Navis™ Optical Network Management System (NMS)

Release 7.0

Provisioning Guide

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Contents

Section I: Digital Links

Section II: Connections

Section VIII: Preplan Restoration

4   Provisioning Concepts

....

5   Network Element Port Addresses

Section I: Introduction

Section II: ISM Port Addresses

Section III: LambdaRouter™ AOS Port Addresses

Section IV: LambdaUnite™ MSS Port Addresses

Section V: LambdaXtreme™ Transport Port Addresses

....

....

C O N T E N T S   **Lucent Technologies**   365-309-262R7.0
x i i   Issue 1, July 2002

List of Figures

List of Tables

4   Provisioning Concepts

....

5   Network Element Port Addresses

....

About this information product

Purpose This chapter provides an overview for this information product.

The purpose of this information product is to provide an overview of the Navis™ Optical Network Management System (NMS) Release 7.0 and present step-by-step tasks so as to instruct the reader the recommended way to provision with Navis™ Optical NMS.

Reason for reissue This Provisioning Guide, Issue 1, is a new document that supports Navis™ Optical NMS, Release 7.0.

Safety labels This information product does not use safety labels.

Intended audience This guide is written primarily for network planners, engineers, operators, and sales teams. It may be used by anyone desiring specific information about the features, applications, and operations of Navis™ Optical NMS.

How to use this information product This section provides information that will help users of this information product.

The following table describes the information in each chapter of this guide.

Section	Title	Description
Preface	About this information product	Describes this guide's purpose, intended audience, how to use it, and how to comment on it.
Chapter 1	Chapter 1, "The Navis™ Optical NMS Provisioning Process "	Provides an overview of the Navis™ Optical NMS provisioning process and commonly used terminology.
Chapter 2	Chapter 2, "Network Element Configuration Tasks"	Describes tasks associated with controlled and noncontrolled network elements.
Chapter 3	Chapter 3, "Provisioning Tasks"	Describes tasks related to digital link, connection, optical layer, subnet, and preplan restoration provisioning.
Chapter 4	Chapter 4, "Provisioning Concepts"	Describes provisioning concepts associated with network elements, connections, optical layers, subnets, and preplan restoration.
Chapter 5	Chapter 5, "Network Element Port Addresses "	Lists the port addresses of the network elements supported by Navis™ Optical NMS.
Index	Index	Enables the user to quickly find information on specific topics.

Conventions used   This document uses the following typographical conventions to distinguish between computer input and output.

- When describing the Navis™ Optical NMS software, fields in windows and field entries are identified with **this font**.

- When describing the UNIX environment, text and numbers that the user inputs to the computer are identified with `boldface type`.

- In the UNIX environment, text and numbers that the computer outputs to the user are identified with `monospace type`.

Related documentation   This information product is part of a set of documents that supports Navis™ Optical NMS.

List of documents

The document set that supports Navis™ Optical NMS includes:

1. *Navis™ Optical NMS Getting Started Guide,* (365-309-260) - provides information needed when you are learning how to use the Navis™ Optical NMS software. It describes how to start and Navis™ Optical NMS, how to use the software, and how to interpret the graphical user interface.
    This document includes tasks and conceptual information.

2. *Navis™ Optical NMS Applications and Planning Guide,* (365-309-261) - describes the Navis™ Optical NMS features and applications, provides a product description and the hardware platforms for the product, and describes system planning and engineering, ordering, and product support.
    This document contains conceptual information only.

3. *Navis™ Optical NMS Provisioning Guide,* (365-309-262) - instructs users on how to provision and manage a network using Navis™ Optical NMS.
    This document includes tasks and conceptual information.

4. *Navis™ Optical NMS Maintenance Guide,* (365-309-263) - instructs users on how to maintain Navis™ Optical NMS and a network.
    This document includes tasks and conceptual information.

5. *Navis™ Optical NMS Administration Guide,* (365-309-264) - instructs users on how to administer Navis™ Optical NMS and a network.
    This document includes tasks and conceptual information.

Glossary

The *WaveStar NMS Administration Guide* contains a glossary that will be helpful to users of Navis™ Optical NMS.

On-line documentation

On-line documentation for Navis™ Optical NMS is provided in two formats:

1. An on-line version, in HTML format, of this document set is provided as part of the Navis™ Optical NMS software.

2. An on-line version, in HTML format, of this document set is available on CD-ROM.
    Navis™ Optical NMS User Documentation CD-ROM, (365-309-265) - includes the full set of documents listed above.

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The Navis™ Optical NMSsoftware includes screen help for each form, which describes the purpose of the form, each of the fields, and each of the buttons.

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1   The Navis™ Optical NMS Provisioning Process

Overview

Purpose

This chapter provides an overview of the Navis™ Optical NMS provisioning process.

Important note

This document instructs users on how to provision with Navis™ Optical NMS.

This document contains two types of chapters:

- **Task** chapters that describe provisioning tasks (that is, step-by-step instructions). The tasks desribed within this document do not require adminstrator privileges. Refer to the **Navis™ Optical NMS Adminstration Guide** for a listing and explanation of tasks that require adminstrator privileges.

- **Conceptual** chapters that contain detailed information related to the tasks.

Task chapters are located in the front of the document; conceptual chapters follow the task chapters.

Contents

What is provisioning?

Overview   Provisioning, as it pertains to Navis™ Optical NMS, is the process of establishing a connection through a Navis™ Optical NMS managed network and setting appropriate transmission parameters for a digital link, optical link, optical multiplex section, optical channel trails, and SDH/PDH circuit/trails for a specified rate.

This overview assumes that all of the administrative procedures needed to have the system fully operational have been completed by a user with administrator privileges.

Supported actions   Navis™ Optical NMS allows users to perform the following actions for provisioning:

- **Add**: users can provision new digital links, circuit/trails and optical layers from Navis™ Optical NMS.

- **Disconnect**: users can delete existing digital links, circuit/trails and optical layers from Navis™ Optical NMS.

- **Modify**: users can modify an existing circuit/trail to create a new route.

- **Merge**: users can merge two or more circuits/trails of the same or equivalent rate to form one new circuit/trail. This activity from Navis™ Optical NMS will not create any implementation commands.

- **Preplan**: users can establish a preplan circuit/trail in Navis™ Optical NMS for use with a service circuit/trail to restore service in case of a service circuit/trail failure.

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Terminology overview

Overview
This section provides an overview of the common terms and concepts necessary to understand the Navis™ Optical NMS product and provisioning process.

For a complete listing of Navis™ Optical NMS-related terms, refer to the glossary section of the *Navis*™ *Optical NMS Administration Guide.*

Add/Drop Multiplexer
A synchronous network element capable of combining signals of different rates and having those signals added to or dropped from the stream.

Aggregate
A collection of one or more network elements and/or aggregates. An aggregate is represented by a single icon on the Navis™ Optical NMS Network Map.

Area
Networks managed by Navis™ Optical NMS can be subdivided into smaller, more manageable networks called areas. An area is a collection of nodes and/or aggregates and their associated links. Subdividing a network into areas reduces overcrowding on the user interface and improves system performance because smaller amounts of information are exchanged by the subsystems.

Areas can be defined for any purpose. Examples of areas can include:
- A set of nodes/aggregates dedicated to a subscriber
- A set of nodes/aggregates either connected or not connected
- A set of nodes/aggregates in a geographic location or building

An area is represented by a single icon on the Navis™ Optical NMS Network Map.

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.

Bidirectional line
A transmission path consisting of two fibers that handle traffic in both the transmit and receive directions.

Black box   A functional unit in a network that is displayed on the Navis™ Optical NMS Network Map and which Navis™ Optical NMS cannot monitor or control (also known as noncontrolled network element).

Channel   When either a digital link or trail is channelized, it is subdivided into channels. For time division multiplexing (TDM) equipment, channels represent the time slots with which information is carried within a digital link or in a server trail. Channels are created by Navis™ Optical NMS for use during circuit/trail provisioning. When creating channels for digital links, depending on the network element capability, alternate channels, to accommodate the provisioning of different rates of circuits/trails, are created.

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.

Circuits can ride on paths (for example, a CEPT-1 circuit riding on a VC-12 path) or digital links (a circuit can ride on a digital link directly if the digital link is channelized to one channel, such as a CEPT-1 circuit riding on a CEPT-1 digital link).

The following figure shows how a circuit relates to a trail and digital links.

Figure 1-1 A circuit in relation to a trail and digital links
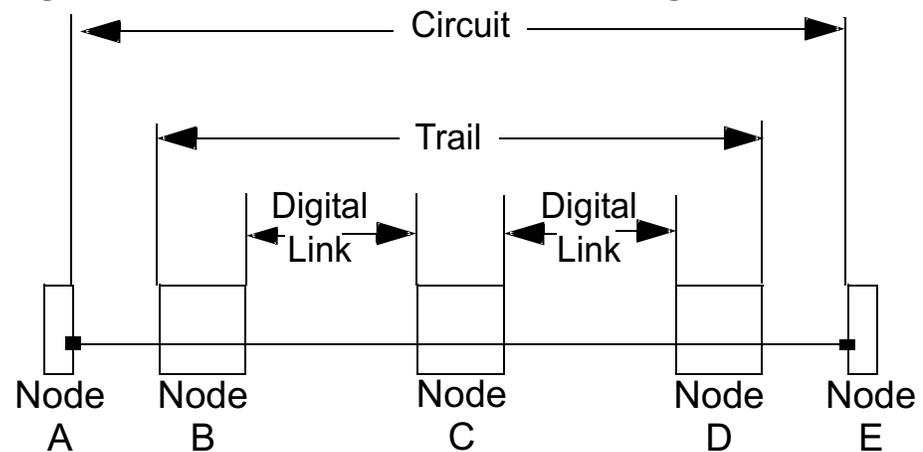
Concatenation   A procedure whereby multiple virtual containers are associated with each other resulting in a combined capacity that can be used as a single container across which bit sequence intergrity is maintained.

Craft interface terminal   The user interface terminal used by craft personal to communicate with a network element.

Cross-connect rate   The attribute of a cross-connection that defines the constituent signal rate(s) it can carry. For a cross-connection with an STS-3/STM-1 "pipe" cross-connection rate, the constituent signals carried by the cross-connection can be either an STS-3c/STM-1c signal or three STS-3/STM-1 signals. Similarly, for a cross-connection with an STS-12/STM-4 "pipe" cross-connection rate, the constituent signals carried by the cross-connection can be either an STS-12c/STM-4c signal or an allowed mix of STS-12c/STM-1c signals and STS-3/STM-1 signals.

Cross-connection   Path-level connections between input and output tributaries or specific ports within a single network element. Cross-connections are made in a consistent way even though there are various types of ports and various types of port protection. Cross-connections are reconfigurable interconnections between tributaries of transmission interfaces.

Cut-through   A simple ASCII interface to a network element. It enables the user to send TL1 messages directly to the network element with no interpretation or assistance provided by the craft interface terminal

Dense wavelength division multiplexing   Dense wavelength division multiplexing (DWDM) is the transmitting of two or more signals of different wavelengths simultaneously over a single fiber.

Digital links   Digital links are fiber or electrical connections between two points. These transport facilities are assignable to high-order and low-order circuits to carry customer services. Digital links can be of two types: SDH or PDH.

SDH digital links connect two SDH network elements or an SDH network element and a black box or equipment.

PDH digital links are asynchronous connections between two PDH ports of the network elements assignable to the PDH circuits.

The following figure shows a digital link.

Figure 1-2 Sample digital link
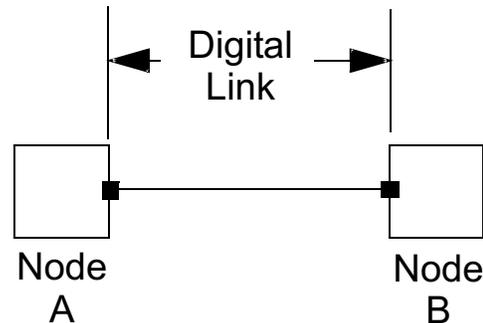
Entity	A specific piece of hardware, usually a circuit pack, slot or module, that has been assigned a name recongnized by Navis™ Optical NMS.

Entity

A specific piece of hardware, usually a circuit pack, slot or module, that has been assigned a name recongnized by Navis™ Optical NMS.

Entity identifier

The name used by Navis™ Optical NMS to refer to a circuit pack, memory device or communications link.

Equipment

A functional unit in a network that is not displayed on the Navis™ Optical NMS Network Map (rather, it is displayed in the Graphical Layout form) and which Navis™ Optical NMS cannot monitor or control (also known as noncontrolled network element). Some examples of equipment is customer premises equipment.

Facility

A one or two-way circuit that carries a transmission signal.

Loopback

A 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 towards the output.

Lucent Optical Network Navigation System

The Lucent Optical Network Navigation System (Lucent ONNS) is the software and hardware present in the LambdaRouter™ All Optical Switch (AOS) that performs management functions (e.g., configuration management and fault management) on optical connections across a network of LambdaRouter™ AOSs. The Lucent ONNS consists of a number of Lucent ONNS Modules, each on a different LambdaRouter™ AOS.

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.
Network	A network carries a payload from one point to another. This payload can consist of data, voice, video, or images. Digital links and trails carry the circuits that carry the data.
Network element	A functional unit in a customer's network that displays on the Navis™ Optical NMS Network Map and is controlled by the user. Network elements supply switching, transmission, or multiplexing functionality in a network and are either controlled or noncontrolled.
Out-of-domain object	To facilitate the identification of links going out of a domain, Navis™ Optical NMS automatically creates an Out-of-Domain Object (ODO) in each Lucent DMS when an inter-domain link is provisioned between two domains. The objective of ODO is to accommodate current Navis™ Optical NMS design constraints. Subsequent inter-domain links between domains utilizing the same edge nodes do not create additional ODO in the domain. Therefore, even if a single network element is connected to multiple domains, the same ODO is used for these connections. The automatically created ODO is assigned a unique name within the DMS it is created. As long as uniqueness criteria are met, development is free to decide on the string length and type of characters to be used for ODO naming. Navis™ Optical NMS may create as many ODOs as it deems necessary. However, under no circumstance shall the number of ODO exceed the number of network elements in the respective DMS. ODOs are not displayed on a network map. They are, however, visible in a graphical layout at a DMS level.
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.
PDH	A transmission hierarchy that involves multiple digital synchronous circuits running at different clock rates.
Port	A physical interface, consisting of both an input and output, where an electrical or optical transmission interface is connected to a system and may be used to carry traffic between network elements.

Preplan restoration   Preplan restoration allows for a back-up circuit to be predefined for an existing in service circuit. Navis™ Optical NMS stores the preplan circuit in a database and accesses it when a failure occurs so as to restore the circuit.

Ring   A configuration of network elements connected to form a closed loop. Under normal conditions, each network element is interconnected with its neighbor and includes capacity for transmission in either direction between adjacent network elements. Path-switched rings use a head-end bridge and tail-end switch. Line-switched rings actively reroute traffic over the protection capacity.

Figure 1-3 Sample formation of four rings
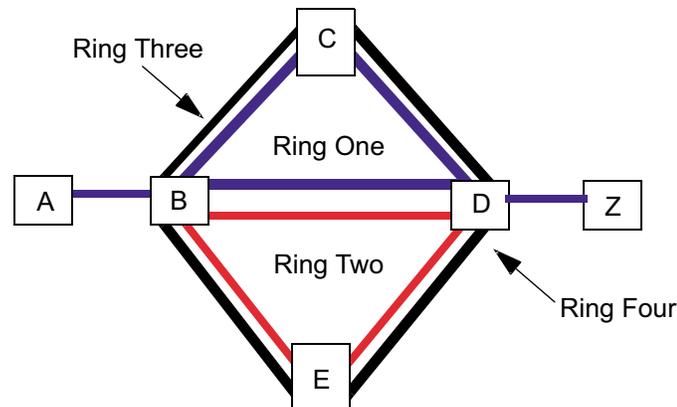
Synchronous digital hierarchy (SDH)   A transmission hierarchy designed to transport multiple digital signals with different capacities.

Tandem connection   The sublayer between the multiplex section layer and the path layer that allows users to monitor the quality of the signal transport within its managed domain. A tandem connection also provides users with information about the total quality of a signal before the signal travels from the user's managed network to a network managed by a different user. Users can create tandem connections on paths that do not terminate in its managed network but traverse its network from other user managed networks.

Trails   A logical connection between two adjacent, or nonadjacent network element. It may traverse one or more channels and supports add/drop capability along the path.

Trails simplify provisioning by allowing users to establish routes through digital links and network elements so that circuits can be assigned to the path. This capability allows users to assign a circuit to a path at the path's A and Z ends without spelling out a list of digital links and cross-connections that make up the trail. Two or more trails may be connected as part of a circuit.

Trails ride on one or more digital links and also contain their own payload and overhead sections.

The following figure shows how a trail relates to a digital link.

Figure 1-4 Relationship between a trail and digital links
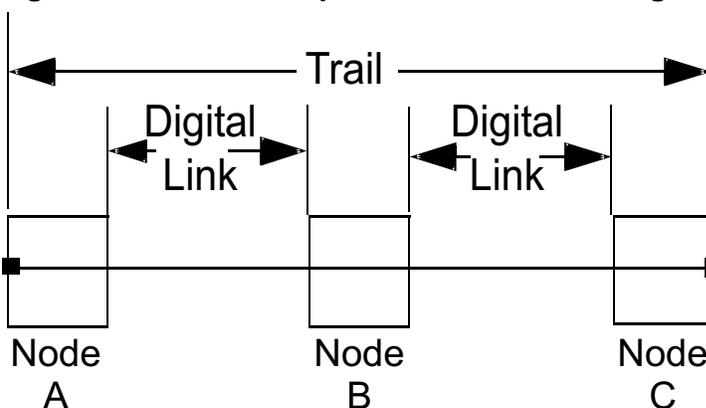
Virtual Refers to artificial objects created by a computer to help a system control shared resources.

Virtual concatenation A standards compliant inverse multiplexing protocol which creates a virtual concatenated SDH entity (called VCn-Xv) which is transported by VC-As across the SDH network.

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Task information

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Overview   Refer to Chapter 2: Network Element Configuration Tasks for task information related to network elements; refer to Chapter 3: Provisioning Tasks for task information regarding digital links, connections, optical layers, optical network navigator, subnets, virtual concatenation groups, shared risk groups, and preplan restoration.

This information is extremely useful when provisioning with Navis™ Optical NMS.

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Conceptual information

Overview   Refer to Chapter 4: Provisioning Concepts for conceptual background information related to network elements, digital links, connections, optical layers, optical network navigator, subnets, virtual concatenation groups, shared risk groups, and preplan restoration.

This information is useful in understanding the 'big picture' of a given feature.

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2   Network Element Configuration Tasks

Overview

Purpose   This chapter contains tasks to add and delete controlled and noncontrolled network elements through Navis™ Optical NMS.

Overview   After a database synchronization with an element management system (EMS), Navis™ Optical NMS will automatically add all the network elements managed by the EMS to the Navis™ Optical NMS Network Map and store them in the database. Navis™ Optical NMS allows users to add WaveStar® ITM-SC managed network elements to the Network Map and to discover, through a database synchronization, network elements managed by a Lucent or non-Lucent EMS.

Note: These tasks also apply to non-Lucent EMS controlled network elements that are manageable by Navis™ Optical NMS. Please refer to the appropriate non-Lucent EMS guide for specific information about the non-Lucent EMS controlled network elements supported by Navis™ Optical NMS.

Before you begin   Before you begin using the tasks contained within this chapter, note
the following items:

- The number of allowable network elements on the Network Map
varies with the Navis™ Optical NMS configuration. When the
limit is reached, an error message will appear.

- When a network element is first added to Navis™ Optical NMS,
its corresponding icon is always displayed as green, regardless of
whether equipment or environment alarms exist. Users should
perform a manual database synchronization to display the
network element's true state.

- Users must use the correct network element identification number
format. The identification number can consist of up to 20
alphanumeric characters, including the /, - and _ characters. No
leading delimiters are allowed and only upper case alphabetical
characters are supported.
Navis™ Optical NMS does not support the following characters:

  - space ( )

  - quote (″)

  - percent (%)

  - star (*)

  - dot (.)

  - backslash (\)

  - pipe (|).

- Not all controlled network elements can implement a one-way
cross-connection. The WaveStar® ADM 16/1 and WaveStar®
AM 1 Plus are two examples of controlled network elements that
cannot implement a one-way cross-connection.

- A network element can only be deleted if it is not assigned to a
digital link or circuit/trail (pending or in-effect). If a network
element linked to another network element is deleted, the
network element is put in a "pending delete" state and not
deleted from the system database or Network Map. Users cannot
back out of the pending delete state. However, a database
synchronization with the EMS can bring the network element
back to a normal state so long as the EMS still reports that
network element is still managed by it.

- No commands, such as a delete cross-connect or port reprovisioning, will be sent to a network element once it is in a pending delete state.

- If a network element is inadvertently deleted, perform a database synchronization with the corresponding element management system (EMS) to recover the network element to its original state.

- If a network element is completely deleted, a database synchronization cannot be performed on the network element. To recover the network element in this case, perform a network element database synchronization on the corresponding EMS.

Contents

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Section I: Controlled Network Elements

Overview

Purpose This section discusses the provisioning tasks associated with controlled network elements.

Contents

Controlled network element support

Definition   Controlled network elements are network elements that can be controlled by Navis™ Optical NMS.

Characteristics   Controlled network elements have the following characteristics:

- They are usually displayed on the network maps as nodes (physical locations) interconnected by digital links. A unique icon represents each network element type.

- They are in constant communication with their EMS.

- They are controlled by commands sent from the EMS (the EMS receives and processes the responses from the controlled network element).

- They report and show alarms.

Controlled Navis™ Optical NMS network elements   For a complete list of controlled network elements supported by Navis™ Optical NMS, refer to Chapter 4: Provisioning Concepts.

Icons for controlled network elements   Controlled network elements managed by Navis™ Optical NMS appear as icons on the Network Map. A legend showing all the icons and their respective models of network elements is available from the Network Map when requested by the user. For additional information regarding what controlled network elements map to which icon, refer to the network elements section of Chapter 4: Provisioning Concepts.

Automatically discovered controlled network elements   Navis™ Optical EMS controlled network elements are not added to Navis™ Optical NMS; they are automatically discovered by Navis™ Optical NMS during start-up or a database synchronization with the EMS.

Examples of network elements automatically discovered by Navis™ Optical NMS include:

- WaveStar® BandWidth Manager

- WaveStar® TDM 10G (STM-64)

- WaveStar® OLS 1.6T

- LamdaXtreme™ Transport

- LambdaUnite™ MultiService Switch (MSS)

- LambdaRouter™ All Optical Switch (AOS)

- Metropolis® Enhanced Optical Networking (EON)

- Network elements managed by non-Lucent EMSs, such as Alcatel or Nortel Networks.

Additional information   For additional information about controlled network elements, refer to the network element section of Chapter 4: Provisioning Concepts or the *Navis™ Optical NMS Applications and Planning Guide*.

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Add a controlled network element

Purpose Use this task to add a WaveStar® ITM-SC controlled network element to the Navis™ Optical NMS Network Map.

> **Important!** Navis™ Optical EMS controlled network elements are not added to Navis™ Optical NMS; they are automatically discovered by Navis™ Optical NMS during start-up or a database synchronization with an EMS. Examples of network elements automatically discovered by Navis™ Optical NMS are listed at the beginning of this chapter.

Before you begin Before you perform this task, refer to the "Before You Begin" information located at the beginning of this chapter.

Task Perform the following task to add a WaveStar® ITM-SC controlled network element to the Navis™ Optical NMS Network Map.

....

1 From the Network Map, select **Configuration > Network Element > Add > (Select any NE Type from the list except for WaveStar® DACS or DACS VI)**.

> **Result:**
>
> The NE window appears.

....

2 In the **EMS ID** field, select an EMS ID from the list.

....

3 Click **OK**.

> **Result:**
>
> The Connection dialog box appears. If the connection occurs, the **Create MIB Image from NE** window appears.

....

4 Specify the Network Element Name, NSAP Format, Area ID (optional), Network Element SID, and Connection Type.

....

5 Click **Apply**.

....

Result:

The network element appears on the Network Map and a success message appears within the window's Message panel.

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Synchronize a network element

Purpose   Use this task to synchronize a network element.

Synchronizing a network element is a recommended step when performing many provisioning tasks with Navis™ Optical NMS because it will automatically synchronize a network element's alarms, ports, switches, protection group, and cross-connects with the database. This saves the user time because many graphical user interface (GUI) fields, such as the ones used for port selection, will automatically present up-to-date selections for the user if the network elements in the provisioning process are synchronized first.

> **Important!** This procedure synchronizes a single network element with the Navis™ Optical NMS database. To synchronize all network element appearing on the Network Map, perform a database synchronization from the EMS-level. Refer to the *Navis™ Optical NMS Administration Guide* for details on performing an EMS-level database synchronization for network elements. Note that this procedure does not apply to black boxes.

Task   Perform the following task to synchronize a network element with the Navis™ Optical NMS database. This procedure applies to both controlled and noncontrolled network elements.

1   On the Network Map, select a network element.

> **Result:**
>
> The icon becomes highlighted.

2   Right click on the icon.

> **Result:**
>
> The Node menu appears.

3   Select **Session > Start Database Synchronization**.

> **Result:**
>
> A window appears.

....

4   For **NE ID**, verify that the identification listed corresponds to the
selected network element.

....

5   Under **Type**, select the item you wish to synchronize with the
database. For example, select **Port** to synchronize the network
element's ports. To synchronize all attributes of the selected network
element, select **All**.

....

6   Press **Apply**.

> **Result:**
>
> A confirmation window appears.

....

7   Press **Yes**.

> **Result:**
>
> The Database Synchronization window appears. This window
> will report the progress of the database synchronization. If the
> synchronization is successful, a confirmation window appears.

....

8   Press **OK**.

> **Result:**
>
> The network element is synchronized.

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2 - 1 0   **Lucent Technologies**   365-309-262R7.0
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Update a network element location

Purpose	Use the following task to update the location of a network element on the Navis™ Optical NMS Network Map. This task applies to both controlled and noncontrolled network elements that appear on the Navis™ Optical NMS Network Map.

> **Important!** Any user is able to move a network element on the Network Map, but the network element's actual location on the Network Map can only be updated within the Navis™ Optical NMS database by a user with appropriate privileges, such as a system administrator. Refer to the ***Navis™ Optical NMS Administration Guide*** for details on updating a network element's location in the database.

Task	Perform the following task to update the location of a network element on the Navis™ Optical NMS Network Map.

1 On the Network Map, left-click and hold on the network element to be moved.

> **Result:**
>
> The network element becomes highlighted.

2 Drag the network element to the desired location on the Network Map.

> **Result:**
>
> The network element is repositioned on the Network Map.

3 From the Network Map, select **File > Save Node and Label Map Positions**.

> **Result:**
>
> The network element location is updated on the Network Map.

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Delete a controlled network element

Purpose Use this task to delete a controlled network element from the Navis™ Optical NMS Network Map.

> **Important!** This procedure only deletes a network element from the Navis™ Optical NMS database; it leaves any cross-connect information on the network element. If the database has cross-connect information this procedure will fail. If you want the cross-connect information to remain in the EMS or network element database, you will need to disconnect the cross-connect through a virtual disconnect in Navis™ Optical NMS.

Task Perform the following task to delete a controlled network element from the Network Map.

1 On the Network Map, right-click the network element to be deleted.

> **Result:**
>
> The Node menu is displayed.

2 Select **Node Operation > Delete Node**.

> **Result:**
>
> A confirmation dialog box is displayed.

3 Click **Yes**.

> **Result:**
>
> The network element is deleted or put in a "pending delete" state.

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Section II: Noncontrolled Network Elements

Overview

Purpose
This section presents provisioning tasks for noncontrolled network elements, such as black boxes and equipment.

Contents

Noncontrolled network element support

Definition	Noncontrolled network elements are network elements that cannot be controlled by Navis™ Optical NMS.
Characteristics	Noncontrolled network elements:

- Support only manual provisioning
- Do not report alarms
- Are listed in the database as part of provisioning records

Noncontrolled Navis™ Optical NMS network elements	For a complete list of noncontrolled network elements supported by Navis™ Optical NMS, refer to Chapter 4: Provisioning Concepts.
Icons for noncontrolled network elements	Noncontrolled network elements managed by Navis™ Optical NMS appear as icons on the Network Map. A legend showing all the icons and their respective models of network elements is available from the Network Map when requested by the user. For additional information regarding what noncontrolled network elements map to which icon, refer to Chapter 4: Provisioning Concepts.
Additional information	For additional information about noncontrolled network elements, refer to Chapter 4: Provisioning Concepts of this guide or the *Navis™ Optical NMS Applications and Planning Guide* .

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Add a black box

....

Purpose   Use this task to add a black box to the Navis™ Optical NMS Network Map.

Task   Perform the following task to add a black box to the Network Map.

....

1   From the Network Map, select **Configuration > Black Box > Add**.

> **Result:**
>
> The Add Black Box form appears.

....

2   In the **BBOX** field, enter a name for the black box. This name will appear on the Network Map.

....

3   In the **Acronym** field, specify an acronym.

....

4   *(Optional)* In the **Customer Information** field, enter any relevant information about the black box you wish other users to view.

....

5   Click **OK**.

> **Result:**
>
> A confirmation window appears and informs you of either the success or failure of the operation.

....

6   Click **OK**.

> **Result:**
>
> The black box is added to the Network Map.

E N D   O F   S T E P S

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Display black box list

Purpose   Use this task to view all currently existing black boxes known to Navis™ Optical NMS.

Task   Perform the following steps to display a complete listing of all existing black boxes.

1   From the Network Map, select **Configuration > Black Box > Display List**.

> **Result:**
>
> The Black Box Display List Query window appears.

2   Enter ***** within the **Black Box ID** field.

3   Press **OK**.

> **Result:**
>
> All the currently existing black boxes appear within the Black Box Display List window.

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Search for a specific black box

Purpose Use this procedure to search for a specific black box.

Task Perform the following steps to search for a specific black box.

1 From the Network Map, select **Configuration > Black Box > Display List**.

   Result:

   The Black Box Display List Query window appears.

2 Enter the black box name within the **Black Box ID** field. You can search for groupings of black boxes by using a wildcard (*). Simply enter an alphanumeric string followed (or preceeded) by the * character.

3 Press **OK**.

   Result:

   If you entered a valid name, the specified black box will appear within the Black Box Display List window. If you entered a wildcard, the specified black boxes will appear within the window.

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Delete a black box

Purpose   Use the following task to delete a black box from the Network Map.

Before you begin   Before you delete a black box from the Network Map, consider the following items:

- Users must delete any digital links and circuits/trails associated with the black box prior to deleting it.

Task   Perform the following task to delete a black box from the Network Map.

1   From the Network Map, right-click on the black box you wish to delete.

   Result:

   The Node menu appears.

2   From the menu, select **Node Operation > Delete Node**.

   Result:

   A confirmation window appears asking you to confirm the deletion.

3   Select **Yes**.

   Result:

   A confirmation window appears.

4   Press **OK**.

   Result:

   The black box is deleted from the Network Map.

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Add equipment

....

Purpose   Use this task to add equipment to the Navis™ Optical NMS Network Map.

Task   Complete the following task to add equipment to the Navis™ Optical NMS Network Map.

....

1   From the Network Map, select **Configuration > Equipment > Add**.

> **Result:**
>
> The Add equipment form is displayed. The **Model** field displays **EQPT**.

....

2   In the **Equipment ID** field, enter the network element identification.

....

3   In the **Acronym** field, enter the acronym.

....

4   In the **Customer Information** field, enter any information you wish other users to view.

....

5   Click **OK**.

> **Result:**
>
> A window informs you of the success or failure of the operation, and the newly added equipment can be viewed on the Equipment Display List.

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365-309-262R7.0   **Lucent Technologies**   2 - 1 9
Issue 1, July 2002

Display equipment list

Purpose   Use this task to display a list of existing equipment.

Task   Perform the following task to display a list of existing equipment.

1   From the Network Map, select **Configuration > Equipment > Display List**.

>   **Result:**
>
>   The Equipment Display List Query Box form displays.

2   In the Equipment ID field, enter the ID of the equipment you wish to display (or enter ***** to list all existing equipment). You can search for groupings of equipment by using a wildcard (*). Simply enter an alphanumeric string followed (or preceeded) by the * character.

3   Click **OK**.

>   **Result:**
>
>   The Equipment Display List appears and displays all the equipment in the network with the specified ID.

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Delete equipment

....

Purpose Use this task to delete equipment from the Navis™ Optical NMS Network Map.

Task Perform the following task to delete equipment from the Navis™ Optical NMSNetwork Map.

....

1 Display the equipment list (see preceeding task).

....

2 Select an entry.

....

3 Select **Actions > Delete Node**.

Result:

The equipment is deleted from the Network Map.

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Display ODO List

Purpose The following task allows users to display the out-of-domain objects (ODOs) existing for Navis™ Optical NMS and the WaveStar® Transport Management System (TMS).

Task Perform the following task to display a list of ODOs.

1 From the Network Map, select **Configuration > ODO Display List**.

Result:

The ODO Display List Query Box form appears.

2 Enter ***** within the **ODO ID** field to get a complete listing of all ODOs. To locate a specific object, enter its name within this field. Of course, you can search for groupings of ODOs by using a wildcard (*). Simply enter an alphanumeric string followed (or preceded) by the * character.

3 Press **OK**.

Result:

The specified ODOs appear within the ODO Display List form.

E N D   O F   S T E P S

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3 Provisioning Tasks

Overview

Purpose This chapter presents provisioning tasks usable with Navis™ Optical NMS.

Contents

Section I: Digital Links

Overview

Purpose This section discusses provisioning tasks associated with digital links as they relate to Navis™ Optical NMS.

Definition Digital links are fiber or electrical connections between two points. These transport facilities are assignable to high-order and low-order circuits to carry customer services. Digital links can be of two types: SDH or PDH.

SDH digital links connect two SDH network elements or an SDH network element and a black box or equipment.

PDH digital links are asynchronous connections between two PDH ports of the network elements assignable to the PDH circuits.

Supported digital links Refer to Chapter 4: Provisioning Concepts of this guide for descriptions of the digital links supported by Navis™ Optical NMS.

Protection Digital links can be unprotected or protected. When protected by another link, it is called Multiplex Section Protection (MSP). MSP protection can be of two types - 1+1 or 1x1.

Before you begin Refer to the individual tasks contained within this section for important "Before You Begin" information.

Additional information For additional information about digital links as they relate to Navis™ Optical NMS, refer to Chapter 4: Provisioning Concepts of this guide.

Contents

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Add a digital link between two network elements

Purpose	Use this task to add a digital link between two network elements.
Before you begin	Before adding a digital link between two network elements, note the network element's capabilities with regards to the types of digital links you can use and the protection offered. Although Navis™ Optical NMS will automatically show only the digital links usable with a particular network element pair, Chapter 4: Provisioning Concepts presents the digital link support per network element.
	Note for WaveStar® BandWidth Manager and LambdaUnite™ MSS network elements: some ports can be configured (through Navis™ Optical EMS) as SONET gateway ports. When ports are configured as SONET ports, digital links can be provisioned by specifying the ports either by selecting the ports from the Port table or cutting through to the F-Interface and selecting the ports.
Task	Perform the following task to add a digital link between two network elements on the Network Map. This task assumes that two network elements already exist on the Network Map.

1   From the Network Map, select a network element.

>   **Result:**

>   The selected network element is highlighted.

2   Synchronize the network element's ports. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

>   **Result:**

>   The network element is synchronized.

3   Select a second network element and repeat Step 2.

....

4   On the Network Map, select **Configuration > Digital Link > Add >
(select an applicable digital link according to the selected
network elements)**.

> **Result:**
>
> The Network Map becomes the Provisioning Profile form.

....

5   Under the **Essentials** tab, enter a circuit ID within the last field of
the **CKT/Trail ID** field. The previous two fields should be prepopulated
with the two previously selected network elements while the third
field specifies the selected digital rate.

....

6   Press the **A port** button. The **A Location** field should have been
prepopulated with one of the selected network elements.

> **Result:**
>
> The Port Selection window appears.

....

7   Select a port and press **OK**.

> **Result:**
>
> The selected port appears within the Essentials tab as the **A
> port**.

....

8   Repeat Steps 6 and 7 to add the **Z port** (of course, exchange any
instances of **A port** with **Z port**). Note that you have to select a port
that is different than the port selected in Step 7.

> **Result:**
>
> The selected port appears within the Essentials tab as the **Z port**.

....

9   Verify that **Order Action** is set to **Add**.

....

10   Press **OK**.

> **Result:**
>
> The graphical layout form appears.

....

....

11   Note the information pertaining to the newly created digital link and
press **OK**.

> **Result:**
>
> A Provisioning In-Progress pop up window appears followed by
> a confirmation window.

....

12   Confirm all confirmation windows that appear.

> **Result:**
>
> The new digital link, linking the specified network elements,
> appears on the Network Map.

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365-309-262R7.0
Issue 1, July 2002

Lucent Technologies

3 - 9

Add a 1+1 MSP digital link

Purpose   Use this task to provision a 1+1 MSP digital link.

When MSP is 1+1, the protection link is dedicated to the working (service) link and cannot carry preemptible extra traffic.

Task   **Important!** This task assumes that the appropriate provisioning was completed on the EMS-level. That is, a protection link was provisioned on the EMS-level prior to this task (this task will create a service link based on the protection link provisioned on the EMS-level).

Perform the following task to provision a 1+1 MSP digital link.

1   From the Network Map, select a network element that supports 1+1 MSP protection. Refer to Chapter 4: Provisioning Concepts for a list of network elements that support 1+1 protection.

   Result:

   The selected network element is highlighted.

2   Synchronize the network element's ports. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

   Result:

   The network element is synchronized.

3   Select a second network element and repeat Step 2.

4   On the Network Map, select **Configuration > Digital Link > Add > (select an applicable digital link according to the selected network elements)**.

   Result:

   The Network Map becomes the Provisioning Profile form.

....

5 Under the **Essentials** tab, specify a circuit ID within the last field of the **CKT/Trail ID** field. The previous two fields should be prepopulated with the two previously selected network elements while the third field specifies the selected digital rate.

....

6 For **Service Path**, press the **A port** button. The **A Location** field should have been prepopulated with one of the selected network elements.

> **Result:**
>
> The Port Selection window appears.

....

7 Select a port and press **OK**.

> **Result:**
>
> The selected port appears in the field as the **A port**.

....

8 Repeat Steps 6 and 7 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**). Note that you have to select a port that is different than the port selected in Step 7.

> **Result:**
>
> The selected port appears within the Essentials tab as the **Z port**.

....

9 For **MSP Protected?**, select **1+1 Protected**. Note that if this field does not show **1+1 Protected**, it means that the selected network elements do not allow for 1+1 MSP.

> **Result:**
>
> The interface alters to display a new panel (**Protection Path**) and field (**MSP Type**).

....

10 For **Protection Path**, press the **A Protect Port** button.

> **Result:**
>
> The Port Selection window appears.

....

....

11   Select a port for the protection path and press **OK**.

> **Result:**
>
> The selected port appears in the field as the **A Protect Port**.

....

12   Repeat Steps 10 and 11 to add the **Z Protect Port** (of course, exchange any instances of **A Protect Port** with **Z Protect Port**).

> **Result:**
>
> The selected port appears as the **Z Protect Port**.

....

13   For **MSP Type**, select either **UNI** (unidirectional) or **BI** (bidirectional).

....

14   Verify that **Order Action** is set to **Add**.

....

15   Verify that the **MS Protection Group Name** is the same as the name of the protection link created on the EMS-level.

....

16   Press **OK**.

> **Result:**
>
> The graphical layout form appears.

....

17   Note the information pertaining to the newly created digital link and press **OK**.

> **Result:**
>
> A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

18   Confirm all confirmation windows that appear.

> **Result:**
>
> The new 1+1 digital link, linking the specified network elements, appears on the Network Map.

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Add a 1x1 MSP digital link

Purpose Use this task to provision a 1x1 MSP digital link between two network elements.

1x1 MSP occurs when a single protection link protects a single service digital link. With a 1x1 MSP digital link, the protection link can carry extra traffic that will be preempted whenever MSP switching occurs. As a result, both the service and protection links involved with 1x1 MSP have separate digital link identifications.

Before you begin Before you provision a 1x1 MSP digital link, consider the following items:

- The network elements selected for provisioning must support 1x1 MSP. The following network elements support 1x1 MSP: WaveStar® BandWidth Manager, LambdaUnite™ MSS, and black box.

- 1x1 MSP is primarily used as a span protection in a 4-fiber MS-SPRING. Users must first create a protection digital link before any service digital links are created and associated to it.

- Each of the two digital links (service and protection) for a 1x1 MSP must be created or deleted with two separate provisioning orders having separate implementations.

- Users cannot rearrange a 1x1 MSP-protected digital link. They can only delete and add a new digital link with a new layout.

- A protection link cannot be associated with more than one service link.

- Users may specify a switching operation to preempt extra traffic carried on a protection link. Note that Navis™ Optical NMS does not determine if a protection link is carrying extra traffic (users must manually check for extra traffic).

Task **Important!** This task assumes that the appropriate provisioning was completed on the EMS-level. That is, a protection link was provisioned on the EMS-level prior to performing this task (this task will create a service link based on the protection link provisioned on the EMS-level).

Perform the following task to provision a 1x1 MSP-protected digital link.

....

1 From the Network Map, select a network element that supports 1x1 MSP protection. Refer to Chapter 5: Provisioning Concepts for a list of network elements that support 1x1 protection.

> **Result:**
>
> The selected network element is highlighted.

....

2 Synchronize the network element's ports. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

> **Result:**
>
> The network element is synchronized.

....

3 Select a second network element and repeat Step 2.

....

4 On the Network Map, select **Configuration > Digital Link > Add > (select an applicable digital link according to the selected network elements)**.

> **Result:**
>
> The Network Map becomes the Provisioning Profile form.

....

5 Under the **Essentials** tab, specify a circuit ID within the last field of the **CKT/Trail ID** field. The previous two fields should be prepopulated with the two previously selected network elements while the third field specifies the selected digital rate.

....

6 For **Service Path**, press the **A port** button. The **A Location** field should have been prepopulated with one of the selected network elements.

> **Result:**
>
> The Port Selection window appears.

....

7   Select a port and press **OK**.

> **Result:**

> The selected port appears in the field as the **A port**.

....

8   Repeat Steps 6 and 7 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**). Note that you have to select a port that is different than the port selected in Step 7.

> **Result:**

> The selected port appears within the Essentials tab as the **Z port**.

....

9   For **MSP Protected?**, select **1x1 Protected**. Note that if this field does not show **1x1 Protected**, it means that the selected network elements do not allow for 1x1 MSP.

> **Result:**

> The interface alters to display a new panel (**Protection Path**) and field (**MSP Type**).

....

10 For **Protection Path**, press the **A Protect Port** button.

> **Result:**

> The Port Selection window appears.

....

11 Select a port for the protection path and press **OK**.

> **Result:**

> The selected port appears in the field as the **A Protect Port**.

....

12 Repeat Steps 10 and 11 to add the **Z Protect Port** (of course, exchange any instances of **A Protect Port** with **Z Protect Port**).

> **Result:**

> The selected port appears as the **Z Protect Port**.

....

13 For **MSP Type**, select either **UNI** (unidirectional) or **BI** (bidirectional)

....

....

14   Verify that **Order Action** is set to **Add**.

....

15   Verify that the **MS Protection Group Name** is the same as the name
of the protection link created on the EMS-level.

....

16   Press **OK**.

> **Result:**
>
> The graphical layout form appears.

....

17   Note the information pertaining to the newly created digital link and
press **OK**.

> **Result:**
>
> A Provisioning In-Progress pop up window appears followed by
> a confirmation window.

....

18   Confirm all confirmation windows that appear.

> **Result:**
>
> The new 1x1 digital link, linking the specified network
> elements, appears on the Network Map.

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Display digital link specifications

Purpose   Use this task to display the specifications and graphical layout of an existing digital link.

Task   Perform the following task to display the specifications and graphical layout of an existing digital link.

1   From the Network Map, select a digital link.

> **Result:**
>
> The digital link becomes highlighted.

2   Right click on the digital link.

> **Result:**
>
> The Link menu appears.

3   Select **Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail List form appears.

4   Select the CKT/Trail ID corresponding to the digital link you wish to view the specifications for.

> **Result:**
>
> The selection becomes highlighted, and the **Actions** menu item becomes enabled.

5   Select **Actions > Graphical Layout**.

> **Result:**
>
> The Graphical Layout form appears. This form presents the graphical layout and specifications associated with the digital link.

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Display digital link protection group names

Purpose   Use this task to display a list of protection group names associated with MSP digital links.

In addition to the procedure described below, MSP group names are also displayed in the Graphical Layout, Modify Parameters, and Order Parameters forms. This procedure allows you to view a complete listing of protection group names.

Task   Perform the following task to display a list of protection group names associated MSP digital links.

1   From the Network Map, select **Configuration > Connection > Display > MS Protection Group Names**.

    Result:

    The Protection Group Names list is displayed.

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Add a regenerator to a digital link

Purpose Use this task to add a regenerator to a digital link.

Task Perform the following task to add a regenerator to a digital link. This task assumes that a digital link has already been provisioned and appears on the Network Map.

1 From the Network Map, select a digital link.

> **Result:**
>
> The digital link becomes highlighted.

2 Right click on the digital link.

> **Result:**
>
> The Link menu appears.

3 Select **Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail List form appears.

4 Select the CKT/Trail ID corresponding to the digital link you wish to add the regenerator to.

> **Result:**
>
> The selection becomes highlighted, and the **Actions** menu item becomes enabled.

5 Select **Actions > Graphical Layout**.

> **Result:**
>
> The Graphical Layout form appears.

6 Select **Actions > Modify > Regenerators/Optical Amplifiers**.

Result:

The Regenerator Selection form appears.

....

7   Select a regenerator from the **Non-Members** sub-window.

Result:

The **Add** and **Remove** buttons become enabled.

....

8   Press **Add**.

Result:

The regenerator is moved to the **Service** window.

....

9   Specify the regenerator's left/right ports and service protection.

....

10   Press **OK**.

Result:

A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

11   Press **OK**.

Result:

A regenerator is added to the digital link.

E N D   O F   S T E P S
....

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Delete a regenerator from a digital link

Purpose   Use this task to delete a regenerator from a digital link.

Task   Perform the following task to delete a regenerator from a digital link. This task assumes that a digital link has already been provisioned and appears on the Network Map.

....

1   From the Network Map, select a digital link.

      Result:

      The digital link becomes highlighted.

....

2   Right click on the digital link.

      Result:

      The Link menu appears.

....

3   Select **Circuit/Trail List**.

      Result:

      The Circuit/Trail List form appears.

....

4   Select the CKT/Trail ID corresponding to the digital link you wish to delete the regenerator from.

      Result:

      The selection becomes highlighted, and the **Actions** menu item becomes enabled.

....

5   Select **Actions > Graphical Layout**.

      Result:

      The Graphical Layout form appears.

....

6   Select **Actions > Modify > Regenerators/Optical Amplifiers**.

Result:

The Regenerator Selection form appears.

....

7   Select a regenerator from the **Service** window.

Result:

The **Add** and **Remove** buttons become enabled.

....

8   Press **Remove**.

Result:

The regenerator is moved to the **Non-Members** window.

....

9   Press **OK**.

Result:

A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

10   Press **OK**.

Result:

The regenerator is deleted from the digital link.

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3 - 2 2   **Lucent Technologies**   365-309-262R7.0
Issue 1, July 2002

Modify digital link order parameters

....

Purpose   Use this task to modify the order parameters of a digital link.

Task   Perform the following task to modify the order parameters of a digital link.

....

1   From the Network Map, select a digital link.

> **Result:**
>
> The digital link becomes jagged.

....

2   Right-click on the digital link.

> **Result:**
>
> The Link List form displays.

....

3   Select **Link List**.

....

4   Select a digital link from the list.

....

5   Select **Actions > Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail List form displays.

....

6   Select a circuit/trail ID.

> **Result:**
>
> Selection becomes highlighted and the **Actions** menu item becomes enabled.

....

7   Select **Actions > Graphical Layout**.

> **Result:**
>
> The Graphical layout form displays.

....

....

8   Select **Actions > Modify > (make a selection)**.

Result:

A modification form will display depending upon your selection.

....

9   Perform any modification to the digital link through the three available forms.

....

10   Press **OK**.

Result:

A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

11   Once finished with your modifications, from the Network Map, select **File > Query Again**.

Result:

The digital link is modified.

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3 - 2 4   **Lucent Technologies**   365-309-262R7.0
                                                                            Issue 1, July 2002

Check a digital link connection

....

Purpose   Use this task to verify if a digital link is being used by a connection.

Important! This task should be performed before disconnecting a digital link. A digital link that is being used by a connection *cannot* be disconnected.

Task   Perform the following task to verify if a digital link is being used by a connection.

....

1   From the Network Map, right click on a digital link.

Result:

The Link List form displays.

....

2   Select **Circuit/Trail List**.

Result:

The Circuit/Trail List form displays.

....

3   Select an entry.

Result:

The entry becomes highlighted.

....

4   Select **Actions > Client Trail List**.

Result:

The Client Trail List query box displays with completed fields.

....

5   Press **OK**.

Result:

The Client Trail List form displays.

....

....

6   Determine if the Client Trail List form is populated with entries, then
continue with one of the following options.

- If values *display*, then the digital link is being used by a
connection and *cannot* be disconnected.

- If values *do not display*, then the digital link is not being used by
a connection and *can* be disconnected.

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Disconnect a digital link

....

Purpose   Use this task to disconnect a digital link.

> **Important!** Deletion of a digital link is only permitted if there are no in-effect or pending circuits or paths riding on it. Refer to the previous task, "Check a Digital Link Connection," for details.

Before you begin   Before disconnecting a digital link, note the following:

- Users are not required to stop already running performance monitoring data collection prior to disconnecting the digital link.

- Any preplan paths riding on a circuit must be disassociated from the service path they are protecting before there is any attempt to disconnect them.

- When deleting 1x1 digital links, the working service link must be deleted before the protection link.

Task   Perform the following task to disconnect a digital link.

....

1   From the Network Map, select a digital link. Be sure that the selected link is not being used by a connection.

> **Result:**
>
> The digital link becomes highlighted.

....

2   From the Network Map, select **Configuration > Digital Link > Disconnect**.

> **Result:**
>
> The Ckt/Trail Query Box is displayed.

....

3   In the **Order Number** field, enter the order number of the digital link to be disconnected.

....

4   Click **OK**.

> **Result:**
>
> A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

....

5   Click **Yes**.

> **Result:**
>
> An action window appears.

....

6   Click **OK**.

> **Result:**
>
> Navis™ Optical NMS disconnects the digital link if all validations are successful. The digital link, linking the specified network elements, disappears from the Network Map.

E ND   OF   S TEPS

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3 - 2 8   **Lucent Technologies**   365-309-262R7.0
                                                                                   Issue 1, July 2002

Section II: Connections

Overview

Purpose   This section discusses the provisioning tasks associated with connections.

Definition   A circuit/trail is a concatenation of link/sub-network connections (cross-connects in Navis™ Optical NMSterminology) that provides end-to-end service to a customer. A circuit/trail is identified by the rate at which service is provided. ITU and ETSI standards for SDH and PDH circuit/trails define the rate.

A circuit is a set of transmission channels through one or more network elements that provides signal transmissions between two points to support a single communications path. Circuits can ride on paths (for example, a CEPT-1 circuit riding on a VC-12 path) or digital links (a circuit can ride on a digital link directly if the digital link is channelized to one channel, such as a CEPT-1 circuit riding on a CEPT-1 digital link).

A trail (in SDH terminology) is often referred to as a path. A trail can be assignable or non-assignable depending on the terminating port or based on the sub-structuring of the port to carry lower order traffic. In Navis™ Optical NMS, if one or both end ports of a trail are PDH/Asynchronous, or if one or both end ports are substructured to carry lower order traffic, the trail is called an ***assignable entity***. If both end ports are SDH and not sub-structured to carry low order traffic, then the trail is called as an ***non-assignable entity***. Certain trails, such as VC4-4c, VC4-16c, VC-64c, and VC2, are always non-assignable. Navis™ Optical NMS creates channels for assignable trails in order to carry the low order trails or PDH/asynchronous circuits.

Supported connection types   Refer to Chapter 4: Provisioning Concepts of this guide for descriptions of the connection types supported by Navis™ Optical NMS.

Before you begin   Refer to the individual tasks contained within this section for important "Before You Begin" information.

Additional information   For additional information about connections as they relate to Navis™
Optical NMS, refer to Chapter 4: Provisioning Concepts of this guide.

Contents

Lucent Technologies

Add a circuit between two controlled network elements

Purpose   Use this task to add a circuit between two controlled network elements.

Before you begin   Before you add a circuit between two controlled network elements, note the following items:

- A digital link must exist before attempting to provision a circuit.

- Not all controlled network elements can implement a one-way cross-connection. The WaveStar® ADM 16/1 and WaveStar® AM 1 Plus are two examples of controlled network elements that cannot implement a one-way cross-connection.

- Navis™ Optical NMS does not support the provisioning of an unprotected broadcast circuit on a WaveStar® ADM 4/1 network element.

Task   Perform the following task to add a circuit between two controlled network elements.

....

1   On the Network Map, select two network element icons that already have a digital link joining them.

   Result:

   The icons become highlighted.

....

2   Synchronize the network elements' ports and cross-connects. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

   Result:

   The network elements are synchronized.

....

3   On the Network Map, select **Configuration > Connection > Add > (select an applicable circuit rate according to the selected network elements)**.

   Result:

   The Provision Profile form is displayed.

....

....

4   Under the **Essentials** tab, specify a circuit ID next to where the
connection type is listed.

....

5   Press the **A port** button.

> **Result:**
>
> A window appears.

....

6   Select a port and press **OK**. Note that depending upon the circuit type,
you may have to select multiple ports.

> **Result:**
>
> The selected port appears within the Essentials tab as the **A
> port**.

....

7   Repeat steps 5 and 6 to add the **Z port** (of course, exchange any
instances of **A port** with **Z port**).

> **Result:**
>
> The selected port appears within the Essentials tab as the **Z port**.

....

8   Under the Parameters tab, verify that **Order Action** is set at **Add**.

....

9   Press **OK**.

> **Result:**
>
> The graphical layout form appears.

....

10   Press **OK**.

> **Result:**
>
> A Provisioning In-Progress pop up window appears followed by
> a confirmation window.

....

11   Press **OK**.

....

Result:

The circuit is created.

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Add a circuit between two noncontrolled network elements

Purpose Use this task to add a circuit between two noncontrolled network elements.

Before you begin Before you add a circuit between two noncontrolled network elements, note the following items:

- A circuit cannot be created directly between two noncontrolled network elements without at least one intermediate controlled network element.

- Digital links must already be provisioned from the network element to each of the two equipment.

Task Perform the following task to add a circuit between two noncontrolled network elements.

1 On the Network Map, select two noncontrolled network element icons that already have a digital link joining them and have at least one intermediate controlled network element.

   Result:

   The icons become highlighted.

2 Synchronize the network elements' ports and cross-connects. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

   Result:

   The network elements are synchronized.

3 On the Network Map, select **Configuration > Connection > Add > (select an applicable circuit rate according to the selected network elements)**.

   Result:

   The Provision Profile form is displayed.

....

4 Under the **Essentials** tab, specify a circuit ID next to where the connection type is listed.

....

5 Press the **A port** button.

> **Result:**
>
> A window appears.

....

6 Select a port and press **OK**. Note that depending upon the circuit type, you may have to select multiple ports.

> **Result:**
>
> The selected port appears within the Essentials tab as the **A port**.

....

7 Repeat steps 5 and 6 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**).

> **Result:**
>
> The selected port appears within the Essentials tab as the **Z port**.

....

8 Under the Parameters tab, verify that **Order Action** is set at **Add**.

....

9 Press **OK**.

> **Result:**
>
> The graphical layout form appears.

....

10 Press **OK**.

> **Result:**
>
> A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

11 Press **OK**.

....

Result:

The circuit is created.

E ND OF S TEPS

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Add a circuit between a controlled network element and a noncontrolled network element

Purpose   Use this task to add a circuit between a controlled network element and a noncontrolled network element.

Before you begin   Before you add a circuit between a controlled network element and a noncontrolled network element, note the following items:

- A digital link must exist between the controlled and noncontrolled network elements before attempting to provision a circuit between the two.

- The equipment list menu item is only highlighted on the node menu for those network elements connected to originating or terminating equipment.

Task   Perform the following task to add a circuit between a controlled network element and a noncontrolled network element.

1   On the Network Map, select one noncontrolled network element icon and one controlled network element icon that already have a digital link joining them.

   Result:

   The icons become highlighted.

2   Synchronize the network elements' ports and cross-connects. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

   Result:

   The network elements are synchronized.

3   On the Network Map, select **Configuration > Connection > Add > (select an applicable circuit rate according to the selected network elements)**.

   Result:

   The Provision Profile form is displayed.

Section II: Connections
Add a circuit between a controlled network
element and a noncontrolled network
element

Provisioning Tasks

....

4   Under the **Essentials** tab, specify a circuit ID next to where the connection type is listed.

....

5   Press the **A port** button.

        Result:

        The Port Selection window appears.

....

6   Select a port and press **OK**. Note that depending upon the circuit type, you may have to select multiple ports.

        Result:

        The selected port appears within the Essentials tab as the **A port**.

....

7   Repeat steps 5 and 6 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**).

        Result:

        The selected port appears within the Essentials tab as the **Z port**.

....

8   Under the Parameters tab, verify that **Order Action** is set at **Add**.

....

9   Press **OK**.

        Result:

        The graphical layout form appears.

....

10   Press **OK**.

        Result:

        A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

11   Press **OK**.

....

Section II: Connections
Add a circuit between a controlled network
element and a noncontrolled network
element

Provisioning Tasks

Result:

The circuit is created.

E ND OF S TEPS

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Add an AU3-AU4 trail via the WaveStar® BandWidth Manager

Purpose   Use this task to add an AU3-AU4 trail using the WaveStar® BandWidth Manager's AU3-AU4 adaptation feature.

Before you begin   Before provisioning a trail using the WaveStar® BandWidth Manager's AU3-AU4 adaptation feature, note the following items:

- Navis™ Optical NMS only supports bi-directional TU3-AU3 trails.

- Navis™ Optical NMS only supports the manual provisioning of TU3-AU3 trails.

- Navis™ Optical NMS supports merge and protection feaures for TU3-AU3 trails.

- Navis™ Optical NMS does not support preplan restoration for TU3-AU3 trails.

Additional information   For more information about the WaveStar® BandWidth Manager's adaptation feature, refer to Chapter 4: Provisioning Concepts of this guide.

Task   Perform the following task to provision a trail using the WaveStar® BandWidth Manager's AU3-AU4 adaptation feature. This task assumes that you have already provisioned a VC4 trail that terminates on a WaveStar® BandWidth Manager.

1   On the Network Map, select a pair of WaveStar® BandWidth Manager icons.

> **Result:**
>
> The icons become highlighted.

2   Synchronize the network elements' ports and cross-connects. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

> **Result:**
>
> The network elements are synchronized.

3   On the Network Map, select **Configuration > Connection > Add > (select a VC4 rate)**.

   Result:

   The Provision Profile form is displayed.

4   Under the **Essentials** tab, enter a circuit ID next to where the connection type is listed.

5   Press the **A port** button.

   Result:

   The Port Selection window appears.

6   Select a port and press **OK**.

   Result:

   The selected port appears within the Essentials tab as the **A port**.

7   Repeat steps 5 and 6 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**).

   Result:

   The selected port appears within the Essentials tab as the **Z port**.

8   Under the Parameters tab, verify that **Order Action** is set at **Add**.

9   For the **Enable AU4-AU3** option, select **Yes**.

10 Press **OK**.

   Result:

   The graphical layout form appears.

....

11   Press **OK**.

        Result:

        A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

12   Press **OK**.

        Result:

        The AU3-AU4 trail is created.

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3 - 4 2   **Lucent Technologies**   365-309-262R7.0
Issue 1, July 2002

Display circuit list

Purpose	Use this task to display a list of existing circuits.
Task	Perform the following task to display a complete listing of existing circuits.

1 From the Network Map, select **Configuration > Display > Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail List Query Box form appears.

2 Place a check in the **Free Form** box.

> **Result:**
>
> The Free Form field alters.

3 Within the **Free Form** field, enter *****.

4 From the field's pull-down menu, select **All**.

> **Result:**
>
> The OK button becomes active.

5 Click **OK**.

> **Result:**
>
> The Circuit/Trail List form appears listing all existing circuits.

E N D   O F   S T E P S

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Display circuit list by type

Purpose	Use this task to display a list of particular circuit types.
Task	Perform the following task to display a list of particular circuit types.

1 From the Network Map, select **Configuration > Display > Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail List Query Box form appears.

2 Place a check in the **Free Form** box.

> **Result:**
>
> The Free Form field alters.

3 Within the **Free Form** field, enter *****.

4 From the field's drop-down menu, specify a transmission rate.

> **Result:**
>
> The **OK** button becomes active.

5 For **Status**, specify an order status. Your query will show all the circuits that meet this criteria. For example, if you select **Pending**, only pending circuits will be displayed.

6 For **Order Action**, select an order action if desired to narrow the display criteria.

7 Press the **More** button if you wish to apply additional search criteria.

> **Result:**
>
> If pressed, the form lengthens to provide additional selections.

....

8   Click **OK**.

Result:

The Circuit/Trail List form appears and lists all existing circuits
that fit the search criteria.

E ND OF S TEPS

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365-309-262R7.0
Issue 1, July 2002

Lucent Technologies

3 - 4 5

Display channel information

....

Purpose	Use this task to display channel information.

Task	Perform the following task to display channel information.

....

1 From the Network Map, select **Configuration > Connection > Display > Channel Information**.

> **Result:**
>
> The Channel Information Query Box displays.

....

2 In the **Circuit ID** field, optionally enter a circuit ID.

....

3 Select a value from the drop down list.

....

4 In the **Order Number** field, enter an order number.

....

5 *(Optional)*If you want to select channel types and enter spare capacity information, press **More** and complete the information.

....

6 Press **OK**.

> **Result:**
>
> The Channel Information form displays and lists circuits/trail IDs that fit the search criteria.

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3 - 4 6   **Lucent Technologies**   365-309-262R7.0
Issue 1, July 2002

Display connection attributes

Purpose   Use this task to display the attributes of a connection.

Task   Complete the following steps to display the attributes of a connection.

1   From the Network Map, select **Configuration > Connection > Display > Graphical Layout**.

   Result:

   The Graphical Layout Query Box displays.

2   Complete the **CKT/Trail ID** or **Order #** field.

3   Press **OK**.

   Result:

   The Graphical Layout form displays the requested layout.

   E N D   O F   S T E P S

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Display network discrepancies

Purpose   Use this task to display network discrepancies. This section covers three types of network discrepancies: improper disconnects, uncorrelated crossconnects, and Lucent ONNS connections.

An improper disconnect occurs when an intradomain portion of a connection is disconnected or rearranged by that domain's NMS. Because the Network Map does not notify the user of improper disconnects as they occur, this task is used when there is a need to display improper disconnect data. The same applies to uncorrelated crossconnects and Lucent ONNS connections.

Task   Complete the following task to locate and view network discrepancies. Note that this task will discuss the displaying of improper disconnects. Users can display network discrepancies for uncorrelated crossconnects or Lucent ONNS Connections by exchanging "Uncorrelated Crossconnects" (or "Lucent ONNS Connections") for "Improper Disconnects" in Step 1.

1   From the Network Map, select **Configuration > Network Discrepancy > Improper Disconnects**.

> **Result:**
>
> The Improper Disconnects Query Box form displays.

2   In the **CKT/Trail ID** field, enter a circuit/trail identification.

3   In the adjoining pull-down menu, select a rate.

4   If you know the network element you wish to query, enter its ID within the **NE ID** field, otherwise, press the **NE ID** button.

> **Result:**
>
> The Selection Box form displays.

5   Using the **Filter** pull-down menu, select the domain you wish to view for network elements.

Result:

The **NE ID** panel lists all the network elements that belong to that domain.

....

6 From the **NE ID** panel, select a network element.

Result:

The **OK** button becomes enabled.

....

7 Press **OK**.

Result:

Your network element selection displays within the **NE ID** field.

....

8 For **Area ID**, select an area.

....

9 Press **OK**.

Result:

The Improper Disconnects form displays. If there are any improper disconnects or network discrepancies found using the query information you entered, the affected circuit/trails will display within the window.

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365-309-262R7.0
Issue 1, July 2002

Lucent Technologies

3 - 4 9

Display client trail list

Purpose   Use this task to display client trail list information.

Task   Perform the following task to display client trail list information.

1   From the Network Map, select **Configuration > Connection > Display > Client Trail List**.

   Result:

   The Client Trail List Query Box displays.

2   In the **Circuit ID** field, optionally enter a circuit ID.

3   Select a value from the drop down list.

4   *(Optional)* In the **Order Number** field, enter an order number.

5   *(Optional)* If you want to select client trail types and enter unit/frequency information, press **More**, complete the information and proceed to the next step.

6   Press **OK**.

   Result:

   The Client Trail form displays and lists circuits/trail IDs that fit the search criteria.

   E ND OF S TEPS

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Merge multiple circuits

Purpose   Use this task to merge several circuits into one circuit.

Before you begin   Be sure that circuits to be merged are:

- adjacent to one another or are connected by a channel.

- in the In-Effect state and their order action must be In-Effect, Add, Rearrange, or Normalization.

The circuit merging process is only valid only on paths with no circuits riding on them. The circuits to be merged should not have any pending or In-Effect circuits. The original circuits must be of the same rate and their channel assignment must be the same. Note that digital links cannot be merged.

Circuit merge is not supported for one-way or broadcast circuits; it is only available for a two-way circuit.

Task   Perform the following task to merge multiple circuits.

1   From the Network Map, select **Configuration > Merge > (select an applicable circuit rate based upon the circuits, digital links and network elements involved)**.

   Result:

   The Merge Circuits form displays.

2   In the **CKT/Trail ID** field, enter a circuit/trail identification.

3   In the Service Path area of the form, click the **A Location** button.

   Result:

   The Selection form displays.

4   Select a location from the list then click **OK**.

   Result:

   The selected location displays in the **A Location** field.

....

5   Click the **A Port** button.

> **Result:**
>
> The Selection form displays.

....

6   Select a port and press **OK**.

> **Result:**
>
> The selected port displays within the Essential tab as the **A Port**.

....

7   Repeat Steps 5 and 6 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**).

> **Result:**
>
> The selected port displays within the Essential tab as the **Z port**.

....

8   Click the **A Protect Loc** button.

> **Result:**
>
> A form displays.

....

9   Select the protecting location press **OK**.

> **Result:**
>
> The selected location displays within the Essential tab as the **A Protect Loc**.

....

10   Repeat Steps 8 and 9 to add the **Z Protect Loc** (of course, exchange any instances of **A Protect Loc** with **Z Protect Loc**).

> **Result:**
>
> The selected port displays within the Essential tab as the **Z Protect Loc**.

....

11   *(Optional)* Press the **Display Graphical Layout** button to display the layout for approval .

....

....

12 *(Optional)* Select the **Protection Type** from the drop down list.

....

13 Click **OK** to apply selections.

Result:

A new circuit is created from the merged circuits.

If a new circuit is not created and one or more of the requests fail to lower level management system, the Navis™ Optical NMS will display a message indicating that the merge update of the Navis™ Optical NMS circuit ID failed for the Navis™ Optical NMS circuit ID in Navis™ Optical NMS. The merge will complete, but **setUserLabel** will fail. In this case, the user will have to modify the circuit ID locally in the appropriate network management system through modify order parameters.

E N D   O F   S T E P S

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Copy a connection using the Clone feature

Purpose   Use this task to copy a circuit through the Clone feature.

Task   Perform the following task to copy a circuit through the Clone feature.

1   From the Network Map, select **Configuration > Connection > Clone**.

Result:

A query box form appears.

2   Enter a circuit identification so as to filter through all the currently existing circuits.

3   Press **OK**.

Result:

The Circuit/Trail List form appears.

4   Select a circuit to clone.

Result:

A provisioning screen appears pre-populated.

5   From the Essentials tab, change the **ID** field to name the circuit clone.

6   Change the port addresses for the circuit clone.

7   Click **OK**.

Result:

The circuit is cloned.

E ND OF S TEPS

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View a work order record document

Purpose   Use the following task to view a work order record document (WORD).

The WORD feature is a customer service order or network infrastructure order and includes the end-to-end design of the circuit associated with that order. The primary use of the WORD feature is for circuit installation, testing and fault tracing by a field technician.

Before you begin   Before performing this task, consider the following items:

- The WORD feature must be turned on by a user with administrator privileges. Administrators may turn on/off the WORD feature through the license tool. Refer to the *Navis*™ *Optical NMS Administration Guide* for details.

- Prior to using the WORD feature, an administrator must set the IP address of the DNA server. Refer to the *Navis*™ *Optical NMS Administration Guide* for details.

- The user's system must have a web browser installed in order to view the WORD.

Task   Perform the following task to view a work order record document (WORD).

1   From the Network Map, select **Configuration > Connection > Display > Circuit/Trail List**.

>   **Result:**

>   The Circuit/Trail Query box form appears.

2   Within the **CKT/Trail ID** field, enter a valid circuit/trail identification.

3   Select a valid **Order Status** and **Order Action**.

>   **Result:**

>   The OK button becomes active.

4   Press **OK**.

Result:

The Circuit/Trail List form appears.

....

5 With the circuit selected, go to **Actions > Enable WORD Display**.

Result:

Your system will launch the resident web browser (in most cases, Microsoft Internet Explorer).

....

6 In the web page's entry field, enter a valid IP address.

Result:

The WORD for the entered IP address will appear.

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Modify circuit order transmission parameters

Purpose Use this task to modify circuit order transmission parameters.

Important! Modifying transmissions can only be done for in-effect circuits.

Task Perform the following task to modify a circuit's order transmission parameters.

1 From the Network Map, select a circuit.

2 Right click on the circuit.

Result:

The Node menu appears.

3 Select **Circuit/Trail List**.

Result:

The Circuit/Trail List form appears.

4 Select the CKT/Trail ID corresponding to the circuit you wish to modify.

Result:

The selection becomes highlighted, and the **Actions** menu item becomes enabled.

5 Select **Actions > Graphical Layout**.

Result:

The Graphical Layout form appears.

6 Select **Actions > Modify > Transmission Parameters**.

Result:

The Transmission Parameters form appears.

....

7   Make the desired modifications to the circuit's order parameters.

....

8   Select **OK**.

Result:

The circuit's new transmission parameters are saved.

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Disconnect a circuit

....

Purpose   Use this task to disconnect a circuit.

Before you begin   When attempting to disconnect a circuit, note the following items:

- A backbone circuit cannot be disconnected unless all its tributaries (other backbones it is feeding) are disconnected first. Users may disconnect backbones and tributaries in the same manner as with any other circuit except for the first circuit that terminates at a customers location containing the backbone.

- You may not disconnect the first circuit in Navis™ Optical NMS.

- You must disconnect the circuit that contains the backbone and add a new circuit. This circuit will contain the new backbone.

- You may then add remaining circuits you wish to maintain.

- You are not required to stop data collection prior to disconnecting a circuit.

- Preplan paths riding on a circuit to be disconnected must be first disassociated from the service path they are protecting before there is any attempt at canceling them.

- If the circuit to be deleted is part of a broadcast circuit, the circuit that was added last ***must*** be disconnected first.

Task   Perform the following task to disconnect a circuit.

....

1   From the Network Map, select a circuit.

....

2   Right click on the circuit.

Result:

The Node menu appears.

....

3   Select **Circuit/Trail List**.

Result:

The Circuit/Trail List form appears.

....

....

4   Select the CKT/Trail ID corresponding to the circuit you wish to disconnect.

> **Result:**
>
> The selection becomes highlighted, and the **Actions** menu item becomes enabled.

....

5   Select **Actions > Graphical Layout**.

> **Result:**
>
> The Graphical Layout form appears.

....

6   Select **Actions > Disconnect > Actual**.

> **Result:**
>
> A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

7   Select **Yes**.

> **Result:**
>
> The circuit is disconnected.
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> E ND   OF   S TEPS

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3 - 6 0   **Lucent Technologies**   365-309-262R7.0
Issue 1, July 2002

Perform a virtual disconnect

Purpose Use this task to perform a virtual disconnect on a circuit.

Task Perform the following task to perform a virtual disconnect on a circuit.

1 From the Network Map, select a circuit.

> **Result:**
>
> The circuit becomes highlighted.

2 Right click on the circuit.

> **Result:**
>
> The Node menu appears.

3 Select **Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail List form appears.

4 Select the CKT/Trail ID corresponding to the circuit you wish to disconnect.

> **Result:**
>
> The selection becomes highlighted, and the **Actions** menu item becomes enabled.

5 Select **Actions > Graphical Layout**.

> **Result:**
>
> The Graphical Layout form appears.

6 Select **Actions > Disconnect > Virtual (DB only)**.

Result:

A Provisioning In-Progress pop up window appears followed by a confirmation window.

....

7 Select **Yes**.

Result:

A virtual disconnect is performed on the circuit.

