OC-12 R3.1, if a ring system receives an `ENT-CRS-rr` command with *RING* parameter in the *spec_block* with the *cct* set to a value other than *2WAYBR*, the following error response is returned to the user:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, RING parameter is valid only
when CCT is set to 2WAYBR */
```

....

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```
;
```

In DDM-2000 OC-3 R9.0, if a ring system receives an `ENT-CRS-rr`
command with *RING* parameter in the *spec_block* with the *cct* set to a
value other than *2WAYBR* or *LOCKED*, the following error response is
returned to the user:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, RING parameter is valid only
when CCT is set to 2WAYBR or LOCKED */

;
```

In DDM-2000 OC-3 R9.0 and FiberReach R1/0, if the NE receives an
`ENT-CRS-rr`command with the *RING* parameter in the *spec_block*
whose value is other than *m1*, or *m2*, the following error response is
returned:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, invalid RING */

;
```

In DDM-2000 OC-3 R7.0, if a ring system receives an `ENT-CRS-VT1`
command with the *cct* set to *2WAYBR* and with *RING* parameter in
the*spec_block* whose value is valid but conflicts with the *RING*
parameter value already set for another *VT1* path, the following error
response is returned:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, invalid RING */

;
```

In DDM-2000 OC-3 R6.1, 7.0, 7.1, 11.0 and OC-12 R3.1, if
DDM-2000 receives an otherwise valid `ENT-CRS-rr` command for
which the system does not support either any cross-connection or the

specified cross-connection type between the *src_aid* and *dest_aids*, then the following error response is returned:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, cross connection not supported
between the specified AIDs*/

;
```

For example no cross-connections are supported between fn-a and fn-b in an OC-3 system.

As another example, *LOCKED* and *2WAYBR* pass-through cross connections are not allowed.

As yet another example, STS-3c add/drop cross-connections are not allowed in a DDM-2000 OC-3 R11.0 system. Only STS-3c pass-through cross-connections are allowed if the main slots are equipped with OC-12 HS interfaces.

In DDM-2000 OC-3 R15.0 , if the NE receives an otherwise valid ENT-CRS-STS3ccommand but it does not have 29-type OLIUs in Mains, then the following error response is returned:

```
sid date time

M ctag DENY

ENSI

/* Equippage, Not Equipped for Setting specified
information */

;
```

In DDM-2000 OC-3 R15.0 , if the NE receives an otherwise validENT-CRS-STS3c command but it does not have 22-type OLIUs in function group, the following error response is returned:

```
sid date time

M ctag DENY

ENSI

/* Equippage, Not Equipped for Setting specified
information */
```

;

In DDM-2000 OC-3 R15.0 (Group 4 shelf and earlier) , if the NE receives an otherwise valid ENT-CRS-STS3c command but it does not have 22-type OLIUs in function group C, the following error response is returned:

```
sid date time

M ctag DENY

ENSI

/* Equippage, Not Equipped for Setting specified
information */

;
```

In DDM-2000 OC-3 R15.0 , if the NE receives an otherwise valid ENT-CRS-STS3c command but it does not have 29-type OLIUs in Mains and the OC-3 OLIU specified by the *dest_aid* has an *application* parameter value other than *0X1*, then the following error response is returned:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, Invalid Application */

;
```

In DDM-2000 OC-3 R15.0 , if the NE receives an otherwise valid ENT-CRS-STS3c command but it does not have 29-type OLIUs in Mains and the OC-3 OLIU specified by the *dest_aid* already has pre-existing cross-connects, then the following error response is returned:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, Cross-connection already
exists */

;
```

In DDM-2000 OC-3 R15.0 (Group 4 Shelf) with 29-type OLIUs in Main, if the NE receives an otherwise valid ENT-CRS-STS3c command

for cross-connection to an FN with a *dest_aid* of b-1, the following error response is returned:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, Invalid cross-connect
request */

;
```

In DDM-2000 OC-3 R15.0 (Group 4 Shelf) with 29-type OLIUs in Main, if NE receives an otherwise valid ENT-CRS-STS3c command for cross-connection to an FN with a *dest_aid* of a-1, then the following error response is returned:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, Invalid cross-connect
request */

;
```

If the NE receives an otherwise valid ENT-CRS-rr command but for which, the DDM-2000 is not properly equipped, the following error response is returned to the user:

```
sid date time

M ctag DENY

SNVS

/* Equipage, shelf equipage does not allow requested cross
connection */

;
```

The following list provides some sample cases, where the above error would result:

DDM-2000 OC-3, OC-12 or FiberReach WBS system receives an otherwise valid cross-connection command, but the slot pair addressed by at least one of the *aids* in the input command is equipped with a mix of incompatible circuit pack

DDM-2000 OC-12 R5.0 system receives an `ENT-CRS-STS3C` command with a function slot *aid* that does not have an OC-3 or IS-3 CP in it

DDM-2000 OC-12 R5.0 system receives an `ENT-CRS-STS3C` command while the addressed system has MAIN-B slots and/or both of the TSI slots unequipped

If DDM-2000 OC-3 (R15.0) receives an otherwise valid `ENT-CRS-STS3C` command with *cct* parameter set to *2WAYPR* but the OC-3 LS interface addressed by the *aid* is provisioned for 1+1 application , the following error response is returned to the user:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, Provisioned LS interface
application does not allow requested cross connection */

;
```

In DDM-2000 R6.1, 7.0, 7.1, 11.0 and OC-12 R 3.1, if the system receives an otherwise valid `ENT-CRS-rr` command but for which, the cross-connection cannot be made because the addressed *src_aid* or *dest_aid* is already involved in an existing cross-connection (e.g. DDM-2000 OC-3 system receives and `ENT-CRS-STS1` command, but the STS1 addressed by one of *src_aids* or *dest_aids* is already VT cross-connected, or a DDM-2000 OC-12 R5.0 system receives an `ENT-CRS-STS3C` command but the one of the STS-1s in the STS-3c groups addressed by either the source or destination aid is already STS1 cross-connected, or a DDM-2000 OC-3 R11.0 system equipped with OC-12 HS interfaces receives a pass-through `ENT-CRS-STS3C` command but the one of the STS-1s in the STS-3c groups addressed by either the source or destination aid is already STS1 cross-connected), the following error response is returned:

```
sid date time

M ctag DENY

SACC

/* Status, Already Cross Connected */

;
```

If DDM-2000 receives an otherwise valid `ENT-CRS-rr` command but for which the cross-connection cannot be made because the

cross-connect mode of the system is not currently set to *manual*, the following error response is returned:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, system currently
provisioned for default cross-connections */

;
```

In DDM-2000 OC-3 R11.0, if the system receives an otherwise valid ENT-CRS-rr command but the entered command, if executed, would exceed its cross-connection capacity, the following error response is returned:

```
sid date time

M ctag DENY

SROF

/* Status, Requested Operation Failed, cross-connect
capacity is not available */

;
```

In DDM-2000 OC-3 R11.0, if this command is received by the NE while a mix of incompatible packs exists in the main group, i.e. during upgrade, the following error message will be returned:

```
sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, both main slots must be
equipped with compatible OLIU packs*/

;
```

In DDM-2000 OC-3 R15.3, mixed-rate cross-connections are not allowed to FEPL Ethernet ports. If a cross-connect (STS-1/STS-3c/VT-1.5) is issued to a FEPL Ethernet port that already has an existing cross-connect of a different rate the following error message will be returned:

```
sid date time
```

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```
M ctag DENY
```

```
SNVS
```

```
/* Status, Already Cross Connected*/
```

```
;
```

In DDM-2000 OC-3 R15.3, if the VT cross-connect exceeds 63 VT1.5 for an FEPL port in function unit slot C, or exceeds 56 VT1.5 for an FEPL port in function unit slots A or B, or an STS1 cross-connect exceeds 3 STS1 in function unit slot C, or exceeds 2 STS1 in function unit slots A or B, the following error message will be returned:

```
sid date time
```

```
M ctag DENY
```

```
SNVS
```

```
/* Status, Requested Operation Failed, cross-connect
capacity is not available */
```

```
;
```

RELATED TL1 MESSAGES   dlt-crs-tl1, rtrv-crs-tl1, rept dbchg

□

OPR-LPBK-rr
···

NAME	`OPR-LPBK`: Operate Low-Speed (LS) Terminal and Facility Loopbacks
	The `OPR-LPBK` command is available for DDM-2000 Multiplexers, starting with:
	OC-3 Release 6.1 and OC-12 Release 2.1 (for linear systems)
	OC-3 Release 7.1 and OC-12 Release 3.1 (ring systems)
	FiberReach Release 1.0
LOGIN PRIVILEGE	This command is available to all general users.
INPUT FORMAT	In DDM-2000 OC-3 R6.1, 7.1, OC-12 R2.1, 3.1, and FiberReach R1.0:
	`OPR-LPBK` -*modifier*:*tid*:*aid*:*ctag*[::];
	In DDM-2000 OC-3 R8.0, 9.0, OC-12 R5.0, and FiberReach R2.1 and later::
	`OPR-LPBK` -*modifier*:*tid*:*aid*:*ctag [::,,, lpbktype]*;
DESCRIPTION	*CAUTION: Execution of this command may affect service.*
	The `OPR-LPBK` command can be initiated by a user to request the network element to operate a manual terminal loopback at the specified LS interface toward the HS OC-n fiber interface or, for Releases 5.0 and 6.0, a facility loopback at the specified OC-3 LS interface. This command will be used during preservice testing of facilities and during fault diagnostics.
	The loopback request remains active until released; for example, by the TL1 command `RLS-LPBK-rr`, or by the appropriate network element craft interface device (CID) command, or until overridden by a network element reset or initialization.

···

The following are input parameters.

Table 5-32 `OPR-LPBK` **input parameters**

Parameter	Description
modifier	This is a required modifier to the OPR-LPBK message and may only have the following values: • T1 - This requests a loopback on a DS1 or T1 LS interface. • T3 - This requests a loopback on a DS3 LS interface. • EC1 - In DDM-2000 OC-3 R6.1, 7.1 and OC-12 R2.1, 3.1, this requests a loopback on an EC1 LS interface. • FE - In DDM-2000 OC-3 R15.3 and later. This requests a loopback on an Ethernet interface. Ethernet ports support only terminal loopback.
tid	Target Identifier. This is the name of the network element to which the command is addressed.
aid	Access Identifier. The *aid* determines the Low Speed Port for which the loop back is being requested. *aid* is a required parameter. ALL is not allowed in the *aid* value for the OPR-LPBK command.
ctag	Correlation Tag. This is included in the command by the TL1 user and is repeated by the network element in the response to allow the TL1 user to associate the command and response messages. The *ctag* is a required parameter.

Table 5-32   `OPR-LPBK` **input parameters   (continued)**

Parameter	Description
lpbktype	In DDM-2000 Oc-3 R8.0, 9.0, OC-12 R5.0, and FiberReach R2.1: Loopback Type. This is an optional parameter. When this parameter is used, the two ″:″s and three ″,″s between the *ctag* and *lpbktype* are required. This parameter indicates the type of the loopback being operated. Valid values are: • FACILITY - Facility loopback. The signal is looped back toward the facility. • TERMINAL - (default). Terminal loopback. The signal is looped back toward the high speed fiber of the terminal.

OUTPUT FORMAT Refer to the `RTRV-HDR OUTPUT FORMAT` section. The requirements listed there apply to the `OPR-LPBK` command also.

If the requested loopback command does not alter the existing loopback condition, the network element will not DENY the command. Instead the network element willl respond with a COMPLD message.

OUTPUT PARAMETERS Refer to the OUTPUT PARAMETERS section of the `RTRV-HDR` command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The output parameters listed there also apply to this command.

EXAMPLE INPUT/OUTPUT The following example requests a terminal loopback at the DS1 or T1 port a-1-1.

`OPR-LPBK-T1:LT-PF-2000:a-1-1:123456;`

IP 123456

<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD

....

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;

The following example requests a FE terminal loopback at the Ethernet port number 2 of a FEPL circuit pack equipped in function slot A.

```
OPR-LPBK-FE:LT-PF-2000:a-2::,,,123456;
```

IP 123456

```
<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD
```

;

The following example requests a T1 Terminal loopback on an IMA LAN circuit pack.

```
OPR-LPBK-T1:LT-PF-2000:a-1-1:123456::,,,terminal;
```

IP 123456

```
<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD
```

;

ERROR RESPONSES   Refer to the ERROR RESPONSES section of the RTRV-HDRcommand in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151.* The error responses listed there also apply to this command.

If the system receives an OPR-LPBK command with a *modifier* other than that supported by the NE, the following error response is returned:

```
sid date time

M ctag DENY

ICNV

/* Input, Command Not Valid, invalid modifier */
```

;

If the Network Element receives an OPR-LPBK command without an *aid* or with an *aid* other than that supported by the Network Element, the following error response is returned:

```
sid date time

M ctag DENY

IIAC

/* Input, Invalid Access Identifier, AID is inconsistent
with modifier */

;
```

If the Network Element receives an OPR-LPBK with an otherwise valid *aid* value but for which the corresponding equipment is not present, the following error response is returned:

```
sid date time

M ctag DENY

ENEQ

/* Equipage, Not EQuipped */

;
```

If the network element receives an OPR-LPBK with an otherwise valid *aid* value but the command could not be completed by the network element, the following error response is returned:

```
sid date time

M ctag DENY

SROF

/* Status, Requested Operation Failed */

;
```

In DDM-2000 OC-3 6.2, 7.2 and earlier, DDM-2000 OC-12 3.1 and earlier, FiberReach 2.0 and earlier, if the Network Element receives an OPR-LPBK with an otherwise valid *aid*value but with the *lpbktype* parameter, the following error response is returned:

```
sid date time

M ctag DENY

ICNV
```

....

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```
/* Input, Command Not Valid */
```

```
;
```

In DDM-2000 OC-3 R8.0, 9.0, OC-12 R5.0, and FiberReach R2.1: If the NE receives an OPR-LPBK-rr command with an invalid *lpbktype* parameter value, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IDNV
```

```
/* Input, Data Not Valid, invalid LPBKTYPE */
```

```
;
```

In DDM-2000 OC-3 R15.0 and later: If the NE receives an OPR-LPBK-T1 command for an *aid* for a channel on an IMA LAN (BBF9) circuit pack with a *lpbktype* parameter value FACILITY, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IDNV
```

```
/* Input, Data Not Valid, invalid LPBKTYPE */
```

```
;
```

In DDM-2000 OC-3 R15.3 and later: If the NE receives an OPR-LPBK-FE command for an *aid* for an Ethernet port on a FEPL (BBG23) circuit pack with a *Ilpbktype* parameter value FACILITY, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IDNV
```

```
/* Input, Data Not Valid, invalid LPBKTYPE */
```

```
;
```

In DDM-2000 OC-3 R15.3 and later: If the NE receives an OPR-LPBK-FE command for an *aid* for an Ethernet port on an FEPL (BBG23) circuit pack with a loopback already operated on that circuit pack, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
SAOP
```

```
/* Status, Already OPerated, Loopback already in place on
addressed CP */
```

```
;
```

If the Network Element receives a OPR-LPBK-rr command with a valid *aid* value but the command could not be completed by the Network Element because there is the another type of loopback active at that *aid*, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
SAOP
```

