



Cisco Edge Craft, Software Guide

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About This Guide

This section explains the objectives, intended audience, and organization of this publication and describes the conventions that convey instructions and other information.

This section provides the following information:

- [Document Objectives](#)
- [Audience](#)
- [Document Organization](#)
- [Related Documentation](#)
- [Document Conventions](#)
- [Where to Find Safety and Warning Information](#)
- [Obtaining Documentation](#)
- [Obtaining Technical Assistance](#)
- [Obtaining Additional Publications and Information](#)

Document Objectives

This Software Guide explains the functionality of the Cisco Edge Craft for the Cisco ONS 15302 and ONS 15305 system. It contains installation and user information for the Cisco ONS 15302 and ONS 15305 system. Use this Software Guide in conjunction with the appropriate publications listed in the [Related Documentation](#) section.

Audience

To use this publication, you should be familiar with Cisco or equivalent optical transmission hardware and cabling, telecommunications hardware and cabling, electronic circuitry and wiring practices, and preferably have experience as a telecommunications technician.

Document Organization

This Cisco Edge Craft, Software Guide is organized into the following chapters:

- [Chapter 1, “Starting of Cisco Edge Craft”](#) provides information how to install the Cisco Edge Craft Software.
- [Chapter 2, “Software Description”](#) provides details about the features of the Cisco Edge Craft.
- [Chapter 3, “Using Cisco Edge Craft”](#) provides information how to use the Cisco Edge Craft.
- [Chapter 4, “General Management”](#) provides information about the configuration operations supported by the Management Interfaces managed object.
- [Chapter 5, “Traffic Port Management”](#) provides information about the configuration of the four different port types (SDH, PDH, LAN, and WAN)
- [Chapter 6, “Link Aggregation”](#) provides details how to manage the link aggregation functionality of the network element.
- [Chapter 7, “Layer 2 Configuration”](#) provides information to manage the bridging service (L2 forwarding) on the network element.
- [Chapter 8, “Performance Management”](#) provides information about the performance of the system.
- [Chapter 9, “Troubleshooting and FAQ”](#) provides information in case of problems with the system.

Related Documentation

Use this Cisco Edge Craft, Software Guide in conjunction with the following referenced publications:

- *Cisco ONS 15302 Installation and Operation Guide*
Provides information how to install the system and how to initial the system.
- *Cisco ONS 15305 Installation and Operation Guide*
Provides information how to install the system and how to initial the system.

Document Conventions

This publication uses the following conventions:

Convention	Application
boldface	Commands and keywords in body text.
<i>italic</i>	Command input that is supplied by the user.
[]	Keywords or arguments that appear within square brackets are optional.
{ x x x }	A choice of keywords (represented by x) appears in braces separated by vertical bars. The user must select one.
Ctrl	The control key. For example, where Ctrl + D is written, hold down the Control key while pressing the D key.
screen font	Examples of information displayed on the screen.

Convention	Application
boldface screen font	Examples of information that the user must enter.
< >	Command parameters that must be replaced by module-specific codes.

**Note**

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the document.

**Caution**

Means *reader be careful*. In this situation, the user might do something that could result in equipment damage or loss of data.

**Warning****IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the translated safety warnings that accompanied this device.

Note: SAVE THESE INSTRUCTIONS

Note: This documentation is to be used in conjunction with the specific product installation guide that shipped with the product. Please refer to the Installation Guide, Configuration Guide, or other enclosed additional documentation for further details.

Where to Find Safety and Warning Information

For safety and warning information, refer to the Cisco Edge Craft, Software Guide that accompanied the product. This publication describes the international agency compliance and safety information for the Cisco ONS 15302 and ONS 15305 systems. It also includes translations of the safety warnings that appear in the ONS 15302 and ONS 15305 system documentation.

Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

International Cisco web sites can be accessed from this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Optical networking-related documentation is available in a CD-ROM package that ships with your product. The Optical Networking Product Documentation CD-ROM is updated with incremental releases and may be more current than printed documentation.

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:
<http://www.cisco.com/en/US/partner/ordering/index.shtml>
- Registered Cisco.com users can order the Documentation CD-ROM (Customer Order Number DOC-CONDOCCD=) through the online Subscription Store:
<http://www.cisco.com/go/subscription>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can submit comments electronically on Cisco.com. On the Cisco Documentation home page, click **Feedback** at the top of the page.

You can email your comments to bug-doc@cisco.com.

You can submit your comments by mail by using the response card behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com, which includes the Cisco Technical Assistance Center (TAC) Website, as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from the Cisco TAC website. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC website, including TAC tools and utilities.

Cisco.com

Cisco.com offers a suite of interactive, networked services that let you access Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

To obtain customized information and service, you can self-register on Cisco.com at this URL:

<http://www.cisco.com>

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC website and the Cisco TAC Escalation Center. The avenue of support that you choose depends on the priority of the problem and the conditions stated in service contracts, when applicable.

We categorize Cisco TAC inquiries according to urgency:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Cisco TAC Web Site

You can use the Cisco TAC website to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC website, go to this URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC website. Some services on the Cisco TAC website require a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

<http://tools.cisco.com/RPF/register/register.do>

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC website, you can open a case online at this URL:

<http://www.cisco.com/en/US/support/index.html>

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC website so that you can describe the situation in your own words and attach any necessary files.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:

http://www.cisco.com/en/US/products/products_catalog_links_launch.html

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary*, *Internetworking Technology Handbook*, *Internetworking Troubleshooting Guide*, and the *Internetworking Design Guide*. For current Cisco Press titles and other information, go to Cisco Press online at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco monthly periodical that provides industry professionals with the latest information about the field of networking. You can access *Packet* magazine at this URL:

http://www.cisco.com/en/US/about/ac123/ac114/about_cisco_packet_magazine.html

- *iQ Magazine* is the Cisco monthly periodical that provides business leaders and decision makers with the latest information about the networking industry. You can access *iQ Magazine* at this URL:

http://business.cisco.com/prod/tree.taf%3fasset_id=44699&public_view=true&kbns=1.html

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in the design, development, and operation of public and private internets and intranets. You can access the *Internet Protocol Journal* at this URL:
http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html
- Training—Cisco offers world-class networking training, with current offerings in network training listed at this URL:
http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html



Starting of Cisco Edge Craft

1.1 Installation of Cisco Edge Craft

This section describes how to install the Cisco Edge Craft and how to start the VT100 terminal.

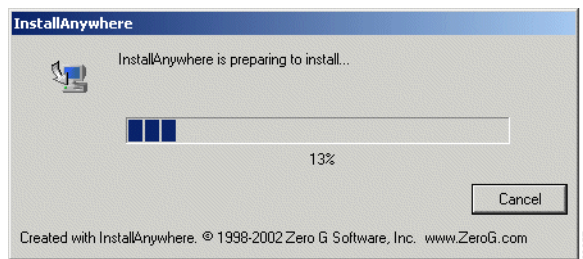
- Step 1** Insert the Cisco Edge Craft SW CD in desired drive on target PC.



Note Required diskspace for the Cisco Edge Craft installation is minimum 65 Mb.

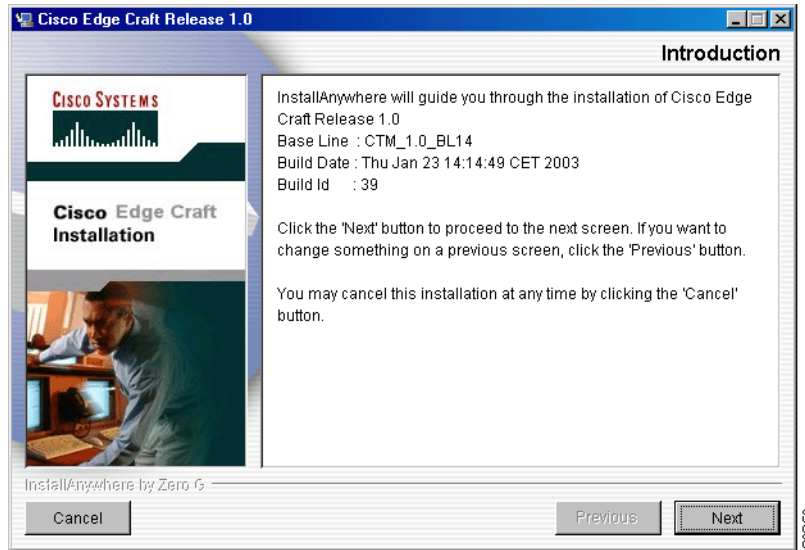
- Step 2** Run `ciscocraft.exe` and the Cisco Edge Craft Install shield launches, [Figure 1-1](#).

Figure 1-1 Install Shield preparing Installation Wizard



- Step 3** Follow the instructions given in the Install wizard, [Figure 1-2](#).

Figure 1-2 Install Wizard - Introduction



Un-install Cisco Edge Craft

Select start>programs>Cisco Edge Craft>unistall and follow instructions given on screen.

or:

Select start>settings>Control Panel>Add/Remove Programs.

1.1.1 Commissioning of IP Address via VT100 Interface

A local terminal with VT100 emulation is required during the first commissioning of the network element in order to set up the necessary communications parameters enabling access to the element via Cisco Edge Craft over the Management Port. After the first commissioning, the VT100 interface can be used for modifying the communications parameters and perform some status checks of the network element. The VT100 interface is password protected.

1.1.1.1 Commissioning of IP Address via VT100 Interface

ONSCLI is a line-oriented ASCII-based management interface embedded in the Cisco network element. The ONSCLI is accessed via the VT100-port. The serial connection communications parameters are fixed:

- 19200 bit/s,
- no parity,
- 8 bits,
- 1 stop bit,
- and no hardware flow control.

VT100 terminal codes are used.

The VT100-port (Console port) for the Cisco network element is provided using a RJ-45 connector. The cable for connecting the VT100-port to the serial-port on the PC can be provided, [Table 1-1](#).

Table 1-1 CLI Connector Pinout (RJ-45 to DS-9)

RJ-45 Connector		DS-9 Connector	
Pin 1	GND	Pin 5	NC
Pin 2	Tx	Pin 2	Rx
Pin 3	Rx	Pin 3	Tx
Pin 4	NC		
Pin 5	NC		
Pin 6	CTS	Pin 8	CTS
Pin 7	NC		
Pin 8	RTS	Pin7	RTS



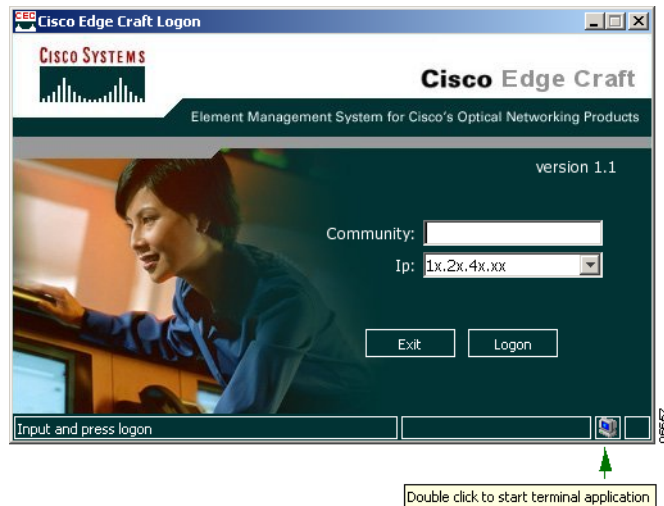
Note

Pin 4, 5 and 7 are only used for debug purposes.

Invoke ONSCLI

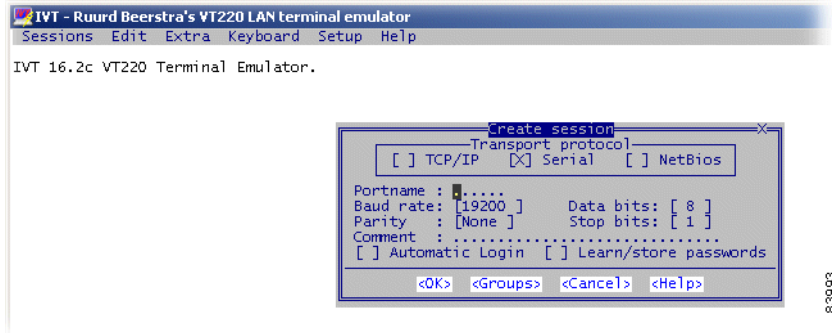
- Step 1** Connect the VT100 interface of the network element to a free COM port of the PC running the Cisco Edge Craft application.
- Step 2** A VT100 terminal application is available from the Cisco Edge Craft Logon window. Select Program>Cisco Edge Craft>**Cisco Edge Craft**
- Step 3** Double-click the VT100 icon in the lower right corner of the Logon window, [Figure 1-3](#).

Figure 1-3 Logon Window



- Step 4** The terminal application launches, [Figure 1-4](#).

Figure 1-4 Start Window



Step 5 Enter **COM port** name and select **OK**.

Step 6 An ONSCLI session is invoked by typing **onscli** in terminal window. User authentication (password, 6 to 12 ASCII characters) is required, as the following session start-up sequence shows. Default password is ONSCLI.

```
>ONSCLI
-----
          ONS 15305 Command Line Interface
-----

Enter ONSCLI password: *****
ONSCLI>
```

Step 7 When access has been granted, you can define the following parameters:

```
IP-Configuration(Management-Port):
Show-Current-Alarms:
Community-handler:
Exit:
```

It is sufficient to type leading characters of the command name to avoid ambiguity – the same applies to keywords.



Note The backspace or delete key may be used to edit the command line. Commands and keywords are not case-sensitive.

The management port IP address is a compulsory parameter, and must be specified by you. All the other parameters (except default gateway) are defaulted to pre-defined values if they are not specified.

1.1.1.2 Configure Community-handler



Note The following parameters settings are shown both for ONS 15305 and ONS 15302.

The following example shows how to set community for a default user. If setting community for a specific user, the corresponding IP address must be entered instead of 0.0.0.0

ONS 15305

-
- Step 1** ONSCLI>**com**
- Step 2** Press **Enter**.
- Step 3** ONSCLI>**Community-handler**
- Step 4** Press **Enter**.

```
Add:    Add Community entry
Edit:    Edit Community entry
Remove:  Remove Community entry
Show:    Show Community entry
Exit:
```

```
ONSCLI>Community-handler\
```

- Step 5** ONSCLI>**Community-handler\add man=0.0.0.0 com=public acc=super traps=disable**
- Step 6** Press **Enter**.

```
MANAGER:  0.0.0.0
COMMUNITY: public
ACCESS:    super
TRAPS:     disable
```

```
ONSCLI>Community-handler\
```

ONS 15302

Factory pre-configured community:

```
Manager:  0.0.0.0
Community:public
Access:Super
Traps:Disabled
```

This is an insecure community, which enables all managers regardless of the IP-address for the SNMP manager to access the device with the community string public.

To add your own community string please use the following command:

-
- Step 1** ONSCLI>**Security\Community-Table\add manager=10.0.0.20 community=admin access=super traps=enable**
- Step 2** Press **Enter**.
-

1.1.1.3 Assign an IP Address**ONS 15305**

```
ONSCLI>ip ?
```

Usage:

IP-Configuration(Management-Port)

```
[IP-ADDRESS=<IP address>]
[SUBNET-MASK=<IP address>]
[DEFAULT-GATEWAY=<IP address>]
```

Available independent of router license

```
[MODE=<notUsed|ip|clnp|ipAndClnp>]
```

Management mode for the management port

|clnp|ipAndClnp| only with OSI license

```
ONCLI>ip
IP-ADDRESS:      10.20.47.131
SUBNET-MASK:     255.255.254.0
DEFAULT-GATEWAY: 10.20.47.254
MODE:           ip
STATUS:        up
Management port Status
```

ONCLI>

Configure the device by setting IP address to the management port:

Step 1 ONCLI>ip ip=192.168.2.2 sub=255.255.255.252 def=192.168.2.1

```
--- Change IP address, are you sure (y/n)? Y
IP-ADDRESS:      192.168.2.2
SUBNET-MASK:     255.255.255.252
DEFAULT-GATEWAY: 192.168.2.1
```

ONS 15302

Step 1 Enter the following:

```
ONCLI>Device\Management-Configuration\Custom\Management-Port\IP-Configuration
ip-address=10.0.0.1 subnet-mask=255.255.255.0 default-gateway=10.0.0.254
```

Step 2 Press **Enter**.

Step 3 You have to verify the intention of the operation (y/n).

Step 4 Press **y**.

```
IP-ADDRESS: 10.0.0.1
SUBNET-MASK: 255.255.255.0
DEFAULT-GATEWAY: 10.0.0.254
```

Step 5 Type **exit** to terminate the session.

1.1.1.4 Change Passwords

ONS 15305

```
ONSCLI>ch ?
Usage:

Change-Passwords

[ONSCLI -PASSWORD=<string[6:12]>]
[TELNET-PASSWORD=<string[6:12]>]
```

By this command, TELNET and ONSCLI passwords can be changed. Both passwords can be changed in the same command or they can be changed one by one.

ONS 15302

```
ONSCLI>Security\Community-Table>ch ?
Usage:

Change-Passwords

[ONSCLI -PASSWORD=<string[6:12]>]
[TELNET-PASSWORD=<string[6:12]>]
```

By this command, TELNET and ONSCLI passwords can be changed. Both passwords can be changed in the same command or they can be changed one by one.

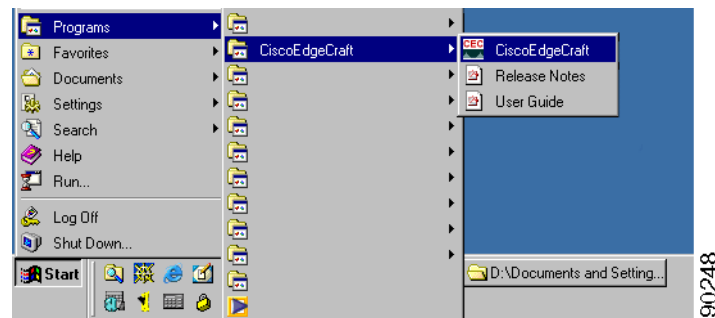
1.1.2 Set up Connection to a Network Element

The purpose of this section is to describe the tasks involved in setting up a connection between the Craft Terminal and any network element from Cisco. See also “[1.1.1 Commissioning of IP Address via VT100 Interface](#)” section on page 1-2.

1.1.2.1 Start the Cisco Edge Craft Application on your Computer

Step 1 Select Program>Cisco Edge Craft>Cisco Edge Craft, [Figure 1-5](#).

Figure 1-5 Starting Cisco Edge Craft



Step 2 A logon window is presented for you.

Step 3 Enter Community **password**.

Step 4 If present, select desired network element from **Ip** pull-down menu, [Figure 1-6](#)

Figure 1-6 Selection of IP Address - Logon Window



The system adds the selected IP address to the logon window. You can also fill in the IP address manually, [Figure 1-7](#).

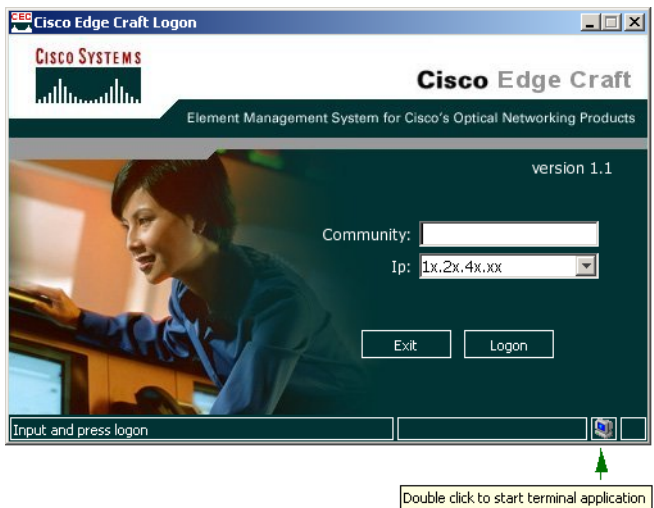
Step 5 Click **Logon** to continue.

Community access levels:

The network element supports three community access levels

- ReadOnly - only read access to the whole MIB
- ReadWrite - read and write to the MIB, but can not change community strings
- Super - read and write to the complete MIB.

Figure 1-7 Cisco Edge Craft Logon Window



- Step 6** The system validates the community string and IP address combination. If valid, that means combination correct and valid SNMP community string, the craft terminal sets up a connection to the specified IP address. The desktop of the craft terminal with its working windows is presented to you.

You can now browse the network element topology and perform the required management tasks.

1.1.2.2 Invalid Community String

If the community string is invalid, access to the network element is not granted and an error message is presented.

1.1.2.3 Non-existent IP Address

The IP address given by you manually or selected by you in the list, is not reachable/non-existent or does not belong to an Cisco network element. The system gives an error message and ask for a new IP address.

1.1.3 Configuration of VT100 Terminal

The VT100 terminal can be launched from the both Cisco Edge Craft desktop [Figure 1-8](#) and the logon window [Figure 1-7](#). You may change the terminal SW to be launched.

Figure 1-8 VT 100 available from Cisco Edge Craft Desktop



This is done by editing the VT 100 path description in the ExternalApplications.xml file, found in the folder:

install\dir\CISCOEDGE CRAFT\res\config\

Example of the ExternalApplications.xml:

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
- <ExternalApplications>
  <vt100 file="..\external\IVT VT220 Telnet\ivt.exe" />
  <exec file="rundll32 url.dll,FileProtocolHandler" />
  <editor file="notepad.exe" />
  <fileexplorer file="explorer.exe" />
  <web file="rundll32 url.dll,FileProtocolHandler" />
  <ciscoweb file="rundll32 url.dll,FileProtocolHandler" params
="http://www.cisco.com" />
  <help file="rundll32 url.dll,FileProtocolHandler" params="
..\res/help/CEC1-0.pdf" />
  <releasenotes file="rundll32 url.dll,FileProtocolHandler" params="
..\res/help/CECRN10.pdf" />
</ExternalApplications>
```




Software Description

This section gives an overview of the Cisco Edge Craft with its features.

2.1 Introduction

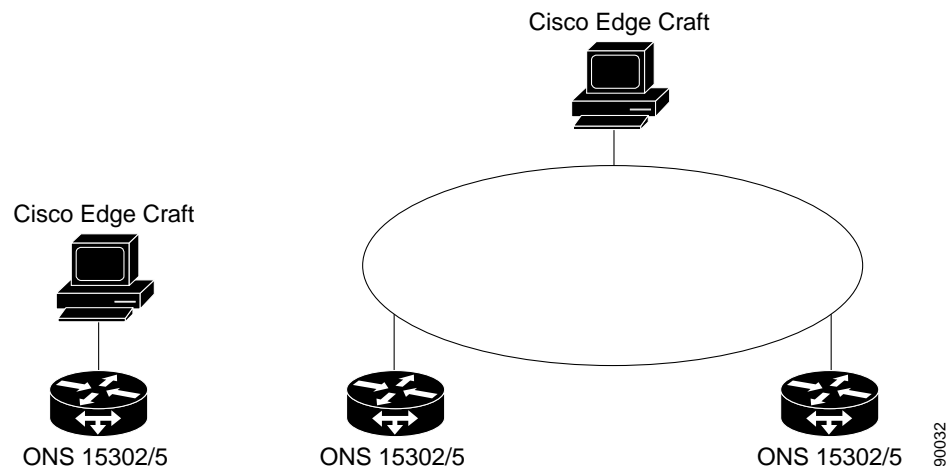
Cisco Edge Craft is used to get one, single network element at the time into operation. Cisco Edge Craft can only present and work on information that are stored on the network element. A user must be logged onto Cisco Edge Craft graphical user interface (GUI) for it to function. The GUI present alarms as long as Cisco Edge Craft is connected to the network element. Performance data can be loaded from the network element and presented.

The Cisco Edge Craft presents the current (a snapshot) situation on the network element, and has very little added value functions apart from the functions on the network element.

Cisco Edge Craft is a single user system. It is a standalone application running on Windows platform or Solaris platform.

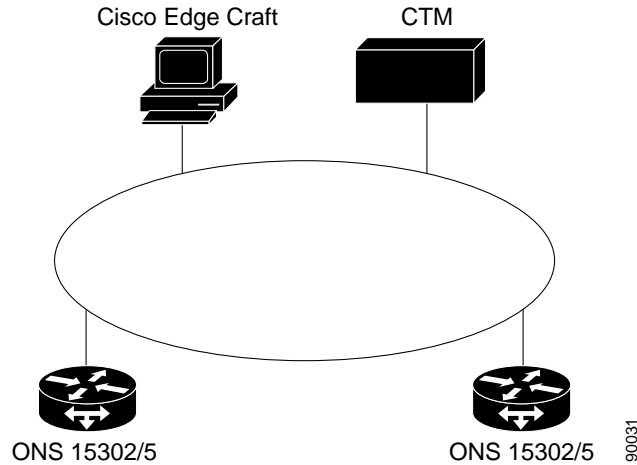
Cisco Edge Craft is a totally self contained product. It is not dependent on any other system to be able to perform its tasks. The laptop or a PC, at which Cisco Edge Craft is running, can be attached to the network element directly through the management port or through a LAN, [Figure 2-1](#).

Figure 2-1 Cisco Edge Craft Connection Possibilities



It can co-exist together with other management products from Cisco, [Figure 2-2](#). The SNMP Agent used by Cisco Edge Craft for communication with the network element, handles multiple SNMP Managers.

Figure 2-2 Cisco Edge Craft in co-existence with other Management Systems



[Table 2-1](#) displays the capabilities of the Cisco Edge Craft.

Table 2-1 Cisco Edge Craft Capabilities

Customer Benefit	Supporting Features
Support for configuration of network element for no extra cost, to get it into operation quickly.	All necessary configuration of network element can be done by Cisco Edge Craft.
Part of Cisco Family of products and therefore easy to upgrade to EMS or NMS level.	Cisco Edge Craft has the same look and feel as the other products in the family and uses a sub-set of components from the Cisco component collection.
Easy access to network element	Can run on a laptop.
Can access network elements both locally and remote.	Communication on management port (IP) to the embedded SNMP Agent in the network element.

2.2 Product Features

Some of the feature listed here are only applicable to Cisco Edge Craft if the feature is available on the network element. In the remaining part of this chapter, Cisco Edge Craft is called the system.

2.2.1 Network Element Access

The system communicates with the network element through the embedded SNMP Agent. To establish this communication line the network element must have been assigned an IP address. In situations where assignment has not been done a separate communication line on the serial port is used to perform the assignment of the IP address and other related parameters.

2.2.2 Information Model

The system has its own internal representation (information model) of the network elements. This is an object-oriented model and is identical to the information model used by all products in the Cisco Family.

2.2.3 Single User

Only one user can be logged onto the system at the time.

2.2.4 Single Network Element

The system can only communicate with one network element at the time. The user closes the connection with one element before connecting to a new network element.

2.2.5 Graphical User Interface Types

The GUI presents the network element in accordance with the information model and has no knowledge about the SNMP MIBs used by the embedded Agent.

GUI cannot be customized by the user.

The system has two different types of graphical user interfaces (GUI).

Network Element topology Browser (NETB)

A hierarchical presentation of the managed objects in the network element.

Custom GUI to Support a Specific System Feature

A GUI developed to support a specific task/function.

2.2.6 No Persistency

The system has no persistent storage of operations and notifications.

2.2.7 List of Possible Network Element IP Addresses

The system stores the IP address of the already accessed network elements. The operator can choose the IP address of the current network element in the start up window for the system.

2.2.8 Configuration Download and Upload

The system can initiate upload of the complete configuration from one network element and store it on the local or a remote computer. The remote computer is identified by its IP address.

The system can initiate download of the complete configuration from a local or remote computer to the network element. The remote computer is identified by its IP address.

The uploaded configuration can not be edited.

2.2.9 Software, Firmware and Licenses Download

The system can initiate download of software, firmware and licenses on the network element. The location of the software, firmware and licenses can either be on the same computer as the system is running or on a remote computer. The remote computer is identified by its IP address and both the local and remote computer must be an TFTP server.

The restart of the equipment that uses new downloaded software/firmware can be scheduled.

2.2.10 User Access

The system supports user authentication through user identification (community string).

Initial access of the network element is through public access.

2.2.11 Alarm and Event Notifications Presentation

The system presents all alarms and events that are generated while the user is logged onto the system. The alarms are presented in a tabular view. If the received traps from the network element can not be mapped to an alarm or an event, the trap is still presented to the operator.

The system presents the alarm history stored on the network element. The alarm history is presented in a tabular view.

2.2.12 Presentation of Performance Data

The system has no analysis of performance management data.

The user can read the current registered performance data on the network element, get it presented in a GUI, and copy it to file. The file can be read or edited in any tool, for example Microsoft Excel.

Supported performance data are: G.826, MIB-II (RFC1213) and RMON counters.

2.2.13 Management Configuration

The system supports configuration of the DCN management traffic settings.

2.2.14 Physical Inventory

The physical inventory gives an overview of the physical installed parts on the network element and the currently running software or firmware. Possibly also downloaded not yet activated software and firmware packages are presented.

2.2.15 Logical Inventory

The logical inventory gives an overview of the managed entities that the network element consists of. The logical entities may agree with the physical parts, but not necessarily.

2.2.16 Global Settings

The network element has some configurations that are not related to the user traffic of the network element. These are parameters like location, owner, time server, LED settings, power modules, etc.

2.2.17 Alarm and Event Filtering Configuration on Network Element

The alarm reporting from some managed entities on the network elements can be filtered out.

2.2.18 SDH Ports Configuration

The system supports configuration of the SDH ports. The SDH ports have two main configuration areas.

- Properties of the ports. The properties can be viewed and edited.
- Structuring of the ports

2.2.19 PDH Ports Configuration

The system supports configuration of PDH ports properties. The properties can be viewed and edited.

2.2.20 MSP and SNCP Configuration

The system supports configuration of MSP and SNCP set-up, that means view, create, modify, and delete.

2.2.21 SDH Synchronization Configuration

The network element can have more than one synchronization source for the SDH traffic. The sources are prioritized. The system helps the user in the set-up of these rules.

2.2.22 LAN Ports Configuration

The system supports configuration of LAN ports properties. The properties can be viewed and edited.

2.2.23 WAN Ports Configuration

The system supports configuration of WAN ports properties. The properties can be viewed and edited. The system also supports configuration of WAN bandwidth.

2.2.24 Test Loops Configuration

The system supports configuration of test loops.

2.2.25 Cross Connect (XC) Configuration

The system supports cross connection management for the SDH ports. The XCs can be set, deleted, updated. Two supported XC's are:

- Point-to-point
- WAN to SDH mapping

2.2.26 Bridge Configuration

The system supports the set-up of the bridge.

2.2.27 VLAN Configuration

The system supports configuration of VLAN, that means, create, remove, and update VLANs.

2.2.28 Security

The security of Cisco Edge Craft is based on the SNMP v.1 security, that means community string.

2.2.29 Data Communication

Cisco Edge Craft can communicate with the network elements

- Directly on the management port
- The management port can be connected to a VLAN
- Inband DCC

2.2.30 Reliability

This section lists the reliability requirements and know bugs on the system.

Redundancy

One or more Cisco Edge Craft user can be connected to the same network element at the time if the network element is connected to a LAN, but they will have no knowledge of each other.

Bugs

Known bugs are presented with a workaround in the Release Notes.

2.2.31 Maintenance

Debugging and system logging are realized through log4j, open source code.

Debugging

- All components in the system have a debugging interface.
- The components can log different information decided by the debug level.
- The components have one debug level.

System Logging

- All system errors are logged.
- The system error messages include a text description of the error, the operating system error code (if applicable), the module detecting the error condition, and a time stamp.
- If configured, all system errors are retained in the Error Log Database.

New Releases and Patches

The new releases or patches are available for download from the Support pages on <http://www.cisco.com>.



Using Cisco Edge Craft

3.1 Desktop

3.1.1 Cisco Edge Craft Desktop

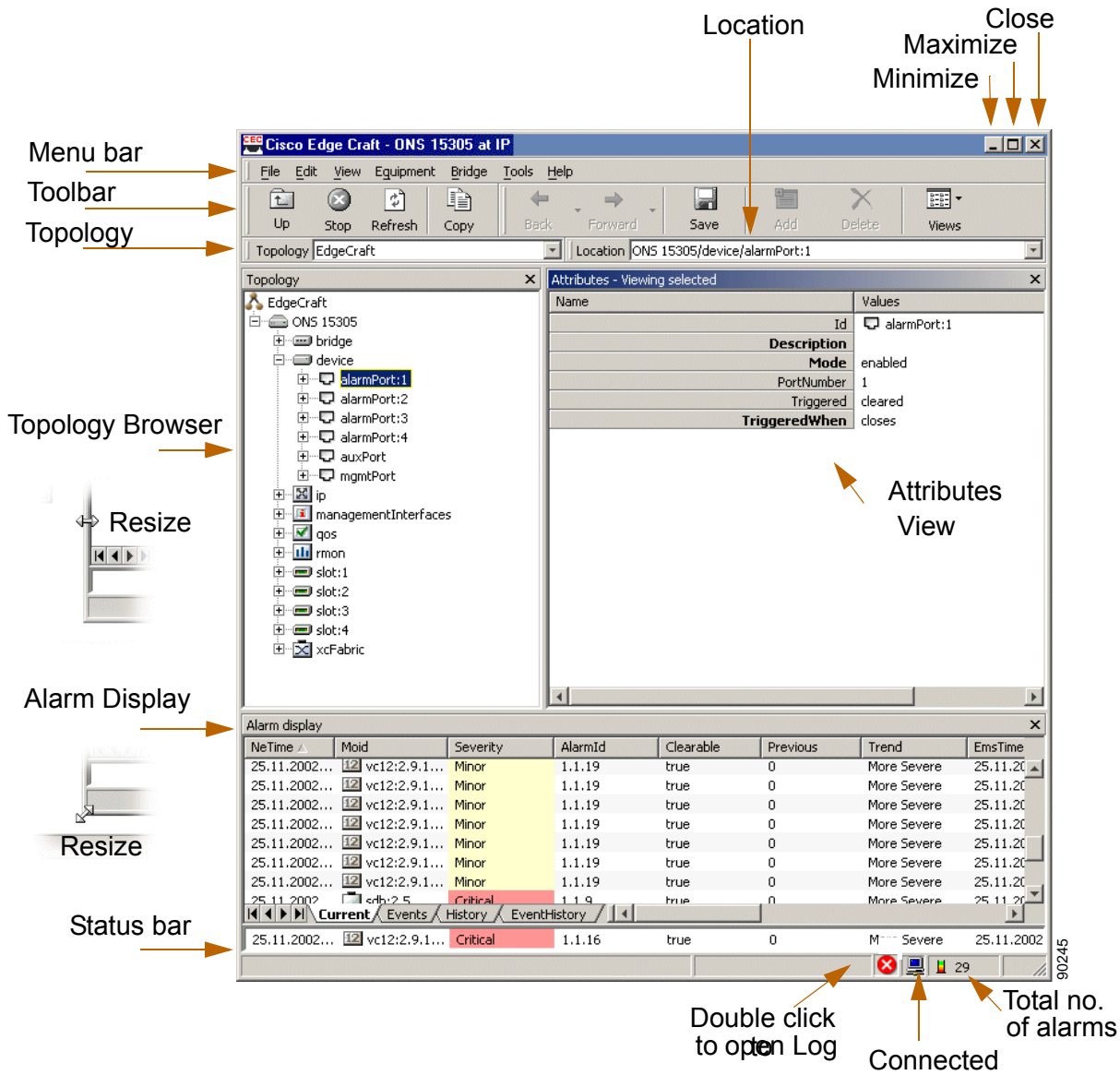
The graphical user interface of Cisco Edge Craft is built on the Cisco GUI framework and is delivered pre-customized to show a network element topology browser, attributes, and an alarm list.

The alarm list displays all alarms, events and notifications that occur while Cisco Edge Craft is connected to the network element.

[Figure 3-1](#) gives an overview of the Cisco Edge Craft desktop with explanation of the functionality.

The status bar will display a description of selected toolbar button or menu item.

Figure 3-1 Cisco Edge Craft Desktop Overview



3.1.2 Toolbar Buttons

Figure 3-2 to Figure 3-11 shows the functionality of the icons, which are used in the Cisco Edge Craft.

Figure 3-2 Icon Up



Move up one level in topology.

Figure 3-3 Icon Stop

Stop the current operation.

Figure 3-4 Icon Refresh

Refresh the active view.

Figure 3-5 Icon Copy

Copy selected row(s) to the system clipboard.

Figure 3-6 Icon Forward

Move Forward in Attributes Viewer.

Figure 3-7 Icon Backward

Move Backward in Attributes Viewer.

Figure 3-8 Icon Save

Save the content of the Attributes View on the equipment.

Figure 3-9 Icon Add

Add a new row to the Attributes View.

Figure 3-10 Icon Delete



Delete selected item(s).

Figure 3-11 Icon Cell Mode



By default, entire rows are selected in table, but single cells can easily be selected using the cell-mode toggle button

Figure 3-12 and Figure 3-13 shows the functionality how to lock and move toolbars.

Figure 3-12 Lock Toolbars

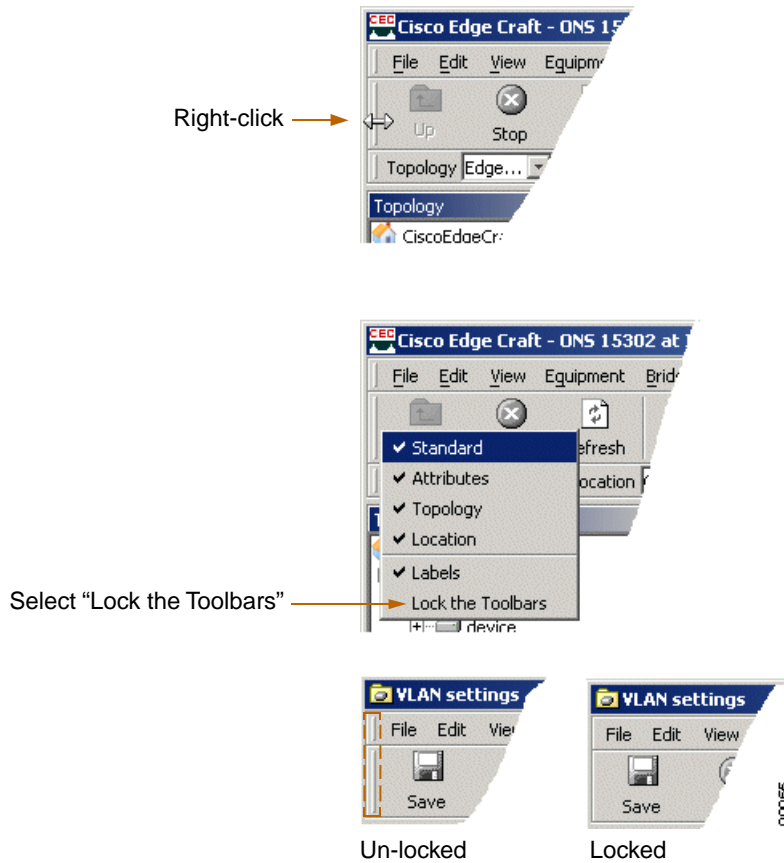
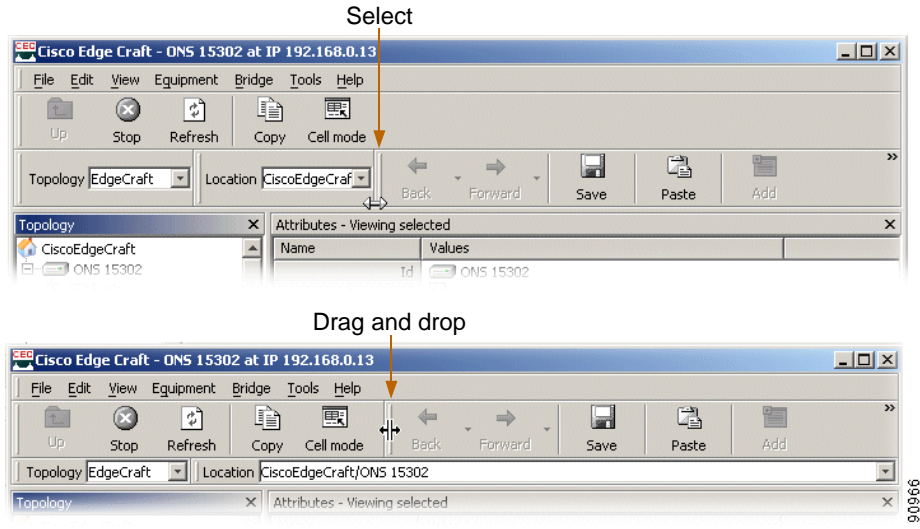


Figure 3-13 Move Toolbars



3.1.3 Menu Items

3.1.3.1 File

Figure 3-14 and Table 3-1 shows and explain the functionality of the menu File.

Figure 3-14 Pull Down Menu File

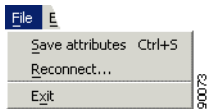
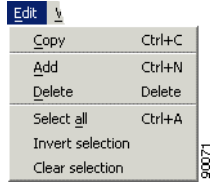


Table 3-1 Menu File

Menu item	Action
Save attributes	Save attributes.
Reconnect	Reconnect to equipment.
Exit	Exit Cisco Edge Craft.

3.1.3.2 Edit

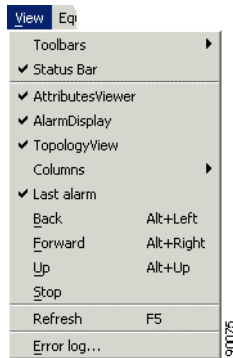
Figure 3-15 and Table 3-2 shows and explain the functionality of the menu edit.

Figure 3-15 Pull Down Menu Edit**Table 3-2 Menu Edit**

Menu item	Action
Copy	Copy selected items to system clipboard.
Add	Add row.
Delete	Delete selected item(s).
Select all	Select all items in active the active view.
Invert selection	Invert current selection in the active view.
Clear selection	Clear current selection.

3.1.3.3 View

Figure 3-16 and Table 3-3 shows and explain the functionality of the Menu View.

Figure 3-16 Pull Down Menu View**Table 3-3 menu View**

Menu item	Action
Toolbars	Standard: Check to make standard toolbar active. Attributes: Check to make attributes toolbar active. Labels: Check to make labels visible on tool buttons.
Status bar	Check to make status bar visible in the bottom of Cisco Edge Craft desktop.
Attributes Viewer	Check to make attributes viewer an active application on the desktop.
Alarm Display	Check to make alarm display an active application on the desktop.

Table 3-3 menu View

Menu item	Action
Topology View	Check to make topology view an active application on the desktop.
Columns	Toggle visible columns in alarm display. Please see Visible Columns, page 3-17 for details.
Last Alarm	Check to view last alarm in separate window in the alarm display.
Back	Move back.
Forward	Move forward.
Up	Move up one level.
Stop	Stop current operation.
Refresh	Refresh the active view.
Error Log	Open error log. The log is also available from the status bar. These symbols indicates severity in the staus bar, if the log contains messages see Figure 3-22 to Figure 3-25 Double-click current symbol to view log.

3.1.3.4 Equipment

[Figure 3-17](#) and [Table 3-4](#) shows and explain the functionality of the menu Equipment.

Figure 3-17 Pull Down Menu Equipment

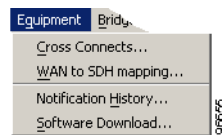


Table 3-4 Menu Equipment

Menu item	Action
Cross Connect	Open Cross connect GUI. Please see “ 5.7 ONS 15305 SDH Cross-Connection Management ” section on page 5-33 for details on Cross Connects
WAN to SDH mapping	Open WAN to SDH mapping GUI. Please see “ 5.5.2 Add Initial WAN Port Capacity ” section on page 5-16 for details.
Notification History	Open Notification History GUI. Please see History, page 3-14 .

3.1.3.5 Bridge

[Figure 3-18](#) and [Table 3-5](#) shows and explain the functionality of the menu bridge.

Figure 3-18 Pull Down Menu Bridge**Table 3-5 Menu Bridge**

Menu item	Action
VLAN Settings	Open VLAN Settings GUI. Please see “7.4 VLAN provisioning” section on page 7-11 for details on VLAN Settings.

3.1.3.6 Tools

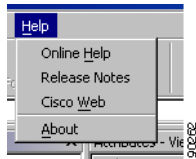
[Figure 3-19](#) and [Table 3-6](#) shows and explain the functionality of the menu Tools.

Figure 3-19 Pull Down Menu Tools**Table 3-6 Menu Tools**

Menu item	Action
VT 100 Terminal	If configured, the VT100 terminal launches. Please see “1.1.3 Configuration of VT100 Terminal” section on page 1-9 for details.
Features	List supported features for the current NE.

3.1.3.7 Help

[Figure 3-20](#) and [Table 3-7](#) shows and explain the functionality of the menu Help.

Figure 3-20 Pull Down Menu Help**Table 3-7 Menu Help**

Menu item	Action
Online Help	Launches Cisco Edge Craft User Guide online.

Table 3-7 Menu Help

Menu item	Action
Cisco Web	Open Cisco internet site.
About	Launches information of installed Cisco Edge Craft software, Figure 3-21 .

Figure 3-21 The About box

3.1.3.8 Log Viewer

[Figure 3-22](#) and [Figure 3-26](#) shows and explain the functionality of the log viewer icons. These symbols indicates severity in the status bar, if the log contains messages:

Figure 3-22 Icon Error

An error messages occurs.

Figure 3-23 Icon Warning

A warning message occurs.

Figure 3-24 Icon Info

Information is available.

Figure 3-25 Icon Unmapped Severity



Unmapped severity information is available.

Figure 3-26 Icon Note

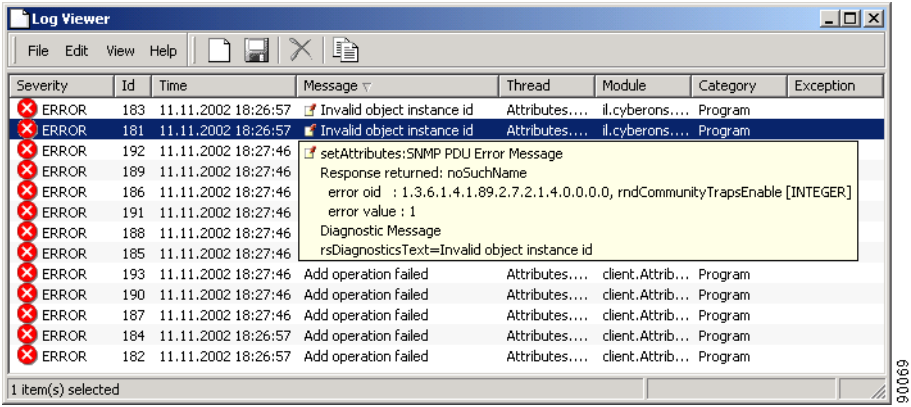


If this icon occurs additional information are available.

- Step 1 Double-click current symbol to view log.
- Step 2 Messages marked with the note icon contain additional information.
- Step 3 Click note icon to view hyper link.

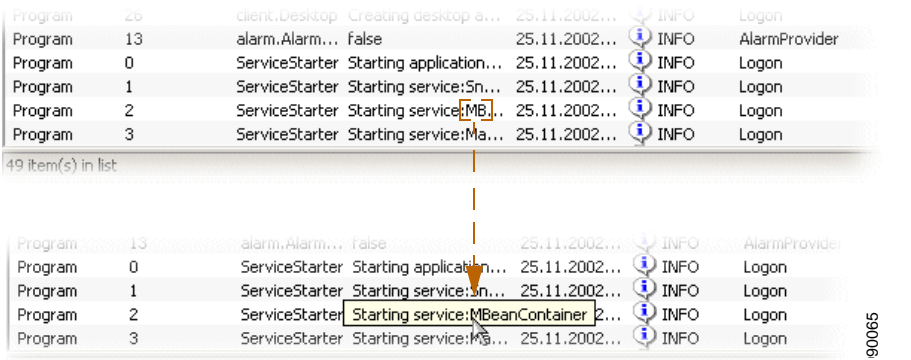
Figure 3-27 and Figure 3-28 shows details of the lock viewer function.

Figure 3-27 Log Viewer



Tool tip shows entire value if it does not fit inside the cell.

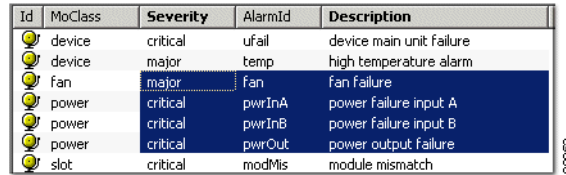
Figure 3-28 Log Viewer - Tool tip



3.1.4 Copy and Paste

All Cisco Edge Craft applications supporting table entry editing have a copy and paste feature. When pasting, Cisco Edge Craft will verify that selected columns have the same data type as the cells copied from. If not, you are asked if you would like to copy the data based on the column names. Only editable columns with the same name and datatype will be then be pasted. This enables copying and pasting between tables with the same data but with different column order, [Figure 3-29](#).

Figure 3-29 Example Copy and Paste



Id	MoClass	Severity	AlarmId	Description
device	critical	ufail	device main unit failure	
device	major	temp	high temperature alarm	
fan	major	fan	fan failure	
power	critical	pwrInA	power failure input A	
power	critical	pwrInB	power failure input B	
power	critical	pwrOut	power output failure	
slot	critical	modMis	module mismatch	

3.1.5 Cell Selection Mode

By default, entire rows are selected in table, but single cells can easily be selected using the cell-mode toggle button, [Figure 3-11](#).

The feature enables copying one table cell, selecting the entire column, press Paste and copying the value into all selected cells. Copy and paste of ranges are also supported. Thus you can copy values A and B and paste them into a large range in order to get the A and B values repeated throughout the range.

Copy and paste to external applications, for example Microsoft Excel is also supported.

3.1.6 Navigation in Tables using the Keyboard.

Cell in focus is easily spotted and the arrow-keys can be used to move the cursor (applies for editable tables only). Editing of selected cell is easily available via Enter or F2. The Tab-key can be used for moving to the next editable cell (from left to right and top to bottom). The selection is circular, meaning when last editable cell on the last row is reached, the first editable cell in the first row will be activated.

In order to move to first editable cell in a table, activate the window and press the Tab-key twice.

3.1.7 Auto fit Column width

Double-clicking on the resize-area in the column header will resize the column so that it is wide enough to show all values in the column. By default, the column name is not taken into consideration, but this can be achieved by holding down the Shift key while double-clicking.

3.2 Topology Browser

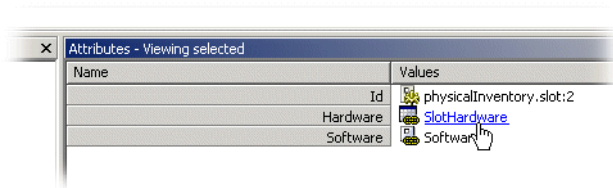
The topology browser shows the hierarchy of managed entities, for example, LAN ports, VLANs, bridge, etc. on the current network element. The operator can view the entire hierarchy, or use any of the pre-defined views to only view managed entities of a certain type, for example only view the LAN ports. Whenever an item in the topology is selected, the attributes view will list the child objects under it.

Clicking on the device folder in the topology browser shown in [Figure 3-1](#), will display all alarm-, aux- and management port(s). Clicking on alarmport:1 will show that specific port's attributes. Attributes that are editable (shown as bold), can be edited directly in the table, or through custom user interfaces.

The different configuration tasks using the topology browser are thoroughly shown in the following chapters.

The combination of topology and attribute panes will work similar to Windows Explorer, only that it shows the contents of a network element instead of files in the file system.

Figure 3-30 Editable Types and Tables - Hyperlinks



All links to editable complex types and tables are visualized as hyperlinks, [Figure 3-30](#).

Although changing attribute values can carry all necessary configurations, more complex configuration is handled using wizards or custom user interfaces.

Opening links in a new window

By selecting a managed object instance and right clicking you can select **Open in new window**. A new AttributesViewer displaying selected managed object is opened. This enables you to easily compare values on different managed objects.

3.3 Alarm Display

The purpose of the alarm display is to present the current alarm and event notifications.

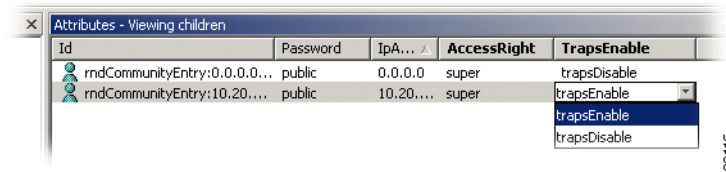
In addition the history of all alarms are presented. The history list in the network element can be cleared. Alarms report failures in the network element. They can be clearable or not clearable. Clearable alarms have duration. Events report other situations in the network element that are not failures. An event has a status, [Figure 3-1](#).

3.3.1 View Current Alarms

3.3.1.1 Subscription of Alarms

- Step 1** Log in to target network element, see section Set up the connection to a network element.
- Step 2** You must manually register Cisco Edge Craft a subscriber to alarms and events from the network element. The registration is done by setting the device>users>snmp>**TrapsEnable** attribute to trapsEnable, [Figure 3-31](#).

Figure 3-31 Setting the TrapsEnable Attribute



- Step 3** Click **Save**.
- Step 4** When the registration has been done, Cisco Edge Craft polls the element for all current alarms and starts sending alarms and events to the IP address of Cisco Edge Craft.

The SNMP traps are mapped to Notifications in Cisco Edge Craft. The mapping philosophy is described in “[3.3.3 Notification](#)” section on page 3-20.

You can view the list of current alarm notifications by selecting current alarm in the notification list.

View Alarms

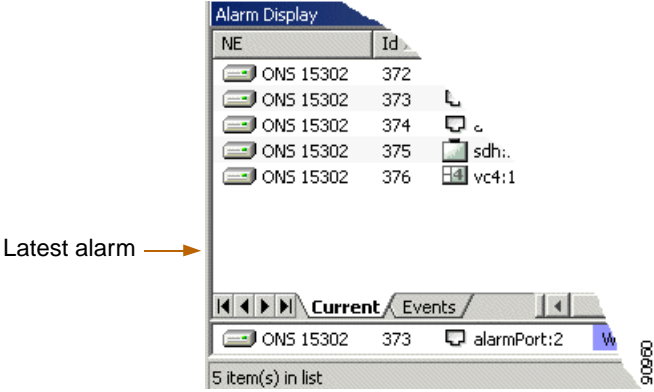
Click on the **Current** tab to view current alarms, [Figure 3-32](#).

Figure 3-32 Current Tab - Alarm List



The latest alarm is visible in lower part of the Alarm List, [Figure 3-33](#).

Figure 3-33 Latest Alarm



Refresh

Click **Refresh** in the tool bar to update the Alarm List.

History