E ND OF S TEPS

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Section III: Optical Layers

Overview

Purpose   This section contains tasks associated with optical layers as they relate to Navis™ Optical NMS.

Definition   An optical layer refers to an existing optical multiplex section (OMS), optical link (OL) or optical channel trail (OCH) that connects particular types of network elements on the Navis™ Optical NMS Network Map.

An OMS can join two DWDM network elements.

An optical link can connect:

- a SDH network element with a DWDM network element
- a DWDM network element with a LambdaRouter™ AOS
- two LambdaRouter™ AOSs together
- a LambdaRouter™ AOS with an SDH network element.

Supported optical layer types   Refer to Chapter 4: Provisioning Concepts of this guide for descriptions of the optical layers supported by Navis™ Optical NMS.

Before you begin   Refer to the individual tasks contained within this section for important "Before You Begin" information. Note that the tasks themselves are presented in the order in which they should occur. Failure to follow the order presented here could result in provisioning problems.

Additional information   For additional information about optical layers as they relate to Navis™ Optical NMS, refer to Chapter 4: Provisioning Concepts of this guide.

Contents

Create an optical multiplex section

Purpose   Use this task to create an OMS. An OMS is used to connect two DWDM network elements.

Before you begin   Before you create an OMS, note the following:

- The OMS between two WaveStar® OLS80G DWDMs can either be unprotected or 1+1 protected.

- The optical amplifier list only contains the amplifiers that support the OMS section with the appropriate number of channels (16 or 40/80). It is assumed that the optical amplifiers are all bidirectional.

Task   Perform the following task to create an OMS. This procedure assumes that the appropriate network elements already exist.

....

1   From the Network Map, select two DWDM network element icons.

> **Result:**
>
> The two selected network elements become highlighted.

....

2   Synchronize the network elements' ports and cross-connects. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

> **Result:**
>
> The network elements are synchronized.

....

3   From the Network Map, select **Configuration > Optical Layer > Add > OMS**.

> **Result:**
>
> The Network Map becomes the Provisioning Profile form.

....

4   Under the **Essentials** tab, specify an ID within the last field of the **CKT/Trail ID** field. The previous two fields should be prepopulated with the two previously selected network elements. The third field specifies the OMS name.

....

5   Press the **A port** button. The **A Location** field should have been prepopulated with one of the selected network elements.

> **Result:**
>
> The Port Selection window appears.

....

6   Select a port and press **OK**.

> **Result:**
>
> The selected port appears within the Essentials tab as the **A port**.

....

7   Repeat steps 5 and 6 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**). Note that you have to select a port that is different than the port selected in Step 6.

> **Result:**
>
> The selected port appears within the Essentials tab as the **Z port**.

....

8   Verify that **Order Action** is set to **Add**.

....

9   Press **OK**.

> **Result:**
>
> The graphical layout form appears.

....

10   Press **OK**.

> **Result:**
>
> A confirmation window appears.

....

11   Confirm all confirmation windows that appear.

> **Result:**
>
> The newly created OMS appears on the Network Map.

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Lucent Technologies

Create an optical multiplex section with 1+1 protection

Purpose Use this task to create an OMS with 1+1 protection.

Before you begin Before you create an OMS with 1+1 protection, note the following:

- The OMS must be between two WaveStar® OLS80G DWDMs.

- The optical amplifier list contains only the amplifiers that support the OMS section with the appropriate number of channels (16 or 40/80). It is assumed that the optical amplifiers are all bi-directional.

Task Perform the following task to create an OMS with 1+1 protection. This procedure assumes that the appropriate network elements already exist.

1 From the Network Map, select two WaveStar® OLS80G DWDM network element icons.

   Result:

   The two selected network elements become highlighted.

2 Synchronize the network elements' ports and cross-connects. Refer to the network element synchronization task in Chapter 2 for details on how to perform this task.

   Result:

   The network elements are synchronized.

3 From the Network Map, select **Configuration > Optical Layer > Add > OMS**.

   Result:

   The Network Map becomes the Provisioning Profile form.

4 Under the **Essentials** tab, enter a circuit ID next to where **OMS** is listed.

5 Press the **A port** button.

Result:

A window appears.

....

6 Select a port and press **OK**.

Result:

The selected port appears within the Essentials tab as the **A port**.

....

7 Repeat steps 5 and 6 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**).

Result:

The selected port appears within the Essentials tab as the **Z port**.

....

8 Verify that **Auto** is checked for **Path Selection**.

....

9 Set **MSP** (for multiplex section protection) to **Y**.

....

10 Press **OK**.

Result:

The graphical layout form appears.

....

11 Press **OK**.

Result:

A confirmation window appears.

....

12 Confirm all confirmation windows that appear.

Result:

The newly created OMS with 1+1 protection appears on the Network Map.

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3 - 6 8   **Lucent Technologies**   365-309-262R7.0
Issue 1, July 2002

Create an optical link

Purpose Use this task to create an optical link. An optical link can connect a network element with a DWDM network element, a DWDM network element with a LambdaRouter™ AOS, two LambdaRouter™ AOSs together, or a LambdaRouter™ AOS with an network element. Unlike an OMS, an optical link can not join two DWDM network elements.

Task Perform the following task to create an optical link. This procedure assumes that the appropriate network elements already exist.

1 From the Network Map, select two network element icons. Note: the network elements can be DWDM, SDH or a LambdaRouter™ AOS. However, only one network element you select can be a DWDM.

   Result:

   The two selected network elements become highlighted.

2 Synchronize the network elements' ports and cross-connects. Refer to the network element synchronization task in Chapter 2: Network Element Configuration Tasks for details on how to perform this task.

   Result:

   The network elements are synchronized.

3 From the Network Map, select **Configuration > Optical Layer > Add > OL**.

   Result:

   The Network Map becomes the Provisioning Profile form.

4 Under the **Essentials** tab, enter a circuit ID within the last field of the **CKT/Trail ID** field. The previous two fields should be prepopulated with the two previously selected network elements while the third field specifies the OL name.

....

5 Press the **A port** button. The **A Location** field should have been prepopulated with one of the selected network elements.

> **Result:**

> The Port Selection window appears.

....

6 Select a port and press **OK**.

> **Result:**

> The selected port appears within the Essentials tab as the **A port**.

....

7 Repeat Steps 5 and 6 to add the **Z port** (of course, exchange any instances of **A port** with **Z port**). Note that you have to select a port that is different than the port selected in Step 6.

> **Result:**

> The selected port appears within the Essentials tab as the **Z port**.

....

8 Verify that **Order Action** is set to **Add**.

....

9 Press **OK**.

> **Result:**

> The graphical layout form appears.

....

10 Press **OK**.

> **Result:**

> A confirmation window appears.

....

11 Confirm all confirmation windows that appear.

> **Result:**

> The newly created optical link appears on the Network Map.

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Lucent Technologies

Create an optical channel trail

Purpose   Use this task to create an optical channel trail. An optical channel trail transverses the connections established by either an OMS or and OMS/optical link combination. As such, an optical channel trail can span such combinations as two DWDMs (in the case of a single OMS)/SDH network element (optical link)/DWDM (OMS)/DWDM (optical link)/SDH network element scheme.

Before you begin   Before you create an optical channel trail, note the following:

- There must be at least one OMS provisioned. There also must be the desired number of optical links provisioned prior to creating an optical channel trail.

- Optical channel SNCP is supported for the LambdaRouter™ AOS.

- Cascaded SNCPs are not supported.

Task   Perform the following task to create an optical channel trail. This procedure assumes that the appropriate network elements already exist. This task will discuss the provisioning of an optical channel trail for a single OMS. Note that an optical channel trail can be provisioned so as to include several optical links and OMSs.

1   From the Network Map, select an existing OMS.

> **Result:**
>
> The selected OMS becomes highlighted.

2   From the Network Map, select **Configuration > Optical Layer > Add > OChTrail**.

> **Result:**
>
> The Network Map becomes the Provisioning Profile form.

3   Under the **Essentials** tab, enter a circuit ID within the last field of the **CKT/Trail ID** field. The previous two fields should be prepopulated with the two previously selected network elements. The third field specifies the optical channel trail name.

....

4   Press the **A port** button. The **A Location** field should have been
       prepopulated with one of the selected network elements.

   Result:

   The Port Selection window appears.

....

5   Select a port and press **OK**.

   Result:

   The selected port appears within the Essentials tab as the **A
   port**.

....

6   Repeat Steps 4 and 5 to add the **Z port** (of course, exchange any
       instances of **A port** with **Z port**). Note that you have to select a port
       that is different than the port selected in Step 5.

   Result:

   The selected port appears within the Essentials tab as the **Z port**.

....

7   Verify that **Order Action** is set to **Add**.

....

8   Press **OK**.

   Result:

   The graphical layout form appears.

....

9   Press **OK**.

   Result:

   A confirmation window appears.

....

10   Confirm all confirmation windows that appear.

   Result:

   The newly created optical channel trail appears on the Network
   Map.

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Important Note for WaveStar® OLS400G

When provisioning an optical channel with a fixed connection span on a WaveStar® OLS400G, the sequence of provisioning matters. In short, a cross-connect database synchronization must be performed before an optical link or optical multiplex section is provisioned. To successfully provision an optical channel with the WaveStar® OLS400G, you must do the following:

1. Synchronize the ports of the WaveStar® OLS400G (database synchronization). Refer to Chapter 2: Network Element Configuration Tasks of this guide for information on how to perform a database synchronization.

2. Synchronize the cross-connects of the WaveStar® OLS400G (database synchronization). Refer to Chapter 2: Network Element Configuration Tasks of this guide for information on how to perform a database synchronization.

3. Provision the optical links between the SDH network elements and the WaveStar® OLS400G. Refer to the task within this section for details.

4. Provision the optical multiplex section between the two WaveStar® OLS400Gs. Refer to the task within this section for details.

5. Provision the optical channel. Refer to the task within this section for details.

☐

Add an optical amplifier to an optical multiplex section

Purpose   Use this task to add an optical amplifier to an OMS.

Task   Perform the following task to add an optical amplifier to an OMS.

1   From the Network Map, select an OMS.

2   Right click on the OMS.

   Result:

   The Node menu appears.

3   Select **Circuit/Trail List**.

   Result:

   The Circuit/Trail List form appears.

4   Select the CKT/Trail ID corresponding to the OMS you wish to add the optical amplifier to.

   Result:

   The selection becomes highlighted, and the **Actions** menu item becomes enabled.

5   Select **Actions > Graphical Layout**.

   Result:

   The Graphical Layout form appears.

6   Select **Actions > Modify > Regenerators/Optical Amplifiers**.

   Result:

   The Optical Amplifier Selection form appears.

7   Select an optical amplifier from the **Non-Members** sub-window.

Result:

The **Add** and **Remove** buttons become enabled.

....

8   Press **Add**.

Result:

The optical amplifier is moved to the **Service** window.

....

9   Specify the optical amplifier's left/right ports and the service
protection.

....

10   Press **OK**.

Result:

A confirmation window appears.

....

11   Press **OK**.

....

12   From the Network Map, select **File > Query Again**.

Result:

An optical amplifier is added to the OMS.

E ND OF S TEPS

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Delete an optical amplifier from an optical multiplex section

Purpose   Use this task to delete an optical amplifier from an OMS.

Task   Perform the following task to delete an optical amplifier from an OMS.

....

1   From the Network Map, select an OMS.

....

2   Right click on the OMS.

> **Result:**
>
> The Node menu appears.

....

3   Select **Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail List form appears.

....

4   Select the CKT/Trail ID corresponding to the OMS you wish to add the optical amplifier to.

> **Result:**
>
> The selection becomes highlighted, and the **Actions** menu item becomes enabled.

....

5   Select **Actions > Graphical Layout**.

> **Result:**
>
> The Graphical Layout form appears.

....

6   Select **Actions > Modify > Regenerators/Optical Amplifiers**.

> **Result:**
>
> The Optical Amplifier Selection form appears.

....

7   Select an optical amplifier from the **Service** window.

....

Result:

The **Add** and **Remove** buttons become enabled.

....

8   Press **Remove**.

Result:

The amplifier is moved to the **Non-Members** window.

....

9   Press **OK**.

Result:

A confirmation window appears.

....

10   Press **OK**.

....

11   From the Network Map, select **File > Query Again**.

Result:

The optical amplifier is deleted from the OMS.

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365-309-262R7.0
Issue 1, July 2002

Lucent Technologies

3 - 7 7

Create a preplan for an optical channel trail

Purpose

Use this task to assign preplan restoration to an optical channel trail. Preplan restoration allows a user to re-route traffic temporarily so as to restore service in the event of a failure with the optical channel trail.

Before you begin

Before you create a preplan for an optical channel trail, note the following:

- Navis™ Optical NMS will not perform validation to insure that the service path includes a LambdaRouter™ AOS or the service and preplan paths use the same LambdaRouter™ AOS where the restoration cross connect occurred.

- Navis™ Optical NMS can restore an optical channel trail if the following items occur:
  - the service and preplan paths have the same channel/client service type
  - the service and preplan paths have different optical channel trails
  - the service path optical channel and the preplan path optical channel trail have the same end port.

- Navis™ Optical NMS supports preplan for an optical channel trail for the WaveStar® OLS80G and all models of the WaveStar® OLS400G.

- LambdaRouter™ AOS 256 and 128 are supported.

Task

Perform the following task to create a preplan for an optical channel trail. This procedure assumes that the appropriate network elements, OMSs and optical links already exist.

1

From the Network Map, select an existing OMS that supports preplan (see above caveats). For sake of clarity, this procedure will discuss creating a preplan for an optical channel trail. Note: an optical channel trail can be provisioned so as to include several optical links and OMSs.

> **Result:**
>
> The selected OMS becomes highlighted.

....

2   From the Network Map, select **Configuration > Optical Layer > Add
> OChTrail**.

> **Result:**

> The Network Map becomes the Provisioning Profile form.

....

3   Under the **Essentials** tab, enter a circuit ID next to where **OChTrail**
is listed.

....

4   Press the **A port** button.

> **Result:**

> A window appears.

....

5   Select a port and press **OK**.

> **Result:**

> The selected port appears within the Essentials tab as the **A
port**.

....

6   Repeat steps 10 and 11 to add the **Z port** (of course, exchange any
instances of **A port** with **Z port**).

> **Result:**

> The selected port appears within the Essentials tab as the **Z port**.

....

7   Verify that **Auto** is checked for **Path Selection**.

....

8   Under the Parameters tab, specify **Order Action** as **Pre-plan**.

....

9   Press **OK**.

> **Result:**

> The graphical layout form appears.

....

....

10 Press **OK**.

Result:

A confirmation window appears.

....

11 Confirm all confirmation windows that appear.

Result:

The newly created optical channel trail with preplan restoration appears on the Network Map.

E ND OF S TEPS
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3 - 8 0   **Lucent Technologies**   365-309-262R7.0
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Insert an optical layer into a digital link

Purpose Use this task to insert an optical layer into an existing digital link. In this case, an optical layer refers to an existing OMS, optical link or optical channel trail.

Before you begin Before attempting to insert an optical layer into a digital link, consider the following items:

- In the case of an MSP-protected digital link, it is not necessary to have an optical layer both in the service link and protection link. One of the links need not go through the optical layer.

Task Perform the following task to insert an optical layer into a digital link. This task assumes that all necessary optical layer components are provisioned in Navis™ Optical NMS before attempting to insert the optical layer.

....

1 From the Network Map, right click on a terminating network element icon of a digital link.

> **Result:**
>
> The Node menu appears.

....

2 Select **Assigned Ports List**.

> **Result:**
>
> The Assigned Ports List window appears.

....

3 From the list, select a digital link.

> **Result:**
>
> The digital link becomes highlighted.

....

4 Select **Actions > Graphical Layout**.

> **Result:**
>
> The Graphical Layout form appears.

....

5   Select **Actions > Insert Optical Layer**.

> **Result:**
>
> A confirmation window appears.

....

6   Press **Yes**.

> **Result:**
>
> The optical layer is inserted into the digital link.

E ND OF S TEPS

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Create a digital link through an optical channel trail

Purpose   Use this task to create a digital link through an optical channel trail.

Task   Perform the following task to create a digital link through an optical channel trail. This task assumes that all necessary optical layer components are provisioned in Navis™ Optical NMS before attempting to create the digital link.

1   From the Network Map, select the terminating SDH network element icons of an optical trail.

2   From the Network Map, select **Configurations > Digital Link > Add > (select an applicable rate according to the selected network elements)**.

Result:

The Network Map becomes the Provisioning Profile form.

3   Under the **Essentials** tab, enter a circuit ID within the last field of the **CKT/Trail ID** field. The previous two fields should be prepopulated with the two previously selected network elements. The third field specifies the digital link name.

4   Press the **A port** button. The **A Location** field should have been prepopulated with one of the selected network elements.

Result:

The Port Selection window appears.

5   Select a port and press **OK**.

Result:

The selected port appears within the Essentials tab as the **A port**.

....

6   Repeat Steps 4 and 5 to add the **Z port** (of course, exchange any
instances of **A port** with **Z port**). Note that you have to select a port
that is different than the port selected in Step 5.

> **Result:**
>
> The selected port appears within the Essentials tab as the **Z port**.

....

7   Verify that **Order Action** is set to **Add**.

....

8   Press **OK**.

> **Result:**
>
> The graphical layout form appears.

....

9   Press **OK**.

> **Result:**
>
> A confirmation window appears.

....

10   Confirm all confirmation windows that appear.

> **Result:**
>
> The newly created digital link follows the optical channel trail.

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Disconnect an optical channel trail

Purpose   Use the following task to disconnect an optical channel trail.

Task   Perform the following task to disconnect an optical channel trail.

1   From the Network Map, select an optical channel trail (by selecting one of its end points).

2   Right click on the end point (a network element icon).

Result:

The Node menu appears.

3   Select **Assigned Ports List**.

Result:

The Assigned Ports List window appears.

4   From the listing, select an optical channel trail. Make sure it is **In-Effect (IE)**.

Result:

The selection becomes highlighted.

5   Select **Actions > Graphical Layout**.

Result:

The Graphical Layout form appears.

6   Select **Actions > Disconnect > Actual**.

Result:

A confirmation window appears.

7   Press **OK**.

Result:

The optical channel trail is disconnected.

E ND OF S TEPS

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Disconnect an optical link

Purpose Use the following task to disconnect an optical link.

Task Perform the following task to disconnect an optical link.

1 From the Network Map, select an optical link (by selecting one of its end points).

2 Right click on the end point (a network element icon).

Result:

The Node menu appears.

3 Select **Assigned Ports List**.

Result:

The Assigned Ports List window appears.

4 From the listing, select the optical link. Make sure it is **In-Effect (IE)**.

Result:

The selection becomes highlighted.

5 Select **Actions > Graphical Layout**.

Result:

The Graphical Layout form appears.

6 Select **Actions > Disconnect > Actual**.

Result:

A confirmation window appears.

7 Press **OK**.

Result:

The optical link is disconnected.

E N D   O F   S TEPS

Disconnect an optical multiplex section

Purpose Use the following task to disconnect an OMS.

Task Perform the following task to disconnect an OMS.

1 From the Network Map, select an OMS (by selecting one of its end points).

2 Right click on the end point (a network element icon).

> **Result:**
>
> The Node menu appears.

3 Select **Assigned Ports List**.

> **Result:**
>
> The Assigned Ports List window appears.

4 From the listing, select the OMS. Make sure it is **In-Effect (IE)**.

> **Result:**
>
> The selection becomes highlighted.

5 Select **Actions > Graphical Layout**.

> **Result:**
>
> The Graphical Layout form appears.

6 Select **Actions > Disconnect > Actual**.

> **Result:**
>
> A confirmation window appears.

7 Press **OK**.

> **Result:**
>
> The OMS is disconnected.

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Lucent Technologies

Section IV: Lucent Optical Network Navigation System

Overview

Purpose   This section discusses the provisioning tasks associated with the Lucent Optical Network Navigation System (ONNS) Release 1.0.

Note: The Lucent ONNS is a limited-availability feature of Navis™ Optical NMS.

Definition   The Lucent ONNS is the software and hardware present in the LambdaRouter™ AOS that performs management functions, such as configuration management and fault management, on optical connections across a network of LambdaRouter™ AOSs.

The Lucent ONNS consists of a number of modules, each on a different LambdaRouter™ AOS.

Icons for ONNS   Navis™ Optical NMS uses a unique icon to identify that a LambdaRouter™ AOS has been associated with a signalling element. For additional information regarding what icons map to the Lucent ONNS, refer to Chapter 4: Provisioning Concepts located within this guide.

Before you begin   Refer to the individual tasks contained within this section for important "Before You Begin" information. Review the Lucent ONNS section of Chapter 4: Provisioning Concepts for details about Lucent ONNS provisioning features.

Note: the Lucent ONNS Domain field will always be prepopulated (and uneditable) as there is only one Lucent ONNS domain currently supported.

> **Important!** When a LambdaRouter™ AOS associated with the Lucent ONNS is deleted from Navis™ Optical NMS, the system will also delete all associations and data shared between Navis™ Optical NMS and the Lucent ONNS associated with the LambdaRouter™ AOS.

Additional information   For additional information about the Lucent ONNS, refer to Chapter 4: Provisioning Concepts of this guide.

Contents

Establish a connection with the Lucent ONNS

....

Purpose   Use this task to establish a connection between Navis™ Optical NMS and the Lucent ONNS.

Before you begin   Before you perform this task, refer to the Lucent ONNS section of Chapter 4: Provisioning Concepts for important details regarding the features discussed in this task.

Task   Perform the following task to establish a connection between Navis™ Optical NMS and the Lucent ONNS.
....

1   On the Network Map, select **Configuration > ONNS > Session Parameters > Add**.

> **Result:**
>
> The Add ONNS Session Parameters form appears.

....

2   In the **NE ID** field, press the **Location** button.

> **Result:**
>
> The Selection box appears.

....

3   In the **Location** field, select a network element that is not yet associated with the Lucent ONNS.

> **Result:**
>
> The network element is highlighted.

....

4   Press **OK**.

> **Result:**
>
> The selected network element populates that NE ID field.

....

5   In the **Signalling ID** field, enter the IP address Navis™ Optical NMS can use for Lucent ONNS connection requests.

....

....

6 In the **ONNS Session Parameters** field, enter a valid login (an alphanumeric string up to eight characters) at the **Login** prompt.

....

7 Enter a valid password (an alphanumeric string up to eight characters) at the **Password** prompt.

....

8 In the **IP Address** field, enter the IP address Navis™ Optical NMS can use to communicate with the Lucent ONNS.

....

9 Press **OK**.

Result:

A connection between Navis™ Optical NMS and the Lucent ONNS is established.

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Start communication with the Lucent ONNS

Purpose   Use this task to start communication with the Lucent ONNS.

Before you begin   Before you perform this task, refer to the Lucent ONNS section of
Chapter 4: Provisioning Concepts for important details regarding the
features discussed in this task.

Task   Perform the following task to start communication with the
Lucent ONNS.

1   From the Network Map, select a LambdaRouter™ AOS network
element icon associated with the Lucent ONNS but not in
communication with the Lucent ONNS.

> **Result:**
>
> The selected network element becomes highlighted.

2   Right-click the network element.

> **Result:**
>
> The Node menu appears.

3   Select **Session > Manage ONNS > Start ONNS Communications**.

> **Result:**
>
> Communication is started, and the icon will specify the session
> status (UP).

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Stop communication with the Lucent ONNS

Purpose   Use this task to stop communication with the Lucent ONNS.

Before you begin   Before you perform this task, refer to the Lucent ONNS section of Chapter 4: Provisioning Concepts for important details regarding the features discussed in this task.

Task   Perform the following task to stop communication with the Lucent ONNS.

1   From the Network Map, select a LambdaRouter™ AOS network element icon that is in communication with the Lucent ONNS.

> **Result:**
>
> The selected network element becomes highlighted.

2   Right-click the network element.

> **Result:**
>
> The Node menu appears.

3   Select **Session > Manage ONNS > Stop ONNS Communications**.

> **Result:**
>
> Communication is stopped, and the icon will specify the session status (DOWN).

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Modify Lucent ONNS session parameters

....

Purpose   Use this task to modify the Lucent ONNS session parameters of a
network element that is DOWN so as to re-establish communication
with the Lucent ONNS using the new Lucent ONNS session
parameters.

> **Important!** After performing this task, Navis™ Optical NMS will
> not start communication with the Lucent ONNS. The user must
> start communication using the "Start Communication" option
> from the node menu. Navis™ Optical NMS will then use the
> newly specified session parameters (changed through this task)
> and establish communication between the Lucent ONNS and
> Navis™ Optical NMS.

Before you begin   Before you perform this task, refer to the Lucent ONNS section of
Chapter 4: Provisioning Concepts for important details regarding the
features discussed in this task.

Task   Perform the following task to modify the Lucent ONNS session
parameters so as to re-establish communication between a
network element and the Lucent ONNS.

....

1   From the Network Map, select a Lucent ONNS network element icon
that is DOWN (out of communication).

> **Result:**
>
> The selected network element becomes highlighted.

....

2   Right-click the network element.

> **Result:**
>
> The Node menu appears.

....

3   Select **Session > Manage ONNS > Display/Modify Session
Parameters**.

> **Result:**
>
> The ONNS Session Parameters form appears.

....

Note: A user may also reach this form by selecting from the Network Map: Configuration > ONNS > Session Parameters > Add/Modify. From this alternate approach, the user can modify the Lucent ONNS session parameters for multiple LambdaRouter™ AOSs within the same form.

....

4   Select and edit a single editable field. Editable fields include: **IP Address**, **Signalling IP Address**, **Login**, and **Password**.

      Result:

      The edited field remains active.

....

5   Select **Actions > Update**.

      Result:

      The field is updated to include the edit.

....

6   Repeat Steps 4 and 5 to edit any additional fields.

....

7   Press **OK**.

      Result:

      The ONNS session parameter is modified.

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View Lucent ONNS network elements

Purpose   Use this task to view only the Lucent ONNS network elements on the Network Map. This task is useful when you wish to quickly view only the Lucent ONNS network elements on a Network Map crowded with many network element types.

Before you begin   Before you perform this task, refer to the Lucent ONNS section of Chapter 4: Provisioning Concepts for important details regarding the features discussed in this task.

Task   Perform the following task to view only the Lucent ONNS network elements on the Network Map. This task assumes that the Network Map view already has an expanded view of an area.

1   From the Network Map, select **View > ONNS network elements**.

Result:

The Expanded Area window of the Network Map alters so as to show only the Lucent ONNS-related network elements.

END OF STEPS

Note

The user can return to the Network Map's default view by selecting **View > Network View Reset**.

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View Lucent ONNS switch connection spans

Purpose   Use this task to view the Lucent ONNS switch connection spans appearing on the Network Map.

Through this task, Navis™ Optical NMS will display all the fixed connection spans and optic links based on whether they are:

- allocated and unallocated to the Lucent ONNS

- terminating on a LambdaRouter™ AOS or any SDH network element

- not terminating on DWDMs.

Before you begin   Before you perform this task, refer to the Lucent ONNS section of Chapter 4: Provisioning Concepts for important details regarding the features discussed in this task.

Task   Perform the following task to view the Lucent ONNS switch connection spans on the Network Map.

1   From the Network Map, select **View > Link View > ONNS Switch Connection Spans**.

Result:

The Expanded Area window of the Network Map alters so as to show the Lucent ONNS switch connection spans.

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Note

The user can return to the Network Map's default view by selecting
View > Network View Reset.

□

View and modify bandwidth allocation by trail

Purpose   Use this task to view and modify the bandwidth allocation parameters by trail.

Before you begin   Before you perform this task, refer to the Lucent ONNS section of Chapter 4: Provisioning Concepts for important details regarding the features discussed in this task.

Task   Perform the following task to modify the bandwidth allocation parameters by trail.

....

1   From the Network Map, select **Configuration > ONNS > Allocate Bandwidth**.

Result:

The Bandwidth Allocation Query Box appears.

Users may also access this form by right-clicking on an Lucent ONNS network element and selecting Link > Ckt/Trail List.

....

2   From the **Trails** tab, select a trail type for **Trail**.

Result:

The Trail field contains the selection.

....

3   Press **CKT/Trail ID**.

Result:

The Selection box appears.

....

4   Select a trail.

Result:

The trail becomes highlighted.

....

5   Press **OK**.

....

Result:

The **CKT/Trail ID** field contains the selected trail.

....

6   Press **OK**.

Result:

The Bandwidth Allocation window appears listing the bandwidth allocation details for the selected trail.

....

7   Select and edit a single editable field.

Result:

The edited field remains active.

....

8   Select **Actions > Allocate**.

Result:

The field is updated to include the edit.

....

9   Repeat Steps 7 and 8 to edit any additional fields.

....

10 Press **OK**.

Result:

The bandwidth allocation is modified.

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View and modify bandwidth allocation by port

....

Purpose   Use this task to view and modify the bandwidth allocation parameters
by port.

Before you begin   Before you perform this task, refer to the ONNS section of Chapter 5:
Provisioning Concepts for important details regarding the features
discussed in this task.

Task   Perform the following task to view and modify the bandwidth
allocation parameters by port.

....

1   From the Network Map, select **Configuration > ONNS > Allocate
Bandwidth**.

> **Result:**
>
> The Bandwidth Allocation Query Box appears.
>
> Users may also access this form by right-clicking on a Lucent ONNS
> network element and selecting "Session."

....

2   Select the **Ports** tab.

> **Result:**
>
> The Ports tab appears.

....

3   Press the **Node** button.

> **Result:**
>
> The Selection Box form appears.

....

4   Select a network element.

> **Result:**
>
> The network element becomes highlighted.

....

5   Press **OK**.

....

Result:

The **Node** field contains the selected network element.

....

6   Press **OK**.

Result:

The Bandwidth Allocation window appears listing the bandwidth
allocation details for the selected network element.

....

7   Select and edit a single editable field.

Result:

The edited field remains active.

....

8   Select **Actions > Allocate**.

Result:

The field is updated to include the edit.

....

9   Repeat Steps 7 and 8 to edit any additional fields.

....

10   Press **OK**.

Result:

The bandwidth allocation is modified.

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365-309-262R7.0
Issue 1, July 2002

Lucent Technologies

3 - 1 0 3

Provision a Lucent ONNS connection

Overview   For information on provisioning a Lucent ONNS connection, refer to
the Lucent ONNS section of Chapter 4: Provisioning Concepts.

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Section V: Subnets

Overview

....

Purpose This section describes the provisioning tasks associated with subnets.

Definition Subnets are defined as devices on a network that shares a common address component. For example, all devices with IP addresses that start with 100.100.100. could be part of the same subnet. Dividing a network into subnets is useful for both security and performance reasons.

Navis™ Optical NMS subnet support allows users to create rings on the Network Map. In terms of Navis™ Optical NMS, a ring is defined as when three or more network elements are connected to form a closed loop. Messages travel around the ring, with each network element reading those messages addressed to it.

An advantage of ring networks is that they can span larger distances than other types of networks, such as bus networks, because each network element regenerates messages as they pass through it. Another advantage is that one half of the ring's channels can be defined as working (carrying data) while the other half can be defined as protection.

Creating subnets Navis™ Optical NMS allows users to create subnets either automatically or manually. Refer to Chapter 4: Provisioning Concepts for details about subnets.

Supported subnets Navis™ Optical NMS supports two broad categories of subnets:

- line switched rings (LSR).
- path switched rings (PSR).

Before you begin Refer to the individual tasks contained within this section for important "Before You Begin" information.

Additional information For additional information about subnets as they relate to Navis™ Optical NMS, refer to Chapter 4: Provisioning Concepts of this guide.

....

Contents

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Lucent Technologies

Add an LSR (automatic)

....

Purpose   Use this task to automatically add a line-switched ring (LSR) to the Navis™ Optical NMS Network Map.

Before you begin   Before you attempt to add a LSR to the Network Map automatically, note the following items:

- A ring is uniquely identified by the digital link rates forming the ring. An VC-16 BLSR and VC-64 LSR that share the same exact network elements are different from one another due to their rates.

- A maximum of 16 network elements are allowed.

- The ring forming digital links are all of the same level.

- The ring is closed.

- No black boxes are included.

- The ring forming digital links have identical (2-fiber or 4-fiber) protection groups.

- All the network elements in the ring can interwork in a LSR-forming capacity.

- Within each ring, the same timeslot and channel must be used.

Task   Perform the following task to automatically add an LSR to the Network Map. This task will show you how to add a LSR consisting of three network elements. Note that an LSR can consist of up to 16 network elements.

....

1   From the Network Map, select a network element. Be sure the selected network element has LSR forming capabilities.

> **Result:**
>
> The selected network element is highlighted.

....

2   Synchronize the network element's ports. Refer to the network element synchronization task in Chapter 3: Network Element Configuration Tasks for details on how to perform this task.

....

Result:

The network element is synchronized.

....

3   Select a second network element and repeat Step 2. Be sure that the network element can interwork with the first network element in a LSR-forming capacity.

> **Result:**
>
> The network element is synchronized.

....

4   Provision a digital link between the two network elements. Refer to Section I: Digital Links in this chapter for information on how to provision a digital link between two network elements.

> **Result:**
>
> A digital link joins the two network elements (network element A and network element B).

....

5   From the Network Map, select a third network element and repeat Step 2.

> **Result:**
>
> The network element is synchronized.

....

6   Provision a digital link between this network element (network element C) and network element A. Note that the digital link you provision in this step must be identical in rate to the digital link you provisioned in Step 4.

....

Lucent Technologies

Result:

A digital link joins the two network elements (network element A and network element C).

---

7 Provision a digital link between network element C and network element B being sure to form an enclosed ring. Note that the digital link you provision in this step must be identical in rate to the digital link you provisioned in Steps 4 and 6.

Result:

Assuming the conditions mentioned in the "Before You Begin" section are met, Navis™ Optical NMS automatically creates a LSR and adds its name (automatically generated) to the Subnet List.
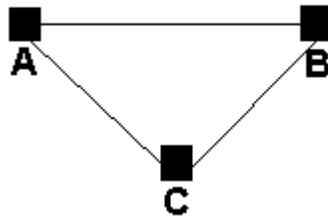
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Add an LSR (manual)

Purpose Use this task to manually add a line-switched ring (LSR) to the Navis™ Optical NMS Network Map.

Before you begin Before you attempt to manually add an LSR to the Network Map, note the items presented in the "Add a LSR (automatic)" task.

Task Perform the following task to manually add an LSR to the Network Map. This task assumes that the appropriate network elements and digital links, for forming an LSR, have already been provisioned.

1 From the Network Map, select **Configuration > Subnet > Add > LSR > (select a rate)**. The rate you select must be compatible with the network elements and digital links you are planning to use in creating the LSR.

> **Result:**
>
> The Subnet Manual Creation form appears.

2 From the Network Map, select a digital link you wish to add to the ring.

> **Result:**
>
> The **A** and **Z** fields within the Subnet Manual Creation form become populated with the digital link information.

3 From the Subnet Manual Creation form, select the digital link.

> **Result:**
>
> Selection becomes highlighted and the arrow icon becomes enabled.

4 Press the arrow icon to move the digital link to the Subnet Designation sub-window.

Result:

The subwindow's fields become populated with the digital link information. The digital link on the Network Map becomes thicker to signify the creation of a piece of the LSR.

....

5   Repeat Steps 2 through 4 until you form an enclosure using the digital links and network elements.

....

6   Press **OK**.

Result:

The LSR is created.

E ND OF S TEPS
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365-309-262R7.0
Issue 1, July 2002

Lucent Technologies

3 - 1 1 1

Add a PSR (automatic)

Purpose   Use this task to automatically add a path-switched ring (PSR) to the Navis™ Optical NMS Network Map.

Before you begin   Before you attempt to add a PSR to the Network Map automatically, note the following items:

- A ring is uniquely identified by the digital link rates forming the ring. An VC-16 PSR and VC-64 PSR that share the same exact network elements are different from one another due to their rates.

- A maximum of 65 network elements are allowed.

- The ring forming digital links are all of the same level.

- The ring is closed.

- No black boxes are included.

- The ring forming digital links have identical (2-fiber or 4-fiber) protection groups.

- All the network elements in the ring can interwork in a PSR-forming capacity.

- Only homogenous network elements are allowed in automatically forming a PSR. Note: Metropolis® DMX and Metropolis® DMX*press* network elements are considered as the same network element type when forming a UPSR.

- Within each ring, the same timeslot and channel must be used.

Task   Perform the following task to automatically add a PSR to the Network Map. This task will show you how to add a PSR consisting of three network elements. Note, however, that a PSR can consist of up to 65 network elements.

1   From the Network Map, select a network element. Be sure the selected network element has PSR forming capability.

> **Result:**
>
> The selected network element is highlighted.

....

2   Synchronize the network element's ports. Refer to the network element synchronization task in Chapter 3: Network Element Configuration Tasks for details on how to perform this task.

> **Result:**
>
> The network element is synchronized.

....

3   Select a second network element and repeat Step 2. Be sure that the network element can interwork with the first network element in a PSR-forming capacity,

> **Result:**
>
> The network element is synchronized.

....

4   Provision a digital link between the two network elements. Refer to Section I: Digital Links in this chapter for information on how to provision a digital link between two network elements.

> **Result:**
>
> A digital link joins the two network elements (network element A and network element B).

....
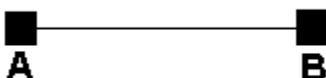
5   From the Network Map, select a third network element that is compatible with the other two network elements and repeat Step 2.

> **Result:**
>
> The network element is synchronized.

....

6   Provision a digital link between this network element (network element C) and network element A. Note that the digital link you provision in this step must be identical in rate to the digital link you provisioned in Step 4.

....

Result:

A digital link joins the two network elements (network element A and network element C).

....

7   Provision a digital link between network element C and network element B being sure to form an enclosed ring. Note that the digital link you provision in this step must be identical in rate to the digital link you provisioned in Steps 4 and 6.

Result:
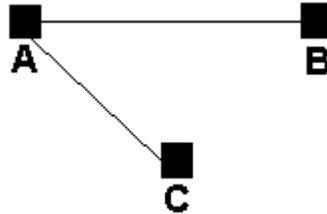
Assuming the conditions mentioned in the "Before You Begin" section are met, Navis™ Optical NMS automatically creates a PSR and adds its name (automatically generated) to the Subnet List.

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3 - 1 1 4   **Lucent Technologies**   365-309-262R7.0
                                                                                   Issue 1, July 2002
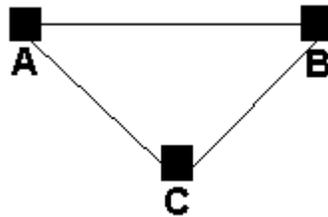
Add a PSR (manual)

....

Purpose   Use this task to manually add a path-switched ring (PSR) to the Navis™ Optical NMS Network Map.

Before you begin   Before you attempt to manually add a PSR to the Network Map, note the items presented in the "Add a PSR (automatic)" task.

Task   Perform the following task to manually add a PSR to the Network Map. This task assumes that the appropriate network elements and digital links, for forming a PSR, have already been provisioned.

....

1   From the Network Map, select **Configuration > Subnet > Add > PSR > (select a rate)**. The rate you select must be compatible with the network elements and digital links you are planning to use to create the ring.

> **Result:**
>
> The Subnet Manual Creation form appears.

....

2   From the Network Map, select a digital link you wish to add to the subnet.

> **Result:**
>
> The **A** and **Z** fields within the Subnet Manual Creation form become populated with the digital link information.

....

3   From the Subnet Manual Creation form, select the digital link.

> **Result:**
>
> Selection becomes highlighted and the arrow icon becomes enabled.

....

4   Press the arrow icon to move the digital link to the Subnet Designation sub-window.

....

Result:

The subwindow's fields become populated with the digital link information. The digital link on the Network Map becomes thicker to signify that it is a piece of the PSR.

....

5 Repeat Steps 2 through 4 until you form an enclosure using digital links and network elements.

....

6 Press **OK**.

Result:

The PSR is created.

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Modify a ring name

Purpose   After successful ring creation, Navis™ Optical NMS will generate a unique name to identify the ring. Use this task to modify the name of an existing ring.

Task   Perform the following task to modify the name of an existing ring. This task assumes that a ring has already been created.

1   From the Network Map, select **Configuration > Subnet > Display/Modify**.

> **Result:**
>
> The Subnet Display List form appears.

2   In the **Subnet IDs** column, select a subnet.

> **Result:**
>
> The selection is highlighted, and the **Actions** menu item becomes enabled.

3   Select **Actions > Modify Parameters**.

> **Result:**
>
> The Subnet window appears.

4   Specify a new subnet ID in the **Subnet ID** field. You must assign a unique ID.

5   Click **OK**.

> **Result:**
>
> The Network Map displays the new ring name.

E ND OF S TEPS

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Modify a ring

Purpose   Use this task to modify an existing ring.

Task   **Important!** No modification of a virtual ring is allowed after the ring is created. To make any changes to an already existing virtual ring, the user must delete the ring and create it again.

Perform the following task to modify an existing ring.

1   From the Network Map, select **Configuration > Subnet > Display/Modify**.

Result:

The Subnet Display List form appears.

2   In the **Subnet IDs** column, select a subnet.

Result:

The selection is highlighted, and the **Actions** menu item becomes enabled.

3   Select **Actions > Modify Parameters**.

Result:

The Subnet window appears.

4   Make the desired modifications to the ring.

5   Click **OK**.

Result:

The Network Map reflect any modifications made to the ring.

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Delete a ring

Purpose   Use this task to delete a ring from the Navis™ Optical NMS Network Map.

Before you begin   Before you attempt to delete a ring from the Network Map, note the following items:

- Navis™ Optical NMS allows for the disconnection of a digital link even if the digital link is part of a ring loop as long as the ring is not providing any protection.

- If the user disconnects a digital link that is part of a ring forming loop, Navis™ Optical NMS will delete the ring and remove the ring name from the list of ring names.

- Navis™ Optical NMS allows users to delete a virtual ring without deleting the STS-1 paths as long as there are no VT1.5 circuits riding on the virtual ring. If any of the STS-1 paths that are part of a virtual ring are deleted, the virtual ring is automatically deleted. If any of the rings forming the virtual ring are deleted, the virtual ring is deleted.

Task   Perform the following task to delete a ring from the Network Map.

1   Select a digital link that is part of the ring you wish to delete.

2   From the Network Map, select **Configuration > Digital Link > Disconnect**.

   Result:

   The Ckt/Trail Query Box is displayed.

3   In the **Order Number** field, specify the order number of the digital link.

4   Click **OK**.

   Result:

   A confirmation window appears.

....

5   Click **Yes**.

Result:

An action window appears.

....

6   Click **OK**.

Result:

Navis™ Optical NMS disconnects the digital link provided that it
is not in-effect (IE) or pending.

....

7   From the Network Map, select **File > Query Again**.

Result:

The digital link, that was part of the subnet, disappears from the
Network Map, and Navis™ Optical NMS deletes the ring
because there is no longer an enclosed ring.

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3 - 1 2 0   **Lucent Technologies**   365-309-262R7.0
                                                                                     Issue 1, July 2002

Section VI: Virtual Concatenation Groups

Overview

Purpose   This section describes the provisioning tasks associated with virtual concatenation groups.

Definition   Virtual concatenation is a standards compliant inverse multiplexing protocol that creates a virtual concatenated SDH entity (called VCn-Xv) that is transported by VC-As across the SDH network. The created VCns are standards compliant. Additional VCns can be added, but it will be service affecting.

Before you begin   Refer to the individual tasks contained within this section for important "Before You Begin" information.

Additional information   For additional information about virtual concatenation groups as they relate to Navis™ Optical NMS, refer to Chapter 4: Provisioning Concepts of this guide.

Contents

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Add a virtual concatenation group

Purpose Use this task to add a VCG to the Navis™ Optical NMS Network Map.

Task Perform the following task to add a VCG to Navis™ Optical NMS Network Map.

1 From the Network Map, select **Configuration > Virtual Concatenation Group > Add**.

> **Result:**
>
> The Add VCG form appears.

2 In the **VCG Name** field, specify a VCG name (maximum of 83 alphanumeric characters).

3 Specify either **Single-Ended** or **Dual-Ended**.

> **Result:**
>
> If **Single-Ended** is selected, either the A or Z field will disappear.

4 Press the **A Location** button.

> **Result:**
>
> The Selection box appears.

5 Select a network element.

6 Press **OK**.

> **Result:**
>
> The A Location field will contain the specified network element, and the A Port button becomes active.

7   Press the **A Port** button.

> **Result:**
>
> The Selection box appears.

8   Select a port.

> **Result:**
>
> The port becomes highlighted.

9   Press **OK**.

> **Result:**
>
> The A Port field contains the specified network element.

10   Repeat Steps 4 through 9 to specify the **Z location** and **Z Port**.

> **Result:**
>
> The Z Location and Z Port fields specify a network element and port.

11   Specify the options within the **VCG Capacity** panel.

12   Specify the **Required Capacity**.

13   Select **LCAS Flag** if applicable (this option must be supported by the network elements selected as the A and Z Location). Refer to Chapter 4: Provisioning Concepts for details regarding LCAS.

14   Press **OK**.

> **Result:**
>
> The VCG is created.
>
> **Note**: If the **Graphical Layout** option is checked, the Graphical Layout screen will appear. Press **Approve** to dismiss the screen.

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Modify a virtual concatenation group

Purpose Use this task to modify an existing VCG.

Task Perform the following task to modify an existing VCG.

1 From the Network Map, select **Configuration > Virtual Concatenation Group > Display/Modify**.

Result:

The VCG List form appears.

2 Select a VCG name from the **VCG Name** field.

Result:

The selection is highlighted, and the **Actions** menu item becomes enabled.

3 Select **Actions > Graphical Layout**.

Result:

The VCG Graphical Layout form appears.

4 Select **Actions > Modify > Order Parameters.**

Result:

The Modify VCG form appears.

5 Perform edits on the applicable fields.

6 Press **OK**.

Result:

The VCG is modified.

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Delete a virtual concatenation group

Purpose   Use this task to delete an existing VCG.

Before you begin   Before attempting to delete a VCG, verify that the VCG to be deleted does not have any VC-Ns associated with it.

Task   Perform the following task to delete an existing VCG.

1   From the Network Map, select **Configuration > Virtual Concatenation Group > Display/Modify**.

   Result:

   The VCG List form appears.

2   Select a VCG name from the **VCG Name** field.

   Result:

   The selection is highlighted, and the **Actions** menu item becomes enabled.

3   Select **Actions > Delete**.

   Result:

   The VCG is deleted.

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Section VII: Shared Risk Groups

Overview

Purpose This section discusses the provisioning tasks associated with shared risk groups.

Definition In order to provide physical separacy between a protected route and service route, Navis™ Optical NMS supports the association of shared risk groups to digital links. One or more shared risk groups can be associated with one digital link, or a number of digital links can be associated with one shared risk group.

All fibers, cables and conduits in a given shared risk group may not survive physical disaster. In order to design a network for maximum survivability, shared risk groups, which are used for working paths or circuits, must not be used for protection paths or circuits. In case of rings or linear protection, network designers must take care of physical separacy, because links and path are well defined.

Before you begin Before you attempt to create a shared risk group, consider the following items:

- A maximum of five shared risk groups can be associated with a single digital link.

- One shared risk group can be used by multiple digital links.

- A shared risk group identification can not exceed 83 alphanumeric characters.

- A shared risk group description can not exceed 32 alphanumeric characters.

- Shared risk groups are only applicable to digital links, optical links and optical multiplex sections.

- Users are not allowed to modify or delete a shared risk group ID when it is associated with a digital link, optical link, or optical multiplex section.

Contents

Create a shared risk group ID	3-128

Create a shared risk group ID

Purpose   Use this task to create a shared risk group ID.

Before you begin   Before performing this task, refer to "Before You Begin" located at the beginning of this section for important information.

Task   Perform the following task to create a shared risk group ID.

1   On the Network Map, select **Configuration > Shared Risk Group > Add**.

> **Result:**
>
> The Add Shared Risk Group form appears.

2   In the **SRG Name** field, specify a unique name for the shared risk group.

3   In the **SRG ID** field, specify a unique identification for the shared risk group.

4   In the **Description** field, provide a description of the shared risk group so as to distinguish it from other existing shared risk groups.

5   Click **OK**.

> **Result:**
>
> The shared risk group ID is created.

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Display a list of shared risk groups

Purpose Use this task to display a list of existing shared risk groups.

Before you begin Before following this procedure, refer to "Before You Begin" located at the beginning of this section for important information.

Task Perform the following task to display a list of existing shared risk groups.

1   From the Network Map, select **Configuration > Shared Risk Group > Display/Modify**.

   Result:

   The Shared Risk Group Display List Query Box appears.

2   In the **SRG ID** field, specify an identification (or specify ***** to list all shared risk groups).

3   Press **OK**.

   Result:

   The Shared Risk Group Display List form appears and displays a list of all the existing shared risk groups.

   E ND OF S TEPS

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Display the shared risk groups associated with a digital link

Purpose   Use this task to display the shared risk groups associated with a digital link.

Before you begin   Before following this procedure, refer to "Before You Begin" located at the beginning of this section for important information.

Task   Perform the following task to display the shared risk groups associated with a digital link.

....

1   From the Network Map, select **Configuration > Connection > Display > Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail Query Box window appears.

....

2   In the **Ckt/Trail ID** field, select a rate.

....

3   In the **Order Status** field, specify an order status.

....

4   In the **Order Action** field, select an order action.

....

5   Press **OK**.

> **Result:**
>
> The Circuit Trail List window appears.

....

6   From the list, select a circuit/trail identification.

> **Result:**
>
> The selected identification is highlighted.

....

7   Select **Actions > Shared Risk Group Associations/Display**.

Section VII: Shared Risk Groups
Display the shared risk groups associated
with a digital link

Provisioning Tasks

Result:

A window appears showing all the shared risk groups associated
with the digital link.

E ND OF S TEPS

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Display the digital links associated with a shared risk group

Purpose   Use this task to display the digital links associated with a shared risk group.

Before you begin   Before following this procedure, refer to "Before You Begin" located at the beginning of this section for important information.

Task   Perform the following task to display the digital links associated with a shared risk group.

....

1   From the Network Map, select **Configuration > Shared Risk Group > Display/Modify**.

Result:

The Shared Risk Group Display Query Box appears.

....

2   In the **SRG ID** field, specify a shared risk group ID.

....

3   Press **OK**.

Result:

The Share Risk Group Display List form appears and lists the shared risk groups according to the query information that was specified.

....

4   From the list, select a shared risk group.

Result:

The selection is highlighted.

....

5   Select **Actions > Shared Risk Group-Links Associations List**.

Result:

The Shared Risk Group-Links Associations List form appears and displays all the digital links associated with the specified shared risk group.

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Associate a shared risk group with a digital link

Purpose   Use this task to associate a shared risk group with a digital link.

Before you begin   Before following this procedure, refer to "Before You Begin" located at the beginning of this section for important information.

Task   Perform the following task to associate a shared risk group with a digital link.

....

1   From the Network Map, select **Configuration > Connection > Display > Circuit/Trail List**.

> **Result:**
>
> The Circuit/Trail Query Box form appears.

....

2   In the **Order Status** field, specify an order status.

....

3   In the **Ckt/Trail ID** field, select a rate.

....

4   Press **OK**.

> **Result:**
>
> The Circuit/Trail List form appears.

....

5   From the list, select a circuit/trail identification.

> **Result:**
>
> The selected identification is highlighted.

....

6   Select **Actions > Shared Risk Group Associations/Display**.

> **Result:**
>
> A form appears displaying all the shared risk groups associated with the digital link.

....

....

7 Using the window's arrow icons, associate a shared risk group with
the digital link by moving the SRG from the **Non-associated SRGs**
panel to the **Associated SRG** panel.

Result:

The SRG is moved between panels.

....

8 Select **Apply**.

Result:

The shared risk group is associated with the digital link.

E ND OF S TEPS
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3 - 1 3 4   **Lucent Technologies**   365-309-262R7.0
Issue 1, July 2002

Disassociate a shared risk group with a digital link

Purpose   Use the following task to disassociate a shared risk group with a digital link.

Before you begin   Before following this procedure, refer to "Before You Begin" located at the beginning of this section for important information.

Task   Perform the following task to disassociate a shared risk group with a digital link.

....

1   From the Network Map, select **Configuration > Connection > Display > Circuit/Trail List**.

     Result:

     The Circuit/Trail Query Box form appears.

....

2   In the **Order Status** field, specify an order status.

....

3   In the **Ckt/Trail ID** field, select a rate.

....

4   Press **OK**.

     Result:

     The Circuit/Trail List form appears.

....

5   From the list, select a circuit/trail identification.

     Result:

     The selected identification is highlighted.

....

6   Select **Actions > Shared Risk Group Associations/Display**.

     Result:

     A form appears displaying all the shared risk groups associated with the digital link.

....

7   Using the window's arrow icons, disassociate a shared risk group with
the digital link by moving the SRG from the **Associated SRG** panel
to the **Non-associated SRGs** panel.

Result:

The SRG is moved between panels.

....

8   Select **Apply**.

Result:

The digital link is disassociated with the shared risk group.

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Modify a shared risk group ID

....

Purpose   Use this task to modify a shared risk group ID.

Task   Perform the following task to modify a shared risk group ID.
....

1   From the Network Map, select **Configuration > Shared Risk Group > Display/Modify**.

   Result:

   The Shared Risk Group Display List Query Box form appears.

....

2   In the **SRG ID** field, specify an existing shared risk group identification. If you specify nothing, you will get a complete list of existing shared risk groups.

....

3   Press **OK**.

   Result:

   The Shared Risk Group Display List form appears and lists the shared risk groups according to the query information specified within the previous window.

....

4   In the **SRG ID** field, select a shared risk group.

   Result:

   The selection becomes highlighted.

....

5   Select **Actions > Update**.

   Result:

   A form appears.

....

6   In the **New SRG ID** and **New Description** fields, specify new information for the shared risk group.

....

7   Click **OK**.

....

Result:

The shared risk group ID is modified.

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Delete a shared risk group ID

Purpose   Use this task to delete a shared risk group ID.

Task   Perform the following task to delete a shared risk group ID.

1   From the Network Map, select **Configuration > Shared Risk Group > Display/Modify**.

> **Result:**
>
> The Shared Risk Group Display List Query Box form appears.

2   In the **SRG ID** field, specify an existing shared risk group identification. If you specify nothing, you will get a complete list of existing shared risk groups.

3   Press **OK**.

> **Result:**
>
> The Shared Risk Group Display List form appears and lists the shared risk groups according to the query information specified within the previous window.

4   From the list, select a shared risk group.

> **Result:**
>
> The selection is highlighted.

5   Select **Actions > Delete**.

6   From the Network Map, select **File > Query Again**.

> **Result:**
>
> The shared risk group ID is deleted.

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Section VIII: Preplan Restoration

Overview

Purpose This section describes the Navis™ Optical NMS provisioning tasks associated with preplan restoration.

Definition Restoration allows users to temporarily re-route traffic in order to restore service in case of a network failure. Preplan restoration is one type of restoration provided by Navis™ Optical NMS that allows for a back-up circuit to be predefined for an existing in-service circuit. Navis™ Optical NMS stores a preplan in a database and accesses it whenever a failure occurs so as to restore the circuit.

Preplan restoration works best where:

- one portion of the service circuit is controlled by Navis™ Optical NMS while the other end is outside Navis™ Optical NMS control and on the end customer's premise;
- customers have mixed network elements in their network;
- restoration paths are "off-network" and must be defined by the customer;
- ring protection is not provided by the network element;
- there is a fiber cut between rings;
- more efficient usage of spare capacity is desired.

Before you begin Refer to the individual tasks contained within this section for important "Before You Begin" information. Note that this tasks themselves are presented in the order in which they should occur. Failure to follow the order presented here could result in provisioning problems.

Additional information For additional information about preplan restoration as it relates to Navis™ Optical NMS, refer to Chapter 4 of this guide.

Contents

Lucent Technologies

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365-309-262R7.0
Issue 1, July 2002

Lucent Technologies

3 - 1 4 1

Add a preplan circuit

....

Purpose   Use this task to add a preplan circuit. If the service circuit fails, the associated preplan circuit can be invoked manually or automatically.

For details about circuit provisioning, refer to Section II: Connections found within this chapter.

Task   Perform the following task to create a preplan circuit that is reserved for one specific service circuit.

....

1   On the Network Map, select two network element icons.

> **Result:**
>
> The icons become highlighted.

....

2   On the Network Map, select **Configuration > Connection > (Desired Circuit Rate)**.

> **Result:**
>
> The Provision Profile form is displayed.

....

3   Under the Essentials tab, enter a circuit ID next to where the circuit rate is displayed.

....

4   Specify an **A port** and a **Z port**. Refer to Section II: Connections within this chapter for details on specifying a circuit's A port and Z port.

....

5   Under the Parameters tab, specify **Order Action** as **Pre-plan**.

....

6   Click **OK**.

> **Result:**
>
> A message appears indicating that the preplan circuit has been created.

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Assign a preplan circuit to a service circuit

Purpose Use this task to associate a preplan circuit with a service circuit. By assigning a preplan circuit to a service circuit, you create a preplan pair.

Before you begin Before you associate a preplan circuit with a service circuit, consider the following items:

- The service circuit being protected must be in-effect (IE).

- The preplan circuit must be in the pending state (CPL).

Task Perform the following task to associate a preplan circuit with a service circuit.

1   From the Network Map, select **Configuration > Preplan Restore Management > Preplan Pairs > Add**.

  Result:

  The Preplan Pairs Add form appears.

2   In the **Service Circuit ID** field, enter the service circuit ID.

3   In the **Preplan Circuit ID** field, enter the preplan circuit ID.

4   In the **Preference** field, enter a preference (from 1-99 with 99 as the highest preference).

5   In the **Priority** field, enter a priority (from 1-10 with a default value of 5).

6   Press **Apply**.

  Result:

  An association between the service circuit and the preplan circuit is created. The preplan circuit now protects the service circuit.

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Create a preplan plan

Purpose   Use this task to create a preplan plan. A preplan plan must be created before you can assign preplan pairs to it.

Task   Complete the following task to create a preplan plan.

1   From the Network Map, select **Configuration > Preplan Restore Management > Preplan Plan > Add**.

        Result:

        A window appears.

2   In the **Preplan ID** field, enter a preplan ID.

3   Press **OK**.

        Result:

        A message appears indicating that the preplan plan has been created.

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Assign a preplan pair to a preplan plan

Purpose   Use this task to assign a preplan pair to a preplan plan. A preplan circuit can not be assigned to a preplan plan by itself. It has to be associated with a service circuit first (becoming a preplan pair), before it can be assigned to a preplan plan.

Before you begin   Before you assign a preplan pair to a preplan plan, the following conditions must be met:

- The service circuit being protected must be in-effect (IE).
- The preplan circuit must be in a pending state (CPL).
- The preplan pairs must already exist.
- A preplan plan can contain a maximum of 500 preplan circuit pairs.

Task   Perform the following task to assign a preplan pair to a preplan plan. Note: you can also assign a preplan pair to a preplan plan through the Preplan Pairs form.

....

1   Create a preplan plan. Refer to the previous task "Create a preplan plan" for details.

....

2   Create a preplan pair by assigning a preplan circuit to a service circuit.

....

3   Select **Configuration > Preplan Restore Management > Preplan Pairs > Add**.

   Result:

   The Preplan Plan Pairs Add form appears.

....

4   Select a preplan pair.

   Result:

   The selection becomes highlighted.

....

5   Select **Link to Plan**.

....

Result:

The **Plan ID** field becomes active.

....

6   Within the **Plan ID** field, enter a plan ID.

....

7   Press **Apply**.

Result:

A message appears indicating if the preplan pair has been assigned to the preplan plan.

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Create a preplan group

Purpose   Use this task to add a preplan group. Note: a preplan group must be created first before you can assign preplan plans to it.

Task   Perform the following task to add a preplan group.

1   From the Network Map, select **Configuration > Preplan Restore Management > Preplan Group > Add**.

   Result:

   A window appears.

2   In the **Preplan ID** field, enter an ID for the preplan group.

3   Press **OK**.

   Result:

   A message appears indicating if the preplan group has been created.

   E ND OF S TEPS

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Assign a preplan plan to a preplan group

Purpose   Use this task to assign a preplan plan to a preplan group.

Before you begin   Before you assign a preplan plan to a preplan group, the following conditions must be met:

- The service circuit being protected must be in-effect (IE) state.
- The preplan facility must be in a pending state (CPL).
- The preplan plan must already exist.
- A preplan group can contain a maximum of 500 preplan plan identifications.

Task   Perform the following task to assign a preplan plan to a preplan group.

1   Create a preplan plan. Refer to the previous task "Create a preplan plan" for details.

2   From the Network Map, select **Configuration > Preplan Restore Management > Preplan Plan > Display/Modify**.

   Result:

   The Preplan Query Box form appears.

3   Press **OK**.

   Result:

   The Preplan Plan form appears.

4   Select a preplan plan.

5   Select **Actions > Link Plan to Group**.

   Result:

   The Link Plan to Group form appears.

6   For **Group ID**, enter a valid preplan group ID.

7   Press **OK**.

Result:

The preplan plan is assigned to the preplan group.

E ND OF S TEPS

Restore a service circuit with a preplan circuit

Purpose   Use this task to restore service with a preplan circuit.

Task   Perform the following task to restore service with a preplan circuit.

1   From the Network Map, select **Configuration > Preplan Restore Management > (select any one of the three preplan types) > Display/Modify**.

> **Result:**
>
> A preplan form appears.

2   Select a preplan.

3   Select **Actions > Reinstate**.

> **Result:**
>
> A query window appears.

4   Select **Yes**.

> **Result:**
>
> The Preplan Parameters form appears.

5   If desired, specify a value for **Reinstatement** and **Preemption**.

6   Press **OK**.

> **Result:**
>
> The preplan circuit restores the service circuit it is associated with.

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Reinstate a preplan pair

Purpose   Use this task to reinstate a preplan pair.

Task   Perform the following task to reinstate a preplan pair.

1   From the Network Map, select **Configuration > Preplan Restore Management > Preplan Pairs > Display/Modify**.

Result:

A preplan form appears.

2   Select a preplan pair.

3   Select **Actions > Reinstate**.

Result:

A query window appears.

4   Select **Yes**.

Result:

The Preplan Parameters form appears.

5   If desired, specify a value for **Reinstatement** and **Preemption**.

6   Press **OK**.

Result:

The preplan pair is reinstated.

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Disassociate a preplan circuit from a service circuit

Purpose Use this task to disassociate a preplan circuit from a service circuit. Note: you must perform this task before you can delete a preplan pair, preplan plan, or preplan group.

Before you begin Before you disassociate a preplan circuit from a service circuit, the following conditions must be met:

- The service circuit being protected must be in-effect (IE).
- The preplan circuit must be in the pending state (CPL).
- The preplan circuit is associated with a service circuit.

Task Perfom the following task to disassociate a preplan circuit from a service circuit.

1 Select **Configuration > Preplan Restore Management > Preplan Pairs > Display/Modify**.

Result:

The Preplan Pairs query box is displayed.

2 Select a preplan pair.

3 Select **Actions > Delete**.

Result:

A confirmation window appears.

4 Confirm the confirmation window.

Result:

The preplan pair is dissociated from the service circuit.

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Cancel a preplan circuit order

Purpose Use this task to cancel a preplan circuit order.

Before you begin Before you cancel a preplan circuit order, consider the following item:

- The preplan cannot be associated with any service paths.

Task Perform the following task to cancel a preplan circuit order.

1 From the Network Map, select a service circuit with a preplan associated with it.

2 Right click on either network element icon associated with the circuit.

  Result:

  The node menu appears.

3 Select **Assigned Port List**.

  Result:

  The Assigned Port List window appears.

4 Press **OK**.

  Result:

  A window appears.

5 Select a preplan.

6 Select **Actions > Cancel Order**.

  Result:

  The preplan circuit order is cancelled.

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Unlink a preplan pair from a preplan plan

Purpose   Use this task to unlink a preplan pair from a preplan plan.

Task   Perform the following steps to unlink a preplan pair from a preplan plan.

1   From the Network Map, select **Configuration > Preplan Restore Management > Preplan Pair > Display/Modify**.

Result:

The Preplan Pairs form appears.

2   Select a preplan pair.

3   Select **Actions > Unlink Pair from Plan**.

Result:

A window appears.

4   For **Plan ID**, enter the preplan plan ID.

5   Press **OK**.

Result:

A confirmation window appears.

6   Confirm the confirmation.

Result:

The preplan pair is unlinked from the preplan plan.

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Unlink a preplan plan from a preplan group

Purpose Use this task to unlink a preplan plan from a preplan group.

Task Perform the following task to unlink a preplan plan from a preplan group.

....

1 Ensure that there are no preplan pairs linked to the preplan plan.

....

2 From the Network Map, select **Configuration > Preplan Restore Management > Preplan Plan > Display/Modify**.

Result:

The Preplan Plan form appears.

....

3 Select a preplan plan.

....

4 Select **Actions > Unlink Plan from Group**.

Result:

A window appears.

....

5 For **Group ID**, enter the preplan group ID.

....

6 Press **OK**.

Result:

A confirmation window appears.

....

7 Confirm the confirmation.

Result:

The preplan plan is unlinked from the preplan group.

E ND OF S TEPS

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365-309-262R7.0
Issue 1, July 2002

Lucent Technologies

3 - 1 5 5

Delete a preplan plan

Purpose   Use this task to delete a preplan plan.

Before you begin   Before you delete a preplan plan, consider the following item:

- The preplan circuits included in the preplan plan cannot be associated with any service paths.

Task   Perform the following task to delete a preplan plan.

1   Ensure that any preplan pairs are unlinked from the preplan plan.

2   Select **Configuration > Preplan Restore Management > Preplan Plan > Display/Modify**

   Result:

   The Preplan Plan query box is displayed.

3   Select a preplan plan.

4   Select **Actions > Delete**.

5   Click **OK**.

   Result:

   The preplan plan is deleted.

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Delete a preplan group

....

Purpose   Use this task to delete a preplan group.

Before you begin   Before you delete a preplan group, consider the following item:

- The preplan circuit included in the preplan group cannot be associated with any service paths.

Task   Perform the following task to delete a preplan group.
....

1   Ensure that there are no preplan plans associated with the preplan group.

....

2   Select **Configuration > Preplan Restore Management > Preplan Plan Group > Display/Modify**.

   Result:

   The Preplan Group query box is displayed.

....

3   Select a preplan group.

....

4   Select **Actions > Delete**.

....

5   Click **OK**.

   Result:

   The preplan group is deleted.

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365-309-262R7.0   **Lucent Technologies**   3 - 1 5 7
Issue 1, July 2002

4   Provisioning Concepts

Overview

Purpose   This chapter provides conceptual material related to network elements, digital links, connections, optical layers, subnets, virtual concatenation, and preplan restoration with Navis™ Optical NMS. This information is meant to compliment and provide detail for the task-related provisioning information presented in the previous chapters.

Contents

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Section I: Network Elements

Overview

Purpose   This section provides conceptual information regarding the network elements supported by Navis™ Optical NMS. Navis™ Optical NMS supports two types of network elements: controlled and noncontrolled.

Contents

Controlled network elements

Definition Controlled network elements are network elements that can be controlled by Navis™ Optical NMS.

Characteristics Controlled network elements have the following characteristics:

- They are displayed on the Network Maps as nodes (physical locations) interconnected by digital links. A unique icon represents each network element type.

- They are in constant communication with their EMS.

- They are controlled by commands sent from the EMS (The EMS receives and processes the responses from the controllable network element.)

- They report and show alarms.

Control techniques Controlled network elements may be controlled:

- Directly, by WaveStar® ITM-XM

- Indirectly, through the WaveStar® ITM-SC or Navis™ Optical EMS.

Controlled Navis™ Optical NMS network elements The Navis™ Optical NMS products listed within the following table are controllable network elements.

Table 4-1   Controlled network elements supported by Navis™ Optical NMS

Network Element	Navis™ Optical NMS Model
ISM-1 Terminal Multiplexer	ISM1TERM
ISM-1 Add-Drop Multiplexer	ISM1RDI
ISM-1 Regenerator	ISM1REGEN
ISM-4 Terminal Multiplexer	ISM4TERM
ISM-4 Add-Drop Multiplexer	ISM4RDI
ISM-4 Regenerators	ISM4REGEN
ISM-5E Terminal Multiplexer	ISM5ETERM
SLM-4 (0:1) Terminal Multiplexer	SLM40xN
SLM-4 (1+1) Multiplexer	SLM41+1
SLM-4 Multiplexer	SLM4RDI

Table 4-1   Controlled network elements supported by Navis™ Optical NMS   (continued)

SLM4 Regenerator	SLM4REGEN
SLM-4 Terminal Multiplexer	SLM4TERM
SLM-16 (0:N) Terminal Multiplexer	SLM160xN
SLM-16 (1+1) Terminal Multiplexer	SLM161+1
SLM-16 Add-Drop Multiplexer	SLM16RDI
SLM-16 Regenerator	SLM16REGEN
NERA Radio Terminal	NERATERM
NERA Regenerator	NERAREGEN
NERA CityLink Radio	CITY_LINK1_REGEN
WaveStar® ADM-155E Add-Drop Multiplexer	155E
WaveStar® ADM 4/1 (with STM-1 line card)	WS4/1STM1
WaveStar® ADM 4/1 (with STM-4 line card)	WS4/1STM4
WaveStar® ADM 4/1 Regenerator (STM-4 line card)	WS4/1STM4R
PHASE TM4/4 Terminal	TM4/4
PHASE TM 16/4 Terminal	TM16/4
PHASE ADM 4/4 Add-Drop Multiplexer	ADM4/4
PHASE ADM 16/4 Add-Drop Multiplexer	ADM16/4
PHASE LXC 4/1	LXC4/1
PHASE LXC-16/1	LXC16/1
PHASE STM-4 REGENERATOR	LR4REGEN
PHASE STM-16 REGENERATOR	LR16REGEN
Physical Link Details from Xpercom, with models:	ODF, LGX, DDF, DSX, and NIE
WaveStar® ADM 16/1 (non MSSPRING)	WS16/1
WaveStar® ADM 16/1c (non MSSPRING)	WS16/1c
WaveStar® ADM 16/1 (MSSPRING)	WS16/1MSSP
WaveStar® ADM 16/1c (MSSPRING)	WS16/1cMSSP
WaveStar® DACS VI	DACSVI
WaveStar® DACS R2.0	WAVESTARDACS
WaveStar® DACS R2.1 & R3.0	WSDACS
WaveStar® TM-1	WS_TM1
WaveStar® AM-1 (with STM-1 line card)	WS_AM1STM1

Table 4-1   Controlled network elements supported by Navis™ Optical NMS   (continued)

WaveStar® AM1Plus (with 2 STM-1 line ports) R1.0,1.1,& 2.0	WS_AM1PLUS_STM1
WaveStar® AM1Plus (with 2 STM-4 line ports) R1.0,1.1,& 2.0	WS_AM1PLUS_STM4
WaveStar® AM1Plus (with 1 STM-1 line port) R1.0,1.1,& 2.0	WS_AM1PLUS_STM1_T
Metropolis® EON Single Ended DWDM Metropolis® EON Dual Facing DWDM * up to and including Release 6.0; controlled by SC.	WS_OLS80G_SE WS_OLS80G_DF
Metropolis® EON Repeater * up to and including Release 6.0; controlled by SC.	WS_OLS80G_REPEATER
Metropolis® EON Single Ended DWDM * Release 8.0; controlled by Navis™ Optical EMS. Node types include: 1A-TX, 1A-TX-THRU, 1A-RCV, 1A-RCV-THRU, 1A-TX-32, 1A-TX-THRU-32, 1A-RCV-32, 1A-RCV-THRU-32.	EON_SE
Metropolis® EON Dual Facing DWDM * Release 8.0; controlled by SNMS. Node types include: DUAL	EON_DF
Metropolis® EON Repeater * Release 8.0; controlled by SNMS. Node types include: Repeater	EON_RPTR
WaveStar® OLS80G Single Ended DWDM WaveStar® OLS80G Dual Facing DWDM (up to and incl Rls 6.0, controlled via SC.)	WS_OLS80G_SE WS_OLS80G_DF
WaveStar® OLS80G Repeater (up to and incl Rls 6.0, controlled via SC.)	WS_OLS80GREPEATER
WaveStar® BandwidthManager	BWM
WaveStar® TDM 10G	WS_TDM10G
LambdaRouter™ AOS 256 Release 2.0	LAMBDA_ROUTER_256
LambdaRouter™ AOS 128 Release 2.0	LAMBDA_ROUTER_128
LambdaUnite™ MultiService Switch (MSS) R2.0, 2.1, and 3.0	LAMBDA_UNITE
LambdaXtreme™ Transport - 10G R1.1 End Terminal	LAMBDA_XTREME_TERM_10G

Table 4-1   Controlled network elements supported by Navis™ Optical NMS   (continued)

LambdaXtreme™ Transport - 10G R1.1 50% Optical Add-Drop Mux	LAMBDA_XTREME_10G
LambdaXtreme™ Transport - 10G R1.1 Repeater	LAMBDA_XTREME_REPEATER_10G
LambdaXtreme™ Transport - 40G R1.1 End Terminal	LAMBDA_XTREME_TERM_40G
LambdaXtreme™ Transport - 40G R1.1 Repeater	LAMBDA_XTREME_REPEATER_40G

Adding controlled network elements to Navis™ Optical NMS

After a database synchronization with the EMS (WaveStar® ITM-SC, WaveStar® EMS or non-Lucent EMS), Navis™ Optical NMS will automatically add all the network elements managed by the EMS to the Network Map and store them in the database. Navis™ Optical NMS allows the user, with appropriate privileges, to add a new network element from the Configuration menu item of the Network Map. Refer to Chapter 2 for details on adding network elements to the Navis™ Optical NMS Network Map.