```
/* Status, Already OPerated loopback active in the
opposite direction */
```

```
;
```

RELATED TL1 MESSAGES rls-lpbk-rr

□

REPT DBCHG

....

NAME REPT DBCHG: Report Data Base Change

Support for this message is available for DDM-2000 Multiplexers, starting with:

OC-3 Release 6.1 and OC-12 Release 2.1 (for linear systems)

OC-3 Release 7.1 and OC-12 Release 3.1 (for rings)

FiberReach Release 1.0

DESCRIPTION The REPT DBCHG messages are generated autonomously by a network element to report data base changes that have occurred as a result of line termination and cross-connection provisioning commands.

RTRV-EPM message is generated in response to the following database changes:

Table 5-33   REPT DBCHG **Database Changes**

Change	Description
Change in line termination provisioning	Anytime the ENT-rr command is entered on the OS-NE interface, or the equivalent command is entered via the CIT, and successfully executes, a REPT DBCHG message is generated indicating the new settings.
Change in line termination alarm attribute provisioning	Anytime the SET-ATTR command is entered on the OS-NE interface, or the equivalent command is entered via the CIT, and successfully executes, a REPT DBCHGmessage is generated indicating the new settings.

....

Table 5-33   REPT DBCHG **Database Changes   (continued)**

Change	Description
Change in a cross-connection for a SONET signal path	Any time a SONET signal path cross-connection is changed by an ENT-CRS-rr or DLT-CRS-rr command on the OS-NE interface, or the equivalent command is entered via the CIT, a REPT DBCHG message is generated indicating the new or deleted cross-connection.
Conversion of STS-1 cross-connection to VT1.5 cross-connections	In DDM-2000 OC-3 R6.2, 7.1, any time a SONET STS-1 cross-connection is converted to 28 VT1.5 cross-connections by a CNVT-CRS command on the CIT interface, a REPT DBCHG message is generated indicating the deleted STS-1 cross-connection, and then 28 REPT DBCHG messages are generated indicating the created VT1.5 cross-connections. These messages are reported as if a user had entered one DLT-CRS-STS1 and 28 ENT-CRS-VT1 commands.
Performance monitoring parameter threshold provisioning	For Releases 7.0 and later, any time the SET-TH-rr command is entered on the OS-NE interface, or the equivalent command is entered via the CIT, and successfully REPT DBCHGexecutes, a message is generated indicating the new settings.

Table 5-33 `REPT DBCHG` **Database Changes   (continued)**

Change	Description
OSI/TARP Provisioning	R13.0, OC-12 R7.0, and FiberReach R3.0, any time the `ENT-ULSDCC` or `DLT-ULSDCC` command is entered on the OS-NE interface, or the equivalent command is entered via the CIT, and successfully `REPT DBCHG` executed, a message is generated indicating the new settings.
System initialization	Anytime the `INIT-SYS` command is entered on the OS/NE or CIT interface, a `REPT DBCHG` message is transmitted before the system resets.
Controller reset	Anytime the system controller resets (including on power-up), a `REPT DBCHG` message is transmitted after the controller has successfully recovered from the reset.

Note: For Release 5.0, anytime the `update` function occurs, a `REPT DBCHG` message is transmitted.

In DDM-2000 OC-3 R8.0, 9.0, OC-12 R4.0, 5.0, and FiberReach R1.0, the following additional TL1 and equivalent CIT commands will trigger a `REPT DBCHG` message:

Command	Special Notes
`ENT-FEAT`	
`ENT-TL1MSGMAP`	May result in `REPT DBCHG` reporting being turned off on the virtual circuit.
`ENT-OSACMAP`	The affected virtual circuits reset.
`ENT-SYNCN`	

ENT-SYS	May cause system reset and/or will/may cause TL1 session to be dropped
ENT-ULSDCC	Causes system reset when NSAP fields are changed or NE is set as an IS-IS Level 2 router.
SET-ATTR-ALM	
SET-ATTR-CONT	
SET-ATTR-ENV	
SET-TH	
ENT-CID-SECU	
SET-X25	Causes session to be dropped when packet size is changed.

In DDM-2000 OC-3 13.0, OC-12 R7.0, and FiberReach R3.0, the following additional TL1 and equivalent CIT commands will trigger a REPT DBCHG message.

Command	Special Notes
ENT-FEAT	
ENT-TL1MSGMAP	May result in REPT DBCHG reporting being turned off on the virtual circuit.
ENT-OSACMAP	The affected virtual circuits reset.
ENT-SYNCN	
ENT-SYS	May cause system reset and/or will/may cause TL1 session to be dropped
ENT-ULSDCC	Causes system reset when NSAP fields are changed or NE is set as an IS-IS Level 2 router.
DLT-ULSDCC	
SET-ATTR-ALM	
SET-ATTR-CONT	

SET-ATTR-ENV	
SET-TH	
ENT-CID-SECU	
SET-X25 when packet size is changed.	Causes session to be dropped.

The following additional TL1 and equivalent CIT commands will trigger a `REPT DBCHG` message in Release 15.3.1 and later:

Command	Special Notes	Releases
ED-EPORT		OC3 15.3.1 and later
ED-VCG		OC3 15.3.1 and later

OUTPUT FORMAT

```
sid date time

A atag REPT DBCHG

"umb:ccb:aid:[com_block]:[spec_block]:[state_block]"

;
```

Trailing commas after the last non-null parameter value within a parameter block are not included in the output message. Also, trailing colons after the last non-null parameter block are not included in the output message.

OUTPUT PARAMETERS   The following are output parameters for this command.

sid	Source identifier. This is the system name.
date	Date output message is generated. This has the format YY-MM-DD (year-month-day).
time	Time output message is generated. This has the format HH:MM:SS (hours:minutes:seconds).
A	This indicates that the message is sent autonomously.

atag	The *atag* is used for message sequencing. The number is incremented by one for each autonomous message sent by FT-2000, on a per-OS-type basis. The network element uses only whole numbers from 000 through 999.
umb	Update management block. This parameter field is used for returning the time and date of the data base change and the source ID of the command that caused the change (when applicable). Parameters within the update mangement block are positionally independent and are specified using a name defined construct of: *PARAMETER=value* in a comma separated list. The parameters are listed and explained below. TIME This reflects the time that the database change occurred and is in the form: HH-MM-SS. The time is the same as the time that is recorded in the history log for the database change record. DATE This reflects the date that the data base change occurred and is in the form: YY-MM-DD. The date is the same as the date that is recorded in the history log for the data base change record. SOURCE If the data base change occurs as a result of a TL1 command with a non-null *ctag*, the SOURCE field contains this value. Otherwise, this parameter is not included in the message.

ccb	Command code block. This is a single position defined parameter block which indicates the trigger information of the action which created the data base update. If a TL1 command created this update, the command code parameter is specified in the form:
	`<verb>-<modifier>[-<modifier>]`
	For Releases 5.0 through 7.2, if the data base change was caused by a user interface command, a button push caused the data base change, or a TBOS control input. The command code block contains the equivalent TL1 command which would have had to be entered to make the change. The format is shown above.
	If the data base change was caused by execution of the `SET-ATTR-rr` command, the command code block contains the `ENT-rr` command with the appropriate *rr* value.
	In DDM-2000 OC-3 Release 9.8, and beginning with DDM-2000 OC-3 Release 13.0, OC-12 Release 7.0, and FiberReach 3.0, TBOS control inputs are no longer supported.
	For Releases 7.0 and later, if the database change was caused by execution of the `SET-TH-rr` command, the Command Code Block contains the `ENT-rr` command with the appropriate *rr*value.
	In DDM-2000 OC-3 R9.1, OC-12 R5.1, and FiberReach R2.1, if a plug-in insertion caused the database update, the command code parameter is set equal to *PLUGIN*.
	For controller reset, the *ccb* is equal to `RESET`. For controller reset, the *ccb* is equal to `RESET`. For the UPDATE function, the *ccb* is equal to `UPD-SYS`.

aid	Access identifier. This is the address of the object entity which the data base update has affected. For cross-connect changes, this is the pair of AIDs specified in the cross-connection command. The AIDs are separated by a comma.
	For cross-connect rolls, this is the trio of AIDs specified in the roll command. The AIDs are separated by commas (that is, *src_aid, dest_aid, new_srd_aid*).
	For system initialization, RESET, and UPDATE events, this field is null.
	In DDM-2000 OC-3 R9.1, OC-12 R5.1, and FibwerReach R2.1, for circuit pack insertions, this field contains the AID of the slot, and the pst parameter of the state_block contains the value of the state, *IS*.
	Refer to Table ?? at the end of this section for a list of valid addresses.
	For SLC-2000 OSINT spec (5 lines): Refer to the SONET and DLC AID tables in Section 6 for a list of valid addresses.
com_block	Common Block. In DDM-2000 OC-3 R9.0, OC-12 R5.0, and FiberReach R1.0, this is a position defined field. If the database change is the result of a TL1 command which contains parameters in this block, the parameter values are included in this block in the same order as the corresponding TL1 command.

spec_block	Specific Block. This is a name defined field. If the database change is the result of a TL1 command which contains parameters in this block, the parameter names and values are included in this block. Parameters within the specific block are positionally independent and are specified using a name defined construct of: *PARAMETER=value* in a comma separated list. The parameter names are the same as those for the corresponding TL1 command.
	If the data base change is the result of a (non-TL1) user interface command which contains parameters in this block, the equivalent TL1 parameter names and values are included in this block. The parameter names are the same as those for the corresponding TL1 command.
	This field is null if the value in the *ccb* is one of: *INIT-SYS, RESET, UPD-SYS, PLUGIN, or UNPLUG*.
	If the data base change is a result of a cross-connect or roll command, the cross-connect type *cct* of those commands is reported in the *spec_block*as *CCT=value*, where *CCT* can assume the following values: *WAY, 2WAY, and 1WAYDRI* as defined in the RTRV-CRS-STS3 command.
	For Releases 7.0 and later:
	If the database change is a result of system initialization command, the phase parameter *(ph)* of the command is reported in the *spec_block* as *PH=value*, where *PH* can assume the following values:*9* and *3* as defined in the INIT-SYS command.
state_block	State block. This is a position defined field. If a state change is being reported, the new state is included in this block. It contains the following parameters in the order shown:
	pst Primary State

EXAMPLE INPUT/OUTPUT All DDM-2000 OC-3 examples pertain to DDM-2000 OC-3 Release 6.1 and 7.1 and later unless otherwise noted

The following message is sent when a cross connect is established by a TL1 user between STS-1 number 1 from the main slot to STS-1 number 2 on the C mux group:

```
LT-PF-2000 93-10-01 08:00:00

A 888 REPT DBCHG

"TIME=07-59-20,DATE=93-10-01,SOURCE=123456:ENT-CRS-STS1:m-
1,c-2"

;
```

The following message is sent when a cross connect is established by a CIT user between STS-1 number 2 from the main slot to STS-1 number 1 on the A mux group:

```
LT-PF-2000 93-10-01 08:00:00

A 888 REPT DBCHG

"TIME=07-59-20,DATE=93-10-01:ENT-CRS-STS1:m-2,a-1"

;
```

The following message is sent when the ENT-T3 command from a TL1 user has been completed for a DS3 port in the C mux group:

```
LT-PF-2000 93-10-01 08:00:00

A 888 REPT DBCHG

"TIME=07-59-20,DATE=93-10-01,SOURCE=123456:ENT-T3:c

::AIS=Y,LINECDE=CCHAN,NTFCNCDE=CR,PBIT=ON"

;
```

For Releases 15.3.1 and later, the following message is sent when the ED-EPORT TL1 message has been completed for an Ethernet port:

```
LT-PF-2000 93-10-01 08:00:00

A 888 REPT DBCHG

"TIME=07-59-20,DATE=04-10-01,SOURCE=123456:ED-EPORT:C-
1::epmode=NMON,

eppm=ENABLE,fcmd=ENABLE,lnrate=10M,admin=DISABLE,almlvl=MJ,

mtu_size=1500"
```

;

For Releases 15.3.1 and later, the following message is sent when the ED-VCG TL1 message has been completed for a VCG port:

```
LT-PF-2000 93-10-01 08:00:00

A 888 REPT DBCHG

"TIME=07-59-20,DATE=04-10-01,SOURCE=123456:ED-VCG:C-
1::vmode=NMON,

almlvl=MJ,vpm=DISABLE,gfp_fcs=ENABLE"

;
```

RELATED TL1 MESSAGES

For Releases 5.0 and later:

```
dlt-crs-rr

ent-crs-rr

ent-roll-rr

ent-rr
```

For Releases 7.0 and later:

```
init-sys

reset

rtrv-ao

set-attr-rr

upd-sys

ent-ulsdcc
```

For Releases 7.1 and later:

```
cpy-prgm
```

For Releases 8.0 and later:

```
dlt-ulsdcc
```

For Releases 15.3.1 and later:

[ed-eport](#)

[ed-vcg](#)

□

....

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RLS-LPBK-rr

....

NAME   RLS-LPBK-rr: Release Low-Speed (LS) Terminal and Facility Loopbacks.

The RLS-LPBK command is available for DDM-2000 Multiplexers, starting with: beginning in .

OC-3 Release 6.1 and OC-12 Release 2.1 (for linear systems)

OC-3 Release 7.1 and OC-12 Release 3.1 (ring systems)

FiberReach Release 1.0

LOGIN PRIVILEGE   This command is available to all general users.

INPUT FORMAT   In DDM-2000 OC-3 R8.0, 9.0, and OC-12 R5.0::

RLS-LPBK -*modifier*:*tid*:*aid*:*ctag [::,,, lpbktype]*;

DESCRIPTION   CAUTION: Execution of this command may affect service.

The RLS-LPBK command can be initiated by a user to request the network element to release a manual terminal loopback at the specified LS interface toward the HS OC-n fiber interface. This command will be used during pre-service testing of facilities and during fault diagnostics.

When the network element receives an RLS-LPBK-rr command from the user without specifying *lpbktype*, the network element will release a terminal loopback toward the HS fiber on the specified LS interface.

....

The following are input parameters.

Table 5-34 `RLS-LPBK` **input parameters**

Parameter	Description
modifier	This is a required modifier to the RLS-LPBK message and may have only the following values: • T1 - In DDM-2000 OC-3 R6.1, 7.1, OC-12 R2.1, 3.1, and FiberReach R1.0, 2.0, this requests a loopback on a DS1 or T1 LS interface. • T3 - In DDM-2000 OC-3 R6.1, 7.1, OC-12 R2.1, 3.1, and FiberReach R1.0, 2.0, this requests a loopback on a DS3 LS interface. • EC1 - In DDM-2000 OC-3 R6.1, 7.1 and OC-12 R2.1, 3.1, this requests a loopback on an EC1 LS interface. In DDM-2000 OC-3 R15.3, this request releases the terminal loopback on an FEPL Ethernet pack. This pack supports only TERMINAL loopback. • OC3 - This requests terminal or line loopback at the addressed OC-3 LS interface.
tid	Target Identifier. This is the name of the network element to which the command is addressed. The *tid* is a required parameter.

Table 5-34 `RLS-LPBK` **input parameters (continued)**

Parameter	Description
aid	Access Identifier. *aid*determines the Low Speed Port for which the loopback release is being requested. *aid*is a required parameter. ALL is not allowed in the *aid* value for the RLS-LPBK command.
ctag	Correlation Tag. This is included in the command by the TL1 user and is repeated by the network element in the response to allow the TL1 user to associate the command and response messages. The *ctag* is a required parameter.
lpbktype	In DDM-2000 OC-3 R8.0, 9.0, and OC-12 R5.0,: This loopback type is an optional parameter. When this parameter is used, the two ″:″s and three ″,″s between the *ctag*and *lpbktype* are required. Valid values of type are: FACILITY TERMINAL (default) - Terminal loopback. The signal is looped back toward the HS fiber of the terminal.

OUTPUT FORMAT Refer to the `RTRV-HDR OUTPUT FORMAT` section. The requirements listed there apply to the `RLS-LPBK` command also.

If the requested loopback command does not alter the existing loopback condition, the network element will not DENY the command. Instead the network element willl respond with a COMPLD message.

OUTPUT PARAMETERS Refer to the OUTPUT PARAMETERS section of the `RTRV-HDR` command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151.* The output parameters listed there also apply to this command.

EXAMPLE INPUT/OUTPUT The following DDM-2000 OC-3 example requests a terminal loopback at the FEPL Ethernet pack in function unit c, port 4.