To get a list of all alarm notifications reported on the network element since the last restart of the network element or the last clearing of the history list in the network element

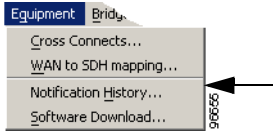
Select **History** in the notification list to get a list of all alarm notifications reported on the network element since the last restart of the network element or the last clearing of the history list in the network element.

You must explicitly do a refresh for Cisco Edge Craft to collect the alarm history from the network element. Before the refresh is selected the notification list might be empty because a load has not been performed yet.

The history log on the network element can be cleared through an action on the log administration attribute of the device. See "4.4 Manage Common Parameters" section on page 4-12.

- Step 1 Select **Notification History** in the **Equipment** menu, [Figure 3-34](#).
- Step 2 Select **Refresh**.

Figure 3-34 Notification History

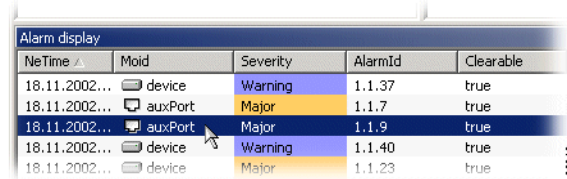


3.3.1.2 Select Alarm

Single Selection

Click on desired **single** alarm, [Figure 3-35](#).

Figure 3-35 Select Single Alarm

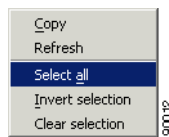


NeTime	Moid	Severity	AlarmId	Clearable
18.11.2002...	device	Warning	1.1.37	true
18.11.2002...	auxPort	Major	1.1.7	true
18.11.2002...	auxPort	Major	1.1.9	true
18.11.2002...	device	Warning	1.1.40	true
18.11.2002...	device	Major	1.1.23	true

Multiple Selections

Step 1 Right click and choose **Select all**, [Figure 3-36](#).

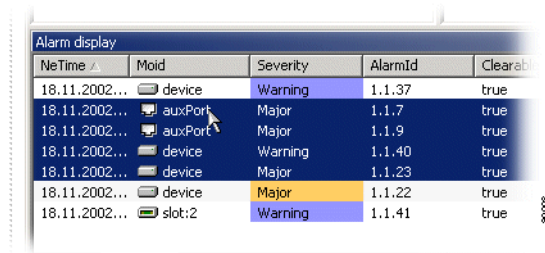
Figure 3-36 Select All Alarms



or

Step 2 Click on first alarm in a continuous range, hold Shift key and click on last alarm in desired range, [Figure 3-37](#).

Figure 3-37 Select Alarms - Continuous Range



NeTime	Moid	Severity	AlarmId	Clearable
18.11.2002...	device	Warning	1.1.37	true
18.11.2002...	auxPort	Major	1.1.7	true
18.11.2002...	auxPort	Major	1.1.9	true
18.11.2002...	device	Warning	1.1.40	true
18.11.2002...	device	Major	1.1.23	true
18.11.2002...	device	Major	1.1.22	true
18.11.2002...	slot:2	Warning	1.1.41	true

or

Step 3 Click on first alarm, hold Ctrl key and click on desired alarms to make none continuous selection, [Figure 3-38](#).

Figure 3-38 Select Alarms - None Continuous Range

NeTime	Moid	Severity	AlarmId	Clearable
18.11.2002...	device	Warning	1.1.37	true
18.11.2002...	auxPort	Major	1.1.7	true
18.11.2002...	auxPort	Major	1.1.9	true
18.11.2002...	device	Warning	1.1.40	true
18.11.2002...	device	Major	1.1.23	true
18.11.2002...	device	Major	1.1.22	true
18.11.2002...	slot:2	Warning	1.1.41	true

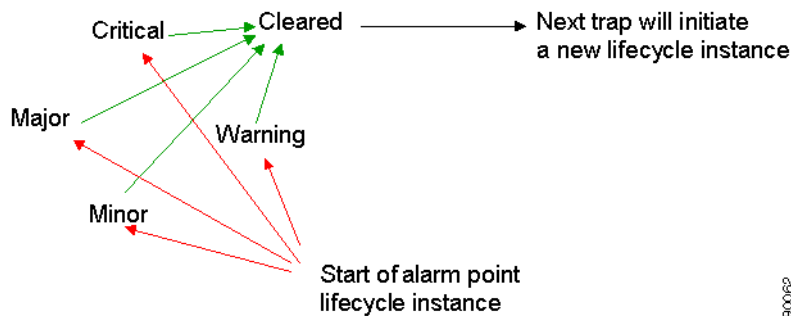
You can also choose **Invert selection** or **Clear selection**.

Copy alarm(s)

- Step 1** Select desired alarm(s).
- Step 2** Click **Copy**.
- Step 3** The content of your selection is copied to the clipboard and can be pasted to other applications, for example Notepad.

3.3.1.3 Alarm lifecycle

Figure 3-39 Lifecycle Instance of Alarm Point



The notification list presents one row for each alarm point, that means, an alarm source and an alarm identification combination. When a new alarm notification for the same alarm point is being presented, the row is possibly updated with the severity of the new alarm and new timestamp(s) unless the alarm has been cleared. A new row is created if the alarm point starts a new lifecycle instance, [Figure 3-39](#). Each new alarm notification might cause a transition from one severity to another or to the cleared severity, which ends the lifecycle.

No traps are sent to Cisco Edge Craft IP address if you have de-registered as trap receiver.

3.3.2 View the Events Reported from the Network Element

Current Events

To view current events reported from the network element, you select **Event** in the notification list, [Figure 3-40](#) and [Figure 3-41](#).

Figure 3-40 Select Events



Figure 3-41 Current Events

Alarm display			
Id	Moid	Description	EventType
985	mgmtPort	Link Up	equip
986	dccR:1.1.1	Link Down	equip
987	dccM:1.1.2	Link Down	equip
988	dccR:1.2.1	Link Down	equip
989	dccM:1.2.2	Link Down	equip
990	dccR:1.3.1	Link Down	equip
991	dccM:1.3.2	Link Down	equip

Event History

Select **Event History** to view event history, [Figure 3-42](#).

Figure 3-42 Event History



Details about the attributes of the event notifications are found in [Table 3-8 on page 3-20](#).

Visible Columns

You can decide which columns to be visible in the alarm display.

-
- Step 1** Select **View > Columns**
 - Step 2** Uncheck desired column and this column will not be visible in the alarm display.
- Current alarms and history of alarms is available in [Figure 3-43](#).
Events and events history is displayed in [Figure 3-44](#).

Figure 3-43 Visible Columns 1

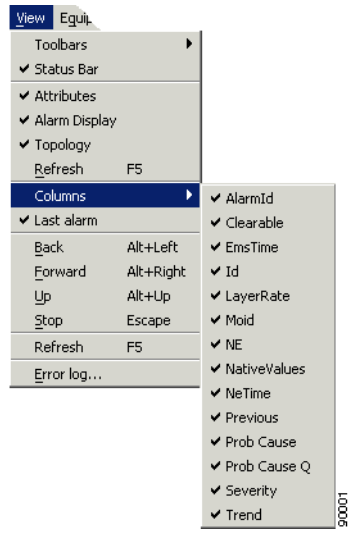


Figure 3-44 Visible Columns 2

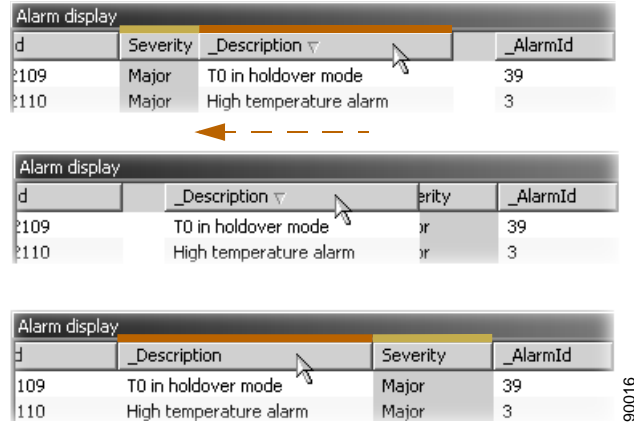


Change Column Order

The order of selected columns can be easily changed, [Figure 3-45](#).

- Step 1** Click on desired column heading.
- Step 2** Drag column to new position.

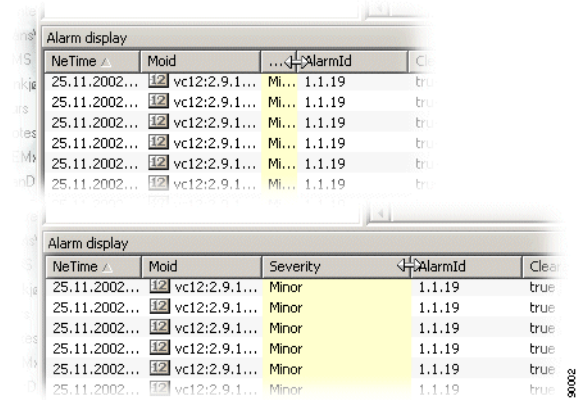
Figure 3-45 Column Order



Column Resize

- Step 1 Rest the mouse pointer to the right of desired column header. The mouse pointer turns into a double-arrow, Figure 3-46.
- Step 2 Click and drag to suitable column-size.

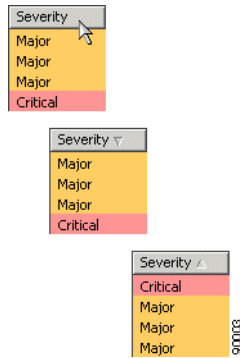
Figure 3-46 Column Resize



Sort Columns

- Step 1 Click on desired column to sort ascending, Figure 3-47.
- Step 2 Click again to sort descending

Figure 3-47 Column Sorting



3.3.3 Notification

The notification types with attributes supported by Cisco Edge Craft are:

- alarm notification, [Table 3-8](#).
- event notification, [Table 3-9](#).

Notification Types

Table 3-8 Alarm Notification Types and their Attributes

Notification	Attribute	Legal Values
Moid	Identification of the network element that contains the source of the alarm.	Depends on NE type. Has to be a M.O for the NE.
Id	Sequence number	
Previous	Sequence number of previous notification	
AlarmId	Unique identification of alarm	
NeTime	Timestamp from network element if available	Number of seconds since 1.1.1970
Ems Time	Timestamp set by Cisco Edge Craft	Number of seconds since 1.1.1970
Severity	Severity of alarm.	Critical, major, minor, warning, cleared, Indeterminate
Trend	Trend indication to report the trend in the severity change.	No change, less severe, more severe
Prob Cause	The probable cause of the alarm.	Legal values depend on the network element.
Prob Cause Q	A probable cause qualifier if the probable cause itself is not sufficient to determine the exact error and source.	Legal values depend on the network element.

Table 3-8 Alarm Notification Types and their Attributes (continued)

Notification	Attribute	Legal Values
Layer rate	The layer rate in which the managed object belongs if applicable.	Not Applicable, or any other layer rate supported by the network element
Clearable	Boolean value to indicate if the alarm can be cleared or not. Some alarms do not have duration and therefore no cleared severity.	false, true
Native Values	Unmapped trap data	Depends on NE

Events Notifications

Table 3-9 Event Notification Types and their Attributes

Notification	Attribute	Legal Values
Moid	Identification of the network element that contains the source of the event.	A M.O in the Information Model for the equipment
EventId	Unique identification of event	
NeTime	Timestamp from network element if available	Number of seconds since 1.1.1970
Ems Time	Timestamp set by Cisco Edge Craft	Number of seconds since 1.1.1970
Description	Additional text	
EventType	Type of event	equip, comm
Id	Sequence number	

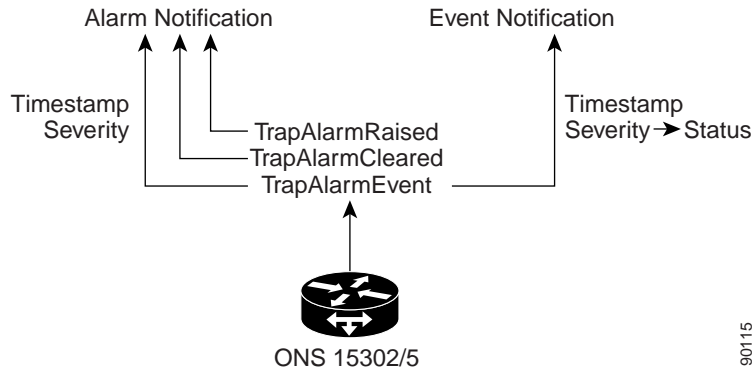
Alarm Notification Severity

The severity of an alarm notification can either be reported from the network element or must be defined in the notification mapping.

Trap to Notification Mapping

The interpretation of alarm and event is slightly different in the network element and Cisco Edge Craft. The mapping rules applied to the SNMP traps are illustrated in [Figure 3-48](#)

Figure 3-48 Trap to Notification Mapping



The TrapAlarmRaised and TrapAlarmCleared traps are mapped to alarm notification. The timestamp in the trap will be used together with the severity. ONS 15305 and ONS 15302 have severity in the trap. This severity is used in notification.

One attribute in an alarm notification is called clearable. If set to true, this attribute indicates that the management system should expect a TrapAlarmCleared for this alarm.

Those TrapAlarmEvent traps that indicate an error failure in the network element will be mapped to an alarm notification with the attribute clearable set to false. The severity and timestamp from the trap are used in the alarm notification.

Other TrapAlarmEvents will be mapped to event notifications. These have no severity, but a status defining the type of event, for example info, confirm etc. The severity in the trap might be used as the status in the event notification.

Unknown Traps

If Cisco Edge Craft receives a trap and there exists no mapping to any type of notification, a notification is generated. The notification contains all the information as it was received in the trap.



General Management

4.1 Manage the Management Interfaces

This chapter describes the configuration operations supported by the Management Interfaces managed object (M.O.). It is organized the following sections:

- Introduction
- ONS 15305 management modes and configurations. This section describes the management modes supported by the management interfaces, and how they can be configured.
- ONS 15305 scenarios. This section is a repository of simple, but yet typical configuration scenarios. These can be applied in combination to specific networks.
- Manage common parameters
- Download SW to network element (NE)
- Up/download of NE configuration data
- Alarm and event configuration
- ONS 15305 manage slots

The attributes under the management interfaces managed object are not unique in the information model. Each attribute mirrors a similar attribute located under another managed object. The attributes under the management interfaces managed object have been put together to allow the user to set-up basic configuration of the management interfaces without having to browse through many managed objects in the topology browser. For advanced configuration operations, additional managed objects must still be used.

4.2 Management Modes and Configuration

The management traffic is IP based (SNMP and TFTP messages), and therefore configuring a management path comes to deciding which encapsulation shall be used to send the IP datagrams carrying the management traffic over the network. For the management interfaces, there exist two main encapsulation types

- IP directly carried over a layer 2 protocol (Ethernet, PPP, or proprietary).
- IP encapsulated within CLNP carried over a layer 2 protocol (IEEE 802.x or LAP-D).

In addition, each management interface can be turned off. Actual encapsulation support varies depending on the management interface type (management port or DCC). An overview of the different management modes versus the management interfaces is given in [Table 4-1](#).



Note This is an important feature for security purposes, especially for the management port, which is physically accessible on the network element (main card).

Table 4-1 Management Modes Versus Management Interface

Management Interface	Not Used	IP		
		IP/Ethernet	IP/proprietary encapsulation	IP/PPP
Management Port	X	X		
DCC	X		X	X



Note The management port is able to run both IP over Ethernet and CLNP over IEEE 802.x at the same time. On the contrary, a DCC can run only one mode at a time. In addition, a maximum of eight DCCs can be used for management purposes, that means only up to eight DCCs can have their management mode not set to not used.

The following sections describe how to configure the management port and the DCCs by using the management interfaces managed object present in the topology browser.

4.2.1 Management Port Configuration

The management port can run two types of encapsulation, referred to as mode. A particular mode is selected by setting the variable mode (management interfaces >management port > mode). Required configuration for possible modes:

- not used
- IP

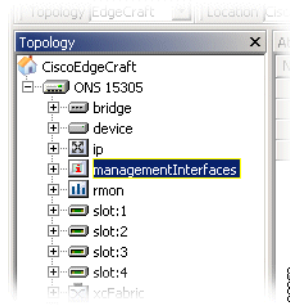
is further detailed in the next sections.

4.2.1.1 Mode: Not Used

To configure the management port with mode set to not used:

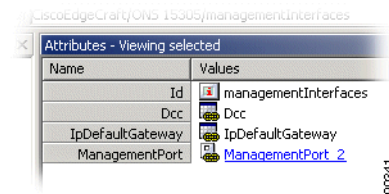
- Step 1** Click on the ONS 15305 managed object, then on the **management Interfaces** managed object in the topology browse, [Figure 4-1](#).

Figure 4-1 Management Interfaces - Managed Object



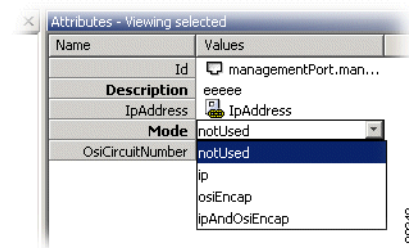
Step 2 Click on **managementPort** in the attributes window, Figure 4-2.

Figure 4-2 ManagementPort - Attributes



Step 3 In the attributes window, set mode to **Not Used**, Figure 4-3.

Figure 4-3 ManagementPort - Mode Selector



Step 4 Click **Save** on the toolbar.

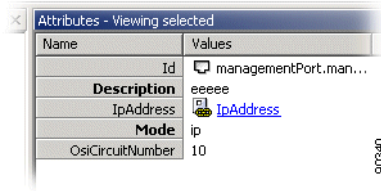
4.2.1.2 Mode: IP

To configure the management port with mode set to IP:

- Step 1 Click on the ONS 15305 managed object, then on the **management Interfaces** managed object in the topology browser.
- Step 2 Click on **managementPort** in the attributes window.
- Step 3 In the attributes window, set **mode** to **IP**.
- Step 4 Click **Save** on the toolbar.

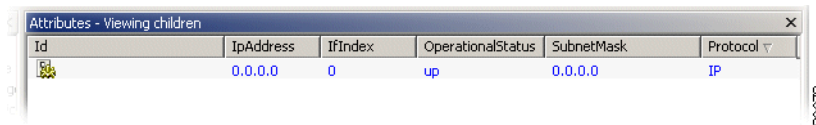
Step 5 Click on **ipAddress** in the attributes window, [Figure 4-4](#).

Figure 4-4 ManagementPort - IP Address Attribute



Step 6 Click **Add** on the toolbar. Set **protocol** to **IP**, and set **ipAddress** and **subnetMask** according to your IP addressing scheme or plan, [Figure 4-5](#).

Figure 4-5 ManagementPort - Add IP Address



Step 7 Click **Save** on the toolbar.

Depending on your topology, additional routing information might have to be configured. You can define static routes, and or control dynamic protocols (RIP, OSPF) by using the IP managed object in the topology browser. Defining a default gateway can be done directly from the management interfaces managed object as explained in section “[4.2.3 IP Default Gateway Configuration](#)” section on page 4-6.

4.2.2 DCC Configuration

A DCC can run three types of encapsulation, referred to as mode. A particular mode is selected by setting the variable mode (management interfaces >DCC >mode). Required configuration for one of the three possible modes (not used or IP) is further detailed in the next sections.

4.2.2.1 Mode: Not Used

To configure a DCC with mode set to Not Used

-
- Step 1** Click on the ONS 15305 managed object and then on the **management Interfaces** managed object in the topology browser.
- Step 2** Click on **dcc** in the attributes window.
- Step 3** In the attributes window, each row represents a DCC interface. Set **mode** to **Not Used** for the desired DCC interface.
- Step 4** Click **Save** on the toolbar.
-

4.2.2.2 Mode: IP

To configure a DCC with mode set to IP:

- Step 1** Click on the ONS 15305 managed object and then on the **management Interfaces** managed object in the topology browser, [Figure 4-6](#).
- Step 2** Click on **dcc** in the attributes window.
- Step 3** In the attributes window, each row represents a DCC interface. Set **mode** to **IP over DCC** for the desired DCC interface.

Figure 4-6 Management Interfaces - Dcc Attribute

Id	Slot	PppConfig...	LapdRole	Port	UserLabel	DccType	OsiCircuit...	Mode	IpAddr...	IpEncapsu...
axx...	1	[PppCo...	network	1		dccR	0	ipOverDcc		proprietary
axx...	0	[PppCo...	network	0		dccR	0	notUsed		NA
axx...	0	[PppCo...	network	0		dccR	0	notUsed		NA
axx...	0	[PppCo...	network	0		dccR	0	notUsed		NA
axx...	0	[PppCo...	network	0		dccR	0	notUsed		NA
axx...	0	[PppCo...	network	0		dccR	0	notUsed		NA
axx...	0	[PppCo...	network	0		dccR	0	notUsed		NA

- Step 4** In addition, when the mode is set to IP, the layer 2 encapsulation for the IP datagrams must be configured. This done by setting the ipEncapsulation variable to the desired encapsulation (proprietary or PPP), [Figure 4-7](#).

Figure 4-7 IPEncapsulation - Encapsulation Selector



- Step 5** Click **Save** on the toolbar.
- Step 6** Click on **ipAddress** in the attributes window.
- Step 7** Click **Add** on the toolbar. Set protocol to IP, and set ipAddress and subnetMask according to your IP addressing scheme or plan.
- Step 8** Click **Save** on the toolbar.

If mode is set to IP, and ipEncapsulation is set to PPP, additional configuration for PPP can be performed via the pppConfiguration variable (management interfaces > DCC > pppConfiguration).

Depending on your topology, additional routing information might have to be configured. You can define static routes, and or control dynamic protocols (RIP, OSPF) by using the IP managed object in the topology browser. Defining a default gateway can be done directly from the management interfaces managed object as explained in “[4.2.3 IP Default Gateway Configuration](#)” section on page 4-6.

4.2.3 IP Default Gateway Configuration

To configure an IP default gateway on the network element:

-
- Step 1** Click on the ONS 15305 managed object, then on the **management Interfaces** managed object in the topology browser.
 - Step 2** Click on **ipDefaultGateway** in the attributes window.
 - Step 3** Set the `defaultGatewayIpAddress` and `defaultGatewayInterface` according to your IP addressing plan.
 - Step 4** Click **Save** on the toolbar.



Note

The default gateway must be directly reachable from the network element, that means the default gateway must belong to a subnet defined on the interface identified by `defaultGatewayInterface`. Modifying the default gateway results in removing the previous default gateway from the network element's routing table, and adding the new (modified) gateway to the routing table.



Note

Secure routing before removal of default gateway.

4.3 ONS 15305 Scenarios

This section presents four typical network topologies, and describes how the management interfaces can be configured through the management interfaces managed object in Cisco Edge Craft in order to carry management traffic, [Figure 4-8](#) to [Figure 4-11](#) and [Table 4-2](#) to [Table 4-5](#).

4.3.1 Important Note

In the following scenarios, it is assumed that both RIP and OSPF are disabled. Although each IP network is unique, the topologies and configurations presented in this chapter can be thought of basic building blocks, which can be combined together in order to be applied to a specific network.

In a real network, with a larger number of network elements, additional managed objects can be required to perform the configurations. In particular, configuration of IP, activation and configuration of dynamic routing protocols (RIP, OSPF, IS-IS) require the use of additional managed objects.

IP over DCC (with proprietary or PPP encapsulation) requires configuring a subnet per link (per DCC). Any network element configured with IP over DCC, and located more than two DCC links away from Cisco Edge Craft must either have a static route to Cisco Edge Craft, or run a dynamic routing protocol. As the number of static routes grows with the number of interfaces configured to run IP over DCC, running a dynamic routing protocol can be advantageous. Note that depending on the network topology, care must be taken when enabling IP routing protocol over DCC to prevent the DCC network from being advertised as a path for the user traffic (as opposed to only the management traffic).

Each of the next sections ([“4.3.3 Scenario 1: Cisco Edge Craft and ONS 15305 on the Same Subnet” section on page 4-7](#) to [“4.3.6 Scenario 4: IP over PPP” section on page 4-11](#)) presents a figure of a typical IP topology, together with the required parameters to be configured in the Management interfaces M.O.

4.3.2 Notations Used

The following notations are used throughout the rest of this section:

The /<prefix-length> notation is used to denote the {IP address, subnet mask} pairs. As an example, the notation 192.168.0.1 / 24 refers to the following pair {IP address 192. 168.0.1, subnet mask 255.255.255.0}.



Note The prefix-length is equal to the total number of contiguous 1-bits in the traditional subnet mask.

N/A (non-applicable) is used to denote that an attribute is not relevant for a particular configuration, that means the value of the attribute will not influence the configuration.

The notation Interface: (XXX) used for defining the interface of the default gateway (Figure 4-9 to Figure 4-11) indicates that the ifIndex of the XXX interface should be used. Possible values for XXX are , (MGMT Port), or (DCC #n) to the ifIndex of the management port, or the ifIndex of DCC channel n respectively. The values of the ifIndex can be found under the respective M.O.s, that means management port, and DCCs.

4.3.3 Scenario 1: Cisco Edge Craft and ONS 15305 on the Same Subnet

Figure 4-8 Cisco Edge Craft and ONS 15305 on the Same Subnet

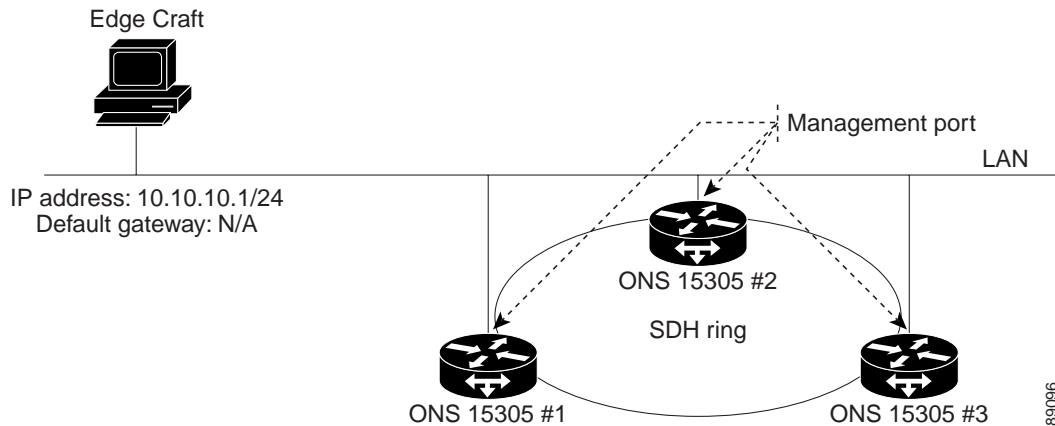


Table 4-2 Cisco Edge Craft and ONS 15305 on the Same Subnet - Settings

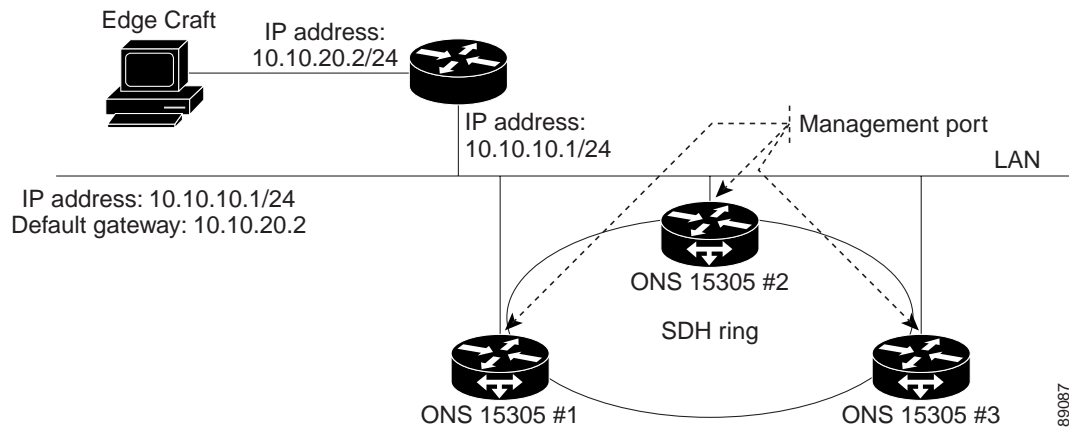
	ONS 15305 #1	ONS 15305 #2	ONS 15305 #3
Management Port			
mode	IP	IP	IP
iPAddress	IP, 10.10.10.10 / 24	IP, 10.10.10.20 / 24	IP, 10.10.10.30 / 24
DCC#1			
mode	notUsed	notUsed	notUsed
ipEncapsulation	N/A	N/A	N/A
lapdRole	N/A	N/A	N/A

Table 4-2 Cisco Edge Craft and ONS 15305 on the Same Subnet - Settings (continued)

	ONS 15305 #1	ONS 15305 #2	ONS 15305 #3
pppConfiguration			
initialMRU	N/A	N/A	N/A
pppIpAdminStatus	N/A	N/A	N/A
compression	N/A	N/A	N/A
ipAddress	N/A	N/A	N/A
DCC#2			
mode	not used	not used	not used
ipEncapsulation	N/A	N/A	N/A
lapdRole	N/A	N/A	N/A
pppConfiguration			
initialMRU	N/A	N/A	N/A
pppIpAdminStatus	N/A	N/A	N/A
compression	N/A	N/A	N/A
ipAddress	N/A	N/A	N/A
IP Defaulty Gateway			
ipAddress	N/A	N/A	N/A
interface	N/A	N/A	N/A

4.3.4 Scenario 2: Cisco Edge Craft and ONS 15305 on Different Subnets

Figure 4-9 Cisco Edge Craft and ONS 15305 on Different Subnets



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Table 4-3 Cisco Edge Craft and ONS 15305 on Different Subnet - Settings

	ONS 15305 #1	ONS 15305 #2	ONS 15305 #3
Mangement Port			
mode	IP	IP	IP
iPAddress	IP, 10.10.10.10 / 24	IP, 10.10.10.20 / 24	IP, 10.10.10.30 / 24
DCC#1			
mode	notUsed	notUsed	notUsed
ipEncapsulation	N/A	N/A	N/A
lapdRole	N/A	N/A	N/A
pppConfiguration			
initialMRU	N/A	N/A	N/A
pppIpAdminStatus	N/A	N/A	N/A
compression	N/A	N/A	N/A
ipAddress	N/A	N/A	N/A
DCC#2			
mode	not used	not used	not used
ipEncapsulation	N/A	N/A	N/A
lapdRole	N/A	N/A	N/A
pppConfiguration			
initialMRU	N/A	N/A	N/A
pppIpAdminStatus	N/A	N/A	N/A
compression	N/A	N/A	N/A
ipAddress	N/A	N/A	N/A
IP Defaulty Gateway			
ipAddress	10.10.10.1	10.10.10.1	10.10.10.1
interface	mgmt port	mgmt port	mgmt port

4.3.5 Scenario 3: IP over DCC

Figure 4-10 IP over DCC

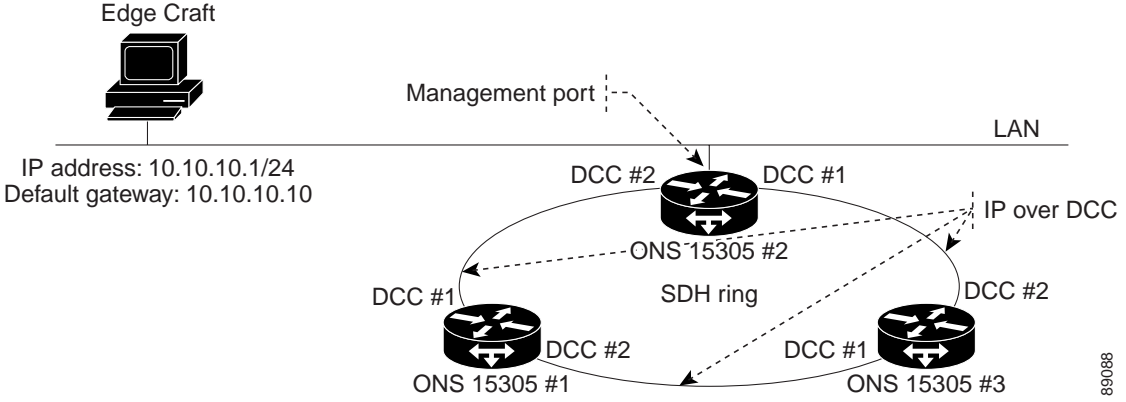


Table 4-4 IP over DCC - Settings

	ONS 15305 #1	ONS 15305 #2	ONS 15305 #3
Mangement Port			