Icons for controlled network elements

Controlled network elements managed by Navis™ Optical NMS appear as icons on the Network Map. A legend showing all the icons and their respective models of network elements is available from the Network Map when requested by the user. The following table describes the different controlled network element icons used on the Network Map.

Table 4-2   Controlled network element icons

■	PHASE LXC 4/1; PHASE LXC-16/1; WaveStar® DACS R3.0.4 and R3.1; WaveStar® TDM 10G R4.05; LambdaRouter™ AOS 256 R2.0 and 3.0; LambdaRouter™ AOS 128 R2.0; LambdaRouter™ AOS 1024 R4.0; LambdaUnite™ MSS R2.0, 2.1, and 3.0; WaveStar® BandWidth Manager R4.1.2.
▼	ISM-1 Terminal Multiplexer; ISM-4 Terminal Multiplexer; ISM-4 Add-Drop Multiplexer; ISM-5E Terminal Multiplexer; SLM-4 (0:1) Terminal Multiplexer; SLM-4 (1+1) Multiplexer; SLM-4 Terminal Multiplexer; SLM-16 (0:N) Terminal Multiplexer; SLM-16 (1+1) Terminal Multiplexer; PHASE TM 4/4 Terminal; PHASE TM 16/4; WaveStar® TM-1 R2.2; WaveStar® AM1 Plus (with 1 STM-1 line port) R2.1, 2.2, and 3.0; Metropolis™ EON single ended DWDM (up to and including R6.0 controlled via WaveStar® ITM-SC); Metropolis™ EON single ended DWDM (R8.0.2, 8.2, 8.2.1, and 8.3 controlled via Navis™ Optical EMS); LambdaXtreme™ Transport 10G R1.1 end terminal; LambdaXtreme™ Transport 40G R1.1 end terminal.

Table 4-2   Controlled network element icons   (continued)

Icon	Description
	ISM-1 Regenerator; ISM-4 Regenerator; SLM4 Regenerator; SLM-16 Regenerator; NERA regenerator; ADM 4/1 Regenerator (STM-4 line card); PHASE STM-4 Regenerator; PHASE STM-16 Regenerator; Metropolis™ EON Repeater (up to and including R6.0 controlled via WaveStar® ITM-SC); Metropolis™ EON Repeater (R8.0.2, 8.2, 8.2.1, and 8.3 controlled via Navis™ Optical EMS); LambdaXtreme™ Transport 10G R1.1 Repeater; LambdaXtreme™ Transport 40G R1.1 Repeate; NERA CityLink Radio Regenerator.
	ISM-1 Add-Drop Multiplexer; SLM-4 Multiplexer; ADM-155E Add-Drop Multiplexer; ADM 4/1 (with STM-1 line card); ADM 4/1 (with STm-4 line card); WaveStar® ADM 16/1 (non MSSPRING) R5.01 and 6.0; WaveStar® ADM 16/1c (non MSSPRING) R2.01 and 3.0; WaveStar® ADM 16/1 (MSSPRING) R5.01 and 6.0; WaveStar® ADM 16/1c (MSSPRING) R2.01 and 3.0; WaveStar® AM-1 (with STM-1 line card) R3.1; WaveStar® AM-1 (with STM-1 line ports) R3.1; WaveStar® AM-1 Plus (with 2 STM-1 line card) R2.1, 2.2, 3.0; WaveStar® AM-1 Plus (with 2 STM-4 line ports) R2.1, 2.2, 3.0; Metropolis™ EON Dual Facing DWDM with Add/Drop (R8.0.2, 8.2, 8.2.1, and 8.3 controlled via Navis™ Optical EMS); LambdaXtreme™ Transport 10G R1.1 50% Optical Add-Drop Mux.
	SLM-16 Add-Drop Multiplexer; PHASE ADM 4/4 Add-Drop Multiplexer; PHASE ADM 16/4 Add-Drop Multiplexer.
	Metropolis™ EON dual facing DWDM (up to R6.0 controlled via WaveStar® ITM-SC); other vendor (non-Lucent) network elements.
	NERA Radio.
	Aggregate.

LambdaUnite™ MSS support   The LambdaUnite MultiService Switching (MSS) network element is a flexible single product covering 40G (from R1.1) and 10G SDH/SONET-based network elements. The product supports terminal multiplexers (TM), add-drop-multiplexer (ADM) and local cross connect (LXC) configurations on all line rates within the same common subrack and software load.

Each physical port can be set in one of three different modes: AUTO (automatic), MON (monitored) or NMON (non-monitored). In NMON mode, all alarms that originate in the physical section termination function are suppressed while in the MON mode they are reported. In the AUTO mode, alarms are suppressed until an incoming signal is detected, the mode of the port switches automatically to MON. Each path termination port can be either MON or NMON.

For Navis™ Optical NMS, the supported LambdaUnite MSS features include: STM-16 and STM-64 in various type of transmission protection 2F-MSSPRING, 4F-MSSPRING (including span protection), SNC/I, SNC/N, and 1+1 MSP.

Navis™ Optical NMS supports 1Gb Ethernet interface units (point to point LAN bridge) with direct SDH packet mapping (carried over a SDH WAN port) using VC4 unidirectional or bidirectional virtual concatenation: VC4-Kv where K=1 up to 7 in steps of 1 are supported.

LambdaUnite MSS supports the technique of Link Capacity Adjustment System (LCAS), previously known as Variable Bandwidth Allocation (VBA), for GigaBit Ethernet transport. The LCAS is supported which allows manual in-service dynamic sizing of bandwidth in a VC4-Xv link.

LambdaUnite MSS supports unidirectional and bidirectional cross-connections for HO (high order) VC-3 (AU3), VC-4, VC4-4c, VC4-16c and VC4-64c. It supports bridging and facility rolling for each of the supported cross-connection rates. It also support broadcast option 1:2 unidirectional cross-connection.

LambdaUnite MSS will support 2F-MSSPRING (STM-64 and STM-16), 4F-MSSPRING (STM-64 and STM-16), 4F-MSSPRING Transoceanic Protocols (STM-64 only) and MSSPRING Preemptible Protection Access (STM-n where n=1,4,16,or 64). Non Preemptible Unprotected Traffic (NUT) is not supported by NMS.

Navis™ Optical NMS supports LambdaUnite MSS with 1+1 MSP for STM-n (n=16, or 64) rates but will not support 1:1 MSP Preemptible Protection Access. Two types of SNCP (SNC/I and SNC/N) on all supported cross-connect will be supported. It will also support following combination of protection scheme: MSSPRING with MSSPRING, MSSPRING with 1+1 MSP, 1+1 MSP with 1+1 MSP, SNCP with 1+1 MSP and SNCP with SNCP.

Metropolis® EON support   The Metropolis® EON is a modular ring-based system designed for metropolitan and regional applications. Metropolis® EON provides efficient support of Metropolis® DWDM rings and increased capacity over WaveStar® OLS 40G network elements.

Navis™ Optical NMS's support for Metropolis® EON includes:

- dual-facing DWDMs

- single-ended DWDMs

- repeaters.

Additional information   For additional information about controlled network elements, refer to the *Navis*™ *Optical NMS Applications and Planning Guide* .

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Noncontrolled network elements

Definition
Noncontrolled network elements are network elements that cannot be controlled by Navis™ Optical NMS.

Characteristics
Noncontrolled network elements share the following characteristics:

- They support only manual provisioning
- They do not report alarms
- They are listed in the database as part of provisioning records

Noncontrolled Navis™ Optical NMS network elements
The following Navis™ Optical NMS products are noncontrollable network elements:

Table 4-3   Noncontrolled network elements supported by Navis™ Optical NMS

Network Element	Navis™ Optical NMS Model
Black Box	BBOX
Customer Equipment	EQPT

Adding noncontrolled network elements to Navis™ Optical NMS
The same information that applies to controlled network element applies to noncontrolled network elements.

Icons for noncontrolled network elements
Important! Locations created as "Equipment" do not appear as icons on the Network Map. They are only listed in the Location Reference Table. When used as the termination of a digital link or connection, they appear on the Graphical Layout to clarify the overall assignment.

Noncontrolled network elements managed by Navis™ Optical NMS appear as icons on the Network Map. A legend showing all the icons and their respective models of network elements is available from the Network Map when requested by the user. The following table describes the different noncontrolled network element icons used on the Network Map.

Table 4-4   Noncontrolled network element icons

	Black box.

Table 4-4   Noncontrolled network element icons   (continued)

	Equipment.
	Out of Domain object.

Additional information   For additional information about noncontrolled network elements, refer to the *Navis*™ *Optical NMS Applications and Planning Guide* .

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Section II: Digital Links

Overview

Purpose This section provides conceptual information pertaining to the digital links supported by Navis™ Optical NMS.

Contents

Digital link support

Overview   This section provides an overview of digital links and the support provided by Navis™ Optical NMS.

Definition   Digital Links are transport facilities that are assignable to high order and low order digital links to carry customer services. In Navis™ Optical NMS, digital links are always modelled as bidirectional links that carry two way traffic.

Types of digital links   Digital Links are of two types - SDH and PDH. SDH digital links are synonymous with multiplexer sections that connect two SDH network elements or black boxes/equipment. In Navis™ Optical NMS, the regenerator sections within the multiplexer section layer are not explicitly provisioned; however, Navis™ Optical NMS can add regenerators to the digital links and monitor alarms at regenerator sections.

PDH digital links are physical links that connect two PDH ports of SDH network elements or black boxes/equipment. Except for ethernet interface (e.g. LAN8/TransLAN), all digital links are channelized in Navis™ Optical NMS so as to be assigned to carry SDH trails or PDH circuits.

Protection   Digital links can be unprotected or protected. When protected by another link, it is called multiplex section protection (MSP). The MSP protection can be of two types - 1+1 or 1x1.

When MSP is 1+1, the protection link is totally dedicated to the working (service) link and cannot carry preemptible extra traffic.

When MSP is 1x1, the protection link serves as a protection to the working (service) link but can be configured to carry extra traffic that is preemptible when the traffic in the working link gets switched.

Supported digital links   The following table presents the digital links supported by each network element supported by Navis™ Optical NMS.

Figure 4-1 Supported digital links

NE	STM64	STM16	STM4	STM1	STM0	2.5GB	E4	E3	E1	DS3	DS1	LAN^a (a.k.a. TransLAN)	E_LINK^d	X.21	PCT
ADM155E	·	·	·	Y	·	·	·	Y	Y	Y	·	·	·	·	·
WS ADM4/1STM-1	·	·	·	Y	·	·	·	Y	Y	Y	·	·	·	·	·
WS ADM4/1STM4	·	·	Y	Y	·	·	·	Y	Y	Y	·	·	·	·	·
WS ADM16/1	·	Y	Y	Y	·	·	Y	Y	Y	Y	Y	Y	Y	·	·
WS ADM 16/1 Compact	·	Y	Y	Y	·	·	·	Y	Y	Y	·	·	Y	·	·
WS AM1	·	·	·	Y	·	·	·	Y	Y	Y	·	Y	Y	Y^b	·
WS AM1 PLUS - STM1	·	·	·	Y	·	·	·	Y	Y	Y	Y	·	Y	Y^c	·
WS AM1 PLUS - STM4	·	·	Y	Y	·	·	·	Y	Y	Y	Y	·	Y	Y^c	·
WS TM1	·	·	·	Y	·	·	·	·	Y	·	·	·	·	·	·
WS BWM	Y	Y	Y	Y	·	·	·	·	·	Y	·	·	Y	·	·
WS TDM10G	Y	Y	Y	Y	·	·	·	·	·	·	·	·	Y	·	·
WS DACS (via SC)	·	Y	Y	Y	·	·	·	·	·	·	·	·	·	·	·
WaveStar DACS (via XM)	·	·	·	Y	Y	·	·	·	·	·	·	·	·	·	·
DACS VI **(R2.1)**	·	·	·	Y	Y	·	Y	Y	Y	·	·	·	·	·	·
Black Box/EQPT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
LCT	·	Y	Y	Y	·	·	·	·	·	·	·	·	·	·	·
ISM-1	·	·	·	Y	·	·	·	Y	Y	·	·	·	·	·	·
ISM-4	·	·	Y	Y	·	·	Y	Y	Y	·	·	·	·	·	·
ISM-5E	·	·	·	Y	·	·	·	·	·	·	·	·	·	·	Y
SLM-16	·	Y	·	Y	·	·	Y	·	·	·	·	·	·	·	·
SLM-4	·	·	Y	Y	·	·	Y	·	·	·	·	·	·	·	·
PHASE ADM-16/4	·	Y	Y	Y	·	·	Y	Y	Y	Y	·	·	·	·	·
PHASE ADM-4/4	·	·	Y	Y	·	·	Y	Y	Y	Y	·	·	·	·	·
PHASE LXC-16/1	·	Y	Y	Y	--	·	Y	Y	Y	Y	·	·	·	·	·
PHASE LXC-4/1	·	·	Y	Y	·	·	Y	Y	Y	Y	·	·	·	·	·
PHASE TM-16/4	·	Y	Y	Y	·	·	Y	Y	Y	Y	·	·	·	·	·
PHASE TM-4/4	·	·	Y	Y	·	·	Y	Y	Y	Y	·	·	·	·	·
NERA Term.	·	·	·	Y	·	·	·	·	·	·	·	·	·	·	·
BOSCH	·	·	·	Y	·	·	Y	Y	Y	·	·	·	·	·	·
NEC ADM16	·	·	·	·	·	Y	·	·	·	·	·	·	·	·	·
Nortel NEs	·	Y	Y	Y	·	·	Y	Y	Y	Y	·	·	·	·	·
CityLink (a.k.a. NERA Radio)	·	·	·	Y	·	·	·	·	·	·	·	·	·	·	·
FLAG NEs via UNME	·	·	·	Y	·	·	Y	·	·	Y	·	·	·	·	·
LambdaUnite MSS	Y	Y	Y*	Y*	·	·	·	·	·	·	·	·	Y		

With this table, note the following items:

- A LAN8 digital link between an ADM16/1 or AM1 network element with a LAN card is not allowed. The only LAN8 digital link supported is between a controlled network element and a black box.

- Back-to-back X.21 digital links are not supported. The only X.21 digital link supported is between a AM1 and a Black Box.

- Back-to-back X.21 digital links are not supported. The only X.21 digital link supported is between a AM1 plus and a Black Box.

- E_LINK includes Gb Ethernet and TransLAN+ [14]. Back-to-back E_LINK digital links are not supported. The only E_LINK digital link supported is between a supported network element and a Black Box .

Important! LambdaUnite™ MSS, black box and equipment network elements support STM256 digital link rates in addition to the rates described in the previous table.

Supported digital transmission rates

This section presents the digital transmission rates of the digital links supported by Navis™ Optical NMS. For information about the digital transmission rates of the connections supported Navis™ Optical NMS, refer to Section III: Connections.

The following table presents the digital transmission rates supported by Navis™ Optical NMS.

Table 4-5   Supported digital transmission rates for digital links

Designation	Description	Facility Type	Transmission Rate Mb/s	Notes
STM-64	Digital Link	64S(10,000LN)	9,953.28	
STM-16	Digital Link	16S (2500LN)	2,488.32	
STM-4	Digital Link	4S (620LN)	622.0	
STM-1	Digital Link	1S (155LN)	155.52	
STM-0	Digital Link	0S (52LN)	51.84	
CEPT-4	Digital Link	E4 (140LN)	139.264	
CEPT-3	Digital Link	E3 (34LN)	34.368	
CEPT-1	Digital Link	E1 (2LN)	2.048	
DS3	Digital Link	45LN	44.736	

Table 4-5   Supported digital transmission rates for digital links   (continued)

Designation	Description	Facility Type	Transmission Rate Mb/s	Notes
DS1	Digital Link	1.6LN	1.544	
LAN8	Digital Link		up to 4 VC-12s	AM 1, ADM 16/1 only
LSBB			45 Mb/s to 750 Mb/s	OLS
HSBB			100 Mb/s to 2.5 Gb/s	OLS
X.21	Digital Link		2 Mb/s	AM 1, Black Boxes only

Channel support

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Overview	This section provides an overview of the support provided by Navis™ Optical NMS for channels.

Definition	For time division multiplexing (TDM) equipment, channels represent the time slots with which information is carried within a digital link or in a server trail. Channels are created by Navis™ Optical NMS for use during circuit/trail provisioning. When creating channels for digital links, depending on the network element capability, alternate channels, to accommodate the provisioning of different rates of circuits/trails, are created.

Channel termination records	Depending on the type of digital link and the terminating network element type, Navis™ Optical NMS creates channel termination records with a fixed number of channels depending on the channel type specified by Navis™ Optical NMS during provisioning.

In the case of SDH digital links, the channel types can be either VC4-64c, VC4-16c, VC4-4c, VC4 or AU3. When a network element supports multiple higher order cross-connect rates, complimentary channels are created to give the flexibility to the user to provision any of those higher order trails without having the need to re-provision the digital link with other channel types. The creation of complimentary channels is determined by the capability of the network element(s) that terminate the digital link. Such network element-specific capability data is stored in NMS. In general, an STM-n digital link (where n=0,1,4,16 or 64) will have 3*n AU3 channels (except for n=0 where it will have one AU3 channel) or n VC4 channels.

For PDH links, the channel type depends on the rate and the terminating port characteristics. For example, a CEPT-1 digital link will have one C1 channel to carry a CEPT-1 circuit. A CEPT-3 digital link can have either one C3 channel or 16 C1 channels depending on the network element type.

Supported channels	The following table presents the channels supported by each network element supported by Navis™ Optical NMS.

Table 4-6   Supported channel types per supported network elements

Network Element	VC4-64c	VC4-16c	VC4-4c	VC-4	VC-3	VC-2	VC-12	AU3

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Table 4-6   Supported channel types per supported network elements   (continued)

WaveStar® ADM155E	—	—	—	Y	Y	—	Y	—
WaveStar® ADM4/1STM1	—	—	—	Y	Y	—	Y	—
WaveStar® ADM4/1STM4	—	—	—	Y	Y	—	Y	—
WaveStar® ADM16/1	—	—	Y	Y	Y	—	Y	—
WaveStar® ADM16/1 Compact	—	—	Y	Y	Y	—	Y	—
WaveStar® AM1	—	—	—	—	Y	—	Y	—
WaveStar® AM1 Plus	—	—	—	Y	Y	—	Y	—
WaveStar® TM1	—	—	—	—	—	—	Y	—
WaveStar® BandWidth Manager	—	Y	Y	Y	—	—	—	Y
WaveStar® TDM10G	—	Y	Y	Y	—	—	—	Y
WaveStar® DACS (via SC)	—	—	Y	Y	Y	—	Y	Y
WaveStar® DACS (via XM)	—	—	—	Y	Y	—	Y	Y
WaveStar® DACS VI (R2.1)	—	—	—	Y	Y	—	Y	Y
Black Box	Y	Y	Y	Y	Y	Y	Y	Y
Equipment	Y	Y	Y	Y	Y	Y	Y	Y
ISM-1	—	—	—	Y	Y	—	Y	—
ISM-4	—	—	—	Y	Y	—	Y	—
ISM-5E	—	—	Y	—	—	—	Y	—
SLM-16	—	—	—	Y	—	—	—	—
SLM-4	—	—	—	Y	—	—	—	—
PHASE ADM-16/4	—	—	Y	Y	Y	—	Y	—
PHASE ADM-4/4	—	—	—	Y	Y	—	Y	—
PHASE LXC-16/1	—	—	—	Y	Y	Y	Y	—

Table 4-6   Supported channel types per supported network elements   (continued)

PHASE LXC-4/1	—	—	—	Y	Y	Y	Y	—
PHASE TM-16/4	—	—	Y	Y	Y	—	Y	—
PHASE TM-4/4	—	—	—	Y	Y	—	Y	—
NERA CityLink	—	—	—	Y	—	—	—	—
DACS V-2000 (APCN)	—	—	—	Y	—	—	—	—
LambdaUnite™ MSS	Y	Y	Y	Y	—	—	—	Y

Provisioning concepts

Overview
This section presents information pertinant to provisioning digital links with Navis™ Optical NMS. More speciallized information pertaining to particular digital link types supported by Navis™ Optical NMS can be found in subsequent sections.

Purpose
Because physical connectivities have to exist before a digital link is provisioned in Navis™ Optical NMS, four main tasks are performed whenever a user provisions a digital link in Navis™ Optical NMS.

1. The digital link is inventoried in NMS so that the system can create appropriate channels to provision higher order SDH trails or PDH circuits.

2. The corresponding ports at the A and Z ends of the digital link are put in-service or verified to be in-service to enable reporting of alarms on them.

3. The ports are structured to carry any of the following higher order paths - VC4-64c, VC4-16c, VC4-4c, VC4, AU3 or whichever is applicable.

4. If the digital link is MSP protected, the MSP protection is verified by the EMS and the protection switch status data on the appropriate ports are stored in NMS.

Provisioning order action
There are several order actions for any digital link during provisioning:

- **Add (A)**: used when a digital link is first added to the network from Navis™ Optical NMS. Port provisioning commands will be generated and sent to the EMS for putting the ports in-service, if they are not already in-service.

- **Disconnect (D)**: used to delete the digital link from the Navis™ Optical NMS database although the link can still physically exist with the terminations. During the "Disconnect" order, commands are generated and sent to the EMS to put the ports "out-of-service". In Navis™ Optical NMS, the "Disconnect" order will not be processed if there are any "in-effect" or "pending" higher order trails or PDH circuits that are provisioned on any of the digital link's channels.

- **In-Effect (IE)**: used when the digital link is already put in-service through the EMS or from a local craft terminal and needs to be inventoried in Navis™ Optical NMS. Since the digital link is already provisioned, the appropriate provisioning commands are used by the EMS to verify that the ports are put "in-service" and the MSP protection (when specified) exists. The "In-Effect" digital link may or may not be carrying any higher order trails.

- **Rearrange (R)**: used when changing any components (e.g. facilities/channel, A port, A location, Z port, Z location) on the layout of an In-Effect facility/circuit. The "Restoration" order is used when rerouting an IE facility/circuit onto an alternate path.

- **Reinstatement (RI)**: used when reinstating a facility/circuit that was previously restored back to its original service path.

- **Preplan (PP)**: used when restoring the failed facility including each of the affected circuits over to the pre-planned route.

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Provisioning STM digital links

Overview   This section presents coneptual information related to provisioning STM digital links with Navis™ Optical NMS.

Note: Throughout this section, the ”n” within the term “STM-n” can equal 0, 1, 4, 16, 64, or 2.5 Gb/s.

Selecting network elements   Navis™ Optical NMS allows the user to provision a STM-n digital link between:

1.   two network elements that support the desired STM ports

2.   a network element that support the port and a black box/equipment

3.   between two black boxes.

The network elements that support the ports for the provisioning of STM-n and 2.5 GB digital links are listed earlier in this section.

From the Navis™ Optical NMS Network Map, users can select (left-click) two network elements and create a digital link between the two via the Configuration menu item. If more than two network elements are selected, an error message appears. Clicking on the selected network element will undo the selection and toggle between the two for subsequent clicks on the network element. If the selected network elements already have OCh trails provisioned, the STM-n digital link provisioning shall automatically include the optical layer layout.

Circuit types   The following table specifies the internal and external circuit types for STM-n digital links.

Table 4-7   Internal and external circuit types for STM-n digital links

Digital Link	Internal Circuit Type	External Circuit Type
STM-0	S0DL	0S
STM-1	V4DL	1S
STM-4	S4DL	4S
STM-16	S16DL	16S
STM-64	S64DL	64S
2.5GB	2.5GBDL	2.5GB

Adding regenerators   Navis™ Optical NMS allows the user to add regenerators of appropriate type to STM-1 (only for NERA Regenerators), STM-4, STM-16, and STM-64 digital links during provisioning. No regenerators can be added for STM-0 or STM-1 or 2.5GB digital links except for STM-1 digital links terminating on NERA Radio terminals.

When adding regenerators to digital links, users are required to enter the port addresses for the east and west sides. No validation is made in NMS whether the east and west sides are correctly chosen by the user. However, the rate should be compatible as the rate of the digital link terminating on regenerators. No provisioning commands are generated for the regenerators when they are either added or removed from a digital link. However, the layout of the digital link is updated to reflect the addition or deletion of regenerators.

Deleting regenerators   Users can delete regenerators from an "in-effect" digital link. Deleting a regenerator from a digital link only removes the regenerator from the digital link layout and does delete it from NMS (e.g. from Location Reference Table).

Creating alternate channel types   Depending on the capabilities of the terminating network elements, based on their cross-connect rates, the channel types of AU3, VC4, VC4-4c, VC4-16c and VC4-64c will be created for STM-n digital links as specified in the table below. When more than one channel type is created based on network element support, the channels created are considered alternate channels.

The following table presents the alternate channels for STM-n digital links.

Table 4-8   Alternate channels for STM-n digital links

Digital Link	Alternate channel types to be created	Number of Channels
STM-0	AU3	1
STM-1	AU3	3
	VC4	1
STM-4	AU3	12
	VC4	4
	VC4-4c	1

Table 4-8   Alternate channels for STM-n digital links   (continued)

STM-16	AU3	48
	VC4	16
	VC4-4c	4
	VC4-16c	1
STM-64	AU3	192
	VC4	64
	VC4-4c	16
	VC4-16c	4
	VC4-64c	1
2.5GB	VC4	16

**Provisioning of
unprotected digital links**

Users can provision a regular unprotected STM-n digital link between between any pair of homogeneous or non-homogeneous network elements, BandWidth Manager, TDM 10G, LambdaUnite MSS, or a black box. The provisioning of unprotected STM-n digital link will be denied if Navis™ Optical NMS discovers that a protection group already exists on either of the two (A or Z) ports.

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Provisioning PDH digital links

Overview   This section presents coneptual information related to provisioning PDH digital links with Navis™ Optical NMS.

Selecting network elements   With PDH digital links, Navis™ Optical NMS allows the user to provision an:

- Unprotected E4 (CEPT-4) digital link between two 140 Mb/s ports of two network elements or between a 140 Mb/s port of a network element and a black box or equipment.

- Unprotected E3 (CEPT-3) digital link between two 34 Mb/s ports of two network elements or between a 34 Mb/s port of a network element and a black box or equipment.

- Unprotected E1 (CEPT-1) digital link between two 2 Mb/s ports of two network elements or between a 2 Mb/s port of a network element and a black box or equipment.

- Unprotected DS-3 digital link between two 45 Mb/s ports of two network elements or between a 45 Mb/s port of a network element and a black box or equipment.

- Unprotected DS-1 digital link between two 1.5 Mb/s ports of two network elements or between a 1.5 Mb/s port of a network element and a black box or equipment.

- PCT digital link between a PCT port of an ISM-5E network element and a black box (which is used to represent a 5ESS switching system). The PCT digital link is inherently always protected and therefore the 'MSP Protected?" field in the provisioning screen will always be set to "1+1 Protected" and the MSP Type shall be set to "BI" (bidirectional).

LAN card support   The ADM16/1 LAN card consists of 8 ports whereas the AM1 LAN card consists of two ports. Each port maps up to four TU12s (VC-12). The mapping of the four TU12's to single signal can be considered as a "pseudo concatenation" of four TU12's. The mapped four TU12s provide a point-to-point protocol (PPP) output of up to 8 Mb/s. The four VC-12s to be used for LAN connection can be provisioned individually using the proper ports. The VC-12s used for LAN connection are like any other VC-12 with the exception of their port addresses that tie them to the LAN card and the fact that they can only be two-way VC-12s. (It is the user's responsibility to ensure that all VC-12s used for LAN connection are provisioned as two-way.) Therefore, other than the exceptions stated, the VC-12 used for LAN connection shall enjoy/suffer the privileges/limitations of typical VC-12 in NMS. To summarize, 10/100 Base T PPP provisioning boils down to VC-12 provisioning with ports derived from the LAN Card ports. All the VC-12s making up the LAN connection can take diverse path. It is to be noted that all the VC-12's that make up a single LAN connection have to originate from the same port of a LAN card and terminate on a single port of another LAN card. In other words, different VC-12 of the same LAN connection cannot originate from different LAN card or ports or end up either on different LAN card or different LAN card ports of the same LAN card. However, if the VC-12 used for LAN connection terminate on a port other than LAN card port, it does not have to terminate on the same network element.

A digital link called LAN8 is introduced but is not be able to carry any circuit or path. Navis™ Optical NMS supports the provisioning of LAN8 digital link from/to a LAN port of a controlled network element equipped with LAN8 (a.k.a. TransLAN) cards and a black box. Back-to-back provision is not be allowed. For display purposes, LAN8 digital link is referred to as LAN8DL.

Channel termination record   A channel termination record is created for every provisioning of a PDH link. There are no alternate channels that are required for PDH digital links. The following table summarizes the type and number of channels that shall be created.

Table 4-9   Channel types for PDH links

Digital Link	Channel Type	Number of Channels
CEPT-4	C4	1
CEPT-3	C3	1

Table 4-9   Channel types for PDH links   (continued)

CEPT-1	C1	1
DS-3	D3	1
DS-1	D1	1
PCT	C1	21
LAN8	None	NA
X21	None	NA

E_Link provisioning   Navis™ Optical NMS supports the provisioning of E_Links between a "LAN" port of an VCG capable card of a given network element to a black box or equipment. The E_Link between the LAN port of a network element and black box or equipment has no specific NMS transport rate value. An E_link can not be used as a server to any clients. Performance monitoring and alarm analysis can potentially be done using this link. LAN port to LAN port connections using E_Link is not supported.

User can add an E_Link via Configuration > Digital Link > Add menu option and can delete an E_Link via Configuration > Digital Link > Disconnect menu option as well as other ways of digital link disconnection that is currently supported by NMS .

Navis™ Optical NMS maintains a history of disconnected E_Links for a duration set during NMS installation. In the absence of an installation set, Navis™ Optical NMS will keep the disconnected link for a period of 24 hours.

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Protection concepts

Overview
This section discusses protection concepts related to digital links. As noted earlier in this section, digital links can be unprotected or protected. When protected by another link, it is called Multiplex Section Protection (MSP). The MSP protection can be of two types - 1+1 or 1x1.

When MSP is 1+1, the protection link is totally dedicated to the working (service) link and cannot carry preemptible extra traffic.

When MSP is 1x1, the protection link serves as a protection to the working (service) link but can be configured to carry extra traffic that is preemptible when the traffic in the working link gets switched.

Multiplexer section protection
Multiplexer Section Protection provides protection of service for STM-n (N=0, 1, 4, 16 or 64), digital links in case of a fiber cut or a failure. The protection is provided by grouping two physical fibers (both bidirectional) in to a MSP group. The MSP grouping of the two ports is performed at each network element where the two fibers terminate. There are two types of MSP protection - 1+1 MSP and 1x1 MSP. Each type is described in the following two sections.

1+1 MSP protection for STM-n digital links: 1+1 MSP protection is supported by most of the network elements that support provisioning of unprotected STM-n digital links (except for 2.5 GB digital link). In the case of 1+1 MSP protection, one worker digital link is protected by a protection digital link and they are both grouped with one trail ID. In some network elements, the MSP protection group has to be previously formed from the EMS before it can be provisioned from Navis™ Optical NMS. Also, in some network elements the port address for a MSP protected digital link takes the form a "group address" that always represents the ports in adjacent physical slots. Where "group address" is not supported by some network elements, any two physical port with the same rate can be combined to form a MSP protection, in which case, the Navis™ Optical NMS allows the user to enter the working and protection port addresses separately.

Depending on the network element support, there are three types of MSP switch types that can be provisioned on a 1+1 MSP protected digital link. The three switch types are - UNI (unidirectional), BI (bidirectional) or NTT (a variation of bi-directional switching for Japanese customers).

The following table presents the network elements supported by Navis™ Optical NMS with MSP capabilities.

Table 4-10   MSP protection capabilities per supported network elements

Network Element	STM-0	STM-1	STM-4	STM-16	STM-64
WaveStar® ADM 155E		1+1			
WaveStar® ADM 4/1 STM-1		1+1			
WaveStar® ADM 4/1 STM-4		1+1			
WaveStar® ADM 16/1		1+1		1+1	
WaveStar® ADM 16/1 Compact		1+1			
WaveStar® AM 1		1+1			
WaveStar® AM 1 PLUS STM1		1+1			
WaveStar® AM 1 PLUS STM4					
WaveStar® TM 1		1+1			
WaveStar® BandWidth Manager		1+1	1+1	1+1, 1x1	1x1
WaveStar® TDM 10G		1+1	1+1	1+1	1+1, 1x1
WaveStar® DACS (Rel. 2.1 and 3.0)		1+1	1+1	1+1	
WaveStar® DACS (Rel. 2.0)	1+1	1+1			
WaveStar® DACS VI (Rel. 2.1)	1+1	1+1			
Black Box	1+1	1+1	1+1	1+1	1+1
Equipment	1+1	1+1	1+1	1+1	1+1
ISM-1		1+1			
ISM-4			1+1		
ISM-5E		1+1			
SLM-16 Terminal				1+1	
SLM-16 RDI		1+1			

Table 4-10   MSP protection capabilities per supported network elements   (continued)

SLM-4		1+1		
PHASE ADM 16/4	1+1	1+1	1+1	
PHASE ADM 4/4	1+1	1+1		
PHASE LXC 16/1	1+1	1+1	1+1	
PHASE LXC 4/1	1+1	1+1		
PHASE TM 16/4	1+1	1+1	1+1	
PHASE TM 4/4	1+1	1+1		
DACS V-2000	1+1			
LambdaUnite™ MSS	1+1	1+1	1+1	1+1, 1x1

Users can add regenerators of appropriate type to the 1+1 MSP protected STM-4 or STM-16 digital link during provisioning. The user can add regenerators for working and protection links separately. Certain regenerators can accept up to two inputs and two outputs in which case, the same regenerator could be used in both the working and protection links. The user shall be able to delete the regenerators from an "in-effect" digital link. No provisioning commands are generated for the regenerators when they are either added or removed from a digital link. However, the layout of the digital link shall be updated to reflect the addition or deletion of regenerators.

1x1 MSP Protection on STM-n (n=16 or 64) digital links: the BandWidth Manager supports 1x1 MSP protection for STM-n (n=16 or 64) digital links. LambdaUnite MSS R2.1 and up will support 1x1 MSP on STM-64 digital links. LCT supports 1x1 MSP protection for STM-16 digital links. The 1x1 MSP protection is different from 1+1 MSP protection that is well known to the NMS user in the previous releases. In 1x1 MSP protection scheme, one digital link will protect one service digital link. In the future releases, 1x1 MSP protection will be required to be supported, where one service digital link will be protected by one protection link. In the case of 1x1 MSP protected digital link, the protection link can carry extra traffic that will be preemptible when the MSP switching takes place. Because of this, both the service and protection links of the 1x1 MSP have to be separately identified with Digital Link IDs. 1x1 MSP is primarily used for span protection in a 4-fiber MSSPRING. The Protection Digital Link must be created first and associated with a unique Protection Group Name before any of the service digital links are created and associated.

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Section III: Connections

Overview

Purpose   This section describes the provisioning concepts associated with connections supported by Navis™ Optical NMS.

Contents

Connection support

Overview This section provides an overview of connections and the support provided by Navis™ Optical NMS.

Definition A circuit/trail is a concatenation of digital links and cross-connects used to provide an end-to-end service to a customer. A circuit/trail is identified by a rate at which the service is provided. The "rate" of a circuit/trail is defined by the ITU and ETSI standards for SDH and PDH circuit/trails. An SDH trail is provisioned over the SDH link connections and over SDH cross-connects in Navis™ Optical NMS managed network elements. It is possible that the link connections (SDH) may go through an optical layer. In general, a PDH/Asynchronous circuit is provisioned on SDH trails. With the "One-Step (Combo) Provisioning" feature in Navis™ Optical NMS, it is possible to provision both SDH trails and PDH circuits or trails and Asynchronous circuits in a single provisioning step.

A trail is often referred as a path. A trail can be assignable or non-assignable depending on the terminating port or based on the sub-structuring of the port to carry lower order traffic. In Navis™ Optical NMS, if one or both end ports of a trail are PDH/Asynchronous, or if one or both end ports are sub-structured to carry lower order traffic, the trail is called an "assignable" entity. If both end ports are SDH and not sub-structured to carry low order traffic, then the trail is called as an "non-assignable" entity. Certain trails, such as VC4-4c, VC4-16c and VC2, are always non-assignable. Navis™ Optical NMS creates channels for assignable trails in order to carry the low order trails or PDH/asynchronous circuits.

A circuit provides a service to a customer at a specified rate.

Supported cross-connect types and rates This section presents the rates at which cross-connect types are supported for one-way (O), two-way (T), and broadcast (B) circuits by Navis™ Optical NMS. The network element by itself may support more rates than are supported with Navis™ Optical NMS.

The cross-connect types and rates for each network element supported by Navis™ Optical NMS are shown in the following table.

Table 4-11   Cross-connect types and rates per supported network element

Network Element	VC4-64c	VC4-16c	VC4-4c	VC-4	VC-3	VC-2	VC-12	AU-3
WaveStar® ADM 155E				T	O, T, B		T	
WaveStar® ADM 4/1 STM-1				T	O, T, B		T	
WaveStar® ADM 4/1 STM-4				T	O, T, B		T	
WaveStar® ADM 16/1			T	T	T		T	
WaveStar® ADM 16/1 Compact			T	T	T		T	
WaveStar® AM 1					T		T	
WaveStar® AM 1 PLUS				T	T		T	
WaveStar® TM 1							T (fixed)	
WaveStar® BandWidth Manager		O, T, B	O, T, B	O, T, B				O, T, B
WaveStar® TDM 10G		O, T, B	O, T, B	O, T, B				O, T, B
LambdaUnite™ R2.0	O,T,B	O,T,B	O,T,B	O,T,B				O,T,B
WaveStar® DACS			O, T, B	O, T, B	O, T, B		O, T, B	O, T, B
WaveStar® DACS VI R2.1				T	O, T, B		O, T, B	O, T, B
WaveStar® DACS VI				O, T, B	O, T, B		O, T, B	O, T, B

Table 4-11   Cross-connect types and rates per supported network element   (continued)

Network Element	VC4-64c	VC4-16c	VC4-4c	VC-4	VC-3	VC-2	VC-12	AU-3
Black Box	O, T, B	O, T, B	O, T, B	O, T, B	O, T, B	T	O, T, B	O, T, B
ISM-1				T	O, T, B		T	
ISM-4				T	O, T, B		T	
ISM-5E							T	
SLM-16				T				
SLM-4				T (fixed)				
PHASE ADM 16/4			O, T, B	O, T, B				
PHASE ADM 4/4				O, T, B				
PHASE LXC 16/1				O, T, B	O, T, B	T	O, T, B	
PHASE LXC 4/1				O, T, B	O, T, B	T	O, T, B	
PHASE TM 16/4			O, T, B	O, T, B				
PHASE TM 4/4				O, T, B				
WaveStar® DACS V-2000 (APCN)				O, T, B (R3.0)				

Supported SNCP protection

This section presents the rates at which SNCP protection is supported for one-way (O), two-way (T), and broadcast (B) circuits in Navis™ Optical NMS.

Note: The network element by itself may support more rates than are supported with Navis™ Optical NMS.

The rates at which SNCP cross-connects are supported by Navis™ Optical NMS are shown in the following table.

Table 4-12   SNCP protection supported by Navis™ Optical NMS

Network Element	VC4-64c	VC4-16c	VC4-4c	VC-4	VC-3	VC-2	VC-12	AU-3
ADM 155E				T	O, T, B		T	
WaveStar ADM 4/1 STM-1				T	O, T, B		T	
WaveStar ADM 4/1 STM-4				T	O, T, B		T	
WaveStar ADM 16/1			T	T	T		T	
WaveStar ADM 16/1 Compact			T	T	T		T	
WaveStar AM 1					T		T	
WaveStar AM 1 PLUS				T	T		T	
WaveStar TM 1							T (fixed)	
WaveStar BandWidth Manager		O, T, B	O, T, B	O, T, B				O, T, B
WaveStar TDM 10G		O, T, B	O, T, B	O, T, B				O, T, B
LambdaUnite R2.0	O, T, B	O, T, B	O, T, B	O, T, B				O, T, B
WaveStar DACS (managed by ITM-SC)			O, T, B (R3.0)	O, T, B (R3.0)	O, T, B (R3.0)		O, T, B (R3.0)	O, T, B (R3.0)
WaveStar DACS (managed by ITM-XM)								

Table 4-12   SNCP protection supported by Navis™ Optical NMS   (continued)

Network Element	VC4-64c	VC4-16c	VC4-4c	VC-4	VC-3	VC-2	VC-12	AU-3
DACS VI (R2.1)				T	O, T, B		O, T, B	O, T, B
Black Box	O, T, B	O, T, B	O, T, B	O, T, B	O, T, B	T	O, T, B	O, T, B
ISM-1				T	O, T, B		T	
ISM-4				T	O, T, B		T	
ISM-5E							T	
SLM-16				T				
SLM-4				T (fixed)				
PHASE ADM 16/4			O, T, B	O, T, B				
PHASE ADM 4/4				O, T, B				
PHASE LXC 16/1				O, T, B	O, T, B	T	O, T, B	
PHASE LXC 4/1				O, T, B	O, T, B	T	O, T, B	

Supported digital transmission rates

This section presents the digital transmission rates of the connections supported by Navis™ Optical NMS. For information about the digital transmission rates of the digital links supported Navis™ Optical NMS, refer to Section II: Digital Links.

The following table presents the digital transmission rates supported by Navis™ Optical NMS.

Table 4-13   Supported digital transmission rates for connections

Designation	Description	Facility Type	Transmission Rate Mb/s	Notes
VC-4	Path	VC4S	150.336	
VC-3	Path	VC3S	48.960	
VC-12	Path	VC12S	2.240	
CEPT-4	Facility	1920N	139.264	Similar to CEPT-4 Circuit

Table 4-13   Supported digital transmission rates for connections   (continued)

Designation	Description	Facility Type	Transmission Rate Mb/s	Notes
CEPT-3	Facility	480N	34.368	Similar to CEPT-3 Circuit
CEPT-4	Circuit	1920N	139.264	
CEPT-3	Circuit	480N	34.368	
CEPT-1	Circuit	30N	2.048	
DS3	Circuit	672N	44.736	
DS1	Circuit	24N	1.544	

Ethernet TransLAN+ support

Navis™ Optical NMS supports the provisioning of an Ethernet TransLAN+ (E_Link) between a black box and the LAN ports of the network elements that support the TransLAN+. The E-Link can be considered as an ethernet digital link with an unspecified signal rate. The ITM-SC managed network elements (ADM16/1, ADM16/1c, AM1, and AM1PLUS) support Ethernet TransLAN+.

Navis™ Optical NMS also support the provisioning of the "VCgroup" for the WAN ports of the network elements that support the TransLAN+. As with GbE support, the VCgroup can be considered as a virtual concatenation of VC-n using a grouping concept. For the TransLAN+, the VCgroup consists of VC3-Xv (where X is from 1 to 2) and VC12-Xv (where X is from 1 to 5). The provisioning of VC-n's used in a VCgroup is essentially the same as the provisioning of any other VC-n in Navis™ Optical NMS with the exception of port specifications, association of the VC-n to a VCgroup, specifying the capacity of the VCgroup, and of preserving the port address 'ordinal symmetry' for the 'Dual-Ended VCG'. The capacity can be specified either as rate or number of VC-n's in the VCgroup.

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Provisioning concepts

Overview

This section presents information pertinant to provisioning connections with Navis™ Optical NMS. More specialized information pertaining to particular connection types supported by Navis™ Optical NMS can be found in subsequent sections.

Circuit/trail provisioning modes

Navis™ Optical NMS allows users to provision a circuit/trail in one of the three modes - auto, manual or partial.

- **Auto**: Navis™ Optical NMS will find a route from the user specified end ports for the trail and present it to the user for approval, if requested. In the case of an AU3 trail, Navis™ Optical NMS shall find a shortest route using the V4 channels from each of the links in the path.

- **Manual**: the user will be able to select each link and a channel in the selected link along the path and Navis™ Optical NMS will build the layout based on the user selection(s). In the case of an AU3 trail, the user can select each link from the Network Map that contains one or more AU3 channels from the Network Map and can bring up a display of the Facility Channel List screen showing only the all the digital links between the two end nodes that terminate the selected link. Selecting one of the digital links shall list all the AU3 channels in the selected digital link. The user shall be able to select one of the channels from the list. The selected AU3 channel shall automatically get populated in the provisioning screen. In the case of span of control, the user can select a bridge and intern select a link which allows user to select AU3 and any on of the contained channels.

- **Partial**: the user will pick all the links along the path of the circuit/trail. The channels within the link shall be picked by Navis™ Optical NMS (broadcast and one-way circuits are exceptions). In the case of AU3 trails, the user needs to select only the digital links that are displayed in the Facility Channel List screen. Navis™ Optical NMS will automatically pick an appropriate V4 channel in the selected digital link and populate it in the provisioning screen.

Provisioning controls   Navis™ Optical NMS provides the following controls, through GUI provisioning screens, to provision connections. A description of each control is listed.

- **Circuit Type**: used to specify the circuit type. Valid values are: Two Way (T), One Way (O), or Broadcast (B). The default value is "two way".

- **Ignore Alarms**: when this option is set to "Yes in the "auto" provisioning mode, Navis™ Optical NMS can pick the channels that are in alarm and put the circuit "in effect" even if the alarms are present in the circuit path. The default is "No" (i.e. do not ignore alarms for finding the channels and putting the circuit/trail "in effect").

- **Graphical Layout**: when this option is chosen (Yes), Navis™ Optical NMS will display the graphical layout for the created route for approval by the user. The graphical layout shall also be displayed again when the implementation commands are successfully sent and the circuit/trail is put "in effect". The default is "Yes".

- **Stop at Test Step**: allows the user to perform manual testing after the implementation of the circuit/trail is completed and before the circuit is put in service ("in effect"). After performing manual testing, the user can move the provisioning order to the next step for completion of the provisioning process. The default is "No."

- **Protection**: allows the user to specify if the circuit/trail shall be protected. These are the types of protection available for the user to choose - Ring Protected, 1+1 Protected, A End Open, or Z End Open, and DNI/DRI. The user specified selection is taken in to consideration when finding the path in the "auto" mode or when validating the layout at the end of provisioning in the "manual" or "partial" mode. The default is "Unprotected."

- **Quality of Service**: an optional field in the provisioning screen applicable for all circuits/trails including combo rates. The field is 10 characters long and allows for case-sensitive alpha-numeric '/', '-', '_' and blank (single white space) in the middle of a character string, or all blanks. Users can modify the Quality of Service field from the "Modify Order Parameters" menu selection under the "Action" menu in Graphical Layout. The default value is blank.

- **Customer Priority**: an optional field in the provisioning screen that allows users to set the priority for a service. The value in this field is only for Navis™ Optical NMS users and will not be used during restoration nor for notifying users on any priority basis. The Customer Priority is a number up to 2 digits (0 to 99). Users can modify the Customer Priority field from the "Modify Order Parameters" menu selection under the "Action" menu in Graphical Layout. The default value is blank.

- **Service Domain**: an optional field in the provisioning screen used to specify the service domain name to which a provisioned trail is assigned. The Service Domain name should already exist in the Navis™ Optical NMS database, otherwise the validation will fail. This field is enabled only when the "Service Domain Parititioning" feature is turned on for the customer application. The default value is blank.

- **Implement**: allows users to instruct Navis™ Optical NMS to implement the circuit/trail immediately when approved or schedule the provisioning for a later date and time. The allowed values are "Start Now" or "Schedule". If "Start Now" is selected, the implementation commands will be sent once the layout is approved by the user. If "Schedule" is selected, another dialog box will be displayed for the user to enter the date and time when the implementation commands should be sent to the EMS. The default value is "Start Now."

- **Comments**: an optional field that allows users to enter some free formatted text pertaining to the circuit/trail. There is a maximum number of lines and characters per line for this field.

Specifying trace identifiers and mismatch detection mode

Users can specify two path trace identifiers (PTIs) for each trail - one for A-Z direction and the other for Z-A direction. The PTIs can be either a specific string of upto 15 alphanumeric characters (case sensitive) or non-specific (system generated 0s or 1s). In order to specify non-specific byte for the PTIs, the user shall enter the word "NONE" in the appropriate PTI field(s).

When sending implementation or verification commands, the "pti_t" (transmitted) and "pti_e" (expected) fields in the data structure shall be populated as follows:

- For the A end network element, the "pti_t" shall be the value entered in the PTI for A-Z direction and the "pti_e" shall be the value entered in the PTI for Z-A direction.

- For the Z end network element, the "pti_t" shall be the value entered in the PTI for Z-A direction and the "pti_e" shall be the value entered in the PTI for A-Z direction.

With routing, the user must enter the PTI for all circuit types. The user can enable or disable the PTI mismatch detection mode independently from setting the PTI to specific string or to a non-specific mode.

Path Trace ID cannot be left blank when provisioning any type of VC circuit. If the user intends to leave the Path Trace ID blank, the user must enter the word NONE (in capitals). Additionally, if the user wants to send a string of zeros as the Path Trace ID, the user must enter NULL (in capitals).

The following figure shows an example of how PTIs are applied.

Figure 4-2 Example of a PTI
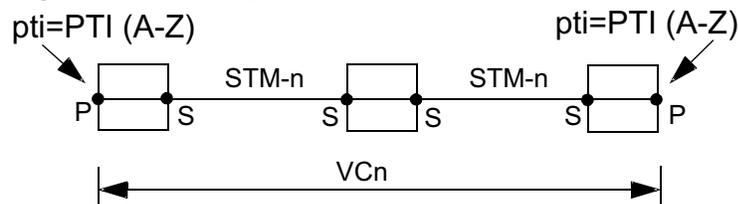
The user can specify the Mismatch Detection Mode for each trail provisioning. The valid values for the Mismatch Detection Mode are "Enable", "Disable" or "null" (\0). If the user specifies "Enable", the EMS will turn on the mismatch detection mode and if the user specifies "Disable", the EMS will turn off the mismatch detection mode. The value of "null" (\0) is used for in-effect circuit orders to instruct the EMS to leave the mismatch detection mode in its current setting.

One-step provisioning Navis™ Optical NMS supports the provisioning of the following one-step or simple combo circuits:

- VC3S-672N
- VC4S-1920N
- VC3S-480N
- VC12S-30N
- TU12-VC11S-24N
- AU3S-672N

Note

Please note the following items with regards to one-step provisioning:

- One-step provisioning is an option that is selected at installation time.

- The selection of either VC12S-30N, VC3S-480N, VC3S-672N or VC4S-1920N for provisioning is a selection for 30N, 480N, 672N, or 1920N provisioning. However, one-step provisioned paths/circuits have the characteristic of the SDH (Skipped SDH) circuits/paths. As such, they possess performance monitoring, path trace identifier, fault management, and pre-plan characteristics.

- 30N, 480N, 672N, and 1920N are no longer available for provisioning to ensure the mutual exclusivity of one-step and traditional provisioning.

- If a free-format circuit ID is used, the circuit type for one-step provisioned circuits can be: VC12S-30N, VC3S-480N, VC3S-672N, VC4S-1920N, TU12-VC11S-24N, or AU3S-672N.

- A one-step provisioned path/circuit can terminate on either an SDH or PDH port. However, both ends of the path/circuit cannot be SDH.

  - In the case of an SDH termination, the ports will be derived from the STM-N link on which the circuit is riding.

  - In the case of a PDH termination, the port is the appropriate PDH port.

- A one-step provisioned circuit can cross or ride SDH links only and cannot cross or ride on PDH links.

- No PDH bridges are allowed when merging one-step provisioned paths/circuits.

Scheduling circuits/trails for provisioning

Users with administrator privileges can schedule circuits and trails for provisioning from the Navis™ Optical NMS Network Map. Refer to the *Navis™ Optical NMS Administration Guide* for details.

Y-protected paths

Y Protection path/circuit can be viewed as "one half" of a 1+1 SNCP protected path/circuit. In a 1+1 SNCP protection path, each of the two network elements at the A-end and the Z-end has a "bridge" and "selector" function. At each end, the function of the "bridge" is to split the incoming input signal into two and send them via separate paths to the other end and the function of the "selector" is to select one of the two incoming signals from the other end (via the two separate paths) as its "received" signal.

The Y Protection has two flavors. If only one of the two end network elements, say A, incorporates the "bridge and selector" functions and its two outgoing paths terminates at two different network elements without the "bridge and selector" functions, then the configuration is referred to as Open-Z Y protection. Conversely, if only the Z end network elements incorporates the "bridge and selector" functions, then it is referred to as the Open-A Y protection.

The following figure shows an example of the supported and non-supported configurations for one-way Y protection.

Figure 4-3 Supported/Not Supported One-way Y-protection Configurations

....
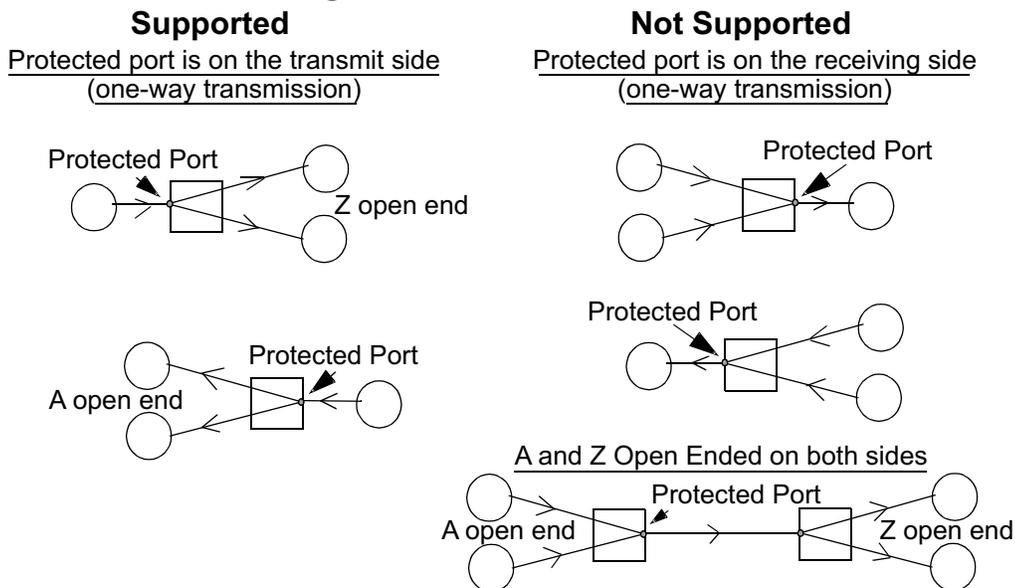
**Work order record
document**

The Work Order Record Document (WORD) describes a customer
service order or an network infrastructure/engineering order and
includes the end-to-end design of the circuit associated with that
order. The primary use of the WORD is for circuit installation, testing,
and fault tracing by technicians in the field.

The WORD document will contain order-related data and circuit
layout details. The WORD can be populated for any circuit ('circuit'
here is used in a generic sense as a 'link' in PRM) including
topological links (digital links and optical layer links), facilities, and
customer circuits.

Enabling low order alarms

Refer to the *Navis*™ *Optical NMS Maintenance Guide* for details.

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Provisioning trails

Overview
This section presents technical informations associated with the different trails supported by Navis™ Optical NMS.

VC4-64c (AU4-64c) trails
Navis™ Optical NMS supports the provisioning of VC4-64c trails using STM-64 subject to the capabilities of the network element involved (at present only LambdaUnite supports VC4-64c). All the network elements in a VC4-64c are "non-assignable." The VC4-64c trail can be one way, two way or broadcast type.

A VC4-64c can not co-exist with a VC4-16c, VC4-4c, VC4, AU3 or any other path/circuits within the same STM-64.

Navis™ Optical NMS supports the merging of VC4-64c circuits/paths. VC4-64c circuits/paths can only be merged with VC4-64c circuits/paths.

Rearrange is supported for VC4-64c. Because VC4-64c is only supported for LambdaUnite STM-64, any rearrange has to be done between LambdaUnites. Although these path/circuit may have already protected, LambdaUnite has bridge and roll capability (SNMS-EML Tier 2 capability release plan) and this feature shall be utilized for rearrange.

VC4-16c (AU4-16c) trails   With a VC4-16c, sixteen VC4s are combined to form a single VC4-16c (or AU4-16c). VC4-16c (AU4-16c) can be provisioned on STM-N (N Š 16) only. Concatenation of VC4s to form a single VC4-16c follows strict numerical order. That is, in an STM-N, the VC4-16cs start at specified time slots. For example, in an STM-64 the VC4-16c can start at time slot 1, 17, 33 or 49 of the STM-64. VC4-16c is supported without termination. For network elements that strictly use AU3s the numbering scheme used is based on the fact that three AU3s from one AUG. Therefore, in the previous example of an STM-64 with several VC4-16c, the VC4-16c can start at AU3 time slots 1, 49, 97 or 145. The VC4-16c starting time slot number (n4 or n3) can be abstracted as Mode16(n4-1) and Mode48(n3-1) in terms of AU4 and AU3 respectively. Two-way, one-way and broadcast VC4-16cs are supported. LambdaUnite, BandWidth Manager and TDM10G can be used to provision VC4-16c. Other than these three network elements, no other network elements have VC4-16c capability. Unless otherwise specified general Navis™ Optical NMS features such as merge, etc. are applicable to VC4-16c.

Navis™ Optical NMS supports the provisioning of VC4-16c trail using STM-N (N = 16 or 64) subject to the capabilities of the network element involved. All the network elements in the VC4-16c are "non-assignable." The VC4-16c trail can be one way, two way or broadcast type.

Navis™ Optical NMS supports the merging and rearranging of VC4-16c circuits/paths. VC4-16c circuits/paths can only be merged with VC4-16c circuit/path.

Mutual Exclusion: if a VC4-16c occupies part of (group of time slots) on an STM-N, the time slots occupied by the VC4-16c shall not be available for other AU3s, VC4s, VC4-4cs or VC4-16cs. For "auto or partial" provisioning, which VC4-16c to select becomes an issue only in the case of STM-N (N >16). For example there are four VC4-16cs in an STM-64. As stated in the introduction, each VC4-16c starts specific time AU4 (AU3) time slots. Therefore, in provisioning VC4-16c, the system is expected to select the first available (see reference [1]) VC4-16c. The order of selection preference is based on an ascending order of the VC4-16c starting time slots.

Transmission Direction: VC4-16c supports one-way, broadcast and two-way transmission direction, subject to and consistent with EMS/network element support. 1809: VC4-16c Protection (two-way) The provisioning of a VC4-16c shall support two-way protected or

unprotected VC4-16c. 1810: VC4-16c Protection (one-way) The provisioning of a VC4-4c shall support one-way protected or unprotected VC4-4c. Merging of VC4-16c 1811: Merging VC4-16c Navis™ Optical NMS supports the merging VC4-16c circuits/paths. VC4-16c circuits/paths can only be merged with VC4-16c circuit/path. Rearranging VC4-16c 1811: Rearranging VC4-16c Navis™ Optical NMS supports rearranging VC4-16c.

VC4-4c trails

Four virtual container level 4's (VC-4) can be combined to form a single VC4-4c known as concatenated VC-4. Of course, the VC4-4c can be provisioned on STM-N (N Š 4) only. Concatenation is supported on STM-4 optical tributary units and STM-16 or STM-64 line units. There are two kinds of concatenation—fixed and virtual. In a fixed concatenation all the AU-4s with in the AU4-4c have their concatenation pointer set in the pointer bit. Navis™ Optical NMS supports only fixed concatenation . VC4-4c is not terminated and is non-assignable. Unless otherwise stated, concatenation follows strict order. That is in an STM-N, the VC4-4s can start only at specified time slots. For example, in an STM-16 the VC4-4c can start at time slot 1, 5, 9 or 13 of the STM-16. The provisioning of a VC4-4c supports one-way, broadcast and two-way transmission direction, subject to and consistent with EMS/network element support.

Navis™ Optical NMS supports the merging and rearranging of VC4-4c circuits/paths. VC4-4c circuits/paths can only be merged with VC4-4c circuit/path.

AU3 trails

From the network map, the user can provision a two way unprotected VC-4 trail either in the "auto", "manual" or "partial" mode. An AU-3 path can be assignable or non-assignable based on the following criteria:

- If one or both end ports of the AU3 is a DS3 port, then the AU3 is channel assignable (for a non-combo trail provisioning). In this case, the AU3 shall be created with one DS3 channel.

- If both end ports of the AU3 are STM-n (n=1,4,16) ports with a cross-connect at the end network elements, then the AU3 is not assignable.

The provisioning of a AU3 shall support one-way, broadcast and two-way transmission direction, subject to and consistent with EMS/network element support.

VC-4 trails   From the network map, the user can provision a two way unprotected VC-4 trail either in the "auto", "manual" or "partial" mode.

When a VC-4 is determined to be assignable, based on its termination port type (140 Mb/s or STM-n), a channel termination record shall be created for the VC-4. If the VC-4 terminates on a 140 Mb/s port (CEPT-4), one C4 channel shall be created. If the VC-4 terminates on an STM-n (n = 1,4,16 or 64), based on the union of the cross-connect capabilities of both end nodes, it shall create (n x 63) V12, (n x 3) V3 and (n x 21) V2 channels. If one or both the end nodes of the assignable VC4 terminates on a fixed multiplexed 2 Mb/s port of PHASE ADM16/4, PHASE ADM 4/4, PHASE TM 4/4 or a PHASE TM 16/4 network element, then only the first 21 channels shall be available for use. The rest 42 channels shall be blocked. No alternate channels shall be created. If one or both the end nodes of the assignable VC4 terminates on a fixed multiplexed 34 or 45 Mb/s port of PHASE ADM16/4, PHASE ADM 4/4, PHASE TM 4/4 or a PHASE TM 16/4 network element, then only three V3 channels shall be created (no alternate channels).

VC-3 trails   From the network map, the user can provision a two way unprotected VC-3 trail either in the "auto", "manual" or "partial" mode.

In the "auto" mode, Navis™ Optical NMS finds the shortest route using the V3 channels from each of the links in the path.

In the "manual" mode, Navis™ Optical NMS selects each link from the VC-3 provisioning view of the Network Map that shows all VC-4 trail connectivities. Selecting any VC-4 trail connectivity link that contains one or more V3 channels, the user shall be able to bring up a display of the Facility Channel List screen showing only the V3 channels in the selected VC-4 trail connectivity link. The user shall be able to select one of the channels from the list. The selected V3 channel shall automatically get populated in the provisioning screen.

In the "partial" mode, the user needs to select only the VC-4 trails that are displayed in the Facility Channel List screen. Navis™ Optical NMS shall automatically pick an appropriate V3 channel in the selected VC-4 and populate it in the provisioning screen.

The transmission type for a VC-3 path terminating on a 45-Mb/s port can be:

- One-way

- Two-way

- Broadcast

- Only two-way transmission is supported by the ADM16/1.

- The specific network element known capabilities, PHASE network elements that are ADM-16/4, ADM-4/4, TM-16/4, TM-4/4 do not support the one-way and broadcast VC-3 path.

A VC-3 path terminating on a 45-Mb/s port can be protected or unprotected. If the VC-3 path is protected, then all existing protection types are supported. This is limited only by the specific network element capabilities (in addition to the transmission type limitations). WaveStar DACS and DACS VI -2000 do not support protected path. Also, a switch status and switch requests are possible and are available on all ports where a 1+1 protected cross-connect exists.

VC-2 trails   From the network map, the user can provision a two way unprotected VC-2 trail either in the "auto", "manual" or "partial" mode.

In the "auto" mode, Navis™ Optical NMS will find the shortest route using the V2 channels from each of the links in the path. A VC-2 trail is always non-assignable since it does not have trail termination point on a SDH port nor has a PDH port corresponding to its rate.

In the "manual" mode, the user can select each link from the VC-2 provisioning view of the Network Map that shows all VC-4 trail connectivities. Selecting any VC-4 trail connectivity link that contains one or more V2 channels, the user shall be able to bring up a display of the Facility Channel List screen showing only the V2 channels in the selected VC-4 trail connectivity link. The user can select one of the channels from the list. The selected V2 channel shall automatically get populated in the provisioning screen.

In the "partial" mode, the user needs only to select the VC-4 trails that are displayed in the Facility Channel List screen. Navis™ Optical NMS will automatically pick an appropriate V2 channel in the selected VC-4 and populate it in the provisioning screen.

VC-12 trails   VC-12 trails ride on channels of structured VC-4 Paths and can. for example, be provisioned on VC-4 Paths between:

- SLM-4 Tributary Port and SLM-4 Tributary Port (can be used to interconnect two SLM-4 digital rings)

- SLM-4 Tributary Port and SLM-16 Tributary Port (can be used to interconnect an SLM-4 digital ring and an SLM-16 digital ring)

- SLM-16 Tributary Port and SLM-16 Tributary Port (can be used to interconnect an SLM-16 digital ring and an SLM-16 digital ring)

- ADM4/1 or ADM-155E Tributary Port and ADM4/1 or ADM-155E Tributary Port

- ADM4/1 or ADM-155E Tributary Port and SLM-4 Tributary Port

- ADM4/1 or ADM-155E Tributary Port and SLM-16 Tributary Port

- ADM4/1 or ADM-155E Tributary Port and DSX, EQPT or Black Box.

- VC-4 Paths can traverse any of the following:
  - SLMs
  - ADM4/1
  - ADM-155E

  VC-12 paths can be ring protected through the following:

- Transmission Restriction: for VC-4 Paths terminating on ADM4/1 or ADM-155E multiplexers, one-way transmission will not be allowed.

- Line Switched Ring (LSR): when a failure occurs, an LSR loops back switched lines to restore service. As an example, SLMs employ LSRs.

- Path Switched Ring (PSR): when a failure occurs, a new path around the ring is taken. As an example, ADM4/1 network elements employ PSRs.

- Fixed Cross-connect: cross-connections are pre-determined by vendor; no commands are sent from Navis™ Optical NMS.

- Digital Cross-Connect System (DXC): a generic term for electronic cross-connect systems.

TU12-VC11S trails   In some network elements, such as ADM 16/1, a DS-1 (1.5 Mb/s) port can also terminate an SDH trail that can get cross-connected at the VC-12 rate. The DS-1 signal first gets adpated to a VC-11 SDH signal and then mapped to a TU-12 tributary pay load. Those trails that terminate on the DS-1 port are specially designated as VC11-TU12 trails. The circuit type for these trails is VC11-TU12. The requirements for VC11-TU12 trails will be same as for VC-12 trails except the termination ports. For VC11-TU12 trails, the end ports can only be a DS1 (1.5 Mb/s) port.

Navis™ Optical NMS will create client channels if at least one end port is a assignable port.

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Provisioning circuits

Overview   This section presents technical informations associated with the different circuits supported by Navis™ Optical NMS.

CEPT-4 (140 Mb/s)   Users can provision an unproteced two way or one way CEPT-4 (E4) circuit that rides on a two way or a one way VC-4 trail. Since the CEPT-4 circuit rides on a VC-4 trail, the end nodes and the originating and terminating port addresses of the CEPT-4 circuit shall be the same as VC-4 trail. In the "auto" mode, if the two ends of the CEPT-4 circuit do not coincide with the VC-4 trail terminations, then Navis™ Optical NMS finds a route using the C4 channels of CEPT-4 digital links or C4 channels of a VC-4 trail. No broadcast CEPT-4 circuit provisioning is allowed from Navis™ Optical NMS. Currently, there are no parameters that are required to be set at the 140 Mb/s port(s) for the CEPT-4 circuits.

CEPT-3 (34 Mb/s)   Users can provision an unproteced two way or one way CEPT-3 (E3) circuit that rides on a two way or a one way VC-4 trail. Since the CEPT-3 circuit rides on a VC-3 trail, the end nodes and the originating and terminating port addresses of the CEPT-3 circuit shall be the same as VC-3 trail. In the "auto" mode, if the two ends of the CEPT-3 circuit do not coincide with the VC-3 trail terminations, then Navis™ Optical NMS finds a route using the C3 channels of CEPT-3 digital links or C3 channels of a VC-3 trail. Currently, there are no parameters that are required to be set at the 34 Mb/s port(s) for the CEPT-3 circuits.

DS-3 (45 Mb/s)   Users can provision an unproteced two way or one way DS3 (D3) circuit that rides on a two way or a one way VC-3 trail. Since the DS-3 circuit rides on a VC-3 trail, the end nodes and the originating and terminating port addresses of the DS-3 circuit shall be the same as VC-3 trail. In the "auto" mode, if the two ends of the DS-3 circuit do not coincide with the VC-3 trail terminations, then Navis™ Optical NMS finds a route using the D3 channels of DS-3 digital links or D3 channels of a VC-3 trail. For DS-3 circuit provisioning, the Navis™ Optical NMS user can specify a new parameter "Frame Format" in the provisioning screen. The valid values for the Frame Format field are "cbit" and "unframed".

CEPT-1 (2 Mb/s)   Users can provision an unproteced two way or one way CEPT-1 (E1) circuit that rides on a two way or a one way VC-4 trail. Since the CEPT-1 circuit rides on a VC-12 trail, the end nodes and the originating and terminating port addresses of the CEPT-1 circuit shall be the same as VC-12 trail. In the "auto" mode, if the two ends of the CEPT-1 circuit do not coincide with the VC-12 trail terminations, then Navis™ Optical NMS finds a route using the C1 channels of CEPT-1 digital links or C1 channels of a VC-12 trail. The existing CEPT-1 (E1) circuit (30N) provisioning capabilities shall be extended to support AM1PLUS.

T1-E1   The T1-E1 circuit is planned to manage the TDAX-GB through the multi-vendor CORBA interface, and the T1-E1 may extend beyond the TDAX-GB (not just terminate).

A T1-E1 circuit is treated as a combo circuit that rides on a VC12 trail and terminates at an E1 or VC12 port at one end (consistent with current E1 circuit designs) and a T1 port at the other end of the connection. The T1 port can be a logical port within a T3 physical port in a TDAX-GB. No new channel type shall be created to support T1-E1. Navis™ Optical NMS will verify that a T1-E1 circuit terminates at a TDAX-GB DCS T1 port, which could be contained within a T1 or T3 physical port. The T1 logical port shall be connected (virtual VC12 cross-connect) to a VC12 logical port within a STM-1 or STM-4 physical port. The end-to-end T1-E1 circuit, except for the segment in the terminating TDAX-GB, shall be managed (configuration management, fault management, monitoring, etc.) similar to a VC12S-30N circuit.

Broadcast circuits   Broadcast circuits are provisioned in a network where one source signal needs to be sent to multiple end users, as in video broadcast. To support this capability, many network elements provide broadcast type cross-connects where one source port can be cross-connected to more than one destination port in the same network element. In Navis™ Optical NMS, broadcast circuit provisioning is supported by provisioning first a back bone circuit from which each of the broadcast legs can be provisioned. The back bone circuit and each broadcast leg will have its own circuit ID. However, they are all linked together by a "broadcast family" name. This "broadcast family" name is used in Navis™ Optical NMS to identify a set of circuits that derive the same source signal from a back bone. It also enables the Navis™ Optical NMS user to be able to display the complete broadcast circuit along with the broadcast legs. A broadcast leg can be provisioned from a back bone circuit or from another broadcast leg. All broadcast circuits are non-assignable.

Before attempting to disconnect a broadcast circuit, note the following:

- A backbone circuit cannot be disconnected unless all it's tributaries or other backbones it is feeding are disconnected first.

- Backbones circuits and tributaries can be disconnected in the normal manner as any other circuit.

One-way circuits   With regards to provisioning, one-way circuits can be provisioned only in the manual mode through the network elements listed in Table 6-1.

Note that one-way circuits cannot be provisioned:

- Through the SLM and ADM16/1 network elements

- In a manner in which the circuit starts and stops in the same port of the same network element (loopback configuration).

Protection: With regards to protection, one-way circuits can be protected or unprotected with ring protection or 1+1 protection. One-way circuits cannot be modified from protected to unprotected, or from unprotected to protected.

Merging: With regards to merging, one-way and broadcast circuits cannot be merged.

Support circuit ID formats

This section describes the circuit ID, which is a unique identifier of a circuit. At installation time, the user can select one of two formats for circuit ID: user-defined free-format or M.1400.

User-defined free-format

The user-defined free-format circuit ID has the following characteristics:

- 83 characters in length
- allowable characters include:
    - alphanumeric characters (The character string is case-sensitive and both upper- and lower-case characters are allowed.)
    - Forward slash /
    - dash -
    - underscore _
    - period
    - blank
- Tabs are not allowed.
- The syntax of the format is: <A Location> <Z Location> <Type> <ID Number>

An example of a user-defined free-format circuit ID is: NY1 NY2 VC4S 0001.

M.1400-specification format

The M.1400 specification. The format consists of four sub-fields:

- The A Location of the path or circuit
- The Z Location of the path or circuit
- The Type of the path or circuit
- The Identification Number of the path or circuit.

Note that the A Location value will alphabetically precede the Z Location value by default only if the variable to swap network elements are set up at installation.