```
RLS-LPBK-FE:LT-PF-2000:c-4:123456::,,,terminal;
```

IP 123456

```
<
```

```
LT-PF-2000 93-10-26 16:42:11
```

```
M 123456 COMPLD
```

```
;
```

ERROR RESPONSES Refer to the ERROR RESPONSES section of the `RTRV-HDR`command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151.* The error responses listed there also apply to this command.

If the NE receives an RLS-LPBK command with a *modifier* other than that supported by the NE, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
ICNV
```

```
/* Input, Command Not Valid, invalid modifier */
```

```
;
```

If the Network Element receives an `RLS-LPBK` command without an *aid* or with an *aid* other than that supported by the Network Element, the following error response is returned:

```
sid date time
```

```
M ctag DENY
```

```
IIAC
```

```
/* Input, Invalid Access Identifier, AID is inconsistent
with modifier */
```

;

If the Network Element receives an `RLS-LPBK` with an otherwise valid *aid* value but for which the corresponding equipment is not present, the following error response is returned:

```
sid date time

M ctag DENY

ENEQ

/* Equipage, Not EQuipped */

;
```

If the network element receives an `RLS-LPBK` with an otherwise valid *aid* value but the command could not be completed by the network element, the following error response is returned to the TL1 user:

```
sid date time

M ctag DENY

SROF

/* Status, Requested Operation Failed */

;
```

If the Network Element receives an `RLS-LPBK-rr` where rr is T1 or T3, but with the *lpbktype* parameter, the following error response is returned:

```
sid date time

M ctag DENY

ICNV

/* Input, Command Not Valid */

;
```

In DDM-2000 OC-3 R8.0, 9.0, OC-12 R5.0, if the NE receives an `RLS-LPBK-EC1` command with an invalid *lpbktype* parameter value, the following error response is returned:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, invalid LPBKTYPE */
```

....

;

In DDM-2000 OC-3 R15.3, if the NE receives an `RLS-LPBK-FE` command with an invalid for an invalid *lpbktype* parameter (value FACILITY), the following error response is returned:

```
sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, invalid LPBKTYPE */

;
```

In DDM-2000 OC-3 R15.3, if the NE receives an `RLS-LPBK-FE` command but no loopback is operated on the addressed *aid* the following error response is returned:

```
sid date time

M ctag DENY

SROF

/* Status, Requested Operation Failed, specified loopback
does not exist */
```

RELATED TL1 MESSAGES   opr-lpbk-rr

□

RTRV-CRS-rr

....

NAME   RTRV-CRS-rr: Retrieve an STS-1/STS-3c/VT1.5 cross-connection

This command is available for DDM-2000 Multiplexers, starting with:

OC-3 Release 6.1

OC-12 Release4.0

FiberReach Release 1.0.

INPUT FORMAT   RTRV-CRS-:*modifier:tid*:*aid*:*ctag* ;

DESCRIPTION

The RTRV-CRS-rr command can be initiated by a TL1 user to have the NE to retrieve VT-1.5, STS1 (in releases 2.2, 3.1 and later releases) and STS-3c (in release 3.1 and later releases) cross-connections in the case of FiberReach, STS-1/STS-3c/VT-1.5 cross-connections in the case of DDM-2000 OC-3, and STS-1 and STS-3c cross-connections in DDM-2000 OC-12 Add/Drop or Ring systems. Cross-connections in DDM-2000 are always two-way in the sense that each cross-connection represents both transmit and receive.

Refer to the ENT-CRS-rr command description for details on the restrictions on cross-connections in the DDM-2000 Add/Drop Rings Terminal for Path Protection Switched Rings.

When the NE receives a RTRV-CRS-rr command, it will retrieve the cross-connections of the specified level (STS-1/STS-3c/VT-1.5) associated with the specified entity.

If main slot 1 and slot 2 are equipped with different pack types (i.e. during upgrade), the report will include data for what is considered at the time as the valid system pack type.

Note: This command is available to maintenance users starting with DDM-2000 OC3 R9.1, OC-12R5.1, and FiberReach R2.1.

....

Table 5-35 `RTRV-CRS` **Input Parameters**

Parameter	Description
modifier	This is the message modifier for `RTRV-CRS-rr` and may have only one of the following values: • `STS1` - This specifies that an STS-1 cross-connection be retrieved. Applicable in DDM-2000 OC-3 and OC-12 ring and linear releases, and FiberReach Wideband Shelf release 2.2, 3.1 and later releases. • `STS3C` - This specifies that an STS-3c cross-connection be retrieved. Applicable in DDM-2000 OC-12 releases starting from 5.0, DDM-2000 OC-3 releases starting from 11.0, and FiberReach Wideband Shelf releases starting from 3.1. (Applicable only when the shelf is equipped with 28-type or 29-type OLIU circuit packs in its Main unit slots, and 22-type OLIU circuit packs in its function unit slots.) • `VT1` - This specifies that a VT-1.5 cross-connection be retrieved. Applicable in DDM-2000 OC-3 ring and linear releases and DDM-2000 FiberReach Wideband Shelf (WBS) releases.
tid	Target Identifier. This is the name of the network element to which the command is addressed. The *tid* is a required parameter.

Table 5-35 RTRV-CRS **Input Parameters** **(continued)**

Parameter	Description
aid	Access identifier. The *aid* is a required parameter and must address a valid STS-1/STS-3c/VT-1.5 channel in the high speed OC-n line or low speed port or channel of the DDM-2000 in order to be accepted.
	For the valid *aids* for OC-3 and OC-12 systems, see the appropriate CIT command: RTRV-CRS-STS1, RTRV-CRS-VT1, RTRV-CRS-STS3c.
ctag	Correlation Tag. This is included in the command by the user and is repeated by DDM-2000 in the response to allow the user to associate the command and response messages.

OUTPUT FORMAT   When the all option is used in the *aid* field of the input command, the DDM-2000 will report each cross-connection just once. (that is, DDM-2000 will not report a cross-connection and then repeat the same cross-connection once again with the *src_aid* and *dest_aid* reversed).

If DDM-2000 fully complies with the retrieve cross-connection request, the following output message is returned to the user:

```
sid date time

M ctag COMPLD

"src_aid, dest_aid::cct[:ring={m1,m2}]"

;
```

OUTPUT PARAMETERS   Refer to the `RTRV-HDR OUTPUT PARAMETERS` section. The requirements listed there apply to this command also. The following are also output parameters for this command.

src_aid	Source access identifier. This is the *AID* of the STS-1/STS-3c/VT-1.5 line channel or low speed port or channel specified in the `RTRV-CRS-rr` command.
dest_aid	Destination access identifier. This is the destination address of the STS-1/STS-3c/VT-1.5 channel in the high speed OC-n line or low speed port or channel that is cross connected to the *src_aid*.

cct	Cross-connection type. This parameter specifies the type of cross-connection for DDM-2000, and will have one of the following values:
	2WAY
	This value is returned only by the linear systems. This specifies a two-way cross-connection between the source and destination.
	2WAYPR
	This value is returned only by the ring systems. This specifies a two-way add/drop cross-connection between the source and destination in a path switched ring.
	2WAYBR
	This value is returned only by the ring systems. This specifies a Drop-and-Continue cross-connection between the source and destination in a path switched ring.
	LOCKED
	This value is returned only by DDM-2000 OC-3 ring systems (Release 9 and later) and FiberReach systems. This specifies a locked cross-connection in which a single channel received from only one rotation of the path switched ring (specified by the *RING* parameter) is dropped to a low speed channel.

cct (continued)	COV
	This value is reported only by OC-12 release 5.0 and beyond ring systems, when the *modifier* is *STS3C*. This represents that two independent STS-3c signals received from the two receive fibers of a single OC-3 or IS-3 LS interface are being added independently to the two directions of a single STS-3C channel (timeslot) in the OC-12 ring.
	RTV
	This value is reported only in OC-12 release 5.0 and beyond ring systems, when the *modifier* is *STS3C*. This represents that two independent STS-3c signals received from the two directions of a single STS-3c channel on the OC-12 ring are being dropped independently to the two transmit fibers of a single OC-3 or IS-3 LS interface while also continuing those signals on the ring.
RING	If the *cct* is *2WAYBR* or *LOCKED*, then this parameter will be specified. It will have one of the following two values: M1 - Ring 1 M2 - Ring 2

EXAMPLE INPUT/OUTPUT   The following example illustrates the retrieval of a two-way (add/drop) cross-connection associated with the STS-1 channel in the high speed OC-3 line m-2:

```
rtrv-crs-sts1:ATT-DDM-2000-3:m-2,b:123456;

IP 123456

<

ATT-DDM-2000-3 93-11-26 16:42:11

M 123456 COMPLD
```

"m-2,b::2WAY

;

The following example illustrates the retrieval of a non-existent cross-connection associated with the STS-1 channel in the high speed OC-3 line m-2:

rtrv-crs-vt1:ATT-DDM-2000-3:m-2:123456;

IP 123456

<

ATT-DDM-2000-3 93-11-26 16:53:22

123456 COMPLD

;

The following example illustrates the retrieval of a two-way pass-through cross-connection associated with the VT-1.5 line channel m-2-5-6 in a DDM-2000 OC-3 Path Switched Ring.

rtrv-crs-vt1:ATT-DDM-2000-3:m-2-5-4:Z89abc;

IP Z898abc

<

ATT-DDM-2000-3 93-11-26 16:53:22

M Z898abc COMPLD

;

"m-2-5-4,m-2-5-4::2WAYPR"

The following example retrieves a drop-and-continue cross-connection associated with a low speed port b-6-2 in an OC-3 system:

rtrv-crs-vt1:ATT-DDM-2000-3:b-6-2:654321;

IP 654321

<

ATT-DDM-2000-3 93-11-26 16:54:33

M 654321 COMPLD

;

The following example retrieves all of the STS-3c cross-connections in an OC-3 R11.0, or later, system equipped with OC-12 HS interfaces:

```
rtrv-crs-STS3C:ATT-DDM-2000:all:654321;ent

IP 654321

<

ATT-DDM-2000-3 93-11-26 16:54:33

M 654321 COMPLD

"m-4,m-4::2WAYPR"

"m-10,m-10::2WAYPR

;
```

ERROR RESPONSES   Refer to the ERROR RESPONSES section of the `RTRV-HDR` command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The error responses listed there also apply to this command.

In addition to the non-message-specific error found in SRD Section 2.4.4 and Appendix Section C.3.1, the following error responses are those that theDDM-2000 checks for each condition.

If DDM-2000 OC-3 receives an `RTRV-CRS-rr` command with a command code modifier other than *STS1* or *VT1*, the following error response is returned :

```
sid date time

M ctag DENY

ICNV

/* input, Command Not Valid, invalid modifier */

;
```

If the NE receives an `RTRV-CRS-rr` command with a command code modifier and an *aid* combination not supported by the system, (for example, `RTRV-CRS-STS3c` command sent to an DDM-2000 OC-3 system which does not have 24G-U or 29G-U OLIU in Main) the following error response is returned :

```
sid date time

M ctag DENY

ENEQ

/* Equipage, Not equiped */
```

;

If the NE receives a RTRV-CRS-rr command with an *aid* that is incorrect or not supported by the system, the following error response is returned :

sid date time

M ctag DENY

IIAC

/* Input, Invalid Access iIdentifier, AID is missing wrong or inconsistent with modifier */

;

RELATED TL1 MESSAGES   ent-crs-rr, dlt-crs-rr

RTRV-EPM

....

NAME RTRV-EPM: Retrieve Ethernet and Data Performance Monitoring

The RTRV-EPM command is available beginning in DDM-2000, Release 15.3.1.

LOGIN PRIVILEGE This command is available to users with Privileged, General, Maintenance and Reports Only access.

INPUT FORMAT RTRV-EPM:*tid*:*aid*:*ctag*::*[emontype],[monlev],tmper,[mondat],[montm]*;

DESCRIPTION The RTRV-EPM command (Ethernet data packs) retrieves the Ethernet performance monitoring data, but only for the specified Ethernet LAN port(s) or VCG(s). This command is only applicable to Fast Ethernet (FE).

Execution of this command, whether successful or denied, will not be recorded in the Security log.

The RTRV-EPM command does not generate a REPT DBCHG message.

Table 5-36 RTRV-EPM **Input Parameters**

Parameter	Description
tid	Target Identifier. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* for the input parameter syntax and description of this parameter.
aid	Access Identifier. This is the address of the entity for which the RTRV-EPM command is intended. The aid is a required parameter and must reference a valid entity of the NE in order to be accepted. For the valid aids, refer to Appendix A. An all AID range is supported at the pack or shelf level.

....

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Table 5-36 `RTRV-EPM` **Input Parameters (continued)**

Parameter	Description
ctag	Correlation Tag. Refer to the `RTRV-HDR` command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* command for the input parameter syntax and description of this parameter.
emontype	These are the monitored parameter types for which data is requested. If the value is omitted, this parameter defaults to ALL. • EDFC - Count of Dropped Ethernet frames due to congestion. • EDFE - Count of Dropped Ethernet frames due to errors. • EINB - Incoming number of good received bytes. • EINF - Incoming number of good received frames. • EONB - Outgoing number of bytes (bytes transmitted). • EONF - Outgoing number of frames (frame transmitted) • ALL - All of the above monitored types.
monlev	The level for the monitored parameter • 1-UP - (default value). Only nonzero data will be reported. • 0-UP - Zero and all positive data will be reported.

....

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Table 5-36 `RTRV-EPM` **Input Parameters   (continued)**

Parameter	Description
tmper	Time period. There is no default value for this parameter. The parameter must have one of the following values: • 15-MIN - This requests PM data in 15-minute measurement intervals. • 1-DAY - This requests PM data in 1-day measurement intervals.
mondat	Monitored date. The parameter mondat is used to determine the beginning day of the interval for which the PM data is to be reported. This parameter must have one of the following values: • ALL - Retrieve PM data from all dates (yesterday and today) that are available in the NE. • MOY-DOM - Date to start retrieving PM data. This is in the format of MOY-DOM, where MOY (month of year) ranges from 1-12 and DOM (day of month) ranges from 1 to 31. The only valid values are current day and previous day. • NULL - Defaults to the current date.

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Table 5-36   RTRV-EPM **Input Parameters**   **(continued)**

Parameter	Description
montm	Monitored time. If tmper is 1-DAY, then montm is not applicable. • ALL - Retrieve PM data from all times that are available in the NE. i.e. for 15-min time periods, the last 8.25 hrs of data. • HOD-MOH - Time to start retrieving PM data. This is in the format of HOD-MOH, where HOD (hour of day) ranges from 0-23 and MOH (minute of hour) ranges from 0 to 59. • NULL - Defaults to the current HOD-MOH.

OUTPUT FORMAT   If there is no PM data to report, the following normal completion response is returned:

```
sid date time

M ctag COMPLD

;
```

If there is no PM data to report the following listing, the output parameters are displayed:

```
sid date time

M ctag COMPLD

"aid,
aidtype:emontype,monval,[vldyyl],[tmper],[mondat],[montm]

;
```

The order of applicable output lines is as follows:

1. By AID in order of the shelf architecture with the LAN/Data ports for a given slot listed first followed by the VCG ports.

2. By requested time intervals (starting with the current time interval).

3. By applicable PM parameters per AID in the order of the emontype as specified in the INPUT PARAMETERS section of this command.

....

OUTPUT PARAMETERS Refer to the OUTPUT PARAMETERS section of the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The output parameters listed there also apply to this command. Also, refer to the OUTPUT PARAMETER definitions for the RTRV-PM command for definitions of the output parameters listed here. Additional output parameters include the following:

aid	Access Identifier. This is the address of either an Ethernet port, VCG port, Refer to the Appendix A for valid AIDs.
aidtype	The type of access identifier. Values: FE - Used for FE LAN port VCG - Used for a VCG WAN port
emontype	Monitored Parameter Type. See the emontype parameter descriptions under the previous INPUT PARAMETERS section.
monval	Monitored Value. This contains the measured value of the parameter specified in emontype.
vidty	This indicates the validity of the PM data. See the OUTPUT PARAMETERS section of the RTRV-PM command for the values of this parameter.
tmper	Time Period. This parameter must have one of the following values: 15-MIN 1-DAY
mondat	Monitored date. See the description of the mondat parameter in the RTRV-PM command.
montm	Monitored time. See the description of the montm parameter in the RTRV-PM command.

EXAMPLE INPUT/OUTPUT