mode	IP	IP	IP
iPAddress	N/A	IP, 10.10.10.10 / 24	N/A
DCC#1			
mode	notUsed	notUsed	notUsed
ipEncapsulation	proprietary	proprietary	proprietary
lapdRole	N/A	N/A	N/A
pppConfiguration			
initialMRU	N/A	N/A	N/A
pppIpAdminStatus	N/A	N/A	N/A
compression	N/A	N/A	N/A
ipAddress	IP, 192.168.10.1 / 24	IP, 192.168.20.1 / 24	IP, 192.168.30.1 / 24
DCC#2			
mode	not used	not used	not used
ipEncapsulation	proprietary	proprietary	proprietary
lapdRole	N/A	N/A	N/A
pppConfiguration			
initialMRU	N/A	N/A	N/A
pppIpAdminStatus	N/A	N/A	N/A
compression	N/A	N/A	N/A
ipAddress	IP, 192.168.30.2 / 24	IP, 192.168.10.2 / 24	IP, 192.168.20.2 / 24
IP Defaulty Gateway			

Table 4-4 IP over DCC - Settings (continued)

	ONS 15305 #1	ONS 15305 #2	ONS 15305 #3
ipAddress	192.168.10.2	N/A	192.168.20.1
interface	DCC #1	N/A	DCC #2

4.3.6 Scenario 4: IP over PPP

Figure 4-11 IP over PPP

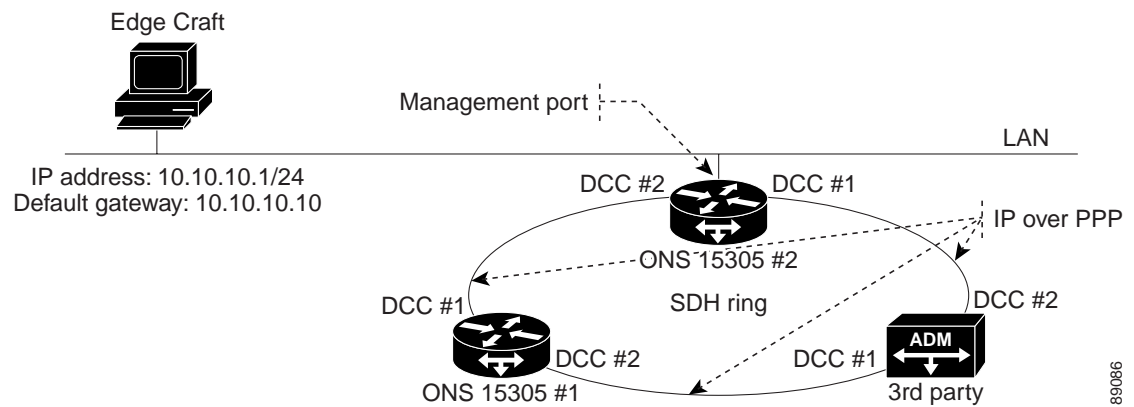


Table 4-5 IP over PPP- Settings

	ONS 15305 #1	ONS 15305 #2	ONS 15305 #3
Mangement Port			—
mode	notUsed	IP	—
iPAddress	N/A	IP, 10.10.10.10 / 24	—
DCC#1			
mode	IP	notUsed	—
ipEncapsulation	PPP	PPP	—
lapdRole	N/A	N/A	—
pppConfiguration			
initialMRU	1500	1500	—
pppIpAdminStatus	open	open	—
compression	none	none	—
ipAddress	IP, 192.168.10.1	IP, 192.168.20.1	IP, 192.168.30.1 / 24
DCC#2			
mode	IP	IP	—
ipEncapsulation	PPP	PPP	—

Table 4-5 IP over PPP- Settings (continued)

	ONS 15305 #1	ONS 15305 #2	ONS 15305 #3
lapdRole	N/A	N/A	—
pppConfiguration			—
initialMRU	1500	1500	—
pppIpAdminStatus	open	open	—
compression	none	none	—
ipAddress	IP, 192.168.30.2	IP, 192.168.10.2	IP, 192.168.20.2 / 24
IP Defaulty Gateway			
ipAddress	192.168.10.2	N/A	192.168.20.1
interface	DCC #1	N/A	DCC #2

The 3rd party equipment supports:

- standard IP over PPP over DCC according IF-DN-0101-R1
- Ip forwarding between its DCC interface

4.4 Manage Common Parameters

The purpose of this section is guide you through management of the attributes that are related to the NE sub-rack and the NE common hardware and software.

The section involves presentation and modification of the NE identification, time settings, users, available features, the physical inventory, restart issues, LEDs and alarm output, and ping mechanism.

Synchronization, download of software, upload and download of configuration data, and management of NE's are described in separate sections.

4.4.1 View Common Parameters

Select the **device** in the topology browser.

The common attributes (parameters) as defined in the information model, are presented for you.

- Identification of the network element
- Time settings
- Users
- Available features (licenses)
- Physical inventory
- Restart of network element
- Logs (alarm logs, performance data logs)

- LEDs and alarm output
- Ping mechanism

4.4.2 Modify Common Parameters

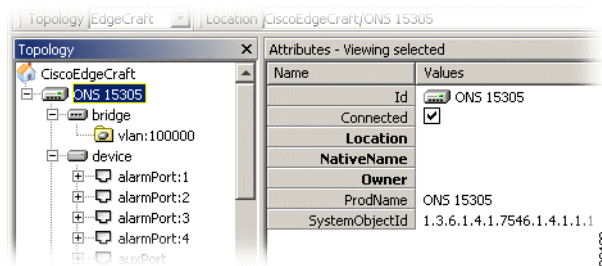
4.4.2.1 Identification of the Network Element

Step 1 Select network element in the topology browser, [Figure 4-12](#).

Step 2 The following attributes can be modified:

- Location
- NativeName
- Owner

Figure 4-12 Identification of Network Element



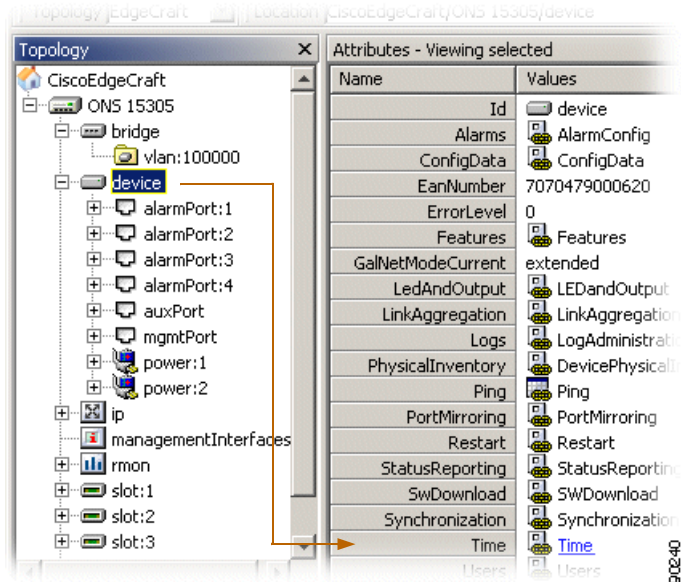
Step 3 Click **Save** to commit changes.

4.4.2.2 Time Settings

The example below shows ONS 15305.

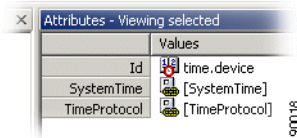
Step 1 Select **ONS 15305** and then the **device** managed object, [Figure 4-13](#).

Figure 4-13 Time Settings - Time Attribute



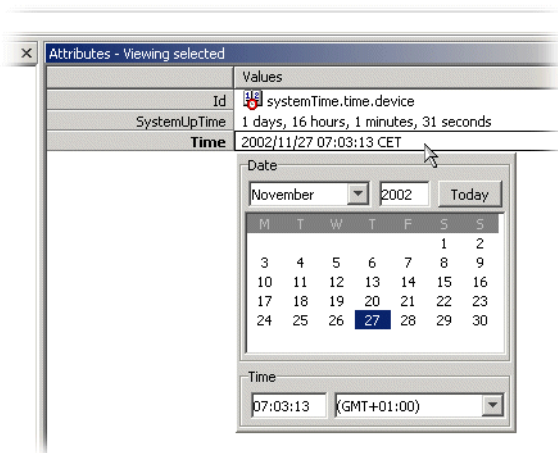
Step 2 Click **Time**, Figure 4-14.

Figure 4-14 Time Attribute - Values



Step 3 Click **SystemTime>Time** to view or modify, Figure 4-15.

Figure 4-15 Time Attributes - System Time



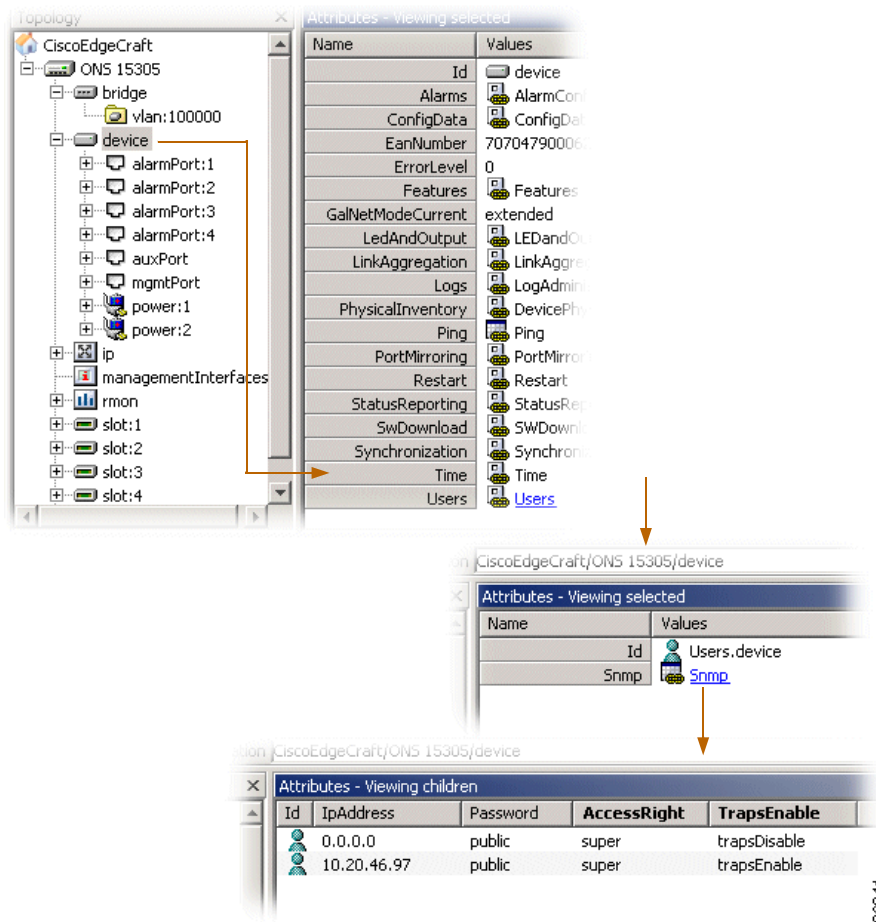
Step 4 Click **TimeProtocol** to view or modify the following objects:

- TimeServerIpAddress
- TimeSyncInterval
- TimeZone

4.4.2.3 Users

This section describes how to add a new user, [Figure 4-16](#).

Figure 4-16 Add a New User - Overview



Add a New User

- Step 1** Navigate as described in, [Figure 4-16](#).
- Step 2** Click **Add**.
- Step 3** **Enter**
 - password

- IpAddress

- Step 4** Select desired **AccessRight** from pull-down menu.
- Step 5** Select desired **TrapsEnable** state from pulldown menu.
- Step 6** Click **Save**.

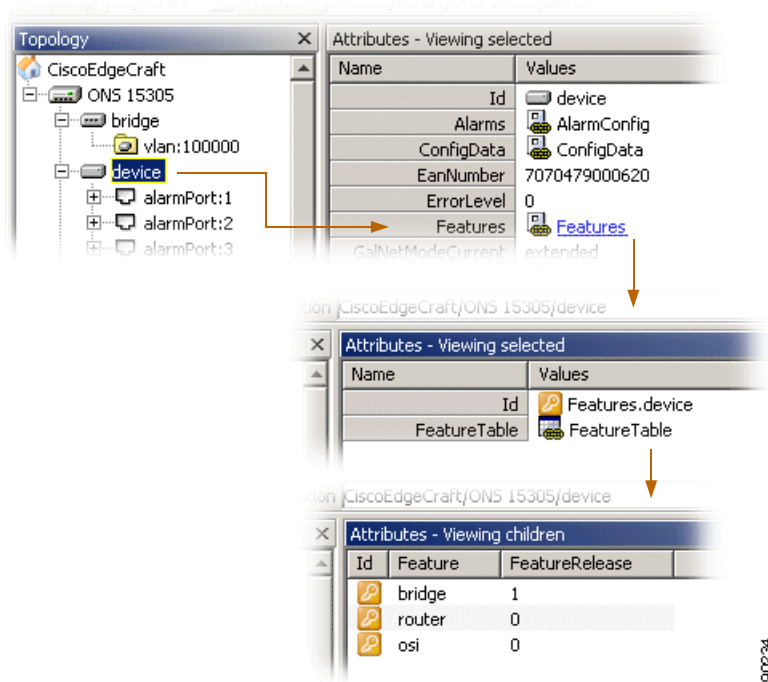
VT 100 Password (ONS 15302 only)

- Step 1** Select **device>time>VT100**.
- Step 2** Edit **Vt100Password** to desired value.
- Step 3** Click **Save**.

4.4.2.4 Available Features (Licenses)

Select **device > Features > FeatureTable** to view available licences, [Figure 4-17](#).

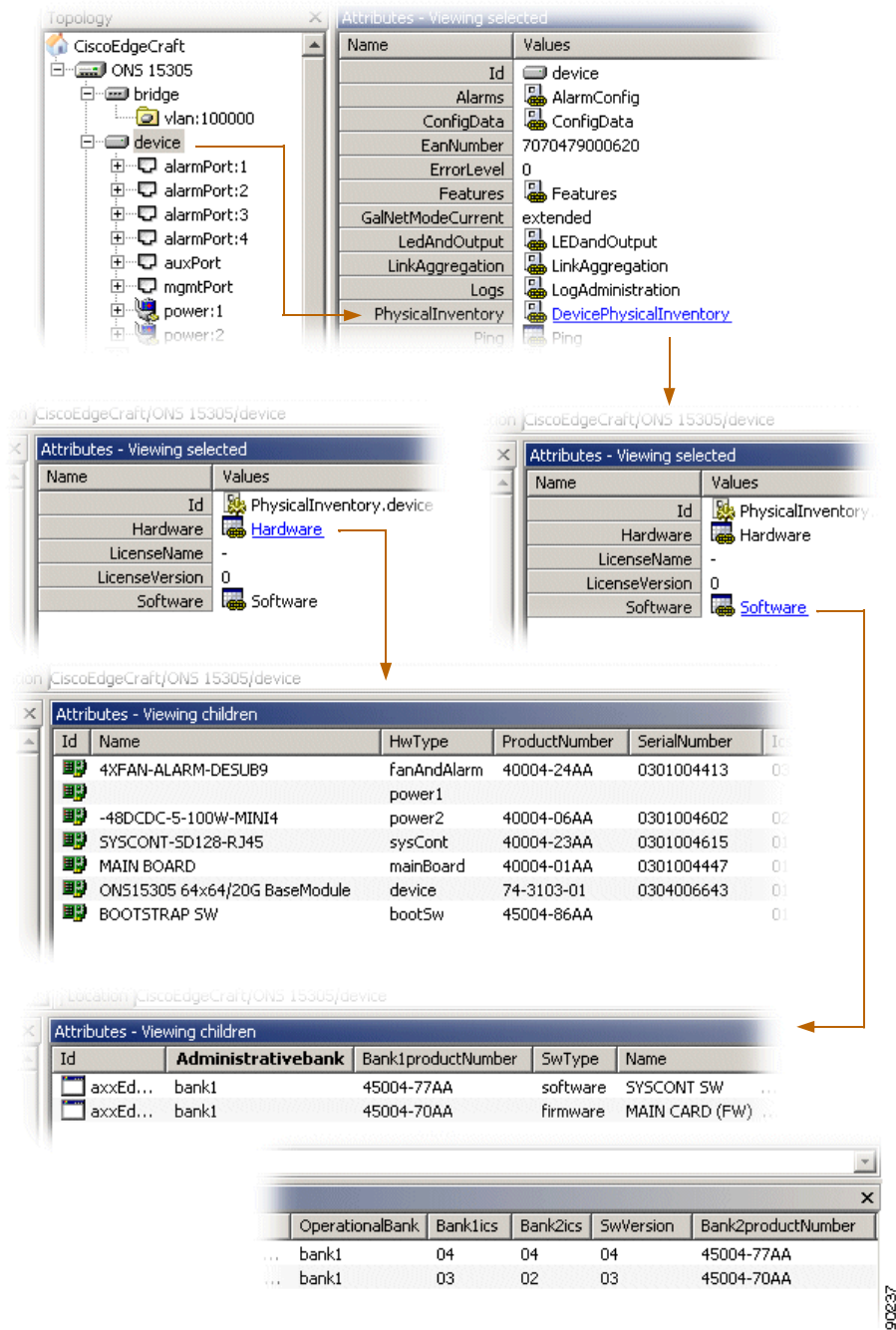
Figure 4-17 Available Features



4.4.2.5 Physical Inventory - ONS 15305

- Step 1** Select **device > DevicePhysicalInventory**, [Figure 4-18](#).

Figure 4-18 Physical Inventory - Overview



- Step 2 Select **Hardware** hyper link to list hardware inventory.
- Step 3 Select **Software** hyper link to list software inventory.

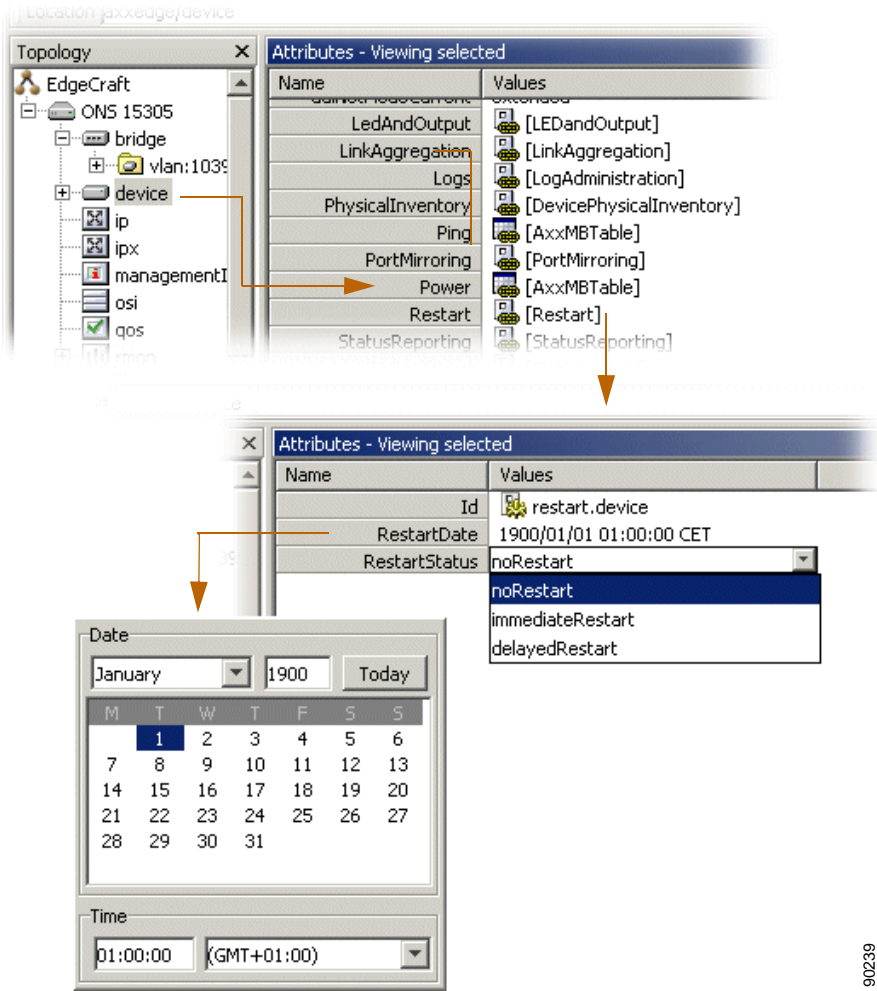
4.4.2.6 Physical Inventory - ONS 15302

Select device>inventory.

4.4.2.7 Restart of ONS 15305

Step 1 Click device>Restart, Figure 4-19.

Figure 4-19 Restart of Network Element - Overview



- Step 2 If selecting **delayedRestart**, set **time** and **date**.
- Step 3 Select desired **RestartStatus**.
- Step 4 Click **Save**.

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4.4.2.8 Restart of ONS 15302

-
- Step 1 Click device > **Restart**.
 - Step 2 Select **restart**.
 - Step 3 Click **Save**.
-

4.4.2.9 Logs (Alarm Logs, Performance Data Logs)

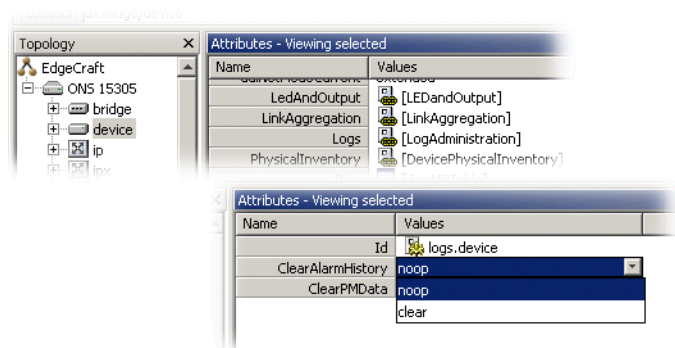
Clear Alarm History

-
- Step 1 Select device > **LogAdministration**.
 - Step 2 Set **ClearAlarmHistory** to **clear**.
 - Step 3 Click **Save**.
 - Step 4 Refresh Alarm History in the Alarm List.
-

Clear PM Data

-
- Step 1 Select device > **LogAdministration**
 - Step 2 Set **ClearPMDData** to **clear**, [Figure 4-20](#).
 - Step 3 Click **Save**.

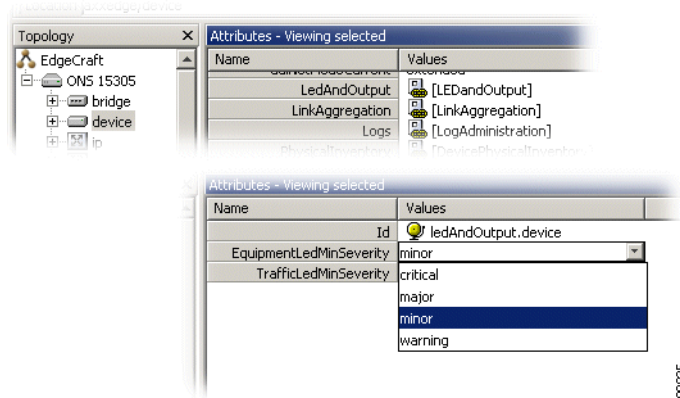
Figure 4-20 Clear Alarm- and Performance Data Log



LEDs and Alarm Output

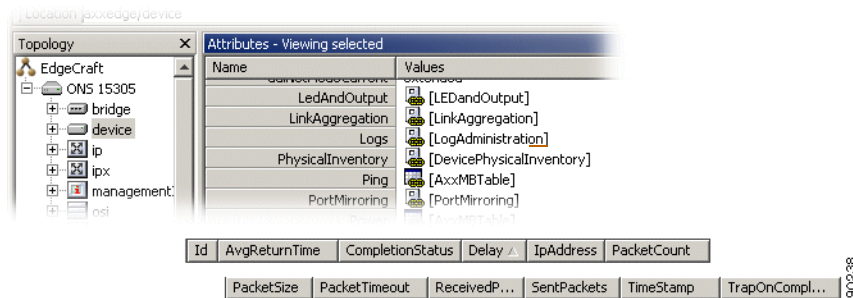
-
- Step 1 Click device > **LEDandOutput**
 - Step 2 Select **severity** to light the NE LEDs, [Figure 4-21](#).

Figure 4-21 LEDs - Severity Selector



Ping Mechanism

Figure 4-22 Ping Mechanism



Step 1 Select device > **Ping** hyper link, [Figure 4-22](#).

Step 2 The following attributes are modifiable:

Delay

PacketCount

TrapOnCompletion (true/false)

PacketSize

PacketTimeout

Alarm Ports

Step 1 Select device > **alarmPort** in the Topology Browser, [Figure 4-23](#).

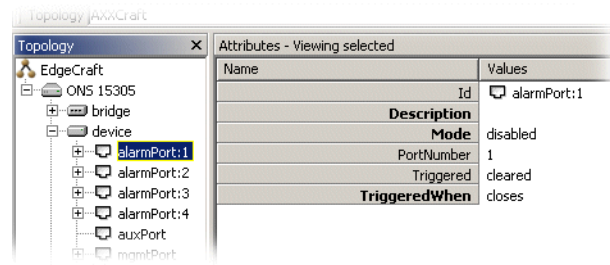
Step 2 The following attributes are modifiable:

- Description

- Free text description.
- Mode
 - enabled or disabled
- TriggeredWhen
 - opens or closes (when an alarm is to be triggered)

Step 3 Click **Save**.

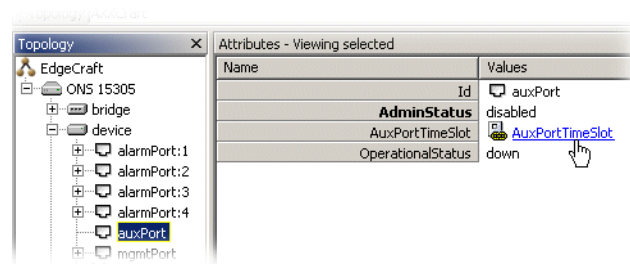
Figure 4-23 Alarm Ports



AUX Port - ONS 15305

Step 1 Select device > **auxPort**, [Figure 4-24](#).

Figure 4-24 AUX Port



- Step 2** The following attributes are modifiable:
- AdminStatus enabled or disabled
 - AuxPortTimeSlot, refer to [“Figure 4-25 AUX port - Timeslots”](#) section on page 4-22.

Figure 4-25 AUX port - Timeslots

Id	Timeslot	OhByte	Slot	Description	Port
axxEdgeAuxIntTimeSlotMapEntry:1	1	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:2	2	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:3	3	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:4	4	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:5	5	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:6	6	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:7	7	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:8	8	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:9	9	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:10	10	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:11	11	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:12	12	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:13	13	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:14	14	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:15	15	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:16	16	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:17	17	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:18	18	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:19	19	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:20	20	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:21	21	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:22	22	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:23	23	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:24	24	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:25	25	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:26	26	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:27	27	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:28	28	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:29	29	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:30	30	unMapped	0		0
axxEdgeAuxIntTimeSlotMapEntry:31	31	unMapped	0		0

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The following attributes can be modified for AuxPortTimeSlot:

- OhByte: e1, e2, f1 or unmapped
- Slot:
- Description:
- Port:

Power Module - ONS 15305

Figure 4-26 Power Module - Attributes

Name	Values
Id	power:1
AlarmReporting	disabled
AlarmReportingInputA	disabled
AlarmReportingInputB	disabled
Description	PowerModule 1

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- Step 1** Select device > **power**, Figure 4-26.
- Step 2** The following attributes are modifiable:
 - AlarmReporting
disabled or enabled
 - AlarmReportingInputA

- disabled or enabled
 - AlarmReportingInputB
 - disabled or enabled
 - Description
 - free text description
-

4.5 Manage Synchronization

The purpose of this section is to select the synchronization source for the internal SDH timing (T0) and the external synchronization output (T4).

The ONS 15305 T0 and T4 automatic selection processes can select the source from a shortlist of available inputs. This selection is based on quality and priority.

You can override the automatic selection process by manual commands.

The first part of this section gives a short introduction to SDH synchronization which is meant to help the reader in understanding the requirements specified in this document. For further reading on SDH synchronization, please see *ETSI ETS 300 417-6-1 and ITU-T Recommendation G.781*.

4.5.1 SDH Synchronization

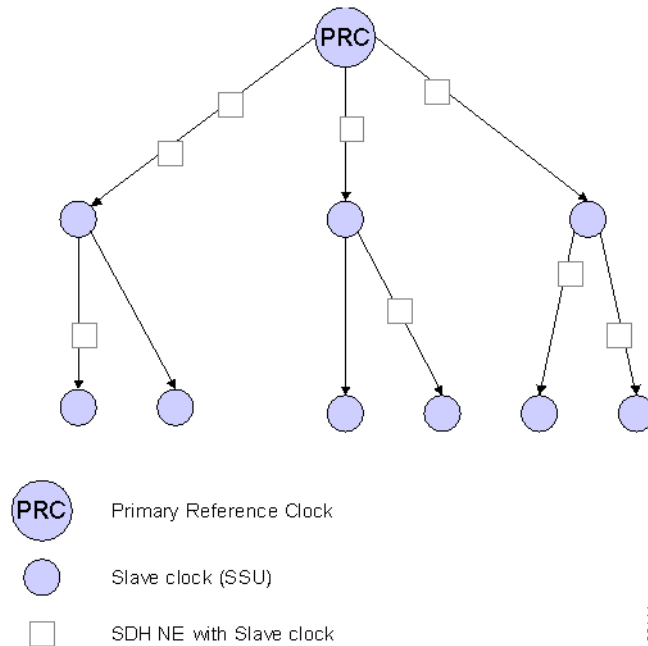
4.5.1.1 Synchronization Networks

A synchronization network is a set of clock nodes that are maintained in synchronization with one another. To achieve this it is necessary to accurately transfer synchronization reference information between nodes so that their relative synchronization may be monitored and maintained.

Since it is difficult to synchronize all international nodes from the same master clock, each network operator typically have a primary reference clock (PRC) as defined in ITU-T Recommendation G.811.

From the PRC the synchronization reference information is distributed to all nodes in the SDH network in a tree-type network topology, [Figure 4-27](#).

Figure 4-27 Example Synchronization Network



Intermediate slave clocks can enter holdover conditions if their connection to the master clock is lost. Slave clocks called Synchronization Supply Units (SSU's) will continue to serve their branch of the network until the connection with the PRC is reestablished. There may be several SSU's concatenated in a large network.

Intermediate SDH NEs will also contain slave clocks, the SDH equipment Clock (SEC). Their quality are not sufficient for providing synchronization reference information to other parts of the network, but they can serve the SDH NE itself in holdover mode if all high quality incoming references are lost.

As can be seen from the figure, the SDH NEs have a dual role since they need a synchronization reference to operate properly in a network and they are important for distribution of synchronization reference information to other networks.

4.5.1.2 Selecting the Best Synchronization Reference

To reinforce the reliability of the synchronization network, alternative routes are often used between the clocks. The slave clock can then be switched to another synchronization reference manually, or automatically by monitoring the signal at the physical interface.

An improvement to simple signal monitoring is to send the synchronization status message (SSM) along with the synchronization signal to indicate the quality level (clock type) of the source clock. The next clock in the chain can now select the best clock based on this quality level.

Not all connections used for synchronization can send the SSM along with its synchronization reference. In this case it is possible to manually indicate the quality level for this interface in ONS 15305. This ensures that also references without SSM can be part of the automatic selection process that is based on quality level.

To avoid timing loops in the network it is sometimes necessary to indicate in SSM that this synchronization reference should not be used. This is done by sending the do not use (DNU) message.

4.5.1.3 Synchronizing the SDH Equipment

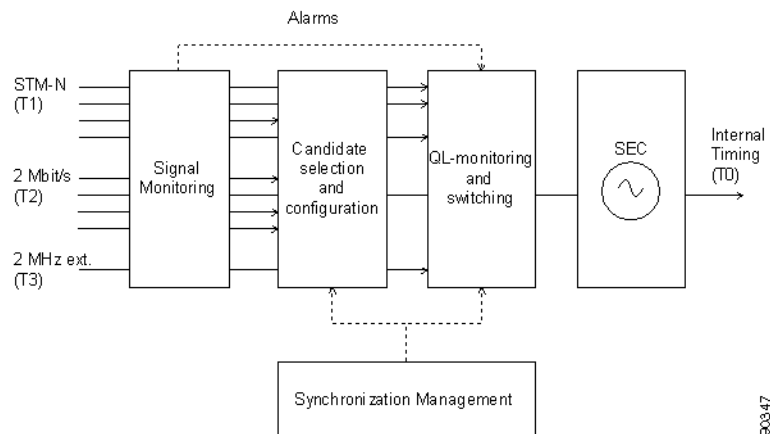
All SDH equipment contains a clock for the SDH pointer adjustments, cross connection matrix operations and the outgoing line signal (STM-N). It is normally operating as a slave clock and locked to a high quality incoming reference, but can run in holdover mode if the reference is lost.

This section describes how the internal timing (T0) is derived from the available synchronization references in ONS 15305.

Synchronization reference information can be extracted from any of the incoming STM-N SDH interfaces (T1), 2 Mbit/s PDH interfaces (T2) or the external 2 MHz synchronization input (T3) as indicated in Figure 4-28.

The figure shows that only one at the time of the available synchronization references will be used as a reference for the SEC. SEC is the clock used for internal timing (T0). When no reference is available it will run in Hold-over mode.

Figure 4-28 T0 Selection



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4.5.2 ONS 15305

4.5.2.1 Signal Monitoring

All interfaces are monitored for signal level and framing errors. The failure will be reported to the candidate selection and QL-monitoring and switching processes.

4.5.2.2 Candidate Selection and Configuration

In ONS 15305 up to five synchronization reference candidates can be selected to participate in the selection process.

For each synchronization source candidate the following parameters can be read or configured:

- Type (T1, T2 or T3 where T2 must be a 2Mbit/s PDH Port in PRA mode).
- Identification of the synchronization source candidate (via its slot number, port number etc.)
- Whether SSM usage is enabled (T1 only).

- Assigned quality level (QL). If SSM usage is disabled, the operator is free to assign a fixed QL.
- Current quality level. If SSM usage is enabled (T1) the quality level of the incoming signal is seen here. If an alarm is detected on the synchronization source interface, the current quality level indicates failed (Independent on SSM usage).
- The priority of the synchronization source candidate. This priority will apply only when there are multiple candidates all having the highest QL among all possible source candidates.
- Hold-Off time and wait to restore time. (See “[QL-monitoring and Switching:](#)” section on page 4-27).
- For each synchronization source candidate the following methods are available:
 - Set or Clear lockout. This is used to temporarily exclude a specified synchronization source.
 - Clear WTR.

4.5.2.3 QL-monitoring and Switching

The QL-monitoring and selection process will continuously monitor the QL of the candidate synchronization references and select the reference with the best QL. Only error free references are included in the selection process. (Alarms are detected in the signal monitoring functional block). If there is more than one candidate with the highest available QL, the priority parameter will be used for selection.

The following parameters can be read or configured for the selection process:

- Selected synchronization reference and its QL.
- Switch mode. This indicates whether the selection process is running in the automatic, forced or manual switch mode.
- The following methods are available for the selection process:
 - Manual switch command. A manual switch can be performed only to a source with the highest available QL. This means that manual switching can only be used to override the synchronization source priorities.
 - Forced switch command. This command overrides the currently selected synchronization source.
 - Clear command. Clears any of the manual or forced switch commands.

4.5.2.4 SEC

The ONS 15305 slave clock.

SEC will enter holdover mode for the specified Hold-Off time if an alarm is detected on the selected synchronization reference. After the Hold-Off time the selection process will switch to the error free reference with the highest QL.

When a candidate synchronization reference recovers from an alarm condition, the signal shall be free for faults for the wait to restore time before taken into consideration by the selection process.

The selected T0 reference is also used on all output STM-N signals.

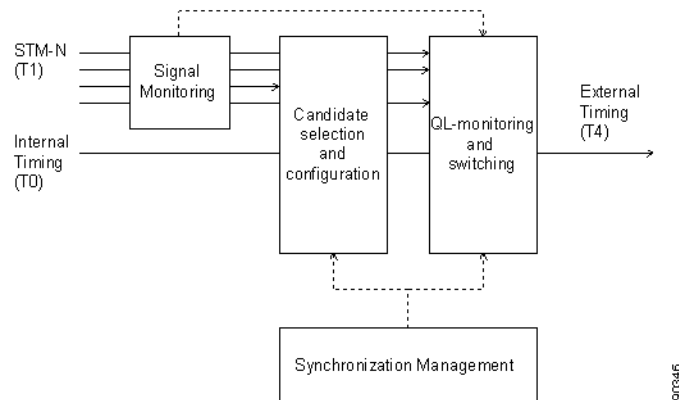
Synchronizing External Equipment

ONS 15305 also provides an external synchronization output (T4). This is a separate 2 MHz signal that can be used directly as a synchronization reference for other equipment or as a synchronization reference to a separate stand alone synchronization equipment (SASE).

Synchronization reference information can be extracted from any of the incoming STM-N SDH interfaces (T1) or the internal timing (T0) as indicated in [Figure 4-29](#).

The figure shows that only one at the time of the available synchronization references will be used for External Timing (T4).

Figure 4-29 T4 Selection



Here is a short description of the functional blocks for T4 selection:

Signal Monitoring:

See [“4.5.1 SDH Synchronization”](#) section on page 4-23.

Candidate Selection and Configuration:

See [“4.5.1 SDH Synchronization”](#) section on page 4-23.

T0 can be one of the candidates.

QL-monitoring and Switching:

See [“4.5.1 SDH Synchronization”](#) section on page 4-23.

Additional parameter for T4:

- QL minimum level (QLM).

4.5.2.5 Rules

- When referring to a T1 or T2 synchronization reference slot and port numbering is used.
- When referring to the T0 or T3 synchronization reference no further identification is required.
- SSM is always disabled for T2 and T3 references
- A 2 Mbit/s PDH port should be treated as a T2 source only when it is operating in PRA mode.
- In principle a user can add the same source twice, but you should be advised not to do this.
- More than one reference can have the same priority.
- You should receive a warning before deleting the active synchronization source. However, no further restrictions apply.

- The Automatic selection process will find the best source based on the current QL. If more than one source have the highest QL, the source with the highest QL and priority will be selected. If priority is also the same, ONS 15305 will choose the first source in the list with highest QL and priority.
- A manual switch can be performed only to a source with the highest available QL.
- A forced switch overrides the currently selected synchronization source.
- The new source selected by the manual and forced switching cannot have a current quality level of failed or SEC.
- WTR clear does not exist as a method in the MIB. Must set WTR = 0 and then back to original value if method is implemented in manager.
- T0 is the default candidate for T4.
- If no candidates are available for the T4 selection process, no synchronization source is selected and the external synchronization output is squelched.
- When QL of the selected T4 reference falls below the QLM level, the T4 output signal shall be squelched (muted) to let the slaved oscillator go into holdover or select another reference.
- T4 is only used for external synchronization output (not for output STM-N signals).

4.5.2.6 Synchronization Alarms

Synchronization alarms are treated as any other ONS 15305 alarms as described in a separate section. The following table identifies the alarms related to SDH synchronization events.

Table 4-6 Alarms related to SDH Synchronization Events

Alarm ID	Description	Comment	Clearable	Default Severity
T0_HOLDOVER	SETG enters holdover	No sync. sources available (applies to T0 sync. only)	Yes	MAJOR
T0_SWITCH	Change of sync. source	Applies to automatic, manual or forced switchover (T0 only).	No	INFO
SYNCSRC_QL	QL_FAILED or QL_DNU for any sync. candidate	Applies to T1/T2/T3 sources member of the T0 sync. table	No	INFO
T4_SQUELCH	T4 output squelched (on permanent basis)	No T4 sync. candidate with QL equal to or above QLmin	Yes	MAJOR
T0_DEFECT	SETG failure	Caused by defective hardware impacting the internal T0 clock	Yes	CRITICAL



Note

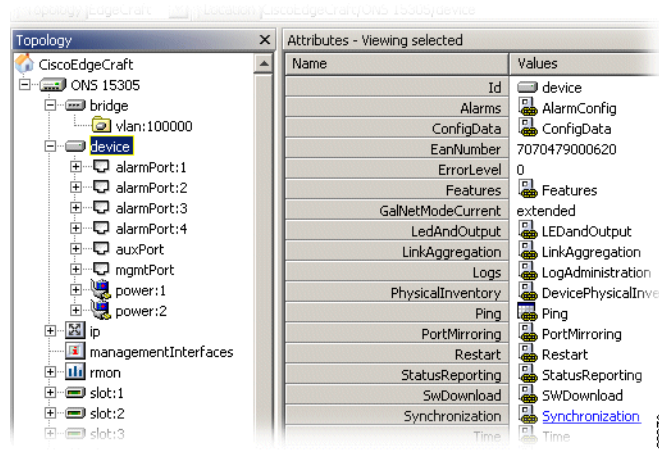
By a synchronization candidate is meant a synchronization source contained in either of the T0 or T4 sync. source tables (5 entries each).

4.5.3 View the Synchronization Data (T0 or T4)

T0 and T4 Synchronization are treated in common in the description of the flows due to their common behaviour. The user is considered to be an experienced SDH user since synchronization management is not directly related to the services offered by ONS 15305.

You access the synchronization attributes from the topology browser, [Figure 4-30](#).

Figure 4-30 Synchronization - Selecting Managed Object

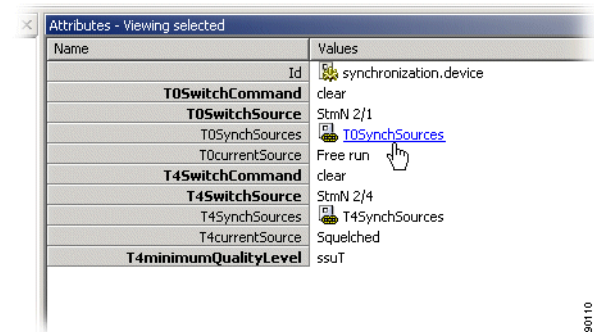


The system presents a list of all Synchronization Source candidates.

All attributes of the Synchronization Source candidate are presented as defined in the information mode, [Figure 4-31](#).

Figure 4-31 Synchronization - T0 SynchSources attribute

1.



If the source experiences a signal error the SSM attribute shows failure instead of the SSM value.

The system presents the synchronization attributes with the relevant data.

4.5.4 Add Synchronization Source Candidate (T0 or T4)

Step 1 Select T0 SynchSources or T4 SynchSources, [Figure 4-31](#).

Step 2 Click **Add** in toolbar, [Figure 4-32](#).

Figure 4-32 Add Synchronization Source

Id	PortDes...	Lockout	Type	OperQuality	Slot	HoldOffTi...	Ssm	AdminQuality	Priority	Port
axxE...SyncT4Entry:1		set	stmN	doNotUse	2	300	enabled	sec	1	1
axxE...SyncT4Entry:2		clear	stmN	failed	1	300	enabled	sec	1	1
axxE...SyncT4Entry:3		clear	stmN	failed	2	300	enabled	sec	1	4
		clear	stmN	failed	2	300	enabled	sec	1	2

Step 3 Enter the synchronization parameters in the topology browser for the new candidate. The list of existing Synchronization source candidates must be less than five.

- Type
- Slot or Port