Delete history   Whenever a circuit is rearranged, the data from the previous circuit is retained in the Navis™ Optical NMS database. A circuit that has been rearranged several times accumulates a large amount of history information. The Delete History script retains only the necessary history data associated with each circuit, and deletes all unnecessary history data from the database.

The Delete History script consists of two parts:

- A script that automatically runs once, when upgrading the database. If you need to refer to any circuits listed in the history that are not the most recent non-RS, non-RI circuits, you should print out these circuits before upgrading the database. The Delete History script will delete these circuits from the history during the upgrade.

- A daily script execution that runs immediately following each successful daily backup.

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AU3-AU4 adaptation feature

Overview   This section describes the provisioning concepts associated with the AU3-AU4 adaptation feature for the BandWidth Manager.

Purpose   The AU3-AU4 adaptation feature maps a higher order VC3 payload (AU3) at the interface of a STM1E port to a lower order VC3 payload (TUG structured), which is multiplexed into a VC4 (AU4). A STM1E port can be provisioned to carry one AU4/VC4 or three AU3 (higher order VC3) signals, in which case the AU3-AU4 adaptation is not enabled, or it can be provisioned to enable the adaptation. If the adaptation is enabled, the STM1E signal at the (external) interface will represent three AU3 signals, and a single AU4 (VC4) signal structured to contain three TU3/VC3 signals will leave the port unit (internally in the BandWidth Manager) to interface with the switching structure of the BandWidth Manager. Although the AU3-AU4 adaptation can be enabled in one direction (ingress or egress), only bidirectional TU3-AU3 type trails are supported.

In the most common application of the feature, a DS3 is mapped into a lower order VC3 at one end of the trail (e.g. in Europe), which in turn is multiplexed into a VC4. The DS3 is extracted from a higher order VC3/AU3 (STS1) at the other end of the trail (e.g. in N. America). If the DS3 within the AU3 needs to be dropped at the same BandWidth Manager, or the AU3 needs to be multiplexed into a higher level optical signal (OC3 or higher) to be transported farther, an external loop-back can be employed at the BandWidth Manager.

The adaptation feature is supported as a provisionable option on STM1E ports only, on the BandWidth Manager's STM1E universal shelf. An STM-1 signal can be looped back at a BandWidth Manager, and the AU3 signals from the STM1E port can be dropped at DS3 ports or consolidated over higher level facilities after being cross-connected through the same BandWidth Manager as AU3 signals. Note that a loop-back is external to BandWidth Manager. It should be configured in advance as a digital link and inventoried in Navis™ Optical NMS.

Caveats   The following caveats apply to the provisioning of TU3-AU3 trails with Navis™ Optical NMS:

- Navis™ Optical NMS only supports bi-directional TU3-AU3 trails.

- Navis™ Optical NMS only supports the manual provisioning of TU3-AU3 trails.

- Navis™ Optical NMS supports a digital link at STM1 rate that terminates at STM1E ports on the same BandWidth Manager at both ends. This is referred to as an external loop-back (see Figure 2). The external loop-back type STM1 digital link shall be channelized for AU3 only (no VC4), and will be used to carry 3 TU3-AU3 type trails.

- Navis™ Optical NMS supports asymmetric VC4 trails, where at one end the VC4 trail terminates at a network element before being cross-connected (a VC3/TU3 is cross-connected and mapped/multiplexed into the VC4), and at the other end the VC4 trail terminates after being cross-connected (e.g., at the BandWidth Manager AU4-AU3 adaptation point).

- Navis™ Optical NMS supports merge and protection feaures for TU3-AU3 trails. Only a TU3 (VC3) or an AU3 can be merged at one end of a TU3-AU3. The resulting trail will be a TU3-AU3. The merge of a TU3 and an AU3 to get a TU3-AU3 is not supported. Also, the merge of two TU3-AU3 trails is not supported.

- Navis™ Optical NMS does not support preplan restoration for TU3-AU3 trails.

Protection schemes The following protection schemes asscociated with a TU3-AU3 are supported:

- Ring protection on a segment of a TU3-AU3 trail. For example, in Figure 3 the STM16 and/or OC12/STM4 can be ring configurations. (The STM16 ring actually would be associated with the VC4 trail.)

- SNCP protection associated with the VC4 trail (if supported by STM1E). (Again, this would be a characteristics of the VC4 trail and not the TU3-AU3 trail.)

- End-to-end protection (similar to SNCP at the ends). For example, Figure 3 can represent the "working" path, and a similar segment (e.g., between the TU3 X-conn and right-most AU3 X-conn) that contains another AU4-AU3 adaptation point - in another BWM - can represent the protection path.

Verifications When the user provisions a TU3-AU3 trail, Navis™ Optical NMS verifies the following conditions and generates the appropriate error messages if the conditions are not met:

- A TU3-AU3 trail rides on a VC4/AU4 trail for part of the connection. If no such trail exists in the TU3-AU3 path selected (designed) by the user, Navis™ Optical NMS will generate an error message.

- Only one of the VC4 paths on which a TU3-AU3 trail rides must terminate at one end only at a STM1E port of a BandWidth Manager and be cross-connected at the VC4/AU4 level in the same BandWidth Manager. If the selected TU3-AU3 trail rides on one or more VC4 paths but none satisfies this condition, Navis™ Optical NMS will generate an error message.

- The BandWidth Manager at which a VC4 path terminates and gets converted into three AU3s, must be of release 4.0 or beyond. Otherwise, an error message will appear.

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Section IV: Optical Layers

Overview

Purpose   This section provides conceptual information pertaining to
provisioning optical layers with Navis™ Optical NMS.

Contents

Optical layer support

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Overview This section describes the Navis™ Optical NMS's support for optical layers.

Optical layer hierarchy The following figure shows the different hierarchy of optical layers for provisioning between DWDMs and SDH network elements or black boxes.

Figure 4-4 Hierarchy of optical layers
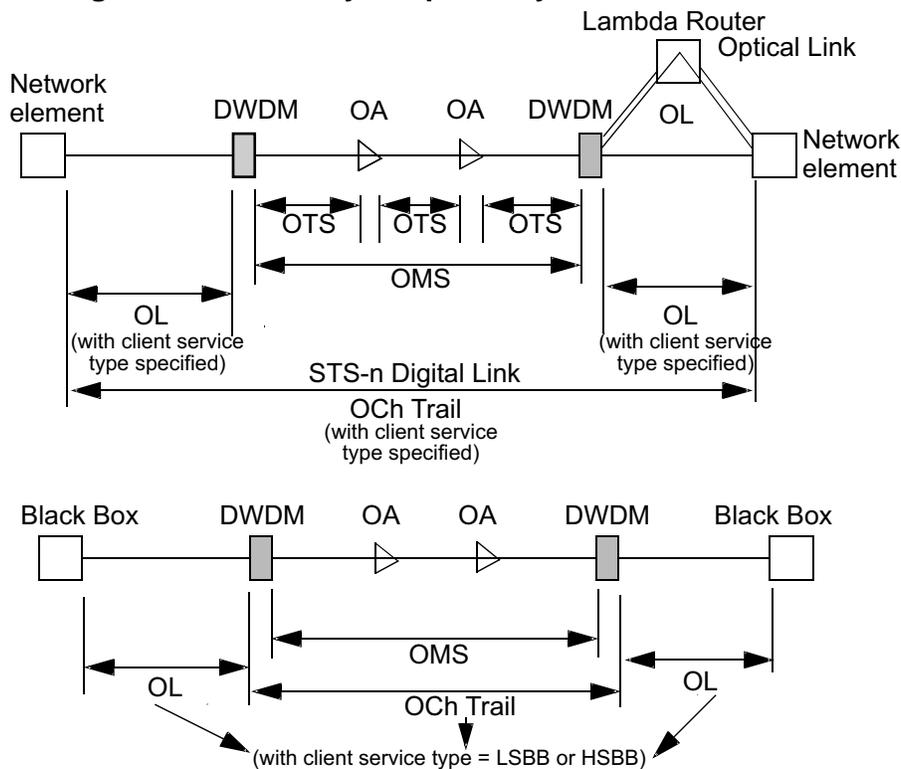
LEGEND:
OTS - Optical Transmission Section
OMS - Optical Multiplex Section
OCh Trail - Optical Channel Trail
OL - Optical Link
OA - Optical Amplifier
DWDM - Dense Wave-Division Multiplexer
Network element - SONET network element

Client Service Types for
OCh Trails and Optical Links:
STS-1   STS3c
STS12c   STS-48c
STS-192c
T1   T3
Low Speed Broadband (LSBB)
High Speed Broadband (HSBB)

Terminology The following terms appear within this section.

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Fixed connection: fixed connections are stored in the Navis™ Optical NMS and used for provisioning. A fixed connection can be terminated by one or two point(s) of flexibility, the tributary side of a DWDM network element, a SDH network element or a black box. It can only be discovered. It is only visible in the 'trail/channel selection' screen. In this document, the fixed connection belows to the OCh layer. However, it can be used at any level (VC-4, VC-12, ...) to help the provisioning process.

Paired Fixed Connection: a pair of two fixed connection that share some common channels.

OCH assignable port: an OCH assignable port terminates an OCH trail. OCH assignable ports are located either on the SDH network element, a non managed network element (Black Box/Equipment), or on the muxed port of a 10G mux card. The OCH assignable port can also be referred as a OCH TTP.

OCH non assignable port: any intermediate port of an OCH connection.

OCH connection: an OCH connection is a end to end optical path.

OCH server: is an OCH that is used to carry other OCH connections instead of regular client types (DL, HSBB, etc.)

Point of flexibility: a port that belongs to a Lambda Router connected to a DWDM network element via a physical link.

Topological link: in the scope of the optical layer, the topological links are OMS and OL.

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Provisioning optical layers

Overview
This section describes the provisioning concepts associated with optical layers.

Provisioning order
The following steps are required to provision the different layers in the Optical Layer. It is important to remember that to be able to use the Optical Layer for SDH layer provisioning, the physical connectivities between the Optical Network Elements must have been established prior to the provisioning of the optical layers from Navis™ Optical NMS. Provisioning in Navis™ Optical NMS is mainly to provide the inventory, display and correlation of alarms in the optical layer in addition to some validations by the EMS. The user provisions the Optical Multiplex Section (OMS) between two similar types of DWDM network elements specifying any Optical Amplifiers (OA) between them. The OMS provisioning is always treated in Navis™ Optical NMS as a bidirectional section. If there are connectivities from the DWDM network elements to other SDH network elements or Black Boxes then the user provisions an Optical Link between them specifying "Client Service Type" (CST). Then the Optical Channel Trail is provisioned. When provisioning an Optical Channel Trail (OChTrail) the user is required to specify the client service type that the OCh trail will carry. The client service types are : V4DL, S4DL, S16DL, S64DL, OC-48, OC-192, LSBB (Low Speed Broadband) or HSBB (High Speed Broadband). If there are connectivities with SDH network elements or Black Boxes to DWDMs, the user can then provision the conventional SDH Digital Links between them. If Navis™ Optical NMS finds connectivities of the two SDH ports through the optical layer, it will prompt the user to "insert Optical Layer" at the time of order completion of digital link.

OMS layer provisioning   Navis™ Optical NMS supports the provisioning of Optical Multiplex Section (OMS) between the optical line sides of two OLS400G or OLS80G DWDM network elements. The cut-through to SNMS-EMS Graphical User Interface for OLS400G and to ITM-SC for OLS80G for port selection and automatic population is provided. Navis™ Optical NMS checks for the same network element model type for both ends of the OMS section. For the point and click provisioning, the selection for "OMS" in the selection menu under "Configuration --> Optical Layer --> Add --> OMS" shall be enabled only if both the network elements selected are DWDM network elements of the same type (i.e. both OLS400G or both OLS80G).

The following table summarizes the interworking of DWDMs and their types/ releases for OMS provisioning.

Table 4-14   DWDMs for OMS provisioning

A/Z End	Type/Rel. No.	Z/A End	Type/Rel. No.
OLS80G	End terminal or dual facing (Any release)	OLS80G	End terminal or dual facing (any release)
OLS400G (C-Band)	End terminal or ring or WAD terminal (Rel. 3.0/3.1)	OLS400G (C-Band)	End terminal or ring or WAD terminal (Rel. 3.0/3.1).
OLS400G (L-Band)	End terminal (R4.0)	OLS400G (L-Band)	End terminal (R4.0)
OLS400G (C-Band)	End terminal or ring or WAD (Type 1 and 2) terminal (Rel. 5.0 or 6.0)	OLS400G (C-Band)	End terminal or Ring or WAD (Type 1 and 2) Terminal (Rel. 5.0 or R6.0)
OLS400G (L-Band)	End terminal or ring terminal (R6.0)	OLS400G (L-Band)	End terminal or Ring terminal (R6.0)

Optical amplifiers: during provisioning of an OMS, users can add Optical Amplifiers similar to adding regenerators during digital link provisioning. The list of Optical Amplifiers that are available shall be displayed for the user to choose. The list of optical amplifiers shall contain only those that support the OMS section with the appropriate number of channels (16 or 40/80). For OMS Section between two OLS400G (C-band) DWDMs, only the C-band optical amplifiers shall be displayed for user selection. For OMS section between two OLS400G (L-band) DWDMs, only the L-band optical amplifiers shall be displayed for user selection. The order of Optical Amplifiers shall determine their sequence from left to right in the layout in the Optical

Multiplex Section. It is assumed that the Optical Amplifiers are all bi-directional providing amplification of the optical signals in both directions of the fiber. As with regenerators in Digital Links, the user shall be allowed to add or delete Optical Amplifiers to the Optical Multiplex Section.

C+L band: the C+L Band OLS400G DWDMs provide more bandwidth (upto 160 wavelengths) over a single fiber. The output of C-Band and the L-Band OLS400G R6.0 DWDMs are fed in to a CLSC (C and L band Separator and Combiner) unit that combines all the 160 wavelengths (80 from C-Band and 80 from L-Band) on a single fiber. This maximizes the output of each fiber in backbone and longhaul networks. When Repeater stations are needed in long haul applications, before each Repeater Station, the wavelengths have to be separated in to the C-band and L-band frequencies and fed in to their respective Optical Amplifiers and then re-combined for transmission again. The CLSC unit is a passive device that does not need any provisioning commands nor does it generate any alarm. However, when combining a L-band with a C-band system, a parameter has to be set in the C-band system that tells the C band system that it is working in conjunction with a L band system. This is required to adjust some power gain in the C band system. It is not expected that this parameter is set from Navis™ Optical NMS. From SNMS and Navis™ Optical NMS perspective, the C-band and L-band DWDMs are treated as two separate network elements. Therefore the OMS provisioning between C+L band DWDMs are treated as two separate OMS sections, one between two C-band DWDMs and the other between two L-band DWDMs with their own set of Optical Amplifiers (Regenerators). It is understood that in case of a fiber break between two C+L Band systems, Navis™ Optical NMS will receive alarms from both C and L band DWDMs resulting in showing two OMS section failures even though in reality there is only one fiber break. The functionality of Navis™ Optical NMS is not in any way affected by this behavior. It is the responsibility of the user to recognize this as a single failure for dispatching craft people to fix the problem.

Deleting an OMS: when the user tries to delete an OMS Section through a Delete Order, the request for deletion shall be denied if there is at least one OCh Trail (in-effect or pending) that is assigned to one of the OMS channels.

**Optical link layer
provisioning**

The following section describes the provisioning of optical links between SDH network element or Black Box and DWDM network elements or between two DWDM network elements.

End nodes for optical link provisioning : a user can provision an optical link between: a SDH network element and a DWDM network element, a black box and a DWDM network element, two DWDM network elements (back to back OLS or in the case of OLS80G dual facing terminals or between ORS and an external DWDM network element) a SDH network element and a Lambda Router, a black box and a Lambda Router, a Lambda Router and a DWDM network element, The Navis™ Optical NMS checks the model of the nodes that terminate the optical link. If the models are not correct, the provisioning request shall be rejected. The cut-through to the selected EMS graphical user interface for port selection and automatic population shall be provided.

Automatic creation of internal optical link in OLS400G through discovery: When an association exists between the output port of a n ORS (Optical Ring Switch) in a OLS400G (R6.0 onwards), that association is reported to Navis™ Optical NMS as a link. Navis™ Optical NMS creates an optical link for this discovered link with a system generated ckt/trail ID and order number.

Behavior of NMS when an internal optical link is removed: if, after an internal optical link is created in Navis™ Optical NMS with a ckt/trail ID and order number after a database synchronization, the optical link is detected to be absent from a subsequent dbsync procedure, the Navis™ Optical NMS shall do the following: If there is no OCh trail provisioned on the internal optical link, the optical link shall be deleted from the system and all the associated records (alarm, PM, if any) shall be removed as per the existing system behavior. In addition, if the optical Fixed Connections are discovered with the internal optical link, those Fixed Connections shall be either removed or reconciled by the system. If an OCh trail is already provisioned on the internal optical link, this should be treated as improper disconnect and reported to the user. The improper disconnect notification shall be on the internal optical link.

'Client service type' in the Optical Link provisioning screen: when provisioning an optical link, depending of the end-node types, a user will have to populate a 'client service type' field in the provisioning screen. The 'client service type' will have to be populated only in the following cases: one end-node of the optical link is a black box and

the other end-node is a lambda router one end-node of the optical link is a black box and the other end-node is a DWDM network element without OTU one end-node of the optical link is a lambda router and the other end-node is a DWDM network element without OTU In other words, the "Client Service Type" field shall be enabled only when both end nodes of the Optical Link are not SDH network elements. In the other cases, the 'client service type' in the optical link provisioning screen shall be disabled and automatically populated by the system internally without explicit user input.

Optical channel connection (trail) provisioning for clients and servers

This section covers the handling and provisioning of OCh connections with Navis™ Optical NMS for both clients and servers.

An OCh trail is defined as an optical connection that is either assignable to a digital link or non-assignable. The OCh trail are of two types. The first type is an OCh trail (assignable OCh trail) that terminates on an SDH network element or a Black Box at either end in its layout (i.e. does not terminate in a Lambda Router with a cross-connect or in a DWDM network element). The second type of OCh trail (non-assignable) does not fall in to the above category of assignable OCh trail but may have a termination in a Lambda Router having a cross-connect in it.

Provisioning optical channel connections: The user may have to provide the following information to provision a new OCH connection:

- whether it is an OCH server or a regular OCH (client)
- Two end ports
- the client service type: this is the type of client connection that will ride on this OCH connection.
- protection type: path protected or not.
- routing mode: manual or auto
- in manual mode: selection of OCH channels and fixed connections from the network map as for other connection type
- in auto mode: selection of a list of node and link to be excluded (optional)

OCH connection type: The connection type for OCH connections is "OCH" for a regular OCH and "OCH-S" for an OCH server. This is also the value in the "type" field of a Circuit ID in the M.1400 circuit ID format. The "channel type" is "OCH" both connection type.

Supported operations: Navis™ Optical NMS supports the following operations for the OCH connection type: Add; Disconnect (include both regular and paper disconnect); Modify (re-arrange).

Map filtering: When an OCH-S is being provisioned, the map should be filtered to represent OL and OMS. When an OCH is being provisioned, the map shall be filtered to represent OL, OMS and OCH-S.

Mandatory fields: Navis™ Optical NMS does not allow the user to validate the order ("Apply") unless the following parameters are filled: connection ID (A and Z location and port ID).

Optional parameters: The following optional parameters exist for optical channel connection provisioning:

•   client service type: mandatory if auto-routing is selected.

•   selection of channels: greyed out for auto-routing mode, optional for manual mode.

•   exclude node and links: greyed out for manual mode, optional for auto-routing mode.

•   exclude node and links: greyed out for manual mode, optional for auto-routing mode.

Port selection: When ports are selected using the NMS port table, those ports shall be filtered depending on the network element, as follows:

•   SDH: STMn port related to an OL.

•   Lambda Router: logical port with no optical link terminating on the related physical port.

•   DWDM: OCH port on the low speed side (not derived from an OMS but including ORS and input ports of a 10G muxed card) with no optical link terminating on the related physical port.

When the ports of an OCH server are selected using the NMS port table, those ports shall be filtered to display only the 10G muxed ports.

Protection types: The protection type for OCH provisioning shall be 1+1. By default, the connection shall be left to unprotected.

For an OCH server connection, the client service type shall be greyed out, and the protection type is set to unprotected and greyed out.

Preplan for optical trails: Navis™ Optical NMS provides the capability to restore/reinstate an OCh channel trail if the following conditions are met: the service path and the preplan path have the same channel type/client service type, the service path and the preplan path have different OCh trail and ride on different OMS. the service path OCh channel trail and the preplan path OCh channel trail have the same end port. The user shall be able to choose provisioning the protection OCh channel trail (i.e. the preplan path) using either through another DWDM or the same DWDM but with different OMS (only if the DWDW supports more than one set with the same wavelength). If the protection OCh channel trail runs across another DWDM, it is client of on another OMS. Note: 1) For protected service path (e.g. involving DWDM equipped with ORS), both the working and protection segments of the service OCh channel trail are using the same OMS (i.e. one fixed OCh). The preplan path can not use the same OCh trail with the service path regardless it is protected or unprotected path. 2) The cross connect between the service and preplan path for optical trail must be done via the same LamdaRouter.

Navis™ Optical NMS allows the user to discover fixed connection between the following network elements:

Table 4-15   Fixed connections per network element

A-end	Z-end	Preconditions
SDH network element/black box	SDH network element/black box	At least 2 DWDM network elements between A-end and Z-end. No Lambda router between A-end and Z-end.
DWDM network element (tributary side)	DWDM network element (tributary side)	A-end different from Z-end.
Lambda router (point of flexibility)	Lambda router (point of flexibility)	A-end different from Z-end At least 2 DWDM network elements between A-end and Z-end.
Lambda router (point of flexibility)	DWDM network element	At least 1 DWDM network element between A-end and Z-end No Lambda router between A-end and Z-end
Lambda router (point of flexibility)	SDH network element/black box	At least two DWDM network elements between A-end and Z-end. No Lambda router between A-end and Z-end.

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Section V: Lucent Optical Network Navigation System

Overview

Purpose   This section provides conceptual information associated with the
Lucent Optical Network Navigation System (Lucent ONNS). Note
that Lucent ONNS is a limited availability feature with Navis™
Optical NMS Release 1.0.

Contents

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Lucent ONNS support

Overview This section describes the Navis™ Optical NMS's support of the Lucent Optical Network Navigation System (Lucent ONNS).

Definition The Lucent ONNS is the software and hardware present in the LambdaRouter™ AOS network element that performs management functions, such as configuration management and fault management, on optical connections across a network of LambdaRouter™ AOSs.

An Lucent ONNS system consists of a number of Lucent ONNS modules, each on a different LambdaRouter™ AOS.

Terminology The following Lucent ONNS-related terms appear within this section.

Connection: in the context of the Lucent ONNS, a signal carried between two edge ports. Depending on the type of connection (unprotected, 1+1), the two edgeports may be connected by different Lucent ONNS paths during the connection's lifetime.

1+1 Lucent ONNS connection: a connection routed by the Lucent ONNS which has two paths through the network. If the first path fails, the second path automatically takes over.

Client service type (CST): the input provided by Navis™ Optical NMS to indicate the bandwidth when provisioning optical links.

Discover route: the process undertaken in configuration management to determine the route of Lucent ONNS-created connections in the network from the cross connections present in the LambdaRouter.

Fixed connection span (FCS): denotes a fixed connection span established internally by Navis™ Optical NMS traversing DWDM's with fixed cross connects.

Auto reroute Lucent ONNS connection: a connection routed by an Lucent ONNS. If a failure occurs, along the length of the Lucent ONNS managed part, the connection will automatically be rerouted on to another path. This new path will be computed at the time the failure occurs.

Lucent ONNS domain: The area of the network that is under the control of the Lucent ONNS. Specifically, an Lucent ONNS domain is a collection of LambdaRouters and ONNs that are capable of signalling amongst themselves and maintain neighbor topology data to

provide routing and restoration within that domain. This is helpful for customer wishing to partition the Lucent ONNS network. In this release, only a single Lucent ONNS domain is supported by Navis™ Optical NMS. Therefore, the system will not provide a mechanism for the user to specify the Lucent ONNS domain. Instead, Navis™ Optical NMS prepopulates the Lucent ONNS domain name either based on the user's input during installation or predefines the Lucent ONNS domain name as "Lucent ONNS_DOMAIN."

Network to network interface (NNI): a network signalling interface value set against the networkInterfacetype Lucent ONNS parameter. This port is available for signaling within the service provider's transport network.

Permanent connection (PC): a connection which is routed entirely over a traditional network.In this mode, the request for service provisioning is received by the management system which handles each network element individually.

Soft permanent connection (SPC): an OCH connection that is partially routed over an Lucent ONNS network. In this mode, the request for service provisioning is received by the management system and then transferred to the signaling control plane to route and establish the end-to-end service within the domain.

User network interface (UNI): the client signalling interface value set against the networkInterfacetype Lucent ONNS parameter. This port is then able to receive requests for connection creation.

Unprotected Lucent ONNS connection: a connection routed by an Lucent ONNS which has only a single path through the LambdaRouter and will not automatically reroute after a failure.

Icon for Lucent ONNS　Navis™ Optical NMS uses a unique icon to identify that a LambdaRouter has been associated to an Lucent ONNS signalling element. Navis™ Optical NMS depicts the Lucent ONNS on the Network Map as a square-shaped icon and specifies whether the Lucent ONNS is active or inactive. When the Lucent ONNS icon contains a green square, the Lucent ONNS is active. When the icon contains an L-shaped pink shape, the Lucent ONNS is inactive.

Navis™ Optical NMS enables users to view the icons representing LambdaRouters associated with the Lucent ONNS from the legend menu accessible through the Network Map.

The following table presents the icon for the Lucent ONNS as it appears on the Navis™ Optical NMS Network Map.

Table 4-16   Icon for the Lucent ONNS

ONN "down" LR "Up"	The Lucent ONNS in active (Up) and inactive (Down) mode. "LR" denotes the LambdaRouter.

Feature description   LambdaRouters managed by the Navis™ Optical EMS possess a signalling element that facilitates automatic routing between similarly equipped LambdaRouters. The auto-routing between the routers with a signalling element is managed by the Lucent ONNS. Navis™ Optical NMS has to interface with the Lucent ONNS for connection (routing and implementation) between LambdaRouters and will interface with the routers through the Navis™ Optical EMS for data synchronization, alarms and notifications of port parameters, and cross-connects.

Navis™ Optical NMS has a direct LAN (TCP/IP) interface to the Lucent ONNS located within the network element. Navis™ Optical NMS provides a mechanism to set up this communication via the Network Map.

Not all LambdaRouters in the network are equipped with the signalling element. This forces Navis™ Optical NMS to manage a mixture of LambdaRouters with Lucent ONNS and some without it. The routing between LambdaRouters is made feasible because of the capability of LambdaRouters to identify its neighbor by signaling. Once a LambdaRouter is set up with the signaling capability, the ports are identified to the Lucent ONNS that are within its control. The ports have to be set with network interface type as NNI for network signaling and UNI to accept connection requests. Navis™ Optical NMS has to inventory these navigable ports based on the allocation from the user. If user requests a connection involving a LambdaRouter with navigable port, the source (ingress LambdaRouter) and the sink (egress LambdaRouter) has to be determined by Navis™ Optical NMS and a connection request has to be made to the Lucent ONNS. If a connection request from the user does not involve a LambdaRouter with navigable ports, the implementation is the same as what exists currently.

The connections passing through Lucent ONNS domains are called soft permanent connections (SPC). The route through the LambdaRouters associated with the Lucent ONNS are determined by the Lucent ONNS. Navis™ Optical NMS needs to request connections from the Lucent ONNS or EMS depending on the category (S/PC) of connection. In addition, Navis™ Optical NMS must also maintain the states of the routes of these SPCs and provide the same to the user accordingly.

Establishing an Lucent ONNS communication connection

Navis™ Optical NMS interfaces directly with the Lucent ONNS through TCP/IP. Navis™ Optical NMS will establish a corresponding number of TCP/IP connections with the corresponding Lucent ONNS. During a network element synchronization with the EMS, Navis™ Optical NMS automatically uploads all LambdaRouters. At this time, Navis™ Optical NMS is unaware whether the LambdaRouter has a signalling element (Lucent ONNS) associated with it. As a result, the association between Navis™ Optical NMS and the Lucent ONNS is not done automatically. Instead, the user has to manually add this association using the Lucent ONNS configuration management features available through the Navis™ Optical NMS Network Map. Navis™ Optical NMS will use the specified session parameters to establish communication with the Lucent ONNS. Once communication is established, the LambdaRouters associated with the Lucent ONNS are represented on the Network Map with a icon different from the LambdaRouters with no Lucent ONNS association. Refer to the "Icon for Lucent ONNS" section located at the beginning of this section for more information.

In addition to the communication IP address, the Lucent ONNS uses a signalling IP address as an identifier to establishing connections during routing. As a result, the session parameters includes a "Signalling IP Address" parameter that is provided by the user during Lucent ONNS session setup. Lucent ONNS session parameters can be modified from the Network Map when the session between Navis™ Optical NMS and the Lucent ONNS is down. The Lucent ONNS session parameters, along with the time when the last synchronization was performed, the time when communication between Navis™ Optical NMS and the Lucent ONNS was lost, and the time when communication between Navis™ Optical NMS and the Lucent ONNS was reestablished will be displayed via the Lucent ONNS Session Parameters form.

Users can start or stop communication with the Lucent ONNS by right-clicking on an Lucent ONNS icon and selecting " Start/Stop Lucent ONNS communication." The Lucent ONNS icon will reflect the color associated with the session status of "Up" or "Down." Refer to the "Icon for Lucent ONNS" section for more information about the Lucent ONNS icon.

Starting an Lucent ONNS session

When the user selects **Configuration > Lucent ONNS Network Elements > Add** from the Navis™ Optical NMS Network Map, the Lucent ONNS Session Setup form appears. This form enables the user to start a session with the Lucent ONNS. After the user provides the session parameters and clicks **OK**, Navis™ Optical NMS applies the provided session parameters when establishing a session with the Lucent ONNS.

Navis™ Optical NMS allows the following attributes for Lucent ONNS session parameters:

- **IP address**: how Navis™ Optical NMS communicates with the Lucent ONNS. Navis™ Optical NMS allows for the standard IP address specifications (nnn.nnn.nnn.nnn n).

- **Login**: used to establish communication from Navis™ Optical NMS to the Lucent ONNS. Navis™ Optical NMS allows for an alphanumeric string of up to eight characters.

- **Passwd**: the password for Lucent ONNS login. Navis™ Optical NMS allows for an alphanumeric string of up to eight characters.

- **Signalling IP address**: used by Navis™ Optical NMS in all connection requests to the Lucent ONNS. Navis™ Optical NMS allows for the standard IP address specifications (nnn.nnn.nnn.nnn n).

Database synchronization

Lucent ONNS port parameters are the port parameters set on the LambdaRouter ports and utilized by the Lucent ONNS during the Lucent ONNS connection requests from Navis™ Optical NMS. Navis™ Optical NMS has to synchronize all Lucent ONNS port parameters and the route states of all the Lucent ONNS SPC connections.

The Lucent ONNS port parameters are synchronized through a port synchronization between Navis™ Optical NMS and the EMS via the TMF interface. The only synchronization between Navis™ Optical NMS and the Lucent ONNS associated with the LambdaRouter is the

route states and the new connections created or deleted from the
Lucent ONNS.

If communication between Navis™ Optical NMS and the Lucent
ONNS is down , and in that time if the Lucent ONNS has rerouted
the traffic on mesh protected paths or if failures has occurred causing
change in route states, these need to be synchronized with the states
of the connections in the system. Incremental synchronizations to
retrieve only the changes during the loss of communication is not
available.

Navis™ Optical NMS provides the user the mechanism to manually
trigger synchronizations with the Lucent ONNS at which time Navis™
Optical NMS will send a request to the Lucent ONNS to obtain route
states. In addition, Navis™ Optical NMS will sift through the data
retrieved to identify the changes and reflect them in its system.

**Modify session
parameters**

When a user selects **Configuration > Lucent ONNS Network
Element > Display/Modify** from the Network Map, the Lucent ONNS
Session Parameters form is displayed. This form allows users to
modify the Lucent ONNS session parameters.

The Lucent ONNS Session Parameters form contains the following
fields for filtering

- **Node name**: the name of the Lucent ONNS network element.

- **Lucent ONNS domain name**: the Lucent ONNS domain the
  Lucent ONNS network element belongs to. This field is
  prepopulated for this release as only one Lucent ONNS domain
  is supported.

- **IP address**: how Navis™ Optical NMS communicates with the
  Lucent ONNS. Navis™ Optical NMS allows for the standard IP
  address specifications (nnn.nnn.nnn.nnn n).

- **Signalling IP address**: used by Navis™ Optical NMS in all
  connection requests to the Lucent ONNS. Navis™ Optical NMS
  allows for the standard IP address specifications
  (nnn.nnn.nnn.nnn n).

- **Session status**: indicates whether the session between Navis™
  Optical NMS and the Lucent ONNS is "Up" or "Down."

- **Login**: used to establish communication from Navis™ Optical
  NMS to the Lucent ONNS. Navis™ Optical NMS allows for an
  alphanumeric string of up to eight characters.

Lucent Technologies

- **Passwd**: the password for Lucent ONNS login. Navis™ Optical NMS allows for an alphanumeric string of up to eight characters.

- **Sync time**: a time stamp indicating the last time when user successfully completed an Lucent ONNS Connection sync.

- **Outage time**: a time stamp indicating when the communication between Navis™ Optical NMS and the Lucent ONNS was last lost.

- **Session start time**: indicates when communication between Navis™ Optical NMS and the Lucent ONNS was last established.

Route discovery and management

Route management for OCH-SPC connections is shared between Navis™ Optical NMS and the Lucent ONNS associated with the ingress Lucent ONNS in the path. Navis™ Optical NMS identifies only the routes outside of the Lucent ONNS domain and the ingress/egress to the Lucent ONNS domain. During execution, Navis™ Optical NMS sends connection requests to the Lucent ONNS associated with the ingress Lucent ONNS. The Lucent ONNS associated with the ingress Lucent ONNS determines the route within the Lucent ONNS domain based on the protection type and constraint criteria specified by the user and executes the cross connects for the LambdaRouters in the path.

Automatic re-routing

The Lucent ONNS has the capability of auto re-routing the Lucent ONNS managed section of an OCH-SPC connection depending on the protection type.

- If the protection type is set to "revertive auto re-route," the Lucent ONNS re-routes the path in case of fault and would re-route back to the original path once the fault has been cleared.

- If the protection type is set to "non-revertive," the Lucent ONNS re-routes the path in case of faults to a different route and the original path details are deleted.

- If the protection type is set to pre-emptible, the connection has the lowest priority in the Lucent ONNS. If a higher priority connection, such as revertive or non-revertive auto reroute paths, could not find available resources, a lower priority path can be pre-empted.

Route discovery

Users can build end-to-end routes for OCH-SPC connections through the Graphical Layout screen: Action > Discover Lucent ONNS Route. This selection is disabled for Disconnect Orders.

When user selects Discover Lucent ONNS Route, Navis™ Optical NMS builds an end-end path using the cross connects received for the LambdaRouters in the path together with the trails terminating on those cross connects. The entire route of the OCH-SPC Connection, with the details of the associated Lucent ONNS domain, is displayed to the user.

Route states

Navis™ Optical NMS supports the following route states for OCH-SPC connections:

- **Initial**: the route state for an OCH-SPC connection when the details within the Lucent ONNS domain are not discovered.

- **Actual**: the route state for OCH-SPC connection when Navis™ Optical NMS successfully builds the end-to-end route.

- **Notfound**: the route state for OCH-SPC connection when Navis™ Optical NMS is unable to build the end-to-end path.

- **Stale**: the route state applicable for a revertive/nonrevertive auto-rerouted OCH-SPC connection when the Lucent ONNS successfully restores/reroutes the connection.

- **ReRouteFailed**: the route state applicable for a revertive/nonrevertive auto-rerouted OCH-SPC connection when the Lucent ONNS fails to re-route the connection.

- **Preempted**: the route state applicable for a pre-emptible OCH-SPC connection when auto re-routing in the Lucent ONNS pre-empts a low priority connection.

Network map views   This section discusses network map views for Lucent ONNS support.

Lucent ONNS layer view

When the user selects the View > Link View > Optical Layer > Lucent ONNS Switch Connection Spans menu item, Navis™ Optical

NMS displays on the Network Map all the fixed Connection spans and optic links based on whether they are:

- allocated and unallocated to the Lucent ONNS

- terminating on a LambdaRouter or any SONET network element

- not terminating on DWDMs.

Span information

A fixed connection span is an entity created in Navis™ Optical NMS to represent fixed cross connects and does not contain data such as channels or circuit trail lists. When a link icon is selected and the right mouse is clicked, a link menu appears and the user can select View > Optic Layer > Switch Spans network element ID--NE ID _ Span Information Form to view the Span Information form. Through this form, Navis™ Optical NMS displays the allocation data for all the optical links and fixed connections spans represented by that link.

When the user selects the Allocation Information form, from the link menu of the Switch Span view, Navis™ Optical NMS will bring up the Span Information Form, which contains the following fields:

- **A-Port**: network level port address for A End

- **Z-Port**: network level port address for Z End

- **Lucent ONNS Allocated (Y/N)**: indicates whether the underlying FCS/OL has been allocated for an Lucent ONNS

- **Spare (Y/N)**: indicates whether the FCS/OL is available or has service.

Behavior when a LambdaRouter is out of service

When a LambdaRouter associated with an Lucent ONNS is put in an out of service state, Navis™ Optical NMS sets the session state between Navis™ Optical NMS and the Lucent ONNS. The color of the Lucent ONNS icon on the Network Map reflects the session state. Refer to the "Icon for Lucent ONNS" section located at the beginning of this section for more information.

Behavior when a LambdaRouter is deleted

When a LambdaRouter associated with an Lucent ONNS is deleted, Navis™ Optical NMS also deletes all associations and data shared between Navis™ Optical NMS and the Lucent ONNS associated with the LambdaRouter.

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Bandwidth allocation feature

Overview This section describes the provisioning concepts associated with the bandwidth allocation feature supported by Navis™ Optical NMS.

Definition The mechanism involving the creation of Lucent ONNS parameters that effectively allocates ports for the Lucent ONNS from Navis™ Optical NMS is termed bandwidth allocation.

Provisioning connections from Navis™ Optical NMS involving the LambdaRouter can be done via the Lucent ONNS for SPC connections and via an EMS otherwise. The provisioning of Lucent ONNS-SPC connections through the Lucent ONNS is only possible with ports under Lucent ONNS control. The control of ports in the LambdaRouter must be shared between the EMS and Lucent ONNS and the ports must be assigned to belong to the EMS or Lucent ONNS. By default, the ports in the LambdaRouter are under the control of the EMS. A port can be assigned to the Lucent ONNS by setting the NetworkInterfaceType Lucent ONNS port parameter on the LambdaRouter or Lucent ONNS. Client service type refers to the type of client rate that can be carried on the Lucent ONNS port.

Shared risk group A shared risk group indicates the risk for existing traffic and is created from Navis™ Optical NMS using a mechanism independent from the allocation process. During the Lucent ONNS port parameter setup, Navis™ Optical NMS assigns the Lucent ONNS port to a shared risk group from the existing shared risk group list.

Setting parameters Navis™ Optical NMS currently sets the LambdaRouter's port parameters only during provisioning through connection requests to the EMS. In order to provision Lucent ONNS (SPC) connections, the Lucent ONNS parameter NetworkInterfaceType must have been set prior to provisioning. Navis™ Optical NMS provides a mechanism independent of provisioning that allows the user to allocate ports for Lucent ONNS control from the Network Map during which Navis™ Optical NMS sends TP set up request to LambdaRouter via the EMS for setting the Lucent ONNS port parameters. Navis™ Optical NMS uses the same mechanism to enable the user to set the other optional Lucent ONNS parameters, namely the client service type and shared risk group.

Operational methods   From Navis™ Optical NMS, users can allocate bandwidth for the
Lucent ONNS using the following two operational methods:

1.   Users can allocate Lucent ONNS client ports. Using this
mechanism, the Lucent ONNS parameters network interface port
type (UNI) and client service type can be allocated for these
ports. Ports that meet the following criteria are eligible to be
allocated using this method:

- Ports in a LambdaRouter/Lucent ONNS that are completely
free with no associated connections.

- Optical link ports on a LambdaRouter/Lucent ONNS that are
not a termination port for any fixed connection span
between two LambdaRouters/ONNs.

- Optical link ports on a LambdaRouter/Lucent ONNS that are
a termination point of optic link between either a
LambdaRouter/Lucent ONNS and a SONET network
element or between a LambdaRouter/Lucent ONNS and a
black box.

2.   Users can allocate ports on the network side. These ports can
only be assigned for the NNI network interface port type. Users
can also assign the shared risk group and client service type
Lucent ONNS port parameters. Based on the allocation from the
user, Navis™ Optical NMS will send port set up requests
(setTPData) to Navis™ Optical EMS for ports at either ends (A
and Z) of the connection. The connections, fixed connection span
and optical link, terminating on ports assigned to the Lucent
ONNS are reserved for OCH-SPC connections through the
Lucent ONNS domain and will not be available for other regular
connections. Ports meeting the following criteria come under this
method of allocation:

- Optical link ports on the LambdaRouter/Lucent ONNS that
are termination ports for any unprotected fixed connection
span between two LambdaRouters or ONNs.

- Optical link ports on the LambdaRouter/Lucent ONNS that
are termination points of an optical link between two
LambdaRouters or ONNs.

Note: The ports on a LambdaRouter or Lucent ONNS that are a
termination point of fixed connection spanning between a
LambdaRouter/Lucent ONNS and a network element are not eligible

to be allocated for Lucent ONNS as they cannot be utilized for SPC connections.

Allocating bandwidth by trails

Whenever a user selects **Configuration > Lucent ONNS Bandwidth Allocation** from the Network Map, Navis™ Optical NMS provides a query box that has two options for allocating bandwidth to the Lucent ONNS, **Ports** and **Trails**. The Trails option presents all the fixed connection spans using OMS trails as a carrier terminating on the Lucent ONNS and optical links between the Lucent ONNS from which (de)allocation can be made.

The following options become available if Trails is selected:

- **Lucent ONNS Domain Name**: prepopulated with the Lucent ONNS domain name.

- **Trail type**: allows the user to select a trail type. Selections include: OL, OMS, and All (default).

  - **OL**: when the user selects OL trail type and then clicks on a CircuitId field name, Navis™ Optical NMS will provide a list of the OLs in the system associated between two LR/Lucent ONNS.

  - **OMS**: when the user selects OMS trail type and then clicks on a CircuitId field name, Navis™ Optical NMS will present a selection box with the circuit IDs of all the OMS trails in Navis™ Optical NMS that are a carrier for a fixed connection span terminating at both ends on LR's associated with Lucent ONNS.

  - **All**: Navis™ Optical NMS provides a list of OMS and OL trails satisfying the criterias mentioned above. Selection of a CircuitID in the selection box shall automatically populate the CircuitID field value in the query box.

Allocating bandwidth by ports

Whenever a user selects **Configuration > Lucent ONNS Bandwidth Allocation** from the Network Map, Navis™ Optical NMS provides a query box that has two options for allocating bandwidth to the Lucent ONNS: **Ports** and **Trails**. The Ports option presents a list of all allocated ports as well as unallocated ports eligible for Lucent ONNS allocation from which (de)allocation can be made.

When the user clicks on **Node** in the Ports tab, Navis™ Optical NMS presents a selection box containing names of all LambdaRouters currently in the system. When a user selects a network element and

clicks **OK**, the Bandwidth Allocation form appears, listing the following types of Lucent ONNS allocated and unallocated ports:

- Optical link ports within the specified Lucent ONNS that are completely free with no associated connections.

- Optical link ports between the Lucent ONNS that are not termination ports for any fixed connection span between two ONNs.

- Optical link ports on the Lucent ONNS that are termination points of an optic link between an Lucent ONNS and a network element between an Lucent ONNS and black box.

Setting bandwidth for client ports

From the Bandwidth Allocation form, accessible through the Network Map, users can view and update previously set Lucent ONNS paramters for bandwidth allocation.

The bandwidth allocation form possesses the following fields:

- **Network:ClientServiceType**: indicates the actual bandwidth (payload) for the port in the network.

- **Network:NetworkInterfaceType**: indicates the client/network interface attribute of the port in the network.

- **Allocation Status**: specifies the status of the allocation requests made for the associated ports by the user.

- **Manager:ClientServiceType**: corresponds the bandwidth set from the network manager.

- **Manager:NetworkInterfaceType**: represents the client/network interface for the port on the network manager.

- **Error Description**: indicates the cause of failure.

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Provisioning support

Overview   This section discusses the provisioning support provided by the
Lucent ONNS.

Connection types   Navis™ Optical NMS supports three connection types: Unprotected,
OnePlusOne protection, and Ring protection. These three protection
types are supported in three provisioning modes: Auto, Manual, and
Partial. The user specifies the category of the required connection,
whether the category is a Permanent Connection (PC), which is not
across the NN domain, or a Soft PC (SPC), which traverses through
the NN domain.

> **Important!** These SPC network connections can be made only
> after successful completion of direct communication to the
> Lucent ONNS from Navis™ Optical NMS and bandwidth
> allocation of ports to the Lucent ONNS. If the user requests a
> SPC connection, and if Navis™ Optical NMS is unable to identify
> the ingress/egress LambdaRouters due to the absence of
> navigable ports, provisioning will fail. Navis™ Optical NMS will
> not attempt a SPC connection using available unallocated ports.

Permanent connections

If the category of connection is permanent (PC), the provisioning flow
is same as what exists currently. Manual, Auto and Partial modes will
be supported with ring, OnePlusOne and unprotected connection
types. The bandwidth in LambdaRouters allocated for navigation will
neither be eligible for manual provisioning nor for automatic route
selections by Navis™ Optical NMS.

Soft permanent connections

If user specifies a SPC, automatic provisioning with the following
protection types will be available:

- **None**: unprotected connection where a simple unprotected
  network connection is made

- **1+1**: where the network connection is protected by dedicated path
  capable of switching in case of failure

- **Reroute**: auto rerouted connections where the Lucent ONNS
  autonomously restores the path on best-effort basis;

Unprotected connections

Unprotected connections can be set to pre-emptible or non-pre-emptible from Navis™ Optical NMS. A unprotected pre-emptible path can be pre-empted during revertive/non revertive auto rerouting when resources are not available.

Auto rerouted protection connections

If the user specifies an auto rerouted protection connection, it can be further classified based on reroute types as:

* Revertive: where a auto rerouted path can be re instated to the original path

* Nonrevertive: where a auto rerouted path cannot be re-instated to its original path

Provisioning an Lucent ONNS connection

This section discusses the provisioning of an Lucent ONNS connection.

Preconditions

The following pre-conditions apply to provisioning an Lucent ONNS connection:

* Prior to the Lucent ONNS connection set up, the user must have provisioned LambdaRouters associated with the Lucent ONNS.

* Bandwidth Allocation involving the networkInterfaceType port parameter must have been completed.

* The session between Navis™ Optical NMS and the Lucent ONNS and Navis™ Optical NMS and Navis™ Optical EMS must be UP. Server trails OL, OMS, FCS conforming with Navis™ Optical NMS guidelines must have been provisioned.

Provisioning input

When the user selects Configuration > Lucent ONNS Connections > Add > OCH from the Network Map, the Circuit Profile Form will appear. This form allows users to specify input for OCH connection request through the NN domain.

The following Lucent ONNS-specific options appear with the Circuit Profile form:

* **Connection Category**: preset to SPC (Soft Permanent Connection). For all other provisioning through Navis™ Optical NMS, this option is set to PC (Permanent Connection).

* **Provisioning mode**: only auto mode is available.

- **Protection types**: default is unprotected (None); 1+1 Protection; Auto Reroute Protection. For 1+1 protection type, the user is not be prompted for a_protect_location and z_protect_location.

- **Preemptible**: if unprotected is selected, the user is provided with an option to select whether the connection is preemptible. The allowed values are Y/N. The default value for preemptible is "N."

- **Reroute type**: when an auto reroute protection connection is selected by the user, the "Reroute Type" option will become active. This option allows the user to indicate whether the re-routed connection is revertive or non-revertive. This selection is available for auto re routed protection type OCH-SPC connections only.

- **Priority**: valid values ranges from 0 to 5.

- **Routing tab**: Navis™ Optical NMS provides users a mechanism to specify one of the following routing constraints : Explicit Node List: A specific list of all intermediate nodes (LR/Lucent ONNS) in the path ordered from source to destination Exclude Node List: A list of nodes (LR/Lucent ONNS) that shall be excluded from the path created.
  For a 1+1 OCH SPC connection, Navis™ Optical NMS provides users a mechanism to specify routing constraints:

  - Explicit Node List (Service): A specific list of all intermediate network elements in the service path specified in order from source to destination.

  - Explicit Node List (Protection): A specific list of all intermediate network elements in the protection path specified in order from source to destination.

  - Exclude Node List: A list of network elements that must be excluded from the path created. This applies for both service and protection paths.

Constrained routing

When the user selects Explicit or Exclude Node List constraint for OCH SPC connection, Navis™ Optical NMS provides only the LambdaRouters associated with the Lucent ONNS in the included or excluded list selection box.

For unprotected and auto-rerouted paths, Navis™ Optical NMS supports a maximum of five intermediate network elements in the

explicit node list and a maximum of 15 intermediate network elements in the exclusive node list.

For 1+1 connections, Navis™ Optical NMS supports a maximum of five intermediate network elements in the service explicit node list, a maximum of five intermediate network elements in the protection explicit node list, and a maximum of 15 intermediate network elements in the exclusive node list.

Cancel an Lucent ONNS connection

Navis™ Optical NMS allows users to cancel an Lucent ONNS connections at LAY, IMP, TST and COI steps. A message indicating the success or failure status is provided to the user.

Disconnect an Lucent ONNS connection

Navis™ Optical NMS allows the disconnection of InEffect Lucent ONNS connections from the Navis™ Optical NMS database. A message indicating the success or failure is provided to the user.

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Network discrepancy

Overview   This section describes the provisioning concepts associated with the network discrepancy feature supported by the Lucent ONNS.

Definition   Network discrepancy occurs when the network is changed externally to Navis™ Optical NMS.

The route involving Lucent ONNS connections is shared between Navis™ Optical NMS and the Lucent ONNS. When the Lucent ONNS-owned section of a connection is modified or deleted, this results in discrepancies between Navis™ Optical NMS and the Lucent ONNS.

Causes   The following scenarios will cause discrepancies in Navis™ Optical NMS:

- When Navis™ Optical NMS establishes SPC paths, by sending connection requests to the Lucent ONNS, a route is determined and cross connects are made on a LambdaRouter by the Lucent ONNS. Navis™ Optical NMS receives the completion response from the Lucent ONNS. Cross connect events on the LambdaRouter are sent by Navis™ Optical EMS. . These discrepancies gets cleared when user triggers route discovery for the OCH-SPC connection and system builds it using these un-correlated cross connects.

- In the case of an auto reroute SPC connection, any failures in the path manged by an Lucent ONNS domain triggers a automatic rerouting in the Lucent ONNS. Navis™ Optical NMS receives cross connects events from Navis™ Optical EMS, which indicate the disconnects inventoried as improper disconnects. According to Navis™ Optical NMS, they belong to the SPC connection.

- Communication between Navis™ Optical NMS and the Lucent ONNS is down and when link comes up, the user performs an Lucent ONNS Connection synchronization to synchronize all connections between Navis™ Optical NMS and the Lucent ONNS. Any new connections created by the Lucent ONNS during this time will have no SPC connection request associated with it in Navis™ Optical NMS.

- From Navis™ Optical NMS, OCH-SPC connections can be pre-emptible. This allows the auto rerouted connections to steal the resources of pre-emptible connections.

Access   When a user selects **Configuration > Network Discrepancy > Lucent ONNS Connections** from the Network Map, the Lucent ONNS Discrepancy form, consisting of discrepancies relating to Lucent ONNS connections, is displayed.

Process   When Lucent ONNS connections are created or disconnected external to Navis™ Optical NMS, Lucent ONNS connection discrepancies are reported to the user. This discrepancy is identified in Navis™ Optical NMS either via notifications from the Lucent ONNS or during an Lucent ONNS connection synchronization from Navis™ Optical NMS. These are connections/paths in Lucent ONNS consisting of cross connects on multiple LambdaRouters and is different from the existing discrepancies. These are reported as a independent Lucent ONNS discrepancy reports to the user.

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Section VI: Subnets

Overview

Purpose   This section provides conceptual information pertaining to the subnets (rings) supported by Navis™ Optical NMS.

Contents

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Subnet support

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Overview   This section presents an overview of Navis™ Optical NMS's support for subnets (rings).

Definition   A ring is a collection of network elements that form a closed loop where each network element is connected to the adjacent network element. Supported line switched rings (LSR) and path switched rings (PSR) provide redundant bandwidth or equipment to ensure system integrity in the event of any transmission failure, such as a fiber cut or network element failure.

Support   Navis™ Optical NMS supports two broad categories of rings:

- line switched rings (LSR).
- path switched rings (PSR).

Ring examples   The following are examples of ways in which users can create rings.

Two rings sharing all nodes

The below figure illustrates two rings sharing all nodes.

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Issue 1, July 2002
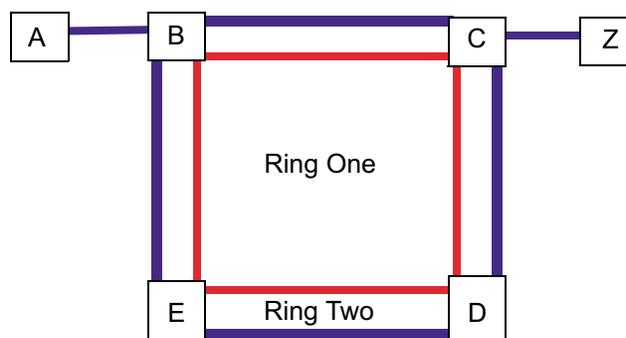
Four rings formed by four nodes

The below figure shows four rings formed using the same four
network elements.
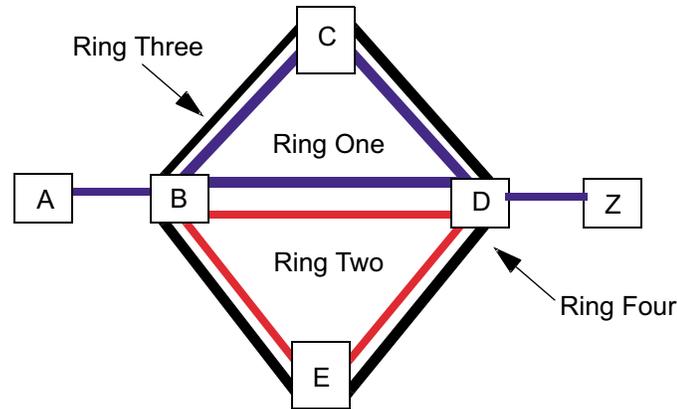
Ring names   Users can display the names of all link IDs that belong to a specified
ring name through the Network Map.

If a ring is deleted, Navis™ Optical NMS will remove the ring name
from the list of ring names. This applies to all ring types.

Protection protocol   Navis™ Optical NMS will display the ring protection protocol as
reported to it by the EMS.

Timeslots and channels   Within each ring, the same timeslot/channel must be used. The same
timeslot/channel rule is applicable to all rings.

**Effect of a digital link
disconnection**   If the user disconnects a digital link that is part of a ring forming
loop, Navis™ Optical NMS will delete the ring and remove the ring
name from the list of ring names. This applies to all ring types.

Deletion criteria   Navis™ Optical NMS allows for the disconnection of a digital link
even if the digital link is part of a ring loop as long as the ring is not
providing any protection.

The following items should be considered before a user attempts to delete a subnet:

- Navis™ Optical NMS allows the disconnection of a digital even if the digital link is part of a ring loop as long as the ring is not providing any protection.

- Navis™ Optical NMS deletes a ring if the disconnection results in the disconnection of digital link that is part of a ring forming loop.

- If a ring is deleted, the system shall remove the ring name from the list of ring names.

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Line switched rings

Overview   This section dicusses Navis™ Optical NMS's support for line switched rings (LSR).

Size limits   Navis™ Optical NMS supports up to 16 network elements (including black boxes) to partake in a LSR.

Note: For Navis™ Optical NMS, all the network elements in the ring will use the same channel/timeslot. This applies to both manual and automatic path provisioning.

LSR forming network elements   The system forms line switched rings using the following SDH network elements at the STM-N level specified when the LSR pre-requisites are met.

Table 4-17   LSR-forming network elements

Network Elements	Rate	Fiber
ADM16/1 (MSSPring Model)	STM-16	2 fiber
ADM16/1 Compact (MSSPring Model)	STM-16	2 fiber
SLM16	STM-16	2 fiber
BWM	STM-16, STM-64	2 and 4 fiber
TDM10G	STM-16, STM-64	2 fiber

Automatic formation criteria   Navis™ Optical NMS uses the following criteria to automatically form a BLSR:

- The loop forming digital links are identical.
- The digital link loop is closed.
- The loop closing digital links have identical (2-fiber or 4-fiber) protection group.
- No black boxes are included.

- The connected network elements have LSR capability (already enforced by Navis™ Optical EMS in order to provide the protection group).

- All the network elements in the loop can interwork in a LSR forming capacity (already enforced by the Navis™ Optical EMS in order to provide the protection group). That is, a LSR can be automatically formed even if the network elements in the loop are not homogenous (a mix of network elements are permitted).

Two-fiber rings

When connectivity is established between two or more network elements, the protection group is 2-fiber, and automatic ring forming pre-requisites are met, Navis™ Optical NMS will form a two-fiber LSR.

With a two-fiber LSR, one fiber transmits and the other receives. Both transmission directions of the bidirectional connection travel through the ring in opposite directions. If the working transmit path at a given network element is clockwise, then the working receive path is *counterclockwise* and vice versa.

For protection against faults, each fiber's channels are split. The first, or top half, fibers are assigned as service paths while the second, or lower half, fibers are assigned as protection paths. The protection channels and service channels are not on the same fiber.

Traffic Flow

The following figure shows the traffic flow on a two-fiber ring. With this figure, note that the path of working traffic transmitting from Node A to Node D traverses both fibers on the service path, and the

path of protection traffic transmitting from Node D to Node A traverses both fibers on the protection path.

Figure 4-5 Two-Fiber LSR
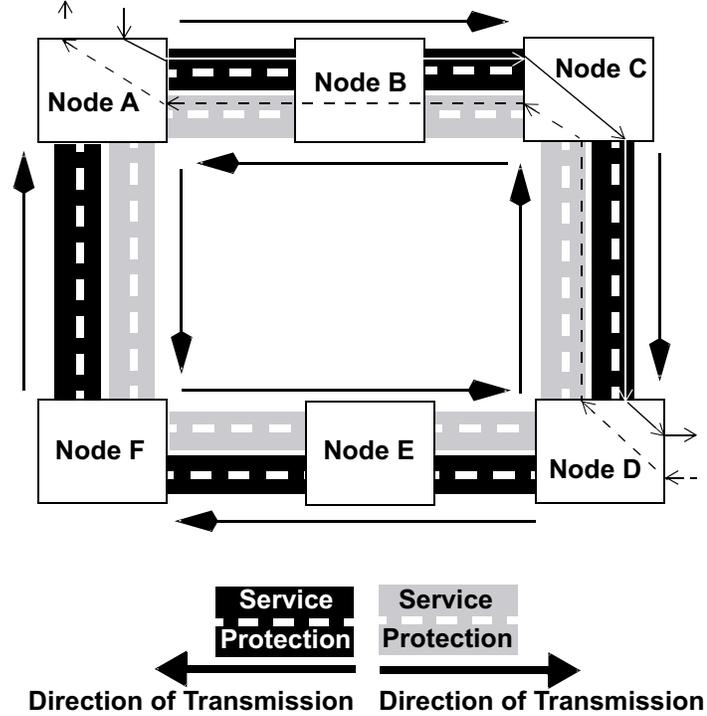
Example of a fault

The following figure shows that a fault has occurred in the paths from Node B to Node C. Note how the traffic is re-routed to bypass the

fault so that the traffic still emerges from the destination node from
the expected port.

Figure 4-6 Two-Fiber LSR with Fault
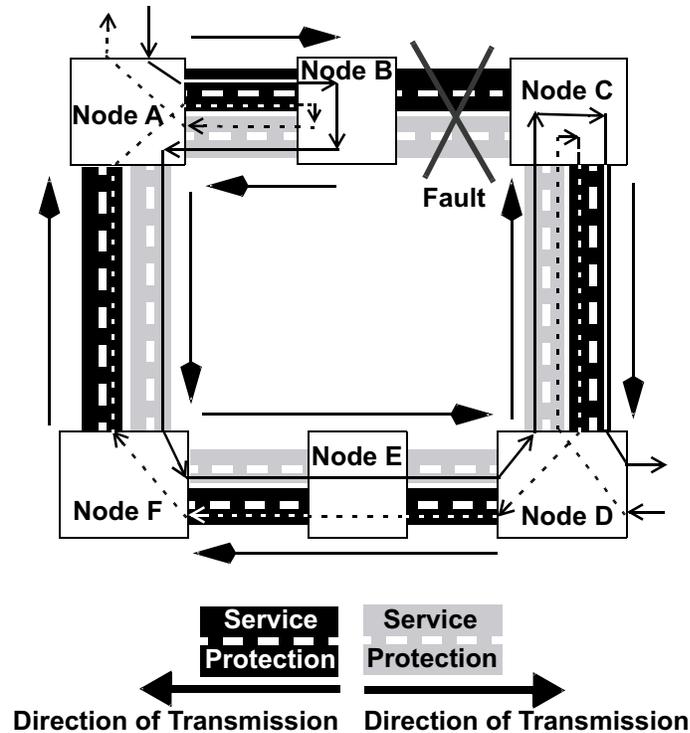
Four-fiber rings   When connectivity is established between two or more network
elements, the protection group is 4-fiber, and automatic ring
pre-requisites are met, Navis™ Optical NMS will create a 4-fiber LSR.

Four-fiber rings are similar to two-fiber rings in function in that they
possess transmit and receive lines. With a four-fiber ring, however,
there are two pairs of transmit and receive lines on each node rather
than a single pair.

Also, the creation of a four-fiber ring is slightly different from that of
a two-fiber ring in that the protection for the digital links have to be
individually provisioned. It is required that the protection digital links
be provisioned between the BandWidth Manager prior to the
provisioning of the working (protected) digital links in creating a
four-fiber ring.

Protection on a four-fiber rings consists of dedicated fibers for protection and service so that two fibers are dedicated for service and two digital links are dedicated for protection.

Traffic Flow

The following figure shows the traffic flow on a four-fiber ring.

Figure 4-7 Four-Fiber LSR
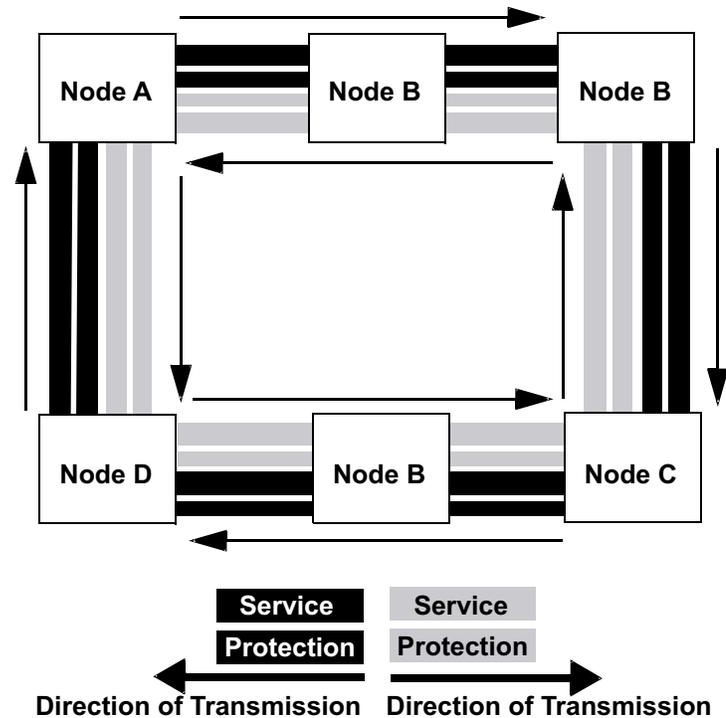
Manual formation criteria   The following conditions must be met in order to manually form a LSR with Navis™ Optical NMS:

- All network elements selected to participate in the 2- or 4-fiber LSR must have 2- or 4-fiber LSR forming capability respectively.

- At least two network elements have been identified/selected for creating the ring.

- The digital links connecting the participating network elements form a closed loop.

- The protection group (if applicable) must be identical on all network elements.

- The digital links forming the closed loop are of the same level.

- The ring to be created does not already exist.

- The network elements selected to participate in the desired ring are not all black boxes.

Timeslot and channel use   In the case of provisioning ring protected paths going through LSRs:

- **Auto path selection**: Navis™ Optical NMS will automatically pick the same timeslot/channel of all the service link segments in the BLSR.

- **Manual path selection** : once a user selects the timeslot/channel of the first service link segment in the LSR, Navis™ Optical NMS will reserve/mark the same timeslot/channel for the rest service link segments. Navis™ Optical NMS will discard any protection link segment selected by the user.

□

Path switched rings

Overview This section dicusses Navis™ Optical NMS's support for path switched rings (PSR).

Definition A PSR provides path-level protection for VT1.5 (DMX and DMXpress) circuits within a physical ring network. The ring is usually comprised of unprotected lines at the same OC-N rate.

Size limits Navis™ Optical NMS supports up to 65 network elements to participate in a PSR.

Note: All network elements in the ring use the same channel and timeslot. This applies to both manual and automatic path provisioning.

Automatic formation criteria Navis™ Optical NMS uses the following criteria to automatically form a PSR:

- The loop is closed.

- The loop forming digital links are identical in value.

- None of the end loop forming digital links are in a 1+1 APS, 2-Fiber, or 4-Fiber protection group.

- No black boxes are included.

- The connected network elements have PSR capability using the loop closing links.

- All the network elements in the loop can interwork in a PSR capacity within the context of Navis™ Optical NMS.

- Only homogenous network elements are allowed in the automatically forming of an PSR.

Automatic PSR forming network elements Navis™ Optical NMS automatically forms a path switched ring for the following network element at the specified STM-N rate when the PRS forming criteria are met. Only the add/drop multiplexer model of a given network element can form a PSR ring.

This table lists the automatic PSR-forming network elements.

Table 4-18   PSR-forming network elements

Network Element	Rate

Table 4-18   PSR-forming network elements   (continued)

ISM-1	STM-1
ISM-4	STM-4
PHASE ADM-16/4	STM-16
PHASE ADM-4/4	STM-4
ADM155E	STM-1
WaveStar ADM4/1STM1	STM-1
ADM155E and WaveStar ADM4/1STM1	STM-1
WaveStar ADM4/1STM4	STM-4
WaveStar AM1	STM-1
WaveStar AM1+STM1	STM-1
WaveStar AM1+STM4	STM-4

Manual PSR-forming network elements   Navis™ Optical NMS supports the forming of path switched rings for the following SDH network element at the specified STM-N rate when the manual ring forming criteria are met:

Table 4-19   Path switched ring-forming network elements

Network Element	Rate
ISM-1	STM-1
ISM-4	STM-4
PHASE ADM-16/4	STM-16
PHASE ADM-4/4	STM-4
ADM155E	STM-1
WaveStar ADM4/1STM1	STM-1
WaveStar ADM4/1STM4	STM-4
WaveStar AM1	STM-1
WaveStar AM1 + STM1	STM-1
WaveStar AM1 + STM4	STM-4
ADM 16/1 (SNCP model)	STM-1, STM-4, STM-16
ADM16/1 Compact (SNCP model)	STM-1, STM-16
TDM10G	STM-1, STM-4, STM-16, STM-64
BWM	STM-1, STM-4, STM-16, STM–64

Manual formation criteria   The following conditions must be met in order to manually form a PSR with Navis™ Optical NMS:

- All network elements selected to participate in a PSR have PSR forming capabilities respectively.

- A minimum of two network elements have been selected for creating the ring.

- The digital links connecting the participating network elements form a closed loop.

- The digital links forming the closed loop are all of the same level.

- The digital links forming the loop are not be members of a 1+1 linear APS, 2-fiber or 4-fiber group.

- The ring to be created does not already exist.

- The network elements selected to participate in the desired ring are not all black boxes.

Timeslot and channel use   When provisioning a 1+1 protected path that goes through a PSR, the following items apply:

- **Auto path selection**: Navis™ Optical NMS will automatically pick the same timeslot/channel of all the link segments in the PSR.

- **Manual path selection**: the user needs to specify each link segment in the PSR as either service or protection. Once the user selects the timeslot/channel of the first link segment in the PSR, Navis™ Optical NMS will reserve/mark the same timeslot/channel for the rest service/protection link segments.

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Synchronous line multiplexer rings

Overview   This section describes Synchronous Line Multiplexer (SLM) rings.

Definition   SLM rings can be interconnected by using tributary ports. The following figure shows two SLM rings at the STM16 rate interconnected at the STM-1 rate by interconnecting their tributary ports.

Figure 4-8 SLM Rings with Interconnecting Tributary Ports
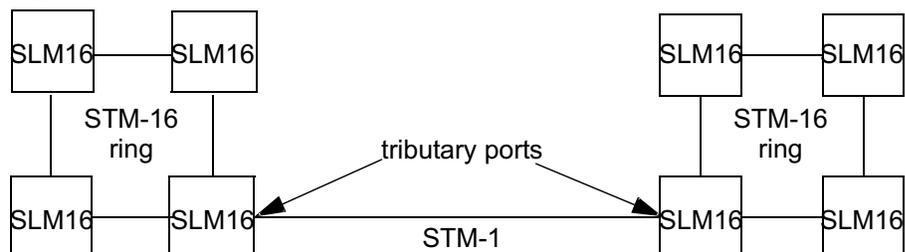
Line switching support   For line switching, SLM-2000 rings support the following features:

- Only channels 1-8 (VC-4 Paths) of the STM-16 lines will be assigned working traffic.

- Channels 9-16 (VC-4 Paths) are reserved for protection traffic.

- Channels 9 through 16 (VC-4 Paths), the reserved channels, are not assigned to protect any particular working channels. Thus, there is only one layout, the working circuit, and no protection layout used in line switched protection.

- Each line contains half working traffic and the other half is reserved for protection channels.

- Navis™ Optical NMS establishes, deletes, or views SLM-2000 rings.

□

Protection protocol

Overview This section describes the protection protocols for rings. LSR ring protection protocol be either standard or Transoceanic Protocol (TOP).

Ring protection protocol can not be set from Navis™ Optical NMS. It can, however, be retrieved from the EMS. Upon request, the system shall display the ring protection protocol as reported to it by the EMS.

TOP protection The transoceanic protection protocol is used for very long path (when the distances between network elements are greater than 1500 km.) in which a purely multiplex section shared protection scheme results in signal delay and degradation. The delay and degradation are results of the added path owing to the fact that the switching in MSSPRING is not done right at either the source or the destination of the working traffic.

In a transoceanic application, the ring switching at a network element is augmented such that the bridging from the working channels to the protections channels is performed at the source network element in the event of a failure.

In current release, line switched rings formed by some network elements supports transoceanic protocol. Since rings formed by these network elements are self-discovering, other than provisioning the links between the network elements, the network manager (Navis™ Optical NMS) need not explicitly configure the protection protocol. Therefore, no protection protocol setting by is necessary. The only requirement on Navis™ Optical NMS is that it recognizes the protocol as reported to it by the EMS.

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Section VII: Virtual Concatenation Groups

Overview

Purpose   This section provides conceptual information pertaining to virtual concatentation as supported by Navis™ Optical NMS.

Contents

Virtual concatentation support

Definition Virtual concatenation is a standards compliant inverse multiplexing protocol which creates a virtual concatenated SDH entity (called VCn-Xv) which is transported by X VC-As across the SDH network. The VCn created are standards compliant VCns. Additional VCn's can be added to the VCn-Xv, however it will be service affecting.

In the network model, virtual concatenation is supported by allowing a virtually concatenated link connection to be derived from multiple VC-N connections. Additionally, a new attribute is added to the link connection to represent the transport mechanism for that link connection over the server(s) which carry it. This can take the values of:

- DirectClient - the link connection is carried over a single connection (all previous link connections have this value).

- InverseMuxScalable - the link connection is carried by an inverse multiplexing scheme which allows dyanmic scaling as the server connections fail (e.g. virtual concatenation with LCAS).

- InverseMuxFixed - the link connection is carried by an inverse multiplexing scheme which does not allow dyanmic scaling as the server connections fail (e.g. virtual concatenation without LCAS).

Principles The principles of virtual concatenation are:

- the VCn-Xv is one signal at the VCn-XvTTP's (i.e. end points) which is transported as X individual (VCn) entities between these VCn-XvTTP's, creating a virtual path.

- the VCn's within the VCn-Xv are not locked together by means of their pointers. All VCn's in the VCn-Xv have a valid AU/TU pointer and a sequence number is added to their overhead.

- the AU's [TU's] in the AU-n-Xv [TU-m-Xv] can be freely distributed over the available timeslots in an STM-N. For the case of interconnecting two pieces of equipment by means of a number of electrical STM-1 signals, the AU's in the AU-n-Xv can be transported over the available STM-1s.