```
RTRV-EPM:LT-TID123:C-1:123456::EDFC,1-UP,15-MIN,01-01,08-
00;

LT-TID123 2000-01-01 08:00:00
```

M 123456 COMPLD

"C-1,FE:EDFC,1,,15-MIN,01-01,08-00"

"C-1,VCG:EDFC,2,,15-MIN,01-01,08-00"

;

ERROR RESPONSES   Refer to the ERROR RESPONSES section of the RTRV-HDR and
RTRV-PMcommands in the *DDM-2000 OC-3, OC-12, and FiberReach
Multiplexers Operations Systems Engineering Guide, 824-102-151.*
The error responses listed there also apply to this command.

If the system receives a RTRV-EPM command for which none of the
requested PM data is available due to equipage or provisioning, the
system will not provide a normal command response.

If a RTRV-EPM command contains an emontype value not supported
by the command, the following error response is returned to the OS:

sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, invalid EMONTYPE */

;

When a RTRV-EPM request is entered and PM or admin is disabled,
the following SNVS error response is returned:

sid date time

M ctag DENY

SNVS

/* Status, Not in Valid State, PM or admin disabled Input,
*/

;

When a RTRV-EPM request is entered for a ethernet port or VCG
port of a function slot and that function slot is not equipped with a
BBG23 circuit pack, the following ENEQ error response is returned:

sid date time

M ctag DENY

ENEQ

```
                        /* Equipage, Not EQuipped FEPL not installed */

                        ;
```

RELATED TL1 MESSAGES   rtrv-pm, ed-eport

☐

RTRV-EPORT

....

NAME   RTRV-EPORT: Retrieve Ethernet Port

The RTRV-EPORT command is available beginning in DDM-2000, Release 15.3.1.

LOGIN PRIVILEGE   This command is available to users with Privileged, Maintenance and Reports Only access.

INPUT FORMAT   RTRV-EPORT:*tid*:[*aid*]:*ctag*;

DESCRIPTION   The RTRV-EPORT command retrieves the attributes of one or more Ethernet ports.

Execution of this command, whether successful or denied, will be recorded in the Security log.

The RTRV-EPORT command generates a REPT DBCHG message.

Table 5-37   RTRV-EPORT Input Parameters

Parameter	Description
tid	Target Identifier. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* for the input parameter syntax and description of this parameter.
aid	Access Identifier. This is the address of a VCG AID. Refer to the "Cross-connection matrix" (2-28) for valid AIDs.
ctag	Correlation Tag. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* command for the input parameter syntax and description of this parameter.

OUTPUT FORMAT   If the NE fully complies with the RTRV-EPORT request, the following normal completion response is returned:

sid date time

....

```
M ctag COMPLD
```

```
"aid::spec_block"
```

```
;
```

OUTPUT PARAMETERS   Refer to the OUTPUT PARAMETERS section of the `RTRV-HDR` command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The output parameters listed there also apply to this command.

The following are `RTRV-EPORT` output parameters and *spec_block* output parameters.

Parameter	Description
aid	Access identifier. This is the address of an Ethernet port. Refer to the AID Table for valid *aids*.
spec_block	Specific parameter block: The *spec_block*parameters are defined in the following table.

Parameter	Description
epmode	Ethernet port monitoring mode. Epmode has the following values: • `AUTO` - (Initial value) • `NMON`
eppm	Ethernet port PM enable. It has the following values: • `ENABLE` • `DISABLE` (Initial value)

Parameter	Description
fcmd	Flow control mode. It has the following values: • ENABLE - Enable Transmit & Receive • DISABLE - Disable Transmit & Receive • AUTO - auto-negotiate (initial value) • DROP - Disable end-to-end flow-control Transmit & Receive Note: ENABLE and DISABLE only control Network-element controlled(local) flow-control; both ENABLE and DISABLE still allow Customer Equipment controlled end-to-end flow control. DROP both disables Network-element controlled flow-control and drops end-to-end flow-control messages. The value AUTO does not apply to optical port (port 5) on the BBG23, so the initial port 5 value is ENABLE.
fcmdo	Flow Control Mode Operational. It has the following values: • ENABLE - Enable Transmit & Receive • DISABLE - Disable Transmit & Receive • DROP - Disable end-to-end flow-control Transmit & Receive If the value is not available, a "?" is reported.

Parameter	Description
lnrate	Line Rate (as provisioned). This parameter is reported for both electrical FE (Fast Ethernet) port and optical port. Note that for optical port, value is always 100M. It has the following values: • AUTO (Initial value) • 10M • 100M
lnrateo	Line Rate Operation. This parameter is reported for both electrical FE (Fast Ethernet) port or optical port. It has the following values: 10M (only applies to Electrical FE port) 100M If the value is not available, a "?" is reported.
admin	Port administration control. This parameter is used to indicate that the specified port is enable or disable. The parameter may have one of the following values: ENABLE (Initial value) DISABLE
almlvl	Alarm Level. This parameter shows the alarm level for an incoming signal failure and may have one of the following values: • cr - Critical Alarm (initial value) • mj - Major Alarm • mn - Minor Alarm • na - No Alarm

Parameter	Description
mtu_size	MTU size (in bytes). This parameter specifies the MTU (Maximum Transmission Unit) size supported on the port, addressed by the aid. This is the size of the payload in the Ethernet frame, excluding Source and Destination Address, Type/Length, and CRC field. Note: mtu_size must be an integer in the range of 1500 to 9614. The default value of mtu_size is 1500.
autoneg	Autonegotiation. This parameter specifies whether autonegotiation is enabled on a port. Valid values are: • ENABLE - (Initial value) autonegotiation enabled. • DISABLE - autonegotiation disabled. If fcmd or lnrate parameters are set to AUTO when autoneg is set to DISABLE, then the system will set them as follows: fcmd = ENABLE lnrate = 100M Note: The autoneg parameter does not pertain to the optical port (port 5) on the BBG23.

Parameter	Description
mdix	Crossover. This parameter sets the crossover mode for the port. Valid values are: • AUTO - Initial value) automatic crossover is enabled. The system determines if crossover is needed, then sets the port to AUTOMDIX or AUTOMDI mode. • MDIX - RJ-45 TXP/TXN pins are transmit; RJ-45 RXP/RXN pins are receive. • MDI - RJ-45 TXP/TXN pins are receive; RJ-45 RXP/RXN pins are transmit. Note: The mdix parameter does not pertain BBG23 port 5, the optical port.
mdixo	Crossover operational value. This parameter reports the current state of the crossover mode. • AUTOMDIX - Port resolved to MDIX. RJ-45 TXP/TXN pins are transmit. RJ-45 RXP/RXN pins are receive. • AUTOMDI - Port resolved to MDI. RJ-TXP/TXN pins are receive. RJ-45RXP/RXN pins are transmit. • MDIX - port was manually set to MDIX. RJ-45 TXP/TXN pins are transmit. RJ-45 RXP/RXN pins are receive. • MDI - port was manually set to MDI. RJ-45 TXP/TXN pins are receive. RJ-45 RXP/RXN pins are transmit. • Note: If the value is not available, a "?" is reported. Note: The mdix parameter does not pertain BBG23 port 5, the optical port.

EXAMPLE INPUT/OUTPUT

```
RTRV-EPORT:TID123:a-1:123456;

IP 123456

<

TID123 00-01-01 08:00:00

M 123456 COMPLD

"a-1::epmode=IS, eppm=ENABLE,fcmd+DISABLE, fcmdo=DISABLE"

"a-1::lnrate=100M, lnrateo=100M, mdix=AUTO,mdixo=AUTOMDI"

"a-1::autoneg=ENABLE, admin=ENABLE, almlvl=MJ,
mtu_size=1500"

;
```

The following example applies when retrieving all ports of an FE
pack in function slot a.

```
RTRV-EPORT:TID123:a-all:123456;

IP 123456

<

TID123 00-01-01 08:00:00

M 123456 COMPLD

"a-1::epmode=NMON,eppm=ENABLE,fcmd=DISABLE,fcmdo=DISABLE"

"a-1::lnrate=100M,lnrateo=100M,mdix=AUTO,mdixo=AUTOMDI"

"a-1::autoneg=ENABLE,admin=ENABLE,almlvl=MJ,mtu_size=1500"

"a-2::epmode=AUTO,eppm=ENABLE,fcmd=DISABLE,fcmdo=?"

"a-2::lnrate=100M,lnrateo=?,mdix=AUTO,mdixo=?"

"a-2::autoneg=ENABLE,admin=ENABLE,almlvl=MJ,mtu_size=1500"

"a-3::epmode=IS,eppm=ENABLE,fcmd=DISABLE,fcmdo=DISABLE"

"a-3::lnrate=100M,lnrateo=100M,mdix=AUTO,mdixo=AUTOMDIX"

"a-3::autoneg=ENABLE,admin=ENABLE,almlvl=MJ,mtu_size=1500"

"a-4::epmode=AUTO,eppm=ENABLE,fcmd=ENABLE,fcmdo=ENABLE"

"a-4::lnrate=100M,lnrateo=100M,mdix=AUTO,mdixo=AUTOMDIX"

"a-4::autoneg=ENABLE,admin=ENABLE,almlvl=MJ,mtu_size=1500"

"a-5::epmode=IS,eppm=ENABLE,fcmd=DISABLE,fcmdo=DISABLE"
```

"a-5::lnrate=100M,lnrateo=100M?,mdix=?,mdixo=?"

"a-5::autoneg=ENABLE,admin=ENABLE,almlvl=MJ,mtu_size=1500"

;

ERROR RESPONSES Refer to the ERROR RESPONSES section of the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The error responses listed there also apply to this command.

If the network element receives an RTRV-EPORT command with an invalid AID value, the following error response is returned:

sid date time

M ctag DENY

IIAC

/* Input, Invalid Access Identifier */

;

If the specified parameter value does not have a valid value, the following error response returned:

sid date time

M ctag DENY

IDNV

/* Input, Data Not Valid, one or more input parameters not valid with specified circuit pack */

;

If the network element receives an ED-EPORT with an invalid AID value, the following error response is returned:

sid date time

M ctag DENY

IIAC

/* Input, Invalid Access Identifier */

;

If any of the fcmd, lnrate, or mtu_size parameters are changed while epmode and vmode for the AID is IS, the following error response is returned:

```
sid date time

M ctag DENY

SNVS

/* parameter(s) cannot be changed on IS port */

;
```

If a parameter appears more than once within a single command, the following error response is returned:

```
sid date time

M ctag DENY

IISP

/* Input, Invalid Syntax or Punctuation, parameter(s)
multiply defined */

;
```

If the slot of the specified AID is empty, the following error response is returned:

```
sid date time

M ctag DENY

ENEQ

/* Equipage, Note EQuipped */

;
```

If the slot of the specified AID does not contain a BBG23 FEPL circuit pack, the following error response is returned:

```
sid date time

M ctag DENY

ENSI

/* Equipage, Not equipped for Setting specified
Information */

;
```

RELATED TL1 MESSAGES   rtrv-vcg, rtrv-eqpt

☐

....

RTRV-EQPT

NAME   `RTRV-EQPT`: Retrieve Equipment

This command is available for DDM-2000 Multiplexers, starting with:

OC-3 Release 6.1 and OC-12 Release 2.1 for linear systems

OC-2 Release 7.1 and OC-12 Release 3.1 for rings

FiberReach Release 1.0.

INPUT FORMAT   `RTRV-EQPT:`*tid*`:`*aid*`:`*ctag* ;

DESCRIPTION   The `RTRV-EQPT` command is initiated to request FT-2000 to retrieve the circuit pack and version number information for one or more slots.

This command is available to all users.

The following are input parameters:

Table 5-38   `RTRV-EQPT` **Input Parameters**

Parameter	Description
tid	Target Identifier. This is the name of the network element to which the command is addressed.
aid	Access identifier. *Aid* determines slot address whose equipage is to be reported. If `all` is specified, all slots are reported.
ctag	Correlation Tag. This is included in the command by the user and is repeated by the Network Element in the response to allow the user to associate the command and response messages.

OUTPUT FORMAT   In response to a valid `RTRV-EQPT` command, the following output report is returned.