- SSM Enabled
- Assigned Quality Level
- Priority
- Lockout
- Hold-Off Time
- Wait To Restore Time

Step 4 Click **Save** to commit the new synchronization source candidate.

If you attempts to add a new synchronization source candidate when the candidate list is fully populated (five entries), you will be informed that a candidate must be deleted before adding a new.

The system verifies that the candidate is legal before performing the actual add. If any errors are found, the candidate is not added and you is informed and given the opportunity to correct the problem.

You can add more than one candidate before committing and a failure on one candidate has no consequence for the addition of the other candidates.

4.5.5 Modify Synchronization Source Candidate (T0 or T4)

Step 1 Access the synchronization attributes from the topology browser, [Figure 4-31](#).

Step 2 Modify the modifiable synchronization source candidate attributes. SSM Enabled can be True only for T1.

QL can only be modified if SSM enabled is False.

Step 3 Click **Save** to commit the changes.

4.5.6 Delete Synchronization Source Candidate (T0 or T4)

You have two possible choices for deleting a synchronization source candidate:

Alternative 1

-
- Step 1** Access the synchronization attributes from the topology browser.
 - Step 2** Select the **synchronization source candidate(s)** to delete and click **Delete** in the toolbar menu.
 - Step 3** Click **Save** to commit.
-

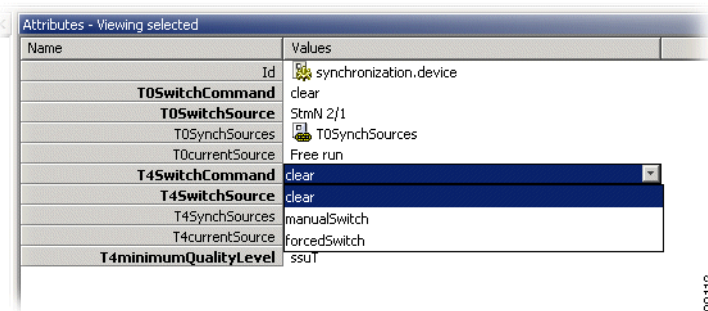
Alternative 2

-
- Step 1** Select the Port (synchronization source) in the topology browser
 - Step 2** Select **Do not use for T0 Synchronization** from the drop down menu.
 - Step 3** Select **Delete**. If you selected synchronization source candidate is the active synchronization source, you receives a warning from the system.
 - Step 4** Click **Save** to commit the final delete.
-

4.5.7 Operate Synchronization Switch (T0 or T4)

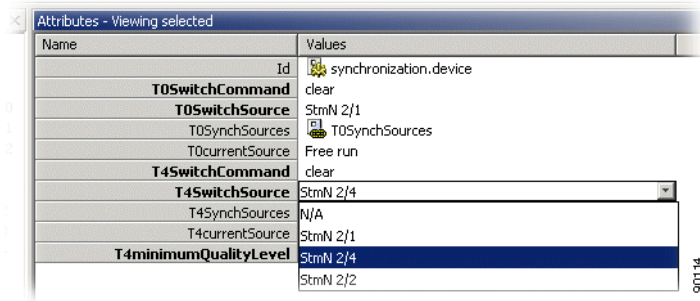
Select **T0** or **T4SwitchCommand** and set to desired value, [Figure 4-33](#).

Figure 4-33 Operate Synchronization Switch 1



Click **T0** or **T4SwitchSource** and select **new** synchronization source. (One of the synchronization source candidates), [Figure 4-34](#).

Figure 4-34 Operate Synchronization Switch 2



Click **Save** to commit the changes.

If the switch parameters are valid, the switch is performed. If a manual or forced switch is performed, the selected source will remain selected until a new forced, manual or clear command is sent.

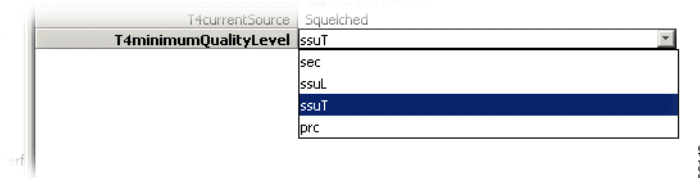
4.5.8 View Synchronization Switch (T0 or T4)

Access the synchronization attributes from the topology browser, [Figure 4-35](#).

The attributes for the synchronization switch are presented:

- QLM (T4 Only)

Figure 4-35 View Synchronization Switch



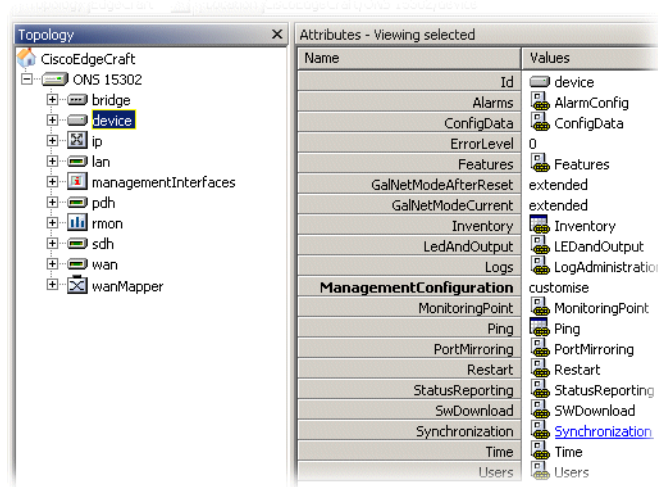
Manual, forced or automatic selection mode.

4.5.9 Operate Synchronization on ONS 15302

Below you find guidelines for management of ONS 15302 synchronization.

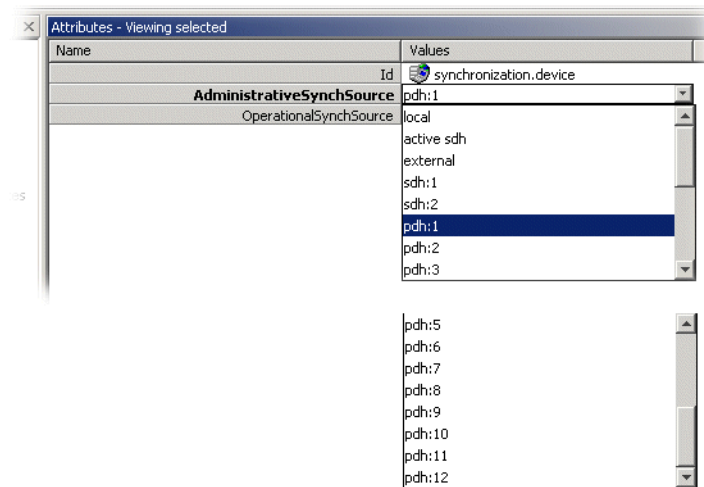
-
- Step 1** Select device > **Synchronization**, [Figure 4-36](#),

Figure 4-36 Select Synchronization



Step 2 Select **AdministrativeSynchSource** from pulldown menu, Figure 4-37.

Figure 4-37 Select AdministrativeSynchSource



Step 3 Click **Save** to activate selected synchronization source.

4.6 Download SW to Network Element

The purpose of this section is to describe the download of new software to the network element. The task of the management system is to give the network element the necessary information for it to be able to start download of new software. The download process is controlled by the element itself.

The section involves presentation of an ongoing download process, starting a new software download process, restart of device after download, and switching between two banks in the element where the software is located.

4.6.1 Network Release

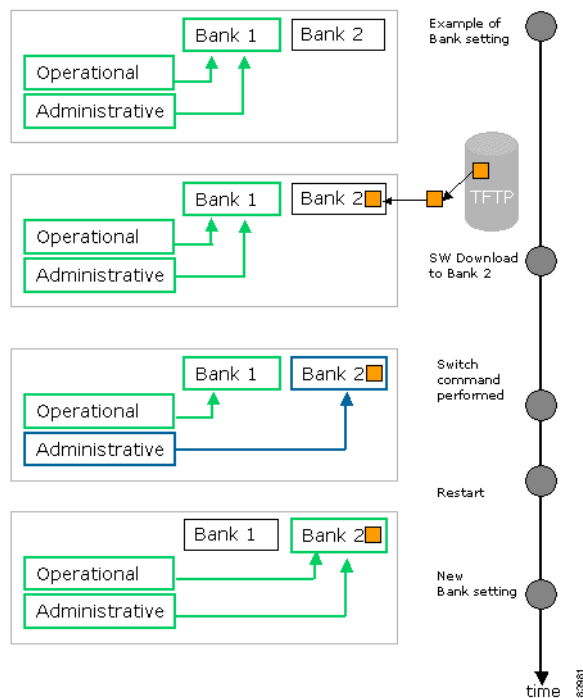
The network element contains device software, firmware and license and module firmware. Updates of the software and firmware is delivered in network releases, which supports a given set of traffic modules. If a new module is introduced, the network element needs a new network release.

A network release is delivered as a zip-file together with a network release control file. The file must be unzipped and its contents must be copied to the TFTP - server. You must initiate the download of the control file. The remaining part of the upgrade will be controlled by the embedded software on the network element, that means check which files are included in the release and download those files that are missing or are too old in the network element.

4.6.2 Operational and Administrative SW Bank

ONS 15305 store software or firmware in banks. There are two banks, one administrative and one operational. Bank 1 initially is both the administrative and the operational, [Figure 4-38](#). After a SW download to bank 2, a switch (bank) command is performed and bank 2 becomes the administrative bank. When a restart is done, bank 2 also becomes the operational bank and the new software is active.

Figure 4-38 Example of Switching SW Banks



4.6.3 Download ONS 15305 Network Release

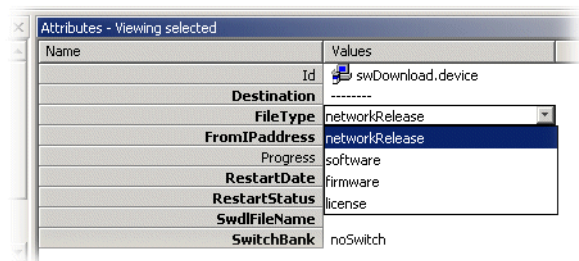
A Network Release is delivered as a zip-file together with a network release control file, [Figure 4-39](#).



Note Please see Release Notes for an example of a TFTP server that has been verified to work in co-operation with CiscoEdgeCraft.

- Step 1** Unzip the Network Release File.
- Step 2** Copy the contents to the TFTP - server.
- Step 3** In the topology browser select device > **SWdownload**.
- Step 4** Set **destination** to **device**
- Step 5** Set **Filetype** to **networkRelease**

Figure 4-39 Download of Release Files



- Step 6** Enter **FromIPAddress** (TFTP server Ip address).
- Step 7** Set **restartstatus** to **immediateRestart**.
- Step 8** Enter **SwdlFileName** attribute values (File path and name).

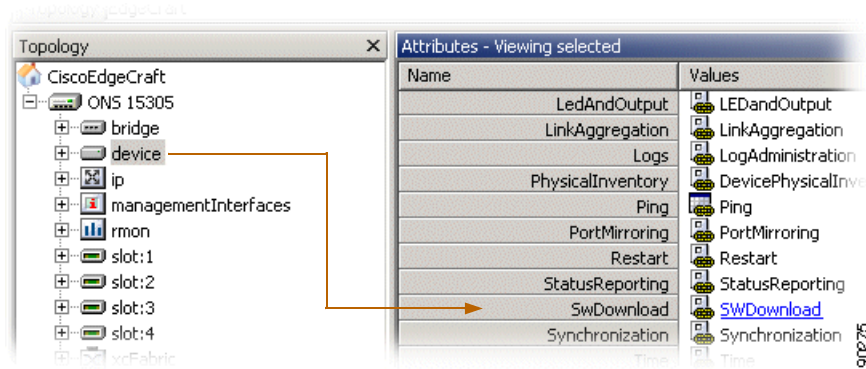


Note Click **Save**. The status of the SwitchBank attribute (switch/noSwitch) is overruled when Filetype is set to networkRelease, thus a switch will be performed.

4.6.4 Software Download to ONS 15305

Step 1 Select device and then **SWDownload**, [Figure 4-40](#).

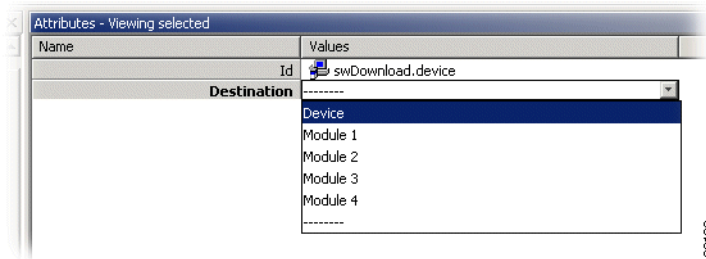
Figure 4-40 Select Device



The following attributes are modifiable, see [Figure 4-41](#) to [Figure 4-47](#).

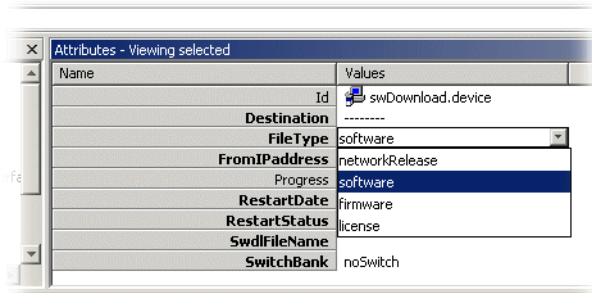
Step 2 Select desired **destination**.

Figure 4-41 Select Destination



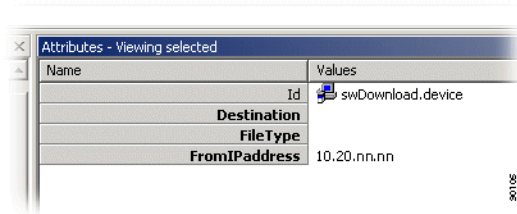
Step 3 Set **Filetype** to software.

Figure 4-42 Select Filetyp



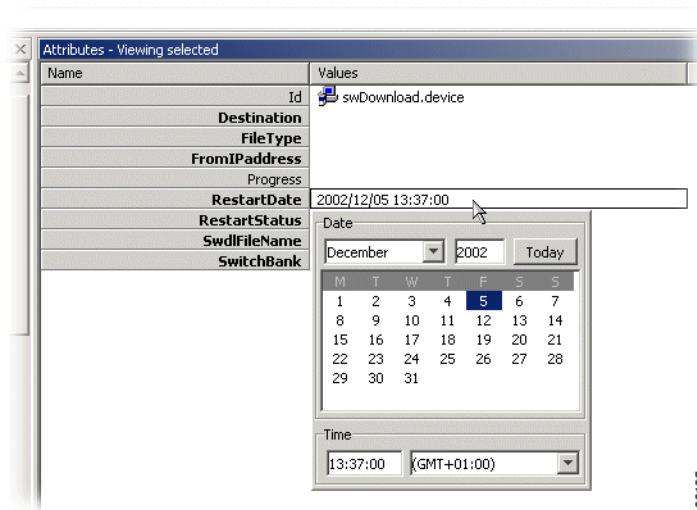
Step 4 Enter **FromIPAddress** (TFTP server Ip address).

Figure 4-43 Select IP Address



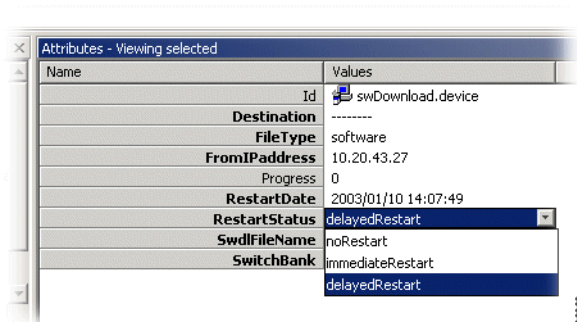
Step 5 Set **RestartDate** if you want **delayed restart** see [Step 6](#).

Figure 4-44 Set Restart Date



Step 6 Select **RestartStatus**.

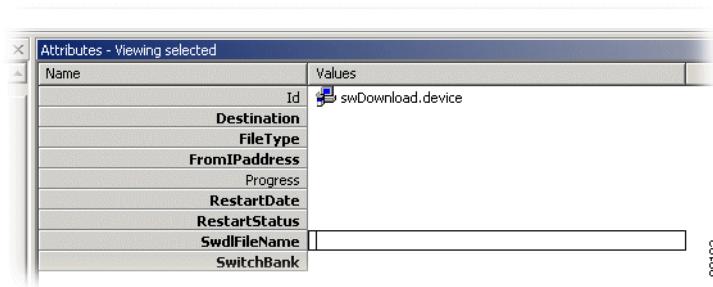
Figure 4-45 Select Delayed Restart



Whether network element should restart immediately or at a specific date/time after the download process.

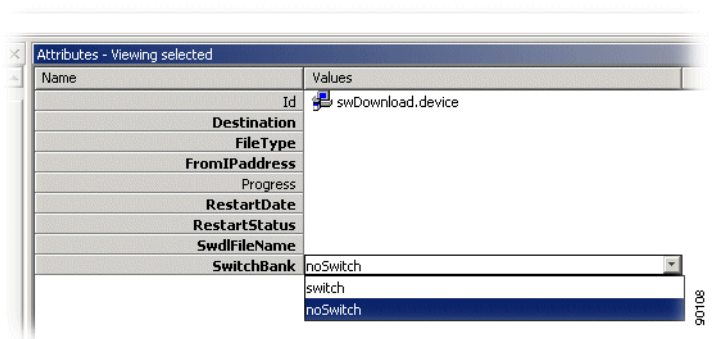
Step 7 Enter **SwdFileName** attribute values (File path and name).

Figure 4-46 Set SW Download File Name



Step 8 Set **SwitchBank** attribute.

Figure 4-47 Select Switch Bank Attributes



- **Switch**
After the restart the operational bank will be switched and the new (downloaded) SW will be active.
- **noSwitch**
The operational bank will not be switched after the restart, hence a manual switch must be performed in order to activate the new software. For further details see [“4.6.4.1 Manual Switch of Banks” section on page 4-38](#).

Step 9 Click **Save**.

4.6.4.1 Manual Switch of Banks

- Step 1** Select device > **DevicePhysicalInventory** > **Software**.
- Step 2** Select **Administrativebank** and switch to **opposite** bank number.
- Step 3** Click **Save**.
- Step 4** Perform a restart.

4.6.5 SW Download to ONS 15302

-
- Step 1** Select device > **SWdownload**.
 - Step 2** Enter **FromIPAddress** (TFTP server Ip address).
 - Step 3** Enter **SwdlFileName** attribute values (File path and name).
 - Step 4** Click **Save**.
 - Step 5** Perform a restart.
-

4.7 Backup and Restore of NE Configuration Data

The purpose of this section is to guide you through management of the configuration data in the network element.

The section involves backup, presentation of an ongoing back-up process and starting a restore process configuration data between a host and a network element.

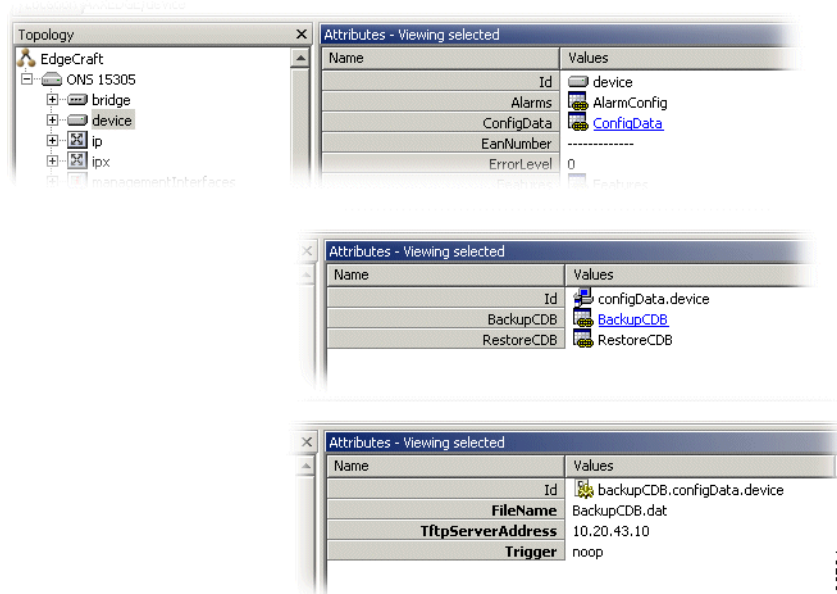
The configuration data is BER coded and can not be edited on the host.

4.7.1 Backup Configuration Data

Backup CDB will perform an back-up of the configuration data of selected NE and place it on the TFTP-server.

-
- Step 1** Select device in the topology viewer.
 - Step 2** Click on **ConfigData**. Here you select whether to upload or download the configuration from or to the network element, [Figure 4-48](#).

Figure 4-48 Select ConfigData

**Step 3** Select **BackupCDB**.

The following attributes values are modifiable:

- TftpServerAddress
Destination IP address if configuration data should be uploaded on a remote host.
- FileName
File name and path for the configuration data storage.
- Trigger
If set to noop only parameters are saved.
If set to backup, the backup operation is started when clicking save.

Step 4 Enter values for the parameters and set **trigger** to **backup**.**Step 5** Click **Save** to commit the changes.**Step 6** The TFTP upload process starts on the network element and the configuration data is stored on the selected host in the specified location (path and file name.)

Note It is recommended to monitor the TFTP console during the upload process.



Note Some TFTP servers requires that the file exist on the TFTP server before and upload can be performed.

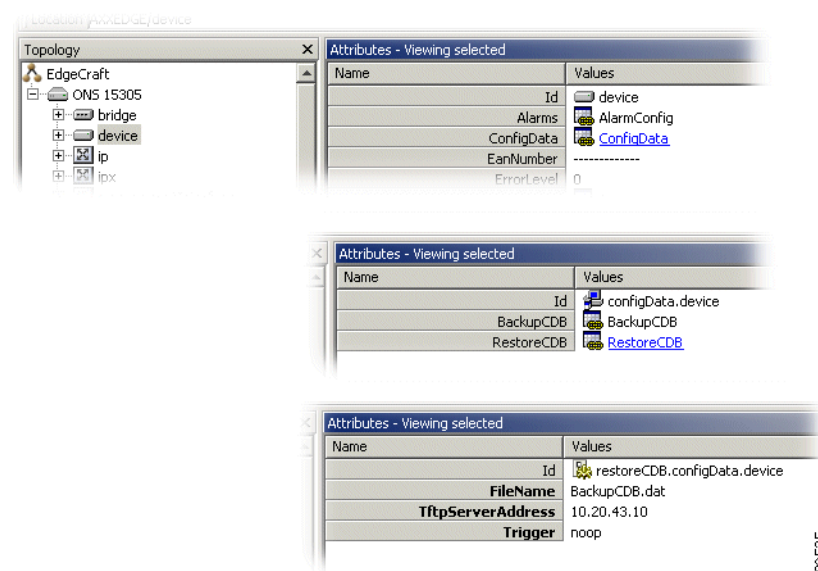
4.7.2 Restore Configuration Data

The previous configuration data restore session has finished. If a scheduled restart is set before a new configuration data download process is started, the scheduling parameters will be overwritten.

In order Cisco Edge Craft to restart the NE after the TFTP download session is terminated, the Cisco Edge Craft needs to be able to capture the endTftpSession trap sent from the NE. This is the trigger needed by Cisco Edge Craft to restart the NE. For enabling trap-sending see [Chapter 1, “Configure Community-handler.”](#)

- Step 1** Select device in the topology viewer.
- Step 2** Click on **ConfigData**. Here you select whether to upload or download the configuration from or to the network element, [Figure 4-49](#).

Figure 4-49 Select Device



- Step 3** Select **RestoreCDB**.

The following attributes values are modifiable:

- TftpServerAddress
Source IP address if configuration data to be downloaded.
- FileName
File name and path for the configuration data storage.
- Trigger
If set to noop only parameters are saved.
If set to backup, the restore operation is started when clicking save.

- Step 4** Set the parameters for the configuration data restore and set **trigger** to **restore**.
- Step 5** Click **Save** to commit the changes.

- Step 6** The TFTP upload process starts in the network element and the configuration data is stored in the network element. Cisco Edge Craft will after a restore is completed, restart the network element.



Note It is recommended to monitor the TFTP console during the download process.

4.8 Alarm and Event Configuration

The purpose of this section is to guide you through the configuration of alarm and event reporting, and to be able to suppress and configure specific alarms.

The network element has a predefined set of combinations of managed objects and alarm types, that means alarm points. These combinations can not be changed by you but the severity level and a description can be defined.

Suppression of specific alarms is important to avoid alarm floods in the network and to focus on the root cause. ONS 15305 let you suppress a number of different alarm types, for example AIS.

In some situation you might want to suppress alarms that are kind of oscillating between being active and not active. A time interval, a persistency filter, indicates the time period an alarm must have been on or off before being reported. The persistency filters are defined for a group of alarms of a specific type.

There are three possible persistency group categories:

- High order level alarms
- Low order level alarms
- Unfiltered alarms

For some managed objects you can enable or disable the alarm reporting.

4.8.1 Event Forwarding

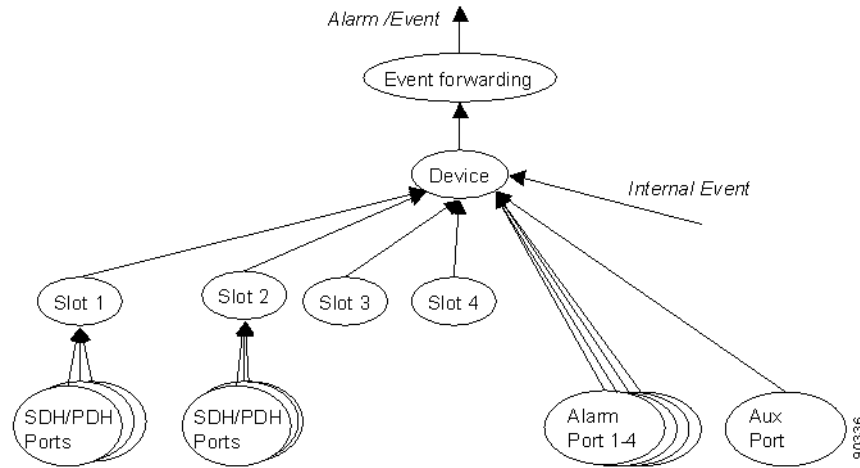
No alarms or events can be reported before the identity of the receiver of alarms and events has been configured. It is possible to forward alarms and events to more than one receiver.

Event forwarding is enabled when a new user is added with the TrapsEnable attribute set to TrapsEnable as described in [“5.3.3 Setting a Loop in a ONS 15302 PDH port” section on page 5-8](#).

4.8.2 Configure General Alarm Reporting

In ONS 15305 there are several levels where alarm reporting can be disabled or enabled. Alarms will be reported to a manager only when alarm reporting is enabled on all levels, [Figure 4-50](#). In addition the event forwarding must be configured for the managers IP address as described in [“4.8.1 Event Forwarding” section on page 4-42](#).

Figure 4-50 General Alarm Reporting Filters.



Note that all alarms from objects [4.8.2.1 Device Alarm Enabling, page 4-43](#) to [4.8.2.5 Aux Port Alarm Enabling, page 4-44](#) including itself have to pass through the filter.

In addition to general alarm reporting, it is possible to filter specific alarm types on specific object instances.

4.8.2.1 Device Alarm Enabling

It is possible to enable or disable alarm and event reporting from ONS 15305. In the disabled state, no alarms or events are reported (some generic events, like cold start, etc. are still reported).

-
- Step 1** Select device > **AlarmConfig** > **AlarmReporting**.
- Step 2** Set **AlarmReporting** to **enabled** or **disabled**.
-

4.8.2.2 Slot Alarm Enabling

-
- Step 1** Select the slot that should report alarms.
- Step 2** Set **AlarmReporting** to **enabled**.
-

4.8.2.3 Traffic Port Alarm Enabling

-
- Step 1** Select the SDH or PDH port that should report alarms.
- Step 2** Set **AdminStatus** to **enabled**
-

4.8.2.4 Alarm Port Alarm Enabling

-
- Step 1** Select the Alarm port that should report alarms.
- Step 2** Set **AdminStatus** to **enabled** or **disabled**.
-

4.8.2.5 Aux Port Alarm Enabling

-
- Step 1** Select the Aux port that should report alarms.
- Step 2** Set **AdminStatus** to **enabled**.
-



Note Slot and port alarm reporting is by default disabled when the slot is configured for a new expected module.

4.8.3 Suppress Specific Alarms

In addition to configuration of the general alarm filters described above, it is possible to suppress specific alarm types to avoid alarm floods in the network. Other alarms from the same objects will be reported independently of these settings.

4.8.3.1 Suppress RDI, EXC, DEG, SSF Alarms

RDI, EXC, DEG, SSF alarm reporting can be suppressed from the VC-12, VC-3 or VC-4 layers.

-
- Step 1** Select device > **AlarmConfig** > **AlarmReportingVc**.
- Step 2** Set **suppress** for the **attributes** corresponding to the **Alarms** that should be suppressed:
- RdiAlarms
 - ExcAlarms
 - DegAlarms
 - SsfAlarms
-

4.8.3.2 Suppress AIS Alarms from SDH Ports

AIS alarm reporting can be suppressed from the TU-12, TU-3 or AU-4 layers.

-
- Step 1** Select device > **AlarmConfig** > **AlarmReportingVc**.
- Step 2** Set **suppress** for the **AisAlarms** attribute.
-

4.8.3.3 Suppress AIS Alarms from E1 and E3 Ports

-
- Step 1** Select device > **AlarmConfig** > **AlarmReportingE1E3**.
- Step 2** Set **AisAlarms** to **suppress**.
-

4.8.3.4 Suppress AIS Alarms from AUX Port

-
- Step 1** Select device > **AlarmConfig** > **AlarmReportingAux**.
- Step 2** Set **AisAlarms** to **suppress**.
-

4.8.4 Modify Alarm Severity and Description

It is possible to modify the severity of the reported alarms from ONS 15305.

-
- Step 1** Select device > **AlarmConfig** > **AlarmPointConfig**.
- Step 2** Set the severity level and description for the combination of alarm type and object type of your choice. The next time the alarm is reported from this object type it will come up with the configured severity and description in the alarm list.
-

4.8.5 Set Signal Degrade Threshold

The threshold for a DEG alarm to be reported (and used for MSP switching) can be set for the VC-12, VC-3, VC-4, MS and RS layers.

-
- Step 1** Select device > **AlarmConfig** > **SdThreshold**.
- Step 2** Set **SdThreshold** to a value between -6 and -9 (BER= 10 exp -6 to 10 exp -9).
-

4.8.6 Modify Alarm Persistency

Alarm reporting on and off can be delayed by setting the alarm persistency filters in ONS 15305. The alarms are divided into groups according to their importance for fault management, [Table 4-7](#) to [Table 4-9](#).

4.8.6.1 Persistency Group 1 (HighOrderLevel)

Table 4-7 Persistency Group 1 (HighOrderLevel)

Associated Alarm Types	Object Classes Associated with Each Alarm Type
LOS	SdhPort, pdhPort
LOF	rs
AIS	ms
EXC	rs, ms
DEG	rs, ms
TIM	rs
RDI	ms
CDF	rs, ms
AUX	auxPort

4.8.6.2 Persistency Group 2 (Unfiltered)

Table 4-8 Persistency Group 2 (Unfiltered)

Associated Alarm Types	Object Classes Associated with Each Alarm Type
LOP	tu4, tu3, tu12
LOM	vc4
LOF-RX, LOF-TX	e1

4.8.6.3 Persistency Group 3 (LowOrderLevel)

Table 4-9 Persistency Group 3 (LowOrderLevel)

Associated Alarm Types	Object Classes Associated with Each Alarm Type
AIS	tu4, tu3, tu12, e1, e3
EXC	vc4, vc3, vc12
DEG	vc4, vc3, vc12
SSF	vc3, vc12
TIM	vc4, vc3, vc12
RDI	vc4, vc3, vc12
UNEQ	vc4, vc3, vc12
PLM	vc4, vc3, vc12

Step 1 Select device > AlarmConfig > AlarmPersistency.

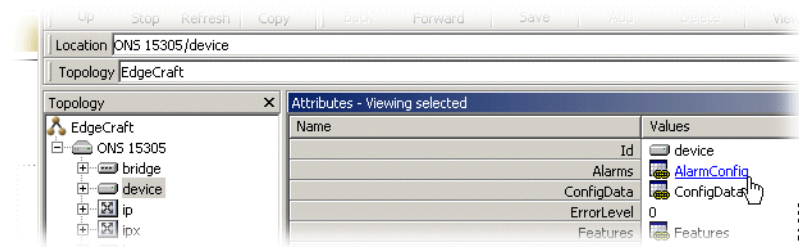
Step 2 Set **onFilter** or **offFilter** to a value between 0 and 30 seconds.

4.8.7 Modify ONS 15302 Alarm Configuration Attributes

4.8.7.1 Location of Alarm Configuration Attributes

Step 1 Select device > **AlarmConfig**, [Figure 4-50](#).

Figure 4-51 Select Device



4.8.7.2 Modify Alarm Severity and Description

Step 1 Select device > **AlarmConfig** > **AlarmConfig**, [Figure 4-52](#).

Figure 4-52 Select Alarm Config

Name	Values
Id	alarms.device
AlarmConfig	AlarmConfig
AlarmReporting	enabled
AlarmReportingAisRdi	AlarmReportingAisRdi
AlarmReportingAll	AlarmReportingAll
Persistency	Persistency
SdThreshold	SdThreshold

Step 2 Set the **Severity level** and **Description** for the combination of alarm type and object type of your choice.

Step 3 Click **Save**. The next time the alarm is reported from this object type it will come up with the configured severity and description in the alarm list.

4.8.7.3 View all Alarm Reporting Instances

Step 1 Select **AlarmReportingAll** to view all alarm reporting instances, [Figure 4-53](#).

Figure 4-53 Select AlarmReportingAll

Name	Values
Id	alarms.device
AlarmConfig	AlarmConfig
AlarmReporting	enabled
AlarmReportingAisRdi	AlarmReportingAisRdi
AlarmReportingAll	AlarmReportingAll
Persistency	Persistency
SdThreshold	SdThreshold

83976

4.8.7.4 Enable Alarm Reporting

- Step 1 Set AlarmReporting to **enable** using the available pull-down menu, [Figure 4-54](#).

Figure 4-54 Select AlarmReporting

Name	Values
Id	alarms.device
AlarmConfig	AlarmConfig
AlarmReporting	enabled
AlarmReportingAisRdi	AlarmReportingAisRdi
AlarmReportingAll	AlarmReportingAll
Persistency	Persistency
SdThreshold	SdThreshold

83977

- Step 2 Click **Save**.

4.8.7.5 Modify Ais Rdi Alarm Reporting

- Step 1 Select AlarmreportingAisRdi, [Figure 4-55](#).

Figure 4-55 Select AlarmreportingAisRdi

Name	Values
Id	alarms.device
AlarmConfig	AlarmConfig
AlarmReporting	enabled
AlarmReportingAisRdi	AlarmReportingAisRdi
AlarmReportingAll	AlarmReportingAll
Persistency	Persistency
SdThreshold	SdThreshold

83978

- Step 2 Select desired instance.
- Step 3 Select **allow** or **suppress** for Ais alarm, [Figure 4-56](#).

Figure 4-56 Select AIS Attributes

Id	Instance	RdiAlarms	AisAlarms
axx155ESdhMsAisAlarmReporting:1	ms:1	allow	allow
axx155ESdhMsAisAlarmReporting:2	ms:2	allow	allow
axx155ESdhAu4AisAlarmReporting:1	au4:1	NA	allow
axx155ESdhVc4RdiAlarmReporting:1	vc4:1	allow	NA
axx155ESdhVc12sRdiAlarmReporting	vc12	supress	NA
axx155ESdhTu12sAisAlarmReporting	tu12	NA	supress

Step 4 Repeat for Rdi alarm.

Step 5 Click Save.

4.8.7.6 Modify Alarm Persistency

Figure 4-57 Set Alarm Persistency Attributes

Name	Values
Id	alarms.device
AlarmConfig	AlarmConfig
AlarmReporting	enabled
AlarmReportingAisRdi	AlarmReportingAisRdi
AlarmReportingAll	AlarmReportingAll
Persistency	Persistency
SdThreshold	SdThreshold

Alarm reporting on and off can be delayed by setting the Alarm Persistency filters in ONS 15302.

Step 1 Select device > **AlarmConfig** > **AlarmPersistency**, Figure 4-57.

Step 2 Set **onFilter** or **offFilter** to a value between 0 and 255 seconds.

Step 3 Click **Save** when desired value settings are completed.

4.8.7.7 Modify Signal Degraded (Sd) Threshold

Step 1 Select **SdTreshold**, Figure 4-58.

Figure 4-58 Select SDTreshold

Name	Values
Id	alarms.device
AlarmConfig	AlarmConfig
AlarmReporting	enabled
AlarmReportingAisRdi	AlarmReportingAisRdi
AlarmReportingAll	AlarmReportingAll
Persistency	Persistency
SdThreshold	SdTreshold

Step 2 Select desired **MO** class

Step 3 Set **SdTreshold** to a value between 6 and 9, Figure 4-59.

Figure 4-59 Set SdThreshold

Id	MoClass	SdThreshold
axx:155ESdhMsSignalDegradedThreshold:1	Ms	9
axx:155ESdhMsSignalDegradedThreshold:2	Ms	7
axx:155ESdhRsSignalDegradedThreshold:1	Rs	7
axx:155ESdhRsSignalDegradedThreshold:2	Rs	6
axx:155ESdhVc4SignalDegradedThreshold:1	Vc4	8
axx:155ESdhVc12SignalDegradedThreshold	Vc12	7

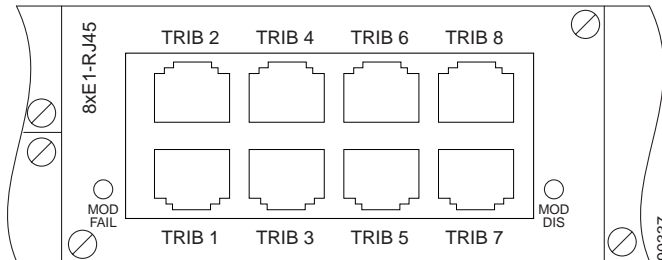
Step 4 Click Save.

4.9 Manage Slots on ONS 15305

A slot represents a physical position on the network element where different HW modules can be located, [Figure 4-60](#). The purpose of this section is to describe the tasks and dynamic involved in inserting modules into and removing modules from a slot.

This section also involves presentation and modification of slots. Slots are static and cannot be created or deleted.

Figure 4-60 Slot on the Network Element



4.9.1 View Slot

- Step 1** The browser presents four slots numbered from 1 to 4. The slot attributes as defined in the information model are available in the attribute window. Each slot can be equipped with one HW module. By default the slot is unequipped, [Figure 4-61](#).
- Step 2** Select a slot in the topology browser.

Figure 4-61 Select Slot

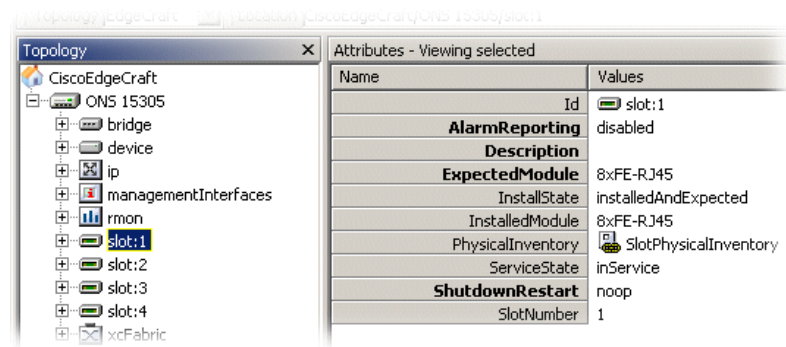
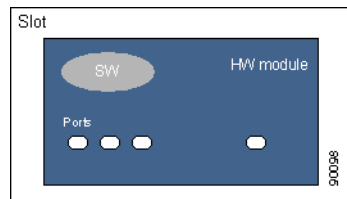