- overhead of all VC's in the VCn-Xv is used for integrity checking of the concatenated structure.

- the payload capacity of the VCn-Xv is X times the payload capacity of the VCn.

Figure 4-9 A virtual concatenated AU-n-XV or STS3-Xv
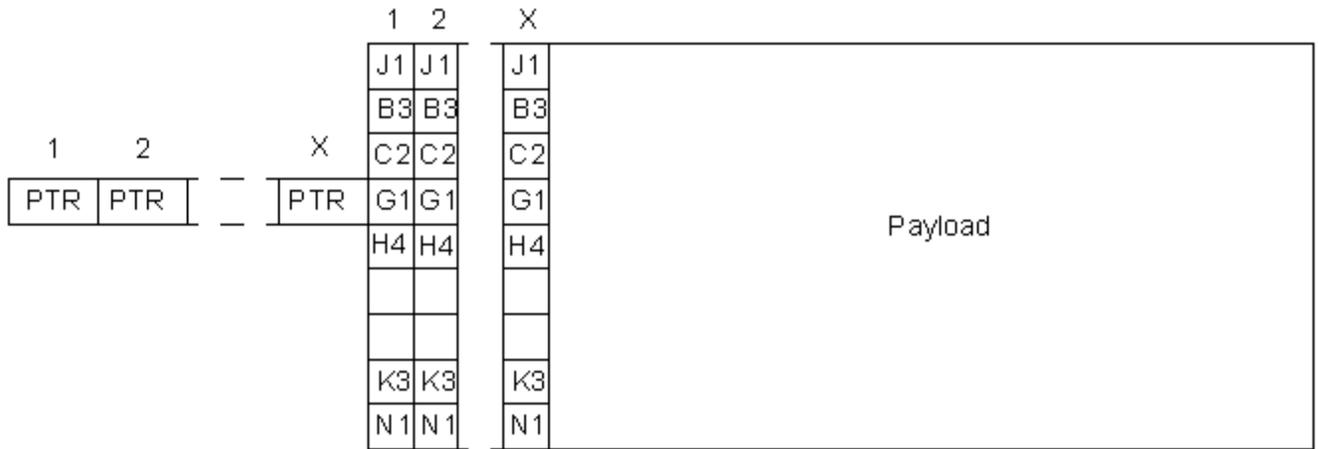
Figure 4-10 A virtual concatenated TU-12-Xv or VT1.5-Xv
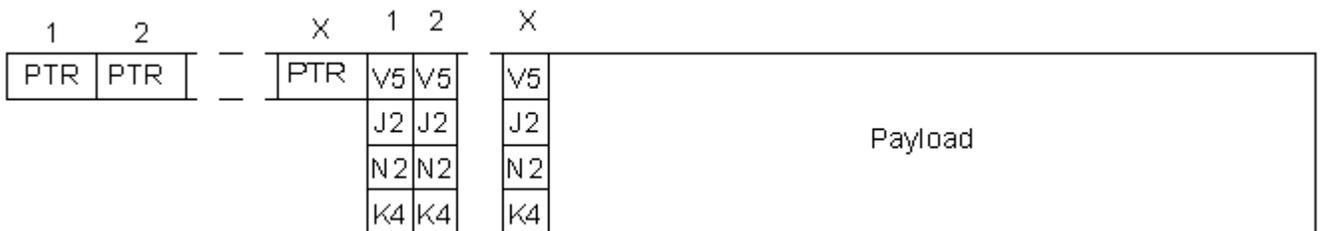
Virtual concatenation with link capacity adjustment scheme

Overview   This section describes Navis™ Optical NMS's support for virtual concatenation with a link capacity adjustment scheme (LCAS).

Background   LCAS provides a control mechanism to hitlessly increase or decrease the capacity of a virtually concatenated link to meet the bandwidth needs of the application. It also provides a means of removing member links that have experienced failure.

Model   The following model is a high level diagram of virtual concatenation.

Figure 4-11 High level diagram of virtual concatenation
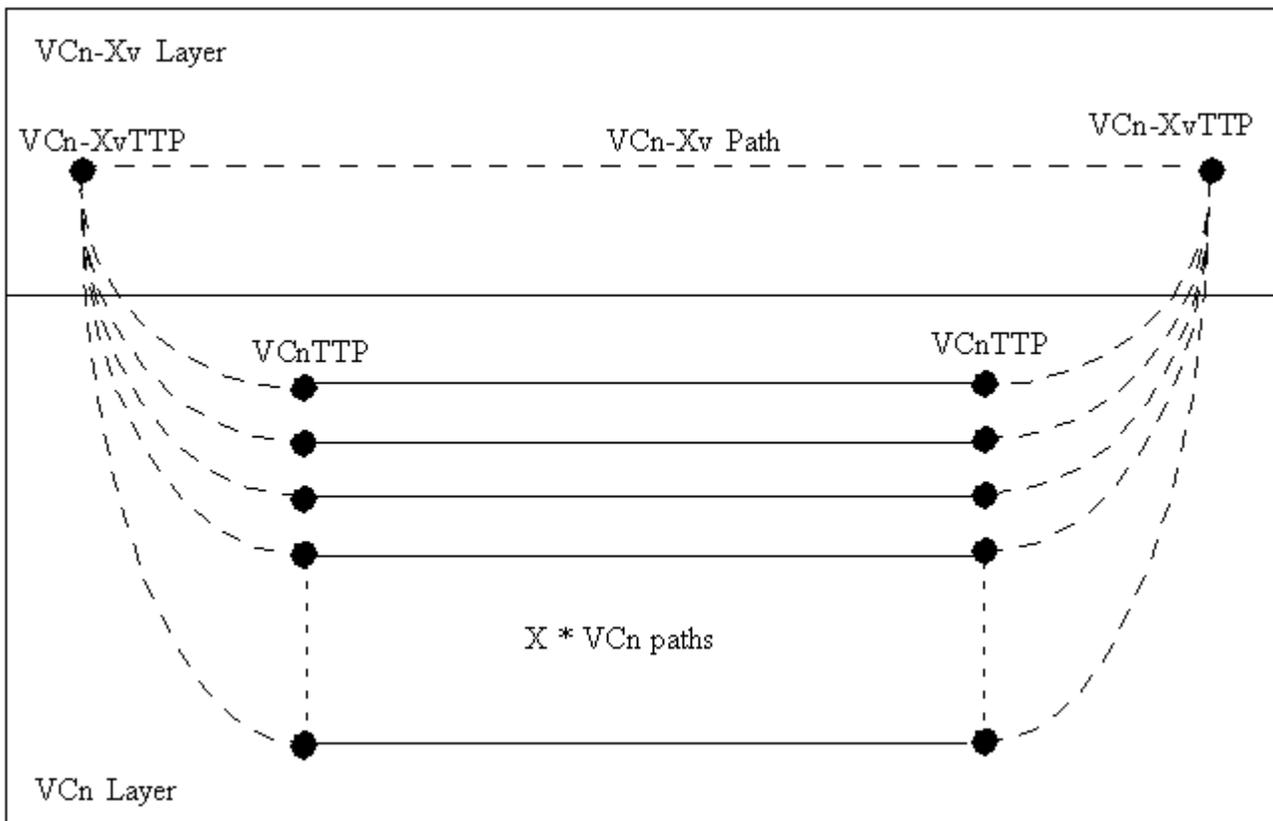
Bandwidth adjustment   Once provisioned, bandwidth adjustment is hitless.

- Bandwidth can be modified under management control whilst keeping the virtually concatenated path in service. This will not be service affecting, and can done by:
    - provisioning additional VCn's to be part of the virtually concatenated path.
    - reducing the number of VCn's that are part of the virtually concatenated path.
- Bandwidth can be modified automatically due to failure of the VCn's whilst keeping the virtually concatenated path in service.
    - On failure, the affected VCn disabled until the VCn path has been restored, at which point it will be re-incorporated into the VCn-Xv.
    - If failure of all but one of the VCn paths that support the VCn-Xv occur, then the VCn-Xv will be degraded and will be operating at a reduced bandwidth. If the final VCn fails then the VCn-Xv also fails.
- Bandwidth can be protected whilst keeping the virtually concatenated path in service by provisioning the capacity VCn-Xv to be greater than the intended maximum capacity needed by the client service.
    - On failure of one or more of the VCn's in the VCn-Xv, reducing the capacity of the VCn-Xv down to the intended maximum capacity needed by the client service, the VCn-Xv itself is degraded, however the service itself is still working.
    - On failure of one or more VCn's in the VCn-Xv, reducing the capacity of the VCn-Xv to below that required for the intended maximum capacity needed by the client service, both the VCn-Xv is degraded and the service itself is degraded.

Ordinal symmetry   Unlike for virtual concatenation without the LCAS, the VCn paths that support the VCn-Xv path do not have to have the same ordinal symmetry at both ends of the connection. Ordinal symmetry will be enforced by Navis™ Optical NMS.

All STS trails belonging to a VCG have to maintain ordinal symmetry when both ends of the trail terminate on VCG capable cards. Ordinal symmetry should not be confused with time slot. Herein, by ordinal

symmetry it is meant the rank order (that is first, second, third, etc.) of the STS at the VCG port. For example, say the user wants to provision up to 150Mb/s capacity between network element "A" and "Z". To achieve the 150Mb/s capacity, three STS-1s have to be provisioned between "A" and "Z". Consider the first, second and third STS-1 terminate on "A" at ports "1", "2" and "3" respectively. To maintain ordinal symmetry the second STS-1 can only terminates at "Z" on ports that have higher sequential order than the ″Z″ termination port for first STS-1. Similarly, the third STS-1 can only terminates at "Z" on ports that have higher sequential order than the ″Z″ termination ports for first and second STS-1. On the other hand, if only 50Mb/s capacity is provisioned from "A" to "Z" any combination is acceptable since only one STS-1 is provisioned.

Figure 4-12 Ordinal symmetry requirements for virtual concatenation with LCAS
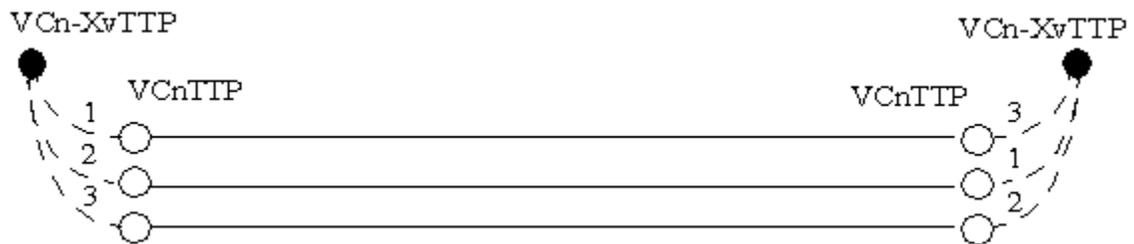
The LCAS has the ability to reconstitute the VCn-Xv based on the sequence number of each of the VCn's, ensuring that the payload of VCn-Xv is reconstituted in the right order. If a VCn has a sequence number that is completely out of the scope of the VCn-Xv, e.g. for Ordinal Symmetry Requirements for Virtual Concatenation with LCAS.

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Virtual concatenation without link capacity adjustment scheme

Overview This section describes Navis™ Optical NMS's support for virtual concatenation without a link capacity adjustment scheme (LCAS).

Background Basic virtual concatenation without LCAS, enables pipes to be created in granularities outside of that for standard SDH. Thus increasing flexibility in the use of the available bandwidth in the network. the availability of these pipes is based on that of the SDH connections that support it. Any adjustments in size made to the pipes, either automatically due to failures or manually due to provisioned changes are service affecting.

Bandwidth adjustment Once provisioned, bandwidth adjustment is *not* hitless.

- To increase the bandwidth, additional VCn's can be added, however, this will be service affecting.

- If a failure of one on the VCn's that makes up the VCn-Xv occurs, then the VCn-Xv Path itself fails. This will also be service affecting.

Ordinal symmetry For the VCn-Xv path to operate successfully, the VCnTTP's over which it is transmitted must have the same ordinal symmetry at both ends of the connection.

All STS trails belonging to a VCG have to maintain ordinal symmetry when both ends of the trail terminate on VCG capable cards. Ordinal symmetry should not be confused with time slot. Herein, by ordinal symmetry it is meant the rank order (that is first, second, third, etc.) of the STS at the VCG port. For example, say the user wants to provision up to 150Mb/s capacity between network element "A" and "Z". To achieve the 150Mb/s capacity, three STS-1s have to be provisioned between "A" and "Z". Consider the first, second and third STS-1 terminate on "A" at ports "1", "2" and "3" respectively. To maintain ordinal symmetry the second STS-1 can only terminates at "Z" on ports that have higher sequential order than the ″Z″ termination port for first STS-1. Similarly, the third STS-1 can only terminates at "Z" on ports that have higher sequential order than the ″Z″ termination ports for first and second STS-1. On the other hand,

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if only 50Mb/s capacity is provisioned from "A" to "Z" any combination is acceptable since only one STS-1 is provisioned.

Figure 4-13 Ordinal symmetry requirements for virtual concatenation without LCAS
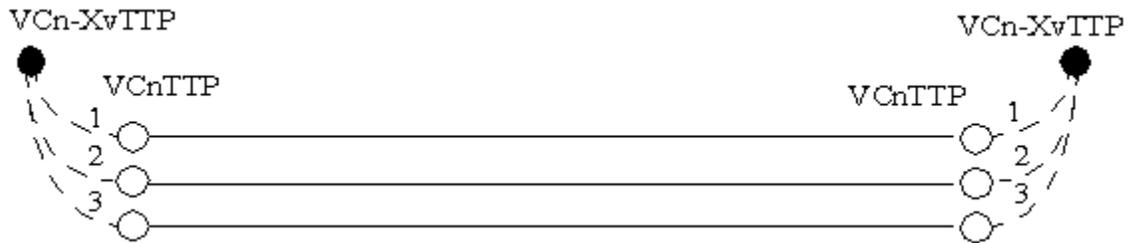
A sequence number is added to the overhead of each of the VCn's to ensure that the payload of the VCn-Xv is reconstituted in the right order. If the order of the VCn paths that support the VCn-Xv path is not maintained, then the VCn-Xv path will fail. If a VCn has a sequence number that is completely out of the scope of the VCn-Xv will be treated the same as if the order has been mixed up and the VCn-Xv will fail.

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Section VIII: Preplan Restoration

Overview

Purpose   Restoration is the process for Navis™ Optical NMS users to reroute traffic temporarily in order to restore service in case of a network failure. Navis™ Optical NMS manages restoration through two features: automatic protection switching and preplan restoration. This section focuses on preplan restoration as it relates to Navis™ Optical NMS.

Contents

How Navis™ Optical NMS manages restoration

Overview
This section describes how Navis™ Optical NMS manages restoration. In the event of a network failure, Navis™ Optical NMS can restore service to an alternative link or path that has been reserved for restoration purposes. Navis™ Optical NMS manages service recovery with two features:

- Automatic protection switching
- Preplan restoration

Automatic protection switching
Automatic protection switching restores service to a disrupted circuit by switching the traffic to a dedicated protection route. It is triggered by an alarm and allows for only one-stage restoration. This restoration feature does not require user intervention.

Automatic protection switching requires dedicated spare capacity to be set up when service is provisioned. Mechanisms for automatic protection switching include: MSP, MS-SPRing, PSR, 1+1 SNC/P, and Y-protection. The mechanism is selected during service provisioning, depending upon the capability of a network element. In the case of failure, detected by the network element supporting the mechanism, a protection path will be selected and routed by the network element automatically.

Preplan restoration
Preplan restoration allows users to create dedicated backups for service paths and circuits. Disrupted circuit can then be temporarily rerouted on an alternate route to restore service. The restoration process can be triggered manually or automatically by an alarm. Once the alarm situation is resolved, the restored circuit is reinstated to its original route.

Preplan restoration works best where:

1. One portion of the service circuit is within control of Navis™ Optical NMS while the other end is outside the Navis™ Optical NMS control and on the end customers premise

2. Customers have mixed network elements in their network

3. Restoration paths are "off-network" and must be defined by the customer.

4. Ring protection not provided in the network element.

5. Fiber cut between rings

6. More efficient usage of spare capacity is desired

Customers can use preplan restoration to establish specific predefined path(s) according to their network preference. In the event of a failure, the service will be restored to one of the predefined paths. The spare capacity is only used at the time of restoration and can be shared among different preplans for different failure scenarios.

Navis™ Optical NMS supports preplan restoration of all the circuit rates that are allowed under normal service provisioning below the digital link level. However, only two-way circuit types can be protected by preplan restoration. One-way and broadcast circuits cannot have preplan.

Normally, a preplan path protects a service path with identical circuit type, including "One Step" provisioned circuits, except for FLAG application. The service facility/circuit to be protected must be in the "In-Effect" (IE) state in the network before preplan association can be invoked. One stage or three stages restoration/reinstatement process can be allowed if appropriately supported by the network element or EMS.

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Aspects of preplan restoration

Overview
This section discusses the three aspects of preplan restoration:

- **Restoration**: a disrupted circuit is temporarily rerouted to an alternate route to restore service.

- **Reinstatement**: a restored circuit is returned to its original route.

- **Preemption**: a higher priority circuit is restored even if there is a lower or equal priority circuit already using the channel. In such a case, the lower priority circuit is disconnected and the higher priority circuit is restored. The system administrator has the option of turning preemption on or off for restoration.

Basic features
The following items are basic features supported by preplan restoration:

- creation of preplan restoration and preplan assignments

- association of a preplan to a service circuit

- preplan plan and preplan group

- execution of a preplan

- preemption and affected circuits

- reinstatement

- restoration status

- reports

- preplan for optical trails

Restoration
Restoration is when a disrupted circuit is temporarily rerouted to an alternate route in order to restore service. The process of restoring the failed facility involves moving each affected circuit over to the preplanned route. The graphical layout for each moved circuit is updated with the new port address information.

Soft Restoration

With soft restoration, also referred to as ***bridge and roll***, a ***bridge*** is first established and then traffic is rerouted from service to the preplan. Once the traffic is rerouted, the bridge is disconnected. Although traffic is uninterrupted, soft restoration is much slower as compared to hard restoration.

Normally, Navis™ Optical NMS supports soft restoration/reinstatement for a protected path. The exception is when cross connection performed between the protection segment of a protected path and another path (either from service to preplan path or from preplan to service path) within the same network element node, where the involving network elements support bridge and roll capabilities, Navis™ Optical NMS does not allow preplan soft restoration/reinstatement (bridge and roll) for protected path.

Figure 1: With the A node and Z node supporting bridge and roll capabilities, soft restoration/reinstatement can be applied in this scenario because either the A node or the Z node does not cross connect traffic from the protection segment of a protected path to the preplan path (5-6). Hard restoration/reinstatement can also be used.
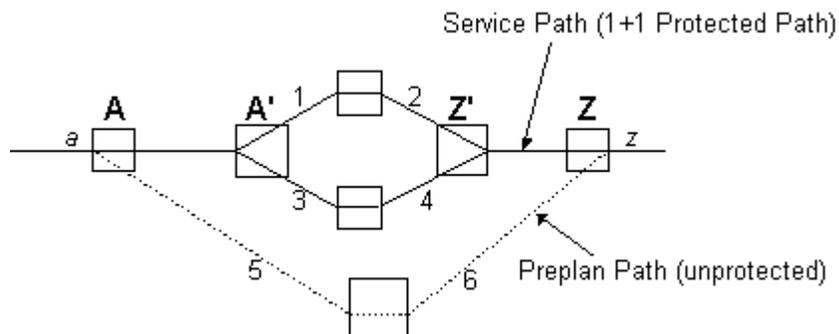
Hard restoration

With hard restoration, a network service is first disconnected on the service path, a switch is made to the preplan and then the service is connected on the preplan path. Traffic is temporarily interrupted in a hard restoration.

Hard restoration/reinstatement (default) is available for restoration/reinstatement of all unprotected and protected paths.

Figure 2: With the A node and Z node supporting bridge and roll capabilities, soft restoration/reinstatement can not be applied in this scenario because either the A node or the Z node has protection segment of a protected service path and unprotected preplan path. No soft restoration/reinstatement shall be allowed for cross connection between the protection segment of a protected service path and preplan (either protected or unprotected) path from the same network

element node. Hard restoration to preplan or reinstatement to service path must be used.
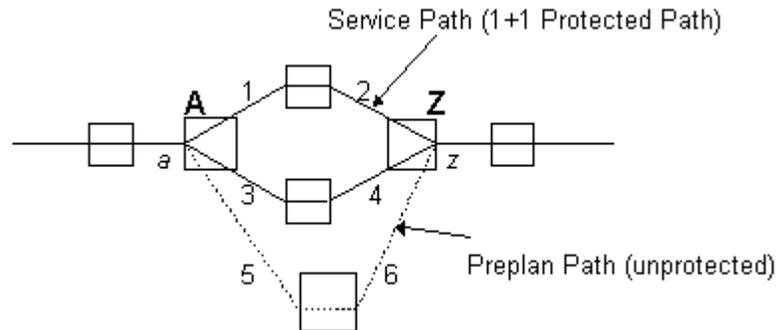
Hard and soft restoration for the Lambda Router: users can choose to use either hard (default) or soft restoration for Lambda Router models 256/128 that support 1+1 SNCP protection. Navis™ Optical NMS can support both hard and soft restoration using modify SNC operation for Lambda Routers (in lieu of bridge and roll).

Hard and soft restoration for the BandWidth Manager: users can choose to use either Hard (default) or Soft restoration for the BandWidth Manager.

Hard and soft restoration for Lambda Unite: Navis™ Optical NMS supports bridge and roll capabilities between service and preplan routes for Lambda Unite. Users can use either Hard (default) or Soft restoration for Lambda Unite.

Hard and soft restoration for WaveStar TDM 10G: Navis™ Optical NMS supports bridge and roll capabilities between service and preplan routes for WaveStar TDM 10G. Users can use either Hard (default) or Soft restoration this network element type.

Triggers

A preplan form's preference and priority fields determine whether restoration is triggered.

- *Automatic* - if a service circuit is protected by multiple preplans, the preplan selection criteria is based on the highest preference level as well as the alarm status of the preplan. If the selected preplans based on the preference level have alarms or in-effect circuits on their channels, the preplan shall not be used for restoration and the next highest preference level available preplan will be tried.

- *Manual* - if a restoration fails, the user will go to the Preplan Pairs, PrePlan Plan, or Preplan Group form to execute restoration for the selected facility/circuit.

Tracking status of restoration orders

Users can track the status of restoration orders by using the Preplan Pairs form.

Reinstatement

Reinstatement is the process whereby a restored circuit is returned to its original route. Once a failure has been repaired, a reinstatement may be initiated which would move circuits from the restoration path back to the original service path.

Enabling reinstatement

Users can activate the reinstatement process from the Preplan Pairs form. From that form, users need to specify the facility to be reinstated and then select the reinstate action from the Actions pull-down menu.

Preemption

Preemption is used to restore a higher-priority circuit to a circuit that is being currently used by lower or equal priority traffic.

How it works

If preemption is turned on and a facility/circuit is needed for restoration, a dialogue box appears, during restoration indicating the preemption target (CKT/Trail ID), and requests user confirmation. After user confirmation, the lower-priority circuit on the channel is disconnected and the higher priority circuit is restored. To maximize restoration speed, Navis™ Optical NMS does not check whether the preemption target has another preplan.

After preemption is completed, the preplan that caused the preemption must be manually re-triggered to complete the restoration process. A preemption report is available to keep track of all the preempted circuits.

Constraints

The following constraints apply to preemption:

- Preemption is not allowed on circuits carrying lower order in-effect traffic (such as a VC-4 carrying a VC-12).

- If any preplan circuit in a preplan plan (or preplan group) requires preemption, the system displays a message for that particular preplan and awaits confirmation. Preemption must be confirmed before the system can continue to process other preplans in that preplan plan (or preplan group). After the preplan plan or preplan group execution is completed, there are two options to re-trigger those circuits that have gone through preemption:

  - A preplan plan (or preplan group) can be triggered for a second restoration because the preplan, marked for restoration order, is skipped. Only the circuits with confirmed preemption are restored.

  - Individual circuits can be triggered for restoration through the preplan pairs form after preemption acknowledgement.

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Preplan creation

Overview   The preplan restoration creation process begins when the user selects a service paths/circuits to be protected and creates preplans via provisioning. The process is done off of the Service Network Map using the point and click provisioning capabilities. The user shall be able to provision a preplan path/circuit using the automatic, semi-automatic or manual route selection, similar to the process used for adding a service path/circuit except using the value 'Preplan' of Order Action for preplan. Each preplan is reserved for one specific service path/circuit of its failure condition.

Implementation   Preplan restoration is implemented in three phases:

1. The user creates and implements a service circuit.

2. The user creates a preplan circuit to backup the service circuit.

3. The preplan circuit is assigned to the service circuit through the preplan pairs add form.

4. Once the process is completed, the service facility is automatically protected in the event of failure.

Selection   The user can select a two-way service facility/circuit to be protected via the Service Network Map and create preplans at that rate (a list of available circuit types will be displayed for user to select from). The user can access the Preplan Assignment form to display the preplan circuit assignment information including corresponding channel status and preplan circuit execution mode and status for a specified circuit.

The user has the option of picking the exact channels for the preplan (manually) or allowing the system to pick the channels (automatic). If the automatic method is selected, then Navis™ Optical NMS shall select and assign spare channels along the selected path to the preplan restoration order. If the manual method is selected, the user shall select the channels on each of the links in the preplan path. A preplan circuit shall be able to be viewed from the graphical layout similar to a regular provisioned circuit.

Using common resources

Navis™ Optical NMS supports multiple service paths, which can be associated with their individual preplan paths using the same common channel resources. To be able to use a common channel resource, the user has to manually provision separate preplans (with different circuit ID for each preplan) for each service path with the common channel resource. Also the same digital link/channel shall be able to be used for multiple preplan paths.

Example 1: Service path 1 (1-2-3-4) associated with preplan path 1 (1-9-10-4) and service path 2 (5-6-7-8) associated with preplan path 2 (5-9-10-8). Preplan path 1 and 2 can use a common channel resource (9-10).

Service path 1 (1-2-3-4)

| 1 | | 2 | | 3 | | 4 |

Service path 2 (- - -)

| 5 | | | | | 8 |

| 1 | | | 1 | | | 4 |

re-p a p ath 1 (1- -1 -4)

| 5 | | | 1 | | | 8 |

re-p a p ath 2 (- -1 -)
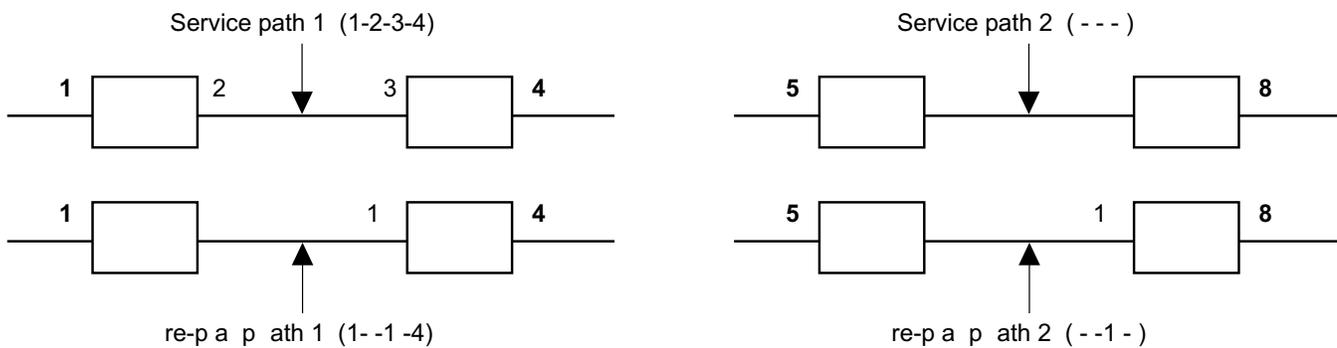
Possible circuit types

Navis™ Optical NMS allows users to create preplan restorations for individual working circuits in a network. The creation of preplans are implemented using map-driven point-and-click operations off the Network Map. A preplan circuit creation is provisioned similar to adding a service circuit. To distinguish the preplan circuit from a service circuit, the value 'Preplan' of Order Action shall be used for preplan circuit/path instead of the value 'Add'. The preplan circuit can be viewed from the Graphical Layout. A preplan path and the service path that it protects, including "One Step" provisioned circuits, have identical circuit types except for the FLAG application.

The following table listed all possible circuit types can be provisioned as service circuit if ″One Step″ provisioning is selected at installation and the corresponding preplan circuits that shall be allowed for each service circuit.

Possible circuit types of service circuit in ″One Step″	Allowed circuit types of preplan in ″One Step″

TU12-VC11S	TU12-VC11S
VC12S	VC12S
VC2S	VC2S
VC3S	VC3S
AU3S	AU3S
VC4S	VC4S
TU12-VC11S-24N	TU12-VC11S-24N
VC12S-30N	VC12S-30N
VC3S-480N	VC3S-480N
VC3S-672N	VC3S-672N
AU3S-672N	AU3S-672N
VC4S-1920N	VC4S-1920N

Protected path support   A protected path can be protected by preplan path(s). The protected paths in Navis™ Optical NMS include 1+1 protected, ring-protected and Y-protected (non-assignable only). The ring-protected paths/preplan paths involved in preplan pairs can be either SNCP (PSR) or MSSPRING (LSR). A preplan path in Navis™ Optical NMS can be provisioned as either a protected or unprotected path. Protected service path can be protected by either unprotected or protected preplan path(s).

The same rules of association for unprotected paths will be applied to the protected paths (e.g. a preplan path shall protect a service path with identical circuit type).

- **Unprotected Service Paths**: A service path provisioned as unprotected path can have either protected path (1+1, ring protected, or Y-protected) or unprotected path as the preplan path. In other word, all the existing preplan capabilities for unprotected service path shall be expanded to allow having either protected path or unprotected path as preplan path.

- **Non-Assignable Y-Protected Paths**: Navis™ Optical NMS can support preplan association for only non-assignable Y-protected paths at any rate that the path can support.

- **Protected Service Paths**: The Navis™ Optical NMS can support preplan provisioning, association and restoration for a service path provisioned as protected path. A service path provisioned as protected path can have either unprotected or protected path as the preplan path. All the existing preplan capabilities for unprotected preplan path shall be applied to protected preplan path (e.g. preplan creation, association, preplan plan, preplan group, alarm-triggered restoration, preemption, reports). A protected path involves both working and protection segments. When a failure (e.g. alarm on paths with Disabled fault status) occurred on the working path, the traffic will be switched automatically by the network elements to the protection path first. If the protection switching can not take place, then the traffic shall be routed to the associated preplan path manually or automatically. The manual preplan restoration for protected path remains the same as for the unprotected path.

The following four figures depict some possible situations for service path provisioned as protected/unprotected having preplan path(s).

Figure 1: A service path, provisioned as an unprotected path, is protected by a preplan path provisioned as an unprotected path.

Service path (unprotected)

Preplan path (unprotected)
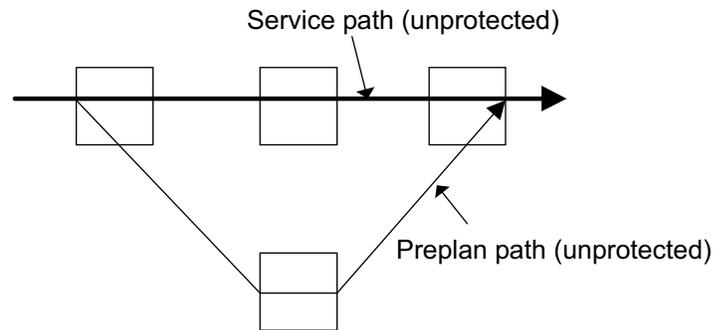
Figure 2: A service path provisioned as a Y-protected path can be protected by a preplan path provisioned as Y-protected and/or an unprotected and/or a ring-protected path.

Working path of service path (Y-protected)

Protection path of service path (Y-protected)

Working path of preplan path 1 (Y-protected)

Protection path of preplan path 1 (Y-protected)

Preplan path 2 (unprotected)

Preplan path 3 (ring-protected)
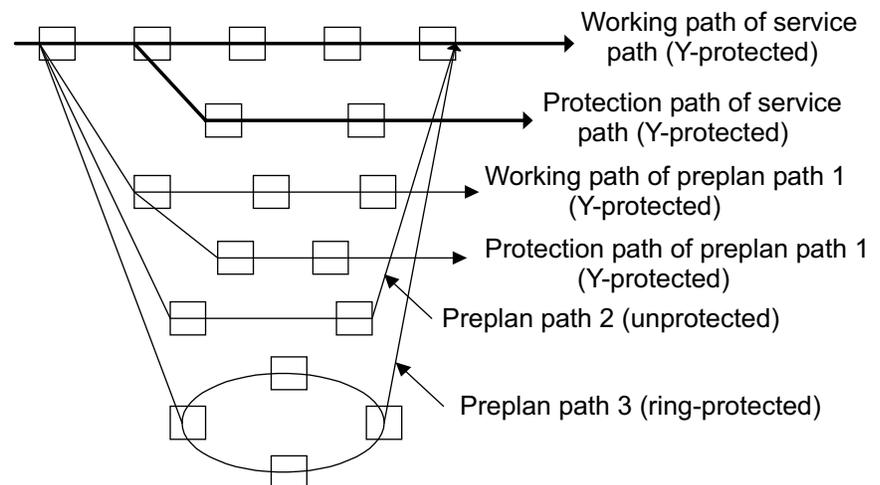
Figure 3: Service paths provisioned as 1+1 protected can be protected by a preplan path provisioned as a ring protected and/or an unprotected path.
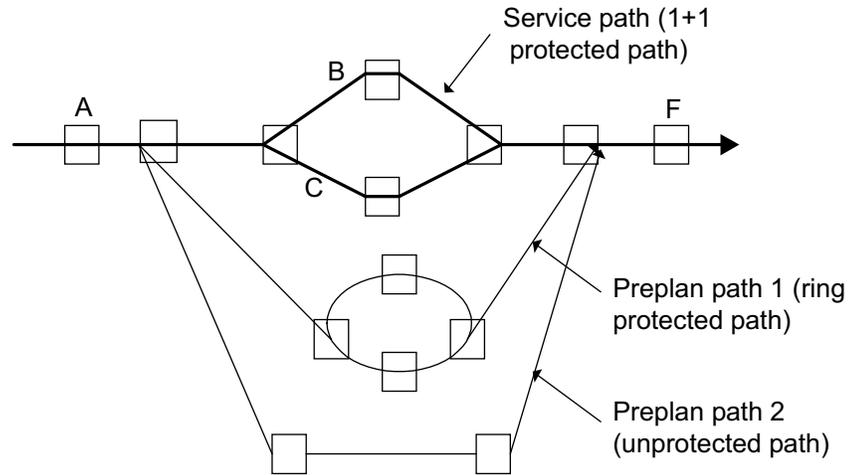
Graphical layout   The graphical layout supports the same display capabilities of unprotected path for the protected path when the implementation of restoration/reinstatement process is failed.

Only the segment(s) which belong to the old order path and are not common with the new order path shall be shown in color gray. The rest segments (if any) of the old order path and the new order path shall be shown with the color indicating the current status (e.g. blue, magenta, green depending on the status).

Figure 1: When restore/reinstate implementation from path 1-2-3-4 (old order) to path 1-5-6-4 (new order) failed, the segments C-2-D and E-3-F of the old order path will be in gray because they are not common segments with the new order path. The rest segments of the

new and old order paths are in the color(s) indicating the current status.
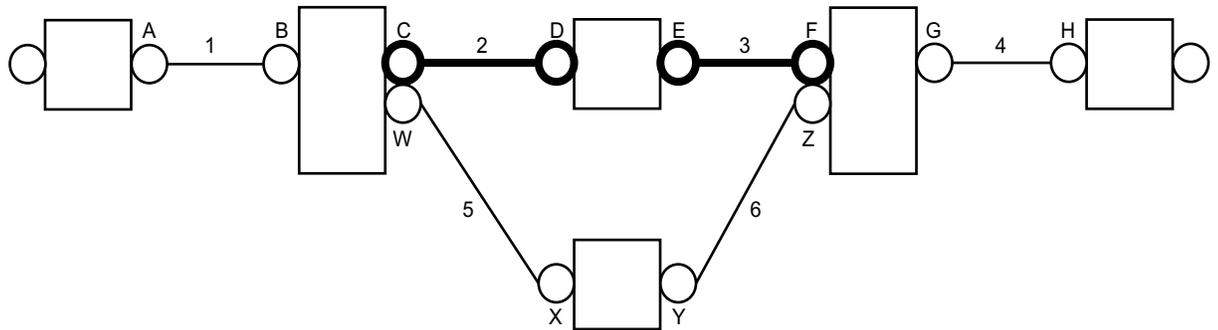
Figure 2: When restore/reinstate implementation from path 1 - 2/4 - 3/5 - 6 (old order) to path 7 - 8 (new order) failed, the whole segments of the old order path (A-1-B, C/G - 2/4 - D/H, E/I - 3/5 - F/J, K-6-L) will be in gray because no common segment with the new order path. The segments of the new order path (W-7-X, Y-8-Z) are in the color(s) indicating the current status.
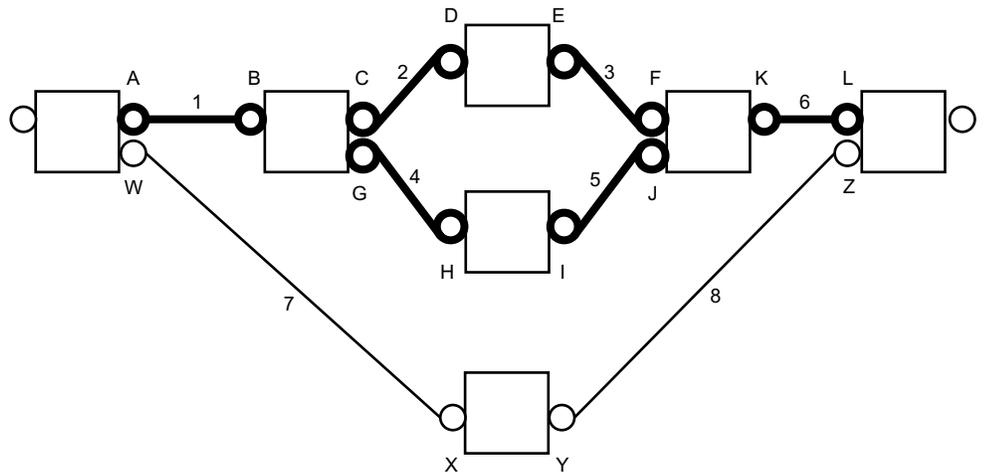
Associating a preplan to a service circuit

Introduction To protect an in-effect service circuit, a preplan circuit needs to be associated with the service circuit to be protected after it is successfully created.

The service circuit being protected must be in the in-effect state and the preplan circuit must be in the pending step (CPL) before an association can be made. The association shall be made utilizing the Preplan Pairs Add form, from which the user shall be able to enter both the service and the preplan circuits IDs to establish the association or link preplan pairs to a preplan plan. A preplan path shall protect a service path with identical circuit type, including "One Step" provisioned circuits, except for FLAG application.

1 x N preplans Navis™ Optical NMS has "1 x N" preplan restoration capability which can be set up through the environmental variable during system installation process. The "1 x N" preplan restoration means that an IE service circuit can be protected by "N" (99 less than or equal to N greater than or equal to 1) preplan circuits.

M x 1 preplans Navis™ Optical NMS provides ″M x 1″ preplan restoration capability which can be set up through an environmental variable during system installation process. ″M x 1″ preplan restoration implies M (10 Š M Š 1) service paths maybe protected by 1 preplan path.

This option is not supported if "1 x N" preplan restoration is chosen (i.e the ″M x 1″ and ″1 x N″ preplan options are mutually exclusive).

**Preplans with different
end nodes**

Navis™ Optical NMS can handle preplan restoration/reinstatement path with one or both end nodes that are not identical to the end nodes of the associated service path. It means the preplan path and its corresponding service path may have two common end nodes, one common end node, or two different end nodes. However, Navis™ Optical NMS shall block the implementation of preplans with different end nodes if the end node of the service circuit contains groomed low-level paths/circuits. A non-channel assignable entity (e.g. VC-4, VC-12, VC-3, or VC-2) shall allow preplan with different end nodes (one or both). An assignable entity but no lower order paths/circuits provisioned shall allow preplan with different end nodes (one or both) at the SDH level. TUG structure VC-4 path can be preplan protected as long as the TUG structure termination points are not changed.

**Preplan path with different
end ports on the same end
node**

For non-infrastructure paths that do not terminate at WaveStar DACS or DACS VI, Navis™ Optical NMS shall allow preplan restoration/reinstatement circuit within the same network element node with the service circuit but sharing one common end port. The preplan path and the associated service path can be either unprotected or protected. If either preplan path or service path is provisioned as protected path, only hard restoration/reinstatement shall be applied regardless the involving network element has bridge and roll capabilities. Soft restoration/reinstatement shall be available only when both preplan and service paths are provisioned as unprotected and the network element, where the cross connect will be performed, supporting the bridge and roll capabilities. Restoration/reinstatement shall not be allowed for the service and preplan paths have no common terminating port within the same end node.

Preplan path with one different end port on the same end node

For non-infra-structure paths that do not terminate at WaveStar DACS or DACS 6, Navis™ Optical NMS allows for a preplan restoration/reinstatement circuit within the same network element with the service circuit but sharing one common end port. The preplan path and the associated service path can be either unprotected or protected. If either preplan path or service path is provisioned as protected path, only hard restoration/reinstatement shall be applied regardless the involving network element has bridge and roll capabilities. Soft restoration/reinstatement shall be available only when both preplan and service paths are provisioned as unprotected and the network element, where the cross connect will be performed, supporting the bridge and roll capabilities.

Restoration/reinstatement shall not be allowed for the service and preplan paths have no common terminating port within the same end node.

Preplan preference level

Users can specify the preference level 1-99 (99 is the highest preference) for each preplan circuit via the Preplan Pairs form and Preplan Pairs Add form. Preference level of each service/preplan circuit pair for the same service circuit must be unique and can be set at the same time the preplan path is established. This will allow the user to establish multiple preplans to protect similar type failures.

In the automatic (alarm-triggered) restoration, the preference level shall be used as the order of selection preference. For example, the preplan with the highest preference will be implemented when a service circuit is protected by multiple preplans. If the preplan with the highest preference is not available (i.e. it has a primary alarm on its route or on its carriers) at the time of restoration, the preplan with the next highest preference when available will be selected. For automatic restoration, if no preplan available at the time of restoration for a service circuit, no restoration action will be taken and the service circuit shall be left in the failed state until manual resolution by the user. Preplan preference level is mainly for alarm-triggered restoration and for 1 x N application.

Preplan priority level
Users have the option of setting the priority (1-10, default value is set to 5 if not entered by user) of the service/preplan circuits pair via the Preplan Pairs form and Preplan Pairs Add form. The user can use priority level to determine which service circuit has higher priority when multiple service circuits share the same preplan. If all service circuits have same priority level then the preference level will be used. The service circuit with the highest preference level will use the preplan. The priority level can be used for preemption.

Automatic triggering of next available preference level preplan restoration
If turned on, Navis™ Optical NMS shall automatically trigger the next highest available preference level preplan if the failed service circuit can not be restored with the highest available preplan because the highest preference level preplan is already used by other circuits or is in alarmed state. The process of finding the next preference level preplan shall be continued until an associated preplan with no alarm or not in use by other service circuits is found. If no available preplan is found at the time of restoration for a service circuit, no restoration action will be taken and the service circuit shall be left in the failed state until manual resolution by the user.

Disassociation of preplans from service circuits
Users can use the Preplan Pairs Form to disassociate the service circuits from its associated preplan circuit. Each disassociation action shall disassociate one service/preplan pair at a time. For the service/preplan pair linked to a Preplan Plan and/or Group, the user needs to unlink the preplan circuits from the Preplan Plan and/or Group before disassociate preplans from service circuits. If user tries to disassociate a preplan of a Preplan Plan and/or Group without unlinking it first, an error message shall be displayed.

Modifying preplans

Users can modify preplans from the Graphical Layout only if it is in the LAY state and not associated with any service circuit. After association, the preplan can not be modified because it must be in the pending CPL step. If the preplan not associated with any service circuit but in the CPL state needs to be modified, the user shall be able to select Actions Æ Move Order Step Back from the preplan's Graphical Layout to bring the preplan's Order Step from CPL to LAY. Once the preplan is in the LAY state, the user shall be able to modify the preplan circuit via the Digital Link/Facility/Circuit Profile form by selecting Actions Æ Modify Æ Path from the preplan's Graphical Layout. The user shall also be able to bring the preplan's Order Step from LAY to CPL by selecting Actions Æ Move Order Step Forward from the preplan's Graphical Layout.

Cancelling preplans

Users can cancel a preplan circuit via the Graphical Layout if the preplan circuit is not associated with a service circuit and the preplan circuit must be in LAY state. For the preplan circuits linked to Preplan Plan and/or Group, the user needs to unlink the preplan circuits from the Preplan Plan and/or Group before cancelling preplans. If user tries to cancel a preplan of a Preplan Plan and/or Group without unlinking it first, an error message shall be displayed.

Preplan restoration on top of preplan

If turned on, the Navis™ Optical NMS shall allow next available unalarmed preplan circuit (one of the 1 x N preplans associated with the same service circuit) for the restoration of the original service circuit if the previous preplan restoration path is alarmed after the restoration has been complete. This feature shall be for 1 x N application only and applicable for manual and automatic restorations. For example, preplan P1 (preference level 90) & P2 (preference level 80) protect a service circuit (S1). First restoration used preplan P1 and completed. Alarmed on the in effect preplan P1, restoration will execute preplan P2 if available. When a service circuit protected by only one preplan, if the preplan restored and then has alarm, the service circuit remains in alarm/failure status.

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Preplan plans and preplan groups

Introduction For a single service circuit, Navis™ Optical NMS supports multiple preplans to be provisioned for different failure scenario in the network. For a single failure scenario, there can be many service circuits involved. For these scenarios, the user can utilize Preplan Plan or/and Preplan Group features. Preplan Plan/Group allows the user to create multiple preplans against each failure condition providing alternate route option at the time of restoration. This feature is applicable for manual restoration/reinstatement process only. Each service circuit can appear only once in each Preplan Plan/Group. For example, service circuit 1 associated with preplan circuit 1 (pair 1) and preplan circuit 2 (pair 2). The pair 1 and pair 2 can not co-exist in the same Preplan Plan/Group. Pair 1 can be in Preplan Plan/Group 1 while pair 2 is in Preplan Plan/Group 2.

Preplan plan Users can group more than one service/preplan circuit pairs into a Preplan Plan (Plan ID). Since a Preplan Plan is intended for a particular restoration route or a specific failure scenario, a service circuit shall appear only once in a Preplan Plan. A Preplan Plan can contain a grouping of maximum 500 service/preplan circuit pairs.

Figure 1: For example, service path 1 associated with preplan path 1, service path 2 associated with preplan path 2, and service path 3 associate with preplan path 3. If a failure occurred on the common carrier of all the three service paths, the entire service paths shall be routed to the associated preplan paths. The user has two ways to restore traffic for this failure scenario. One way is to restore the traffic from service path 1 to preplan path 1, service path 2 to preplan path 2, and service path 3 to preplan path 3 individually. The other way is to put the three service/preplan pairs in a preplan plan during preplan creation. The user only needs to execute a single trigger, the Preplan

Plan will restore the three service paths traffic to their associated preplan paths.
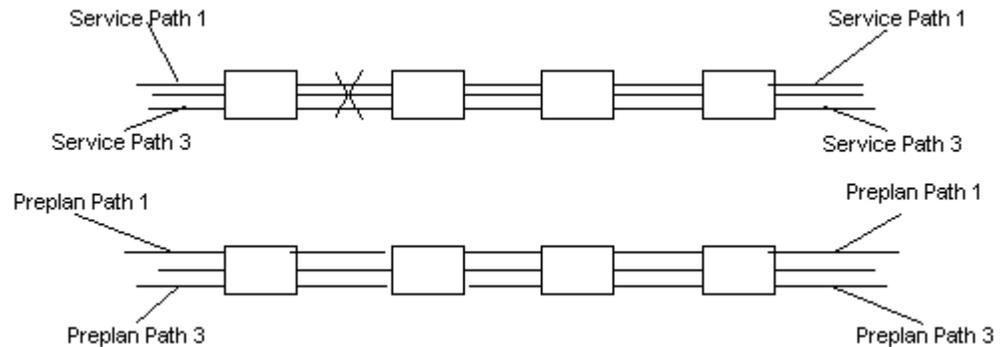
Preplan group Users can group multiple preplan plans into a preplan group (Group ID), so the preplan restorations/reinstatements can be easily tracked and implemented as a group. Since a preplan group is intended for a particular restoration route or a specific failure scenario, a service circuit shall appear only once in a preplan group. The preplan circuits in the same preplan group shall not have common channels. A preplan group can contain a grouping of maximum 500 Plan IDs.

Restoration and reistatement Navis™ Optical NMS allows the execution of the Preplan Plan or Preplan Group with some circuits that have been restored or reinstated. In this scenario, Preplan Plan or Preplan Group restoration/reinstatement shall proceed with restoration or reinstatement for the remaining circuits. Upon completion of the restoration/reinstatement, the total count of already restored or reinstated circuits included in each Preplan Plan/Group shall be indicated in the ″No Action″ column in the table of the Preplan Plan or Preplan Group form. For example, Preplan Plan 1 includes service/preplan circuit pairs 1, 2, 3, 4, 5 while pair #2 has been restored for an alarm situation. When executing restoration from the Preplan Plan 1, pairs 1, 3, 4, 5 will be restored and pair 2 will be skipped (because already in REST status). After the restoration is completed, the number of pairs that have no action taken because the pair was already in the requested state shall be indicated in the No Action column in the Preplan Plan form. In this example, 1 (for pair #2) will be shown in the No Action column.

Preplan for optical trails

Navis™ Optical NMS provides the capability to restore/reinstate an OCh channel trail if the following conditions are met:

- the service path and the preplan path have the same channel type/client service type

- the service path and the preplan path have different OCh trail

Users can choose to provision the protection OCh channel trail (i.e. the preplan path) either through another DWDM or the same DWDM but with different OMS (only if the DWDM supports more than one set with the same wavelength). If the protection OCh channel trail runs across another DWDM, it is client of on another OMS.

The preplan shall support the hierarchy of optical layers for provisioning between DWDMs and SDH network elements/black boxes via LamdaRouter for different applications. All SDH network elements can have compatible or non-compatible optics.

For protected service path (e.g. involving DWDM equipped with ORS), both the working and protection segments of the service OCh channel trail are using the same OMS (i.e. one fixed OCh). The preplan path can not use the same OCh trail with the service path regardless it is protected or unprotected path.

The cross connect between the service and preplan path for optical trail must be done via the same LamdaRouter.

Figure 1: If the failure is between the LamdaRouter and the DWDM (e.g. DWDM 1), one OCh trail is affected. Navis™ Optical NMS can

redirect the traffic through another DWDM (e.g. DWDM A) using one protection OCh trail client of another OMS (e.g. OMS A).
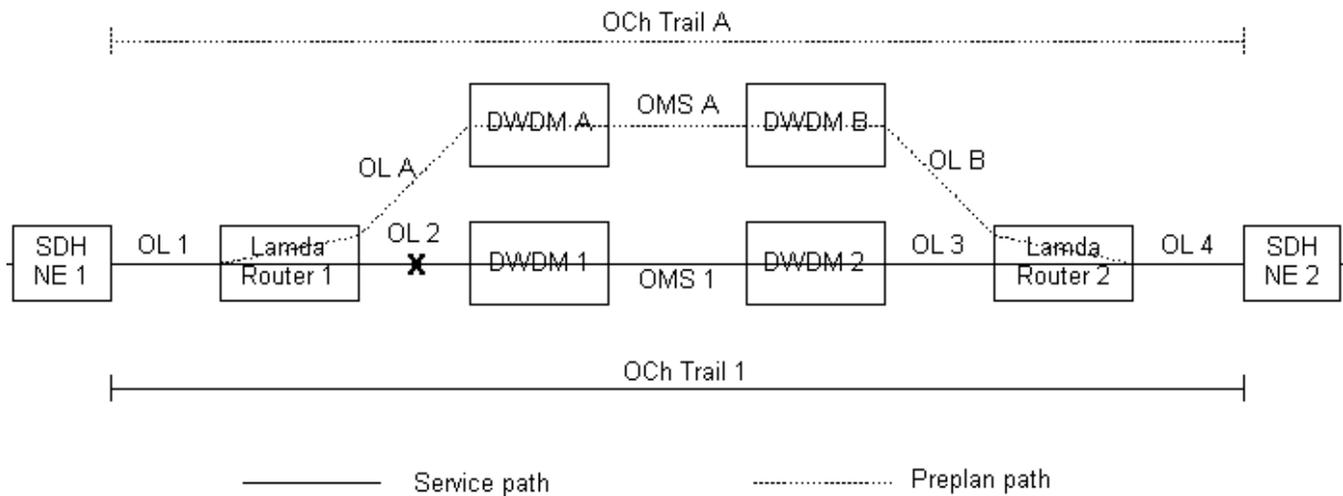
Figure 2: If the failure is between the two DWDMs, all OCh trails on the OMS (e.g. OMS 1) are affected. Navis™ Optical NMS redirects the traffic through another DWDM (e.g. DWDM A) using all protection OCh trails client of another OMS (e.g. OMS A).
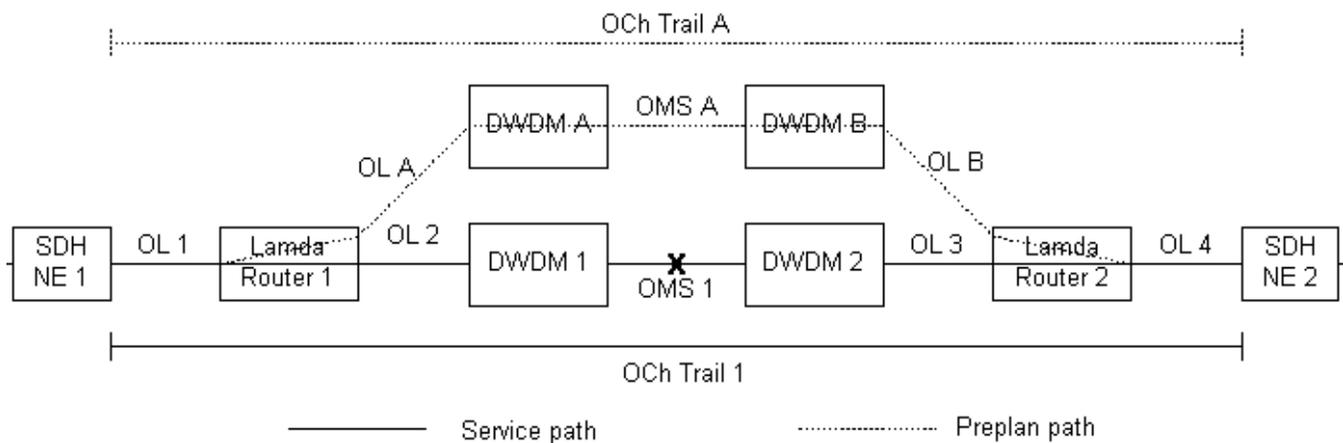
Figure 3: If the failure is between the LamdaRouter and the DWDM (e.g. DWDM 1), one OCh trail is affected. If the involving DWDW supports more than one set with the same wavelength, Navis™ Optical NMS can redirect the traffic through different OMS (e.g. OMS A in

the following figure) within the same DWDM with the same wavelength.
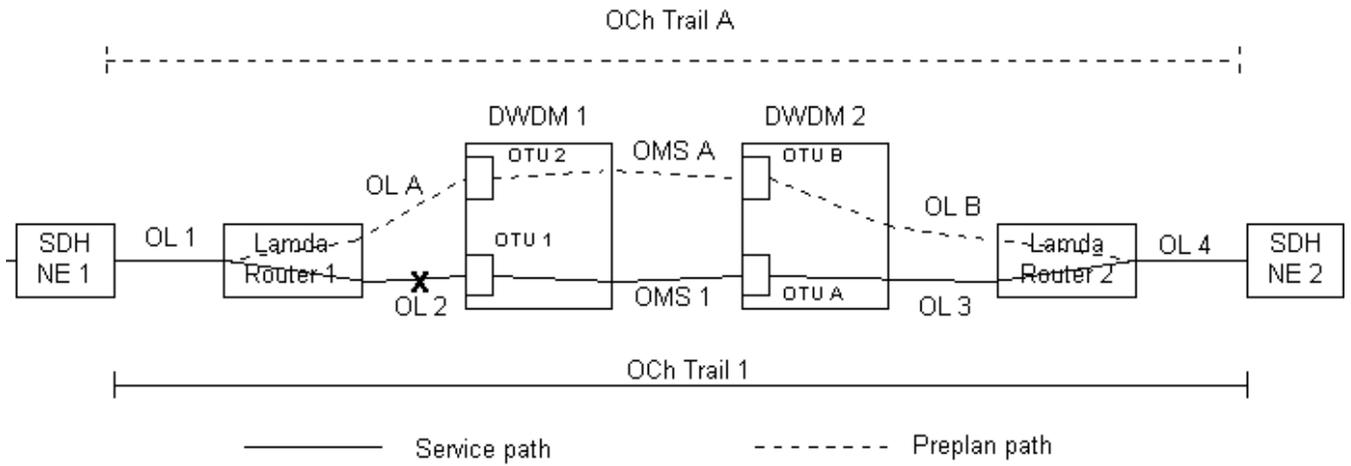
Provisioning controls

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Overview   This section presents an in-depth look at the GUI controls and features usable by the user to provision preplans with Navis™ Optical NMS.

Forms   Preplan restoration managements contains the following forms:

- Preplan Pairs Query Box
- Preplan Pairs
- Preplan Pairs Add
- Preplan Plan Query Box
- Preplan Plan
- Preplan Plan Add
- Preplan Group Query Box
- Preplan Group
- Preplan Group Add
- Affected Circuits for Preplan Execution Query Box
- Affected Circuits for Preplan Execution
- Preplan Assignment Query Box
- Preplan Assignment
- Preplan Parameters

Preplan pairs query box   The Preplan Pairs Query Box form allows users to specify query parameters to display only the selected preplan pairs records on the Preplan Pairs form or to have the all preplan pairs listed. The Preplan Pairs Query Box form has the following fields and buttons.

Editable Fields

- CKT/Trail ID - Enter unique circuit fields as query parameters to search matching records. Enter nothing to list all the preplan pairs. If the Free Form box is checked, only one field displayed allowing maximum 83 ASCII alphanumeric number. If the Free Form box is not checked, this field shall be in M.1400 format containing four sub-fields:

- Plan ID - Enter preplan plan ID to search preplan pairs in the specified preplan plan. Enter nothing to list all the preplan pairs without filtering preplan plan ID.

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Definable Fields

- Mode - Select preplan pairs is undergoing the REST (restoration) mode, REIN (reinstatement) mode, or None. Default value is 'None' to list preplan pairs in all available modes.

- Show Alarms on the Forms - List all the preplan pairs with available alarm information if any. Default value is pre-defined by the value of 'Show Alarms on the Form' in the Administration -> Preferences form. If 'Show Alarms on the Form' is not checked, the preplan query shall not perform filtering on alarms. If all other fields are either blank or using default value plus with 'Show Alarms on the Form' unchecked, the preplan query shall display all preplan pairs (with or without alarm) currently stored in the WS-NMS database. If 'Show Alarms on the Form' is checked, the preplan query shall display only preplan has alarms. The following two sub-fields shall be available only when 'Show Alarms on the Forms' field is checked:
  Alarm - Display preplan pairs with the specified alarm type. Default value is 'All' to list all preplan pairs have alarm. If 'Equipment' is selected, only the preplan has equipment alarm shall be retrieved and displayed if any. If 'Performance' is selected, only the preplan has performance alarm shall be shown if any. If 'Signal' is selected, only the preplan has signal alarm shall be displayed if any.
  Number of Records Requested - Enter the numeric number (maximum of 5 digits) of retrieved records to be displayed on the form. Default value is '100'.

Button Selection

- OK - Search the matching records with the data entered in the form and close the window form.

- Apply - Search the matching records with the data entered in the form and leave the window form opened with user entered data displayed.

- Reset - Clear and unchecked all data fields.

- Close - Close the window form without searching. All entered data fields are eliminated.

- Help - Display help message on the Netscape form.

Preplan plan query box   The Preplan Plan Query Box form allows user to specify query parameters to display only the selected preplan plan records on the Preplan Plan form or to have the all preplan plans listed. If the Circuit ID tab selected and data entered, the query shall be using the data entered in the Circuit ID tab. If the Group ID tab selected and data entered, the query shall be based on the Group ID entered. The Group ID tab shall become un-accessible once a data entered in any field of the Circuit ID tab. When group ID entered in the Group ID tab, the Circuit ID tab shall become un-accessible. The Preplan Plan Query Box form shall have the following two tabs and buttons.

Circuit ID Tab Editable Fields

- Service Circuit ID - Enter unique service circuit fields as query parameters to search matching records. Enter nothing applying to all service circuits. If the Free Form box is checked, only one field displayed allowing maximum 83 ASCII alphanumeric number. If the Free Form box is not checked, this field shall be in M.1400 format containing four sub-fields:

- Preplan Circuit ID - Enter unique preplan circuit fields as query parameters to search matching records. Enter nothing applying to all preplan circuits. If the Free Form box is checked, only one field displayed allowing maximum 83 ASCII alphanumeric number. If the Free Form box is not checked, this field shall be in M.1400 format containing four sub-fields:

Group ID Tab Editable Fields

- Group ID - Enter unique group ID.

Button Selection

- OK - Search the matching records with the data entered in the form and close the window form.

- Apply - Search the matching records with the data entered in the form and leave the window form opened with user entered data displayed.

- Reset - Clear and unchecked all data fields.

- Close - Close the window form without searching. All entered data fields are eliminated.

- Help - Display help message on the Netscape form.

Preplan parameters form   The Preplan Parameters form allows user to specify parameters for restoration or reinstatement. Basic preplan shall not include preemption parameter. Preemption parameter shall be available only when the feature is licensed and set to be 'ON' during installation. This form can have the following fields:

Definable Fields

- Stages - The restoration/reinstatement action is performed in One Stage or Three Stage. Default value is 'One Stage'.

- Restoration (for restoration action) - If reinstatement action is entered, this field shall be labelled as Reinstatement instead. Either for restoration or reinstatement, the default value is 'Hard'. If the associated network elements do not support the bridge and roll features, selecting value 'Soft' shall cause an error message displayed to user.

- Ignore Alarm - If this field is checked, the restoration/reinstatement action shall be performed ignoring any alarms on the preplan path. The default is not to have this field checked.

- Preemption - Only appeared when featured and turned on. If reinstatement action is selected, this field shall not be available. If this field is checked, preemption shall be available for restoration action.

Button Selection

- OK - Search the matching records with the data entered in the form and close the window form.

- Close - Close the window form without searching. All entered data fields are eliminated.

- Help - Display help message on the Netscape form.

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Triggering a preplan

Overview
Preplan restoration can be triggered manually by the user or automatically by a service affecting alarm. This section discusses both manual and automatic preplan restoration.

Manual preplan restoration
The user can go to the Preplan Pairs, Preplan Plan, or Preplan Group form to execute the restoration for the selected facility/circuit or reinstate to service circuit after repair. The user shall be required to set the "Ignore Alarm" (Yes or No), "Stage" (One Stage or Three Stages) and "Restoration/Reinstatement" (Soft or Hard) parameters whenever applicable.

Ignore Alarm option: The user can specify the "Ignore Alarm" option via the PrePlan Parameters form. "Ignore Alarm" option allows the user to specify if the alarm status on the preplan circuit should be ignored and has two choices: 'Yes' and 'No' (default). If the selection is 'No' and the selected preplan based on the preference level has alarm then the preplan restoration shall fail. The only exception is when the user sets "Ignore Alarms" to 'Yes', then an alarmed preplan shall be used and restoration order shall be created.

Stage option: The user can specify the "Stage" option via the PrePlan Parameters form. The "Stage" option allows the user to specify whether the 'one stage' or 'three stages' restoration/reinstatement process should be executed. If value "One Stage" is selected, then all commands will be executed automatically. If value "Three Stages" is selected, then the system stops after each step (IMP – bridge operation, IMR – roll operation) for user to send commands manually. The default setting for the "Stage" option is "One Stage" which can be set for Soft or Hard preplan restoration/reinstatement. Value "Three Stages" shall be applicable only for Soft preplan restoration/reinstatement.

Restoration/Reinstatement option: Users can specify the Hard or Soft restoration/reinstatement via the PrePlan Parameters form at the group level, plan level or preplan circuit at the time of restoration/reinstatement. For network elements which support bridge and roll capabilities, the user shall be able to choose to use either Hard (default) or Soft restoration/reinstatement. Network elements that do not support bridge and roll capabilities shall only be able to use Hard restoration/reinstatement. If value "hard" is selected, then disconnect (for restoration)/connect (for reinstatement) commands are

used for the alarmed service circuit and the cross-connect operation shall be implemented for preplan circuit. If "soft" is selected, then bridge, roll, and disconnect commands are issued for those network elements that support this type of activity. Hard option can not be used together with "Stages" option which has value "Three Stages."

Preemption option: The user can set the "preemption" option via the Preplan Parameters form only when the preemption feature is licensed. This option has two values, Yes and No (default), to turn preemption feature on or off. If 'Yes' is selected then the preemption feature is turned on; otherwise, the preemption is off. Preemption feature is only for manual restoration and used to restore a higher priority circuit even when there is a lower or equal priority circuit already using the channel.

Automatic preplan restoration

Automatic (alarm-triggered) preplan restoration is triggered by service affecting (SA) alarms for hard restoration only. When detecting an SA alarm, the user will be notified by a Maintenance Event icon. Upon receiving a SA alarm against a specific service circuit, the fault analysis will identify the failure at the highest level of the transmission hierarchy. If an alarm comes in against a digital link, then all service circuits with preplans on the digital link will be triggered for restoration. Once selected, a restoration order shall be created for the service path. If the restoration order fails, it needs to be manually resolved by the user.

If a service circuit is protected by multiple preplans, the preplan selection criteria shall be based on the highest preference level as well as the alarm status of the preplan. If the selected preplans based on the preference level have alarms or have in-effect circuits on their channels, then the preplan shall not be used for restoration and the next highest preference level available preplan shall be tried. Alarmed triggered restoration shall not allow user to set values and configure the following defaults for restoration parameters: Ignore Alarm – No, Stages – One Stage, Restoration – Hard, Preemption - No, during Navis™ Optical NMS installation.

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Generating reports

Overview Navis™ Optical NMS allows users to generate reports for both preplan restoration and preemption activities. This section describes these two types of reports.

For preplan restoration Navis™ Optical NMS allows users to generate reports for the preplan restoration activities for up to a period of 31 days on a designated printer. When a service circuit is restored using a preplan circuit before or after it is reinstated, user shall have the ability to print a Preplan Restoration Report. The report shall include information about the service circuit ID(s), the faulted digital link ID/channel number, restoration date and time, reinstatement date and time. The user can set From Date and End Date in the report query form for selecting the restoration circuits. If the dates are not specified, all the data within 31 days shall be printed.

For preemption Preemption reports are only available when the preemption feature is licensed to the user. This report allows a user to obtain paper print out of the preempted circuits, and the correlation between the preempted circuit and the service circuit which caused the preemption. The user shall be able to obtain information up to a period of 31 days from the current date on a designated printer. The information shall include the preempted circuit ID, the service circuit ID that causes preemption, the preemption date/time, the reinstatement date/time, and the restoration order number (i.e. RS Clo) of the preempted circuit.

This report supports up to 400 records of preempted circuits. The user shall be able to set From Date and End Date in the report query form for searching the preempted-and-reinstated circuits. If the dates are not specified, all the data within 31 days shall be printed. If preempted, the "REIN date/time" field shall be blank. If reinstated, all the fields shall be populated.

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Preemption concepts

Overview
When other in-effect service circuit uses the channel of a preplan circuit, this preplan can not be used for restoration until the in-use channel is released/disconnected from the active traffic. The user will have the option of preemption feature on Navis™ Optical NMS if licensed. Preemption is an optional feature which shall be provided as an additional option only if the preplan restoration feature is installed.

The preemption feature can be used to restore a higher priority circuit even where there is a lower or equal priority circuit already using the channel. After preemption is completed, the user needs to manually re-trigger the preplan that caused the preemption.

If preemption is manually activated, then preemption may be used in the restoration process to restore a higher priority circuit even when there is a lower or equal priority circuit already using the channel.

Access
Users can operate the preemption featuer through the preemption button. The preemption button in the Pre-plan Parameters form is accessible to the user only if the preemption feature is licensed to the user.

Detection
The user can turn preemption on or off when initiating the restoration. If preemption is turned on, the user shall be notified at association if any other in-effect circuits use the selected channel. User confirmation is required before the system can continue with the preemption.

At the time of restoration, Navis™ Optical NMS will notify the user if the preplan contains a channel used by other in-effect circuit. The user shall have the ability to either terminate the restoration process or disconnect (preempt) the lower/equal priority circuit on the channel and then implement a preplan restoration with higher priority circuit. If preemption is not turned on and the channel of the selected preplan can not be used at the time of restoration, the system will terminate the restoration process.

The user can use the Affected Circuits for Preplan Execution form to find out what circuit affected by the preplan. This form lists the affected service circuits or circuits have pending circuits where the pending circuits have commands been sent during the IMP state. The user can manually disconnect or rearrange those affected circuits before the preplan can be executed.

For manual restoration The preemption feature is applicable for manual restoration only. If preemption is needed at restoration, a dialogue box shall appear indicating the preemption target circuit and requesting user confirmation to continue. After user confirmation, the preemption process shall create a "dummy" restoration order for the preempted circuit to keep the original circuit layout for reinstatement purpose and disconnect the target circuit. The user shall not be notified when the preemption is completed. After preemption is completed, the original preplan that causes the preemption shall be manually triggered again.

For a preplan plan or group If preemption is turned on and if any circuit in a Preplan Plan (or Group) requires preemption, the Navis™ Optical NMS will display a message for that specific preplan and wait for user confirmation. Once the user confirms the preemption, the system shall continue or process other preplans in the Plan (or Group). After the Plan or Group implementation is completed, the user may trigger the Plan (or Group) operation for a second time for restoration. Only the circuits of which preemption has been confirmed (not in RS state) will be restored. The user can also trigger individual circuits for restoration via the Preplan Pairs Form after the preemption is completed.

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Reinstatement concepts

Overview
The reinstatement of a service circuit is a manual process. This is to ensure that the reinstatement is carried out in a way most appropriate to the customer's network operation since the reinstatement process could introduce service interruption if hard reinstatement is required. The user will be notified at the time of preplan creation that service will be disrupted on reinstatement if only hard reinstatement is supported because the restoration facility needs to be disconnected before the original service path can be re-established. The user can select hard or soft reinstatement (default is soft).

The preempted circuit can not be reinstated unless the service circuit, which causes the preemption, has been reinstated.

The reinstatement process shall always bring the current restoration circuit back to the original service circuit without reverting to any of the intermediate preplan restoration circuits if any.

Of circuits
If a service circuit is protected by a preplan, after the faulted service facility has been repaired, Navis™ Optical NMS will receive an alarm clear message and update the alarm status of the affected service facility. The user then shall be able to move the circuits from the restoration path back to the original service path. The user shall be able to initiate reinstatement using the Preplan Pairs form or Graphical Layout of the preplan circuit. Reinstatement process shall be also applicable for Preplan Plan and Preplan Group reinstatement.

For the reinstatement process, the user shall specify the parameter values in Preplan Parameters form in the same way as they work for the manual restoration process. The Ignore Alarm, Stages, and Hard/Soft Reinstatement options shall also work in a similar fashion as for the manual restoration process.

Modification or deletion
The user can modify the "Start Date" and/or "Start Time" for any scheduled reinstatement or delete a scheduled reinstatement through the "Scheduled List" screen. Modifying or deleting scheduled reinstatement shall not be allowed if the circuit is already undergoing or completing manually initiated reinstatement. This capability shall be supported at the preplan circuit level only and shall not include Preplan Plan and Preplan Group levels.

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5 Network Element Port Addresses

Overview

Purpose
This chapter presents the port addresses for the network elements supported by Navis™ Optical NMS.

Contents

Section I: Introduction

Overview

Purpose   This section presents an overview of the chapter including a definition of terms used throughout the chapter and also a description of port address structure.

Contents

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Terminology

Overview Generic port addressing allows for a single address structure across all network elements. This applies to Lucent network elements and other vendor equipment. With Navis™ Optical NMS, the generic port address is commonly referred to as the *external address* or *network level address*.

Terminology The following terminology applies to the material discussed within this chapter:

- **Entity identifier (EID)**: the name of a logical or physical port or a non-port resource in a network element. The EID is the primary means by which resources within the network elements are identified in the host-to-host interactions between the network management system and the element management system. The EID is often referred to as the internal address.

- **External address**: the network level address used in Navis™ Optical NMS. The external address is sometimes referred to as the network level address.

- **Internal Address**: the element level address, which is generally the 'native' port address used in the EMS. The internal address is sometimes referred to as the entity identifier.