```
sid date time
M ctag COMPLD
"aid::spec_block"
"aid::spec_block"
```

OUTPUT PARAMETERS Refer to the RTRV-HDR OUTPUT PARAMETERS section. The requirements listed there apply to this command also. In addition, the following requirements pertaining to the output parameters also apply to RTRV-EQPT, as well as the following parameters:

aid	Access identifier. This is the address of the slot and shelf for which equipage is being reported.

spec_block	Specific block. This parameter field is used for returning the current equipage information for the slot or quad. Parameters within the specific block are positionally independent and are specified using a name defined construct of: *PARAMETER=value* in a comma separated list. The parameters are listed and explained below.
	It should be noted, however, that the network elements will return the parameter within the *spec_block* in the following order:
	This parameter field is used for returning the current equipage information for the slot. Parameters within the specific block are positionally independent and are specified using a name defined construction of *PARAMETER=value* in a comma separated list.
	DDM-2000: *TYPE, APP, SSN, CLEI, ECI, SLN, VRSN, PID*
	Starting in DDM-2000 OC3 R15.3.1, the BBG23 circuit pack is introduced and it contains the Pluggable optics SFP module. The circuit pack information is reported along with it's SFP module information. The following SFP parameters should be included in the report:
	NAME, QUAL, CLEI, MFGID, PRODID, DATECDE, CCODE
	The parameters are:
	TYPE
	This is the mnemonic name that identifies the general type function provided by the circuit pack. For example, DS3 low speed interfaces are all named DS3.
	APP
	This is the apparatus code and it uniquely identifies the specific function provided by the circuit pack. Circuit packs with different APP are not interchangeable, even if they have the same name.

spec_block (continued)	The parameters are:
	SSN
	This is the series number and it is used to indicate interchangeability among the circuit packs with the same circuit pack type and apparatus code, but different manufacturing versions. In general, a circuit pack can be replaced by another pack that has the same apparatus code and the same or later series number.
	Note that the series number normally includes a colon (:). Since the colon is used as a TL1 field separator, a dash (-) is used instead.
	CLEI
	The Common Language is the 10-character code identifying each circuit pack. Starting in the DDM-2000 OC3 R15.3.1, this parameter applies to both slot AID and SFP module of the FEPL pack.
	COMMON LANGUAGE is a registered trademark and CLEI, CLLI, and CLFI are trademarks of Bell Communication Research, Inc.
	ECI
	The Equipment Catalog Item is a 6-character code identifying each circuit pack. This code corresponds to the bar-code label on the faceplate of the circuit pack and is uniquely equivalent to CLEI.

spec_block (continued)	SLN This is the serial number and it is a 12-character code uniquely identifying each circuit pack and indicating the date and place of manufacture. VRSN The program version is the version of the software currently stored in the circuit pack. PID The Program IDentification code identifies the version of the firmware on one or more socketed devices on the circuit pack. NAME Pluggable optics module name. The value is OMFE for Fast Ethernet module. This parameter applies only to SFP module. QUAL Pluggable optics module qualifier. The value is 100BASE-FX for Fast Ethernet. This parameter applies only to SFP module. MFGID Pluggable optics module Manufacture identifier. This parameter is a 4 character alphanumeric code. This parameter applies only to SFP module. PRODID Pluggable optics product identifier. This parameter is is a 10-digit hexadecimal code. This parameter applies only to SFP module. DATECDE Pluggable optics date code. This parameter is is a 8-character alphanumeric code. This parameter applies only to SFP module. CCODE Pluggable optics commercial code & suffix. This parameter is a 12-digit code This parameter applies only to SFP module.

The network element will include in its response equipage information on only equipped slots.

The network element will successfully complete the RTRV-EQPT command and return a *COMPLD*, even if the *aid* in the command points to slot(s) that is/are not equipped.

If the circuit pack in an equipped slot is removed, declared failed, or replaced with a pack of different type, the TYPE of the provisioned (removed/failed) circuit pack is retained and reported in the normal fashion, except in some specific cases where it is reported as specified in other requirements in this document.

The CLEI value is lost and reported as a dash (″-″) indicating that data is unavailable. The CLEI is reported other than a dash in some specific cases where error conditions are reported by the NE as specified elsewhere in this document.

The program version information is reported whenever the report includes information on a circuit pack on which a downloadable program is stored. Question marks (?) are used in the parameter value fields to indicate that the information is unknown (unrecognized circuit pack, unable to read version information from a circuit pack inserted into a slot in the AUTO state, for example).

If an incorrect circuit pack is inserted in a slot, the response from the Network Element will show the expected circuit pack for that slot and indicate that the current pack does not match inventory. In this case the CLEI field will be set to *illegal_CP_type* for that slot.

If a faulty circuit pack with unreadable version recognition information is placed in the slot, the report indicates that the circuit pack is failed and version information is unrecognizable. In this case the CLEI field will be set to *CP_failed_version_information_unrecognizable*.

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 is followed by a ″?″.

If the system cannot report complete the information for a circuit pack since that LS CP never getting power prior to removal, then the TYPE field will be set to ? and the CLEI field will be set to *CP_removed_version_information_unavailable*.

If the system cannot report complete the information for a circuit pack since that LS DS1 CP does not have a MXRVO or STS1E-HS pack in

the corresponding function slot, then the CLEI field will be set to *CP_not_allowed_-_eqpt*.

If the system cannot report complete the information for a circuit pack since that LS DS1 CP has never been powered, then the TYPE field will be set to ? and the CLEI field will be set to *CP_not_powered_version_information_unavailable*.

If the system cannot report complete the information for a circuit pack since that LS DS1 CP is present but not powered but was powered once, then the TYPE field will be set to the expected pack type and the CLEI field will be set to *CP_not_powered_version_information_ unavailable* .

If the system cannot report the information for a slot that is equipped with the legal pack but the actual CP type and the database do not match, then the TYPE will be set to the expected pack type and the CLEI will be set to *installed_CP_(act_name)_does_not_match_ inventory*.

When the *aid* of the slot in the input command is SYSCTL, the Network Element will return the equipage information for both SYSCTL and OHCTL *aids*.

The program version information is reported whenever the report includes information on a circuit pack on which a downloadable program is stored.

EXAMPLE INPUT/OUTPUT

The following example for DDM-2000 OC-3 R6.1, 7.1 requests the equipage in the entire system:

```
rtrv-eqpt:LT-PF-2000:all:123456;

IP 123456

<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD

"tg-1::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=2MV09625458,PID=AEKCG"

"tg-2::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=92MV04583664, PID=AEKCG"

"main-1::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMGOOCAB,
```

```
                              ECI=680085,SLN=93MV03577681"

                              "main-2::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMG0OCAB,

                              ECI=680085,SLN=92MV08570294"

                              "fn-a-1::TYPE=DS3,APP=BBG4,SSN=S1-2,CLEI=SNCLBBBAAB,

                              ECI=670496,SLN=89MV03680918"

                              "fn-a-2::TYPE=DS3,APP=BBG4,SSN=S1-1,CLEI=SNCLBBBAAA,

                              ECI=663938,SLN=90MV11065879"

                              "fn-b-1::TYPE=MXRVO,APP=25MC,SSN=25Iss,CLEI=25CLEI,

                              ECI=25CECI,SLN=25Ser"

                              "fn-c-1::TYPE=MXRVO,APP=BBG2,SSN=S1-1,CLEI=SNCMAAOAAA,

                              ECI=663642,SLN=90MV07010198"

                              "ls-b-1::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,

                              ECI=3CECI,SLN=3Ser"

                              "ls-c-1::TYPE=DS1,APP=6MC,SSN=6Iss,CLEI=6CLEI,

                              ECI=6CECI,SLN=6Ser"

                              "sysctl::TYPE=SYSCTL,APP=BBG5,SSN=S2-2,CLEI=DMPQ0OWAAA,

                              ECI=676731,SLN=91MV04670097,
                              VRSN=70.4.5,PIDa=AEGGK,PIDb=AADDS"

                              "auxctl::TYPE=OHCTL,APP=BG7,SSN=S2-2,CLEI=DMPQO02AAA,

                              ECI=676733,SLN=91MV07643421,
                              VRSN=70.4.5,PIDa=AEGGH,PIDb=AADDS"

                              ;
```

The following DDM-2000 OC-3 R9.1 example requests the equipage
in the entire system where the system is equipped with a group 4
shelf:

```
rtrv-eqpt:LT-PF-2000:all:123456;

IP 123456

<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD

"tg-1::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,
```

....

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```
                            ECI=680153,SLN=2MV09625458,PID=AEKCG"

                            "tg-2::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

                            ECI=680153,SLN=92MV04583664 PID=AEKCG"

                            "main-1::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMG00CAB,

                            ECI=680085,SLN=93MV03577681"

                            "main-2::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMG00CAB,

                            ECI=680085,SLN=92MV08570294"

                            "fn-a-1::TYPE=DS3,APP=BBG4,SSN=S1-2,CLEI=SNCLBBBAAB,

                            ECI=670496,SLN=89MV03680918"

                            "fn-a-2::TYPE=DS3,APP=BBG4,SSN=S1-1,CLEI=SNCLBBBAAA,

                            ECI=663938,SLN=90MV11065879"

                            "fn-b-1::TYPE=MXRVO,APP=25MC,SSN=25Iss,CLEI=25CLEI,

                            ECI=25CECI,SLN=25Ser"

                            "fn-c-1::TYPE=MXRVO,APP=BBG2,SSN=S1-1,CLEI=SNCMAAOAAA,

                            ECI=663642,SLN=90MV07010198"

                            "ls-b-1::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,

                            ECI=3CECI,SLN=3Ser"

                            "ls-c-1::TYPE=DS1,APP=6MC,SSN=6Iss,CLEI=6CLEI,

                            ECI=6CECI,SLN=6Ser"

                            "sysctl::TYPE=SYSCTL,APP=BBG5,SSN=S2-2,CLEI=DMPQ00WAAA,

                            ECI=676731,SLN=91MV04670097,
                            VRSN=70.4.5,PIDa=AEGGK,PIDb=AADDS"

                            "auxctl::TYPE=OHCTL,APP=BG7,SSN=S2-2,CLEI=DMPQ002AAA,

                            ECI=676733,SLN=91MV07643421,
                            VRSN=70.4.5,PIDa=AEGGH,PIDb=AADDS"

                            "shelf::TYPE=,APP=ED-8C724-30,SSN=G4,CLEI=,ECI=,SLN="

                            ;
```

The following DDM-2000 OC-3 R9.1 example requests the equipage in the entire system where the system is equipped with a group 3 shelf:

```
rtrv-eqpt:LT-PF-2000:all:123456;
```

```
IP 123456

<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD

"tg-1::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=2MV09625458,PID=AEKCG"

"tg-2::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=92MV04583664 PID=AEKCG"

"main-1::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMGOOCAB,

ECI=680085,SLN=93MV03577681"

"main-2::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMGOOCAB,

ECI=680085,SLN=92MV08570294"

"fn-a-1::TYPE=DS3,APP=BBG4,SSN=S1-2,CLEI=SNCLBBBAAB,

ECI=670496,SLN=89MV03680918"

"fn-a-2::TYPE=DS3,APP=BBG4,SSN=S1-1,CLEI=SNCLBBBAAA,

ECI=663938,SLN=90MV11065879"

"fn-b-1::TYPE=MXRVO,APP=25MC,SSN=25Iss,CLEI=25CLEI,

ECI=25CECI,SLN=25Ser"

"fn-c-1::TYPE=MXRVO,APP=BBG2,SSN=S1-1,CLEI=SNCMAAOAAA,

ECI=663642,SLN=90MV07010198"

"ls-b-1::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,

ECI=3CECI,SLN=3Ser"

"ls-c-1::TYPE=DS1,APP=6MC,SSN=6Iss,CLEI=6CLEI,

ECI=6CECI,SLN=6Ser"

"sysctl::TYPE=SYSCTL,APP=BBG5,SSN=S2-2,CLEI=DMPQOOWAAA,

ECI=676731,SLN=91MV04670097,
VRSN=70.4.5,PIDa=AEGGK,PIDb=AADDS"

"auxctl::TYPE=OHCTL,APP=BG7,SSN=S2-2,CLEI=DMPQO02AAA,

ECI=676733,SLN=91MV07643421,
VRSN=70.4.5,PIDa=AEGGH,PIDb=AADDS"
```

```
"shelf::TYPE=,APP=ED-8C724-30,SSN=G3 or
Earlier,CLEI=,ECI=,SLN="
```

```
;
```

The following DDM-2000 OC-3 R15.0 example requests the equipage in the entire system where the system is equipped with a group 4 shelf:

```
rtrv-eqpt:LT-PF-2000:all:123456;
```

```
IP 123456
```

```
<
```

```
LT-PF-2000 93-10-26 16:42:11
```

```
M 123456 COMPLD
```

```
"tg-1::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,
ECI=680153,SLN=2MV09625458,PID=AEKCG"
```

```
"tg-2::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,
ECI=680153,SLN=92MV04583664 PID=AEKCG"
```

```
"main-1::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMGOOCAB,
ECI=680085,SLN=93MV03577681"
```

```
"main-2::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMGOOCAB,
ECI=680085,SLN=92MV08570294"
```

```
"fn-a-1::TYPE=DS3,APP=BBG4,SSN=S1-2,CLEI=SNCLBBBAAB,
ECI=670496,SLN=89MV03680918"
```

```
"fn-a-2::TYPE=DS3,APP=BBG4,SSN=S1-1,CLEI=SNCLBBBAAA,
ECI=663938,SLN=90MV11065879"
```

```
"fn-b-1::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5PAAA,
ECI=472338573,SLN=99MV08488635"
```

```
"fn-b-2::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5PAAA,
ECI=663642,SLN=99MV07010198"
```

```
"fn-c-1::TYPE=MXRVO,APP=25MC,SSN=25Iss,CLEI=25CLEI,
ECI=25CECI,SLN=25Ser"
```

```
fn-c-2::TYPE=MXRVO,APP=BBG2,SSN=S1-1,CLEI=SNCMAAOAAA,
```

```
ECI=663642,SLN=90MV07010198"
"ls-b-1::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,

ECI=3CECI,SLN=3Ser"

""ls-b-2::TYPE=T1EXT,APP=BBF6,SSN=S1-1,CLEI=SNCJAA0AAA,

ECI=472120461,SLN=XXXXXXXXXXXX"

"ls-c-1::TYPE=LAN,APP=BBF9,SSN=S1-1,CLEI=SNCBF05DAA,

ECI=2401594,SLN=XXXXXXXXXXX"

"ls-c-2::TYPE=LAN,APP=BBF9,SSN=S1-1,CLEI=SNCBF05DAA,

ECI=2401594,SLN=XXXXXXXXXXX"

"ls-c-3::TYPE=DS1,APP=6MC,SSN=6Iss,CLEI=6CLEI,

ECI=6CECI,SLN=6Ser"

"sysctl::TYPE=SYSCTL,APP=BBG5,SSN=S2-2,CLEI=DMPQ00WAAA,

ECI=676731,SLN=91MV04670097,
VRSN=70.4.5,PIDa=AEGGK,PIDb=AADDS"

"auxctl::TYPE=OHCTL,APP=BG7,SSN=S2-2,CLEI=DMPQ002AAA,

ECI=676733,SLN=91MV07643421,
VRSN=70.4.5,PIDa=AEGGH,PIDb=AADDS"

"shelf::TYPE=,APP=ED-8C724-30,SSN=G4,CLEI=,ECI=,SLN="

;
```

The following DDM-2000 OC-3 R15.0 example requests the equipage in the entire system, where the system is equipped with a group 3 shelf:

```
rtrv-eqpt:LT-PF-2000:all:123456;

IP 123456

<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD

"tg-1::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=2MV09625458,PID=AEKCG"

"tg-2::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=92MV04583664 PID=AEKCG"
```

"main-1::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMG00CAB,
ECI=680085,SLN=93MV03577681"

"main-2::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMG00CAB,
ECI=680085,SLN=92MV08570294"

"fn-a-1::TYPE=DS3,APP=BBG4,SSN=S1-2,CLEI=SNCLBBBAAB,
ECI=670496,SLN=89MV03680918"

"fn-a-2::TYPE=DS3,APP=BBG4,SSN=S1-1,CLEI=SNCLBBBAAA,
ECI=663938,SLN=90MV11065879"

"fn-b-1::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5PAAA,
ECI=472338573,SLN=99MV08488635"

"fn-b-2::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5PAAA,
ECI=663642,SLN=99MV07010198"

"fn-c-1::TYPE=MXRVO,APP=25MC,SSN=25Iss,CLEI=25CLEI,
ECI=25CECI,SLN=25Ser"

"fn-c-2::TYPE=MXRVO,APP=BBG2,SSN=S1-1,CLEI=SNCMAAOAAA,
ECI=663642,SLN=90MV07010198"

"ls-b-1::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,
ECI=3CECI,SLN=3Ser"

"ls-b-2::TYPE=T1EXT,APP=BBF6,SSN=S1-1,CLEI=SNCJAAOAAA,
ECI=472120461,SLN=XXXXXXXXXXXX"

"ls-c-1::TYPE=LAN,APP=BBF9,SSN=S1-1,CLEI=SNCBF05DAA,
ECI=2401594,SLN=XXXXXXXXXXX"

"ls-c-2::TYPE=LAN,APP=BBF9,SSN=S1-1,CLEI=SNCBF05DAA,
ECI=2401594,SLN=XXXXXXXXXXX"

"ls-c-3::TYPE=DS1,APP=6MC,SSN=6Iss,CLEI=6CLEI,
ECI=6CECI,SLN=6Ser"

"ls-c-4::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,
ECI=3CECI,SLN=3Ser"

"ls-c-5::TYPE=DS1,APP=6MC,SSN=6Iss,CLEI=6CLEI,
ECI=6CECI,SLN=6Ser"

```
"sysctl::TYPE=SYSCTL,APP=BBG5,SSN=S2-2,CLEI=DMPQ00WAAA,

ECI=676731,SLN=91MV04670097,
VRSN=70.4.5,PIDa=AEGGK,PIDb=AADDS"

"auxctl::TYPE=OHCTL,APP=BG7,SSN=S2-2,CLEI=DMPQ002AAA,

ECI=676733,SLN=91MV07643421,
VRSN=70.4.5,PIDa=AEGGH,PIDb=AADDS"

"shelf::TYPE=,APP=ED-8C724-30,SSN=G3 or
Earlier,CLEI=,ECI=,SLN="

;
```