Figure 4-62 Slot Module - Port Concept



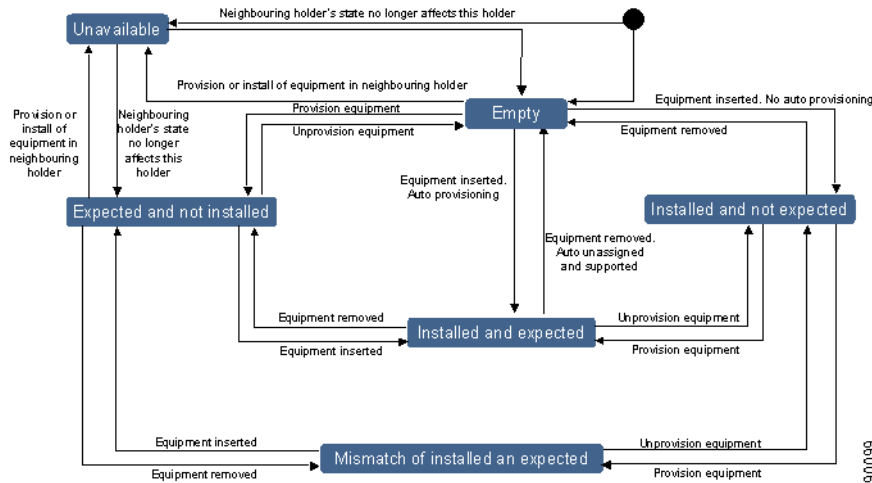
A slot can be empty or have a HW module with a given number of ports and SW version installed as illustrated in Figure 4-62. The physical inventory data for the module, if module present in slot, is also presented in the attribute window.

You can configure the slot and set the expect module type for the slot. The module does not have to be physically inserted. The slot has therefore an attribute that reflects the relation between the expected module and the installed module, that means the slot state:

- Empty
- Installed and expected
- Expected and not installed
- Installed and not expected
- Mismatch of installed and expected
- Unavailable
- Unknown

A state diagram for the possible transitions of a slot is shown in Figure 4-63. This is the suggested state machine from *TMF 814 supporting documentation, equipmentStates.pdf*.

Figure 4-63 Relation between Installed and Expected Module in a Slot.



A state machine for the values of the attribute describing the relation between installed and expected module in a slot is shown in [Figure 4-63](#).

If a mismatch between the two modules occurs an alarm will be generated. The alarm is cleared if the module is replaced or the expected module is changed, that means a match between expected and installed.

You can configure an expected module and assign it to a slot without any physical module present. The system populates the topology browser according to the specified expected module. Before replacing a module, that means selecting a new expected module type, the expected module of the slot must be set to unequipped.

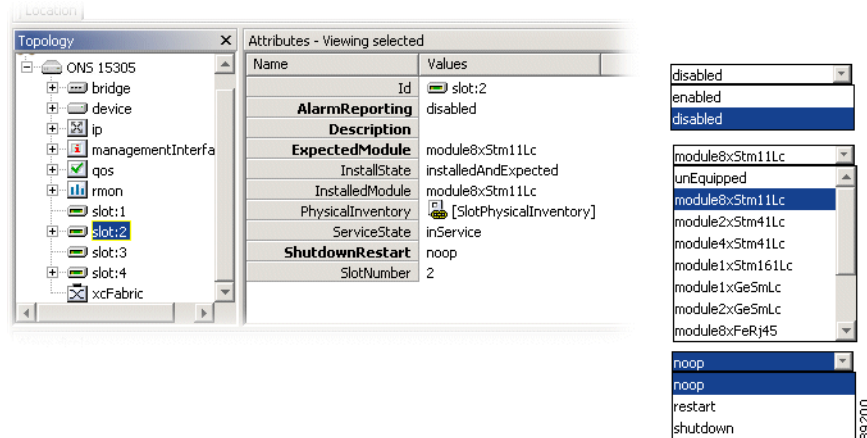
For management of different ports, see [Chapter 5, “Traffic Port Management”](#).

4.9.2 Modify Slot

To modify the expected module attribute the ports of the previous expected module must be unused and unstructured.

Step 1 Select target slot, [Figure 4-64](#).

Figure 4-64 Select Target Slot



Step 2 The following attributes are modifiable:

- AlarmReporting
enable or disable
- ExpectedModule
select module of current interest
- ShutdownRestart
noop, restart or shutdown. (noop; No operation is applied)

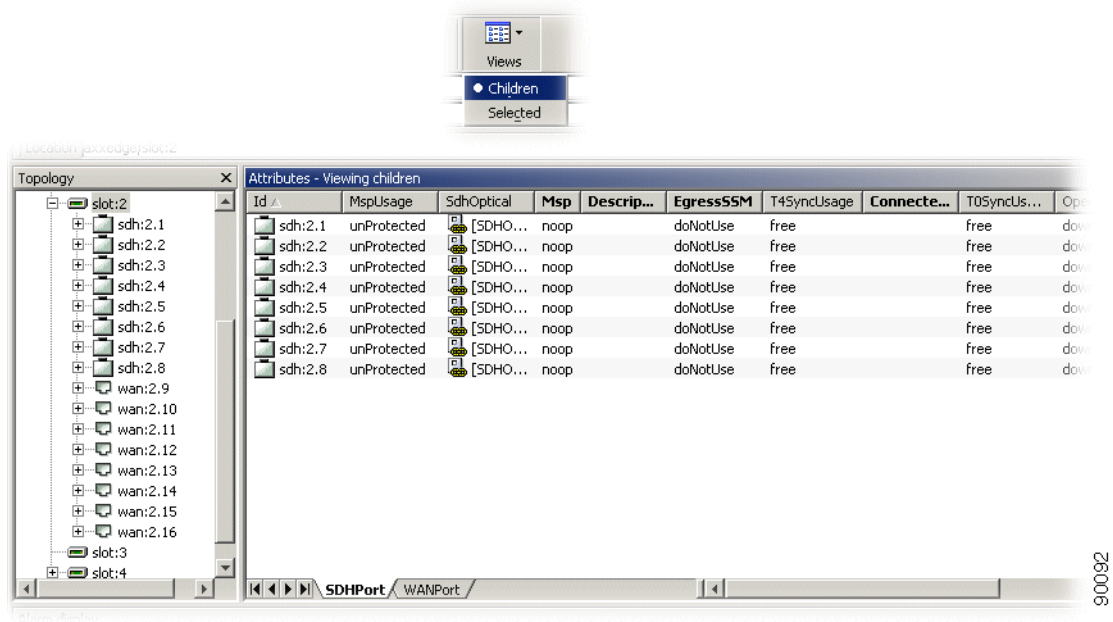
Step 3 Modify the modifiable slot attributes.

Step 4 Click **Save** to activate the modifications.

For some of the changes to take effect a restart of the module is required. In these cases you are prompted to restart.

Step 5 When a slot has been configured to contain a specific module, the ports of the module are automatically created in the network element. The type of ports created depends on the module type configured for the slot, [Figure 4-65](#).

Figure 4-65 Set View Mode to Children



The ports of an installed module were not created if the slot was configured to contain another module type or being empty.



Traffic Port Management

About Port Types

One of the differentiators of ONS 15305 compared to other products is the possibility to equip it with a number of different port types. Some ports are part of the base unit and always present, (management port, AUX ports, alarm input and output ports). The alarm ports and auxiliary port cannot be created or deleted.

See also [“4.2.1 Management Port Configuration” section on page 4-2](#), [“ Alarm Ports” section on page 4-20](#), and [“ AUX Port - ONS 15305” section on page 4-21](#).

Traffic ports are available on replacable traffic modules. When a slot is configured to support a specific traffic module the ports of the traffic module is automatically created as described in [“4.9 Manage Slots on ONS 15305” section on page 4-50](#).

In this chapter we concentrate on the configuration of the traffic ports. The chapter is organized according to the following structure:

- SDH ports
- PDH ports
- LAN ports
- WAN ports

5.1 Selecting a Traffic Port

Traffic ports are always located on a traffic module in slot 1 to 4. In ONS 15305 managed objects for modules and ports are available when the slot is configured for a specific module type. This section describes how to select a traffic port independent of the traffic it carries.

-
- | | |
|---------------|---|
| Step 1 | Click on the ONS 15305 managed object, and then the slot managed object (where the port is) in the topology browser. |
| Step 2 | When the slot is expanded, click on the port managed object with the desired port number. |
| Step 3 | The port is selected and the attributes related to the physical and electrical characteristics of the port is displayed in the attributes view. |
| Step 4 | The physical port usually carries a set of protocols (for example SDH) and the protocols are available from the topology browser. |
-

5.2 SDH Ports



Note

Some procedures in this chapter ,applies for both ONS15302 and ONS 15305. In procedures that only applies for ONS15305, this is stated in the procedure heading.

5.2.1 Configuring ONS 15305 SDH Port Structure (Channelization)

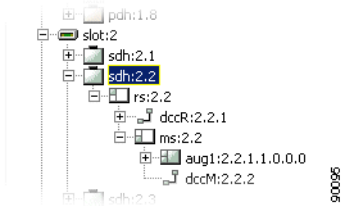
By default the SDH ports are unstructured (or not-channelized) when created. Only the sdh Port, rs, ms and aug1 managed objects are available. In this state the paths inside the STM-N frame cannot be nor terminated nor cross-connected, but the port can be used as a protection port in an MSP protection scheme and a synchronization source candidate. It can also carry DCN traffic in the DCC channels.

The motivation for structuring an SDH port is to identify the paths in the STM-N frame and making them available for cross-connection. As you structure the port it will fan out in the topology browser, showing termination points that are now available for cross-connection.

5.2.1.1 AU4 Termination Points for Cross-connection

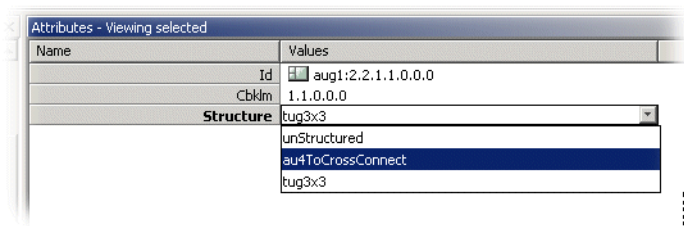
- Step 1 Select an sdh port, [Figure 5-1](#).
- Step 2 Select the **rs** and then the **ms** managed objects as the port expands.
- Step 3 Select the **aug1** managed object that should be structured. (STM-N ports have N aug1 objects).

Figure 5-1 Select the Aug1 Managed Object



- Step 4 Set the **Structure** attribute to **au4ToCrossconnec**, [Figure 5-2](#).

Figure 5-2 Set the Structure Attribute



- Step 5 Click **Save** on toolbar.

- Step 6** Repeat for the other aug1 objects on the port if you want to structure them as au4ToCrossconnect.
-

5.2.1.2 Tu3 Termination Points for XC

- Step 1** Perform [Step 1](#) to [Step 3](#) in “[5.2.1.1 AU4 Termination Points for Cross-connection](#)” section on page 5-2.
- Step 2** Set the **Structure** attribute to **3xtug3**.
- Step 3** Select the **au4**, **vc4** and then the **tug3** managed object that should be structured.
- Step 4** Set the **structure** attribute to **tu3ToCrossConnect**.
- Step 5** Click **Save** on toolbar.
- Step 6** Repeat for the other tug3 objects on the port if you want to structure them as tu3ToCrossconnect.
-

5.2.1.3 Tu12 Managed Objects for XC

- Step 1** Perform [Step 1](#) to [Step 3](#) in “[5.2.1.1 AU4 Termination Points for Cross-connection](#)” section on page 5-2.
- Step 2** Set the **Structure** attribute of the **tug3** managed object to **21xtu12ToCrossConnect**.
- Step 3** Click **Save** on toolbar.
- Step 4** Repeat for the other tug3 objects on the port if you want to structure them as 21xtu12ToCrossconnect.
-

5.2.2 Modifying or Removing ONS 15305 SDH Port Structure

It is also possible to modify or remove the structure of an SDH port when the involved termination points are not cross-connected.

5.2.2.1 Modify between Tu12 and Tu3 Objects

- Step 1** Remove all cross-connections that are terminated in the tu12 or tu3 termination points belonging to the tug3 object that you want to modify.
- Step 2** Follow the guidelines in “[5.2.1 Configuring ONS 15305 SDH Port Structure \(Channelization\)](#)” section on page 5-2, to make tu3 or tu12 termination points of an SDH port available for cross-connection.
-

5.2.2.2 Modify between Au4 and Tu3 or Tu12 Objects

- Step 1** Remove all cross-connections that are terminated in the au4, tu12 or tu3 termination points belonging to the aug1 object that you want to modify.
- Step 2** Set the tug3 Structure to **none** for all tug3 objects contained by the aug1 object that should be modified, “[5.2.2.1 Modify between Tu12 and Tu3 Objects](#)” section on page 5-3.

Step 3 Follow the guidelines in “[5.2.1 Configuring ONS 15305 SDH Port Structure \(Channelization\)](#)” section on page 5-2, to make au4, tu3 or tu12 termination points of an SDH port available for cross-connection.



Note Modification of the structure involves deletion of existing termination points and creation of new termination points (if new structure is not none). To avoid unintentional traffic loss, ONS 15305 will not allow modification of the structure before all cross-connections belonging to a structure object have been deleted.



Note The structure of all contained tug3 objects must have been set to none before the aug1 can be modified.

5.2.3 Setting and Reading Path Trace Identifiers

Path Trace are available at two levels in the SDH port:

- RS path trace that will be terminated in the STM-N port on the opposite side of the link.
- VC-4 Path Trace that will be terminated in the SDH node terminating the VC-4 path.

5.2.3.1 Set or Read RS Path Trace Identifiers

Step 1 Select an sdh port.

Step 2 When the sdh port managed object is expanded, click on the **rs**.

Step 3 Click on **PathTraceRS**.

Step 4 The following attributes can be set:

- PathTrace
Set to enable if TIM alarms should be reported when there is a mismatch between PathTraceReceived and PathTraceExpected.
- PathTraceExpected
Enter a value for the path trace identifier that you expect to receive from the other side of the path.
- PathTraceTransmitted
Enter a value for the path trace identifier that you want to transmit to the other side of the path.

Step 5 The following attributes can be read:

- PathTraceReceived
The actual received path trace identifier from the other side of the link.

Step 6 Click **Save** on the toolbar.

5.2.3.2 Set or Read VC-4 Path Trace Identifiers



Note VC4 path trace is available only when the SDH port is structured with a VC-4 object, that means aug1 Structure is tug3x3, “[5.2.1 Configuring ONS 15305 SDH Port Structure \(Channelization\)](#)” section on page 5-2.

-
- Step 1** Select an sdh port.
- Step 2** Select the **rs** and then the **ms** managed objects as the port expands.
- Step 3** Select the **aug1** managed object that contains the **vc4** to measure.
- Step 4** Select the **au4** and then the **vc4** managed objects as the port expands.
- Step 5** Click on **PathTraceVC4**.
The attributes are the same as for RS path trace.
- Step 6** Click **Save** on the toolbar after setting the path trace parameters.



Note When path trace is set to enabled, AIS is inserted downstream instead of the original signal when there is a mismatch between expected and received path trace.

5.2.4 Monitoring SDH Port Performance

Performance Monitoring is available at three levels in the SDH port:

- RS PM, monitoring near end of the regenerator section.
- MS PM, monitoring near and far end of the multiplexer section.
- VC-4 PM, monitoring near and far end of the VC-4 path.

5.2.4.1 Read RS PM Counters

-
- Step 1** Select an sdh port.
- Step 2** When the sdh port managed object is expanded, select the **rs** managed object.
- Step 3** Click on the **vc12** (for e1 ports) **or** **vc3** (for e3 ports) managed object.
- Step 4** Click on **PmG826NearEnd** to read near end PM data **or** **PmG826FarEnd** to read far end PM data.
- Step 5** The following attributes are available:
- Current15Min ES,SES, BBE and UAS
 - Current24Hour ES, SES, BBE and UAS
- Step 6** To see the performance history of the previous 16x15 minute counters click on **Interval15Min**, or click on **Interval24Hour** to see the previous 24 hour counter.
- Step 7** The following attributes are available:
- Interval15Min ES,SES, BBE and UAS

- Interval24Hour ES, SES, BBE and UAS
-

5.2.4.2 Read MS PM Counters

- Step 1** Select an sdh port.
- Step 2** Select the **rs** and then the **ms** managed objects as the port expands.
- Step 3** Click on **PmG826NearEnd** to read near end PM data or **PmG826FarEnd** to read far end PM data.
- Step 4** The attributes are the same as for RS PM.
-

5.2.4.3 Read VC-4 PM Counters

- Step 1** Select an sdh port.
- Step 2** Select the **rs** and then the **ms** managed objects as the port expands.
- Step 3** Select the **aug1** managed object that contains the **vc4** to measure.
- Step 4** Select the **au4** and then the **vc4** managed objects as the port expands.
- Step 5** Click on **PmG826NearEnd** to read near end PM data or **PmG826FarEnd** to read far end PM data.
- Step 6** The attributes are the same as for RS PM in [“5.2.4.1 Read RS PM Counters” section on page 5-5](#).
-

5.2.5 Enabling the SDH Port to Carry Traffic and Report Alarms

By default the Administrative Status of the SDH port is set to disabled when the port is created. No traffic will pass through the port and no alarms are reported before it is enabled.

- Step 1** Select an sdh port.
- Step 2** Set **AdminStatus** to **enabled**.
- Step 3** Click **Save** on the toolbar.



Note When disabled the SDH port inserts VC4-UNEQ out of the port and AU4-AIS towards the cross-connection matrix.



Note Even if the SDH port is enabled it will only report alarms if the AlarmReporting attribute of the slot is set to enabled.

5.2.6 Set ONS 15305 SDH Port Synchronization Quality Output Signaling

STM-N signals are often used to carry synchronization information. A dedicated protocol is used to indicate the quality of the signal that is output from one SDH node to the next SDH node.

-
- Step 1** Select an sdh port.
- Step 2** Set **EgressSSM** to **t0** or **doNotUse**. T0 will always indicate the quality status of the internal clock.
- Step 3** Click **Save** on the toolbar.



Note When an SDH port is used as a synchronization source candidate, the S1 byte will be set to do not use automatically.

5.2.7 Use the SDH Port as a Synchronization Source Input

See “[4.5.4 Add Synchronization Source Candidate \(T0 or T4\)](#)” section on page 4-29.

5.2.8 Use the DCC Channels of the SDH Port to Carry Management Traffic

See “[4.2.2 DCC Configuration](#)” section on page 4-4.

5.3 PDH Ports

ONS 15305 can be equipped with two different PDH port types:

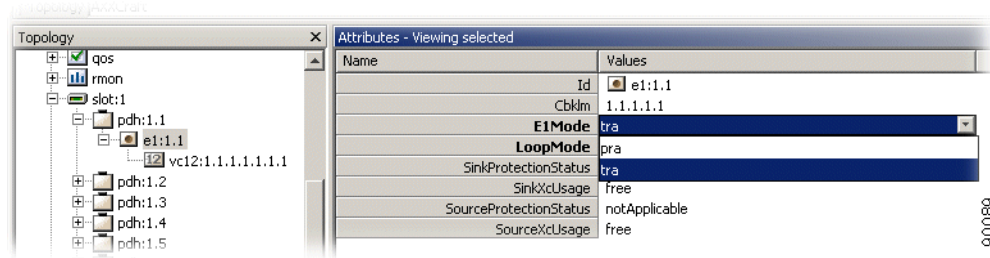
- E1 Ports (2 Mbps) supporting transparent data and NT functionality of ISDN PRA. E1 Ports are available when the slot is configured for the 8xE1 module or the 63xE1 module.
- E3 Ports (34/45 Mbps) supporting transparent data. E3 Ports are available when the slot is configured for the 6xE3 module.

ONS 15302 is equipped with E1 ports.

5.3.1 Setting the Port Mode for ONS 15305

-
- Step 1** Select a pdh port, [Figure 5-3](#).
- Step 2** When the pdh port managed object is expanded, select the **e1** or **e3** managed object.
- Step 3** For e1 ports set the E1Mode attribute to **tra** (2 Mbps transparent G.703) or **pra** (ISDN PRA).

Figure 5-3 Set the E1 Mode Attribute

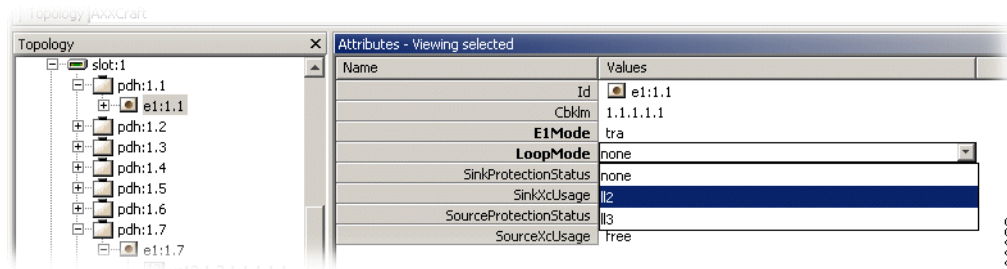


- Step 4** For e3 ports set the E3Mode attribute to **e3** (34 Mbps transparent G.703) or **t3** (45 Mbps) transparent G.703).
- Step 5** Click **Save** on the toolbar.

5.3.2 Setting a Loop in a ONS 15305 PDH Port

- Step 1** Select a pdh port, [Figure 5-4](#).
- Step 2** When the pdh port managed object is expanded, select the **e1** or **e3** managed object.
- Step 3** Set the loopMode attribute to **ll2** (loop back to network) or **ll3** (loop back to customer).

Figure 5-4 Set Loop Mode Attributes



- Step 4** Click **Save** on the toolbar.



Note There are a number of restrictions for setting the loops of PDH ports. Cisco Edge Craft cannot set and release loops when the E1Mode is set to pra. (in this mode loops can only be managed from an NT1 or similar). A loop cannot be set when pdh port AdminStatus is set to disabled.

5.3.3 Setting a Loop in a ONS 15302 PDH port

- Step 1** Select desired pdh port.

- Step 2** When the pdh port managed object is expanded, select the **e1** managed object.
 - Step 3** Set the loopMode attribute to **l12** (loop back to network) or **l13** (loop back to customer).
 - Step 4** Click **Save** on the toolbar.
-

5.3.4 Releasing a Loop in a PDH Port

- Step 1** Select a pdh port.
- Step 2** When the pdh port managed object is expanded, select the **e1** or **e3** managed object.
- Step 3** Set the loopMode attribute to **none**.
- Step 4** Click **Save** on the toolbar.

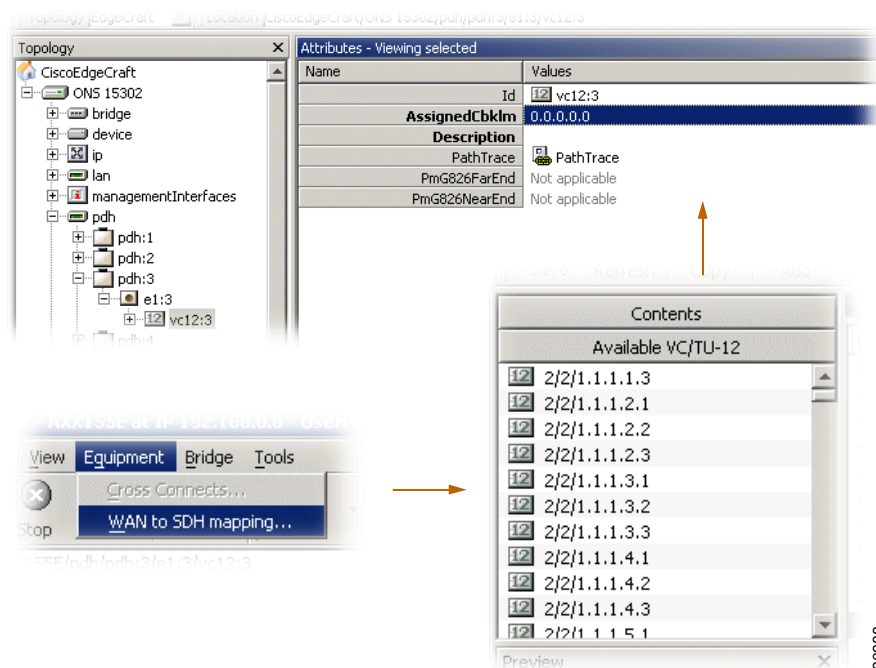


Note Alternatively, any loop will be released if pdh port AdminStatus is set from enabled to disabled.

5.3.5 Assign VC12's in ONS 15302

- Step 1** Expand desired PDH port in the topology browser, to view VC12 managed object attributes, [Figure 5-5](#).
- Step 2** Set **AssignedCbklm** to desired value, [Figure 5-5](#).
You may use the WAN to SDH mapping window to view available VC12s with cbklm values.
- Step 3** Click **Save**.

Figure 5-5 Assign VC 12 Port



5.3.6 Setting and Reading Path Trace Identifiers

- Step 1 Select a pdh port.
- Step 2 When the pdh port managed object is expanded, click on the **e1** or **e3** managed object.
- Step 3 Click on the **vc12** (E1) or **vc3** (E3) managed object.
- Step 4 Click on **PathTraceVC12**.

The following attributes can be set:

- PathTrace
Set to enable if TIM alarms should be reported when there is a mismatch between PathTraceReceived and PathTraceExpected.
- PathTraceExpected
Enter a value for the path trace identifier that you expect to receive from the other side of the path.
- PathTraceTransmitted
Enter a value for the path trace identifier that you want to transmit to the other side of the path.

- Step 5 The following attributes can be read:

- PathTraceReceived
The actual received path trace identifier from the other side of the link.

- Step 6 Click **Save** on the toolbar.

**Note**

When path trace is set to enabled, AIS is inserted downstream instead of the original signal when there is a mismatch between expected and received path trace.

5.3.7 Monitoring PDH Port Performance

- Step 1** Select a pdh port.
- Step 2** When the pdh port managed object is expanded, select the **e1** or **e3** managed object.
- Step 3** Click on the **vc12** (for e1 ports) or **vc3** (for e3 ports) managed object.
- Step 4** Click on **PmG826NearEnd** to read near end PM data or **PmG826FarEnd** to read far end PM data.
- Step 5** The following attributes are available:
- Current15Min ES, SES, BBE and UAS
 - Current24Hour ES, SES, BBE and UAS
- Step 6** To see the Performance history of the previous 16x15 minute counters click on **Interval15Min**, or click on **Interval24Hour** to see the previous 24 hour counter, [Figure 5-6](#) and [Figure 5-7](#).
- Step 7** The following attributes are available:
- Interval15Min ES, SES, BBE and UAS
 - Interval24Hour ES, SES, BBE and UAS

Figure 5-6 Select Interval24Hour

Name	Values
Id	pmG826NearEnd.vc12:1.3.1.1.1.1
Current15MinBBE	0
Current15MinES	0
Current15MinSES	0
Current15MinStartTime	2002/12/02 08:15:00
Current15MinTimeElapsed	00:20
Current15MinUAS	0
Current24HourBBE	0
Current24HourES	0
Current24HourSES	0
Current24HourStartTime	2002/12/02 00:00:00
Current24HourTimeElapsed	08:15:19
Current24HourUAS	0
Interval15Min	Interval15Min
Interval24Hour	Interval24HourNearEndVC12

Figure 5-7 Set Interval24Hour Attributes

Name	Values
Id	interval24Hour,pmG826NearEnd.vc12:1.3.1.1.1.1.1
BBE	0
ES	0
EndTime	2002/12/02 00:00:00
SES	0
Status	valid
UAS	0

5.3.8 Enabling the PDH Port to Carry Traffic and Report Alarms

By default the administrative status of the PDH port is set to disabled when the port is created. No traffic will pass through the port and no alarms are reported before it is enabled.

-
- Step 1** Select a pdh port.
 - Step 2** Set AdminStatus to **enabled**.
 - Step 3** Click **Save** on the toolbar.



Note When disabled the PDH port generates AIS upstream and downstream.

5.3.9 Cross-connect the ONS 15305 PDH Port to another Port

See “5.7 ONS 15305 SDH Cross-Connection Management” section on page 5-33.

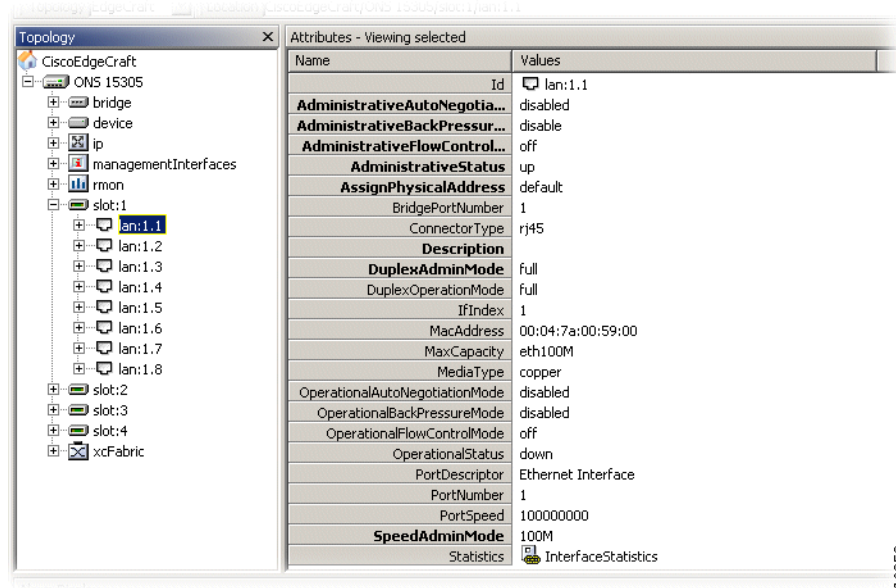
5.4 LAN Ports

5.4.1 ONS 15305 - LAN Port Attributes

An ONS 15305 slot can e.g be configured to carry a 8xFeRj45 module, “4.9 Manage Slots on ONS 15305” section on page 4-50 for details.

-
- Step 1** When the module is installed in desired slot, click desired LAN port to view modifiable attributes, [Figure 5-8](#).
 - Step 2** Attributes marked as bold are modifiable.

Figure 5-8 LAN Port Attributes



These Attributes are modifiable:

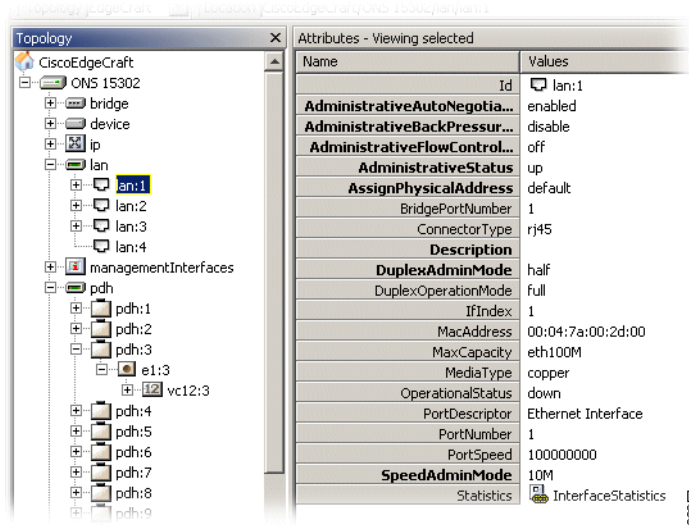
- **AdministrativeAutoNegotiationMode**
disabled or enabled
- **AdministrativeBackPressureMode**
disabled or enabled
- **AdministrativeFlowControlMode**
on, off or auto negotiation
- **AdministrativeStatus**
up, down or testing
- **AssignPhysicalAddress**
reserve or default
- **Description**
string
- **DuplexAdminMode**
none, half or full
- **SpeedAdmin mode**
not set, 10M, 100M or 1000M

Step 3 Click **Save** if attribute modifications are performed.

5.4.2 ONS 15302 LAN Port Attributes

The ONS 15302 is equipped with 4 LAN ports, [Figure 5-9](#). For configuration of LAN ports see “[5.4.1 ONS 15305 - LAN Port Attributes](#)” section on page 5-12.

Figure 5-9 LAN Port Attributes - ONS 15302



5.5 WAN ports - ONS 15305

5.5.1 Introduction

One of the special features of ONS 15305 is the possibility to concentrate IP traffic over the SDH network. The purpose of this section is to describe the tasks involved in assigning capacity from the SDH server layer to WAN ports. The total assigned WAN capacity is made up of SDH channels.

Each SDH channel is equivalent to a VC-12 (2 Mbps). This is available in the first release of the network element. Future releases will also include mapping to VC-3 and VC-4. This section only describes the VC-12/TU-12 layer rate.

The SDH channels can be from different SDH ports.

The WAN channels can be sub-network connection (SNC) protected. In the first release of ONS 15305 only protection scheme SNC/I (inherent monitoring) is supported.

5.5.1.1 WAN Ports and the Mapping

The eight WAN ports are located on the 8xSTM-1 module. They are connected to a Galileo switch, [Figure 5-10](#). A WAN port has a maximum capacity of 100 Mbps.

Figure 5-10 The 8 x STM-1 Module with WAN Ports

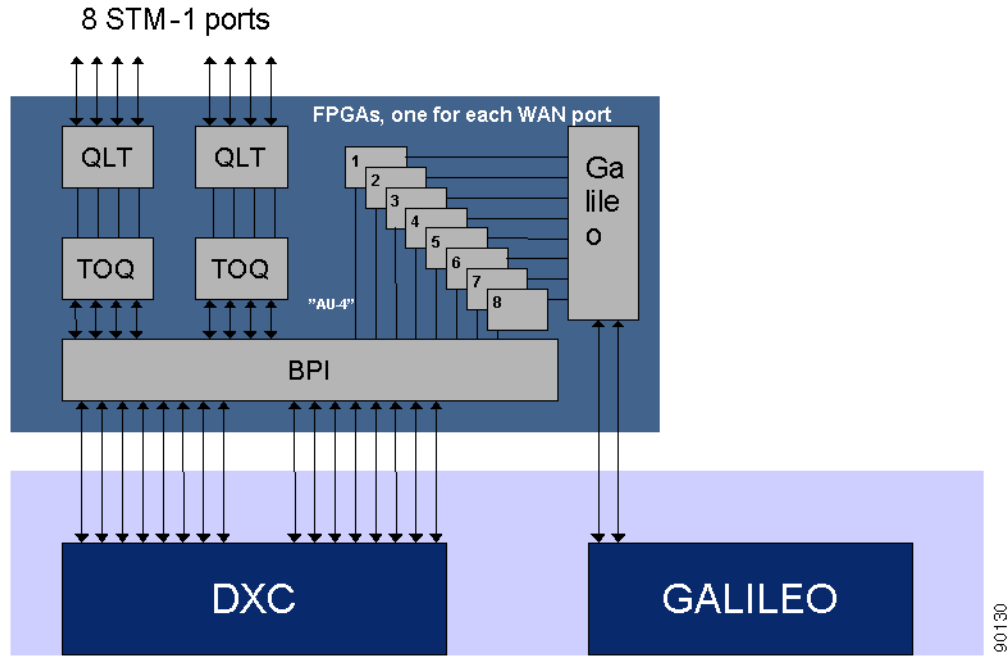
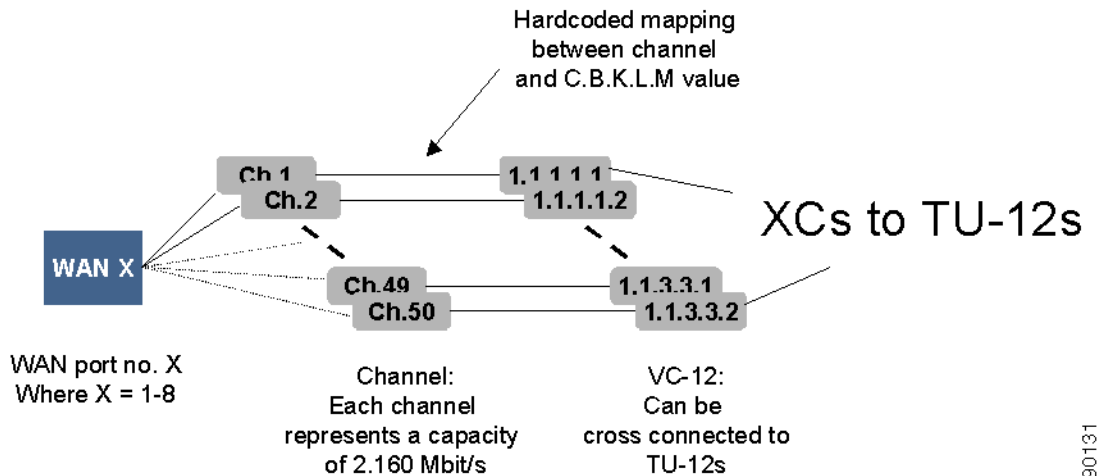


Figure 5-11 shows that the potential capacity of 100 Mbps is realized through 50 channels each able to carry 2.160 Mbps. The capacity of the WAN port is therefore decided by how many channels that are used for traffic.

A WAN port can be mapped to one STM-1 port, that means there are potentially 63 available VC-12s. Only the 50 first of these are used. These 50 channels have hard coded mapping to 50 VC-12 containers. The C.B.K.L.M numbering is described in C.B.K.L.M Value Usage, page 5-35.