- **Logical port address**: address of a logical channel riding on a higher-order system; the higher-order system is terminated on a physical port. A logical port address can also be a lower- order logical channel, riding on a higher-order logical channel, riding on a facility that terminates on a physical port.

- **Network level address**: this format is used for port identification at the NMS user-interface and, also, in the ITM-SC Port Selection screens. The Network Level Address selected by the user from the ITM-SC Port Selection screen is passed to NMS via the F-Interface. NLAs also appear in some of the host-to-host interface messages. The network level address is sometimes referred to as the external address.

- **Physical port address**: address of the port that physically terminates a facility.

- **Protection Group**: not visible in Navis™ Optical NMS.

- **Tributary port**: generally refers to the add/drop side of a network element.

- **Virtual port**: terminates the two line ports in a protection scheme.

- **Virtual port address**: allows users to control two line ports; one line port is the service port while the other is the protection port. Virtual port addressing is a protection scheme.

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Port address structure and components

Overview This section describes the components of a port address.

Generic structure The generic structure of a port address is as follows:

Physical Port Type / Physical Port Location / Logical Address(es)

For a lower-order logical channel riding on a higher-order logical channel, the generic port address structure is as follows:

Physical Port Type / Physical Port Location / Higher Order Logical Address - Lower Order Logical Address

Note that *[]* (brackets) indicates that the selection is contained within brackets. *,* (comma) denotes 'or.' *-* (hyphen) signifies a range of numbers. Users may select only one number in the range.

Physical port types The physical port types associated with the generic port addresses are as follows:

- STM-x = Sx. For example, STM-4 is S4.
- CEPT-x = Px. For example, CEPT-3 is P3.

Physical port location The physical port location consists of: *Shelf / Slot / Port*

If *Slot* contains only one port, the number one is entered for the port number.

Logical port location The logical port location consists of:

- *Shelf / Slot / Port /higher logical port* - lower logical port
- *Shelf / Slot / Port /single logical port*.

External addresses The external addresses associated with generic port addressing may be represented through the following form: **Sx/m/n/p/h - 1**

- *x* can equal 0, 1, 4, 16, or 64.
- *m= mm*: physical shelf number
- *n=nn*: physical slot number
- *p*: physical port number
- *h*: high order logical port number
- *l*: lower order logical port number

□

KLM (G707) notation

Introduction   The KLM (G707) notation feature causes a different notation to be used for external port addressing.

Navis™ Optical NMS uses a sequential port addressing scheme to represent the lower order logical port number. The KLM (or G707) notation for external port addressing uses a tributary numbering notation to represent the "channel number" or the "lower order logical port number" of the VC-3, VC-12, and VC-2 paths.

Examples   The following table provides examples of the two external port addressing schemes:

Table 5-1   External port addressing scheme example with KLM notation

Path Type	Logical Port Type	External Port Address	K, L, M External Port Address Notation
VC-12	TU12	S1/PA5/1/2/1-31	S1/PA5/1/2/1-2.4.1
VC-12	TU12	S1/1/12/4-63	S1/1/12/4-3.7.3
VC-2	TU2	S1/1/2/4/1-20	S1/1/2/3/1-3.6.0
VC-3	TU3	S1/PA5/1/3/1-2	S1/PA5/1/3/1-2.0.0

Section II: ISM Port Addresses

Overview

Purpose   This section discusses the external and internal port addresses for both the physical logical and virtual ports of the ISM (Release 2.3 or later). This section also describes the correlation between external and internal port addresses.

Contents

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Port identifiers for ISM-1 network elements

Overview   This section provides the port identifiers for ISM-1 network elements.

Table   The following table contains the port identifiers for the ISM-1 network elements.

Table 5-2   Port identifiers for ISM-1 network elements

Description	Network Element	Entity Identifier	Network Level Address
STM-1 Physical Port (Line)	ISM-1 TERM	LP[1-2]	S1/1/[12-13]/1
	ISM-1 ADM	LP[1-2]	S1/1/[12-13]/1
	ISM5ETERM	LP[1-2]	S1/1/[7-8]/1
STM-1 MSP Physical Port (Line)	ISM-1 TERM	LP1	S1/1/GRP1/1
	ISM5ETERM	LP1	S1/1/GRP1/1
E4 (140 Mb/s) Physical Port (Trib)	ISM-1 TERM	TP[7-8].1	P4/1/[7-8]/1
	ISM-1 ADM	TP[7-8].1	P4/1/[7-8]/1
E3 (34 Mb/s) Physical Port (Trib)	ISM-1 TERM	TP[1-8].[1-3]	P3/1/[1-8]/[1-3]
	ISM-1 ADM	TP[1-8].[1-3]	P3/1/[1-8]/[1-3]
E1 (2 Mb/s) Physical Port (Trib)	ISM-1 TERM	TP[1-8].[1-16]	P3/1/[1-8]/[1-16]
	ISM-1 ADM	TP[1-8].[1-16]	P3/1/[1-8]/[1-16]
PCTDL Physical Port (MSP) (Trib)	ISM5ETERM	TP1.[1-3]	PCT/1/1/GRP[1-3]
VC-4 Logical Port on STM-1 (Line)	ISM-1 TERM	LP1.1	S1/1/12/1/1
	ISM-1 ADM	LP[1-2].1	S1/1/[12-13]/1/1
	ISM5ETERM	LP1.1	S1/1/7/1/1
VC-4 Logical Port on STM-1 MSP (Line)	ISM-1 TERM	LP1.1	S1/1/GRP1/1/1
	ISM5ETERM	LP1.1	S1/1/GRP1/1/1
VC-4 Logical Port on E4 (140 Mb/s) port (Trib)	ISM-1 TERM	TP[7-8].1	P4/1/[7-8]/1
	ISM-1 ADM	TP[7-8].1	P4/1/[7-8]/1
VC-3 Logical Port on STM-1 (Line)	ISM-1 TERM	LP1.1.[1-3].0.0	S1/1/12/1/1-[1-3]
	ISM-1 ADM	LP[1-2].1.[1-3].0.0	S1/1/[12-13]/1/1-[1-3]
VC-3 Logical Port on STM-1 MSP (Line)	ISM-1 TERM	LP1.1.[1-3].0.0	S1/1/GRP1/1/1-[1-3]

Table 5-2   Port identifiers for ISM-1 network elements   (continued)

VC-3 Logical Port on E3 (34 Mb/s) port (Trib)	ISM-1 TERM	TP[1-8].[1-3]	P3/1/[1-8]/[1-3]
	ISM-1 ADM	TP[1-8].[1-3]	P3/1/[1-8]/[1-3]
VC-12 Logical Port on STM-1 (Line)	ISM-1 TERM	LP1.[1-3].[1-7].[1-3]	S1/1/12/1/1-[1-63]
	ISM-1 ADM	LP[1-2].1.[1-3].[1-7].[1-3]	S1/1/[12-13]/1/1-[1-63]
	ISM5ETERM	LP1.1.[1-3].[1-7].[1-3]	S1/1/7/1/1-[1-63]
VC-12 Logical Port on STM-1 MSP (Line)	ISM-1 TERM	LP1.[1-3].[1-7].[1-3]	S1/1/GRP1/1/1-[1-63]
	ISM5ETERM	LP1.1.[1-3].[1-7].[1-3]	S1/1/GRP1/1/1-[1-63]
VC-12 Logical Port on E1 (2 Mb/s) port (Trib)	ISM-1 TERM	TP[1-8].[1-16]	P1/1/[1-8]/[1-16]
	ISM-1 ADM	TP[1-8].[1-16]	P1/1/[1-8]/[1-16]
	ISM5ETERM	TP1.[1-3].[1-21]	PCT/1/1/GRP[1-3]/[1-21]
E1 (2 Mb/s) Logical Port on PCT Physical Port	ISM5ETERM	TP1.[1-3].[1-21]	PCT/1/1/GRP[1-3]/[1-21]

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Non-port identifiers for ISM-1 network elements

Overview This section provides the non-port identifiers for ISM-1 network elements.

Table The following table contains the non-port identifiers for the ISM-1 network elements.

Table 5-3   Non-port identifiers for ISM-1 network elements

Description	Entity Identifier
Pointer Processing and Cross-connect Unit	PPC[1-2]
Timing Generator Unit	TGU[1-2]
Data Packet Switch	DPS
System Controller	CTL
Power Supply Filter	PSF[1-2]
User Panel	UPL
Line Port Card	LPU[1-2]
Tributary Port Card	TP[1-9]

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Port identifiers for ISM-4 network elements

Overview This section provides the port identifiers for ISM-4 network elements.

Table The following table contains the port identifiers for the ISM-4 network elements.

Table 5-4   Port identifiers for ISM-4 network elements

Description	Network Element	Entity Identifier	Network Level Address
STM-4 Physical Port (Line)	ISM-4 TERM	LP[1-2]	S4/1/[12-13]/1
	ISM-4 ADM	LP[1-2]	S4/1/[12-13]/1
	ISM-4 REGEN	LP[1-2]	S4/1/[12-13]/1
STM-4 MSP Physical Port (Line)	ISM-4 TERM	LP1	S4/1/GRP1/1
STM-4 Physical Port (Trib)	ISM-4 TERM	TP[1-8]	S1/1/[1-8]/1
	ISM-4 ADM	TP[1-8]	S1/1/[1-8]/1
E4 (140 Mb/s) Physical Port (Trib)	ISM-4 TERM	TP[7-8].1	P4/1/[7-8]/1
	ISM-4 ADM	TP[7-8].1	P4/1/[7-8]/1
E3 (34 Mb/s) Physical Port (Trib)	ISM-4 TERM	TP[1-8].[1-3]	P3/1/[1-8]/[1-3]
	ISM-4 ADM	TP[1-8].[1-3]	P3/1/[1-8]/[1-3]
E1 (2 Mb/s) Physical Port (Trib)	ISM-4 TERM	TP[1-8].[1-16]	P1/1/[1-8]/[1-16]
	ISM-4 ADM	TP[1-8].[1-16]	P1/1/[1-8]/[1-16]
VC-4 Logical Port on STM-4 (Line)	ISM-4 TERM	LP1.[1-4]	S4/1/12/1/[1-4]
	ISM-4 ADM	LP[1-2].[1-4]	S4/1/[12-13]/1/[1-4]
VC-4 Virtual Port on STM-4 (Line)	ISM-4 ADM	VP[1-4][1-4]	S4/1/10-[1-4]-[1-4]/1
VC-4 Logical Port on STM-4 MSP (Line)	ISM-4 TERM	LP1.[1-4]	S4/1/GRP1/1/[1-4]
VC-4 Logical Port on STM-1	ISM-4 TERM	TP[1-8].1	S1/1/[1-8]/1/1
	ISM-4 ADM	TP[1-8].1	S1/1/[1-8]/1/1
VC-4 Logical Port on E4 (140 Mb/s) port (Trib)	ISM-4 TERM	TP[7-8].1	P4/1/[7-8]/1
	ISM-4 ADM	TP[7-8].1	P4/1/[7-8]/1

Table 5-4   Port identifiers for ISM-4 network elements   (continued)

VC-3 Logical Port on STM-4 (Line)	ISM-4 TERM	LP1.[1-4].[1-3].0.0	S4/1/12/1/[1-4]-[1-3]
	ISM-4 ADM	LP[1-2].[1-4].[1-3].0.0	S4/1/[12-13]/1/[1-4]-[1-3]
VC-3 Logical Port on STM-4 MSP (Line)	ISM-4 TERM	LP1.[1-4].[1-3].0.0	S4/1/GRP1/1/[1-4]-[1-3]
VC-3 Logical Port on STM-1 (Trib)	ISM-4 TERM	TP1.[1-8].1.[1-3].0.0	S1/1/[1-8]/1/1-[1-3]
	ISM-4 ADM	TP1.[1-8].1.[1-3].0.0	S1/1/[1-8]/1/1-[1-3]
VC-3 Logical Port on E3 (34 Mb/s) port (Trib)	ISM-4 TERM	TP[1-8].[1-3]	P3/1/[1-8]/[1-3]
	ISM-4 ADM	TP[1-8].[1-3]	P3/1/[1-8]/[1-3]
VC-12 Logical Port on STM-4 (Line)	ISM-4 TERM	LP1.[1-4].[1-3].[1-7].[1-3]	S4/1/12/1/[1-4]-[1-63]
	ISM-4 ADM	LP[1-2].[1-4].[1-3].[1-7].[1-3]	S4/1/[12-13]/1/[1-4]-[1-63]
VC-12 Logical Port on VC-4 Virtual (Line)	ISM-4 ADM	VP[1-4][1-4].[1-3].[1-7].[1-3]	S4/1/10-[1-4]-[1-4]/1-[1-63]
VC-12 Logical Port on STM-4 MSP (Line)	ISM-4 TERM	LP1.[1-4].[1-3].[1-7].[1-3]	S4/1/GRP1/1/[1-4]-[1-63]
VC-12 Logical Port on STM-1 (Trib)	ISM-4 TERM	TP[1-8].1.[1-3].[1-7].[1-3]	S1/1/[1-8]/1/1-[1-63]
	ISM-4 ADM	TP[1-8].1.[1-3].[1-7].[1-3]	S1/1/[1-8]/1/1-[1-63]
VC-12 Logical Port on E1 (2 Mb/s) port (Trib)	ISM-1 TERM	TP[1-8].[1-16]	P1/1/[1-8]/[1-16]
	ISM-4 ADM	TP[1-8].[1-16]	P1/1/[1-8]/[1-16]

Non-port identifiers for ISM-4 network elements

Overview   This section provides the non-port identifiers for ISM-4 network elements.

Table   The following table contains the non-port identifiers for the ISM-4 network elements.

Table 5-5   Non-port identifiers for ISM-4 network elements

Description	Entity Identifier
Pointer Processing and Cross-connect Unit	PPC[1-2]
Timing Generator Unit	TGU[1-2]
Data Packet Switch	DPS
System Controller	CTL
Power Supply Filter	PSF[1-2]
User Panel	UPL
Line Port Card	LPU[1-2]
Tributary Port Card	TP[1-9]

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Section III: LambdaRouter™ AOS Port Addresses

Overview

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Purpose   This section provides the port addresses for the physical and logical ports of the LambdaRouter™ AOS 256 (Release 2.0 and 3.0), LambdaRouter™ AOS 128 (Release 2.0 and 3.0), and LambdaRouter™ AOS 1024.

Note: Navis™ Optical NMS Release 7.0 does not support LambdaRouter™ AOS Release 1.0.

Contents

Port identifiers

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Overview   This section provides the port identifiers for the LambdaRouter™ AOS
256 (Release 2.0 and 3.0), LambdaRouter™ AOS 128 (Release 2.0 and
3.0), and LambdaRouter™ AOS 1024.

Fields enclosed in {} are variables. Fields enclosed in [] are optional
fields. The "Entity Identifier" refers to the internal address while the
"Network Level Address" refers to the external address. "Opaque
Ports" refer to a case where the LambdaRouter™ AOS is used in
conjunction with the OEO 10G/2.5G Optical Interface CP.

Table   The following port identifiers are applicable to the LambdaRouter™
AOS 256 (Release 2.0 and 3.0) and LambdaRouter™ AOS 128
(Release 2.0 and 3.0).

Table 5-6   Port identifiers for the LambdaRouter™ AOS 256 and 128

Description	Entity Identifier	Network Level Address
Optical Channel Port (Transparent Ports)	och-[1-32]-[1-32]-[1-4]	OT/och-[1-32]-[1-32]-[1-4]
Optical Link Logical Port (Transparent Ports)	och-[1-32]-[1-32]-[1-4]	OT/och-[1-32]-[1-32]-[1-4]
10G Optical Channel Port (Opaque Ports)	och-[1-32]-[1-32]-1	OT/och-[1-32]-[1-32]-1
10G Optical Link Logical Port (Opaque Ports)	och-[1-32]-[1-32]-1	OT/och-[1-32]-[1-32]-1
2.5G Optical Channel Port (Opaque Ports)	och-[1-32]-[1-32]-[1-2]	OT/och-[1-32]-[1-32]-[1-2]
2.5G Optical Link Logical Port (Opaque Ports)	och-[1-32]-[1-32]-[1-2]	OT/och-[1-32]-[1-32]-[1-2]

The following table presents the getAllPTPs for the LambdaRouter™
AOS 128, 256, and 1024. Within this table, the value of "x" can be
one of the following: 4 (LambdaRouter™ AOS 128), 7
(LambdaRouter™ AOS 256), or 32 (LambdaRouter™ AOS 1024).

Table 5-7   getAllPTPs for the LambdaRouter™ AOS 128, 256, and 1024

Port Type	Primary Layer Rate	nativeEMSName	PTP Name	Embedded Layer Rates	Internal Address	Network Level Address

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Table 5-7   getAllPTPs for the LambdaRouter™ AOS 128, 256, and 1024   (continued)

OCHT, OCHA13, OCHA15 (Transparent ports)	49 = LR_OPTICAL_ SECTION	och-<shelf>-<slot>-<port> och-{1-<x>}-{1-32}-{1-4}	name=PTP value=och-{1-<x>}-{1-32}-{1-4}	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION	och-[1-32]-[1-32]-[1-4]	OT/och-[1-32]-[1-32]-[1-4]
OCH2GC	49 = LR_OPTICAL_ SECTION	och-<shelf>-<slot>-<port> och-{1-<x>}-{1-32}-{1-2}	name=PTP value=och-{1-<x>}-{1-32}-{1-2}	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 22 = LR_Section_ OC48_STS48_ and_RS_ STM16	och-[1-32]-[1-32]-[1-2]	OT/och-[1-32]-[1-32]-[1-2]
OCH10GC	49 = LR_OPTICAL_ SECTION	och-<shelf>-<slot>-<port> och-{1-<x>}-{1-32}-1	name=PTP value=och-{1-<x>}-{1-32}-1	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 23 = LR_Section_ OC192_STS192_ and_RS_ STM-64	och-[1-32]-[1-32]-1	OT/och-[1-32]-[1-32]-1

The following table presents the getContainedTPs for the LambdaRouter™ AOS 128, 256, and 1024. Within this table, the value of "x" can be one of the following: 4 (LambdaRouter™ AOS 128), 7 (LambdaRouter™ AOS 256), or 32 (LambdaRouter™ AOS 1024).

Table 5-8   getContainedTPs for the LambdaRouter™ AOS 128, 256, and 1024

Port Type	CTP Layer Rate	nativeEMSName	PTP Name	Internal Address	Network Level Address

Table 5-8   getContainedTPs for the LambdaRouter™ AOS 128, 256, and 1024   (continued)

OCHT (transparent), OCHA13 (OA), OCHA15 (OA)	49 = LR_OPTICAL_ SECTION	Not available in EMS. Populated with PTP nativeEMSName.	name=PTP value=och-{1-<x>}-{1-32}-{1-4} name=CTP value=/os=1	och-[1-32]-[1-32]-[1-4]	OT/och-[1-32]-[1-32]-[1-4]
OCH2GC (OEO)	49 = LR_OPTICAL_ SECTION	Not available in EMS. Populated with PTP nativeEMSName.	name=PTP value=och-{1-<x>}-{1-32}-{1-2} name=CTP value=/os=1	och-[1-32]-[1-32]-[1-2]	OT/och-[1-32]-[1-32]-[1-2]
OCH10GC (OEO)	49 = LR_OPTICAL_ SECTION	Not available in EMS. Populated with PTP nativeEMSName.	name=PTP value=och-{1-<x>}-{1-32}-1 name=CTP value=/os=1	och-[1-32]-[1-32]-1	OT/och-[1-32]-[1-32]-1

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Section IV: LambdaUnite™ MSS Port Addresses

Overview

Purpose   This section provides the port identifiers for the LambdaUnite™ MSS
network elements (Release 2.0 and 2.1).

Contents

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Port identifiers

Overview   This section presents the port identifiers for the LambdaUnite™ network elements (Release 2.0 and 2.1).

Table   The following table displays the port addresses for the LambdaUnite™ network elements (Release 2.0 and 2.1).

Table 5-9   Port identifiers for LambdaUnite™ Release 2.0 and 2.1

Description	Entity Identifier	Network Level Address
STM-256 Physical Port	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1**	**S256/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1**
VC4-64c logical port on STM-256 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[1, 193, 385, 577]	S256/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/64c.[1-4]
VC4-16c logical port on STM-256 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[48n+1 where n=0 to 15]	S256/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/16c.[1-16]
VC4-4c logical port on STM-256 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[12n+1 where n=0 to 63]	S256/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/4c.[1-64]
VC4 logical port on STM-256 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[3n+1 where n=0 to 255]	S256/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/AU.[1-256].0
AU3 logical port on STM-256 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[1-768]	S256/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/AU.[1-256].[1-3]
OC-768 Physical Port (for SONET Gateway)	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1**	**OC768/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1**
VC4-64c logical port on OC-768 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[1, 193, 385, 577]	OC768/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/192c.[1-4]
VC4-16c logical port on OC-768 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[48n+1 where n=0 to 15]	OC768/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/48c.[1-16]
VC4-4c logical port on OC-768 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[12n+1 where n=0 to 63]	OC768/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/12c.[1-64]

Table 5-9   Port identifiers for LambdaUnite™ Release 2.0 and 2.1   (continued)

VC4 logical port on OC-768 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[3n+1 where n=0 to 255]	OC768/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/3c.[1-256]
AU3 logical port on OC-768 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[1-768]	OC768/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/STS1.[1-768]
STM-64 Physical Port	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1**	**S64/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1**
VC4-64c logical port on STM-64 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-1	S64/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/64c.1
VC4-16c logical port on STM-64 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[1, 49, 97, 145]	S64/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/64c.[1-4]
VC4-4c logical port on STM-64 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[12n+1 where n=0 to 15]	S64/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/4c.[1-16]
VC4 logical port on STM-64 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[3n+1 where n=0 to 63]	S64/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/AU.[1-64].0
AU3 logical port on STM-64 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[1-192]	S64/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/AU.[1-64].[1-3]
OC-192 Physical Port (for SONET gateway)	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1**	**OC192/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1**
VC-64c logical port on OC-192 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-1	OC192/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/192c.1
VC4-16c logical port on OC-192 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[1, 49, 97, 145]	OC192/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/48c.[1-4]
VC4-4c logical port on OC-192 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[12n+1 where n=0 to 15]	OC192/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/12c.[1-16]
VC4 logical port on OC-192 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[3n+1 where n=0 to 63]	OC192/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/3c.[1-64]
AU3 logical port on OC-192 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1-[1-192]	OC192/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-1/STS1.[1-192]

Table 5-9   Port identifiers for LambdaUnite™ Release 2.0 and 2.1   (continued)

STM-16 Physical Port	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]**	**S16/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]**
VC4-16c logical port on STM-16 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]-[1]	S16/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]/16c.[1]
VC4-4c logical port on STM-16 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]-[1, 13, 25, 37]	S16/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]/4c.[1-4]
VC4 logical port on STM-16 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]-[3n+1 where n=0 to 15]	S16/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]/AU.[1-16].0
AU3 logical port on STM-16 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]-[1-48]	S16/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]/AU.[1-16].[1-3]
OC-48 Physical Port (for SONET gateway)	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]**	**OC48/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]**
VC4-16c logical port on OC-48 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]-[1]	OC48/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]/48c.1
VC4-4c logical port on OC-48 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]-[1, 13, 25, 37]	OC48/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]/12c.[1-4]
VC4 logical port on OC-48 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]-[3n+1 where n=0 to 15]	OC48/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]/3c.[1-16]
AU3 logical port on OC-48 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]-[1-48]	OC48/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]/STS1[1-48]
STM-4 Physical Port	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]**	**S4/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]**
VC4-4c logical port on STM-4 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-1	S4/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/4c.1
VC4 logical port on STM-4 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-[1, 4, 7, 10]	S4/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/AU.[1-4].0
AU3 logical port on STM-4 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-[1-12]	S4/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/AU.[1-4].[1-3]
OC-12 Physical Port (for SONET gateway)	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]**	**OC12/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]**

Table 5-9   Port identifiers for LambdaUnite™ Release 2.0 and 2.1   (continued)

VC4-4c logical port on OC-12 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-1	OC12/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/12c.1
VC4 logical port on OC-12 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-[1, 4, 7, 10]	OC12/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/3c.[1-4]
AU3 logical port on OC-12 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-[1-12]	OC12/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/STS1.[1-12]
STM-1 Physical Port	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]**	**S1/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]**
VC4 logical port on STM-1 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-1	S1/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/AU.1.0
AU3 logical port on STM-1 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-[1-3]	S1/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/AU.1.[1-3]
OC-3 Physical Port (for SONET gateway)	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]**	**OC3/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]**
VC4 logical port on OC-3 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-1	OC3/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/3c.1
AU3 logical port on OC-3 physical port	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]-[1-3]	OC3/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-8]/STS1.[1-3]
GbE Physical Port (LAN) - ptp	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]**	**LAN/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-[1-4]**
GbE Physical Port (WAN) - ptp	**1-1-#-#-[1-8, 12-19, 21-28, 32-39]-v[1-4]**	**WAN/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-v[1-4]**
VC4 logical port on GbE Physical Port - ctp	1-1-#-#-[1-8, 12-19, 21-28, 32-39]-v[1-4] - [1, 4, 7, 10, 13, 16, 19]	WAN/1-1-#-#-[1-8, 12-19, 21-28, 32-39]-v[1-4]-[1, 4, 7, 10, 13, 16, 19]

Section V: LambdaXtreme™ Transport Port Addresses

Overview

Purpose   This section provides the port identifiers for the LambdaXtreme™ Transport (Release 1.1) network elements. The values for 'zzzz' are shown in the "Frequency Values" section.

Contents

Port identifiers

Overview This section presents the port identifiers for the LambdaXtreme™ Transport (Release 1.1) network elements.

Tables The following table displays the port identifiers for the LambdaXtreme™ Transport (Release 1.1) network elements.

Table 5-10 Port identifiers for LambdaXtreme™ Transport Release 1.1

OMS Line Port			
Description	**Port Type**	**Entity Identifier**	**Network Level Address**
10G End Terminal	OA	Line 1E: PORT-A1-1-6-OUT_ LINE/PORT-A1-1-14-IN_LINE	Line 1E: OL128c/PORT-A1-1-6-OUT_ LINE/PORT-A1-1-14-IN_LINE
40G End Terminal	OA	40G LINE-1E: PORT-A1-2-7-OUT_ LINE/PORT-A1-1-14-IN_LINE	40G LINE-1E: OL64c/PORT-A1-2-7-OUT_LINE/PORT-A1-1-14-IN_ LINE
10G OADM Terminal	OA	10G LINE-1E: PORT-A1-2-9-OUT_ LINE/PORT-A1-1-14-IN_LINE 10G LINE-1W: PORT-A2-2-9-OUT_ LINE/PORT-A2-1-14-IN_LINE	10G LINE-1E: OL128c/PORT-A1-2-9-OUT_LINE/PORT-A1-1-14-IN_ LINE 10G LINE-1W: OL128c/PORT-A2-2-9-OUT_LINE/PORT-A2-1-14-IN_ LINE
OTS Repeater Port (10G or 40G) (PTP)	OA	10G or 40G LINE-1E: PORT-A1-1-9-OUT_LINE/PORT-A1-2-12-IN_LINE 10G or 40G LINE-1W: PORT-A1-2-4-OUT_LINE/PORT-A1-2-16-IN_LINE	10G or 40G LINE-1E: OL/PORT-A1-1-9-OUT_ LINE/PORT-A1-2-12-IN_LINE 10G or 40G LINE-1W: OL/PORT-A1-2-4-OUT_ LINE/PORT-A1-2-16-IN_LINE
OCH Trail Logical Port on OMS Line			
10G End Terminal	OA (CTP)	PORT-[BAY]-[SHELF]-[OAaddSLOT]-port/ PORT-[BAY]-[SHELF]-[OAdropSLOT]-port-zzzz	OL128c/PORT-[BAY]-[SHELF]-[OAaddSLOT]-OUT/ PORT-[BAY]-[SHELF]-[OAdropSLOT]-OUT-zzzz
		PORT-A1-1-6-OUT_LINE/PORT-A1-1-14-IN_LINE-zzzz	OL128c/PORT-A1-1-6-OUT_ LINE/PORT-A1-1-14-IN_LINE-zzzz

Table 5-10   Port identifiers for LambdaXtreme™ Transport Release 1.1   (continued)

40G End Terminal	OA (CTP)	PORT-[BAY]-[SHELF]-[OAaddSLOT]-port/ PORT-[BAY]-[SHELF]-[OAdropSLOT]-port-zzzz	OL64c/PORT-[BAY]-[SHELF]-[OAaddSLOT]-port/ PORT-[BAY]-[SHELF]-[OAdropSLOT]-port-zzzz
		PORT-A1-2-7-OUT_LINE/PORT-A1-1-14-IN_LINE-zzzz	OL64c/PORT-A1-2-7-OUT_LINE/PORT-A1-1-14-IN_LINE-zzzz
10G OADM Terminal	OA (CTP)	(OADM) 10G LINE-1E: PORT-A1-2-9-OUT_LINE/PORT-A1-1-14-IN_LINE-zzzz	(OADM) 10G LINE-1E: OL128c/PORT-A1-2-9-OUT_LINE/PORT-A1-1-14-IN_LINE-zzzz
		(OADM) 10G LINE-1W: PORT-A2-2-9-OUT_LINE/PORT-A2-1-14-IN_LINE-zzzz	(OADM) 10G LINE-1W: OL128c/PORT-A2-2-9-OUT_LINE/PORT-A2-1-14-IN_LINE-zzzz
Optical Link and OCH Trail (Optical Link terminates at PTP and OCH Trail terminates at CTP)			
10G or 40G add/drop OTU (no compatible optics)	OTU (PTP)	PORT-[BAY]-[SHELF]-[SLOT]-[PORT] PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_ADD	OT/PORT-[BAY]-[SHELF]-[SLOT]-[PORT] OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_ADD
	OTU (CTP)	PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_ADD-zzzz	OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_ADD-zzzz
40G through OTU (no compatible optics)	OTU (PTP	PORT-[BAY]-[SHELF]-[SLOT]-[PORT] PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_WXYZ	OT/PORT-[BAY]-[SHELF]-[SLOT]-[PORT] OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_WXYZ
	OTU (CTP)	PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_WXYZ-zzzz	OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_WXYZ-zzzz

Table 5-10   Port identifiers for LambdaXtreme™ Transport Release 1.1   (continued)

10G/40G MUX OTU (with 2.5G or 10G trib)	2.5G/10G (PTP)	PORT-[bay]-[shelf]-[slot]-[port] PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, IN_TRIB4]	OT/PORT-[bay]-[shelf]-[slot]-[port] OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, IN_TRIB4]
	2.5G/10G (CTP)	PORT-[bay]-[shelf]-[slot]-[port]-1 PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, IN_TRIB4]-1	OT/PORT-[bay]-[shelf]-[slot]-[port]-1 OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, IN_TRIB4]-1
	10G/40G MUX OTU (GTP)	PORT-[bay]-[shelf]-[slot]-[port]-zzzz PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_WXYZ-zzzz	OT/PORT-[bay]-[shelf]-[slot]-[port]-zzzz OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_WXYZ-zzzz
Compatible Optics (virtual OTU)	OMU (PTP/CTP)	EXT_PORT-[bay]-[shelf]-[omuslot]-[port] EXT_PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_zzzz	OT/EXT_PORT-[bay]-[shelf]-[omuslot]-[port] OT/EXT_PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_zzzz

The following table presents the getAIIPTPs for LambdaXtreme™ Transport.

Table 5-11   getAllPTPs for LambdaXtreme™ Transport

Port Type	Primary Layer Rate	nativeEMSName	PTP Name	Embedded Layer Rates	Internal Address	Network Level Address

Table 5-11   getAllPTPs for LambdaXtreme™ Transport   (continued)

| OTU (10G or 40G add/drop) with SDH or SONET client | 49 = LR_OPTICAL_SECTION | PORT-<bay>-<shelf>-<slot>-<port> PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_ADD | name=PTP Add/drop: value=PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_ADD 40G through: value=PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_WXYZ (40G through) | 47 = LR_PHYSICAL_OPTICAL 49 = LR_OPTICAL_SECTION And one of (as appropriate): 23=LR_Section_OC192_STS192_and_RS_STM-64 90=LR_Section_OC768_STS768_and_RS_STM256, for 40G OTU | Add/drop: PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_ADD 40G through: PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_WXYZ Note: _ represents a bidirectional port. Can also be used for 40G through (seperate add and drop packs) but only add pack ports are used. | Add/drop: OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_ADD 40G through: OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_WXYZ |

Table 5-11   getAllPTPs for LambdaXtreme™ Transport   (continued)

Compatible Optics Logical Port (bidirectional)	49 = LR_OPTICAL_SECTION	PORT-<bay>-<shelf>-<omus-lot>-<port> PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_<zzzz>	name=PTP value=EXT_PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_<zzzz>	47 = LR_PHYSICAL_OPTICAL 49 = LR_OPTICAL_SECTION 50 = LR_DIGITAL_SIGNAL_RATE	EXT_PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_zzzz Note: Only the OMU port is modeled EXT_PORT (in EID) versus PORT (in BD).	OT/EXT_PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_zzzz
OA (OMS) (End Terminal) (10G or 40G)	41 = LR_OPTICAL_Multiplex_Section	PORT-<bay>-<shelf>-<OAaddslot>-<port>/PORT-<bay>-<shelf>-<RPdropslot>-<port> 10G Line-1E: PORT-A1-1-6-OUT_LINE/PORT-A1-1-14-IN_LINE 40G Line-1E: PORT-A1-2-7-OUT_LINE/PORT-A1-1-14-IN_LINE	name=PTP 10G Line-1E: value=PORT-A1-1-6-OUT_LINE/PORT-A1-1-14-IN_LINE 40G Line-1E: value=PORT-A1-2-7-OUT_LINE/PORT-A1-1-14-IN_LINE	47 = LR_PHYSICAL_OPTICAL 41 = LR_OPTICAL_Multiplex_Section 42 = LR_Optical_Transmission_Section	10G Line-1E: PORT-A1-1-6-OUT_LINE/PORT-A1-1-14-IN_LINE 40G Line-1E: PORT-A1-2-7-OUT_LINE/PORT-A1-1-14-IN_LINE Note: OAaddslot and RPdropslot represent bidirectional port. Represents Line side PTP.	10G Line-1E: OL128c/PORT-A1-1-6-OUT_LINE/PORT-A1-1-14-IN_LINE 40G Line-1E: OL64c/PORT-A1-2-7-OUT_LINE/PORT-A1-1-14-IN_LINE

Table 5-11   getAllPTPs for LambdaXtreme™ Transport   (continued)

OA (OMS) (10G only OADM)	41 = LR_OPTICAL_ Multiplex_ Section	PORT-<bay>-<shelf>-<OAaddslot>-<port>/PORT-<bay>-<shelf>-<RPdropslot>-<port> 10G Line-1E: PORT-A1-2-9-OUT_ LINE/PORT-A1-1-14-IN_ LINE 10G Line-1W: PORT-A2-2-9-OUT_ LINE/PORT-A2-1-14-IN_ LINE	name=PTP 10G Line-1E: value=PORT-A1-2-9-OUT_ LINE/PORT-A1-1-14-IN_ LINE 10G Line-1W: value=PORT-A2-2-9-OUT_ LINE/PORT-A2-1-14-IN_ LINE	47 = LR_PHYSICAL_ OPTICAL 41 = LR_Optical_ Multiplex_ Section 42 = LR_Optical_ Transmission_ Section	10G Line-1E: PORT-A1-2-9-OUT_ LINE/PORT-A1-1-14-IN_ LINE 40G Line-1W: PORT-A2-2-9-OUT_ LINE/PORT-A2-1-14-IN_ LINE Note: OAaddslot and RPdropslot represent bidirectional port. Represents Line side PTP.	10G Line-1E: OL128c/PORT-A1-2-9-OUT_ LINE/PORT-**A1-1-14-IN_** LINE 10G Line-1W: OL128c/PORT-A2-2-9-OUT_ LINE/PORT-**A2-1-14-IN_** LINE

Table 5-11   getAllPTPs for LambdaXtreme™ Transport   (continued)

OTS Repeater Port (10G or 40G)	42 = LR_Optical_ Transmission_ Section	PORT-<bay>-<shelf>-<OAaddslot>-<port>/PORT-<bay>-<shelf>-<RPdropslot>-<port> 10G or 40G Line-1E: PORT-A1-1-9-OUT_ LINE/PORT-A1-2-12-IN_ LINE 10G or 40G Line-1W: PORT-A1-2-4-OUT_ LINE/PORT-A1-2-16-IN_ LINE	name=PTP 10G or 40G Line-1E: value=PORT-A1-1-9-OUT_ LINE/PORT-A1-2-12-IN_ LINE 10G or 40G Line-1W: value=PORT-A1-2-4-OUT_ LINE/PORT-A1-2-16-IN_ LINE	47 = LR_PHYSICAL OPTICAL 42 = LR_Optical_ Transmission_ Section	10G or 40G Line-1E: PORT-A1-1-9-OUT_ LINE/PORT-A1-2-12-IN_ LINE 10G or 40G Line-1W: PORT-A1-2-4-OUT_ LINE/PORT-A1-2-16-IN_ LINE Note: This is for the repeater. OAaddslot and RPdropslot represent bidirectional port.	10G or 40G Line-1E: OL/PORT-A1-1-9-OUT_ LINE/PORT-**A1-2-12-IN_** LINE 10G or 40G Line-1W: OL/PORT-A1-2-4-OUT_ LINE/PORT-**A1-2-16-IN_** LINE

Table 5-11   getAllPTPs for LambdaXtreme™ Transport   (continued)

MUX OTU (10G or 40G) (2.5G or 10G trib PTPs)	49 = LR_OPTICAL_SECTION	PORT-<bay>-<shelf>-<slot>-<port> PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-{IN_TRIB1,IN_TRIB2, IN_TRIB3,IN_TRIB4}	name=PTP value=PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-{IN_TRIB1, IN_TRIB2,IN_TRIB3,IN_TRIB4}	47 = LR_PHYSICAL_OPTICAL 49 = LR_OPTICAL_SECTION 50=LR_DIGITAL_SIGNAL_RATE And one of (as appropriate): 22=LR_Section_OC48_STS48_and_RS_STM16 for 10G MUX OTU. 23=LR_Section_OC192_STS192_and_RS_STM-64.	PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, INTRIB4]	OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, INTRIB4]
10G MUX OTU (GTP)	40 = LR_OPTICAL_CHANNEL	PORT-<bay>-<shelf>-<slot>-<port> PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_WXYZ	name=GTP value=PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_WXYZ/frequency=<zzz.z>		PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_WXYZ-zzzz	OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_WXYZ-zzzz

The following table presents the getContainedTPs for LambdaXtreme™ Transport.

Table 5-12   getContainedTPs for LambdaXtreme™ Transport

Input PTP	CTP Layer Rate	nativeEMSName	CTP Name	Internal Address	Network Level Address

Table 5-12   getContainedTPs for LambdaXtreme™ Transport   (continued)

OTU (10G or 40G add/drop) with SDH or SONET client	40 = LR_Optical_ Channel	Not available on EMS GUI. Populated with PTP nativeEMSName appended with "-"<frequency> where frequency is in the form <zzzz>.	Add/drop: name=PTP value=PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_ ADD name=CTP value=/frequency=<zzz.z> 40G through: name=PTP value=PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-IN_ WXYZ (40G through) name=CTP value=/frequency=<zzz.z>	10G/40G add/drop OTU: PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_ ADD-zzzz 40G through OTU: PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-IN_ WXYZ-zzzz Note: Represents a bidirectional port.	10G/40G add/drop OTU: OT/PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_ADD-zzzz 40G through OTU: OT/PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_WXYZ-zzzz
Compatible Optics Logical port (bidirectional)	40 = LR_Optical_ Channel	Not available on EMS GUI. Populated with PTP nativeEMSName appended with "-"<frequency> where frequency is in the form <zzzz>.	name=PTP value=EXT_ PORT-{A-H,J-M}{1-5}-{1-4}-{1-16}-IN_ <zzzz> name=CTP value=/frequency=<zzz.z>	EXT_PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_ zzzz Note: Compatible Optics - No OTU.	OT/EXT_PORT-[A-H,J-M][1-5]-[1-4]-[1-16]-IN_ zzzz

Table 5-12   getContainedTPs for LambdaXtreme™ Transport   (continued)

OA (OMS) (End, OADM)	40 = LR_Optical_ Channel	OCHAN-<line>-<freq> OCHAN-{1E, 1W}-<zzzz> (all 128 or 64 channels)	name=PTP value=PORT-<bay>-<shelf>-<OAaddslot>-<port>/ PORT-<bay>-<shelf>-<OAdropslot>-<port> (see PTP table for value ranges) name=CTP value=/frequency=<zzzz>	End : 10G Line-1E: PORT-A1-1-6-OUT_ LINE/ PORT-A1-1-14-IN_ LINE-zzzz End : 40G Line-1E: PORT-A1-2-7-OUT_ LINE/PORT-A1-1-14-IN_ LINE-zzzz OADM: 10G Line-1E PORT-A1-2-9-OUT_ LINE/PORT-A1-1-14-IN_ LINE-zzzz OADM: 10G Line-1W PORT-A2-2-9-OUT_ LINE/PORT-A2-1-14-IN_ LINE-zzzz	End : 10G Line-1E: OL128c/PORT-A1-1-6-OUT_ LINE/PORT-A1-1-14-IN_LINE-zzzz End : 40G Line-1E: OL64c/PORT-A1-2-7-OUT_ LINE/PORT-A1-1-14-IN_LINE-zzzz OADM: 10G Line-1E OL128c/PORT-A1-2-9-OUT_ LINE/PORT-A1-1-14-IN_LINE-zzzz OADM: 10G Line-1W OL128c/PORT-A2-2-9-OUT_ LINE/PORT-A2-1-14-IN_LINE-zzzz

Table 5-12   getContainedTPs for LambdaXtreme™ Transport   (continued)

OA (OTS) (Repeater)	41 = LR_Optical_ Multiplex_ Section	Not available on EMS GUI. Populated with PTP nativeEMSName.	name=PTP value=PORT-<bay>-<shelf>-<OAaddslot>-<port>/ PORT-<bay>-<shelf>-<OAdropslot>-<port> (see PTP table for value ranges) name=CTP value=/oms=1	None Traditionally (since OLS 1.6T/400G), NMS does not use the 'ctp' for this port Note: OCHAN alarms should be reported against the OMS CTP on repeaters.	None
MUX OTU (10G or 40G) (2.5G or 10G trib PTPS)	49 = LR_OPTICAL_ SECTION	Not available on EMS GUI. Populated with PTP nativeEMSName.	name=PTP value=PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-{IN_ TRIB1,IN_TRIB2, IN_TRIB3,IN_ TRIB4} name=CTP value=/os=1	PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, IN_ TRIB4]-1	OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2,IN_TRIB3, IN_TRIB4]-1

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Frequency values

Overview   This section presents the frequency values (represented by 'zzzz' in the previous port identifier tables) for the 10G LambdaXtreme 128 channel system and the 40G LambdaXtreme 64 channel system.

Note that 'zzzz' is a four digit representation of a frequency and are the same as the middle four digits of a frequency in THz. For example, the port associated with 191.950 THz would have a 'zzzz' value of 9195.

Tables   This table presents the frequency value (represented by 'zzzz' in the previous port identifier tables) for the 10G LambdaXtreme 128 channel system.

Table 5-13   Frequency values for the 10G LambdaXtreme 128 channel system

Channel	Freq (zzzz)	Channel	Freq (zzzz)	Channel	Freq (zzzz)	Channel	Freq (zzzz)
1	8650	33	8810	65	8970	97	9130
2	8655	34	8815	66	8975	98	9135
3	8660	35	8820	67	8980	99	9140
4	8665	36	8825	68	8985	100	9145
5	8670	37	8830	69	8990	101	9150
6	8675	38	8835	70	8995	102	9155
7	8680	39	8840	71	9000	103	9160
8	8685	40	8845	72	9005	104	9165
9	8690	41	8850	73	9010	105	9170
10	8695	42	8855	74	9015	106	9175
11	8700	43	8860	75	9020	107	9180
12	8705	44	8865	76	9025	108	9185
13	8710	45	8870	77	9030	109	9190
14	8715	46	8875	78	9035	110	9195
15	8720	47	8880	79	9040	111	9200
16	8725	48	8885	80	9045	112	9205
17	8730	49	8890	81	9050	113	9210
18	8735	50	8895	82	9055	114	9215

Table 5-13   Frequency values for the 10G LambdaXtreme 128 channel system   (continued)

19	8740	51	8900	83	9060	115	9220
20	8745	52	8905	84	9065	116	9225
21	8750	53	8910	85	9070	117	9230
22	8755	54	8915	86	9075	118	9235
23	8760	55	8920	87	9080	119	9240
24	8765	56	8925	88	9085	120	9245
25	8770	57	8930	89	9090	121	9250
26	8775	58	8935	90	9095	122	9255
27	8780	59	8940	91	9100	123	9260
28	8785	60	8945	92	9105	124	9265
29	8790	61	8950	93	9110	125	9270
30	8795	62	8955	94	9115	126	9275
31	8800	63	8960	95	9120	127	9280
32	8805	64	8965	96	9125	128	9285

This table presents the frequency value (represented by 'zzzz' in the previous port identifier tables) for the 40G LambdaXtreme 64 channel system.

Table 5-14   Frequency values for the 40G LambdaXtreme 64 channel system

Channel	Freq (zzzz)	Channel	Freq (zzzz)	Channel	Freq (zzzz)	Channel	Freq (zzzz)
1	8650	17	8810	33	8970	49	9130
2	8660	18	8820	34	8980	50	9140
3	8670	19	8830	35	8990	51	9150
4	8680	20	8840	36	9000	52	9160
5	8690	21	8850	37	9010	53	9170
6	8700	22	8860	38	9020	54	9180
7	8710	23	8870	39	9030	55	9190
8	8720	24	8880	40	9040	56	9200
9	8730	25	8890	41	9050	57	9210
10	8740	26	8900	42	9060	58	9220
11	8750	27	8910	43	9070	59	9230

Table 5-14   Frequency values for the 40G LambdaXtreme 64 channel system   (continued)

12	8760	28	8920	44	9080	60	9240
13	8770	29	8930	45	9090	61	9250
14	8780	30	8940	46	9100	62	9260
15	8790	31	8950	47	9110	63	9270
16	8800	32	8960	48	9120	64	9280

Section VI: Metropolis® EON Port Addresses

Overview

Purpose   This section provides the port identifiers for Metropolis® EON network elements (Release 8.1 and 8.2).

Contents

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Port identifiers

Overview   This section presents the port identifiers for Metropolis® EON
network elements (Release 8.1 and 8.2).

Table   The following table displays the port identifiers for Metropolis® EON
network elements (Release 8.1 and 8.2).

Table 5-15   Port identifiers for Metropolis® EON Release 8.1 and 8.2

Description	Port Type	Entity Identifier	Network Level Address
OMS Line Port (ptp)	OA (20A, 10A, 0OA)	oline-[1a, 1b, 2a, 2b]/oline-[1a,1b,2a,2b]	OL(16, 32)c/oline-[1a, 1b, 2a, 2b]/oline-[1a,1b,2a,2b]
Repeater Port (ptp)	OA	oline-[1a, 1b, 2a, 2b]/oline-[1a,1b,2a,2b]	OL(16, 32)c/oline-[1a, 1b, 2a, 2b]/oline-[1a,1b,2a,2b]
OCH Trail Logical Port on OMS Line (ctp)	OA	oline-[1a, 1b, 2a, 2b]/oline-[1a,1b,2a,2b]-zzzz	OL(16, 32)c/oline-[1a, 1b, 2a, 2b]/oline-[1a,1b,2a,2b]/zzzz
OTPM (Quad OTUs)	OTPM (ptp)	otpm-[1, 2]-[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31]-[1-4]-1	OT/otpm-[1, 2]-[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31]-[1-4]-1
	OTPM (ctp)	otpm-[1, 2]-[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31]-[1-4]-1-zzzz	OT/otpm-[1, 2]-[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31]-[1-4]-1-zzzz
OTU (for GbE)	OTU (ptp)	otu-[1, 2]-[1-32]-1	OT/otu-[1, 2]-[1-32]-1
	OTU (ctp)	otu-[1, 2]-[1-32]-1-zzzz	OT/otu-[1, 2]-[1-32]-1-zzzz
2:1 MUX UBB	OTU (ptp)	dm25-[1, 2]-[1-32]-[p1, p2]	OT/dm25-[1, 2]-[1-32]-[p1, p2]
	OTU (ctp)	dm25-[1, 2]-[1-32]-[p1, p2]-1	OT/dm25-[1, 2]-[1-32]-[p1, p2]-1
	OTU (GTP)	dm25-[1, 2]-[1-32]-hs-<zzzz>	OT/dm25-[1, 2]-[1-32]-hs-<zzzz>

Table 5-15   Port identifiers for Metropolis® EON Release 8.1 and 8.2   (continued)

OUPSR (Full and End Terminal)	OUPSR (ptp)	oupsr-[shelf]-[slot]-[port] oupsr-[1,2]-[1-32]-[cin, ain, bin] Note 1: The three bidirectional ports of the OUPSR may be interpreted as: C is the 'reliable' port and A/B are the 'working' and 'protecting' ports. Note 2: CIN represents bidirectional port CIN/COUT. Similarly, AIN and BIN are bidirectional ports.	OT/oupsr-[shelf]-[slot]-[port] OT/oupsr-[1,2]-[1-32]-[cin, ain, bin]
	OUPSR (ctp)	oupsr-[shelf]-[slot]-[port]-1 oupsr-[1,2]-[1-32]-[cin, ain, bin]-1	OT/oupsr-[shelf]-[slot]-[port]-1 OT/oupsr-[1,2]-[1-32]-[cin, ain, bin]-1
OUPSR (Full Terminal)	OUPSR (ptp)	oupsr-[1, 2]-[1-32]-[ain, bin]	OT/oupsr-[1,2]-[1-32]-[ain,bin]
	OUPSR (ctp)	oupsr-[1, 2]-[1-32]-[ain, bin]-1	OT/oupsr-[1,2]-[1-32]-[ain,bin]-1
OUPSR (End Terminal)	OUPSR (ptp)	oupsr-[1, 2]-[1-32]-[ain, bin]	OT/oupsr-[1,2]-[1-32]-[ain,bin]
	OUPSR (ctp)	oupsr-[1, 2]-[1-32]-[ain, bin]-1	OT/oupsr-[1,2]-[1-32]-[ain,bin]-1

The following table presents the getAllPTPs for the Metropolis® EON network elements.

Table 5-16   getAllPTPs for Metropolis® EON

Port Type	Primary Layer Rate	nativeEMSName	PTP Name	Embedded Layer Rates	Internal Address	Network Level Address

Table 5-16   getAllPTPs for Metropolis® EON   (continued)

Add OTU with SDH, SONET, or GbE client	49 = LR_OPTICAL_ SECTION	otu-<shelf>-<slot>-<port> otu-{1, 2}-{1-32}-1	name=PTP value=otu-{1, 2}-{1-32}-1	SONET/SDH/GBE: 47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION SONET/SDH: One of (as appropriate) 20=LR_Section_ OC3_STS3_ and_RS_ STM1 21=LR_Section_ OC12_STS12_ and_RS_ STM4 22=LR_Section_ OC48_STS48_ and_RS_ STM16 23=LR_Section_ OC192_STS192_ and_RS_ STM-64 GBE: 50=LR_ DIGITAL_ SIGNAL_ RATE	GBE:[1, 2]-[1-32]-1[1] Note: represents a bidirectional port composed of add and drop OTUs. Frequency is given in CTP of the OTU (if the user enters optical association).	OT/otu-[1, 2]-[1-32]-1

Table 5-16   getAllPTPs for Metropolis® EON   (continued)

| Add OTPM (Quad OTUs) with SONET, SDH, GbE, LSBB, or UBB clients | 49 = LR_OPTICAL_SECTION | otupm-<shelf>-<odd>-<slot>-<quadO-TUslot>-<port> otpm-{1, 2}-{1, 3, 5....31}-{1-4}-1 | name=PTP value=otpm-{1,2}-{1, 3, 5...31}-{1-4}-1 | SONET/SDH/GbE: 47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_SECTION SONET/SDH: One of (as appropriate) 20=LR_Section_OC3_STS3_ and_RS_STM1 21=LR_Section_OC12_STS12_ and_RS_STM4 22=LR_Section_OC48_STS48_ and_RS_STM16 23=LR_Section_OC192_STS192_ and_RS_STM-64 GBE: 50=LR_DIGITAL_SIGNAL_RATE | otpm-[1, 2]-[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31]-[1-4]-1 Note: represents a bidirectional port composed of add and drop OTPMs. Frequency is given in CTP of the OTPM (if the user enters optical association). | otpm-[1, 2]-[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31]-[1-4]-1 |

Table 5-16   getAllPTPs for Metropolis® EON   (continued)

OMS	41 = LR_Optical_ Multiplex_ Section	oline-<addOline>/oline-oline-{1a, 1b, 2a, 2b}/ oline-{1a, 1b, 2a, 2b}	name=PTP value=oline-<dropOline> {1a, 1b, 2a, 2b}/oline-{1a, 1b, 2a, 2b}	47 = LR_PHYSICAL_ OPTICAL 42 = LR_Optical_ Transmission_ Section 41 = LR_Optical_ Multiplex_ Section	oline-[1a, 1b, 2a, 2b]/ oline-[1a, 1b, 2a, 2b]	OL[16, 32]c/oline-[1a, 1b, 2a, 2b]/oline-[1a, 1b, 2a, 2b]
OTS Repeater Port	42 = LR_Optical_ Transmission_ Section	oline-<addOline>/oline-oline-{1a, 1b, 2a, 2b}/ oline-{1a, 1b, 2a, 2b}	name=PTP value=oline-<dropOline> {1a, 1b, 2a, 2b}/oline-{1a, 1b, 2a, 2b}	47 = LR_PHYSICAL_ OPTICAL 42 = LR_Optical_ Transmission_ Section	oline-[1a, 1b, 2a, 2b]/ oline-[1a, 1b, 2a, 2b] Note: addOline and dropOline represent one bidirectional port.	OL[16, 32]c/oline-[1a, 1b, 2a, 2b]/oline-[1a, 1b, 2a, 2b]
OUPSR (OUPSR before OTU/OTPM)	49 = LR_OPTICAL_ SECTION	oupsr-<shelf>-<slot>-<port> Client: oupsr-{1, 2}-{1-32}-{cin, cout} A direction: oupsr-{1, 2}-{1-32}-{ain, aout} B direction: oupsr-{1, 2}-{1-32}-{bin, bout}	name=PTP value=oupsr-{1,2}-{1-32}-{cin,ain, bin}	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION	oupsr-[1, 2]-[1-32]-[cin, ain, bin]	OT/oupsr-[1, 2]-[1-32]-[cin, ain, bin]

Table 5-16   getAllPTPs for Metropolis® EON   (continued)

OUPSR (OTU/OTPM Data Mux before OUPSR)	49 = LR_OPTICAL_ SECTION	oupsr-<shelf>-<slot>-<port> Client: oupsr-{1, 2}-{1-32}-{cin, cout} A direction: oupsr-{1, 2}-{1-32}-{ain, aout} B direction: oupsr-{1, 2}-{1-32}-{bin, bout}	name=PTP value=oupsr-{1,2}-{1-32}-{cin,ain, bin}	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 50 = LR_DIGITAL_ SIGNAL_ RATE	oupsr-[1, 2]-[1-32]-[ain, bin]	OT/oupsr-[1, 2]-[1-32]-[ain, bin]
2:1 Data Mux	49 = LR_OPTICAL_ SECTION	dm25-<shelf>-<slot>-<port> dm25-{1, 2}-{1-32}-{p1, p2}	name=PTP value=dm25-{1,2}-{1-32}-{p1, p2}	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 50 = LR_DSR	dm25-[1, 2]-[1-32]-[p1, p2]	OT/dm25-[1, 2]-[1-32]-[p1, p2]
2:1 Data Mux (GTP)	40 = LR_Optical_ Channel	dm25-<shelf>-<slot>-<port> dm25-{1, 2}-{1-32}-hs-<zzzz>	name=GTP value=dm25-{1,2}-{1-32}-hs/frequency<zzz.z>	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 50 = LR_DSR	dm25-[1, 2]-[1-32]-hs-<zzzz>	OT/dm25-[1, 2]-[1-32]-hs-<zzzz>

The following table presents the getContainedTPs for the Metropolis® EON network elements.

Table 5-17   getContainedTPs for Metropolis® EON

Input PTP	CTP Layer Rate	nativeEM-SName	CTP-Name	Internal Address	Network Level Address

Table 5-17   getContainedTPs for Metropolis® EON (continued)

Add OTU	40 = LR_Optical Channel	Not available on EMS GUI. Populated with PTP nativeEMSName appended with "-"<frequency> where frequency is in the form <zzzz>	name= PTP value= otu-{1, 2}-{1-32}-1 name= CTP value=/ frequency=<zzz.z>	otu-[1, 2]-[1-32]-1-zzzz	OT/otu-[1, 2]-[1-32]-1-zzzz
Add OTPM (Quad OTUs)	40 = LR_Optical Channel	Not available on EMS GUI. Populated with PTP nativeEMSName appended with "-"<frequency> where frequency is in the form <zzzz>	name= PTP value= otpm-{1, 2}-{1, 3, 5...31}-{1-4}-1 name= CTP value=/ frequency=<zzz.z>	otpm-[1, 2]-[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31]-[1-4]-1-zzzz	OT/otpm-[1, 2]-[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31]-[1-4]-1-zzzz

**Table 5-17   getContainedTPs for Metropolis® EON
(continued)**

OMS	40 = LR_Optical Channel	ochan-<oline>-<chan> ochan-{1a, 1b, 2a, 2b}-{1-32} Note: maximum of 16 channels until Metro EON R8.2.	name= PTP value= oline-{1a, 1b, 2a, 2b}/oline{1a, 1b, 2a, 2b} name= CTP value=/ frequency=<zzz.z>	oline-[1a, 1b, 2a, 2b]/ oline-[1a, 1b, 2a, 2b]-zzzz	OL(16, 32)c/oline-[1a, 1b, 2a, 2b]/oline-[1a, 1b, 2a, 2b]/zzzz
OTS Repeater Port	41 = LR_Optical_ Multiplex_ Section	Not available on EMS GUI. Populated with PTP nativeEMSName.	name= PTP value= oline-{1a, 1b, 2a, 2b}/oline{1a, 1b, 2a, 2b} name= CTP value=/ oms=1	NMS not used.	NMS not used.
OUPSR (OUPSR before OTU/ OTPM)	49 = LR_ OPTICAL_ SEC- TION	Not available on EMS GUI. Populated with PTP nativeEMSName.	name= PTP value= oupsr-{1, 2}-{1-32}-{cin, ain, bin} name= CTP value=/ os=1	oupsr-[1, 2]-[1-32]-[cin, ain, bin]-1	OT/oupsr-[1, 2]-[1-32]-[cin, ain, bin]-1

**Table 5-17   getContainedTPs for Metropolis® EON
(continued)**

| OUPSR (OTU/OTM Data Mux before OUPSR) | 49 = TRM/2:1 OPTICAL_SEC-TION | Not available on EMS GUI. Populated with PTP nativeEMSName. | One CTP to other End Terminal network element. Note that DUAL Node_ Type will not have a CTP to another End Terminal, this configu-ration only applies to End Termi-nals. name= PTP value= oupsr-{1, 2}-{1-32}-{ain, bin} name= CTP value=/os=1 Note:-ain or -bin repre-sents a bidirec-tional port. | oupsr-[1, 2]-[1-32]-[ain, bin]-1 | OT/oupsr-[1, 2]-[1-32]-[ain, bin]-1 |

Table 5-17   getContainedTPs for Metropolis® EON (continued)

| 2:1 Data Mux | 49 = LR_ OPTICAL_ SEC- TION | Not available on EMS GUI. Populated with PTP nativeEMSName. | name= PTP value= dm25-{1, 2}-{1- 32}-{p1, p2} name= CTP value=/ os=1 | dm25-[1, 2]-[1-32]- [p1, p2]-1 | OT/dm25-[1, 2]-[1-32]-[p1, p2]-1 |

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Frequency values

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Overview	This section presents the frequency values (represented by 'zzzz' in the previous port identifier table) for the Metro EON network elements.
	Note that 'zzzz' is a four digit representation of a frequency and are the same as the middle four digits of a frequency in THz. For example, the port associated with 193.50 THz would have a 'zzzz' value of 9350.
Tables	This table presents the frequency value (represented by 'zzzz' in the previous port identifier tables) for the Metropolis® EON network elements.

Table 5-18   Frequency values for the Metropolis® EON network elements (Release 8.0, 8.1, 8.2)

Channel	Frequency (THz)	zzzz value	Channel	Frequency (THz)	zzzz value
1	193.50	9350	17	194.20	9420
2	193.30	9330	18	194.30	9430
3	193.10	9310	19	194.40	9440
4	192.90	9290	20	194.50	9450
5	192.70	9270	21	194.60	9460
6	192.50	9250	22	194.70	9470
7	192.30	9230	23	194.80	9480
8	192.10	9210	24	194.90	9490
9	193.60	9360	25	195.00	9500
10	193.40	9340	26	195.10	9510
11	193.20	9320	27	195.20	9520
12	193.00	9300	28	195.30	9530
13	192.80	9280	29	195.40	9540
14	192.60	9260	30	195.50	9550
15	192.40	9240	31	195.60	9560
16	192.20	9220	32	195.70	9570

This table presents the frequency value (represented by 'zzzz' in the previous port identifier tables) for the 40G LambdaXtreme™ 64

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channel system.

Table 5-19   Frequency values for the 40G LambdaXtreme™ 64 channel system

Channel	Freq (zzzz)	Channel	Freq (zzzz)	Channel	Freq (zzzz)	Channel	Freq (zzzz)
1	8650	17	8810	33	8970	49	9130
2	8660	18	8820	34	8980	50	9140
3	8670	19	8830	35	8990	51	9150
4	8680	20	8840	36	9000	52	9160
5	8690	21	8850	37	9010	53	9170
6	8700	22	8860	38	9020	54	9180
7	8710	23	8870	39	9030	55	9190
8	8720	24	8880	40	9040	56	9200
9	8730	25	8890	41	9050	57	9210
10	8740	26	8900	42	9060	58	9220
11	8750	27	8910	43	9070	59	9230
12	8760	28	8920	44	9080	60	9240
13	8770	29	8930	45	9090	61	9250
14	8780	30	8940	46	9100	62	9260
15	8790	31	8950	47	9110	63	9270
16	8800	32	8960	48	9120	64	9280

Section VII: NERA CityLink Port Addresses

Overview

Purpose   This section describes the external port addresses for the NERA CityLink network elements.

Contents

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Port identifiers

Overview   This section provides the port identifiers for NERA CityLink network elements.

Table   The following table contains the port identifiers for the NERA CityLink network elements.

Table 5-20   Port identifiers for NERA CityLink network elements

Description	Entity Identifier	Network Level Address
SDH side: for both electrical and optical (port type STM1)	Line	S1 / Line
Radio side (port type STM1)	Radio	S1 / Radio

Section VIII: PHASE Port Addresses

Overview

Purpose   This section describes the external and internal port addresses for both the physical and logical ports of the PHASE network elements. This section also discusses the correlation between the external and internal port addresses.

Contents

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Port identifiers

Overview This section lists the port addresses for the supported PHASE network elements.

Port addresses The following lists the port addresses for the supported PHASE network elements.