The following DDM-2000 OC-3 R15.0 example requests the equipage in the entire system where the system is equipped with a group 5 shelf:

```
rtrv-eqpt:LT-PF-2000:all:123456;

IP 123456

<

LT-PF-2000 93-10-26 16:42:11 M 123456 COMPLD
"tg-1::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=2MV09625458,PID=AEKCG"

"tg-2::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=92MV04583664 PID=AEKCG"

"main-1::TYPE=OLIU,APP=29G,SSN=S1-2,CLEI=FNUMG0OCAB,

ECI=680085,SLN=93MV03577681"

"main-2::TYPE=OLIU,APP=29G,SSN=S1-2,CLEI=FNUMG0OCAB,

ECI=680085,SLN=92MV08570294"

"fn-a-1::TYPE=DS3,APP=BBG4,SSN=S1-2,CLEI=SNCLBBBAAB,

ECI=670496,SLN=89MV03680918"

"fn-a-2::TYPE=DS3,APP=BBG4,SSN=S1-1,CLEI=SNCLBBBAAA,

ECI=663938,SLN=90MV11065879"

"fn-b-1::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5PAAA,

ECI=472338573,SLN=XXXXXXXXXXXX"

"fn-b-2::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5PAAA,
```

```
ECI=472338573,SLN=XXXXXXXXXXXX"
"fn-c-1::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5AAA,
ECI=472338573,SLN=XXXXXXXXXXXX"
"fn-c-2::TYPE=MXRVO,APP=BBG2,SSN=S1-1,CLEI=SNPQB5AAA,
ECI=472338573,SLN=XXXXXXXXXXXX"
"ls-b-1::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,
ECI=3CECI,SLN=3Ser"
"ls-b-2::TYPE=T1EXT,APP=BBF6,SSN=S1-1,CLEI=SNCJAA0AAA,
ECI=472120461,SLN=XXXXXXXXXXXX"
"ls-c-1::TYPE=LAN,APP=BBF9,SSN=S1-1,CLEI=SNCBF05DAA,
ECI=2401594,SLN=XXXXXXXXXXXX"
"ls-c-2::TYPE=LAN,APP=BBF9,SSN=S1-1,CLEI=SNCBF05DAA,
ECI=2401594,SLN=XXXXXXXXXXXX"
"ls-c-3::TYPE=LAN,APP=BBF9,SSN=S1-1,CLEI=SNCBF05DAA,
ECI=2401594,SLN=XXXXXXXXXXXX"
"ls-c-4::TYPE=LAN,APP=BBF9,SSN=S1-1,CLEI=SNCBF05DAA,
ECI=2401594,SLN=XXXXXXXXXXXX"
"ls-c-5::TYPE=DS1,APP=6MC,SSN=6Iss,CLEI=6CLEI,
ECI=6CECI,SLN=6Ser"
"sysctl::TYPE=SYSCTL,APP=BBG5,SSN=S2-2,CLEI=DMPQ00WAAA,
ECI=676731,SLN=91MV04670097,
VRSN=70.4.5,PIDa=AEGGK,PIDb=AADDS"
"auxctl::TYPE=OHCTL,APP=BG7,SSN=S2-2,CLEI=DMPQ002AAA,
ECI=676733,SLN=91MV07643421,
VRSN=70.4.5,PIDa=AEGGH,PIDb=AADDS"
"shelf::TYPE=,APP=ED-8C724-30,SSN=G5,CLEI=,ECI=,SLN="
;
```

The following DDM-2000 OC-3 R15.0 example requests the equipage in the entire system where the system is equipped with a group 4 shelf and the function slot C is equipped with the BBG23 Ethernet

pack (Note that the SFP module information in fn-c-2-5 is also reported as well):

```
rtrv-eqpt:LT-PF-2000:all:123456;

IP 123456

<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD

"tg-1::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=2MV09625458,PID=AEKCG"

"tg-2::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=92MV04583664 PID=AEKCG"

"main-1::TYPE=OLIU,APP=29G,SSN=S1-2,CLEI=FNUMG00CAB,

ECI=680085,SLN=93MV03577681"

"main-2::TYPE=OLIU,APP=29G,SSN=S1-2,CLEI=FNUMG00CAB,

ECI=680085,SLN=92MV08570294"

"fn-a-1::TYPE=DS3,APP=BBG4,SSN=S1-2,CLEI=SNCLBBBAAB,

ECI=670496,SLN=89MV03680918"

"fn-a-2::TYPE=DS3,APP=BBG4,SSN=S1-1,CLEI=SNCLBBBAAA,

ECI=663938,SLN=90MV11065879"

"fn-b-1::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5PAAA,

ECI=472338573,SLN=XXXXXXXXXXX"

"fn-b-2::TYPE=MXRVO,APP=BBG2B,SSN=S1-1,CLEI=SNPQB5PAAA,

ECI=472338573,SLN=XXXXXXXXXXX"

"fn-c-2::TYPE=FEPL,APP=BBG23,SSN=S1-1,CLEI=SNI7GLMDAA,

ECI=124162--1,SLN=XXXXXXXXXXX"

"fn-c-2-5::NAME=OMFE,QUAL=100BASE-FX,CLEI=SOIFKP0CAA,

CCODE=123456789098,DATECDE=05272003,PRODID=04FDC198A0,

FGID=ABCD"

"ls-b-1::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,

ECI=3CECI,SLN=3Ser"
```

```
"ls-b-2::TYPE=T1EXT,APP=BBF6,SSN=S1-1,CLEI=SNCJAAOAAA,

ECI=472120461,SLN=XXXXXXXXXXXX"

"sysctl::TYPE=SYSCTL,APP=BBG5,SSN=S2-2,CLEI=DMPQ00WAAA,

ECI=676731,SLN=91MV04670097,
VRSN=70.4.5,PIDa=AEGGK,PIDb=AADDS"

"auxctl::TYPE=OHCTL,APP=BG7,SSN=S2-2,CLEI=DMPQ002AAA,

ECI=676733,SLN=91MV07643421,
VRSN=70.4.5,PIDa=AEGGH,PIDb=AADDS"

"shelf::TYPE=,APP=ED-8C724-30,SSN=G4,CLEI=,ECI=,SLN="

;
```

The following DDM-2000 OC-3 R6,1, R7.1 example requests the equipage in the entire system while a condition specified in the requirement exists in slot fn-a-2:

```
rtrv-eqpt:LT-PF-2000:all:123456;

IP 123456

<

LT-PF-2000 93-10-26 16:42:11

M 123456 COMPLD

"tg-1::TYPE=TGS,APP=BBF2B,SSN=S1-1,CLEI=SNPQAJCAAA,

ECI=680153,SLN=2MV09625458,PID=AEKCG"

"main-1::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMG00CAB,

ECI=680085,SLN=93MV03577681"

"main-2::TYPE=OLIU,APP=22F,SSN=S1-2,CLEI=FNUMG00CAB,

ECI=680085,SLN=92MV08570294"

"fn-a-1::TYPE=DS3,APP=BBG4,SSN=S1-2,CLEI=SNCLBBBAAB,

ECI=670496,SLN=89MV03680918"

"fn-a-2::TYPE=DS3,CLEI=illegal_CP_type"
"fn-b-1::TYPE=MXRVO,APP=25MC,SSN=25Iss,CLEI=25CLEI,

ECI=25CECI,SLN=25Ser"

"fn-c-1::TYPE=MXRVO,APP=BBG2,SSN=S1-1,CLEI=SNCMAAOAAA,

ECI=663642,SLN=90MV07010198"
```

```
"ls-b-1::TYPE=DS1,APP=3MC,SSN=3Iss,CLEI=3CLEI,

ECI=3CECI,SLN=3Ser"

"sysctl::TYPE=SYSCTL,APP=BBG5,SSN=S2:2,CLEI=DMPQ00WAAA,

ECI=676731,SLN=91MV04670097,
VRSN=70.4.5,PIDa=AEGGK,PIDb=AADDS"

"auxctl::TYPE=OHCTL,APP=BG7,SSN=S2-2,CLEI=DMPQ002AAA,

ECI=676733,SLN=91MV07643421,
VRSN=70.4.5,PIDa=AEGGH,PIDb=AADDS"

;
```

ERROR RESPONSES

Refer to the ERROR RESPONSES section of the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The error responses listed there also apply to this command.

If FT 2000 receives an RTRV-EQPT command without an *aid* or with an invalid *aid*, the following error response is returned:

```
sid date time

M ctag DENY

IIAC

/* Input, Invalid Access Identifier */

;
```

If the NE receives the RTRV-EQPT command with an *aid* that points to a slot that is not equipped, then the NE will return the following response to the user:

```
sid date time

M ctag DENY

ENEQ

/* Equipage, Not EQuipped */

;
```

RELATED TL1 MESSAGES   rtrv-state-eqpt

□

RTRV-STATE-EQPT

....

NAME   RTRV-STATE-EQPT: Retrieve State Equipment

This command is available for DDM-2000 Multiplexers, starting with:

OC-3 Release 8.0 and OC-12 Release 4.0 for linear systems

OC-2 Release 9.0 and OC-12 Release 5.0 for rings

FiberReach Release 1.0.

INPUT FORMAT   RTRV-STATE-EQPT:*tid*:*[aid]*:*ctag [:[:[:]]]*;

DESCRIPTION

The RTRV-STATE-EQPT command can be initiated by general users and reports only users to retrieve the port, slot, and protection switch information for the Network Element identified by the TID. This TL1 command is intended to behave as much as is possible like its CIT equivalent.

This command is available to all users.

The following are input parameters:

Table 5-39   RTRV-STATE-EQPT **Input Parameters**

Parameter	Description
tid	Target Identifier. This is the name of the network element to which the command is addressed. *tid* is a required parameter.

....

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Table 5-39 `RTRV-STATE-EQPT` **Input Parameters** **(continued)**

Parameter	Description

aid	Access identifier. The aid identifies one or more slots. A null value defaults to *all* for all slots in the system.
	
	Valid OC-3 Addresses:
	`all, main-{1,2,all}, fn-all,`
	`fn-{a,b,c}-{1,2,all}, ls-all,`
	`ls-{a,b,c}-{1-8,all}, tg-{1,2,all}`
	Valid FEPL Ethernet (BBG23) addresses:
	`fn-{a,b,c,all}`
	If the shelf is equipped with IMA LAN (BBF9), valid low speed addresses are:
	`ls-{a,b,c}-{1-7,all}`
	Valid SLC Addresses:
	`all, main-{1,2,all}, fn-all,`
	`fn-{a,c}-{1,2,all}, ls-all,`
	`ls-{a,b,c}-{1-8,all}, tg-{1,2,all}`
	Valid OC-12 Addresses:
	`all, main-b-{1,2,all}, fn-all,`
	`fn-{a,b,c,d}-{1,2,all},`
	`tsi-{1,2,all},`
	`tg-{1,2,all}`
	Valid FiberReach Addresses:
	`all, main-{1,2,all},`
	`fn-{1,2,all}, ls-all,`
	`ls-{a,b,c,d}-{1,2,all}`

ctag	Correlation Tag. This is included in the command by the user and is repeated by the Network Element in the response to allow the user to associate the command and response messages.

OUTPUT FORMAT   If the NE fully complies with the RTRV-STATE-EQPT request, the following normal completion response is returned with an output report as follows.

```
IP 123456

<

LT-PF-2000 9-10-26 16:42:11

M 123456 COMPLD

"aid, pack-type:port-state,switch-state,switch-priority"

.

.

"aid, pack-type:port-state,switch-state,switch-priority"
```

In the output report, all slots of the same type are listed together. Within each type, slots are listed in order of their addresses wtih protection slots listed last.

OUTPUT PARAMETERS   Refer to the RTRV-HDR OUTPUT PARAMETERS section. The requirements listed there apply to this command also. The following are also output parameters:

address	The address of a slot. See the input parameters section for more information.
Circuit-Pack	The circuit pack name (type). A null entry means not applicable or not equipped. Examples are ″OLIU″ or ″STS1E-L″. The IMA LAN (BBF9) occupies two adjacent slots.

Port-State(s)	The state of the signal, from the DSX or T1 interface for DS-1 signals is reported.
	Port State(s) may be one of the following:
	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.
	auto
	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-1 signals.
	For OC-3 and FiberReach systems, the port state is always null for low speed slots in the *auto* state.
	nmon
	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.
	null
	Not monitored, not equipped. The port state is always null for timing circuits, and for protection slots for 1x1 and 1xn protected circuit packs. The port state is null on SLC-2000 systems for slots on the low speed group. The port state is always null for both OLIU circuit packs in function units provisioned for the dual 0x1 application.
	Note: the BBG19 DS3 circuit pack is 0X1 protected and thus has independent port states for the "service" and "protection" slots.

| Switch-State | The Switch State 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

For DDM OC-N lines in a 1+1 line-protected configuration, active means the signal being received on this line is selected by the near end protection switch and the signal being transmitted on this line is selected by the far end.

For DDM ring applications, each OLIU in the main slots (OC-3) or main-b slots and the TSI in the TSI slots (OC-12) is feeding its ring channels incoming from the fiber to the other side for pass-through connections and is sending drop channels to the function units.

With the addition of pass-through cross connections in function units in Release 9.1 (OC-3) and path-protected hairpin local drop cross-connections in release 11.0 (OC-3), the above discussion applies to OLIUs in function unit slots supporting such cross connections.

Starting with OC3 Release 15.0, for IMA LAN (BBF9), the *Switch-State* is always *active*

For FiberReach, 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.

active-fn

OC-3 systems (for a main OLIU slot in ring applications). This means that the ring 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 function units. |
|---|---|

Switch-State (continued)	*active-ls*
	For FiberReach, for a main OLIU slot, or for a TSI slot in ring applications (OC-12). 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 function units (OC-3 or OC-12) or low-speed slots (FiberReach).
	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.
	active-tx
	For OC-3 function unit -3 lines. The signal being transmitted is selected by the far end, but the received signal is not selected by the near end protection switch.
	active-rx
	For OC-3 function unit -3 lines. The signal being received on this line is selected by the near end protection switch, but the signal being transmitted is not selected by the far end.
	active-?
	For OC-3 function unit lines. The protection line is failed in the receive direction. The state of the protection line in the transmit direction is unknown; the signal transmitted on the protection line might be selected by the far end.
	standby
	The circuit pack or optical line is not currently active.
	null
	Not applicable or not equipped

Switch-State (continued)	For ring applications because of pass-through connections, the switch state will always be active for both main OLIUs (Fiber Reach and OC-3) and for for both main-b OLIUs and TSIs (OC-12). For function units provisioned for the dual 0x1 application, the switch state will always be active for both OLIUs (OC-3 and OC-12). For function units provisioned for pass-through (OC-3 R9.1 and greater) or path-protected haripin local drop (DDM-OC3 Release 11.0 or later), the switch state will alsways be active for both 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: *inhibit* No protection switches will be done until the switch is reset. *prot-lockout* This prevents access to the protection pack for the group. *svc-lockout* 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.

Switch-Priority (continued)	*K1/K2-byte-failure*
	This occurs when the system cannot determine the protection switching state of the far end due to a failure of the automatic protection switching channel (K1/K2 bytes of the SONET line overhead on the protection line).
	APS-OC3c-Data-intf-failure
	APS-Lan-Data-intf-failure
	Automatic protection switching has occurred due to a failure of the OC3c data interface on the BBG21 ELAN circuit pack. There may be one or more lower priority LAN interface failure conditions also present.
	APS-prot-line-sig-fail
	Automatic protection switching has occurred due to a protection line signal failure.
	APS-svc-line-sig-fail
	Automatic protection switching has occurred due to a service line signal failure.
	APS-sig-fail
	Automatic protection switching has occurred due to a signal failure.
	APS-sig-degrade
	Automatic protection switching has occurred due to a signal degrade.
	APS-pack-fail
	Automatic protection switching has occurred due to a circuit pack failure.
	APS-fn-fail
	This switch priority is applicable to OC-3 Release 11.0 and all later OC-3 ring releases
	Automatic protection switching has occurred in Main-x because of a failure in Fn-x, where there was at least one local drop cross-connect between Fn-x and Fn-y (Main-x did not fail in this case).