Figure 5-11 View of one WAN Port and its Logical View

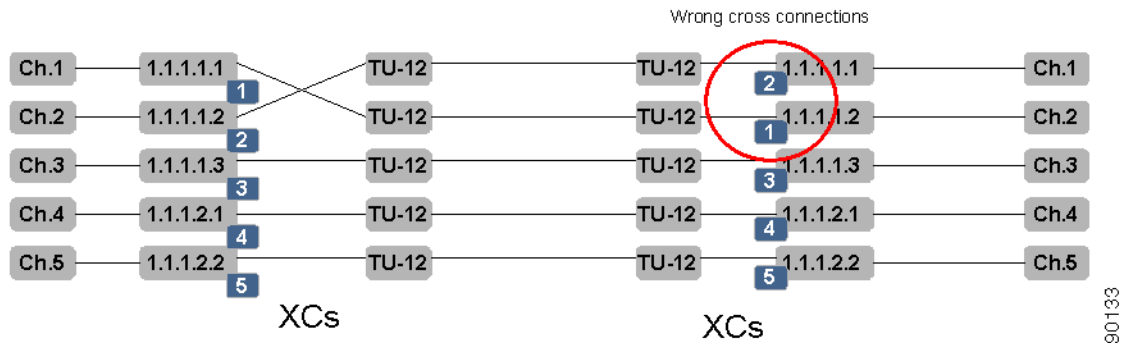


The WAN VC-12s are cross connected to the available TU-12s on the SDH ports. All 50 WAN VC-12s are always available for cross connection. A WAN VC-12 always represents the termination point A in a cross connection and the connection is always bidirectional. The cross connection can be protected.

If there exists a VC-12 (or channel) inside the WAN capacity that is not cross connected, the network element issues an alarm on the WAN VC-12 (unequipped alarm).

The order of the channels are essential and must be the same on both sides of a WAN connection, for example, containers sent from channel 1 must be received on channel 1. A sequence number is used to indicate the correct order of the VC-12 on the receiving side of a WAN connection between two ONS 15305. If the connection is not between two ONS 15305, the sequence number will be zero. A scenario where the cross connection between two TU-12s and two VC-12s in one ONS 15305 are wrong are illustrated in [Figure 5-12](#).

Figure 5-12 Sequence Numbers for Correct Order of TU-12 to VC-12 Cross Connects.



Alarms and performance monitoring data is collected and reported for those VC-12s that are within the WAN capacity.

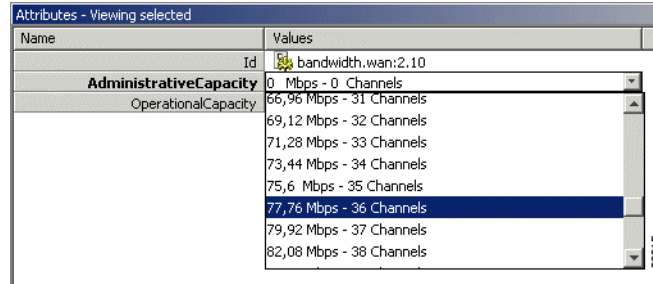
5.5.2 Add Initial WAN Port Capacity

The addition of WAN port capacity is performed in a two step process.

The first step is to set the administrative capacity of the WAN port. This will tell ONS 15305 how many of the 50 possible WAN channels to use for mapping into the SDH server layer.

-
- Step 1** Select a WAN port.
 - Step 2** When the WAN port managed object is expanded, select **Bandwidth**.

Figure 5-13 Set Bandwidth



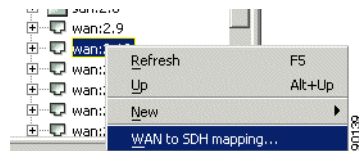
Step 3 Set the Bandwidth to a value between 0 and 100 Mbps, [Figure 5-13](#).

Step 4 Click **Save** on the toolbar.

The next step is to cross-connect the WAN channels that are in use after setting the administrative capacity.

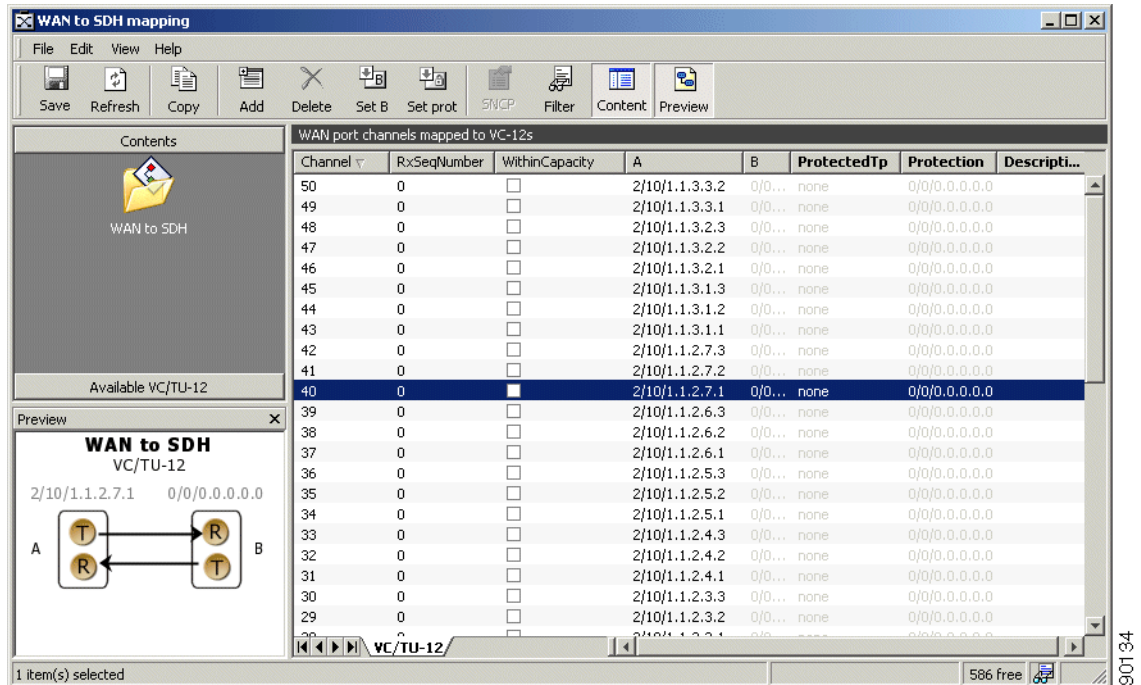
Step 5 Select the WAN port again, right click and select **WAN to SDH mapping**, [Figure 5-14](#).

Figure 5-14 Select WAN Port Attributes



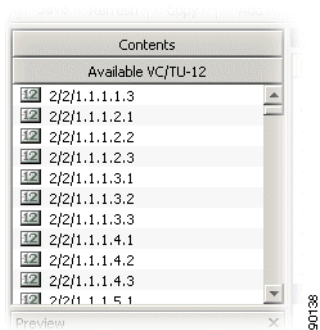
A list of all the WAN channels of the WAN port is shown. The list shows the static relation between each channel number and a VC12 object in the WAN port. The WithinCapacity attribute indicates if the channel is in use by the WAN channel (that means if it was included when setting administrative capacity above).

Figure 5-15 Set WAN Port Attributes



- Step 6** Make sure the Content panel is available in the left part of the window, [Figure 5-15](#).
If it is not available select the **Content** button in the toolbar.
- Step 7** Select the Available VC/TU12 List in the content panel. SHIFT and CTRL buttons can be used for multiple selection The list contains the free TU12 termination points in ONS 15305, [Figure 5-16](#).

Figure 5-16 Select Available VC/TU12



Note If the Available VC or TU12 List in the content panel does not show the TU12 termination points that you want to map your WAN port to, you have to make sure they are made available for cross-connection, “[5.2.1 Configuring ONS 15305 SDH Port Structure \(Channelization\)](#)” section on page 5-2.

- Step 8** Double-click the TU12 termination point that you want to use to map to your WAN channel number 1. The selected TU12 is inserted as the B termination Point for channel 1.

- Step 9** Double-click the termination point that you want to use to map to your WAN channel number 2.
- Step 10** Continue until all channels that are within capacity has a B termination point.
- Step 11** Click **Save** on the toolbar.



Note Remember to perform the same operation on the WAN port on the other side of the SDH network and adding cross-connections in intermediate nodes. The WAN channel will only work if it is connected to the WAN channel with the same channel number on the opposite end of the SDH network.



Note The WAN port will not report alarms on channels that are not part of the administrative capacity.

5.5.3 Modify WAN Port Capacity

You can modify the WAN port capacity in the same way as you added the initial WAN capacity, “[5.5.2 Add Initial WAN Port Capacity](#)” section on page 5-16.

- Step 1** Select a WAN port.
- Step 2** When the WAN port managed object is expanded, select **Bandwidth**.
- Step 3** Set the Bandwidth to a new value between 0 and 100 Mbps.
- Step 4** Click **Save** on the toolbar.
- Step 5** Select the WAN port again, right click and select **WAN to SDH mapping**.
- A list of all the WAN channels of the WAN port is shown. The list shows the static relation between each channel number and a VC12 object in the WAN port. The WithinCapacity attribute indicates if the channel is in use by the WAN channel (that means if it was included when setting administrative capacity above).
- Step 6** If you increased the administrative capacity (“[5.5.2 Add Initial WAN Port Capacity](#)” section on page 5-16), more channels have the WithinCapacity attribute set and they need a B termination point to be mapped to the SDH server layer, “[5.5.2 Add Initial WAN Port Capacity](#)” section on page 5-16.
- Step 7** If you decreased the administrative capacity (“[5.5.2 Add Initial WAN Port Capacity](#)” section on page 5-16), less channels have the WithinCapacity attribute set and the B termination points can be released for other purposes, “[5.5.2 Add Initial WAN Port Capacity](#)” section on page 5-16.

5.5.3.1 Increasing Capacity in the SDH Server Layer:

Make sure the content panel is available in the left part of the window. If it is not available select the content button in the toolbar.

- Step 1** Select the Available VC or TU12 List in the content panel. The list contains the free TU12 termination points in ONS 15305.



Note If the available VC or TU12 list in the content panel does not show the TU12 termination points that you want to map your WAN port to, you have to make sure they are made available for cross-connection, “5.2.1 Configuring ONS 15305 SDH Port Structure (Channelization)” section on page 5-2.

- Step 2** Double-click the TU12 termination point that you want to use to map to your first new WAN channel. The selected TU12 is inserted as the B termination Point for this channel.
- Step 3** Double-click the termination point that you want to use to map to your next new WAN channel.
- Step 4** Continue until all new channels that are within capacity has a B termination point.
- Step 5** Click **Save** on the toolbar.
- Step 6** Remember to perform the same operation on the WAN port on the other side of the SDH network and adding cross-connections in intermediate SDH nodes.

5.5.3.2 Decreasing Capacity in the SDH Server Layer

- Step 1** Select the WAN channels that are no longer used by the WAN port mapping (channels with B termination points, but not WithinCapacity). Multiple selection is possible with Shift or Ctrl buttons, [Figure 5-17](#).
- Step 2** Click **Delete** on the toolbar. The selected channels becomes red.

Figure 5-17 Select WAN Channels

Channel	RxSeqNumber	WithinCapacity	A	B	ProtectedTp	Protection	Description
50	0	<input type="checkbox"/>	2/10/1.1.3.3.2	2/2...	none	0/0/0.0.0.0.0	
49	0	<input type="checkbox"/>	2/10/1.1.3.3.1	0/0...	none	0/0/0.0.0.0.0	
48	0	<input type="checkbox"/>	2/10/1.1.3.2.3	2/2...	none	0/0/0.0.0.0.0	
47	0	<input type="checkbox"/>	2/10/1.1.3.2.2	0/0...	none	0/0/0.0.0.0.0	

- Step 3** Click **Save** on toolbar. The SDH TU12 termination points are released from WAN port mapping.
- Step 4** Remember to perform the same operation on the WAN port on the other side of the SDH network and deleting cross-connections in intermediate SDH nodes.



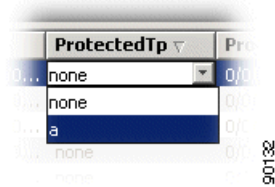
Note It is not possible to modify the B termination point after it has been saved. If you want to modify the B termination point the channel must first be deleted, and then a new termination point can be added.

5.5.4 Protecting a WAN Port

WAN ports can be protected by the SNC protection scheme in the VC12 or TU12 SDH layer. That means that the WAN channels (not necessarily all WAN channels of a WAN port) can have two different routes through the SDH server network, and that the receiving WAN channel selects the route with the best signal.

- Step 1** Add initial WAN port capacity as described in “5.5.2 Add Initial WAN Port Capacity” section on page 5-16.
- Step 2** Set the ProtectedTP attribute to **a** for the WAN channels you want to protect, Figure 5-18.

Figure 5-18 Select Protected Mode



- Step 3** Select the first WAN channel you want to protect.
- Step 4** Make sure the content panel is available in the left part of the window. If it is not available select the content button in the toolbar.
- Step 5** Select the available VC or TU12 list in the content panel. The list contains the free TU12 termination points in ONS 15305.



Note If the available VC or TU12 list in the content panel does not show the TU12 termination points that you want to protect your WAN channel with, you have to make sure they are made available for cross-connection, “5.2.1 Configuring ONS 15305 SDH Port Structure (Channelization)” section on page 5-2.

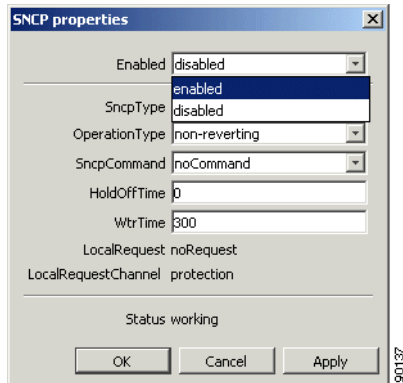
- Step 6** Select the TU12 termination point that you want to protect your WAN channel with.
- Step 7** Click on the **Set Prot** button in the toolbar. The protection TP is filled in for the selected WAN channels.
- Step 8** Select the next WAN channel to protect and insert the protection TU12. Proceed until all WAN channels are protected (channels that have the Protected TP attribute set to a).
- Step 9** Click **Save** on toolbar. Remember to perform the same operation on the WAN port on the other side of the SDH network and adding cross-connections in intermediate nodes.



Note By default the protection is disabled and will not work before it is enabled.

- Step 10** Select the WAN channels where you want to enable protection (Shift and Ctrl buttons can be used for multiple selection).
- Step 11** Click the **SNCP** button in the toolbar, Figure 5-19.
- Step 12** Set the Enabled attribute to **enabled** and click **OK**.

Figure 5-19 Set SNCP Properties Enabled



- Step 13** Click **Save** on toolbar. Remember to perform the same operation on the WAN port on the other side of the SDH network. (However SNC protection is not bidirectional and does not have to be enabled in both ends simultaneously for the SNC protection scheme to work on the side that is enabled).



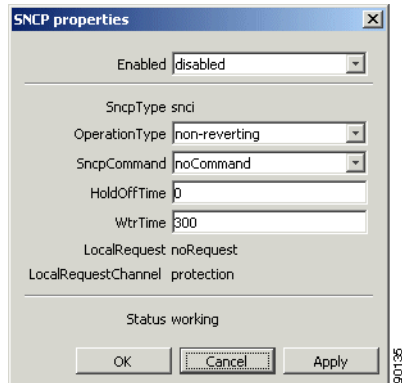
Note It is not possible to modify the protection termination point after it has been saved. If you want to modify the protection termination point the ProtectedTP must first be saved as none. Then the protection TP can be modified. Remember to set the ProtectedTP back to a.

5.5.5 Modifying Protection Parameters of the WAN Port

WAN ports are protected as described in “5.5.4 Protecting a WAN Port” section on page 5-21. The SNC is then set up with a set of default parameters. The parameters can easily be modified, Figure 5-20.

- Step 1** Select a WAN port.
- Step 2** Right click and select **WAN to SDH mapping**.
- Step 3** Select the WAN channels where you want to modify protection parameters (Shift and Ctrl buttons can be used for multiple selection).
- Step 4** Click the **SNCP** button in the toolbar.
- Step 5** Modify the SNC protection parameters and click **OK**.

Figure 5-20 Set SNCP Properties Protection



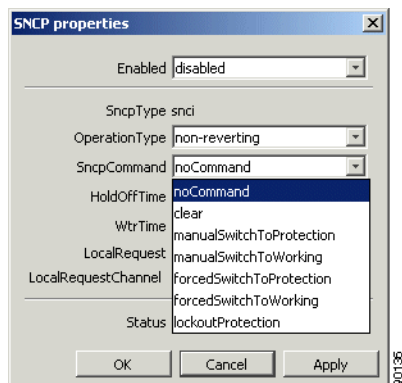
Step 6 Click **Save** on toolbar.

5.5.6 Commanding WAN Port Protection Switch

The Cisco Edge Craft user can control the SNC protection switch by sending a command, [Figure 5-21](#).

- Step 1** Select a WAN port.
- Step 2** Right click and select **WAN to SDH mapping**.
- Step 3** Select the WAN channels where you want to modify protection parameters (Shift and Ctrl buttons can be used for multiple selection).
- Step 4** Click the **SNCP** button in the toolbar.
- Step 5** Select the **SncpCommand** and click **OK**.

Figure 5-21 Set SNCP Properties Command



Step 6 Click **Save** on toolbar. Depending on the priority of the command and current status of each channel, a switch may now take place for some or all selected WAN channels.

5.5.7 Setting Path Trace Identifiers for WAN Port

Path Trace parameters can be set for each channel (VC12) in the WAN port.

-
- Step 1** Select a WAN port.
- Step 2** Click on the **PathTraceWAN** parameter group.
- Step 3** The following attributes can be set collective for all channels of the WAN port:
- PathTrace
Set to enable if TIM alarms should be reported for the WAN port when there is a mismatch between PathTraceReceived and PathTraceExpected.
 - PathTraceExpected
Enter a value for the path trace identifier that you expect to receive from the other side of the WAN channels.
 - PathTraceTransmitted
Enter a value for the path trace identifier that you want to transmit to the other side of the WAN channels.
- Step 4** Click **Save** on toolbar.



Note When path trace is set to enabled, AIS is inserted downstream instead of the original signal when there is a mismatch between expected and received path trace.

5.5.8 Reading Path Trace Identifiers for WAN Port

Path trace parameters can be read for each channel (VC12) in the WAN port.

-
- Step 1** Select a WAN port.
- Step 2** When the WAN port managed object is expanded, click on the **channel (vc12)** where you want to see the Received Path Trace.
- Step 3** Click on **PathTraceVC12**
- Step 4** The following attributes can be read:
- PathTrace
Set to enable if TIM alarms should be reported when there is a mismatch between PathTraceReceived and PathTraceExpected.
 - PathTraceExpected
Enter a value for the path trace identifier that you expect to receive from the other side of the path.
 - PathTraceTransmitted
Enter a value for the path trace identifier that you want to transmit to the other side of the path.
 - PathTraceReceived
The actual received path trace identifier from the other side of the link.



Note When path trace is set to enabled, AIS is inserted downstream instead of the original signal when there is a mismatch between expected and received PathTrace.

5.5.9 Monitoring WAN Port Performance

-
- Step 1** Select a WAN port.
- Step 2** When the WAN port managed object is expanded, click on the **channel (vc12)** where you want to see the Performance data.
- Step 3** Click on **PmG826NearEndVc12** to read near end PM data or **PmG826FarEndVC12** to read far end PM data.
- Step 4** The following attributes are available
- Current15Min ES,SES, BBE and UAS
 - Current24Hour ES, SES, BBE and UAS
- Step 5** To see the Performance history of the previous 16x15 minute counters click on **Interval15Min**, or click on **Interval24Hour** to see the previous 24 hour counter.
- Step 6** The following attributes are available
- Interval15Min ES, SES, BBE and UAS
 - Interval24Hour ES, SES, BBE and UAS
-

5.5.10 Advanced WAN Port Operations

For frequent users of Cisco Edge Craft, it is possible to make use of the enhanced editing facilities to speed up the configuration work.

Selection and Insertion of Multiple Termination Points

-
- Step 1** Select the channels where you want to add termination points as B-end or Protection. Use Shift or Ctrl buttons to select more than one channel, or simply drag the mouse down the list while pressing the left mouse button.
- Step 2** Select the TU-12 termination points that you want to add to the B-ends of the channels in the same way.
- Step 3** Click the **Set B** button in the toolbar.
- Step 4** Select the TU-12 termination points that you want to add to the Protection TPs of the channels.
- Step 5** Click the **Set Prot** button in the toolbar.
- Step 6** Click **Save** on the toolbar.



Note You are only allowed to set the B or protection termination points of channels where B or P are not in use.

If you want to modify the B termination point the relation with the existing B termination point must first be deleted. Then a new termination point can be added.

If you want to modify the protection termination point the ProtectedTP must first be saved as none. Then the protection TP can be modified. Remember to set the ProtectedTP back to a.



Note If you do not select the same number of instances of WAN channels and termination points, the channels will be filled in with as many TPs as available, starting from the top of the selected channel list. If more TPs are selected than channels, the last TPs will not be used.

Entering Termination Points Manually

- Step 1** Select an unconfigured WAN channel.
- Step 2** Click on the **B termination point**. A list of slots appears.
- Step 3** Select a slot. A list of ports appears.
- Step 4** Select a port.
- Step 5** Continue selecting each of the CBKLM values.
- Step 6** Enter the Protection termination point the same way if used (and set **ProtectedTP** to **a**).
- Step 7** Click **Save** on the toolbar.



Note The information can also be entered directly without selecting the numbers from the drop down list. Remember to use the following format: <slot/port/C.B.K.L.M>

5.6 WAN Ports - ONS 15302

One of the special features of ONS 15302 is the possibility to concentrate IP traffic over the SDH network. The purpose of this chapter is to describe the tasks involved in assigning capacity from the SDH server layer to WAN ports.

Each SDH channel is equivalent to a VC-12 (2.160 Mbps). ONS 15302 has one or four WAN ports depending on the hardware configuration.

5.6.1 WAN ports and the Mapping

The network element has one or four WAN ports. A WAN port has a maximum capacity of 100 Mbps.

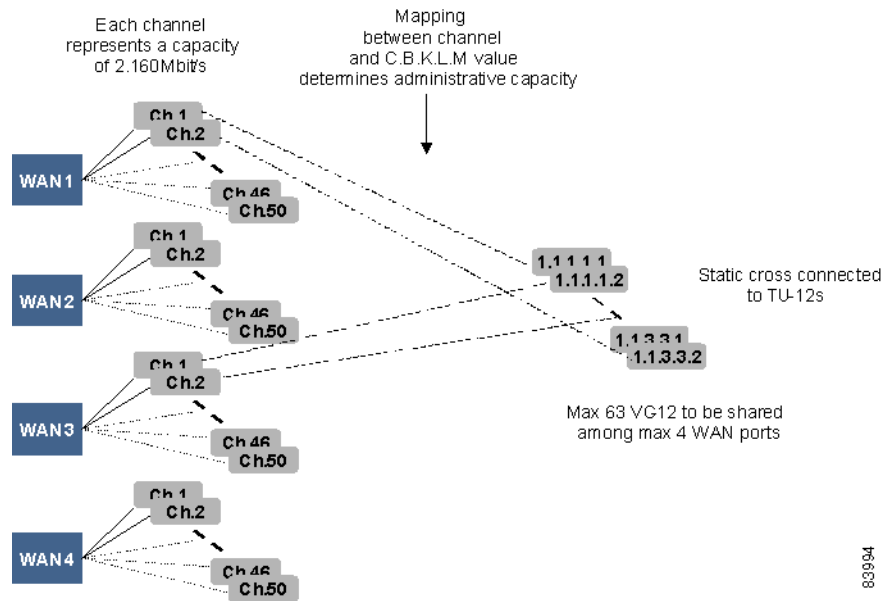
The WAN ports are logical ports and not physical ports. The potential capacity of 100 Mbps is realized and guaranteed through 47-50 VC12s each able to carry 2.160 Mbps. The overhead, that means, extra bits, are used to handle escaped characters. The capacity of the WAN port is therefore decided by how many VC12s that are assigned to the port.

ONS 15302 has one STM-1 port and potentially 63 VC12s are available from a WAN port. Each WAN port has 50 channels that are dynamically mapped to VC12s.

The VC-12s have static cross connections to the available TU-12s on the SDH ports.

The order of the 0-50 channels are essential and must be the same on both sides of a WAN connection, for example containers sent from channel 1 must be received on channel 1, [Figure 5-22](#).

Figure 5-22 View of the WAN Ports and their Logical View



Alarms and performance monitoring data is collected and reported for the VC-12s.

5.6.2 Differences between ONS 15305 and ONS 15302

In ONS 15305 each WAN port has always a potential capacity of 100 Mbps realized through 50 channels. The available capacity is not dependent on the capacity used by the other WAN ports. When you set the capacity, the system selects the first X channels corresponding to this capacity. The channels have a static mapping to VC-12s. You must cross connect the VC-12s to TU-12s to activate the capacity.

In ONS 15302 each WAN port also has a potential capacity of 100 Mbps, but the available capacity is dependent on the capacity used by the other WAN ports. You set and activate the capacity indirectly by selecting a set of channels and map them to VC-12s. The VC-12s are statically cross connected to TU-12s.

5.6.3 Add initial WAN Port Capacity

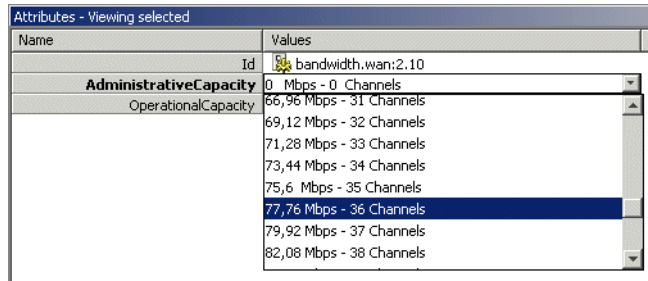
The addition of WAN port capacity can be performed in a two step process.

Set the Administrative Capacity (Optionally)

The first step is to set the administrative capacity of the WAN port. This will tell ONS 15302 how many of the 50 possible WAN channels to use for mapping into the SDH server layer, [Figure 5-23](#).

- Step 1** Select a WAN port.
- Step 2** When the WAN port managed object is expanded, select **Bandwidth**.

Figure 5-23 Set Bandwidth



- Step 3** Set the Bandwidth to a value between 0 and 100 Mbps.



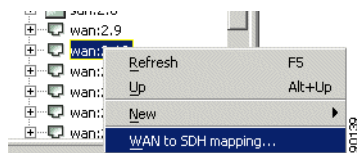
Note If you choose to set the administrative capacity to a desired number of channels and during the WAN to SDH mapping increases the number of channels, the administrative capacity reflects the preset value and not the actual number of channels mapped. When Cisco Edge Craft is restarted, administrative capacity will display actual channel number currently mapped.

- Step 4** Click **Save** on the toolbar.

Cross-connect the WAN Channels

- Step 1** Select the WAN port again, right click and select **WAN to SDH mapping**, [Figure 5-24](#).
- Step 2** A list of all the WAN channels of the WAN port is shown. The list shows the static relation between each channel number and a VC12 object in the WAN port.

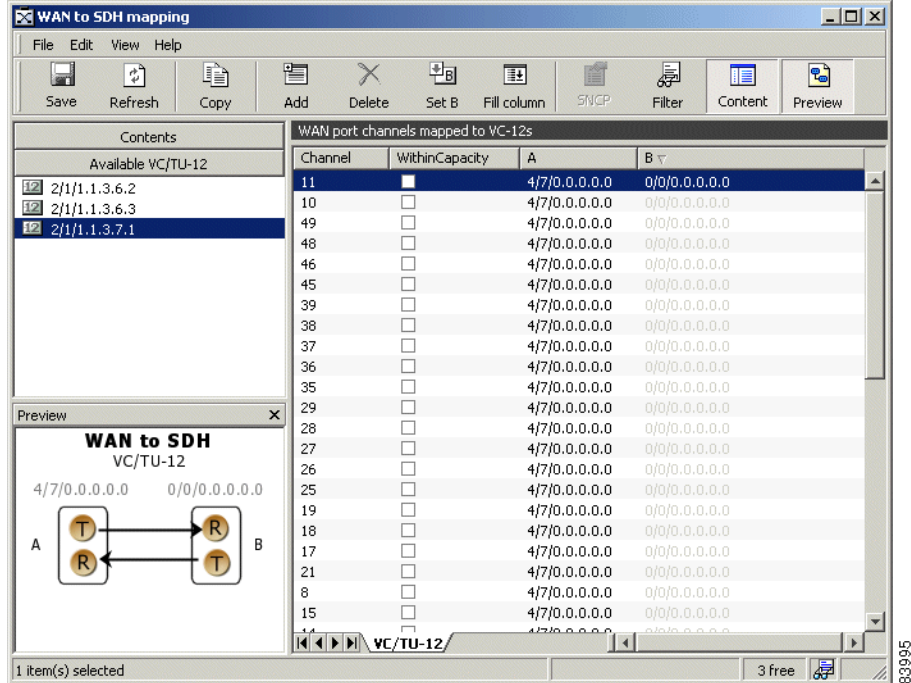
Figure 5-24 Select a WAN port



If the Administrative Capacity is set, the WithinCapacity attribute indicates if the channel is in within the desired capacity, [Figure 5-25](#).

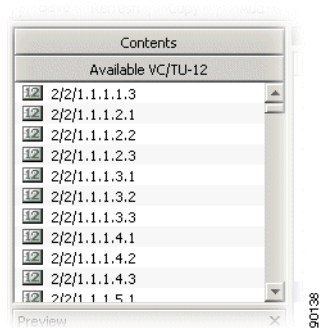
If the Administrative Capacity is not set, the WithinCapacity attribute indicates numbers of channels mapped.

Figure 5-25 Set WAN Attributes



- Step 3** Make sure the Content panel is available in the left part of the window. If it is not available select the Content button in the toolbar.
- Step 4** Select the available VC or TU12 List in the content panel. The list contains the free TU12 termination points in ONS 15305, [Figure 5-26](#).

Figure 5-26 Select Available VC/TU12 Container



- Step 5** Double-click the TU12 termination point that you want to use to map to your WAN channel number 1. The selected TU12 is inserted as the B termination Point for channel 1.
- Step 6** Double-click the termination point that you want to use to map to your WAN channel number 2.
- Step 7** If AdministrativeCapacity is set, continue until all channels that are within capacity has a B termination point.
- Step 8** Click **Save** on the toolbar.



Note Remember to perform the same operation on the WAN port on the other side of the SDH network and adding cross-connections in intermediate nodes. The WAN channel will only work if it is connected to the WAN channel with the same channel number on the opposite end of the SDH network.



Note The WAN port will not report alarms on channels that are not part of the administrative capacity.

5.6.4 Increasing Capacity in the SDH Server Layer

Make sure the content panel is available in the left part of the window. If it is not available select the content button in the toolbar

- Step 1** Select the available VC or TU12 List in the content panel. The list contains the free TU12 termination points in ONS 15302.
- Step 2** Double-click the TU12 termination point that you want to use to map to your first available WAN channel. The selected TU12 is inserted as the B termination Point for this channel.