Table 5-21   PHASE network element port addresses

Description	Network Element	Entity Identifier	Network Level Addresses
STM-16 Physical Port (Line)	TM16/4 (CS-17 or CS-19) ADM16/4 LR 16	LP[301,302,318] LP[302-305] LP[301,302,318]	S16/1/[1,2,18]/1 S16/1/[2-5]/1 S16/1/[1,2,18]/1
STM-16 Physical Port (Trib)	TM16/4 (CS-17 or CS-19) ADM16/4 LXC16/1 LR 16	TP[303-317] TP[306-318] GP[301-306] GP[314-318] GP[401-406] GP[414-418] LP[303-317]	S16/1/[3-17]/1 S16/1/[6-18]/1 S16/1/1-[1-6]/1 S16/1/2-[14-18]/1 S16/1/3-[1-6]/1 S16/1/4-[14-18]/1 S16/1/[3-17]/1
STM-4 Physical Port (Line)	TM4/4 (CS-17 or CS-19) ADM4/4 LR 4	LP[301-302,318-319] LP[302-305] LP[301-302,318-319]	S4/1/[1-2,18-19]/1 S4/1/[2-5]/1 S4/1/[1-2,18-19]/1

Table 5-21   PHASE network element port addresses   (continued)

Description	Network Element	Entity Identifier	Network Level Addresses
STM-4 Physical Port (Trib)	TM4/4	TP[303-317]	S4/1/[3-17]/1
	(CS-17 & CS-19)	TP[303-317]	S4/1/[3-17]/1
	TM16/4	TP[306-319]	S4/1/[6-19]/1
	ADM4/4	TP[306-319]	S4/1/[6-19]/1
	ADM16/4	TP[303-317]	S4/1/[3-17]/1
	LXC4/1	GP[301-306]	S4/1/1-[1-6]/1
	LXC16/1	GP[314-319]	S4/1/2-[14-19]/1
	LR 4	GP[401-406]	S4/1/3-[1-6]/1
		GP[414-419]	S4/1/4-[14-19]/1
		TP[303-317]	S4/[1/[3-17]/1
STM-1 Physical Port on TIU-4 or SIU-1 card (Trib)	TM4/4	TP[303-317].[1-4]	S1/1/[3-17]/[1-4]
	(CS-17 & CS-19)	TP[303-317].[1-4]	S1/1/[3-17]/[1-4]
	TM16/4	TP[306-319].[1-4]	S1/1/[6-19]/[1-4]
	ADM4/4	TP[306-319].[1-4]	S1/1/[6-19]/[1-4]
	ADM16/4	TP[303-317].[1-4]	S1/1/[3-17]/[1-4]
	LXC4/1	GP[301-306].[1-4]	S1/1/1-[1-6]/[1-4]
	LXC16/1	GP[314-319].[1-4]	S1/1/2-[14-19]/[1-4]
		GP[401-406].1	S1/1/3-[1-6]/1
		GP[414-419].1	S1/1/4-[14-19]/1
CEPT-4 Physical Port (Trib)	TM4/4	TP[303-317].[1-4]	P4/1/[3-17]/[1-4]
	(CS-17 & CS-19)	TP[303-317].[1-4]	P4/1/[3-17]/[1-4]
	TM16/4	TP[306-319].[1-4]	P4/1/[6-19]/[1-4]
	ADM4/4	TP[306-319].[1-4]	P4/1/[6-19]/[1-4]
	ADM16/4	TP[303-317].[1-4]	P4/1/[3-17]/[1-4]
	LXC4/1	GP[301-304].[1-4]	P4/1/1-[1-4]/[1-4]
	LXC16/1	GP[314, 316-319].[1-4]	P4/1/2-[14, 16-19]/[1-4]

Table 5-21   PHASE network element port addresses   (continued)

Description	Network Element	Entity Identifier	Network Level Addresses
CEPT-3 Physical Port (Trib)	TM4/4	TP[303-317].[1-2].[1-3]	P3/1/[3-17]/[1-2]-[1-3]
	(CS-17 & CS-19)	TP[303-317].[1-2].[1-3]	P3/1/[3-17]/[1-2]-[1-3]
	TM16/4	TP[306-319].[1-2].[1-3]	P3/1/[6-19]/[1-2]-[1-3]
	ADM4/4	TP[306-319].[1-2].[1-3]	P3/1/[6-19]/[1-2]-[1-3]
	ADM16/4	TP[303-317].[1-6]	P3/1/[3-17]/[1-6]
	LXC4/1	GP[301-304].[1-6]	P3/1/1-[1-4]/[1-6]
	LXC16/1	GP[314, 316-319].[1-6]	P3/1/2-[14, 16-19]/[1-6]
45 Mb/s Physical Port (Trib)	TM4/4	TP[303-317].[1-2].[1-3]	D3/1/[3-17]/[1-2]-[1-3]
	(CS-17 & CS-19)	TP[303-317].[1-2].[1-3]	D3/1/[3-17]/[1-2]-[1-3]
	TM16/4	TP[306-319].[1-2].[1-3]	D3/1/[6-19]/[1-2]-[1-3]
	ADM4/4	TP[306-319].[1-2].[1-6]	D3/1/[6-19]/[1-2]-[1-3]
	ADM16/4	TP[303-317].[1-6]	D3/1/[3-17]/[1-6]
	LXC4/1	GP[301-304].[1-6]	D3/1/1-[1-4]/[1-6]
	LXC16/1	GP[314, 316-319].[1-6]	D3/1/2-[14, 16-19]/[1-6]
CEPT-1 Physical/Logical Port (Trib)	TM4/4	TP[303-317].1.[1-21]	P1/1/[3-17]/1-[1-21]
	(CS-17 & CS-19)	TP[303-317].1.[1-21]	P1/1/[3-17/1-[1-21]
	TM16/4	TP[306-319].1.[1-21]	P1/1/[6-19]/1-[1-21]
	ADM4/4	TP[306-319].1.[1-21]	P1/1/[6-19]/1-[1-21]
	ADM16/4	TP[303-317].[1-21]	P1/1/[3-17]/[1-21]
	LXC4/1	GP[301-304].[1-21]	P1/1/1-[1-4]/[1-21]
	LXC16/1	GP[314, 316-319].[1-21]	P1/1/2-[14, 16-19]/[1-21]
VC-4 Logical Port on STM-16 (Line)	TM16/4	LP[301-302,318].[1-16]	S16/1/[1-2,18]/1/[1-16]
	(CS-17 or CS-19)	LP[302-305].[1-16]	S16/1/[2-5]/1/[1-16]
	ADM16/4		
VC-4 Logical Port on STM-16 (Trib)	TM16/4	TP[303-317].[1-16]	S16/1/[3-17]/1/[1-16]
	(CS-17 & CS-19)	TP[306-318].[1-16]	S16/1/[6-18]/1/[1-16]
	ADM16/4	GP[301-306].[1-16]	S16/1/1-[1-6]/1/[1-16]
	LXC16/1	GP[314-318].[1-16]	S16/1/2-[14-18]/1/[1-16]
		GP[401-406].[1-16]	S16/1/3-[1-6]/1/[1-16]
		GP[414-418][1-16]	S16/1/4-[14-18]/1/[1-16]

Table 5-21   PHASE network element port addresses   (continued)

Description	Network Element	Entity Identifier	Network Level Addresses
VC-4 Logical Port on STM-4 (Line)	TM4/4 (CS-17 or CS-19) ADM4/4	LP[301-302,318-319].[1-4] LP[302-305].[1-4]	S4/1/[1-2,18-19]/1/[1-4] S4/1/[2-5]/1/[1-4]
VC-4 Logical Port on STM-4 (Trib)	TM4/4 (CS-17 & CS-19) TM16/4 ADM4/4 ADM16/4 LXC4/1 LXC16/1	TP[303-317].[1-4] TP[303-317].[1-4] TP[306-319].[1-4] TP[306-319].[1-4] TP[303-317].[1-4] GP[301-306].[1-4] GP[314-319].[1-4] GP[401-406].[1-4] GP[414-419].[1-4]	S4/1/[3-17]/1/[1-4] S4/1/[3-17]/1/[1-4] S4/1/[6-19]/1/[1-4] S4/1/[6-19]/1/[1-4] S4/1/[3-17]/1/[1-4] S4/1/1-[1-6]/1/[1-4] S4/1/2-[14-19]/1/[1-4] S4/1/3-[1-6]/1/[1-4] S4/1/4-[14-19]/1/[1-4]
VC-4 Logical Port on 140 Mb/s port on TIU-4 card (Trib)	TM4/4 (CS-17 & CS-19) TM16/4 ADM4/4 ADM16/4 LXC4/1 LXC16/1	TP[303-317].[1-4] TP[303-317].[1-4] TP[306-319].[1-4] TP[306-319].[1-4] TP[303-317].[1-4] GP[301-304].[1-4] GP[314, 316-319].[1-4]	P4/1/[3-17]/[1-4] P4/1/[3-17]/[1-4] P4/1/[6-19]/[1-4] P4/1/[6-19]/[1-4] P4/1/[3-17]/[1-4] P4/1/1-[1-4]/[1-4] P4/1/2-[14, 16-19]/[1-4]
VC-4 Logical Port on STM-1 (Trib)	TM4/4 (CS-17 & CS-19) TM16/4 ADM4/4 ADM16/4 LXC4/1 LXC16/1	TP[303-317].[1-4].1 TP[303-317].[1-4].1 TP[306-319].[1-4].1 TP[306-319].[1-4].1 TP[303-317].[1-4].1 GP[301-306].[1-4].1 GP[314-319].[1-4].1 GP[401-406].1.1 GP[414-419].1.1	S1/1/[3-17]/[1-4]/1 S1/1/[3-17]/[1-4]/1 S1/1/[6-19]/[1-4]/1 S1/1/[6-19]/[1-4]/1 S1/1/[3-17]/[1-4]/1 S1/1/1-[1-6]/[1-4]/1 S1/1/2-[14-19]/[1-4]/1 S1/1/3-[1-6]/1/1 S1/1/4-[14-19]/1/1

Table 5-21   PHASE network element port addresses   (continued)

Description	Network Element	Entity Identifier	Network Level Addresses
VC-4 Logical Port on TIU-1 card (Trib)	TM4/4 (CS-17 & CS-19) TM16/4 ADM4/4 ADM16/4	TP[303-317].1 TP[303-317].1 TP[306-319].1 TP[306-319].1	P1/1/[3-17]/1 P1/1/[3-17]/1 P1/1/[6-19]/1 P1/1/[6-19]/1
VC-4 Logical Port on TIU-3 card (Trib)	TM4/4 (CS-17 & CS-19) TM16/4 ADM4/4 ADM16/4	TP[303-317].[1-2] TP[303-317].[1-2] TP[306-319].[1-2] TP[306-319].[1-2]	[P,D]3/1/[3-17]/[1-2] [P,D]3/1/[3-17]/[1-2] [P,D}3/1/[6-19]/[1-2] [P,D}3/1/[6-19]/[1-2]
VC-3 Logical Port on STM-16 (Trib)	LXC16/1	GP[301-306].[1-16].[1-3].0.0 GP[314-318].[1-16].[1-3].0.0 GP[401-406].[1-16].[1-3].0.0 GP[414-418][1-16].[1-3].0.0	S16/1/1-[1-6]/1/[1-16]-[1-3] S16/1/2-[14-18]/1/[1-16]-[1-3] S16/1/3-[1-6]/1/[1-16]-[1-3] S16/1/4-[14-18]/1/[1-16]-[1-3]
VC-3 Logical Port on STM-4 (Trib)	LXC4/1 LXC16/1	TP[303-317].[1-4].[1-3].0.0 GP[301-306].[1-4].[1-3].0.0 GP[314-319].[1-4].[1-3].0.0 GP[401-406].[1-4].[1-3].0.0 GP[414-419].[1-4].[1-3].0.0	S4/1/[3-17]/1/[1-4]-[1-3] S4/1/1-[1-6]/1/[1-4]-[1-3] S4/1/2-[14-19]/1/[1-4]-[1-3] S4/1/3-[1-6]/1/[1-4]-[1-3] S4/1/4-[14-19]/1/[1-4]-[1-3]

Table 5-21   PHASE network element port addresses   (continued)

Description	Network Element	Entity Identifier	Network Level Addresses
VC-3 Logical Port on STM-1 (Trib)	LXC4/1 LXC16/1	TP[303-317].[1-4].1.[1-3].0.0 GP[301-306].[1-4].1.[1-3].0.0 GP[314-319].[1-4].1.[1-3].0.0 GP[401-406].[1-4].1.1.[1-3].0.0 GP[414-419].[1-4].1.1.[1-3].0.0	S1/1/[3-17]/[1-4]/1- [1-3] S1/1/1-[1-6]/[1-4]/1- [1-3] S1/1/2-[14-19]/[1-4/1-[1-3] S1/1/3-[1-6]/1/1-[1-3] S1/1/4-[14-19]/1-[1-3]
VC-3 Logical/Physical Port on TIU-3 (Trib)	TM4/4 (CS-17 & CS-19) TM16/4 ADM4/4 ADM16/4 LXC4/1 LXC16/1	TP[303-317].[1-2].[1-3] TP[303-317].[1-2].[1-3] TP[306-319].[1-2].[1-3] TP[306-319].[1-2].[1-3] TP[303-317].[1-6] GP[301-304].[1-6] GP[314, 316-319].[1-6]	[P,D]3/1/[3-17]/[1-2]-[1-3] [P,D]3/1/[3-17]/[1-2]-[1-3] [P,D]3/1/[6-19]/[1-2]-[1-3] [P,D]3/1/[6-19]/[1-2]-[1-3] [P,D]3/1/[3-17]/[1-6] [P,D]3/1/1-[1-4]/[1-6] [P,D]3/1/2-[14, 16-19]/[1-6]
TU2 Logical port on STM-16 (Trib)	LXC16/1	GP[301-306].[1-16].[1-3].[1-7].0 GP[314-318].[1-16].[1-3].[1-7].0 GP[401-406].[1-16].[1-3].[1-7].0 GP[414-418].[1-16].[1-3].[1-7].0	S16/1/1-[1-6]/1/[1-16]- [1-21] S16/1/2-[14-18]/1/[1-16]-[1-21] S16/1/3-[1-6]/1/[1-16]-[1-21] S16/1/4-[14-18]/1/[1-16]-[1-21]
TU2 Logical port on STM-4 (Trib)	LXC4/1 LXC16/1	TP[303-317].[1-4].[1-3].[1-7].0 GP[301-306].[1-4].[1-3].[1-7].0 GP[314-319].[1-4].[1-3].[1-7].0 GP[401-406].[1-4].[1-3].[1-7].0 GP[414-419].[1-4].[1-3].[1-7].0	S4/1/[3-17]/1/[1-4]- [1-21] S4/1/1-[1-6]/1/[1-4]- [1-21] S4/1/2-[14-19]/1/[1-4]-[1-21] S4/1/3-[1-6]/1/[1-4]-[1-21] S4/1/4-[14-19]/1/[1-4]-[1-21]

Table 5-21   PHASE network element port addresses   (continued)

Description	Network Element	Entity Identifier	Network Level Addresses
TU2 Logical port on STM-1 (Trib)	LXC4/1 LXC16/1	TP[303-317].[1-4].1.[1-3].[1-7].0 GP[301-306].[1-4].1.[1-3].[1-7].0 GP[314-319].[1-4].1.[1-3].[1-7].0 GP[401-406].1.1.[1-3].[1-7].0 GP[414-419].1.1.[1-3].[1-7].0	S1/1/[3-17]/[1- 4]/1-[1-21] S1/1/1-[1-6]/[1- 4]/1-[1-21] S1/1/2-[14-19]/[1-4]/1-[1-21] S1/1/3-[1-6]/1/1-[1-21] S1/1/4-[14-19]/1/1-[1-21]
VC-12 Logical port on STM-16 (Trib)	LXC16/1	GP[301-306].[1-16].[1-3].[1-7].[1-3] GP[314-318].[1-16].[1-3].[1-7].[1-3] GP[401-406].[1-16].[1-3].[1-7].[1-3] GP[414-418].[1-16].[1-3].[1-7].[1-3]	S16/1/1-[1-6]/1/[1-16]- [1-63] S16/1/2-[14-18]/1/[1-16]-[1-63] S16/1/3-[1-6]/1/[1-16]-[1-63] S16/1/4-[14-18]/1/[1-16]-[1-63]
VC-12 Logical port on STM-4 (Trib)	LXC4/1 LXC16/1	TP[303-317].[1-4].[1-3].[1-7].[1-3] GP[301-306].[1-4].[1-3].[1-7].[1-3] GP[314-319].[1-4].[1-3].[1-7].[1-3] GP[401-406].[1-4].[1-3].[1-7].[1-3] GP[414-419].[1-4].[1-3].[1-7].[1-3]	S4/1/[3-17]/1/[1-4]-[1-63] S4/1/1-[1-6]/1/[1-4]-[1-63] S4/1/2-[14-19]/1/[1-4]-[1-63] S4/1/3-[1-6]/1/[1-4]-[1-63] S4/1/4-[14-19]/1/[1-4]-[1-63]

Table 5-21   PHASE network element port addresses   (continued)

Description	Network Element	Entity Identifier	Network Level Addresses
VC-12 Logical port on STM-1 (Trib)	LXC4/1 LXC16/1	TP[303-317].[1-4].1.[1-3].[1-7].[1-3] GP[301-306].[1-4].1.[1-3].[1-7].[1-3] GP[314-319].[1-4].1.[1-3].[1-7].[1-3] GP[401-406].1.[1-3].[1-7].[1-3] GP[414-419].1.[1-3].[1-7].[1-3]	S1/1/[3-17]/[1-4]/1-[1-63] S1/1/1-[1-6]/[1-4]/1-[1-63] S1/1/2-[14-19]/[1-4]/1-[1-63] S1/1/3-[1-6]/1/1-[1-63] S1/1/4-[14-19]/1/1-[1-63]
VC-12 Logical/Physical port on TIU-1 (Trib)	TM4/4 (CS-17 & CS-19) TM16/4 ADM4/4 ADM16/4 LXC4/1 LXC16/1	TP[303-317].1.[1-21] TP[303-317].1.[1-21] TP[306-319].1.[1-21] TP[306-319].1.[1-21] TP[303-317].[1-21] GP[301-304].[1-21] GP[314, 316-319].[1-21]	P1/1/[3-17]/1-[1-21] P1/1/[3-17/1-[1-21] P1/1/[6-19]/1-[1-21] P1/1/[6-19]/1-[1-21] P1/1/[3-17]/[1-21] P1/1/1-[1-4]/[1-21] P1/1/2-[14, 16-19]/[1-21]
VC4-4c Logical Port on STM-16 (Line)	TM16/4 ADM16/4	LP[301-302,318].1-4 LP[301-302,318].5-8 LP[301-302,318].9-12 LP[301-302,318].13-16 LP[302-305].1-4 LP[302-305].5-8 LP[302-305].9-12 LP[302-305].13-16	S16/1/[1-2,18]/1/4c.1 S16/1/[1-2,18]/1/4c.2 S16/1/[1-2,18]/1/4c.3 S16/1/[1-2,18]/1/4c.4 S16/1/[2-5]/1/4c.1 S16/1/[2-5]/1/4c.2 S16/1/[2-5]/1/4c.3 S16/1/[2-5]/1/4c.4
VC4-4c Logical Port on STM-16 (Trib)	TM16/4 (CS-17 & CS-19) ADM16/4	TP[303-317].1-4 TP[303-317].5-8 TP[303-317].9-12 TP[303-317].13-16 TP[306-318].1-4 TP[306-318].5-8 TP[306-318].9-12 TP[306-318].13-16	S16/1/[3-17]/1/4c.1 S16/1/[3-17]/1/4c.2 S16/1/[3-17]/1/4c.3 S16/1/[3-17]/1/4c.4 S16/1/[6-18]/1/4c.1 S16/1/[6-18]/1/4c.2 S16/1/[6-18]/1/4c.3 S16/1/[6-18]/1/4c.4

Non-port identifiers

Overview   This section lists the non-port identifiers for the PHASE network elements.

Non-port identifiers   The following table lists the non-port identifiers for the supported PHASE network elements.

Table 5-22   Non-port identifiers for PHASE network elements

Description	Entity Identifier
Management and Communication Unit	MCU_nnn
STM-1 Optical Interface	SIU-1OP_nnn
STM-4 Optical Interface	SIU-4OP_nnn
STM-16 Optical Interface	SIU-16OP_nnn
STM-1 Electrical Interface	SIU-1EL_nnn
STM-4 Optical Interface with OH Bus access and CCU-X3 integrated	SIU-4B_nnn
STM-1 Optical Interface without central clock unit	SIU-1OPWITHOUTCCU_nnn
STM-4 Optical Interface without central clock unit	SIU-4OPWITHOUTCCU_nnn
STM-1 Electrical Interface without central clock unit	SIU-1ELWITHOUTCCU_nnn
CEPT-1 Electrical Interface (21 channels)	TIU-1El_nnn
CEPT-3 Electrical Interface (6 channels)	TIU3WITH34M_nnn
DS-3 Electrical Interface (6 channels)	TIU3WITH45M_nnn
CEPT-4 Electrical Interface (CEPT-4 or STM-1, 4 channels)	TIU4EL_nnn
Bus Bridge Unit	BBU_nnn
Pointer Processing Unit (processes 4 STM-1s)	PPU4_nnn
Pointer Processing Unit (processes 8 STM-1s)	PPU8_nnn
Pointer Processing Unit (processes 16 STM-1s)	PPU16_nnn
Connection Matrix Unit (for LXC4/1)	CMU_nnn
Connection Matrix Unit (for LXC16/1)	CMU16_nnn
Overhead Access Unit	OAU_nnn
Optical Booster Amplifier 1	OBA1_nnn
Optical Booster Amplifier 2	OBA2_nnn
Optical Pre-Amplifier	OPA_nnn

Table 5-22   Non-port identifiers for PHASE network elements   (continued)

Description	Entity Identifier
Synchronous Connection Interface	SCIX1_nnn
Synchronous Connection Interface (SISA)	SCIX2_nnn
Synchronous Connection Interface (Adder)	SCIA_nnn
Tributary Connection Interface (2Mbs Unprotected 120 Ohm)	TCI1U120_nnn
Tributary Protection Interface (2Mbs Protected 120 Ohm)	TPI1T120_nnn
Tributary Protection Interface (2Mbs Protecting 120 Ohm)	TPI1P120_nnn
Tributary Connection Interface (2Mbs Unprotected 75 Ohm)	TCI1U75_nnn
Tributary Protection Interface (2Mbs Protected 75 Ohm)	TPI1T75_nnn
Tributary Protection Interface (2Mbs Protecting 75 Ohm)	TPI1P75_nnn
Tributary Connection Interface (34Mbs)	TCI3WITH34M_nnn
Tributary Protection Interface (34Mbs)	TPI3WITH34M_nnn
Tributary Connection Interface (45Mbs)	TCI3WITH45M_nnn
Tributary Protection Interface (45Mbs)	TPI3WITH45M_nnn
Tributary Connection Interface (140Mbs or STM-1)	TCI4_nnn
Tributary Protection Interface (140Mbs or STM-1)	TPI4_nnn
Overhead Access Interface	OAI_nnn
Order Wire Interface	OWI_nnn
Overhead Access and Order Wire Interface	OAIANDOWI_nnn
MCU Connection Interface (with AIP)	MCI0_nnn
MCU Connection Interface (with AIM)	MCI1_nnn
Unassigned slot, nnn	SLOT_nnn

Section IX: SLM Port Addresses

Overview

Purpose   This section describes the external and internal port addresses for both the physical and logical ports of SLM network elements. This section also discusses the correlation between the external and internal port addresses.

Contents

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Port identifiers for SLM-4 network elements

Overview This section provides the port identifiers for SLM-4 network elements.

Table The following table contains the port identifiers for the SLM-4 network elements.

Table 5-23   Port identifiers for SLM-4 network elements

Description	Network Element	Entity Identifier	Network Level Address
STM-4 Physical Port (Line)	SLM40xNTERM	LP[1-2]	S4/1/[2, 11]/1
	SLM41+1TERM	LP[1-2]	S4/1/[2, 11]/1
	SLM4REGEN	LP[1,2,3,4]	S4/1/[1, 2, 3, 4]/1
STM-4 MSP Physical Port (Line)	SLM41+1TERM	LP1	S4/1/GRP1/1
STM-1 Physical Port (Trib)	SLM40xNTERM	TP[1-4].[1-2]	S1/1/[4,5,8,9]/[1-2]
	SLM41+1TERM	TP[1-2].[1-2]	S1/1/[4,5]/[1-2]
E4 (140 Mb/s) Physical Port (Trib)	SLM40xNTERM	TP[1-4].[1-2]	P4/1/[4,5,8,9]/[1-2]
	SLM41+1TERM	TP[1-2].[1-2]	P4/1/[4,5]/[1-2]
VC-4 Logical Port on STM-4 (Line)	SLM40xNTERM	TP[1-2].[1-4]	S4/1/[2,11]/1/[1-4]
VC-4 Logical Port on STM-4 MSP (Line)	SLM41+1TERM	LP1.[1-4]	S4/1/GRP1/1/[1-4]
VC-4 Logical Port on STM-1 (Trib)	SLM40xNTERM	TP[1-4].[1-2].1	S1/1/[4,5,8,9]/[1-2]/1
	SLM41+1TERM	TP[1-2].[1-2].1	S1/1/[4,5]/[1-2]/1
VC-4 Logical Port on E4 (140 Mb/s) port (Trib)	SLM40xNTERM	TP[1-4].[1-2]	P4/1/[4,5,8,9]/[1-2]
	SLM41+1TERM	TP[1-2].[1-2]	P4/1/[4,5]/[1-2]

Non-port identifiers for SLM-4 network elements

Overview This section presents the non-port identifiers for the SLM-4 network elements.

Non-port identifiers The following table presents the non-port identifiers for the supported SLM-4 network elements.

Table 5-24   Non-port identifiers for SLM-4 network elements

Description	Entity Identifier
For SLM40xNTERM and SLM41+1TERM network elements	
Timing Generator Unit	TGU[1-2]
System Controller	SCT
Power Supply Filter	PSF[1-2]
Line Port Card	LPRX[1-2]
	LPTX[1-2]
Tributary Port Card	TP[1-4]
Tributary Overhead Controller	TOC
Line Overhead Controller	LOC
Interconnect pack with fixed straps	RCU4
For SLM4REGEN network elements	
System Controller	SCT
Power Supply Filter	PSF[1-2]
User Panel	UPL
Regenerator Line Card	RGU[1-4]
Regenerator Overhead Controller	ROC

Port identifiers for SLM-16 network elements

Overview This section provides the port identifiers for SLM-16 network elements.

Table The following table contains the port identifiers for the SLM-16 network elements.

Table 5-25 Port identifiers for SLM-16 network elements

Description	Network Element	Entity Identifier	Network Level Address
STM-16 Physical Port (Line)	SLM160x1TERM	LP1	S16/1/13/1
	SLM161+1TERM	LP[1-2]	S16/1/[13, 29]/1
	SLM16ADM	LP[1-2]	S16/1/[4, 9]/1
	SLM16REGEN	LP[1,2,3,4]	S16/1/[1, 2, 3, 4]/1
STM-16 MSP Physical Port (Line)	SLM161+1TERM	LP1	S16/1/GRP1/1
STM-1 Physical Port (Trib)	SLM160xNTERM	TP[1-8].[1-2]	S1/1/[1-4, 7-10]/[1-2]
	SLM161+1TERM	TP[1-8].[1-2]	S1/1/[1-4, 7-10]/[1-2]
	SLM16ADM	TP[1-8].[1-2]	S1/1/[15-18, 20-23]/[1-2]
STM-1 MSP Physical Port (Trib)	SLM16ADM	TP[1, 3, 5, 7].[1-2]	S1/1/GRP[1-4]/[1-2]
E4 (140 Mb/s) Physical Port (Trib)	SLM160x1TERM	TP[1-8].[1-2]	P4/1/[1-4, 7-10]/[1-2]
	SLM161+1TERM	TP[1-8].[1-2]	P4/1/[1-4, 7-10]/[1-2]
	SLM16ADM	TP[1-8].[1-2]	P4/1/[15-18, 20-23]/[1-2]
VC-4 Logical Port on STM16 (Line)	SLM160x1TERM	LP1.[1-16]	S16/1/13/1/[1-16]
	SLM16ADM	LP1.[1-2].[1-16]	S16/1/[4,9]/1/[1-16]
VC-4 Logical Port on STM-16 MSP (Line)	SLM161+1TERM	LP1.[1-16]	S16/1/GRP1/1/[1-16]
VC-4 Logical Port on STM-1 (Trib)	SLM160x1TERM	TP[1-8].[1-2].1	S1/1/[1-4, 7-10]/[1-2]/1
	SLM161+1TERM	TP[1-8].[1-2].1	S1/1/[1-4, 7-10]/[1-2]/1
	SLM16ADM	TP[1-8].[1-2].1	S1/1/[15-18, 20-23]/[1-2]/1
VC-4 Logical Port on STM-1 MSP	SLM16ADM	TP[1, 3, 5, 7].[1-2].1	S1/1/GRP[1-4]/[1-2]/1

Table 5-25   Port identifiers for SLM-16 network elements   (continued)

VC-4 Logical port on E4 (140 Mb/s) Port (Trib)	SLM160x1TERM	TP[1-8].[1-2]	P4/1/[1-4, 7-10]/[1-2]
	SLM161+1TERM	TP[1-8].[1-2]	P4/1/[1-4, 7-10]/[1-2]
	SLM16ADM	TP[1-8].[1-2]	P4/1/[15-18, 20-23]/[1-2]

Non-port identifiers for SLM-16 network elements

Overview This section presents the non-port identifiers for the SLM-16 network elements.

Non-port identifiers The following table presents the non-port identifiers for the supported SLM-16 network elements.

Table 5-26   Non-port identifiers for SLM-16 network elements

Description	Entity Identifier
For SLM160xNTERM and SLM161+1TERM, and SLM16ADM network elements	
Timing Generator Unit	TGU[1-2]
System Controller	SCT
Power Supply Filter	PSF[1-4]
Line Port Card	LPRX[1-2]
	LPTX[1-2]
Tributary Port Card	TP[1-8]
Tributary Overhead Controller	TOC
Line Overhead Controller	LOC
Transmitter Switch Unit	SWTX[1-2]
Receiver Switch Unit	SWRX[1-2]
Line Controller Unit	LNCTL
System Control Unit	SYSCTL
System Memory Unit	SYSMEM
User Panel	UPL
For SLM16REGEN network elements	
System Controller	SCT
Power Supply Filter	PSF[1-2]
User Panel	UPL
Regenerator Line Card	RGU[1-4]
Regenerator Overhead Controller	ROC

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Section X: WaveStar® ADM Port Addresses

Overview

Purpose   This section provides information regarding the Navis™ Optical NMS port addresses for the both the physical and logical ports of the supported ADM network elements.

Contents

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Port identifiers for WaveStar® ADM 16/1 network elements

Overview   This section describes the port identifiers for WaveStar® ADM 16/1 network elements.

Table   The following table lists the port identifiers for WaveStar® ADM 16/1 network elements.

Table 5-27   Port Identifiers for WaveStar® ADM 16/1 network elements

Description	Network Element	Entity Identifier	Network Level Address
STM-16 Physical Port (Line)	WS16/1, WS16/1MSSP	LP[1,2]	S16/1/[4,16]/1[1]
STM-16 MSP (Line)	WS16/1	LP1	S16/1/GRP1/1[1]
STM-4 Physical Port (Trib)	WS16/1, WS16/1MSSP	TP[1-9]	S4/1/[5-13]/1a
STM-4 MSP (Trib)	WS16/1, WS16/1MSSP	TP[1,3,5,7]	S4/1/GRP1/1[1] [2] S4/1/GRP2/1[1] [2] S4/1/GRP3/1[1] [2] S4/1/GRP4/1[12]
STM-1 Physical Port (Trib-optical or electrical)	WS16/1, WS16/1MSSP	TP[1-9].[1-4]	S1/1/[5-13]/[1-4][1]
STM-1 MSP (Trib-optical only)	WS16/1, WS16/1MSSP	TP1.[1-4] TP3.[1-4] TP5.[1-4] TP7.[1-4]	S1/1/GRP1/[1-4][1] [2] S1/1/GRP2/[1-4][1] [2] S1/1/GRP3/[1-4][1] [2] S1/1/GRP4/[1-4][12]
STM-0 Physical Port (Trib)	WS16/1, WS16/1MSSP	TP[1-9].[1-12]	S0/1/[5-13]/[1-12][1] [2]
STM-0 MSP (Trib)	WS16/1, WS16/1MSSP	TP1.[1-12] TP3.[1-12] TP5.[1-12] TP7.[1-12]	S0/1/GRP1/[1-12][1] [2] S0/1/GRP2/[1-12][1] [2] S0/1/GRP3/[1-12][1] [2] S0/1/GRP4/[1-12][1] [2]

Table 5-27   Port Identifiers for WaveStar® ADM 16/1 network elements   (continued)

Description	Network Element	Entity Identifier	Network Level Address
E4(140 Mb/s) Physical Port (Trib)	WS16/1, WS16/1MSSP	TP[2-9].[1-4]	P4/1/[6-13]/[1-4]
E3(34 Mb/s) Physical Port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-12]	P3/1/[5-12]/[1-4]-[1-3][1] [2]
DS3 (45 Mb/s) Physical Port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-12]	D3/1/[5-12]/[1-4]-[1-3][3] [4]
E1(2 Mb/s) Physical Port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-63]	P1/1/[5-12]/1-[1-63][3]
D1 (1.5Mb/s) Physical Port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-63]	D1/1/[5-12]/1-[1-63]
LAN8 Physical Port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-8]	LAN8/1/[5-12]/[1-8]
LAN Physical/Logical Port (TransLAN + / MLAN)	WS16/1, WS16/1MSSP	LAN[1-8].[1-8]	[[LAN/1/[5-12]/[1-8]]]
LAN Logical Port - VLAN context (TransLAN + / MLAN)	WS16/1, WS16/1MSSP	LAN[1-8].[1-8].[1-4093]	N/A
LANGRP (TransLAN + / MLAN)	WS16/1, WS16/1MSSP	[[LANGRP[1-8].[1-65535]]]	N/A
WAN Logical Port (TransLAN + / MLAN)	WS16/1, WS16/1MSSP	WAN[1-8].[1-8]	N/A
WAN Logical Port - VLAN context (TransLAN + / MLAN)	WS16/1, WS16/1MSSP	WAN[1-8].[1-8].[1-4093]	N/A

Table 5-27   Port Identifiers for WaveStar® ADM 16/1 network elements   (continued)

Description	Network Element	Entity Identifier	Network Level Address
SDH Channel Logical Port (TransLAN+ / MLAN)	WS16/1, WS16/1MSSP	SDHChan[1-8].[1-8]	[[LANBR/1/[5-12]/[1-8]]]
VC4-4c Logical Port on STM-16 Line Port	WS16/1, WS16/1MSSP	LP[1-2].1-4 LP[1-2].5-8 LP[1-2].9-12 LP[1-2].13-16	S16/1/[4,16]/1/4c.1 S16/1/[4,16]/1/4c.2 S16/1/[4,16]/1/4c.3 S16/1/[4,16]/1/4c.4
VC4-4c Logical Port on STM-16 MSP Line Port	WS16/1	LP1.1-4 LP1.5-8 LP1.9-12 LP1.13-16	S16/1/GRP1/1/4c.1 S16/1/GRP1/1/4c.2 S16/1/GRP1/1/4c.3 S16/1/GRP1/1/4c.4
VC4-4c Logical Port on STM-4 Tributary Port	WS16/1, WS16/1MSSP	TP[1-9].1-4	S4/1/[5-13]/1/4c.1
VC4-4c Logical Port on STM-4 MSP Tributary Port	WS16/1, WS16/1MSSP	TP[1,3,5,7].1-4	S4/1/GRP[1-4]/1/4c.1
VC-4 Logical Port on STM-16 (Line)	WS16/1, WS16/1MSSP	LP[1,2].[1-16]	S16/1/[4,16]/1/[1-16]
VC-4 Logical Port on STM-16 MSP (Line)	WS16/1	LP1.[1-16]	S16/1/GRP1/1/[1-16][1]
VC4 Logical Port on STM-4 Tributary Port	WS16/1, WS16/1MSSP	TP[1-9].[1-4]	S4/1/[5-13]/1/[1-4]
VC4 Logical Port on STM-4 MSP Tributary Port	WS16/1, WS16/1MSSP	TP[1,3,5,7].[1-4]	S4/1/GRP[1-4]/1/[1-4]
VC-4 Logical Port on STM-1 (Trib)	WS16/1, WS16/1MSSP	TP[1-9].[1-4].1	S1/1/[5-13]/[1-4]/1[1]

Table 5-27   Port Identifiers for WaveStar® ADM 16/1 network elements   (continued)

Description	Network Element	Entity Identifier	Network Level Address
VC-4 Logical Port on STM-1 MSP(Trib)	WS16/1, WS16/1MSSP	TP[1,3,5,7].[1-4].1	S1/1/GRP[1-4]/[1-4]/1 [5] [6]
[[VC-4 Logical Port on STM-0 (Trib)]]	WS16/1, WS16/1MSSP	[[TP[1-9].[1-4]]]	[[S0/1/[5-13]/[1-4]]]
[[VC-4 Logical Port on STM-0 MSP(Trib)]]	WS16/1, WS16/1MSSP	[[TP[1,3,5,7].[1-4]]]	[[S0/1/GRP[1-4]/[1-4]/1[5] [6]
VC-4 Logical Port on PI/E12 card (Trib)	WS16/1, WS16/1MSSP	TP[1-8]	P1/1/[5-12]/1
VC-4 Logical port on PI-DS1/63 card (Trib)	WS16/1, WS16/1MSSP	TP[1-8]	D1/1/[5-12]/1
VC-4 Logical Port on PI-E3DS3/12 card (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-2] TP[1-8].[3-4]	P3/1/[5-12]/[1-2] D3/1/[5-12]/[3-4]
VC-4 Logical Port on PI-DS3/12 card (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-4]	D3/1/[5-12]/[1-4]
VC-4 Logical Port on P4-E4/4 card (Trib)	WS16/1, WS16/1MSSP	TP[2-9].[1-4]	P4/1/[6-13]/[1-4]
VC4 on LAN8 Tributary Port	WS16/1, WS16/1MSSP	TP[1-8]	LAN8/1/[5-12]/1
VC-4 Logical Port on LAN (TransLAN + / MLAN)	WS16/1, WS16/1MSSP	TP[1-8].[1-2]	[[LANBR/1/[5-12]/[1-2]]]
VC-4 Logical Port on LAN (TransLAN + / MLAN)	WS16/1, WS16/1MSSP	TP[1-8].[1-2]	[[LANBR/1/[5-12]/[1-2]]]

Table 5-27   Port Identifiers for WaveStar® ADM 16/1 network elements   (continued)

Description	Network Element	Entity Identifier	Network Level Address
VC-4 Logical Port in CC-64/n (Flexible Cross Connect - n=16 or 32)	WS16/1, WS16/1MSSP	CC1.[1-32]	N/A
VC-3 Logical Port on STM-16 (Line)	WS16/1, WS16/1MSSP	LP[1,2].[1-16].[1-3].0.0	S16/1/[4,16]/1/[1-16]-[1-3]
VC-3 Logical Port on STM-16 MSP (Line)	WS16/1	LP1.[1-16].[1-3].0.0	S16/1/GRP1/1/[1-16]-[1-3]
VC3 on STM-4 Tributary Port	WS16/1, WS16/1MSSP	TP[1-9].[1-4].[1-3].0.0	S4/1/[5-13]/1/[1-4]-[1-3]
VC3 on STM-4 MSP Tributary Port	WS16/1, WS16/1MSSP	TP[1,3,5,7].[1-4].[1-3].0.0	S4/1/GRP[1-4]/1/[1-4]-[1-3]
VC-3 Logical Port on STM-1 (Trib)	WS16/1, WS16/1MSSP	TP[1-9].[1-4].1.[1-3].0.0	S1/1/[5-13]/[1-4]/1-[1-3]
VC-3 Logical port on STM-1 MSP (Trib)	WS16/1, WS16/1MSSP	TP[1,3,5,7].[1-4].1.[1-3].0.0	S1/1/GRP[1-4]/[1-4]/1-[1-3] [5]
VC-3 Logical Port on E3 port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-12]	P3/1/[5-12]/[1-4]-[1-3][4]
VC-3 Logical Port on DS3 port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-12]	D3/1/[5-12]/[1-4]-[1-3][3]
VC-3 Logical Port on SDH Channel (TransLAN+ / MLAN)	WS16/1, WS16/1MSSP	TP[1-8].wxyz	[[LANBR1/[5-12]/[1-2]-[1-2]]][3]

Table 5-27   Port Identifiers for WaveStar® ADM 16/1 network elements   (continued)

Description	Network Element	Entity Identifier	Network Level Address
VC-3 Logical Port in CC-64/n (Flexible Cross Connect - n=16 or 32)	WS16/1, WS16/1MSSP	CC1.[1-32].[1-3].0.0	N/A
VC-12 Logical Port on STM-16 (Line)	WS16/1, WS16/1MSSP	LP[1,2].[1-16].[1-3].[1-7].[1-3]	S16/1/[4,16]/1/[1-16]-[1-63]
VC-12 Logical Port on STM-16 MSP (Line)	WS16/1,	LP1.[1-16].[1-3].[1-7].[1-3]	S16/1/GRP1/1/[1-16]-[1-63]
VC12 on STM-4 Tributary Port	WS16/1, WS16/1MSSP	TP[1-9].[1-4].[1-3].[1-7].[1-3]	S4/1/[5-13]/1/[1-4]-[1-63]
VC12 on STM-4 MSP Tributary Port	WS16/1, WS16/1MSSP	TP[1,3,5,7].[1-4].[1-3].[1-7].[1-3]	S4/1/GRP[1-4]/1/[1-4]-[1-63]
VC12 on STM-4 MSP Tributary Port	WS16/1, WS16/1MSSP	TP[1,3,5,7].[1-4].[1-3].[1-7].[1-3]	S4/1/GRP[1-4]/1/[1-4]-[1-63]
VC-12 Logical port on STM-1 (Trib)	WS16/1, WS16/1MSSP	TP[1-9].[1-4].1.[1-3].[1-7].[1-3]	S1/1/[5-13]/[1-4]/1-[1-63]
VC-12 Logical port on STM-1 MSP (Trib)	WS16/1, WS16/1MSSP	TP[1,3,5,7].[1-4].1.[1-3].[1-7].[1-3]	S1/1/GRP[1-4]/[1-4]/1-[1-63][5]
VC-12 Logical port on E1 Port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-63]	P1/1/[5-12]/1-[1-63]
VC12 on LAN8 Tributary Port	WS16/1, WS16/1MSSP	TP[1-8].[1-8].[1-4]	LAN8/1/[5-12]/1-[1-8]-[1-4]
VC12 Logical Port on SDH Channel(Trans-LAN+ / MLAN)	WS16/1, WS16/1MSSP	TP[1-8].wxyz	[[LANBR/1/[5-12]/[1-2]-[43-62]

Table 5-27   Port Identifiers for WaveStar® ADM 16/1 network elements   (continued)

Description	Network Element	Entity Identifier	Network Level Address
VC12 Logical Port in CC-64/n (Flexible Cross Connect - n=16 or 32)	WS16/1, WS16/1MSSP	CC1.[1-32].[1-3].[1-7].[1-3]	N/A
VC-11 Logical port on D1 Port (Trib)	WS16/1, WS16/1MSSP	TP[1-8].[1-63]	D1/1/[5-12]/1-[1-63]

Notes:

1. In general, the WaveStar® ITM-SC Port Selection screen should display both the physical port and GRP addresses when the parameter from WaveStar® ITM-NM across the F-interface is UI_PORT_LEVEL. There are, however, two exceptions which are as follows: 1) If the equipment necessary for MSP is known to be not present in the network element, then the display of the MSP Group address should be suppressed. 2) If MSP is already provisioned, then the standard port addresses (non-GRP) should be suppressed from the Port Selection screen.

2. With STM-n tributary units, the WaveStar® ITM-SC Port Selection screen should display the Network Level Address for each physical port, without regard to the AU3 / AU4 type configured for the port (subject to footnote 'a' above).

3. For setting of "In-use" flag for the ports in the WaveStar® ITM-SC Port Selection screens please refer to Port Status of Immediately Multiplexed Ports in Port Selection Screen, 8-54.

4. The definitions for EIDs and network level addresses allow for port addresses that may not be valid. A E3 (34 Mb/s) port, for example, may have port numbers ranging 1 through 6 only; a D3 port (45 Mb/s) in a mixed card may have port numbers ranging 7 to 12 only.

5. The WaveStar® ITM-SC Port Selection screen should display the logical GRP addresses when the corresponding STM-n digital link is provisioned with MSP. If the logical port is not derived from an MSP STM-n port, the standard port addresses (without GRP in the Network Level Address) will be displayed within the WaveStar® ITM-SC Port Selection screens.

6. In the case of the SA-1/4B or SI-L4.1/1 unit, the WaveStar® ITM-SC Port Selection screen should not display any VC-4 address for a physical port which has been configured in AU3 mode. It follows that

no low-order port addresses will be displayed for a physical port which has been configured in AU3 mode.

□

Non-port identifiers for WaveStar® ADM 16/1 network elements

Overview   This section describes the non-port identifiers for WaveStar® ADM 16/1 network elements.

Table   The following table lists the non-port identifiers for WaveStar® ADM 16/1 network elements.

Table 5-28   Non-port identifiers for WaveStar® ADM 16/1 network elements

Slot Number	Description	Entity Identifiers
1	System Controller Unit	SC
2	Cross-connect Unit	CC1
3	Line Port Unit	LS3
4	Line Port Unit	LS1
5-13	Tributary Port Unit	TS(n-4)
14	Cross-connect Unit	CC2
15	Line Port Unit	LS4
16	Line Port Unit	LS2
17-18	Power and Timing Unit	PT(n-16)
19-36	Paddle Board	PB(n-18)
37-38	Timing Interface	TI(n-36)
39-40	Paddle Board	PB(n-20)

Port identifiers for WaveStar® ADM 16/1 compact network elements

Overview   This section describes the port identifiers for WaveStar® ADM 16/1 compact network elements.

Table   The following table lists the port identifiers for WaveStar® ADM 16/1 compact network elements.

Table 5-29   Port Identifiers for WaveStar® ADM 16/1 compact network elements

Description	Entity Identifier	Network Level Address
STM-16 Physical Port (Line)	LP[1,2]	S16/1/[1,4]/1[1]
STM-16 MSP (Line)	LP1	S16/1/GRP1/1[1]
STM-4 Physical Port (Trib)	TP[1-5]	S4/1/[7-11]/1a
STM-4 MSP (Trib)	TP[1,3]	S4/1/GRP1/1[1] [2] S4/1/GRP2/1[1] [2]
STM-1 Physical Port (Trib-optical or electrical)	TP[1-5].[1-4]	S1/1/[7-11]/[1-4][1]
STM-1 MSP (Trib-optical only)	TP1.[1-4] TP3.[1-4]	S1/1/GRP1/[1-4][1] [2] S1/1/GRP2/[1-4][1] [2]
E3/DS3 switchable (34/45 Mb/s) Physical Port (Trib)	TP[1-4].[1-12]	P3-D3/1/[7-10]/[1-4]-[1-3][1] [2]
E1(2 Mb/s) Physical Port (Trib)	TP[1-4].[1-63]	P1/1/[7-10]/1-[1-63][3]
LAN Physical/Logical Port (TransLAN + / MLAN)	LAN[1-4].[1-8]	[[LAN/1/[7-10]/[1-8]]]
LAN Logical Port - VLAN context (TransLAN + / MLAN)	LAN[1-4].[1-8].[1-4093]	N/A
LANGRP (TransLAN + / MLAN)	[[LANGRP[1-4].[1-65535]]]	N/A
WAN Logical Port (TransLAN + / MLAN)	WAN[1-4].[1-8]	N/A
WAN Logical Port - VLAN context (TransLAN + / MLAN)	WAN[1-4].[1-8].[1-4093]	N/A
SDH Channel Logical Port (TransLAN+ / MLAN)	SDHChan[1-4].[1-8]	[[LANBR/1/[7-10]/[1-8]]]

Section X: WaveStar® ADM Port Addresses
Port identifiers for WaveStar® ADM 16/1
compact network elements

Network Element Port Addresses

Table 5-29   Port Identifiers for WaveStar® ADM 16/1 compact network elements   (continued)

Description	Entity Identifier	Network Level Address
VC4-4c Logical Port on STM-16 Line Port	LP[1-2].1-4 LP[1-2].5-8 LP[1-2].9-12 LP[1-2].13-16	S16/1/[1,4]/1/4c.1 S16/1/[1,4]/1/4c.2 S16/1/[1,4]/1/4c.3 S16/1/[1,4]/1/4c.4
VC4-4c Logical Port on STM-16 MSP Line Port	LP1.1-4 LP1.5-8 LP1.9-12 LP1.13-16	S16/1/GRP1/1/4c.1 S16/1/GRP1/1/4c.2 S16/1/GRP1/1/4c.3 S16/1/GRP1/1/4c.4
VC4-4c Logical Port on STM-4 Tributary Port	TP[1-5].1-4	S4/1/[7-11]/1/4c.1
VC4-4c Logical Port on STM-4 MSP Tributary Port	TP[1,3].1-4	S4/1/GRP[1,2]/1/4c.1
VC-4 Logical Port on STM-16 (Line)	LP[1,2].[1-16]	S16/1/[1,4]/1/[1-16]
VC-4 Logical Port on STM-16 MSP (Line)	LP1.[1-16]	S16/1/GRP1/1/[1-16][1]
VC4 Logical Port on STM-4 Tributary Port	TP[1-5].[1-4]	S4/1/[7-11]/1/[1-4]
VC4 Logical Port on STM-4 MSP Tributary Port	TP[1,3].[1-4]	S4/1/GRP[1,2]/1/[1-4]
VC-4 Logical Port on STM-1 (Trib)	TP[1-5].[1-4].1	S1/1/[7-11]/[1-4]/1[1]
VC-4 Logical Port on STM-1 MSP(Trib)	TP[1,3].[1-4].1	S1/1/GRP[1,2]/[1-4]/1 [5] [6]
VC-4 Logical Port on PI-E3DS3/12 card (Trib)	TP[1-4].[1-4]	P3-D3/1/[7-10]/[1-4]
VC-4 Logical Port on P1/E1 card (Trib)	TP[1-4]	P1/1/[7-10]/1
VC4 Logical Port on LAN (TransLAN + / MLAN)	TP[1-4].[1-2]	[[LANBR/1/[7-10]/[1-2]]]
VC-4 Logical Port in CC-64/32 (Flexible Cross Connect)	CC1.[1-32]	N/A
VC-3 Logical Port on STM-16 (Line)	LP[1,2].[1-16].[1-3].0.0	S16/1/[4,16]/1/[1-16]-[1-3]

Section X: WaveStar® ADM Port Addresses
Port identifiers for WaveStar® ADM 16/1
compact network elements

Network Element Port Addresses

Table 5-29   Port Identifiers for WaveStar® ADM 16/1 compact network elements   (continued)

Description	Entity Identifier	Network Level Address
VC-3 Logical Port on STM-16 MSP (Line)	LP1.[1-16].[1-3].0.0	S16/1/GRP1/1/[1-16]-[1-3]5
VC3 on STM-4 Tributary Port	TP[1-5].[1-4].[1-3].0.0	S4/1/[7-11]/1/[1-4]-[1-3]
VC3 on STM-4 MSP Tributary Port	TP[1-4].[1-3].0.0	S4/1/GRP[1,2]/1/[1-4]-[1-3]
VC-3 Logical Port on STM-1 (Trib)	TP[1-5].[1-4].1.[1-3].0.0	S1/1/[7-11]/[1-4]/1-[1-3]
VC-3 Logical port on STM-1 MSP (Trib)	TP[1-4].1.[1-3].0.0	S1/1/GRP[1,2]/[1-4]/1-[1-3] 5
VC-3 Logical Port on E3/DS3 switchable port (Trib)	TP[1-4].[1-12]	P3-D3/1/[7-10]/[1-4]-[1-3]4
VC-3 Logical Port on SDH Channel (TransLAN+ / MLAN)	TP[1-4].wxyz	[[LANBR1/[7-10]/[1-2]-[1-2]]]3
VC-3 Logical Port in CC-64/32 (Flexible Cross Connect)	CC1.[1-32].[1-3].0.0	N/A
VC-12 Logical Port on STM-16 (Line)	LP[1,2].[1-16].[1-3].[1-7].[1-3]	S16/1/[1,4]/1/[1-16]-[1-63]
VC-12 Logical Port on STM-16 MSP (Line)	LP1.[1-16].[1-3].[1-7].[1-3]	S16/1/GRP1/1/[1-16]-[1-63]
VC12 on STM-4 Tributary Port	TP[1-5].[1-4].[1-3].[1-7].[1-3]	S4/1/[7-11]/1/[1-4]-[1-63]
VC12 on STM-4 MSP Tributary Port	TP[1,3].[1-4].[1-3].[1-7].[1-3]	S4/1/GRP[1,2]/1/[1-4]-[1-63]
VC-12 Logical port on STM-1 (Trib)	TP[1-5].[1-4].1.[1-3].[1-7].[1-3]	S1/1/[7-11]/[1-4]/1-[1-63]
VC-12 Logical port on STM-1 MSP (Trib)	TP[1,3].[1-4].1.[1-3].[1-7].[1-3]	S1/1/GRP[1,2]/[1-4]/1-[1-63]5
VC-12 Logical port on E1 Port (Trib)	TP[1-4].[1-63]	P1/1/[7-10]/1-[1-63]
VC-12 Logical Port on SDH Channel(TransLAN+ / MLAN)	TP[1-4].wxyz	[[LANBR/1/[7-10]/[1-2]-[43-62]
VC-12 Logical Port in CC-64/32 (Flexible Cross Connect)	CC1.[1-32].[1-3].[1-7].[1-3]	N/A

Non-port identifiers for WaveStar® ADM 16/1 compact network elements

Overview   This section describes the non-port identifiers for WaveStar® ADM 16/1 compact network elements.

Table   The following table lists the non-port identifiers for WaveStar® ADM 16/1 compact network elements.

Table 5-30   Non-port identifiers for WaveStar® ADM 16/1 compact network elements

Slot Number	Description	Entity Identifiers
1	Line Port Unit	LS1
2	Cross-connect Unit	CC1
3/6	Power and Timing Unit	PT(n/3)
4	Line Port Unit	LS2
5	Cross-connect Unit	CC2
7-11	Tributary Port Unit	TS(n-6)
12	System Controller Unit	SC
13-16	Paddle Board	PB(n-12)

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Port identifiers for WaveStar® ADM 4/1 network elements

Overview   This section describes the port identifiers for WaveStar® ADM 4/1 network elements.

Table   The following table lists the port indentifiers for WaveStar® ADM 4/1 network elements.

Table 5-31   Port identifiers for WaveStar® ADM 4/1 network elements

Description	Network Element	Entity Identifier	Network Level Address
*[[*MSP Group for STM-4*]]*	WS4/1STM4	*[[*LP[20,60]*]]*	*[[*S4/1/GRP[1,2]/1*]]*
MSP Group for STM-1	WS4/1STM1	LP[20,60]	S1/1/GRP[1,2]/1
STM-4 Physical Port (Line)	WS4/1STM4 WS4/1STM4R	LP[20,30, 50,60] LP[20,60]	S4/1/[20,30,50,60]/1 S4/1/[20,60]/1
STM-1 Physical Port (Line)	WS4/1STM1	LP[20,30, 50,60]	S1/1/[20,30,50,60]/1
STM-1 Physical Port (Trib)	WS4/1STM4 WS4/1STM1	TP[21,31,41,51,61] TP[21,31,41,51,61]	S1/1/[21,31,41,51,61]/1 S1/1/[21,31,41,51,61]/1
CEPT-3 Physical Port (Trib)	WS4/1STM4 WS4/1STM1	TP[21,31,41,51,61].1 TP[21,31,41,51,61].1	P3/1/[21,31,41,51,61]/1 P3/1/[21,31,41,51,61]/1
DS3 Physical Port (Trib)	WS4/1STM4 WS4/1STM1	TP[21,31,41,51,61].1 TP[21,31,41,51,61].1	D3/1/[21,31,41,51,61]/1 D3/1/[21,31,41,51,61]/1
CEPT-1 Physical Port (Trib)	WS4/1STM4 WS4/1STM1	TP[21,22,31,32,41,51,52,61,62].[1-16] TP[21,22,31,32,41,51,52,61,62].[1-16]	P1/1/[21,22,31,32,41,51,52,61,62]/[1-16] P1/1/[21,22,31,32,41,51,52,61,62]/[1-16]
*[[*VC-4 Logical Port on STM-4 (Line MSP)*]]*	WS4/1STM4	*[[*LP[20,60].[1-4]*]]*	*[[*S4/1/GRP[1,2]/1/[1-4]*]]*
VC-4 Logical Port on STM-4 (Line)	WS4/1STM4	LP[20,30, 50,60].[1-4]	S4/1/[20,30, 50,60]/1/[1-4] [3]
VC-4 Logical Port on STM-4 (Virtual)	WS4/1STM4	VP[11,22].[1-4]	S4/1/[11,22]/1/[1-4] [3]
VC-4 Logical Port on STM-1 (Line MSP)	WS4/1STM1	LP[20,60].1	S1/1/GRP[1,2]/1/1 [2]
VC-4 Logical Port on STM-1 (Line)	WS4/1STM1	LP[20,30, 50,60].1	S1/1/[20,30, 50,60]/1/1

Table 5-31   Port identifiers for WaveStar® ADM 4/1 network elements   (continued)

Description	Network Element	Entity Identifier	Network Level Address
VC-4 Logical Port on STM-1 (Virtual)	WS4/1STM1	VP[11,22].1	S1/1/[11,22]/1/1
VC-4 Logical Port on STM-1 (Trib)	WS4/1STM4 WS4/1STM1	TP[21,31,41,51,61].1 TP[21,31,41,51,61].1	S1/1/[21,31,41,51, 61]/1/1 S1/1/[21,31,41,51, 61]/1/1
[[VC-3 Logical Port on STM-4 (Line MSP)]]	WS4/1STM4	*[[LP[20,60].[1-4].[1-3].0.0]]*	*[[S4/1/GRP[1,2]/1/[1-4]-[1-3]* [2] *]]*
VC-3 Logical Port on STM-4 (Line)	WS4/1STM4	LP[20,60].[1-4].[1-3].0.0	S4/1/[20,60]/1/[1-4]-[1-3]
VC-3 Logical Port on STM-4 (Virtual)	WS4/1STM4	VP[11,22].[1-4].[1-3].0.0	S4/1/[11,22]/1/[1-4]-[1-3]
VC-3 Logical Port on STM-1 (Line MSP)	WS4/1STM1	LP[20,60].1.[1-3].0.0	S1/1/GRP[1,2]/1/1-[1-3] [2]
VC-3 Logical Port on STM-1 (Line)	WS4/1STM1	LP[20,60].1.[1-3].0.0	S1/1/[20,60]/1/1-[1-3]
VC-3 Logical Port on STM-1 (Virtual)	WS4/1STM1	VP[11,22].1.[1-3].0.0	S1/1/[11,22]/1/1-[1-3]
VC-3 Logical Port on STM-1 (Trib)	WS4/1STM4 WS4/1STM1	TP[21,31,41,51,61].1.[1-3].0.0 TP[21,31,41,51,61].1.[1-3].0.0	S1/1/[21,31,41,51, 61]/1/1-[1-3] S1/1/[21,31,41,51, 61]/1/1-[1-3]
VC-3 Logical Port on CEPT-3 Physical port (Trib)	WS4/1STM4 WS4/1STM1	TP[21,31,41,51,61].1 TP[21,31,41,51,61].1	P3/1/[21,31,41,51,61]/1 P3/1/[21,31,41,51,61]/1
VC-3 Logical Port on DS-3 Physical port (Trib)	WS4/1STM4 WS4/1STM1	TP[21,31,41,51,61].1 TP[21,31,41,51,61].1	D3/1/[21,31,41,51,61]/1 D3/1/[21,31,41,51,61]/1
[[VC-12 Logical Port on STM-4 (Line MSP)]]	WS4/1STM4	*[[LP[20,60].[1-4].[1-3].[1-7].[1-3]]]*	*[[S4/1/GRP[1,2]/1/[1-4]-[1-63]* [2] *]]*
VC-12 Logical Port on STM-4 (Line)	WS4/1STM4	LP[20,60].[1-4].[1-3].[1-7].[1-3]	S4/1/[20,60]/1/[1-4]-[1-63]
VC-12 Logical Port on STM-4 (Virtual)	WS4/1STM4	VP[11,22].[1-4].[1-3].[1-7].[1-3]	S4/1/[11,22]/1/[1-4]-[1-63]
VC-12 Logical Port on STM-1 MSP (Line)	WS4/1STM1	LP[20,60].1.[1-3].[1-7].[1-3]	S1/1/GRP[1,2]/1/1-[1-63] [2]

Table 5-31   Port identifiers for WaveStar® ADM 4/1 network elements   (continued)

Description	Network Element	Entity Identifier	Network Level Address
VC-12 Logical Port on STM-1 (Line)	WS4/1STM1	LP[20,60].1.[1-3].[1-7].[1-3]	S1/1/[20,60]/1/1-[1-63]
VC-12 Logical Port on STM-1 (Virtual)	WS4/1STM1	VP[11,22].1.[1-3].[1-7].[1-3]	S1/1/[11,22]/1/1-[1-63]
VC-12 Logical Port on STM-1 (Trib)	WS4/1STM4 WS4/1STM1	TP[21,31,41,51,61].1.[1-3].[1-7].[1-3] TP[21,31,41,51,61].1.[1-3].[1-7].[1-3]	S1/1/[21,31,41,51, 61]/1/1-[1-63] S1/1/[21,31,41,51, 61]/1/1-[1-63]
VC-12 Logical Port on CEPT-1 (2 Mb/s) Physical port	WS4/1STM4 WS4/1STM1	TP[21,22,31,32,41,51,52, 61,62].[1-16] TP[21,22,31,32,41,51,52, 61,62].[1-16]	P1/1/[21,22,31,32,41,51, 52,61,62]/[1-16] P1/1/[21,22,31,32,41,51, 52,61,62]/[1-16]

Notes:

1. For a STM-n physical port which is involved in MSP protection (as either the worker or protecting port), the WaveStar® ITM-SC Port Selection screen should display the appropriate GRP address only. For a STM-n physical port which is not involved in MSP protection, the WaveStar® ITM-SC Port Selection screen should display the standard port address only (non-GRP).

2. For a logical port which is derived from a STM-n MSP protection group, the WaveStar® ITM-SC Port Selection screen should display the logical GRP address only. For a logical port derived from a STM-n port which is not involved in MSP protection, the WaveStar® ITM-SC Port Selection screen should display the standard logical port address only (non-GRP).

3. The WaveStar® ITM-SC Port Selection screen should always display all the existing AU4 ports, not only the AU4 port available for add/drop use. The 3 AU4 which are fixed cross connected (line to line transferred) will be always tagged as in-use. The 4th AU4 (the flexible one) will be displayed with the in-use tag set depending on its in-use status.

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Port identifiers for WaveStar® ADM-155E network elements

Overview   This section describes the port identifiers for WaveStar® ADM-155E network elements.

Table   The following table lists the port indentifiers for WaveStar® ADM-155E network elements.

Table 5-32   Port identifiers for WaveStar® ADM-155E network elements

Description	Entity Identifier	Network Level Address
MSP Group for STM-1	LP[6,16]	S1/1/GRP[1,2]/1
STM-1 Physical Port (Line)	LP[6,7,16,17]	S1/1/[6,7,16,17]/1
STM-1 Physical Port (Trib)	TP[8-15]	S1/1/[8-15]/1
CEPT-3 Physical Port (Trib)	TP[8-15].1	P3/1/[8-15]/1
DS3 Physical Port (Trib)	TP[8-15].1	D3/1/[8-15]/1
CEPT-1 Physical Port (Trib)	TP[8-15].[1-16]	P1/1/[8-15]/[1-16]
VC-4 Logical Port (Line MSP)	LP[6,16].1	S1/1/GRP[1,2]/1/1
VC-4 Logical Port (Line)	LP[6,16].1	S1/1/[6,16]/1/1
VC-4 Logical Port (Virtual)	VP[21,22].1	S1/1/[21,22]/1/1
VC-4 Logical Port on STM-1 (Trib)	TP[8-15].1	S1/1/[8-15]/1/1
VC-3 Logical Port (Line MSP)	LP[6,16].1.[1-3].0.0	S1/1/GRP[1,2]/1/1-[1-3]
VC-3 Logical Port (Line)	LP[6,16].1.[1-3].0.0	S1/1/[6,16]/1/1-[1-3]
VC-3 Logical Port (Virtual)	VP[21,22].1.[1-3].0.0	S1/1/[21,22]/1/1-[1-3]
VC-3 Logical Port on STM-1 (Trib)	TP[8-15].1.[1-3].0.0	S1/1/[8-15]/1/1-[1-3]
VC-3 Logical Port on CEPT-3 Physical port (Trib)	TP[8-15].1	P3/1/[8-15]/1
VC-3 Logical Port on DS-3 Physical port (Trib)	TP[8-15].1	D3/1/[8-15]/1
VC-12 Logical Port (Line MSP)	LP[6,16].1.[1-3].[1-7].[1-3]	S1/1/GRP[1,2]/1/1-[1-63]
VC-12 Logical Port (Line)	LP[6,16].1.[1-3].[1-7].[1-3]	S1/1/[6,16]/1/1-[1-63]
VC-12 Logical Port (Virtual)	VP[21,22].1.[1-3].[1-7].[1-3]	S1/1/[21,22]/1/1-[1-63]
VC-12 Logical Port on STM-1 (Trib)	TP[8-15].1.[1-3].[1-7].[1-3]	S1/1/[8-15]/1/1-[1-63]

Table 5-32   Port identifiers for WaveStar® ADM-155E network elements   (continued)

Description	Entity Identifier	Network Level Address
VC-12 Logical Port on CEPT-1 (2 Mb/s) Physical port	TP[8-15].[1-16]	P1/1/[8-15]/[1-16]
		☐

Section XI: WaveStar® AM 1 Port Addresses

Overview

Purpose   This section provides the external and internal port addresses for both the physical and logical ports of WaveStar® AM 1 network elements. It also discusses the correlation between the external and internal port addresses.

Contents

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Port identifiers for WaveStar® AM 1 network elements

Overview   This section contains port address information for the physical and
logical ports usable with WaveStar® AM 1 network elements.

Port identifiers   The following table shows the port identifier address information for
WaveStar® AM 1 network elements.

Table 5-33   Port identifiers for WaveStar® AM 1 network elements

Description		Entity Identifier	Network Level Address
STM-1 Line Port	Physical Port (optical)	LP[1-2]	S1/1/[2-3]/1
	Logical Port (AU4 and VC4 combined)	LP[1-2].1	S1/1/[2-3]/1/1
	Logical Port TU3	LP[1-2].1[1-3].0.0	S1/1/[2-3]/1/1-[1-3]
	Logical Port TU12	LP[1-2].1[1-3].[1-7].[1-3]	S1/1/[2-3]/1/1-[1-63]
STM-1 Line MSP Group	Physical Port (optical)	LP1	S1/1/GRP1/1
	Logical Port (AU4 and VC4 combined)	LP1.1	S1/1/GRP1/1/1
	Logical Port TU3	LP1.1.[1-3].0.0	S1/1/GRP1/1/1-[1-3]
	Logical Port TU12	LP1.1.[1-3].[1-7].[1-3]	S1/1/GRP1/1/1-[1-63]
DS3 (45Mb/s) Tributary	Physical Ports	TP2.[1-2]	D3/1/5/[1-2]
	Logical Port VC3	TP2.[1-2]	D3/1/5/[1-2]
E3 (CEPT-3) (34Mb/s) Tributary	Physical Ports	TP2.[1-2]	P3/1/5/[1-2]
	Logical Port VC3	TP2.[1-2]	P3/1/5/[1-2]
CMB E1 (CEPT-1) (2Mb/s) Tributary (on-board)	Physical Ports	TP1.[1-16]	P1/1/4/[1-16]
	Logical Port VC12	TP1.[1-16]	P1/1/4/[1-16]

Table 5-33   Port identifiers for WaveStar® AM 1 network elements   (continued)

CMC E1 (CEPT-1) (2Mb/s) Tributary (additional)	Physical Ports	TP2.[1-16]	P1/1/5/[1-16]
	Logical Port VC12	TP2.[1-16]	P1/1/5/[1-16]
X.21 Tributary (TransLAN/X.21 card)	Physical X.21 Ports (X21DL)	TP2.[1-4]	X21/1/5/[1-4]
	Logical X.21 Ports VC12	TP2.[1-4]	X21/1/5/[1-4]
TransLAN Tributary (TransLAN/X.21 card)	Physical LAN 10/100baseT Ports (LAN8DL)	LAN2.[1-2]	LAN8/1/5/[1-2]
	Logical LAN 10/100baseT ports VC12	LAN2.[1-2].[1-4]	LAN8/1/5/[1-2]/[1-4]
TransLAN+ Tributary	Physical LAN 10/100baseT Ports	LAN2.[1-4]	[[LAN/1/5/[1-4]]]
	[[Logical LAN 10/100baseT LAN Groups]]	[[LANGRP2.n]]	[[NA]]
	Logical LAN 10/100baseT LAN Ports	LAN2.[1-4]	N/A
	Logical LAN 10/100baseT WAN Ports	WAN2.[1-4]	N/A
	Logical SDH Channel Ports	SDHChan2.[1-4]	[[LANBR/1/5/[1-4]]]
	Logical Ports VC3	TP2.abcd	[[LANBR/1/5/abcd]]
	Logical Ports VC12	TP2.abcd	[[LANBR/1/5/abcd]]

□

Non-port identifiers for WaveStar® AM 1 network elements

Overview This section describes the non-port identifiers for WaveStar® AM 1 network elements.

Table The following table lists the non-port identifiers for WaveStar® AM 1 network elements.

Table 5-34   Non-port identifiers for WaveStar® AM 1 network elements

Slot Number	Description	Entity Identifiers	AM 1, AM 1+ Add/Drop	AM 1+ Terminal (STM-1)
1	Motherboard (System control, timing and cross-connect)	SC	Y	Y
2	Line Slot 1	LS1		
3	Line Slot 2	LS2		N
4	Tributary Slot 1 (Motherboard)	TS1		Y
5	Tributary Slot 1 (Motherboard)	TS2		

□

Port identifiers for WaveStar® AM 1 Plus network elements

Overview   This section contains port address information for the physical and logical ports usable with WaveStar® AM 1 Plus network elements.

Port identifiers   The following table shows the port identifier address information for WaveStar® AM 1 Plus network elements.

Table 5-35   Port identifiers for WaveStar® AM 1 Plus network elements

Network Elements	Description		Entity Identifier	Network Level Address
WS_AM1PLUS_ STM4	STM-4 Line Port	Physical Ports	LP [1-2]	S4/1/[2-3]/1
		Logical Port (AU4 or AU4/VC4 combined)	LP[1-2].[1-4]	S4/1/[2-3]/1/[1-4]
		Logical Port TU3	LP[1-2].[1-4].[1-3].0.0	S4/1/[2-3]/1/[1-4]-[1-3]
		Logical Port TU12	LP[1-2].[1-4].[1-3].[1-7].[1-3]	S4/1/[2-3]/1/[1-4]-[1-63]
	[[STM-4 Line MSP Group]]	[[Physical Ports]]	[[LP1]]	[[S4/1/GRP1/1]]
		[[Logical Port (AU4 or AU4/VC4 combined)]]	[[LP1.[1-4]]]	[[S4/1/GRP1/1[1-4]]]
		[[Logical Port TU3]]	[[LP1.[1-4].[1-3].0.0]]	[[S4/1/GRP1/1[1-4]-[1-3]]]
		[[Logical Port TU12]]	[[LP1.[1-4].[1-3].[1-7].[1-3]]]	[[S4/1/GRP1/1[1-4]-[1-63]]]
	STM-1 Tributary	Physical Port (optical or electrical)	TP2.[1-2]	S1/1/5/[1-2]
		Logical Port (AU4)	TP2.[1-2].1	S1/1/5/[1-2]/1

Table 5-35   Port identifiers for WaveStar® AM 1 Plus network elements   (continued)

WS_AM1PLUS_STM1, WS_AM1PLUS_STM1_T	STM-1 Line Port (Line Slot 1)	Physical Ports (optical)	LP1	S1/1/2/1
		Logical Port (AU4 and VC4 combined)	LP1.1	S1/1/2/1/1
		Logical Port TU3	LP1.1.[1-3].0.0	S1/1/2/1/1-[1-3]
		Logical Port TU12	LP1.1.[1-3].[1-7].[1-3]	S1/1/2/1/1-[1-63]
WS_AM1PLUS_STM1	STM-1 Line Port (Line Slot 2)	Physical Ports (optical)	LP2	S1/1/3/1
		Logical Port (AU4 and VC4 combined)	LP2.1	S1/1/3/1/1
		Logical Port TU3	LP2.1.[1-3].0.0	S1/1/3/1/1-[1-3]
		Logical Port TU12	LP2.1.[1-3].[1-7].[1-3]	S1/1/3/1/1-[1-63]
WS_AM1PLUS_STM1	STM-1 Line MSP Group	Physical Ports (optical)	LP1	S1/1/GRP1/1
		Logical Port (AU4 and VC4 combined)	LP1.1	S1/1/GRP1/1/1
		Logical Port TU3	LP1.1.[1-3].0.0	S1/1/GRP1/1/1-[1-3]
		Logical Port TU12	LP1.1.[1-3].[1-7].[1-3]	S1/1/GRP1/1/1-[1-63]

Table 5-35   Port identifiers for WaveStar® AM 1 Plus network elements   (continued)

WS_AM1PLUS_STM4, WS_AM1PLUS_STM1, WS_AM1PLUS_STM1_T	DS3 (45Mb/s) Tributary	Physical Ports	TP2.[1-2]	D3/1/5/[1-2]
		Logical Port VC3	TP2.[1-2]	D3/1/5/[1-2]
	E3 (CEPT-3) (34Mb/s) Tributary	Physical Ports	TP2.[1-2]	P3/1/5/[1-2]
		Logical Port VC3	TP2.[1-2]	P3/1/5/[1-2]
	CMB E1 (CEPT-1) (2Mb/s) Tributary (on-board)	Physical Ports	TP1.[1-16]	P1/1/4/[1-16]
		Logical Port VC12	TP1.[1-16]	P1/1/4/[1-16]
	CMC E1 (CEPT-1) (2Mb/s) Tributary (additional)	Physical Ports	TP2.[1-16]	P1/1/5/[1-16]
		Logical Port VC12	TP2.[1-16]	P1/1/5/[1-16]
	ISDN PRI (2Mb/s) Tributary (on-board)	Physical Ports	TP1.[1-16]	P1/1/4/[1-16]
		Logical Port VC12	TP1.[1-16]	P1/1/4/[1-16]
	ISDN PRI (2Mb/s) Tributary (additional)	Physical Ports	TP2.[1-16]	P1/1/5/[1-16]
		Logical Port VC12	TP2.[1-16]	P1/1/5/[1-16]
	DS1 Tributary	Physical Ports	TP2.[1-16]	P1/1/5/[1-16]
		Logical Port VC12	TP2.[1-16]	P1/1/5/[1-16]
	X.21 Tributary	Physical X.21 Ports (X21DL)	TP2.[1-4]	X21/1/5/[1-4]
		Logical X.21 Ports VC12	TP2.[1-4]	X21/1/5/[1-4]

Port identifiers for WaveStar® AM 1 Plus
network elements

Table 5-35   Port identifiers for WaveStar® AM 1 Plus network elements   (continued)

WS_AM1PLUS_STM4, WS_AM1PLUS_STM1, WS_AM1PLUS_STM1_T	TransLAN+ Tributary	Physical LAN 10/100baseT Ports	LAN2.[1-4]	[[LANACC/1/5/[1-4]]]
		[[Logical LAN 10/100baseT LAN Groups]]	[[LANGRP2.n]]	[[NA]]
		Logical LAN Ports	LAN2.[1-4]	N/A
		Logical LAN Ports - VLAN context	WAN2.[1-4]	N/A
		Logical WAN Ports	WAN2.[1-4]	N/A
		Logical WAN Ports - VLAN context	WAN2.[1-4].[1-4093]	N/A
		Logical SDH Channel Ports	SDHChan2.[1-4]	[[LANBR/1/5/[1-4]]]
		Logical Ports VC3	TP2.abcd	[[LANBR/1/5/abcd]]
		Logical Ports VC12	TP2.abcd	[[LANBR/1/5/abcd]]

□

Non-port identifiers for WaveStar® AM 1 Plus network elements

Overview   This section describes the non-port identifiers for WaveStar® AM 1 Plus network elements.

Table   The following table lists the non-port identifiers for WaveStar® AM 1 Plus network elements.

Table 5-36   Non-port identifiers for WaveStar® AM 1 Plus network elements

Slot Number	Description	Entity Identifiers	AM 1, AM 1+ Add/Drop	AM 1+ Terminal (STM-1)
1	Motherboard (System control, timing and cross-connect)	SC	Y	Y
2	Line Slot 1	LS1		
3	Line Slot 2	LS2		N
4	Tributary Slot 1 (Motherboard)	TS1		Y
5	Tributary Slot 1 (Motherboard)	TS2		

☐

Section XII: WaveStar® BandWidth Manager Port Addresses

Overview

Purpose This section contains WaveStar® BandWidth Manager port addresses specific to Navis™ Optical NMS.

Contents

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Port identifiers

Overview This section presents the port identifiers for the WaveStar®
BandWidth Manager.

Address format The format for the WaveStar® BandWidth Manager addresses are as
follows:

<bay>-<Shelf>-<Protection group#>-<w/p>-<slot>-<port>

Important! The Protection group# and the w/p are not used.
Enter the *#* character for both of these.

Table This table contains the port addresses (internal and external) for the
WaveStar® BandWidth Manager (BWM).

Table 5-37   Port identifiers for the WaveStar® BandWidth Manager

Description	Entity Identifier	Network Level Address
STM-64 Physical Port	[1-99]-[1-2]-#-#-tr[1-4]-1	S64/[1-99]-[1-2]-#-#-tr[1-4]-1
VC4-16c logical port on STM-64 physical port	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 49, 97, 145]	S64/[1-99]-[1-2]-#-#-tr[1-4]-1/16c.[1-4]
VC4-4c logical port on STM-64 physical port	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 13, 25, 37, 49, 61, 73, 85, 97, 109, 121, 133, 145, 157, 169, 181]	S64/[1-99]-[1-2]-#-#-tr[1-4]-1/4c.[1-16]
VC4 logical port on STM-64 physical port	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100, 103, 106, 109, 112, 115, 118, 121, 124, 127, 130, 133, 136, 139, 142, 145, 148, 151, 154, 157, 160, 163, 166, 169, 172, 175, 178, 181, 184, 187, 190]	S64/[1-99]-[1-2]-#-#-tr[1-4]-1/AU.[1-64].0
AU3 logical port on STM-64 physical port	[1-99]-[1-2]-#-#-tr[1-4]-1-[1-192]	S64/[1-99]-[1-2]-#-#-tr[1-4]-1/AU.[1-64].[1-3]
OC-192 physical port (for SONET gateway)	[1-99]-[1-2]-#-#-tr[1-4]-1	OC192/[1-99]-[1-2]-#-#-tr[1-4]-1

Table 5-37   Port identifiers for the WaveStar® BandWidth Manager   (continued)

VC4-16c logical port on OC-192 physical port	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 49, 97, 145]	OC192/[1-99]-[1-2]-#-#-tr[1-4]-1/48c.[1-4]
VC4-4c logical port on OC-192 physical port	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 13, 25, 37, 49, 61, 73, 85, 97, 109, 121, 133, 145, 157, 169, 181]	OC192/[1-99]-[1-2]-#-#-tr[1-4]-1/12c.[1-16]
VC4 logical port on OC-192 physical port	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100, 103, 106, 109, 112, 115, 118, 121, 124, 127, 130, 133, 136, 139, 142, 145, 148, 151, 154, 157, 160, 163, 166, 169, 172, 175, 178, 181, 184, 187, 190]	OC192/[1-99]-[1-2]-#-#-tr[1-4]-1/3c.[1-64]
AU3 logical port on OC-192 physical port	[1-99]-[1-2]-#-#-tr[1-4]-1-[1-192]	OC192/[1-99]-[1-2]-#-#-tr[1-4]-1/STS1.[1-192]
STM-16 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1	S16/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1
VC4-16c logical port on STM-16 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1-[1]	S16/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1/16c.[1]
VC4-4c logical port on STM-16 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1-[1, 13, 25, 37]	S16/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1/4c.[1-4]
VC4 logical port on STM-16 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46]	S16/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1/AU.[1-16].0
AU3 logical port on STM-16 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1-[1-48]	S16/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1/AU.[1-16].[1-3]
OC-48 physical port (for SONET gateway)	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1	OC48/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1
VC4-16c logical port on OC-48 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1-[1]	OC48/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1/48c.1
VC4-4c logical port on OC-48 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1-[1, 13, 25, 37]	OC48/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1/412c.[1-4]
VC4 logical port on OC-48 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46]	OC48/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1/3c.[1-16]

Table 5-37   Port identifiers for the WaveStar® BandWidth Manager   (continued)

AU3 logical port on OC-48 physical port	[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1-[1-48]	OC48/[1-99]-[1-2]-#-#-[02, 04, 06.....16]-1/STS1.[1-48]
STM-4 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-2]	S4/[1-99]-[1-2]-#-#-[01-16]-[1-2]
VC4-4c logical port on STM-4 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1]	S4/[1-99]-[1-2]-#-#-[01-16]-[1-2]/4c.[1]
VC4 logical port on STM-4 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1, 4, 7, 10]	S4/[1-99]-[1-2]-#-#-[01-16]-[1-2]/AU.[1-4].0
AU3 logical port on STM-4 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1-12]	S4/[1-99]-[1-2]-#-#-[01-16]-[1-2]/AU.[1-4].[1-3]
OC-12 Physical Port (for SONET Gateway)	[1-99]-[1-2]-#-#-[01-16]-[1-2]	OC12/[1-99]-[1-2]-#-#-[01-16]-[1-2]
VC4-4c logical port on OC-12 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1]	OC12/[1-99]-[1-2]-#-#-[01-16]-[1-2]/12c.1
VC4 logical port on OC-12 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1, 4, 7, 10]	OC12/[1-99]-[1-2]-#-#-[01-16]-[1-2]3c.[1-4]
AU3 logical port on OC-12 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1-12]	OC12/[1-99]-[1-2]-#-#-[01-16]-[1-2]/STS1.[1-12]
STM-1 and STM1E Physical Port	[1-99]-[1-2]-#-#-[01-16]-[1-4]	S1/[1-99]-[1-2]-#-#-[01-16]-[1-4]
VC4 logical port on STM-1 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1]	S1/[1-99]-[1-2]-#-#-[01-16]-[1-4]/AU.1.0
AU3 logical port on STM-1 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1-3]	S1/[1-99]-[1-2]-#-#-[01-16]-[1-4]/AU.1.[1-3]
OC-3 Physical Port (for SONET Gateway)	[1-99]-[1-2]-#-#-[01-16]-[1-4]	OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]
VC4 logical port on OC-3 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1]	OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]/3c.1
AU3 logical port on OC-3 physical port	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1-3]	OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]/STS1.[1-3]

The following table presents the getAlIPTPs for the WaveStar® BandWidth Manager.