Switch-Priority (continued)	*APS-pack-fail-HIGH*
	Automatic protection switching has occurred due to a circuit pack failure for 1xn protected circuit packs only.
	APS-sig-degrade
	Automatic protection switching has occurred due to a signal degrade.
	APS-pack-fail
	Automatic protection switching has occurred due to a circuit pack failure.
	APS-fn-fail
	This switch priority is applicable to OC-3 Release 11.0 and all later OC-3 ring releases
	Automatic protection switching has occurred in Main-x because of a failure in Fn-x, where there was at least one local drop cross-connect between Fn-x and Fn-y (Main-x did not fail in this case).
	APS-pack-fail-HIGH
	Automatic protection switching has occurred due to a circuit pack failure for 1xN protected circuit packs only.
	APS-auto-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.
	APS-wait-to-restore
	Automatic protection switching has occurred, but the service line is now good and service will revert back to its original source after a specified period of time.

Switch-Priority (continued)	*manual*
	Traffic has been manually switched to protection.
	No manual or automatic switch requests are active. Starting with OC3 Release 15.0, for IMA LAN (BBF9) circuit packs, the *CISwitch-Priority* is always ″-″ .

For ring applications, the switch priority in this report applies only to the equipment switching of the main OLIUs (OC-3), TSIs (OC-12) to function unit signals, or, in the case of FiberReach, from Fiber Reach main OLIUs to low speed slots. See the `rtrv-state-path` command for path protection switching information.

For OC-3 and FiberReach, the switch priority is always null for protection slots, with one exception. For 1xn protected slots, the protected slot may have a switch priority of *prot-lockout*

For OC-12 systems, the switch priority is always null for protection slots.

The state of the timing reference is reported in the `RTRV-SYNCN` command.

EXAMPLE INPUT/OUTPUT
Comprehensive descriptions of possible reports and the format differences between DDM OC-3, DDM OC-12, FiberReach, and SLC correspond to the DDM-2000 CIT (see references).

The following example shows a `RTRV-STATE-EQPT` command for a DDM-2000 OC-3 system in a ring configuration:

```
rtrv-state-eqpt:LT-PF-2000::123456;

IP 123456

<

LT-PF-2000-3 93-10-26 16:42:11

M 123456 COMPLD

"tg-1, TGS:,active,"

"tg-2, TGS:,active,"

"fn-c-1, OLIU:, active,"

"fn-c-2, OLIU:, standby,"
```

....

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;

ERROR RESPONSES Refer to the ERROR RESPONSES section of the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151.* The error responses listed there also apply to this command.

RELATED TL1 MESSAGES rtrv-eport, rtrv-vcg

☐

RTRV-VCG

....

NAME RTRV-VCG: Retrieve Virtual Concatenation Group (VCG)

The RTRV-VCG command is available beginning in DDM-2000, Release 15.3.1.

LOGIN PRIVILEGE This command is available to users with Privileged, General Maintenance and Reports Only access.

INPUT FORMAT RTRV-VCG:*tid*:*[aid]*:*ctag*;

DESCRIPTION The RTRV-VCG command retrieves the attributes of a virtual concatenation group (VCG).

Execution of this command, whether successful or denied, will not be recorded in the Security log.

Table 5-40 RTRV-VCG **Input Parameters**

Parameter	Description
tid	Target Identifier. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* for the input parameter syntax and description of this parameter.
aid	Access Identifier. This is the address of a VCG AID. Refer to the "Cross-connection matrix" (2-28) for valid AIDs.
ctag	Correlation Tag. Refer to the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151* command for the input parameter syntax and description of this parameter.

OUTPUT FORMAT If the Network Element (NE) fully complies with the RTRV-VCG request, the following normal completion responses are returned:

sid date time

M ctag COMPLD

....

```
"aid::spec_block"

;
```

OUTPUT PARAMETERS   Refer to the OUTPUT PARAMETERS section of the RTRV-HDR
command in the *DDM-2000 OC-3, OC-12, and FiberReach
Multiplexers Operations Systems Engineering Guide, 824-102-151*.
The output parameters listed there also apply to this command.
Additional output parameters include:

aid	Access Identifier. This is the address of a VCG AID. Refer to the AID Table for valid AIDs.
spec_block	Specific parameter block. The spec_block parameters are defined in the following table.

vcgrate	Rate used on the addressed VCG. vcgrate will be displayed as "?" if no tributaries are cross-connected to the addressed VCG. Values are: VT1.5, STS1, and STS3C
vcgsz	Vcgsz represents the number of VT1.5's, STS1's or STS3c's provisioned for the VCG, depending on vcgrate. Vcgsz may be zero if no tributaries are cross-connected to the addressed VCG.
vmode	VCG Monitoring Mode. vmode will be displayed as "?" if no tributaries are cross-connected to the addressed VCG. Values are as follows: • AUTO • IS • NMON

Lucent Technologies

almlvl	Alarm Level. This parameter sets the alarm level for an incoming signal failure, and may have one of the following values: • `cr` - Critical Alarm (initial value) • `mj` - Major Alarm • `mn` - Minor Alarm • `na` - No Alarm
gfp_fcs	GFP FCS (Frame Check Sequence). This parameter controls the handling of the GFP FCS field for the specified VCG. When interworking with current DMX NEs, gfp_fcs should be set to DISABLE. When interworking with equipment that supports the GFP FCS, gfp_fcs should be set to ENABLE. Values for GFP FCS (Frame Check Sequence) are: • ENABLE • DISABLE (initial value)
vcat	Virtual Concatenation Mode. This parameter controls whether H4 is inserted/monitored for the specified VCG. It has effect only when a single trib, not VT, is cross-connected to the VCG, to allow interworking with non-VCAT equipment. Values for Virtual Concatenation Mode are: • ENABLE (initial value) • DISABLE

EXAMPLE INPUT/OUTPUT　　RTRV-VCG:ATT-PF-2000:a-1:123456;

IP 123456

<

ATT-PF-2000 98-01-01 08:00:00

M 123456 COMPLD

"a-1::vcgrate=STS1, vcgsz=1,vmode=NMON,almlvl=NA"

"a-1::gfp_fcs=DISABLE,vcat=ENABLE"

;

ERROR RESPONSES　　Refer to the ERROR RESPONSES section of the RTRV-HDR command in the *DDM-2000 OC-3, OC-12, and FiberReach Multiplexers Operations Systems Engineering Guide, 824-102-151*. The error responses listed there also apply to this command.

RELATED TL1 MESSAGES　　ed-vcg

☐

Glossary

NUMERICS

0x1

The 0x1 architecture is used in ring applications. Both fibers carry service, rather than one fiber being designated as "service" and one fiber designated as "protection".

1+1 (unidirectional)

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 (service in one direction, protection in the other).

A   ABN

Abnormal (status condition)

AC

Alternating Current

Active

Active identifies a switchable entity (for example, a port) which is currently carrying service. (See Standby).

AIS

Alarm Indication Signal

Alarm

Visible or audible signal indicating that an equipment failure or significant event/condition has occurred.

Alarm Cut-Off (ACO)

A button on the SYSCTL used to silence audible alarms.

Alarm Gateway Network Element (AGNE)

A defined NE in an alarm group through which members of the alarm group exchange information.

Alarm Indication Signal (AIS)

A code transmitted downstream in a digital network that shows that an upstream failure has been detected and alarmed.

Alternate Mark Inversion (AMI)

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.

American Standard Code for Information Interchange (ASCII)

A standard 7-bit code that represents letters, numbers, punctuation marks, and special characters in the interchange of data among computing and communications equipment.

AMI

Alternate Mark Inversion

ANM

Autonegotiation Mismatch

ANSI

American National Standards Institute

APS

Automatic Protection Switch

APS Channel

The signalling channel carried in the K1 and K2 bytes of the SONET overhead on the protection line. It is used to exchange requests and acknowledgments for protection switch actions.

ASCII

American Standard Code for Information Interchange

Auto

Automatic

Auto

One possible state of a port or channel.

....

B   **B3ZS**

Bipolar 3-Zero Substitution

Backbone Ring

A host ring.

Backup

The backup and restoration features provide the capability to recover from loss of NE data because of such factors as human error or power failures.

Bandwidth

The difference in Hz between the highest and lowest frequencies in a transmission channel. The data rate that can be carried by a given communications circuit.

Baud Rate

Transmission rate of data (bits per second) on a network link.

BER

Bit Error Rate

Bidirectional Line

A transmission path consisting of two fibers that handle traffic in both the transmit and receive directions.

BIP

Bit Interleaved Parity

Bipolar 8-Zero Substitution (B8ZS)

A line coding technique that replaces eight consecutive zeros with a bit sequence having special characteristics accomplishing two objectives: First, this bit sequence accommodates the density requirements of the ones for digital T1 carrier; Second, the sequence is recognizable at the destination (due to deliberate bipolar violations) and is removed to produce the original signal.

Bit

The smallest unit of information in a computer, with a value of either 0 or 1.

Bit Error Rate (BER)

The ratio of error bits received to the total number of bits transmitted.

Bit Error Rate Threshold

The point at which an alarm is issued for bit errors.

....

BITS clock

A BITS (Building Integrated Timing Source) clock is simply a clock within a central office that distributes timing to all the equipment in that central office. The BITS clock is tied to an external, stable timing source, such as a GPS (global positioning satellite).

Broadband

Any communications channel with greater bandwidth than a voice channel; sometimes used synonomously with wideband.

Byte

Refers to a group of eight consecutive binary digits.

C   ### CAT5

Category 5 cabling, used for voice and data/LAN traffic. Category 5 cables are designed to transmit cleanly 100 megahertz of communications.

CCITT

Comité Consultatif International Télégrafique & Téléphonique
(International Telephone and Telegraph Consultative Committee)

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 Standards Sector (ITU-TSS).

CD-ROM

Compact Disk, Read-Only Memory

Channel

A logical signal within a port. For example, for an OC-3 port, there are three STS-1 channels. See Port.

Channel State

The channel state is also referred to as the primary state of an STS-n or VT1.5 tributary. The values may be AUTO, NMON, or IS. The primary state parameter affects alarm reporting and performance monitoring.

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-n channels. See Port State Provisioning.

Circuit

A set of transmission channels through one or more network elements that provides transmission of signals between two points, to support a single communications path.

CIT

Craft Interface Terminal

CLEI

Common Language Equipment Identifier

CO

Central Office

Coding Violation (CV)

A performance monitoring parameter indicating that bipolar violations of the signal have occurred.

Collocated

System elements that are located in the same location.

CPE

Customer Premises Equipment

CR

Critical (alarm status)

Craft Interface Terminal (CIT)

The user interface terminal used by craft personnel to communicate with a network element.

Critical (CR)

Alarm that indicates a severe, service-affecting condition.

Cross-Connect Capacity

The total bandwidth of cross-connections as measured by the bandwidth of input and output tributaries. A system with N STS-1 equivalent input tributaries and N STS-1 equivalent output tributaries (referred to as "NxN") provides a cross-connection capacity of N STS-1 equivalents. This system could provide N one-way point-to-point cross-connections or N/2 two-way point-to-point cross-connections at the equivalent rate of STS-1.

Cross-Connection Rate

The attribute of a cross-connection that defines the constituent signal rate it can carry.

CTS

Customer Technical Support; now known as Technical Support Services (TSS)

Cut-Through

Refers to a simple ASCII interface to an NE. It enables the user to send TL1 messages directly to the NE with no interpretation or assistance provided by the CIT.

CV

Coding Violation

CVFE

Coding Violation Far End

D   Data Communications Channel (DCC)

The embedded overhead communications channel in the synchronous line, used for end-to-end communications and maintenance. The DCC carries alarm, control, and status information between network elements in a synchronous network.

Data Communications Equipment (DCE)

The equipment that provides signal conversion and coding between the data terminating 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.

Data Terminating Equipment (DTE)

The equipment that originates data for transmission and accepts transmitted data.

dB

Decibels

DC

Direct Current

DCC

Data Communications Channel

DCE

Data Communications Equipment

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 Cross-Connect Panel (DSX)

A panel designed to interconnect to equipment that operates at a designated rate. For example, a DSX-3 interconnects equipment operating at the DS3 rate.

Digital Multiplexer

Equipment that combines time-division multiplexing several digital signals into a single composite digital signal.

Digital Signal Levels 0, 1, 3 (DS0, DS1, DS3)

An ANSI-defined signal or service level corresponding to the following: DS0 is 64 Kb/s, DS1 is 1.544 Mb/s (equivalent to T1), and DS3 is 44.736 Mb/s (equivalent to 28 T1 channels or T3).

Directory Services Network Element (DSNE)

A designated network element that is responsible for administering a database that maps network element names (TIDs) to addresses (NSAPs - network service access points) in an OSI subnetwork. There can be one DSNE per ring. Can also be a GNE.

DLC

Digital Loop Carrier

DS1

Digital Signal Level 1

DSX

Digital Cross-Connect Panel

DTE

Data Terminating Equipment

E   ECI

Equipment Catalog Item

EEPROM

Electrically-Erasable Programmable Read-Only Memory

EIA

Electronic Industries Association

Electromagnetic Compatibility (EMC)

A measure of equipment tolerance to external electromagnetic fields.

Electromagnetic Interference (EMI)
High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

Electronic Industries Association (EIA)
A trade association of the electronic industry that establishes electrical and functional standards.

Electrostatic Discharge (ESD)
Static electrical energy potentially harmful to circuit packs and humans.

EMC
Electromagnetic Compatibility

EMI
Electromagnetic Interference

EPORT
Ethernet port

EPROM
Erasable Programmable Read-Only Memory

EQPT
Equipment

Equipment Catalog Item
The bar code number on the faceplate of each circuit pack used by some inventory systems.

Errored Seconds (ES)
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.

ES
Errored Seconds

ESD
Electrostatic Discharge

ESF
Extended Super Frame

Ethernet
A local area network used for connecting computers, printers, terminals, servers, workstations, etc. within the same building or campus. For LAN interconnection, Ethernet is a physical link

and data link protocol reflecting the two lowest layers for the Open Systems Interconnection (OSI) model.

Event

A significant change. Events in controlled Network Elements include signal failures, equipment failures, signals exceeding thresholds, and protection switch activity. When an event occurs in a controlled Network Element, the controlled Network Element will generate an alarm or status message and send it to the management system.

Extended Superframe Format (ESF)

A T1 format that uses the framing bit for non-intrusive signaling and control. A T1 frame is sent 8,000 times a second, with each frame consisting of a payload of 192 bits, and with each frame preceeded by a framing bit. Because ESF only requires 2,000 framing bits for synchonization, the remaining 6,000 framing bits can be used for error detection.

F   Facility

A one- or two-way circuit that carries a transmission signal.

Facility Loopback

A facility loopback is where an entire line is looped back toward the DTE.

Far End (FE)

Any other network element in a maintenance subnetwork other than the one the user is at or working on. Also called remote.

Far-End Receive Failure (FERF)

An indication returned to a transmitting Network Element that the receiving Network Element has detected an incoming section failure. Also known as RDI (Remote Defect Indication) and RFI (Remote Failure Indications).

Fault

Term used when a circuit pack has a hard (not temporary) failure and cannot perform its normal function.

Fault Management

Collecting, processing, and forwarding of autonomous messages from network elements.

FCC

Federal Communications Commission

FE

Far End

FEBE

Far End Block Error

FEPL

Fast Ethernet Private Line

FEPROM

Flash EPROM

File Transfer and Access Management (FTAM)

FTAM is the Open Systems Interconnection (OSI) standard for file transfer, file access, and file management.

Flash EPROM

A technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

Forced

Term used when a switchable entity (for example, a working or protection port) has been locked into a service-providing state by user command.