Table 5-38   getAllPTPs for the WaveStar® BandWidth Manager

Port Type	nativeEMSName	PTP Name	Embedded Layer Rates	Internal Address	Network Level Address

Table 5-38   getAllPTPs for the WaveStar® BandWidth Manager   (continued)

STM-1/OC-3 [1-99]-[1-2]-#-#-[01-16]-[1-4]	name=PTP value=[1-99]-[1-2]-#-#-[01-16]-[1-4]	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 50 = LR_DIGITAL_ SIGNAL_RATE 20 = LR_Section_OC3_ STS3_and_RS_ STM1 25 = LR_Line_OC3_ STS3_and_MS_ STM1	[1-99]-[1-2]-#-#-[01-16]-[1-4]	SDH: S1/[1-99]-[1-2]-#-#-[01-16]-[1-4] SONET Gateway: OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]
STM-4/OC-12 [1-99]-[1-2]-#-#-[01-16]-[1-4]	name=PTP value=[1-99]-[1-2]-#-#-[01-16]-[1-4]	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 50 = LR_DIGITAL_ SIGNAL_RATE 21 = LR_Section_OC12_ STS12_and_RS_ STM4 26 = LR_Line_OC12_ STS12_and_MS_ STM4	[1-99]-[1-2]-#-#-[01-16]-[1-4]	SDH: S4/[1-99]-[1-2]-#-#-[01-16]-[1-2] SONET Gateway: OC12/[1-99]-[1-2]-#-#-[01-16]-[1-2]

Table 5-38   getAllPTPs for the WaveStar® BandWidth Manager   (continued)

STM-16/OC-48	[1-99]-[1-2]-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-1	name=PTP value=[1-99]-[1-2]-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-1	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 50 = LR_DIGITAL_ SIGNAL_RATE 22 = LR_Section_OC48_ STS48_and_RS_ STM16 27 = LR_Line_OC48_ STS48_and_MS_ STM16	[1-99]-[1-2]-#-#-[02, 06...16]-1	SDH: S16/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1 SONET Gateway: OC48/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1
STM-64/OC-192	[1-99]-[1-2]-#-#-tr[1-4]-1	name=PTP value=[1-99]-[1-2]-#-#-tr[1-4]-1	47 = LR_PHYSICAL_ OPTICAL 49 = LR_OPTICAL_ SECTION 50 = LR_DIGITAL_ SIGNAL_RATE 28 = LR_Line_OC192_ STS192_and_MS_ STM64 23 = LR_Section_OC192_ STS192_and_RS_ STM64	[1-99]-[1-2]-#-#-tr[1-4]-1	SDH: S64/[1-99]-[1-2]-#-#-tr[1-4]-1 SONET Gateway: OC192/[1-99]-[1-2]-#-#-tr[1-4]-1

Table 5-38   getAllPTPs for the WaveStar® BandWidth Manager   (continued)

DS3	[1-99]-[1-2]-#-#-[01-16]-[1-8]	name=PTP value=[1-99]-[1-2]-#-#-[01-16]-[1-8]	46 = LR_PHYSICAL_ ELECTRICAL 4 = LR_T3_and_DS3_ 45M, 45Mbit/s async/PDH signal 50 = LR_DIGITAL_ SIGNAL_RATE	[1-99]-[1-2]-#-#-[01-16]-[1-8]	SDH: D3/[1-99]-[1-2]-#-#-[01-16]-[1-8]
STM-1e	[1-99]-[1-2]-#-#-[01-16]-[1-4]	name=PTP value=[1-99]-[1-2]-#-#-[01-16]-[1-4]	46 = LR_PHYSICAL_ ELECTRICAL 50 = LR_DIGITAL_ SIGNAL_RATE 20 = LR_Section_OC3_ STS3_and_RS_ STM1 25 = LR_Line_OC3_ STS3_and_MS_ STM1	[1-99]-[1-2]-#-#-[01-16]-[1-4]	SDH: S1/[1-99]-[1-2]-#-#-[01-16]-[1-4] SONET Gateway: OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]
STS-1E/EC1	[1-99]-[1-2]-#-#-[01-16]-[1-8]	name=PTP value=[1-99]-[1-2]-#-#-[01-16]-[1-8]	46 = LR_PHYSICAL_ ELECTRICAL 29 = LR_Electrical_EC1_ STS1_and_STM0 50 = LR_DIGITAL_ SIGNAL_RATE		

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5 - 1 0 6   **Lucent Technologies**   365-309-262R7.0
                                                                                            Issue 1, July 2002

Table 5-38   getAllPTPs for the WaveStar® BandWidth Manager   (continued)

| OTS Repeater Port (10G or 40G) | PORT-<bay>-<shelf>-<OAaddslot>-<port>/PORT-<bay>-<shelf>-<RPdropslot>-<port>

10G or 40G Line-1E: PORT-A1-1-9-OUT_LINE/PORT-A1-2-12-IN_LINE

10G or 40G Line-1W: PORT-A1-2-4-OUT_LINE/PORT-A1-2-16-IN_LINE | name=PTP
10G or 40G Line-1E: value=PORT-A1-1-9-OUT_LINE/PORT-A1-2-12-IN_LINE

10G or 40G Line-1W: value=PORT-A1-2-4-OUT_LINE/PORT-A1-2-16-IN_LINE | 47 = LR_PHYSICAL_OPTICAL
42 = LR_Optical_Transmission_Section | 10G or 40G Line-1E: PORT-A1-1-9-OUT_LINE/PORT-A1-2-12-IN_LINE

10G or 40G Line-1W: PORT-A1-2-4-OUT_LINE/PORT-A1-2-16-IN_LINE

Note: This is for the repeater. OAaddslot and RPdropslot represent bidirectional port. | 10G or 40G Line-1E: OL/PORT-A1-1-9-OUT_LINE/PORT-A1-2-12-IN_LINE

10G or 40G Line-1W: OL/PORT-A1-2-4-OUT_LINE/PORT-A1-2-16-IN_LINE |
| MUX OTU (10G or 40G) (2.5G or 10G trib PTPs) | PORT-<bay>-<shelf>-<slot>-<port>
PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-{IN_TRIB1,IN_TRIB2,IN_TRIB3,IN_TRIB4} | name=PTP value=PORT-{A-H, J-M}{1-5}-{1-4}-{1-16}-{IN_TRIB1,IN_TRIB2,IN_TRIB3,IN_TRIB4} | 47 = LR_PHYSICAL_OPTICAL
49 = LR_OPTICAL_SECTION
50=LR_DIGITAL_SIGNAL_RATE
And one of (as appropriate):
22=LR_Section_OC48_STS48_and_RS_STM16 for 10G MUX OTU.
23=LR_Section_OC192_STS192_and_RS_STM-64. | PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, INTRIB4] | OT/PORT-[A-H, J-M][1-5]-[1-4]-[1-16]-[IN_TRIB1, IN_TRIB2, IN_TRIB3, INTRIB4] |

The following table presents the getContainedTPs for the WaveStar®
BandWidth Manager.

Table 5-39   getContainedTPs for the WaveStar® BandWidth Manager

Input PTP	CTP Layer Rate	nativeEMSName	CTPName	Internal Address	Network Level Address

Table 5-39   getContainedTPs for the WaveStar® BandWidth Manager   (continued)

STM-64/OC192	64 AU-4 / STS3c: 15=LR_STS3c_ and_AU4_ VC4	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100, 103, 106, 109, 112, 115, 118, 121, 124, 127, 130, 133, 136, 139, 142, 145, 148, 151, 154, 157, 160, 163, 166, 169, 172, 175, 178, 181, 184, 187, 190]	last tuple name=CTP value="/sts3c_ au4-j=<J>" where j=[1..64]	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100, 103, 106, 109, 112, 115, 118, 121, 124, 127, 130, 133, 136, 139, 142, 145, 148, 151, 154, 157, 160, 163, 166, 169, 172, 175, 178, 181, 184, 187, 190]	SDH: S64/[1-99]-[1-2]-#-#-tr[1-4]-1/AU.[1-64].0 SONET Gateway: OC192/[1-99]-[1-2]-#-#-tr[1-4]-1/3c.[1-64]
	192 AU3 / STS1: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-99]-[1-2]-#-#-tr[1-4]-1-[1-192]	name=CTP value="/sts1_ au3-j=<J>-k=<K>" where J=1-64, K=1-3	[1-99]-[1-2]-#-#-tr[1-4]-1-[1-192]	SDH: S64/[1-99]-[1-2]-#-#-tr[1-4]-1/AU.[1-64].[1-3] SONET Gateway: OC192/[1-99]-[1-2]-#-#-tr[1-4]-1/STS1.[1-192]
	16 VC4_4c / STS12c: 16=LR_STS12c_ and_VC4_4c	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 13, 25, 37, 49, 61, 73, 85, 97, 109, 121, 133, 145, 157, 169, 181]	name=CTP value="/sts12c_ vc4_4c=[1-16]"	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 13, 25, 37, 49, 61, 73, 85, 97, 109, 121, 133, 145, 157, 169, 181]	SDH: S64/[1-99]-[1-2]-#-#-tr[1-4]-1/4c.[1-16] SONET Gateway: OC192/[1-99]-[1-2]-#-#-tr[1-4]-1/12c.[1-16]
	4 VC4_16c / STS48c: 17=LR_STS48c_ and_VC4_16c	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 49, 97, 145]	name=CTP value="/sts48c_ vc4_16c=[1-4]"	[1-99]-[1-2]-#-#-tr[1-4]-1-[1, 49, 97, 145]	SDH: S64/[1-99]-[1-2]-#-#-tr[1-4]-1/16c.[1-4] SONET Gateway: OC192/[1-99]-[1-2]-#-#-tr[1-4]-1/48c.[1-4]

Table 5-39   getContainedTPs for the WaveStar® BandWidth Manager   (continued)

STM-16/OC-48	1 VC4_16c / STS48c: 17=LR_STS48c_ and_VC4_16c	[1-99]-[1-2]-#-#-[2, 4, 6...16]-1	name=CTP value="/sts48c_ vc4_16c=1"	[1-99]-[1-2]-#-#-[02, 04, 06...16]-1-[1]	SDH: S16/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1/16c.[1] SONET Gateway: OC48/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1/48c.[1]
	48 AU3 / STS1: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-99]-[1-2]-#-#-[2, 4, 6...16]-1-[02, 04, 06...16]-1-[1-48]	name=CTP value="/sts1_ au3-j=<J>-k=<K>" where J=1-16; k=1-3	[1-99]-[1-2]-#-#-[02, 04, 06...16]-1-[1-48]	SDH: S16/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1/AU.[1-16].[1-3] SONET Gateway: OC48/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1/STS1.[1-48]
	16 AU-4 / STS3c: 15=LR_STS3c_ and_AU4_ VC4	[1-99]-[1-2]-#-#-[2, 4, 6...16]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46]	last tuple name=CTP value="/sts3c_ au4-j=<J>" where j=[1..16]	[1-99]-[1-2]-#-#-[02, 04, 06...16]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46]	SDH: S16/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1/AU.[1-16].0 SONET Gateway: OC48/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1/3c.[1-16]
	4 VC4_4c / STS12c: 16=LR_STS12c_ and_VC4_4c	[1-99]-[1-2]-#-#-[2, 4, 6...16]-1-[1, 13, 25, 37]	name=CTP value="/sts12c_ vc4_4c=[1-4]"	[1-99]-[1-2]-#-#-tr[02, 04, 06...16]-1-[1, 13, 25, 37]	SDH: S16/[1-99]-[1-2]-#-#-[02, 04, 06...16]-1/4c.[1-4] SONET Gateway: OC48/[1-99]-[1-2]-#-#-[02, 04, 06..16]-1/12c.[1-4]

Table 5-39   getContainedTPs for the WaveStar® BandWidth Manager   (continued)

STM-4/OC-12 AU3 / STS1: LR_STS1_and_ AU3_High_ Order_VC3	[1-99]-[1-2]-#-#-[1-16]-[1-2]-[1-12]	name=CTP value="/sts1_ au3-j=<J>-k=<K>" where J=1-4; K=1-3	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1-12]	SDH: S4/[1-99]-[1-2]-#-#-[01-16]-[1-2]/AU.[1-4].[1-3] SONET Gateway: OC12/[1-99]-[1-2]-#-#-[01-16]-[1-2]/STS1.[1-12]
4 AU4 / STS3c: LR_STS3c_and_ AU4_VC4	[1-99]-[1-2]-#-#-[1-16]-[1-2]-[1, 4, 7, 10]	name=CTP value="/sts3c_ au4-j=<J>"	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1, 4, 7, 10]	SDH: S4/[1-99]-[1-2]-#-#-[01-16]-[1-2]/AU.[1-4].0 SONET Gateway: OC12/[1-99]-[1-2]-#-#-[01-16]-[1-2]/3c.[1-4]
1 VC4_4c / STS12c13:	[1-99]-[1-2]-#-#-[1-16]-[1-2]-[1]	name=CTP value="/sts12c_ vc4_4c=[1..n]" where n=1	[1-99]-[1-2]-#-#-[01-16]-[1-2]-[1]	SDH: S4/[1-99]-[1-2]-#-#-[01-16]-[1-2]/4c[1] SONET Gateway: OC12/[1-99]-[1-2]-#-#-[01-16]-[1-2]/12c.[1]

Table 5-39   getContainedTPs for the WaveStar® BandWidth Manager   (continued)

STM-1/OC-3	AU3 / STS1: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1-3]	name=CTP value="/sts1_ au3-j=<J>-k=<K>" where J=1, K=1-3	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1-3]	SDH: S1/[1-99]-[1-2]-#-#-[01-16]-[1-4]/AU.1.[1-3] SONET Gateway: OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]/STS1.[1-3]
	1 AU4 / STS3c: 15=LR_STS3c_ and_AU4_ VC4	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1-3]	name=CTP value="/sts1_ au3-j=<J>-k=<K>" where J=1, K=1-3	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1-3]	SDH: S1/[1-99]-[1-2]-#-#-[01-16]-[1-4]/AU.1.[1-3] SONET Gateway: OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]/STS1.[1-3]
STM-1E	1 AU4 / STS3c: 15=LR_STS3c_ and_AU4_ VC4	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1]	name=CTP value="/sts3c_ au4-j=<J>" where J=1	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1]	SDH: S1/[1-99]-[1-2]-#-#-[01-16]-[1-4]/AU.1.0 SONET Gateway: OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]/3c.1
	3 AU3 / STS1: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1-3]	name=CTP value="/sts1_ au3-j=<J>-k=<K>" where J=1-16; k=1-3	[1-99]-[1-2]-#-#-[01-16]-[1-4]-[1-3]	SDH: S1/[1-99]-[1-2]-#-#-[01-16]-[1-4]/AU.1.[1-3] SONET Gateway: OC3/[1-99]-[1-2]-#-#-[01-16]-[1-4]/STS1.[1-3]
AU3 of DS3	1 AU3 / STS1: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-99]-[1-2]-#-#-[01-16]-[1-8]-1	name=CTP value="/sts1_ au3-j=<J>-k=<K>" where J=1, K=1	[1-99]-[1-2]-#-#-[01-16]-[1-8]	SONET Gateway: D3/[1-99]-[1-2]-#-#-[01-16]-[1-8]

Table 5-39   getContainedTPs for the WaveStar® BandWidth Manager   (continued)

STS-1E/EC-1	AU3 STS1: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-99]-[1-2]-#- #-[01-16]-[1- 8]-1	name=CTP value="/sts1_ au3=1"		

□

Section XIII: WaveStar® DACS Port Addresses

Overview

Purpose   This section provides the external and internal port addresses for both the physical and logical ports of WaveStar® DACS network elements.

Contents

Port identifiers

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Overview   This section discusses the port identifiers for WaveStar® DACS network elements.

Entity identifier and network-level address syntax   The following tables provides the port identifiers for WaveStar® DACS network elements.

Table 5-40   Port identifiers for WaveStar® DACS network elements

Port Derivation	Description	Entity Identifier	Network Level Address
STM-1, non-MSP	STM-1 Physical Port	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]	S1/PA[4-19]/[1-8, 11-18]/[1-4]
	VC4 Logical Port on STM1	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]-AUG1#1-AU4	S1/PA[4-19]/[1-8, 11-18]/[1-4]/1
	VC3 Logical Port on STM1	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]-AUG1#1-AU4-TUG3#[1-3]-TU3	S1/PA[4-19]/[1-8, 11-18]/[1-4]/1-[1-3]
	VC12 Logical Port on STM1	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]-AUG1#1-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]	S1/PA[4-19]/[1-8, 11-18]/[1-4]/1-[1-63]
	AU3 logical port on STM1	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]-AUG1#1-AU3#[1-3]	S1/PA[4-19]/[1-8, 11-18]/[1-4]/[1-3]

Table 5-40   Port identifiers for WaveStar® DACS network elements   (continued)

STM-1, MSP	STM-1 (MSP) Physical Port	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]	S1/PA[4-19]/GRP[1-8]/[1-4]
	VC4 Logical Port on STM1 (MSP)	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]-AUG1#1-AU4	S1/PA[4-19]/GRP[1-8]/[1-4]/1
	VC3 Logical Port on STM1 (MSP)	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]-AUG1#1-AU4-TUG3#[1-3]-TU3	S1/PA[4-19]/GRP[1-8]/[1-4]/1-[1-3]
	VC12 Logical Port on STM1 (MSP)	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]-AUG1#1-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]	S1/PA[4-19]/GRP[1-8]/[1-4]/1-[1-63]
	AU3 logical port on STM1 (MSP)	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]-AUG1#1-AU3#[1-3]	S1/PA[4-19]/GRP[1-8]/[1-4]/1-[1-3]
STM-4, non-MSP	STM-4 Physical Port	PSC-[4-19]-STM4-[1-8]-[1-4]	S4/PC[4-19]/[1-8]/[1-4]
	VC4-4c Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG4#1-AU4_4C	S4/PC[4-19]/[1-8]/[1-4]/4c.1
	VC4 Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG1#[1-4]-AU4	S4/PC[4-19]/[1-8]/[1-4]/[1-4]
	VC3 Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG1#[1-4]-AU4-TUG3#[1-3]-TU3	S4/PC[4-19]/[1-8]/[1-4]/[1-4]-[1-3]
	VC12 Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG1#[1-4]-AU4-TUG3#[1-3]-TU2#[1-7]-TU12#[1-3]	S4/PC[4-19]/[1-8]/[1-4]/[1-4]-[1-63]
	AU3 Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG1#[1-4]-AU3#[1-3]	S4/PC[4-19]/[1-8]/[1-4]/[1-12]

Table 5-40   Port identifiers for WaveStar® DACS network elements   (continued)

STM-4, MSP	STM-4 (MSP) Physical Port	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]	S4/PC[4-19]/GRP[1-4]/[1-4]
	VC4-4c Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]-AUG4#1-AU4_4C	S4/PC[4-19]/GRP[1-4]/[1-4]/4c.1
	VC4 Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]-AUG1#[1-4]-AU4	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-4]
	VC3 Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]-AUG1#[1-4]-AU4-TUG3#[1-3]-TU3	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-4]-[1-3]
	VC12 Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]]-[1-4]-AUG1#[1-4]-AU4-TUG3#[1-3]-TU2#[1-7]-TU12#[1-3]	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-4]-[1-63]
	AU3 Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]-AUG1#[1-4]-AU3#[1-3]	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-12]
STM-16, non-MSP	STM-16 Physical Port	PSC-[4-19]-STM16-[1-8]-1	S16/PC[4-19]/[1-8]/1
	VC4-4c Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG4#[1-4]-AU4_4c	S16/PC[4-19]/[1-8]/1/4c.[1-4]
	VC4 Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG1#[1-4][1-4]-AU4	S16/PC[4-19]/[1-8]/1/[1-16]
	VC3 Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG1#[1-4][1-4]-AU4-TUG3#[1-3]-TU3	S16/PC[4-19]/[1-8]/1/[1-16]/[1-3]
	VC12 Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG1#[1-4][1-4]-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-4]-[1-63]
	AU3 Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG1#[1-4][1-4]-AU3#[1-3]	S16/PC[4-19]/[1-8]/1/[1-48]

Table 5-40   Port identifiers for WaveStar® DACS network elements   (continued)

STM-16, MSP	STM-16 Physical Port (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1	S16/PC[4-19]/GRP[1-4]/1
	VC4-4c Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG4#[1-4]-AU4_4c	S16/PC[4-19]/GRP[1-4]/1/4c.[1-4]
	VC4 Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG1#[1-4][1-4]-AU4	S16/PC[4-19]/GRP[1-4]/1/[1-16]
	VC3 Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG1#[1-4][1-4]-AU4-TUG3#[1-3]-TU3	S16/PC[4-19]/GRP[1-4]/1/[1-16]/[1-3]
	VC12 Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG1#[1-4][1-4]-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]	S16/PC[4-19]/GRP[1-4]/1/[1-16]-[1-63]
	AU3 Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG1#[1-4][1-4]-AU3#[1-3]	S16/PC[4-19]/GRP[1-4]/1/[1-48]

Table 5-41   WaveStar® DACS port addresses for AU3 and VC4 logical ports

Logical Port	Port Card Type	Entity Identifier	Network Level Address
AU3	STM0	S0/PB*[4-19]*/[1-8,11-18]/[[1-12]/1	PSB-*[4-19]*-STM0-[1-8,11-18]-[1-12]-*AUG1*#1-AU3#1
AU3	STM1	S1/PA*[4-19]*/[1-8,11-18]/[[1-4]/[1-3]	PSA-*[4-19]*-STM1-[1-8,11-18]-[1-4]-*AUG1*#1-AU3#[1-3]
AU3	STM0 (MSP)	S0/PB*[4-19]*/GRP[1-8]/[1-12]/1	PSB-*[4-19]*-STM0-MSP[1,3,5,7,11,13,15,17]-[1-12]-*AUG1*#1-AU3#1
AU3	STM1 (MSP)	S1/PA*[4-19]*/GRP[1-8]/[1-4]/[1-3]	PSA-*[4-19]*-STM1-MSP[1,3,5,7,11,13,15,17]-[1-4]-*AUG1*#1-AU3#[1-3]
VC4	STM1	S1/PA*[4-19]*/[1-8,11-18]/[[1-4]/1	PSA-*[4-19]*-STM1-[1-8,11-18]-[1-4]-*AUG1*#1-AU4
VC4	STM1 (MSP)	S1/PA*[4-19]*/GRP[1-8]/[1-4]/1	PSA-*[4-19]*-STM1-MSP[1,3,5,7,11,13,15,17]-[1-4]-*AUG1*#1-AU4

Table 5-42   WaveStar® DACS network level port addresses for VC3 and VC12

Logical Port	Port Card Type	Entity Identifier	Network Level Address
VC3	STM1	S1/PA*[4-19]*/[1-8,11-18]/[[1-4]/1-[1-3]	PSA-*[4-19]*-STM1-[1-8,11-18]-[1-4]-*AUG1*#1-AU4-TUG3#[1-3]-TU3
VC3	STM1 (MSP)	S1/PA*[4-19]*/GRP[1-8]/[1-4]/1-[1-3]	PSA-*[4-19]*-STM1-MSP[1,3,5,7,11,13,15,17]-[1-4]-*AUG1*#1-AU4-TUG3#[1-3]-TU3
VC12	STM1	S1/PA*[4-19]*/[1-8,11-18]/[[1-4]/1-[1-63]	PSA-*[4-19]*-STM1-[1-8,11-18]-[1-4]-*AUG1*#1-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]
VC12	STM1 (MSP)	S1/PA*[4-19]*/GRP[1-8]/[1-4]/1-[1-63]	PSA-*[4-19]*-STM1-MSP[1,3,5,7,11,13,15,17]-[1-4]-*AUG1*#1-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]

Entity identifier and network-level address syntax

The following tables provides the port identifiers for WaveStar® DACS network elements.

Table 5-43   Port identifiers for WaveStar® DACS network elements

Port Derivation	Description	Entity Identifier	Network Level Address
STM-1, non-MSP	STM-1 Physical Port	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]	S1/PA[4-19]/[1-8, 11-18]/[1-4]
	VC4 Logical Port on STM1	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]-AUG1#1-AU4	S1/PA[4-19]/[1-8, 11-18]/[1-4]/1
	VC3 Logical Port on STM1	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]-AUG1#1-AU4-TUG3#[1-3]-TU3	S1/PA[4-19]/[1-8, 11-18]/[1-4]/1-[1-3]
	VC12 Logical Port on STM1	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]-AUG1#1-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]	S1/PA[4-19]/[1-8, 11-18]/[1-4]/1-[1-63]
	AU3 logical port on STM1	PSA-[4-19]-STM1-[1-8, 11-18]-[1-4]-AUG1#1-AU3#[1-3]	S1/PA[4-19]/[1-8, 11-18]/[1-4]/[1-3]

Table 5-43   Port identifiers for WaveStar® DACS network elements   (continued)

STM-1, MSP	STM-1 (MSP) Physical Port	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]	S1/PA[4-19]/GRP[1-8]/[1-4]
	VC4 Logical Port on STM1 (MSP)	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]-AUG1#1-AU4	S1/PA[4-19]/GRP[1-8]/[1-4]/1
	VC3 Logical Port on STM1 (MSP)	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]-AUG1#1-AU4-TUG3#[1-3]-TU3	S1/PA[4-19]/GRP[1-8]/[1-4]/1-[1-3]
	VC12 Logical Port on STM1 (MSP)	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]-AUG1#1-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]	S1/PA[4-19]/GRP[1-8]/[1-4]/1-[1-63]
	AU3 logical port on STM1 (MSP)	PSA-[4-19]-STM1-[1, 3, 5, 7, 11, 13, 15, 17]-[1-4]-AUG1#1-AU3#[1-3]	S1/PA[4-19]/GRP[1-8]/[1-4]/1-[1-3]
STM-4, non-MSP	STM-4 Physical Port	PSC-[4-19]-STM4-[1-8]-[1-4]	S4/PC[4-19]/[1-8]/[1-4]
	VC4-4c Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG4#1-AU4_4C	S4/PC[4-19]/[1-8]/[1-4]/4c.1
	VC4 Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG1#[1-4]-AU4	S4/PC[4-19]/[1-8]/[1-4]/[1-4]
	VC3 Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG1#[1-4]-AU4-TUG3#[1-3]-TU3	S4/PC[4-19]/[1-8]/[1-4]/[1-4]-[1-3]
	VC12 Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG1#[1-4]-AU4-TUG3#[1-3]-TU2#[1-7]-TU12#[1-3]	S4/PC[4-19]/[1-8]/[1-4]/[1-4]-[1-63]
	AU3 Logical Port on STM4	PSC-[4-19]-STM4-[1-8]-[1-4]-AUG1#[1-4]-AU3#[1-3]	S4/PC[4-19]/[1-8]/[1-4]/[1-12]

Table 5-43   Port identifiers for WaveStar® DACS network elements   (continued)

STM-4, MSP	STM-4 (MSP) Physical Port	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]	S4/PC[4-19]/GRP[1-4]/[1-4]
	VC4-4c Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]-AUG4#1-AU4_4C	S4/PC[4-19]/GRP[1-4]/[1-4]/4c.1
	VC4 Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]-AUG1#[1-4]-AU4	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-4]
	VC3 Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]-AUG1#[1-4]-AU4-TUG3#[1-3]-TU3	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-4]-[1-3]
	VC12 Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]]-[1-4]-AUG1#[1-4]-AU4-TUG3#[1-3]-TU2#[1-7]-TU12#[1-3]	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-4]-[1-63]
	AU3 Logical Port on STM4 (MSP)	PSC-[4-19]-STM4-[1, 3, 5, 7]-[1-4]-AUG1#[1-4]-AU3#[1-3]	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-12]
STM-16, non-MSP	STM-16 Physical Port	PSC-[4-19]-STM16-[1-8]-1	S16/PC[4-19]/[1-8]/1
	VC4-4c Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG4#[1-4]-AU4_4c	S16/PC[4-19]/[1-8]/1/4c.[1-4]
	VC4 Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG1#[1-4][1-4]-AU4	S16/PC[4-19]/[1-8]/1/[1-16]
	VC3 Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG1#[1-4][1-4]-AU4-TUG3#[1-3]-TU3	S16/PC[4-19]/[1-8]/1/[1-16]/[1-3]
	VC12 Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG1#[1-4][1-4]-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]	S4/PC[4-19]/GRP[1-4]/[1-4]/[1-4]-[1-63]
	AU3 Logical Port on STM16	PSC-[4-19]-STM16-[1-8]-1-AUG1#[1-4][1-4]-AU3#[1-3]	S16/PC[4-19]/[1-8]/1/[1-48]

Table 5-43   Port identifiers for WaveStar® DACS network elements   (continued)

STM-16, MSP	STM-16 Physical Port (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1	S16/PC[4-19]/GRP[1-4]/1
	VC4-4c Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG4#[1-4]-AU4_4c	S16/PC[4-19]/GRP[1-4]/1/4c.[1-4]
	VC4 Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG1#[1-4][1-4]-AU4	S16/PC[4-19]/GRP[1-4]/1/[1-16]
	VC3 Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG1#[1-4][1-4]-AU4-TUG3#[1-3]-TU3	S16/PC[4-19]/GRP[1-4]/1/[1-16]/[1-3]
	VC12 Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG1#[1-4][1-4]-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]	S16/PC[4-19]/GRP[1-4]/1/[1-16]-[1-63]
	AU3 Logical Port on STM16 (MSP)	PSC-[4-19]-STM16-[1, 3, 5, 7]-1-AUG1#[1-4][1-4]-AU3#[1-3]	S16/PC[4-19]/GRP[1-4]/1/[1-48]

Table 5-44   WaveStar® DACS port addresses for AU3 and VC4 logical ports

Logical Port	Port Card Type	Entity Identifier	Network Level Address
AU3	STM0	S0/PB*[4-19]*/[1-8,11-18]/[[1-12]/1	PSB-*[4-19]*-STM0-[1-8,11-18]-[1-12]-*AUG1*#1-AU3#1
AU3	STM1	S1/PA*[4-19]*/[1-8,11-18]/[[1-4]/[1-3]	PSA-*[4-19]*-STM1-[1-8,11-18]-[1-4]-*AUG1*#1-AU3#[1-3]
AU3	STM0 (MSP)	S0/PB*[4-19]*/GRP[1-8]/[1-12]/1	PSB-*[4-19]*-STM0-MSP[1,3,5,7,11,13,15,17]-[1-12]-*AUG1*#1-AU3#1
AU3	STM1 (MSP)	S1/PA*[4-19]*/GRP[1-8]/[1-4]/[1-3]	PSA-*[4-19]*-STM1-MSP[1,3,5,7,11,13,15,17]-[1-4]-*AUG1*#1-AU3#[1-3]
VC4	STM1	S1/PA*[4-19]*/[1-8,11-18]/[[1-4]/1	PSA-*[4-19]*-STM1-[1-8,11-18]-[1-4]-*AUG1*#1-AU4
VC4	STM1 (MSP)	S1/PA*[4-19]*/GRP[1-8]/[1-4]/1	PSA-*[4-19]*-STM1-MSP[1,3,5,7,11,13,15,17]-[1-4]-*AUG1*#1-AU4

Table 5-45   WaveStar® DACS Network Level Port Address for VC3 and VC12

Logical Port	Port Card Type	External Address	Internal Address
VC3	STM1	S1/PA*[4-19]*/[1-8,11-18]/[[1-4]/1-[1-3]	PSA-*[4-19]*-STM1-[1-8,11-18]-[1-4]-*AUG1*#1-AU4-TUG3#[1-3]-TU3
VC3	STM1 (MSP)	S1/PA*[4-19]*/GRP[1-8]/[1-4]/1-[1-3]	PSA-*[4-19]*-STM1-MSP[1,3,5,7,11,13,15,17]-[1-4]-*AUG1*#1-AU4-TUG3#[1-3]-TU3
VC12	STM1	S1/PA*[4-19]*/[1-8,11-18]/[[1-4]/1-[1-63]	PSA-*[4-19]*-STM1-[1-8,11-18]-[1-4]-*AUG1*#1-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]
VC12	STM1 (MSP)	S1/PA*[4-19]*/GRP[1-8]/[1-4]/1-[1-63]	PSA-*[4-19]*-STM1-MSP[1,3,5,7,11,13,15,17]-[1-4]-*AUG1*#1-AU4-TUG3#[1-3]-TUG2#[1-7]-TU12#[1-3]

Non-port identifiers

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Overview   This section discusses the non-port identifiers for WaveStar® DACS network elements.

Entity identifier and network-level address syntax   The following tables provides the non-port identifiers for WaveStar® DACS network elements.

Table 5-46   Non-port identifiers for PSA subrack in WaveStar® DACS network elements

Description	Entity Identifier
STM-1 Port Unit	PSA[4-19]-STM1[1-9, 11-19]
Digital Timing Unit	PSA[4-19]-DTU[1-2]
Subrack Controller	PSA[4-19]-SRC1
Interface Unit	PSA[4-19]-IU[1-8, 11-18]
Bit Sliced Interface Unit	PSA[4-19]-BSIU[1-10]
Power Terminal Module	PSA[4-19]-SRC1-PWR[1, 2]

Table 5-47   Non-port identifiers for MC subrack in WaveStar® DACS network elements

Description	Entity Identifier
Main Process Unit	MC[1-2]-MPU[1-2]
Mass Storage Unit	MC[1-2]-MSU[1-2]
Memory and Interface Unit	MC[1-2]-MIU[1-2]
LAN Hub Unit	MC[1-2]-LHU[1-2]
Alarm Relay Unit	MC[1-2]-ARU1
Power Supply Filter	MC[1-2]-PSP1
Fan	MC[1-2]-FAN1

Table 5-48   Non-port identifiers for MS subrack in WaveStar® DACS network elements

Description	Entity Identifier
Bit Switch Controller	MS3-BSC[1-2]
System Timing Unit	MS3-STU[1-2]
Subrack Controller	MS3-SRC[1-2]
Power Terminal Module	MS3-SRC[1-2]-PWR[1-2]
Optical Link Unit	MS3-OLU[1-4]

Table 5-48   Non-port identifiers for MS subrack in WaveStar® DACS network elements (continued)

Bit Sliced Switching Unit	MS3-BSSU[1-10]

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Section XIV: WaveStar® OLS80G Port Addresses

Overview

Purpose   This section describes the external port addresses for the WaveStar®
OLS80G network elements.

Contents

Port identifiers

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Overview   This section provides the port identifiers for the WaveStar® OLS80G
network elements.

**Port identifiers for
WaveStar® OLS80G**   This table presents the port identifiers for the WaveStar® OLS80G
network elements.

Table 5-49   Port identifiers for WaveStar® OLS80G network elements

Description	Entity Identifier	Network Level Address
OCH Trail or Optical Link (with no OMSP on line port)	TP[1-4].[1-16]	OT/ TP[1-4]/[1-16]
OCH Trail or Optical Link (with OMSP on line port)	TP 1&2. [1-16]	OT/ TP 1&2/[1-16]
Optical Physical Port	TP[1-4].[1-16]	OT/ TP[1-4]/[1-16]
OMS Line Port	LP[1-4]	OL16c/ LP[1-4]
OMSP Line Port	LP[1, 2]	OL16c/ LP[1, 2]
OCH Trail logical port on OMS line	LP[1-4].[1-16]	OL16c/ LP[1-4]/[1-16]
OCH Trail logical port on OMSP line	LP[1,2].[1-16]	OL16c/ LP[1,2]/[1-16]
Repeater Port	LP[1A,2A,3A,4A,1B,2B,3B,4B]]	OL16c/ LP[1A,2A,3A,4A,1B,2B, 3B,4B]

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Section XV: WaveStar® OLS400G Port Addresses

Overview

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Purpose   This section describes the external port addresses for the WaveStar®
OLS400G network elements.

Contents

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5 - 1 2 8
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Port identifiers

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Overview	This section provides the port identifiers for the WaveStar® OLS400G network elements.
Port identifiers for WaveStar® OLS400G	This section provides the port identifiers for the WaveStar® OLS400G network elements (Release 3.0, 3.1, 4.0, and 5.0 C-Band; Release 4.0 L-Band).

Table 5-50   Port identifiers for an OCH trail or optical link (up to WaveStar® OLS400G Release 5.0)

Description	Port Type	Entity Identifier	Network Level Address
No compatible Optics	OTU	[linenum]/[BAY]-[SHELF]-[SLOT]-freq (port-num)	OT /[linenum]/[BAY]-[SHELF]-[SLOT]-freq (port-num)
		[1E, 2E, 1W, 2W]/[1-12]-[1-3]-[1-12]-zzzz ([1, 2])	OT / [1E, 2E, 1W, 2W]/[1-12]-[1-3]-[1-12] /zzzz ([1, 2])
Compatible Optics	OMU	EXT_[linenum]/[BAY]-[SHELF]-[SLOT]-freq	OT/EXT_[linenum]/[BAY]-[SHELF]-[SLOT]-freq
		EXT_[1E, 2E, 1W, 2W]/[1-12]-[1-3]-[1-12]-zzzz	OT/EXT_[1E, 2E, 1W, 2W]/[1-12]-[1-3]-[1-12]/zzzz

Table 5-51   Port identifiers for an OMS line port (up to WaveStar® OLS400G Release 5.0)

Description	Port Type	Entity Identifier	Network Level Address
All OLS400G models except WADs	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop)	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop)
		[1E, 2E, 1W, 2W] (see lookup table for Bay-Shelf-Slot values)	OL [40, 80]c/[1E, 2E 1W, 2W]/[see lookup table for Bay-Shelf-Slot values]

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Issue 1, July 2002

Lucent Technologies

5 - 1 2 9

Table 5-51   Port identifiers for an OMS line port (up to WaveStar® OLS400G Release 5.0) (continued)

For WAD model, 2F_4CH_AD	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop)	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop)
		[1E, 2E, 1W, 2W] (see lookup table for Bay-Shelf-Slot values)	OL [40, 80]c/[1E, 2E 1W, 2W]/[see lookup table for Bay-Shelf-Slot values]
For WAD model, 2F_4CH_AD2	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop)	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop)
		[1E, 2E, 1W, 2W] (see lookup table for Bay-Shelf-Slot values)	OL [40, 80]c/[1E, 2E 1W, 2W]/[see lookup table for Bay-Shelf-Slot values]
For WAD model, 4F_4CH_AD	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop)	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop)
		[1E, 2E, 1W, 2W] (see lookup table for Bay-Shelf-Slot values)	OL [40, 80]c/[1E, 2E 1W, 2W]/[see lookup table for Bay-Shelf-Slot values]
Repeater port	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop)	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop)
		[1E, 2E, 1W, 2W] / [1-12] - [1-3] - [1-12] / [1-12] - [1-3] - [1-12]	OL [40, 80]c/[1E, 2E 1W, 2W]/[1-12] - [1-3] - [1-12] / [1-12] - [1-3] - [1-12]

Table 5-52   Port identifiers for an OCH trail logical port on OMS line (up to WaveStar® OLS400G Release 5.0)

Description	Port Type	Entity Identifier	Network Level Address

Table 5-52   Port identifiers for an OCH trail logical port on OMS line (up to WaveStar® OLS400G Release 5.0)   (continued)

All OLS400G models except WADs	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop) - zzzz	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop) / zzzz
		[1E, 2E, 1W, 2W] (see lookup table for Bay-Shelf-Slot values) - zzzz	OL [40, 80]c/[1E, 2E 1W, 2W]/[see lookup table for Bay-Shelf-Slot values] / zzzz
For WAD model, 2F_4CH_AD	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop) zzzz	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop) / zzzz
		[1E, 2E, 1W, 2W] (see lookup table for Bay-Shelf-Slot values) zzzz	OL [40, 80]c/[1E, 2E 1W, 2W]/[see lookup table for Bay-Shelf-Slot values] / zzzz
For WAD model, 2F_4CH_AD2	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop) zzzz	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop) / zzzz
		[1E, 2E, 1W, 2W] (see lookup table for Bay-Shelf-Slot values) zzzz	OL [40, 80]c/[1E, 2E 1W, 2W]/[see lookup table for Bay-Shelf-Slot values] / zzzz
For WAD model, 4F_4CH_AD	OA	[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) /[BAY]-[SHELF]-[SLOT] (for Drop) zzzz	OL[40, 80]c/[linenum]/[BAY]-[SHELF]-[SLOT] (for Add) [BAY]-[SHELF]-[SLOT] (for Drop) / zzzz
		[1E, 2E, 1W, 2W] (see lookup table for Bay-Shelf-Slot values) zzzz	OL [40, 80]c/[1E, 2E 1W, 2W]/[see lookup table for Bay-Shelf-Slot values] / zzzz

Table 5-53   Lookup table for WaveStar® OLS 400G Bay-Shelf-Slot values

Model Type	Linenum	Bay-Shelf-Slot for OA
2 Fiber End Terminal 2F_END_80 2F_END_80_800G 2F_END_80_800GL 2F_END_16	1E 1W	1-1-8 / 1-1-5

Table 5-53   Lookup table for WaveStar® OLS 400G Bay-Shelf-Slot values   (continued)

2 Fiber Ring Terminal 2F_FULL_AD_80 2F_FULL_AD_80_800G 2F_FULL_AD_80_800GL 2F_FULL_AD_16	1E 1W	1-1-8 / 1-1-5 2-1-8 / 2-1-5
2F_4CH_AD (Type 1)	1E 1W	1-1-5 / 1-1-8 1-1-8 / 1-1-5
2F_4CH_AD2 (Type 2)	1E 1W	1-3-10 / 1-3-1 1-1-8 / 1-1-5
2 Fiber Repeater 2F_RPTR 2F_RPTRL 2F_RPTR_16	1E 1W	1-1-1 / 1-1-4 1-1-4 / 1-1-1
4 Fiber End Terminal 4F_END_80	1E 2E	1-1-8 / 1-1-5 2-1-8 / 2-1-5
4 Fiber Ring Terminal 4F_FULL_AD_80	1E 2E 1W 2W	1-1-8 / 1-1-5 2-1-8 / 2-1-5 3-1-8 / 3-1-5 4-1-8 / 4-1-5
4 Fiber 4 Channel Add/Drop WAD 4F_4CH_AD	1E 2E 1W 2W	1-1-5 / 1-1-8 2-1-5 / 2-1-8 1-1-8 / 1-1-5 2-1-8 / 2-1-5
4 Fiber Repeater 4F_RPTR 4F_RPTRL	1E 2E 1W 2W	1-2-1 / 1-2-4 1-1-1 / 1-1-4 1-2-4 / 1-2-1 1-1-4 / 1-1-1

Section XVI: WaveStar® OLS 1.6T Port Addresses

Overview

Purpose   This section describes the external port addresses for the WaveStar®
OLS 1.6T network elements (Release 6.0 and 6.1).

Contents

Port identifiers	5-134

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Port identifiers

Overview
This section provides the port identifiers for the WaveStar® OLS 1.6T network elements (Release 6.0 and 6.1).

Port identifiers for WaveStar® OLS 1.6T
The following table provides the port identifiers for the WaveStar® OLS 1.6T network elements (Release 6.0 and 6.1).

Table 5-54   Port address table for WaveStar® OLS 1.6T Release 6.0 and 6.1

OMS Line Port			
Description	**Port Type**	**Entity Identifier**	**Network Level Address**
(All OLS 1.6T models including WADs)	OA	PORT-[BAY]-[SHELF]-[OAaddSLOT]-OUT/ PORT-[BAY]-[SHELF]-[OAdropSLOT]-OUT	OL80c/PORT-[BAY]-[SHELF]-[OAaddSLOT]-OUT/PORT-[BAY]-[SHELF]-[OAdropSLOT]-OUT
		PORT-[1-2]-[1-3]-[1-12]-OUT/PORT-[1-2]-[1-3]-[1-12]-OUT	OL80c/PORT-[1-2]-[1-3]-[1-12]-OUT/PORT-[1-2]-[1-3]-[1-12]-OUT
OTS Repeater Port (PTP)	OA	PORT-[BAY]-[SHELF]-[OAaddSLOT]-OUT/ PORT-[BAY]-[SHELF]-[OAdropSLOT]-OUT	OL80c/PORT-[BAY]-[SHELF]-[OAaddSLOT]-OUT/PORT-[BAY]-[SHELF]-[OAdropSLOT]-OUT
		PORT-[1]-[1]-[1,4]-OUT/PORT-[1]-[1]-[1,4]-OUT	OL80c/PORT-[1]-[1]-[1,4]-OUT/PORT-[1]-[1]-[1,4]-OUT
OCH Trail Logical Port on OMS Line			
(All OLS 1.6T models including WADs)	OA (CTP)	PORT-[BAY]-[SHELF]-[OAaddSLOT]-OUT/ PORT-[BAY]-[SHELF]-[OAdropSLOT]-OUT-zzzz	OL80c/PORT-[BAY]-[SHELF]-[OAaddSLOT]-OUT/PORT-[BAY]-[SHELF]-[OAdropSLOT]-OUT-zzzz
		PORT-[1-2]-[1-3]-[1-12]-OUT/PORT-[1-2]-[1-3]-[1-12]-OUT-zzzz	OL80c/PORT-[1-2]-[1-3]-[1-12]-OUT/ PORT-[1-2]-[1-3]-[1-12]-OUT-zzzz
Optical Link and OCH Trail (Optical Link terminates at PTP and OCH Trail terminates at CTP)			

Table 5-54   Port address table for WaveStar® OLS 1.6T Release 6.0 and 6.1   (continued)

No compatible optics (i.e., OTU) required	OTU (PTP)	[PORT]-[BAY]-[SHELF]-[SLOT]-[PORT]	OT/PORT-[BAY]-[SHELF]-[SLOT]-[PORT]
		[PORT]-[1-12]-[1-3]-[1-12]-[IN1, IN2]	OT/PORT-[1-12]-[1-3]-[1-12]-[IN1, IN2]
	OTU (CTP)	PORT-[1-12]-[1-3]-[1-12]-[IN1, IN2]-zzzz	OT/PORT-[1-12]-[1-3]-[1-12]-[IN1, IN2]-zzzz
		PORT-[1-12]-[1-3]-[1-12]-[IN1, IN2]-zzzz	OT/PORT-[1-12]-[1-3]-[1-12]-[IN1, IN2]-zzzz
	10G MUX-OTU 2.5G (PTP)	[PORT]-[BAY]-[SHELF]-[SLOT]-[PORT]	OT/PORT-[BAY]-[SHELF]-[SLOT]-[PORT]
		[PORT]-[1-12]-[1-3]-[1-12]-[IN1, IN2, IN3, IN4]	OT/PORT-[1-12]-[1-3]-[1-12]-[IN1, IN2, IN3, IN4]
	10G MUX-OTU 2.5G (CTP)	[PORT]-[BAY]-[SHELF]-[SLOT]-[PORT]-1	OT/PORT-[BAY]-[SHELF]-[SLOT]-[PORT]-1
		[PORT]-[1-12]-[1-3]-[1-12]-[IN1, IN2, IN3, IN4]-1	OT/PORT-[1-12]-[1-3]-[1-12]-[IN1, IN2, IN3, IN4]-1
	10G MUX OTU (GTP)	[PORT]-[BAY]-[SHELF]-[SLOT]-[PORT]-zzzz	OT/PORT-[BAY]-[SHELF]-[SLOT]-[PORT]-zzzz
		[PORT]-[1-12]-[1-3]-[1-12]-IN-zzzz	OT/PORT-[1-12]-[1-3]-[1-12]-[IN]-zzzz
	ORS End/Ring Terminal (PTP)	PORT-[BAY]-[SHELF]-[SLOT]-[PORT]	OT/PORT-[BAY]-[SHELF]-[SLOT]-[PORT]
		PORT-[1-12]-[1-3]-[1-12]-[C1IN, C2IN, 1AIN, 2AIN, 1BIN, 2BIN]	OT/PORT-[1-12]-[1-3]-[1-12]-[C1IN, C2IN, 1AIN, 2AIN, 1BIN, 2BIN]
	ORS End/Ring Terminal (CTP)	PORT-[BAY]-[SHELF]-[SLOT]-[PORT]-1	OT/PORT-[BAY]-[SHELF]-[SLOT]-[PORT]-1
		PORT-[1-12]-[1-3]-[1-12]-[C1IN, C2IN, 1AIN, 2AIN, 1BIN, 2BIN]-1	OT/PORT-[1-12]-[1-3]-[1-12]-[C1IN, C2IN, 1AIN, 2AIN, 1BIN, 2BIN]-1
Compatible optics (i.e., virtual OTU)	OMU (PTP/CTP)	EXT_PORT-[BAY]-[SHELF]-[omuSLOT]-[port]	OT/EXT_PORT-[BAY]-[SHELF]-[omuSLOT]-[port]
		EXT_PORT-[1-12]-[1-3]-[1-12]-zzzz	OT/EXT_PORT-[1-12]-[1-3]-[1-12]-zzzz

Table 5-55   Lookup table for WaveStar® OLS 1.6T Bay-Shelf-Slot values

Model Type	Linenum	Bay-Shelf-Slot for OA

Table 5-55   Lookup table for WaveStar® OLS 1.6T Bay-Shelf-Slot values   (continued)

2 Fiber End Terminal 2F_END_80 2F_END_80_800G 2F_END_80_800GL 2F_END_16	1E 1W	1-1-8 / 1-1-5
2 Fiber Ring Terminal 2F_FULL_AD_80 2F_FULL_AD_80_800G 2F_FULL_AD_80_800GL 2F_FULL_AD_16	1E 1W	1-1-8 / 1-1-5 2-1-8 / 2-1-5
2F_40CH_AD_800G	1E 1W	1-1-5 / 1-1-8 1-1-8 / 1-1-5
2F_4CH_AD (Type 1)	1E 1W	1-1-5 / 1-1-8 1-1-8 / 1-1-5
2F_4CH_AD2 (Type 2)	1E 1W	1-3-10 / 1-3-1 1-1-8 / 1-1-5
2 Fiber Repeater 2F_RPTR 2F_RPTRL 2F_RPTR_16	1E 1W	1-1-1 / 1-1-4 1-1-4 / 1-1-1

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Section XVII: WaveStar® TDM 10G Port Addresses

Overview

Purpose   This section provides conceptual information regarding the external and internal port addresses for both the physical and logical ports of the WaveStar® TDM 10G. It also discusses the correlation between the external and internal port addresses.

Contents

Port identifiers	5-138

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Port identifiers

Overview   This section presents the port identifiers for the WaveStar® TDM 10G network elements.

Table   The following table contains the port identifiers for the WaveStar® TDM 10G network elements.

Table 5-56   Port identifiers for WaveStar® TDM 10G network elements

Description	Entity Identifiers	Network Level Address
STM-64 Physical Port	1-2-#-#-[tre, trw]-1	S64/ 1-2 - #-# - [tre, trw] - 1
VC4-16c logical port on STM-64 physical port	1-2-#-#-[tre, trw]-1-[1, 49, 97, 145]	S64/ 1-2 - #-# - [tre, trw] - 1 / 16c.[1-4]
VC4-4c logical port on STM-64 physical port	1-2-#-#-[tre, trw]-1-[1, 13, 25, 37, 49, 61, 73, 85, 97, 109, 121, 133, 145, 157, 169, 181]	S64/ 1-2 - #-# - [tre, trw] - 1/4c.[1-16]
VC4 logical port on STM-64 physical port	1-2-#-#-[tre, trw]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100, 103, 106, 109, 112, 115, 118, 121, 124, 127, 130, 133, 136, 139, 142, 145, 148, 151, 154, 157, 160, 163, 166, 169, 172, 175, 178, 181, 184, 187, 190]	S64/ 1-2 - #-# - [tre, trw] -1 / AU.[1-64].0
AU3 logical port on STM-64 physical port	1-2-#-#-[tre, trw]-1-[1-192]	S64/ 1-2 - #-# - [tre, trw] -1 / AU.[1-64].[1-3]
STM-16 Physical Port	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1	S16/[1-4]-[1-3]-#-#- [02, 04,06.....16]/ 1
VC4-16c logical port on STM-16 physical port	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1-[1]	S16/[1-4]-[1-3]-#-#- [02, 04,06.....16] -1/ 16c.[1]
VC-4c logical port on STM-16 physical port	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1-[1, 13, 25, 37]	S16/[1-4]-[1-3]-#-#- [02, 04,06.....16] -1/ 4c.[1-4]

Table 5-56   Port identifiers for WaveStar® TDM 10G network elements   (continued)

VC4 logical port on STM-16 physical port	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46]	S16/[1-4]-[1-3]-#-#- [02, 04,06.....16] -1/ AU.[1-16].0
AU3 logical port on STM-16 physical port	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1-[1-48]	S16/[1-4]-[1-3]-#-#- [02, 04,06.....16] -1/ AU.[1-16].[1-3]
STM-4 Physical Port	[1-4]-[1-3]-#-#-[01-16]-[1-2]	S4/[1-4]-[1-3]-#-#- [01-16]-[1-2]
VC4-4c logical port on STM-4 physical port	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1]	S4/[1-4]-[1-3]-#-#- [01-16]-[1-2] / 4c.[1]
VC4 logical port on STM-4 physical port	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1, 4, 7, 10]	S4/[1-4]-[1-3]-#-#- [01-16]-[1-2] AU.[1-4].0
AU3 logical port on STM-4 physical port	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1-12]	S4/[1-4]-[1-3]-#-#- [01-16]-[1-2] / AU.[1-4].[1-3]
STM-1 Physical Port	[1-4]-[1-3]-#-#-[01-16]-[1-8]	S1/[1-4]-[1-3]-#-#- [01-16]-[1-8]
VC4 logical port on STM-1 physical port	[1-4]-[1-3]-#-#-[01-16]-[1-8]-1	S1/[1-4]-[1-3]-#-#- [01-16]-[1-2] / AU. 1.0
AU3 logical port on STM-1 physical port	[1-4]-[1-3]-#-#-[01-16]-[1-8]-[1-3]	S1/[1-4]-[1-3]-#-#- [01-16]-[1-8] / AU.1[1-3]
GbE Physical Port (LAN) - ptp	{1-4}-{1-3}-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-[1-4]	LAN/{1-4}-{1-3}-#-#- [02, 04, 06, 08, 10, 12, 14, 16]-[1-4]
GbE Physical Port (WAN) - ptp	{1-4}-{1-3}-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-v[1-2]	WAN/{1-4}-{1-3}-#-#- [02, 04, 06, 08, 10, 12, 14, 16]-v[1-2]
VC4 Logical Port on GbE Physical Port - ctp	{1-4}-{1-3}-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-v[1-2]-[1, 4, 7, 10, 13, 16, 19, 22]	WAN/{1-4}-{1-3}-#-#- [02, 04, 06, 08, 10, 12, 14, 16]-v[1-2]-[1, 4, 7, 10, 13, 16, 19, 22]

The following table presents the getAllPTPs for WaveStar® TDM 10G.

Table 5-57   getAllPTPs for WaveStar® TDM 10G

Port Type	nativeEMSName	PTPName	Embedded Layer Rates	Internal Address	Network Level Address
STM-1	[1-4]-[1-3]-#-#-[01-16]-[1-8]	name=PTP value=[1-8]-[1-3]-#-#-[01-16]-[1-8]	47=LR_PHYSICAL OPTICAL 49=LR_OPTICAL_ SECTION 50=LR_DIGITAL_ SIGNAL_RATE 20=LR_Section_ OC3_STS3_and_ RS_STM1 25=LR_Line_OC3_ STS3_and_MS_ STM1	[1-4]-[1-3]-#-#-[01-16]-[1-8]	S1/[1-4]-[1-3]-#-#-[01-16]-[1-8]
STM-1e	[1-4]-[1-3]-#-#-[01-16]-[1-8]	name=PTP value=[1-8]-[1-3]-#-#-[01-16]-[1-8]	46=LR_PHYSICAL ELECTRICAL 50=LR_DIGITAL_ SIGNAL_RATE 20=LR_Section_ OC3_STS3_and_ RS_STM1 25=LR_Line_OC3_ STS3_and_MS_ STM1	[1-4]-[1-3]-#-#-[01-16]-[1-8]	S1/[1-4]-[1-3]-#-#-[01-16]-[1-8]
STM-4	[1-4]-[1-3]-#-#-[01-16]-[1-8]	name=PTP value=[1-4]-[1-3]-#-#-[01-16]-[1-2]	47=LR_PHYSICAL OPTICAL 49=LR_OPTICAL_ SECTION 50=LR_DIGITAL_ SIGNAL_RATE 21=LR_Section_ OC12_STS12_and_ RS_STM4 26=LR_Line_OC12_ STS12_and_MS_ STM4	[1-4]-[1-3]-#-#-[01-16]-[1-2]	S4/[1-4]-[1-3]-#-#-[01-16]-[1-2]

Table 5-57   getAllPTPs for WaveStar® TDM 10G   (continued)

STM-16	[1-4]-[1-3]-#-#-[02, 04, 06....16]-1	name=PTP value=[1-4]-[1-3]-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-1	47=LR_PHYSICAL_OPTICAL 49=LR_OPTICAL_SECTION 50=LR_DIGITAL_SIGNAL_RATE 22=LR_Section_OC48_STS48_and_RS_STM16 27=LR_Line_OC48_STS48_and_MS_STM16	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1	S16/[1-4]-[1-3]-#-#-[02, 04, 06...-16]/1
STM-64	1-2-#-#-[tre, trw]-1	name=PTP value=1-2-#-#-[tre, trw]-1 Note: STM-64o CPs can only be in Bay 1 Shelf 2. Therefore, the only valid AIDs are 1-2-#-#-[tre, trw]-1.	47=LR_PHYSICAL_OPTICAL 49=LR_OPTICAL_SECTION 50=LR_DIGITAL_SIGNAL_RATE 28=LR_Line_OC192_STS192_and_MS_STM64 23=LR_Section_OC192_STS192_and_RS_STM64	1-2-#-#-[tre, trw]-1	S64/1-2-#-#-[tre, trw]-1
LAN port 1 Gigabit Ethernet	{1-4}-{1-3}-#-#-{02, 04, 06, 08, 10, 12, 14, 16}-{1-4}	name=PTP value={1-4}-{1-3}-#-#-{02, 04, 06, 08, 10, 12, 14, 16}-{1-4}	47=LR_PHYSICAL_OPTICAL (use for both electrical and optical) 50=LR_DIGITAL_SIGNAL_RATE 68=LR_Gigabit_Ethernet, Gigabit ethernet	{1-4}-{1-3}-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-[1-4]	LAN/{1-4}-{1-3}-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-[1-4]

Table 5-57   getAllPTPs for WaveStar® TDM 10G   (continued)

| WAN port 1 Gigabit Ethernet | {1-4}-{1-3}-#-#-{02, 04, 06, 08, 10, 12, 14, 16}-v{1-2} | name=PTP value={1-4}-{1-3}-#-#-{02, 04, 06, 08, 10, 12, 14, 16}-v{1-2} | 504=LR_Virtual_ Concatenated_ Group

47=LR_PHYSICAL_ OPTICAL (use for both electrical and optical)

50=LR_DIGITAL_ SIGNAL_RATE

68=LR_Gigabit_ Ethernet, Gigabit ethernet | {1-4}-{1-3}-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-v[1-2] | WAN/{1-4}-{1-3}-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-v[1-2] |

The following table presents the getContainedTPs for WaveStar® TDM 10G.

Table 5-58   getContainedTPs for WaveStar® TDM 10G

Input PTP	CTP Layer Rate	nativeEMSName	CTPName	Internal Address	Network Level Address

Table 5-58   getContainedTPs for WaveStar® TDM 10G   (continued)

STM-64	16 VC4_4c: 16=LR_STS12c_ and_VC4_4c	1-2-#-#-[tre, trw]-1-[1, 13, 25, 37, 49, 61, 73, 85, 97, 109, 121, 133, 145, 157, 169, 181]	name=CTP value="/sts12c_ vc4_4c=[1..n]" where n=[1-16]	1-2-#-#-[tre, trw]-1-[1, 13, 25, 37, 49, 61, 73, 85, 97, 109, 121, 133, 145, 157, 169, 181]	S64/1-2-#-#- [tre, trw]-1/4c.[1-16]
	4 VC4_16c: 17=LR_STS48c_ and_VC4_16c	1-2-#-#-[tre, trw]-1-[1, 49, 97, 145]	name=CTP value="/sts48c_ vc4_16c=[1-4]"	1-2-#-#-[tre, trw]-1-[1, 49, 97, 145]	S64/1-2-#-#- [tre, trw]-1/16c.[1-16]
	64 AU-4: 15=LR_STS3c_ and_AU4_VC4	1-2-#-#-[tre, trw]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100, 103, 106, 109, 112, 115, 118, 121, 124, 127, 130, 133, 136, 139, 142, 145, 148, 151, 154, 157, 160, 163, 166, 169, 172, 175, 178, 181, 184, 187, 190]	name=CTP value="/sts3c_ au4-j=<J>" where J=[1-64]	1-2-#-#-[tre, trw]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100, 103, 106, 109, 112, 115, 118, 121, 124, 127, 130, 133, 136, 139, 142, 145, 148, 151, 154, 157, 160, 163, 166, 169, 172, 175, 178, 181, 184, 187, 190]	S64/1-2-#-#- [tre, trw]-1/AU.[1-64].0
	192 AU3: 14=LR_STS1_ and_AU3_High_ Order_VC3	1-2-#-#-[tre, trw]-1-[1-192]	name=CTP value="/sts1_au3- j=<J>-k=<K>" where J=1-64; K=1-3	1-2-#-#-[tre, trw]-1-[1-192]	S64/1-2-#-#- [tre, trw]-1/AU.[1-64].[1-3]

Table 5-58   getContainedTPs for WaveStar® TDM 10G   (continued)

STM-16	4 AU4_VC4-4c: 16=LR_STS12c_ and_VC4_4c	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1-[1, 13, 25, 37]	name=CTP value="/sts12c_ vc4_4c=[1-4]"	[1-4]-[1-3]-#-#-[02, 04, 06....16]-1-[1, 13, 25, 37]	S16/[1-4]-[1-3]-#-#-[02, 04, 06...16]-1/4c.[1-4]
	48 AU3: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1-[1-48]	name=CTP value="/sts1_au3-j=<J>-k=<K>" where J=1-64; K=1-3	[1-4]-[1-3]-#-#-[02, 04, 06....16]-1-[1-48]	S16/[1-4]-[1-3]-#-#-[02, 04, 06...16]-1/4c.[1-4]
	16 AU4: 15=LR_STS3c_ and_AU4_VC4	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46]	name=CTP value="/sts3c_ au4-j=<J>" where j=[1-16]	[1-4]-[1-3]-#-#-[02, 04, 06....16]-1-[1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46]	S16/[1-4]-[1-3]-#-#-[02, 04, 06...16]-1/AU.[1-16].0
	1 VC4_16c: 17=LR_STS48c_ and_VC4_16c	[1-4]-[1-3]-#-#-[02, 04, 06...16]-1-[1]	name=CTP value="/sts48c_ vc4_16c=1"	[1-4]-[1-3]-#-#-[02, 04, 06....16]-1-[1]	S16/[1-4]-[1-3]-#-#-[02, 04, 06...16]-1/16c.[1]
STM-4	12 AU3: LR_STS1_and_ AU3_High_Order_ VC3	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1-12]	name=CTP value="/sts1_au3-j=<J>-k=<K>" where J=1-4; K=1-3	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1-12]	S4/[1-4]-[1-3]-#-#-[01-16]-[1-2]/AU.[1-4].[1-3]
	4 AU4: LR_STS3c_and_ AU4_VC4	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1, 4, 7, 10]	name=CTP value="/sts3c_ au4-j=<J>"where J=[1-4]	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1, 4, 7, 10]	S4/[1-4]-[1-3]-#-#-[01-16]-[1-2]/AU.[1-4].0
	1 VC4_4c: 16=LR_STS12c_ and_VC4_4c	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1]	name=CTP value="/sts12c_ vc4_4c=[1..n]" where n=1	[1-4]-[1-3]-#-#-[01-16]-[1-2]-[1]	S4/[1-4]-[1-3]-#-#-[01-16]-[1-2]/4c.[1]

Table 5-58   getContainedTPs for WaveStar® TDM 10G   (continued)

STM-1	3 AU3: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-4]-[1-3]-#-#- [01-16]-[1-8]-[1-3]	name=CTP value="/sts1_au3- j=\<J\>- k=\<K\>"where J=1, K=3	[1-4]-[1-3]-#-#- [01-16]-[1-8]-[1- 3]	S1/[1-4]-[1- 3]-#-#-[01- 16]-[1- 8]/AU.1.[1- 3]
	1 AU4: 15=LR_STS3c_ and_AU4_VC4	[1-4]-[1-3]-#-#- [01-16]-[1-8]-1	name=CTP value="/sts3c_ au4-j=\<J\>" where J=1	[1-4]-[1-3]-#-#- [01-16]-[1-8]-1	S1/[1-4]-[1- 3]-#-#-[01- 16]-[1- 8]/AU.1.0
STM-1e	3 AU3: 14=LR_STS1_ and_AU3_High_ Order_VC3	[1-4]-[1-3]-#-#- [01-16]-[1-8]-1	name=CTP value="/sts3c_ au3-j=\<J\>" where J=1, K=1-3	[1-4]-[1-3]-#-#- [01-16]-[1-8]-[1- 3]	S1/[1-4]-[1- 3]-#-#-[01- 16]-[1- 8]/AU.1.[1- 3]
	1 AU4: 15=LR_STS3c_ and_AU4_VC4	[1-4]-[1-3]-#-#- [01-16]-[1-8]-1	name=CTP value="/sts3c_ au4-j=\<J\>" where J=1	[1-4]-[1-3]-#-#- [01-16]-[1-8]-1	S1/[1-4]-[1- 3]-#-#-[01- 16]-[1- 8]/AU.1.0
1 GBET HRNET WAN port	7 VC4: 15=LR_STS3c_ and_AU4_VC4	{1-4}-{1-3}-#-#-{02, 04, 06, 08, 10, 12, 14, 16}-v{1-2}-{1, 4, 7, 10, 13, 16, 19, 22}	name=PTP value={1-4}-{1- 3}-#-#-{02, 04, 06, 08, 10, 12, 14, 16}-v{1-2} name=CTP value="/sts3c_ au4=[1..n]" where n=[1-8]	{1-4}-{1-3}-#- #-[02, 04, 06, 08, 10, 12, 14, 16]-v{1-2}-[1, 4, 7, 10, 13, 16, 19, 22]	WAN/{1-4}- {1-3}-#-#-[02, 04, 06, 08, 10, 12, 14, 16]-v[1-2]-[1, 4, 7, 10, 13, 16, 19, 22]

Section XVIII: WaveStar® TM 1 Port Addresses

Overview

Purpose   This section provides the port identifiers for WaveStar® TM 1 network elements.

Contents

Port identifiers	5-147
Non-port identifiers	5-148

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Port identifiers

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Overview This section presents the port identifiers for WaveStar® TM 1
network elements.

Table The following table contains the port identifiers for the WaveStar®
TM 1 network elements.

Table 5-59 Port identifiers for WaveStar® TM 1 network elements

Description		Entity Identifier	Network Level Address
STM-1 Line Port 1	Physical Port	LP1	S1/1/2/1
	Logical Port (AU4 and VC4 combined)	LP1.1	S1/1/2/1/1
	Logical Port TU12	LP1.1.1.[1-6].[1-3]	S1/1/2/1/1-[1-16]
E1 (CEPT-1) (2Mb/s) Tributary (on-board)	Physical Ports	TP1.[1-16]	P1/1/3/[1-16]
		TP1.[1-16]	P1/1/3/[1-16]

□

Non-port identifiers

Overview   This section presents the non-port identifiers for the supported WaveStar® TM 1 network elements.

Table   The following table contains the non-port identifiers for the supported WaveStar® TM 1 network elements.

Table 5-60   Non-port identifiers for WaveStar® TM 1 network elements

Slot	Description	Entity Identifier
1	Motherboard (System control and timing)	SC
2	Line port	LS1
3	Tributary Slot 1	TS1

Index

generating reports, 4-146

hard restoration, 4-118

implementation, 4-123

manual, 4-144

modifying, 4-134

on top of a preplan, 4-134

possible circuit types, 4-124

preemption, 4-118, 4-121

preemption concepts, 4-147

preference level, 4-132

preplan creation, 4-123

preplan groups, 4-136

preplan pairs query box, 4-140

preplan parameters form, 4-143

preplan path with different end ports on same end node, 4-131

preplan path with one different end port on the same end node, 4-132

preplan plan query box, 4-142

preplan plans, 4-135

preplan plans and preplan groups, 4-135

preplans with different end nodes, 4-131

priority level, 4-133

protected path support, 4-125

provisioning, 3-140

provisioning concepts, 4-115

provisioning controls, 4-140

reinstatement, 4-118, 4-121, 4-136

reinstatement concepts, 4-149

restoration, 4-118, 4-118

selection, 4-123

soft restoration, 4-118

tracking status of restoration orders, 4-121

Triggering a preplan, 4-144

triggers, 4-121

using common resources, 4-124

Protection

automatic protection switching, 4-116, 4-116

non-assignable Y-protected paths, 4-126

preemption, 4-121

preplan restoration, 4-116, 4-116, 4-118

protected path support, 4-125

protected service paths, 4-126

reinstatement, 4-121

unprotected service paths, 4-126

Y-protected paths, 4-45

Provision

ONNS connection, 3-104

Provisioning

circuits, 4-54

conceptual information, 1-11

connections, 3-29

definition, 1-2

digital links, 3-5

Lucent Optical Network Navigation System, 3-89, 4-72

network discrepancy, 4-90

optical layers, 3-63, 4-62, 4-65

preplan restoration, 3-140

rings, 3-105

shared risk groups, 3-126

subnets, 3-105

supported actions, 1-2

task information, 1-10

trails, 4-47

using the Clone feature, 3-54

virtual concatenation groups, 3-121

....

R Regenerator

adding, 4-25

deleting, 4-25

deleting from a digital link, 3-21

Regenerators, 3-19

Reinstate

preplan pair, 3-151

Reinstatement, 4-121

Restoration, 4-116, 4-118, 4-118

Restore

service circuit with a preplan circuit, 3-150

Ring

definition, 1-8, 4-93

Rings
See: Subnets
See: Subnets
See: Subnets
See: Subnets

bidirectional, 4-96

creating, 3-105

definition, 3-105

deleting, 3-119

deletion criterion, 4-94

effect of digital link disconnect, 4-94

examples, 4-93

modifying, 3-118

names, 4-94

naming, 3-117

path switched, 4-102

protection protocol, 4-94, 4-106

provisioning, 3-105

size limits, 4-96, 4-102

support, 4-93

transoceanic protection protocol, 4-106

Screen help, xxvi

SDH
See: Synchronous Digital Hierarchy (SDH)

Service circuit

restoring with a preplan circuit, 3-150

Service recovery, 4-116, 4-118

Shared risk group

associate with a digital link, 3-133

create an ID, 3-128

definition, 3-126

deleting IDs, 3-139

disassociate with a digital link, 3-135

display associations with a digital link, 3-130, 3-132

display list of, 3-129

modifying an ID, 3-137

Shared risk groups

provisioning, 3-126

SLM-4 network elements

port identifiers, 5-67

Non-port identifiers

SLM-16 network elements, 5-71

Port identifiers

SLM-16 network elements, 5-69

Non-port indentifiers

SLM-4 network elements, 5-68

Port indentifiers

SLM-4 network elements, 5-67

Start

communication with Lucent Optical Network Navigation System, 3-93

Stop

communication with Lucent Optical Network Navigation System, 3-94

Subnet

bidirectional rings, 4-96

definition, 4-93

deletion criterion, 4-94

effect of digital link disconnect, 4-94

examples, 4-93

names, 4-94

path switched rings, 4-102

protection protocol, 4-94

Provisioning concepts, 4-92

size limits, 4-96, 4-102

support, 4-93, 4-93

Subnets

adding, 3-107, 3-110, 3-112, 3-115

creating, 3-105

definition, 3-105

deleting, 3-119

modifying, 3-118

naming, 3-117

protection protocol, 4-106

provisioning, 3-105

without link capacity
adjustment scheme,
4-113

Virtual disconnect, 3-61

WaveStar BandWidth
Manager, 2-5, 3-40

Port addresses

WaveStar BandWidth
Manager, 5-100

Port identifiers

WaveStar BandWidth
Manager, 5-101

Port addresses

WaveStar OLS 1.6T,
5-133

Port indentifiers

WaveStar OLS 1.6T,
5-134

WaveStar OLS400G, 3-73

Port addresses

WaveStar OLS400G,
5-128

Port indentifiers

WaveStar OLS400G,
5-129

Port addresses

WaveStar OLS80G,
5-126

Port indentifiers

WaveStar OLS80G,
5-127

WaveStar TMS, 2-22

WORD
See: Work order record
document (WORD)

Work Order Record
Document

definition, 4-46

Work order record
document (WORD)

view, 3-55

....

Y Y-protected paths, 4-45