Forced Switch to Protection

The CIT command that forces the protection group to be the ″Active Unit.″ The clear command is required to remove the Forced Switch state. While in the Forced Switch state the system may not switch the active unit either automatically, by means of the CIT Forced Switch, or Manual Switch command.

Free Running

An operating condition of a clock in which its local oscillator is not locked to an external synchronization reference and is using no storage techniques to sustain its accuracy.

FTAM-FTP Gateway

This is also referred to as file transfer translation device (FTTD). The FTTD translates FTAM over OSI presentation to FTP over TCP/IP.

G **Gateway Network Element (GNE)**

A network element that passes information between other network elements and management systems through a data communication network.

GB

Gigabytes (2^{30} or 10^9)

Gb/s

Gigabits per second

GFP
Generic Framing Procedure

GHz
Gigahertz

GNE
Gateway Network Element

GR-XXX
Telcordia Technologies (Bellcore) General Requirement-XXX

GUI
Graphical User Interface

H   Hashed FTP
The hashed FTP (digital signature) capability prevents tampering with a downloadable software image.

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.

Hz
Hertz

I   I/O
Input/Output

ID
Identifier

IEC
International Electrotechnical Commission

IEEE
Institute of Electrical and Electronics Engineers

In-Service (IS)
A memory administrative state for ports. IS refers to a port that is fully monitored and alarmed.

INC
Incoming Status

Intermediate Reach (IR)
A term used to describe distances of 15 to 40 km between optical transmitter and receiver without regeneration. See long reach.

IP
Internet Protocol

IR
Intermediate Reach

IS
In Service

ISO
International Standards Organization

ISP
Internet Service Provider

J Jitter
Timing jitter is defined as short-term variations of the significant instants of a digital signal from their ideal positions in time.

K Kb/s
Kilobits per second (2^{10} or 10^3)

L LAN
Local Area Network

LBC
Laser Bias Current

LBO
Lightguide Build Out or Line Build Out

LCN
Local Communications Network

LEC

Local Exchange Carrier

LED

Light-Emitting Diode

LGX

Lightguide Cross-Connect

Light Emitting Diode (LED)

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.

Lightguide Build-Out (LBO)

An attenuating (signal-reducing) element used to keep an optical output signal strength within desired limits.

Lightguide Cross-Connect (LGX)

A SONET device that contains ports for optical fiber connections to an optical network element (NE). An LGX is used to make and change connections to an NE without changing the cabling on the NE itself.

Line

A transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements. One network element originates the line signal; the other terminates it.

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.

Link Capacity Adjustment Scheme (LCAS)

LCAS is an enhancement to SONET/SDH Virtual Concatenation that allows adding or removing Virtual Concatenation Group (VCG) members, to vary its bandwidth, by management command. It also automatically removes and restores failed members.

Local

See Near-End.

Local Area Network (LAN)

A communications network that covers a limited geographic area, is privately owned and user administered, is mostly used for internal transfer of information within a business, is normally contained within a single building or adjacent group of buildings, and transmits data at a very

rapid speed.

LOF
Loss of Frame

LOM
Loss of Multiframe

Long Reach (LR)
A term used to describe distances of 40 km or more between optical transmitter and receiver without regeneration. See Intermediate Reach.

Loopback
Type of diagnostic test used to compare an original transmitted signal with the resulting received signal. A loopback is established when the received optical or electrical external transmission signal is sent from a port or tributary input directly back toward the output.

LOP
Loss of Pointer

LOS
Loss of Signal

Loss of Frame (LOF)
A failure to synchronize to an incoming signal.

Loss of Pointer (LOP)
A failure to extract good data from a VT1.5 or STS-n payload.

Loss of Signal (LOS)
The complete absence of an incoming signal.

LPBK
Loopback

LR
Long Reach

M Major
Indicates a service-affecting failure, main or unit controller failure, or power supply failure.

MB
Megabytes (2^{20} or 10^6)

Mb/s

Megabits per second

Minor (MN)

Indicates a non-service-affecting failure of equipment or facility.

Miscellaneous Discrete Interface

Allows an operations system to control and monitor equipment collocated within a set of input and output contact closures.

MJ

Major Alarm

MM

Multimode

MN

Minor Alarm

Multiplexer

A device (circuit pack) that combines two or more transmission signals into a combined signal on a shared medium.

Multiplexing

The process of combining multiple signals into a larger signal at the transmitter by a multiplexer. The large signal is then split into the original smaller signals at the receiver by a demultiplexer.

MUX

Multiplex

....

N   **NA**

Not Applicable

NE

Near End

NE

Network Element

Near End

The network element the user is at or working on. Also called local.

....

NEBS
Network Equipment-Building System

Network Element (NE)
A node in a telecommunication network that supports network transport services and is directly manageable by a management system. Typical internal attributes of a network element include: one or more high- and low-speed transmission ports, built-in intelligence, synchronization and timing capability, and access interfaces for use by technicians and/or operation systems. In addition, a network element may also include a time slot interchanger.

Network Service Access Point (NSAP) Address
Network Service Access Point Address (used in the OSI network layer 3). An automatically assigned number that uniquely identifies a Network Element for the purposes of routing DCC messages.

Network Time Protocol
Network time protocol is an easy, accurate, and automatic method to get and synchronize date/time.

nm
Nanometer (10^{-9} meters)

NMA
Network Monitoring and Analysis

NMON
Not Monitored (provisioning state)

No Request State
This is the routine-operation quiet state in which no external command activities are occurring.

Node
A network element in a ring or, more generally, in any type of network. In a network element supporting interfaces to more than one ring, node refers to an interface that is in a particular ring. Node is also defined as all equipment that is controlled by one system controller. A node is not always directly manageable by a management system.

Non-Revertive Switching
In non-revertive switching, an active and standby line exist on the network. When a protection switch occurs, the standby line is selected to support traffic, thereby becoming the active line. The original active line then becomes the standby line. This status remains in effect even when the fault clears. That is, there is no automatic switch back to the original status.

Non-Volatile Memory (NVM)
Memory that retains its stored data after power has been removed. An example of NVM would be a hard disk.

Not Monitored (NMON)
A provisioning state for equipment that is not monitored or alarmed.

NR
Not Reported

NRZ
Nonreturn to Zero

NSA
Not Service Affecting

NTP
Network time protocol

NVM
Non-Volatile Memory

O **OAM&P**
Operations, Administration, Maintenance, and Provisioning

OC, OC-n - Optical Carrier
The optical signal that results from an optical inversion of an STS signal; that is, OC-1 from STS-1 and OC-n from STS-n.

OC-12
Optical Carrier Level 12 Signal (622 Mb/s).

OC-3
Optical Carrier Level 3 Signal (155 Mb/s).

OHCTL
Overhead Controller

OI
Operations Interworking

OOF
Out of Frame

OOS

Out-of-Service

Open Systems Interconnection (OSI)

Referring to the OSI reference model, a logical structure for network operations standardized by the International Standards Organization (ISO).

Operations Interface

Any interface providing you with information on the system behavior or control. These include the equipment LEDs, SYSCTL faceplate, CIT, office alarms, and all telemetry interfaces.

Operations Interworking (OI)

The capability to access, operate, provision, and administer remote systems through craft interface access from any site in a SONET/SDH network or from a centralized operations system.

Operations System (OS)

A central computer-based system used to provide operations, administration, and maintenance functions.

OS

Operations System

OSP

Outside Plant

....

P   Pass Through

Paths that are cross-connected directly across an intermediate node in a ring network.

Path

A logical connection between the point at which a standard frame format for the signal at the given rate is assembled, and the point at which the standard frame format for the signal is disassembled.

Path Protection Group

The part of a cross-connection topology that is provisioned to provide path-level protection switching for all the constituent signals carried by the cross-connection. A path protection group can be identified as an entity by its logical output tributary and its cross-connection rate. A path protection group consists of one or more constituent path selectors.

PC

Personal Computer

Performance Monitoring (PM)

Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

PID

Program Identification

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 particular instant. For example, in SONET networks, each timing traceable to their own Stratum 1 clock are considered plesiochronous with respect to each other

PM

Performance Monitoring

Port (also called Line)

The physical interface, consisting of both an input and output, where an electrical or optical transmission interface is connected to the system and may be used to carry traffic between network elements. The words ″port″ and ″line″ may often be used synonymously. ″Port″ emphasizes the physical interface, and ″line″ emphasizes the interconnection. Either may be used to identify the signal being carried.

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

Extra capacity (channels, circuit packs) in transmission equipment that is not intended to be used for service, but rather to serve as backup against equipment or signal failures.

Protection Group

A logical grouping of ports or circuit packs that share a common protection scheme, for example, UPSR switching or 1+1 line.

PROTN

Protection

Provisioning

The modification of certain programmable parameters that define how the node functions with various installed entities. These modifications are initiated locally or remotely by either a CIT

or an OS. They may arrive at the node via the IAO LAN, CIT port, or any DCC channel. The provisioned data is maintained in NVM and/or hardware registers.

PWR
Power

R   RAM
Random Access Memory

RDI
Remote Defect Indication

Reactive Maintenance
Refers to decting defects/failures and clearing them.

Remote
See Far-End (FE).

Remote Defect Indication (RDI)
An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure. [Previously called far-end-receive failure (FERF).]

Remote Network Element
Any Network Element that is connected to the referenced Network Element through either an electrical or optical link. It may be the adjacent node on a ring, or N nodes away from the reference. It also may be at the same physical location but is usually at another (remote) site.

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 the clearing of any failure conditions that caused a protection switch to occur or after any external switch commands are reset. See Non-Revertive.

RFI
Remote Failure Indication

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.

RJ 45

Registered Jacks (RJ) are telephone and data plugs registered with the FCC. RJ 45 is an 8-pin connector used for data transmission.

RTRV

Retrieve

RU

Rack Unit

RZ

Return to Zero

S   SA

Service Affecting

SD

Signal Degrade

SEFS

Severely Errored Frame Seconds

Service

The operational mode of a physical entity that indicates that the entity is carrying customer traffic. This designation will change with each switch action.

SES

Severely Errored Seconds

Severely Errored Seconds (SES)

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) occur.

SF

Super Frame (format for DS1 signal)

SFP

Small Form-factor Pluggable (optics connector)

SID

System Identification

Slot

A physical position in a shelf for holding a circuit pack and connecting it to the backplane. This term is also used loosely to refer to the collection of ports or tributaries connected to a physical circuit pack placed in a slot.

SM

Single Mode

SMC

SONET Minimum Clock

SNMP

Simple Network Management Protocol

Software Backup

The process of saving an image of the current network element's databases, which are contained in its NVM, to a remote location. The remote location could be the CIT or an OS.

Software Download

The process of transferring a generic or provisioned database from a remote entity to the target network element's memory. The remote entity may be the CIT or an OS. The download procedure uses bulk transfer to move an uninterpreted binary file into the network element.

SONET

Synchronous Optical NETwork

SPE

Synchronous Payload Envelope

SQM

Sequence Number Mismatch

SRD

Software Release Description

Standby

Standby identifies a switchable entity (for example, a port) that is not currently carrying service. See Active.

Status

The indication of a short-term change in the system.

STS, STS-n

Synchronous Transport Signal

STS, STS-n - Synchronous Transport Signal
The basic 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

STU
Synchronized - Traceability Unknown

Subnetwork
A group of interconnected/interrelated Network Elements. The most common connotation is a synchronous network in which the Network Elements have data communications channel (DCC) connectivity.

Synchronization Messaging
SONET synchronization messaging is used to communicate the quality of network timing, internal timing status, and timing states throughout a subnetwork.

Synchronous Network
The synchronization of transmission systems with synchronous payloads to a master (network) clock that can be traced to a reference clock.

Synchronous Optical Network (SONET)
The North American standard for the rates and formats that defines optical signals and their constituents.

Synchronous Payload
Payloads that can be derived from a network transmission signal by removing integral numbers of bits from every frame. Therefore, no variable bit-stuffing rate adjustments are required to fit the payload in the transmission signal.

Synchronous Payload Envelope (SPE)
The combined payload and path overhead of an STS-1 or STS-3c signal.

SYSCTL
System Controller (circuit pack)

System Controller (SYSCTL)
The circuit pack that provides overall administrative control of the terminal.

System View

A graphical depiction of the entire Network Element. Selectable objects in this view are the bays and shelves.

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T **T1**

A carrier system that transmits at the rate of 1.544 Mb/s (a DS1 signal).

T1X1 and T1M1

The ANSI committees responsible for telecommunications standards

T3

A carrier system that transmits at the rate of 44.736 Mb/s (a DS3 signal).

TA

Telcordia Technologies Technical Advisory

Target Identifier (TID)

A provisionable parameter that is used to identify a particular Network Element within a network. It is a character string of up to 20 characters where the characters are letters, digits, or hyphens (-).

TARP

Target Identifiers Address Resolution Protocol

TBD

To Be Determined

TCA

Threshold-Crossing Alert

TCP/IP

Transmission Control Protocol/Internet Protocol

TDC

TARP Data Cache

TDM

Time Division Multiplexing

Telcordia Technologies

Telcordia Technologies (formerly Bellcore) is a well-recognized telecommunications standards organization.

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Threshold-Crossing Alert (TCA)

A message type sent from a Network Element that indicates that a certain performance monitoring parameter has exceeded a specified threshold.

Through (or Continue) Cross-Connection

A cross-connection within a ring, where the input and output tributaries have the same tributary number but are in lines opposite each other.

TID

Target Identifier

Time Division Multiplexing (TDM)

A technique for transmitting a number of separate data, voice, and/or video signals simultaneously over one communications medium by interleaving a portion of each signal one after another.

TL1

Transaction Language One

TR

Telcordia Technologies Technical Requirement

Transaction Language One (TL1)

A machine-to-machine communications language that is a subset of ITU's human-machine language.

Tributary

A path-level unit of bandwidth within a port, or the constituent signal(s) being carried in this unit of bandwidth, for example, an STS-1 tributary within an OC-N port.

TSA

Time Slot Assignment

TSI

Time Slot Interchange

TSO

Technical Support Organization

U   UAS

Unavailable Seconds

Unavailable Seconds (UAS)
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 Path-Switched Ring (UPSR)
Path-Switched rings employ redundant fiber optic transmission facilities in a pair configuration, with one fiber transmitting in one direction (for example, East) and the other fiber transmitting in the other direction (for example, West). If the active path fails, then the standby path becomes active.

UPD/INIT
A push-button on the SYSCTL faceplate.

UPSR
Unidirectional Path Switched Rings

UTP
Unshielded Twisted Pair

V   VAC
Volts Alternating Current

VCG
Virutal Concatenation Group

VDC
Volts Direct Current

Virtual Concatenation Group
A standard inverse multiplex scheme for transporting a payload using multiple channels, each of which has a lower capacity than the payload to be transported.

Virtual Tributary (VT)
A structure designed for transport and switching of sub-STS-1 payloads. There are currently four sizes: VT1.5 (1.728 Mb/s), VT2 (2.304 Mb/s), VT3 (3.456 Mb/s), and VT6 (6.912 Mb/s).

VM
Violation Monitor

VMR
Violation Monitor and Removal

VT

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

VT1.5

Virtual Tributary 1.5 (1.728 Mb/s)

VT1.5 Tributary

A SONET logical signal with a data rate of 1.728 Mbps. In the 9-row structure of the STS-1 SPE, a VT1.5 occupies three columns. VT-structured STS-1 SPEs are divided into seven VT groups. Each VT group occupies twelve columns of the 9-row structure and, for VT1.5s, contains four VTs per group.

W   WAN

Wide Area Network

Wavelength Division Multiplexing (WDM)

A means of increasing the information-carrying capacity of an optical fiber by simultaneously transmitting signals at different wavelengths.

WDCS

Wideband Digital Cross-Connect System

WDM

Wavelength Division Multiplexing

Wide Area Network (WAN)

A communication network that uses common-carrier provided lines and covers an extended geographical area.

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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