Note For the ONS 15302, mapping must be performed in a continuous range.

- Step 3** Double-click the termination point that you want to use to map to.
- Step 4** If AdministrativeCapacity is set, continue until all channels that are within capacity has a B termination point.
- Step 5** Click **Save** on the toolbar.
- Step 6** Remember to perform the same operation on the WAN port on the other side of the SDH network and adding cross-connections in intermediate SDH nodes.

5.6.5 Decreasing Capacity in the SDH Server Layer

- Step 1** Select the WAN channels that are not used anymore by the WAN port mapping (channels with B termination points, but not WithinCapacity). Multiple selection is possible with Shift or Ctrl buttons.



Note For the ONS 15302, deleting mappings, must be performed in a continuous range.

- Step 2** Click **Delete** on the toolbar. The selected channels becomes red, [Figure 5-27](#).

Figure 5-27 Delete WAN Port

Channel	RxSeqNumber	WithinCapacity	A	B	ProtectedTp	Protection	Description
50	0	<input type="checkbox"/>	2/10/1.1.3.3.2	2/2...	none	0/0/0.0.0.0.0	
49	0	<input type="checkbox"/>	2/10/1.1.3.3.1	0/0...	none	0/0/0.0.0.0.0	
48	0	<input type="checkbox"/>	2/10/1.1.3.2.3	2/2...	none	0/0/0.0.0.0.0	
47	0	<input type="checkbox"/>	2/10/1.1.3.2.2	0/0...	none	0/0/0.0.0.0.0	

- Step 3** Click **Save** on toolbar. The SDH TU12 termination points are released from WAN port mapping.
- Step 4** Remember to perform the same operation on the WAN port on the other side of the SDH network and deleting cross-connections in intermediate SDH nodes.



Note It is not possible to modify the B termination point after it has been saved. If you want to modify the B termination point the mapping must first be deleted, and then a new termination point can be added.

5.6.6 Setting Path Trace Identifiers for WAN Port

Path trace parameters can be read for each channel (VC12) in the WAN port.

- Step 1** Select a WAN port.
- Step 2** Click on the **PathTraceWAN** parameter group
- Step 3** The following attributes can be set for all channels of the WAN port:
- PathTrace

Set to enable if TIM alarms should be reported for the WAN port when there is a mismatch between PathTraceReceived and PathTraceExpected.
 - PathTraceExpected

Enter a value for the path trace identifier that you expect to receive from the other side of the WAN channels.
 - PathTraceTransmitted

Enter a value for the path trace identifier that you want to transmit to the other side of the WAN channels.
- Step 4** Click **Save** on toolbar.



Note When path trace is set to enabled, AIS is inserted downstream instead of the original signal when there is a mismatch between expected and received path trace.

5.6.7 Reading Path Trace Identifiers for WAN Port

Path trace parameters can be read for each channel (VC12) in the WAN port.

-
- Step 1** Select a WAN port.
- Step 2** When a WAN port managed object is expanded, click on the channel (vc12) where you want to see the Received Path Trace.
- Step 3** Click on **PathTraceVC12**.
- Step 4** The following attributes can be read:
- PathTrace
Set to enable if TIM alarms should be reported when there is a mismatch between PathTraceReceived and PathTraceExpected.
 - PathTraceExpected
Enter a value for the path trace identifier that you expect to receive from the other side of the path.
 - PathTraceTransmitted
Enter a value for the path trace identifier that you want to transmit to the other side of the path.
 - PathTraceReceived
The actual received path trace identifier from the other side of the link.



Note When path trace is set to enabled, AIS is inserted downstream instead of the original signal when there is a mismatch between expected and received PathTrace.

5.6.8 Monitoring WAN Port Performance

-
- Step 1** Select a WAN port.
- Step 2** When the WAN port managed object is expanded, click on the channel (vc12) where you want to see the Performance data.
- Step 3** Click on **PmG826NearEndVc12** to read near end PM data or **PmG826FarEndVC12** to read far end PM data.
- Step 4** The following attributes are available:
- Current15Min ES,SES, BBE and UAS
- Step 5** To see the Performance history of the previous 16x15 minute counters click on **Interval15Min**.
The following attributes are available:
- Interval15Min ES,SES, BBE and UAS
-

5.6.9 Advanced WAN Port Operations

For frequent users of Cisco Edge Craft, it is possible to make use of the enhanced editing facilities to speed up the configuration work.

Selection and Insertion of Multiple Termination Points

-
- Step 1** Select the channels where you want to add termination points as B-end. Use Shift or Ctrl buttons to select more than one channel, or simply drag the mouse down the list while pressing the left mouse button.
 - Step 2** Select the TU-12 termination points that you want to add to the B-ends of the channels in the same way.
 - Step 3** Click the **Set B** button in the toolbar.
 - Step 4** Click **Save** on the toolbar.



Note You are only allowed to set the B termination points of channels where B is not in use. If you want to modify the B termination point the relation with the existing B termination point must first be deleted. Then a new termination point can be added.



Note If you do not select the same number of instances of WAN channels and termination points, the channels will be filled in with as many TPs as available, starting from the top of the selected channel list. If more TPs are selected than channels, the last TPs will not be used.

5.7 ONS 15305 SDH Cross-Connection Management

The purpose of this section is to describe the tasks involved when managing cross connections between termination points on the network element.

The section involves management of the complete life cycle of a cross connection, including creation, presentation, modification, deletion and manual operation of the sub-network connection protection switch.

A cross connection is defined by its termination points. Only termination points with the same characteristic information can be cross-connected. The characteristic information of a termination point defines the format of the signal that can be transferred by this termination point. Format defines the capacity of the signal, for example TU-12 and VC-12 have the same characteristic information since they both have a 2 Mbps traffic capacity.

Unidirectional and bidirectional point to point cross connections with or without protection are supported.

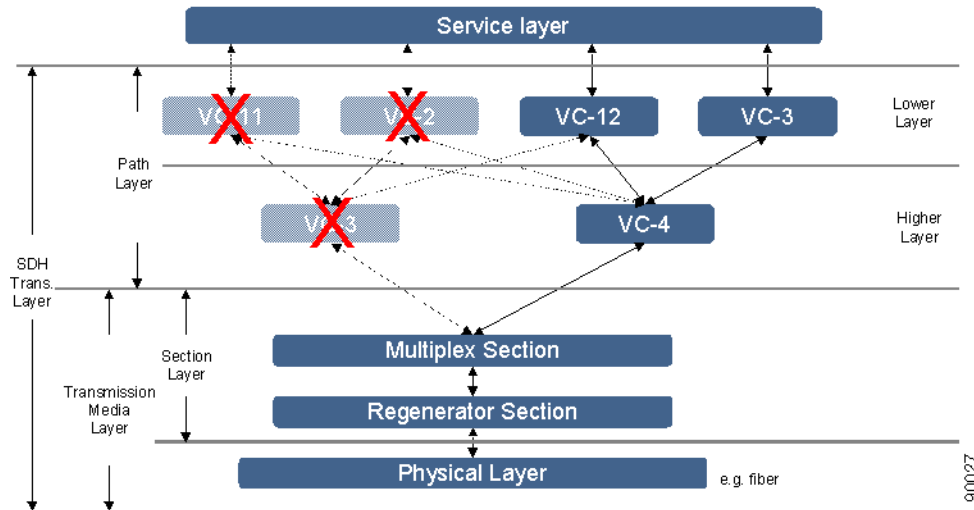
The protection scheme supported by the first release of ONS 15305 is SNC/I, (inherent monitoring). Non-intrusive monitoring SNC/N will be supported in later releases.

The first part of this section gives a short introduction to SDH layers and cross connections which is meant to help the reader in understanding the requirements specified in this document. For further reading on SDH and cross connections, please see ITU-T Recommendations G-Series.

5.7.1 SDH Layer Network and Cross Connections

An SDH network has layered structure as depicted in Figure 5-28. The layers operate in a client/server based scenario. The service layer generates the bit streams that are to be carried across the SDH network. This layer is not part of SDH. The path layer is a virtual layer and can only be observed through a management system. It is in this layer that the cross connection management and structuring of the SDH ports are performed. The path layer works on containers.

Figure 5-28 SDH Layer Network



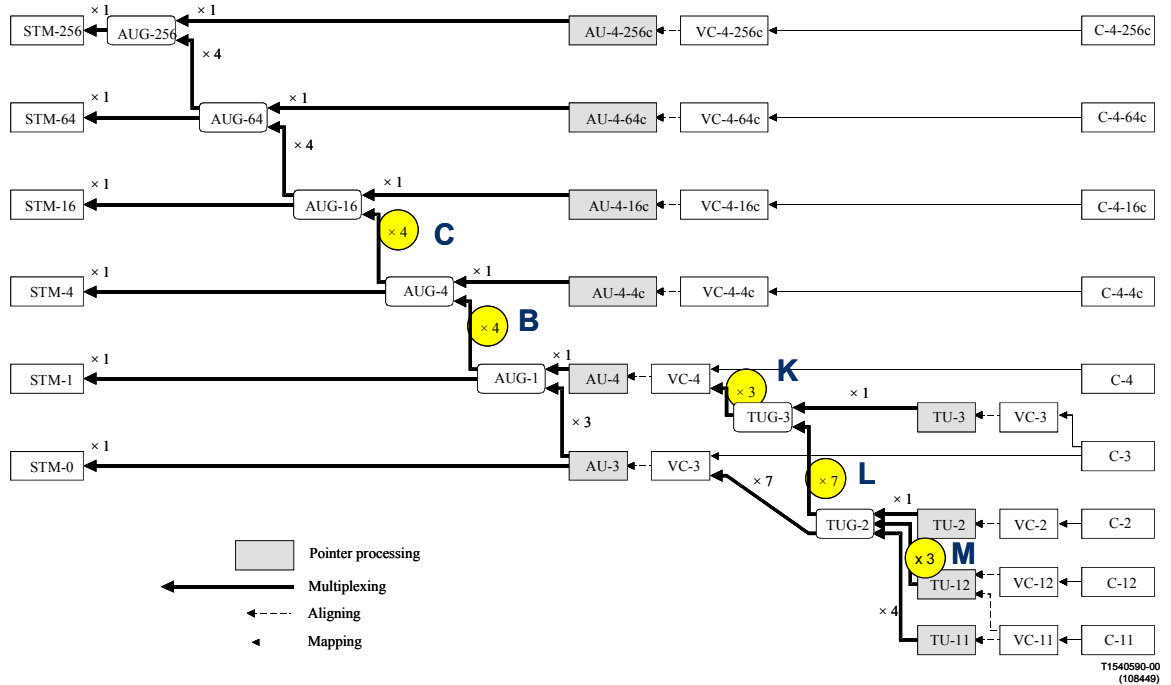
The ONS 15305 network element has support for VC-4 in the higher order layer and in the lower order layer VC-12 and VC-3.

5.7.1.1 SDH Port Structuring

The multiplexing structure of the SDH ports determine which layers and their termination points that are available to be cross connected. The multiplexing structure for SDH in all layers are shown in Figure 5-29 (taken from ITU-T Recommendation G.707.) The C.B.K.L.M value determines the path through the structure. The usage of the C.B.K.L.M value follows the rules defined in Table 5-1.

Only traffic on non-terminated containers called connection termination points can be cross connected, that means AU-4, TU-3, and TU-12. The other containers, VC-4, VC-3, and VC-12, represent trail termination points where the traffic can be read.

Figure 5-29 SDH Multiplexing Structure



The original illustration used in Figure 5-29, is found in ITU-T G.707/Y1322 (10/2000).

C.B.K.L.M Value Usage

Table 5-1 C.B.K.L.M Value Usage

Rules	Examples
When referring to SDH objects the complete C.B.K.L.M value is used even if some fields are in-significant.	
Not significant fields in C.B.K.L.M are set to 0.	AU-4 in STM-16: C.B.0.0.0 TU-3 in STM-16: C.B.K.0.0

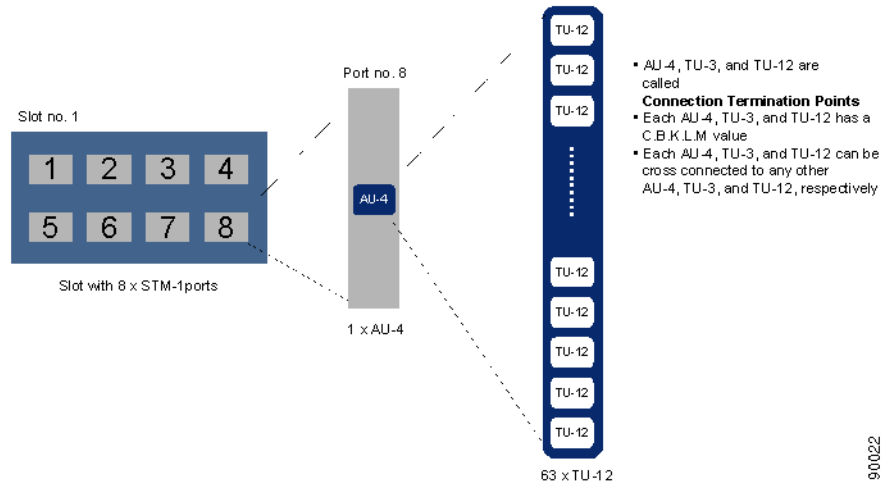
Table 5-1 C.B.K.L.M Value Usage (continued)

Rules	Examples
C identifies which AUG4. If no AUG4 exists, its is set to 1, like a phantom AUG4. B identifies which AUG1. If no AUG1 exists, its is set to 1, like a phantom AUG1.	<p>STM-1: C = 1, B = 1 There is one AUG1 in STM-1 and a phantom AUG4</p> <p>STM-4: C = 1, B = 1 - 4 There is one AUG4 in STM-4</p> <p>STM-16: C = 1 - 4, B = 1 - 4</p> <p>Example: AU-4 in STM-1: 1.1.0.0.0 TU-3 in STM-4: 1.3.3.0.0 TU-12 in STM-16: 2.4.2.7.2</p>
The C.B.K.L.M value is used for VC objects associated with E1, E3, and E4 modules but the C and B values are always 0.	<p>VC-12 on E1 module: 1.1.1.1.1 Protecting: 1.1.1.1.2 VC-3 on E3 module: 1.1.1.0.0 Protecting: 1.1.2.0.0 VC-4 on E4 module: 1.1.0.0.0 (not release1) Protecting: 1.2.0.0.0</p>
For VC objects for WAN	<p>VC-12 on E1 module: 1.1.x.y.z VC-3 on E3 module: x.y.z.0.0 (not release 1) VC-4 on E4 module: x.y.0.0.0 (not release 1)</p>
Combination 0.0.0.0.0 is not a legal value and can be used as an error code.	

Cross-Connection Management

Cross-connection management is the management of connectivity within the network element itself. Cross-connections (XC) are set up between connection termination points with the same characteristic information, for example cross connections between AU-4s, or between TU-3s, between VC-12 and TU-12, or between two VC-12s.

Figure 5-30 Slot - Port - CTP Relations



In ONS 15305 there are four slots that can hold an SDH module. The module can be of different types, that means, STM-1, STM-4, or STM-16. In this document the STM-1 module with 8 ports is used as an example.

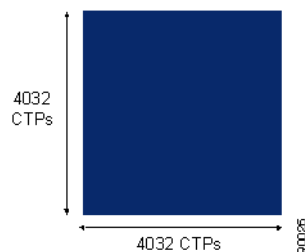
In addition the ONS 15305 can have PDH modules with a number of E1 or E3 ports. The E1 and E3 ports have a corresponding VC-12 or VC-3, respectively. These VCs can be cross connected to termination points on the SDH modules or with each other.

Example

A slot with an 8 x STM-1 module has eight ports. Available CTPs on port no.8 in slot no. 1 are shown in Figure 5-30. There is one AU-4 on the port and depending on the structuring of the AU-4 container, there are 63 TU-12s, 3 TU-3s, or a combination of TU-12s and TU-3s since the TUG-3s can be structured independently, which can be cross-connected. This means that in this single slot there are $8 \times 63 = 504$ CTPs (maximum) in the lower layer and $8 \times 1 = 8$ CTPs in the higher layer.

All four slots in this ONS 15305 are equipped with 8 x STM-1 modules there are $3 \times 504 = 1512$ possible choices for the connecting CTP in the lower layer and $8 \times 3 = 24$ in the higher layer, Figure 5-31.

Figure 5-31 Largest Possible Cross Connect Matrix



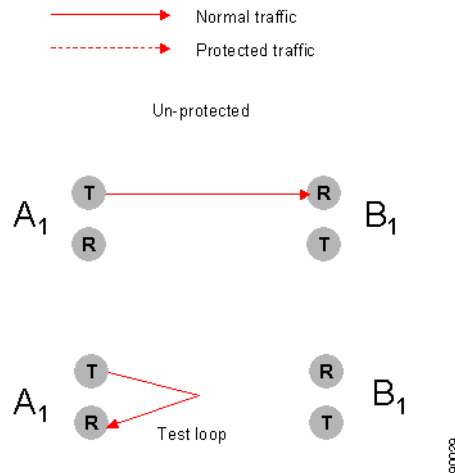
This is a very large number of choices and impossible for a user to keep track of. In addition there are several different types of cross connections:

- Point-to-point

- WAN XCs (special type of point-to-point, “5.5.1.1 WAN Ports and the Mapping” section on page 5-14).
- Drop and continue (not in R1).
- Broadcast (not in R1)

All of these types can be with or without protection and uni-directional or bidirectional, [Figure 5-32](#) to [Figure 5-37](#).

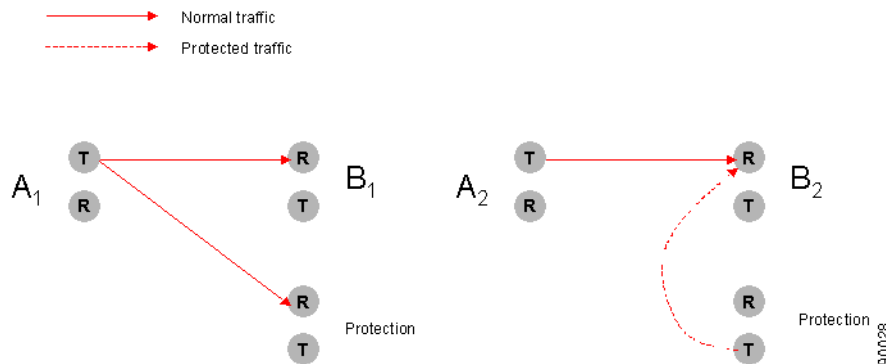
Figure 5-32 Unidirectional XC, Unprotected



Un-protected, uni-directional cross connects can be used for test loops, as illustrated in [Figure 5-32](#).

In [Figure 5-33](#) protection has been set up for the termination point A1 and B2. The protected termination point A1 has no switching possibility since the cross connection is uni-directional, but termination point B2 has switching.

Figure 5-33 Uni-directional XC, Protected



The bidirectional, unprotected cross connection is depicted in [Figure 5-34](#). For bidirectional cross-connections all termination points have switching possibilities when protected. In [Figure 5-35](#) the termination points A1 and B2 are protected, that means A1 can choose to receive from either B1 or the protection and B2 can switch between A2 or the protection.

Figure 5-34 Bidirectional XC, Unprotected

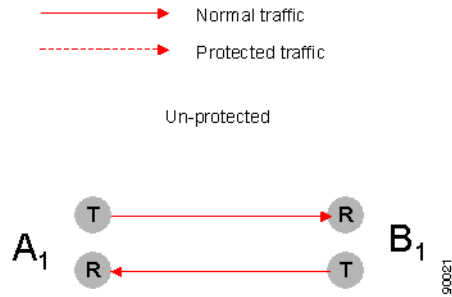


Figure 5-35 Bidirectional, Protected

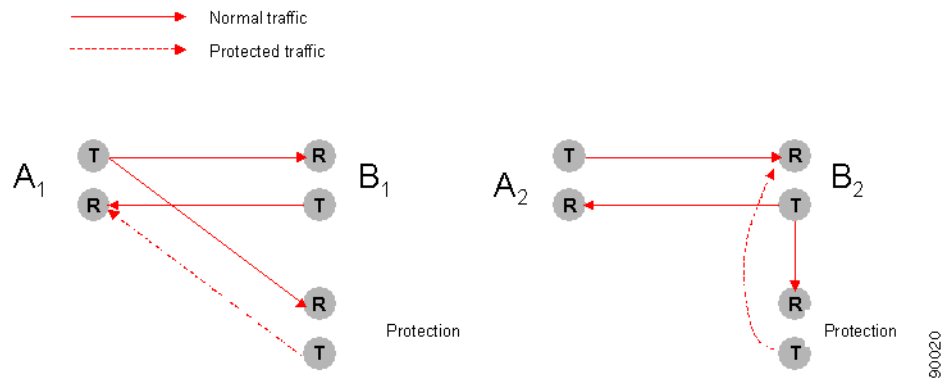


Figure 5-36 Example of Bidirectional, Unprotected, Point-to-point XC

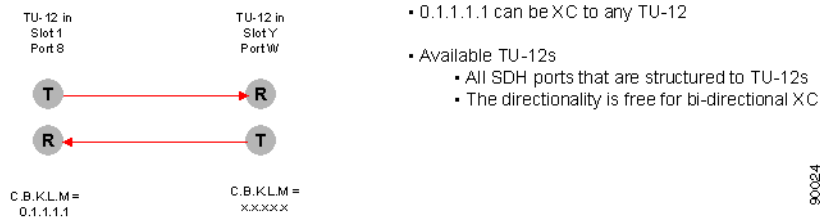
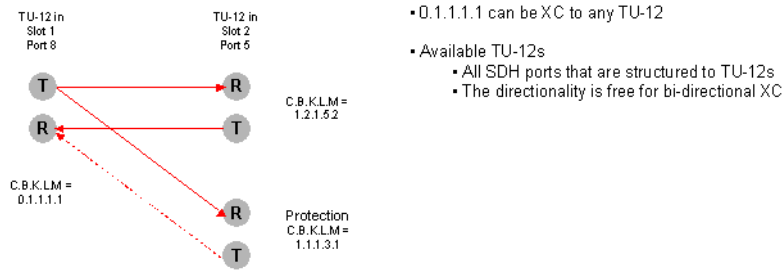


Figure 5-37 Example of Bidirectional, Protected, Point-to-point XC

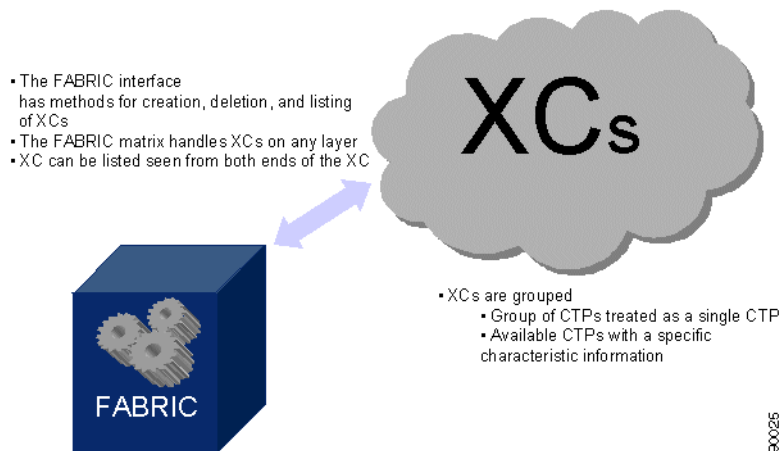


Examples of an unprotected, bidirectional, point-to-point cross connect and a protected, bidirectional, point-to-point cross connect are given in Figure 5-36 and Figure 5-37, respectively.

XC Fabric

The connection management is taken care of by a FABRIC as depicted in Figure 5-38. The FABRIC has an interface that offers a set of methods that helps you in the cross connection management tasks on any layer. The FABRIC can create, delete, and modify cross connections. It has several options for listing of XCs, for example, all XCs with the same characteristic information, all available CTPs on one port of a specific characteristic information. A third possible listing of CTPs can be a pre-defined grouping of points. A user might be indifferent to which specific CTP that is used in a XC as long as it is a member of a specific group of CTPs. The system will choose an arbitrary CTP in the group. This will simplify the selection of CTP for you.

Figure 5-38 XC Fabric



5.7.2 Open the Cross Connection GUI

You have three possible choices for opening of the Cross Connection GUI.

- Step 1** You can start the cross-connection GUI from the desktop menu. The system presents an empty cross-connection GUI, Figure 5-39.

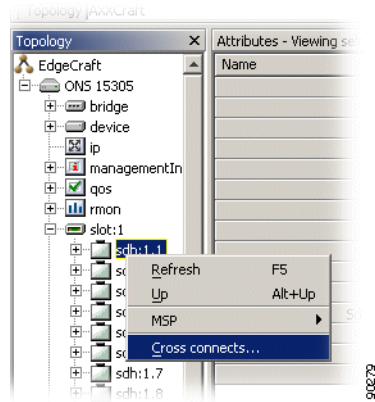
Figure 5-39 Select Cross Connect



or,

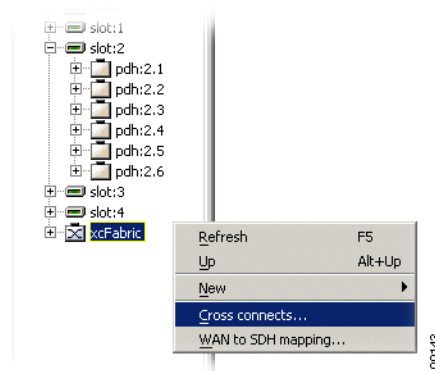
Step 2 Click on a **sdh port**, [Figure 5-40](#)

Figure 5-40 Select SDH Port Cross Connect



Step 3 You can right-click the **xcFabric** managed object in the topology browser, [Figure 5-41](#)

Figure 5-41 Select XCFabric Cross Connect



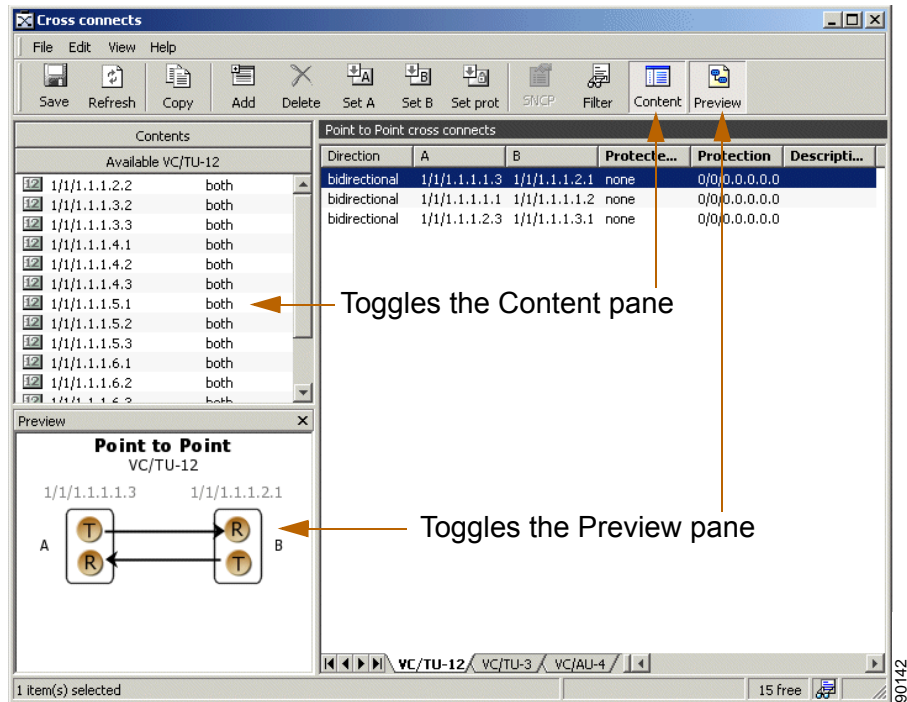
The system presents the cross-connection GUI with the relevant data from the selected managed object in the topology browser.

The cross-connection GUI allows you to filter the selection based on predefined set of queries.

5.7.2.1 Cross-connection GUI - Overview

[Figure 5-41](#) displays the cross-connection screen.

Figure 5-42 Cross-connection GUI - Overview



5.7.3 Browsing Existing Cross-connections

5.7.3.1 Browsing all Cross-connections

- Step 1 Open the cross-connections window from the equipment menu.
- Step 2 A list of all cross-connections is shown.



Note For bidirectional cross-connections the termination points are located in the A column and the B column, according to how the cross-connection was created. One termination point can be in both the A and B-end column if the cross-connections are unidirectional. By default the cross-connections are sorted based on the A-end. Click the B column header to sort based on the B-end.

5.7.3.2 Browsing Cross-connections of a Port

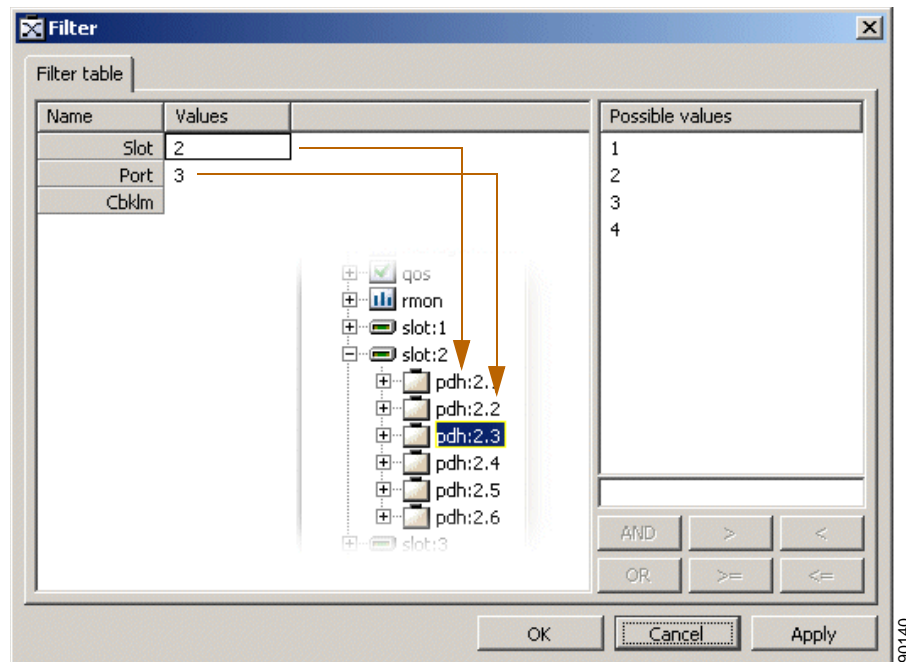
- Step 1 Select a port.
- Step 2 Right click on the port and select cross-connections.

A list of all cross-connections to and from the port is shown.

5.7.3.3 Filtering the Content of the Cross-connection List

- Step 1** Open the Cross-connects window from the equipment menu or from a port as described above.
- Step 2** Click the **Filter** button in the toolbar, [Figure 5-43](#).
- Step 3** Select the filtering criteria you want for slot, port or CBKLM or combinations of them.

Figure 5-43 Example of Filtering Criteria - Cross-connections



- Step 4** Click **Apply**.

The cross-connects window shows only cross-connections where at least one of the termination points are included in the filtering criteria.

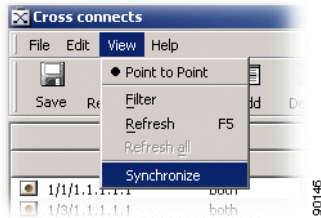
A filter icon is displayed in the status bar of the window to indicate that the filter is active.

5.7.3.4 Synchronizing or Refreshing the Cross-connect Window

Synchronization of the cross-connect GUI will synchronize the available TP list and cross-connections list with the MIB in ONS 15305, [Figure 5-44](#).

- Step 1** Select **Synchronize** from the View menu.

Figure 5-44 Select Synchronize



Note This operation may take some time depending on the number of cross-connections that are created in ONS 15305 and the management network. It ensures data integrity with ONS 15305 MIB.

Refreshing the window will refresh the available TP list and cross-connection list based on the last operations performed by the local user of Cisco Edge Craft.

Step 2 Click **Refresh** button on toolbar.

5.7.4 Setting up Cross-connections

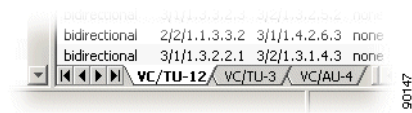
5.7.4.1 From a 2 Mbps E1 Port to a Timeslot in an SDH Port

Creating a cross-connection from a 2 Mbps E1 port to a timeslot in an SDH port (TU-12 termination point).

Step 1 Open the Cross-connects window from the equipment menu.

Step 2 Select the **VC/TU12** tab in the bottom of the window, [Figure 5-45](#).

Figure 5-45 Select the VC/TU12 Tab



Step 3 Make sure the Content panel is available in the left part of the window. If it is not available select the Content button in the toolbar.

Step 4 Select the Available TP List in the Content panel. The list contains the free E1 ports and TU-12 termination points in ONS 15305.



Note If the available TP List in the content panel does not show the E1 termination points that you want to cross-connect from, you have to make sure the slot is configured for E1 ports, "[5.3.1 Setting the Port Mode for ONS 15305](#)" section on page 5-7.



Note If the available TP List in the content panel does not show the TU-12 termination points that you want to cross-connect to, you have to make sure they are made available for cross-connection, [“5.2.1 Configuring ONS 15305 SDH Port Structure \(Channelization\)” section on page 5-2.](#)



Note You can create bidirectional or unidirectional cross-connections. In the available TP list you will see whether the termination point is available in both directions or as A-end or B-end.

- Step 5** Double-click the **E1 port** in the available TP list. A new cross-connection is created with the E1 port as the A-end.
- Step 6** Double-click the **TU-12 (timeslot)** that you want to connect to. The TU-12 is moved to the B-end of the cross-connection.
- Step 7** Select **Direction** (unidirectional or bidirectional).
- Step 8** Click **Save** on the toolbar.



Note Remember that both the E1 port and the SDH port must be enabled before traffic can flow between the ports, [“5.2.5 Enabling the SDH Port to Carry Traffic and Report Alarms” section on page 5-6](#) and [“5.2.6 Set ONS 15305 SDH Port Synchronization Quality Output Signaling” section on page 5-7.](#)

5.7.4.2 From a 45 Mbps E3 (T3) Port to a Timeslot in an SDH Port

Creating a cross-connection from a 45 Mbps E3 (T3) port to a timeslot in an SDH port (TU-3 termination point):

- Step 1** Open the cross-connects window from the equipment menu.
- Step 2** Select the **VC/TU3 tab** in the bottom of the window, [Figure 5-46.](#)

Figure 5-46 Select the VC/TU12 Tab



5.7.4.3 Creating a Pass-through Cross-connection

Creating a pass-through cross-connection from one SDH port to another SDH port:

- Step 1** Open the Cross-connects window from the equipment menu.
- Step 2** Select the **TU-12 or TU-3 or AU-4 tab** termination points for both A and B ends in the bottom of the window.

5.7.5 Modifying Cross Connections

A cross-connection is a relationship between termination points and the relationship cannot be modified after it has been created.

It is not possible to modify the direction (bidirectional or unidirectional) of a cross-connection in the supported release of ONS 15305. The only parameter that can be modified is the description of the cross-connection.

Cross-connections can be protected after they have been created, [“5.7.6 Protecting Cross Connections” section on page 5-46](#).

5.7.6 Protecting Cross Connections

The A-end or B-end of a cross-connection can be protected by the SNC protection scheme when a cross-connection is being set up or after the cross-connection has been set up.



Note When the cross-connection is uni-directional and protectedTp is a, a static bridge will be created from the A-end to the B and protection termination points. (SNCP parameters are not used).



Note When the cross-connection is uni-directional and protected TP is b, a SNC protection switch is created where the signal from A is working connection and the signal from protection is protection connection. In this case the SNCP parameters are available after the cross-connection has been saved.

-
- Step 1** Open the Cross-connects window from the equipment menu.
 - Step 2** Set the protectedTP attribute to a or b for one or more cross-connections. This is the termination point you want to protect.
 - Step 3** Select the cross-connection you want to protect.
 - Step 4** Make sure the content panel is available in the left part of the window. If it is not available select the Content button in the toolbar.
 - Step 5** Select the available TP list in the content panel. The list contains the free TU12/VC12 or TU3/VC3 or AU4 termination points in ONS 15305.



Note If the available TP list in the content panel does not show the termination points that you want to protect your WAN channel with, you have to make sure they are made available for cross-connection, [“5.2.1 Configuring ONS 15305 SDH Port Structure \(Channelization\)” section on page 5-2](#).



Note You can protect bidirectional or unidirectional cross-connections. In the available TP list you will see whether the termination point is available in both directions or as A-end or B-end.

- Step 6** Select the termination point that you want to protect your a or b-end with.

- Step 7** Click on the **Set Prot** button in the toolbar. The protection TP is filled in for the selected cross-connection.
- Step 8** Select the next cross-connection to protect and insert the protection TP. Proceed until all cross-connections are protected (cross-connections that have the protected TP attribute set to a or b).
- Step 9** Click **Save** on toolbar.

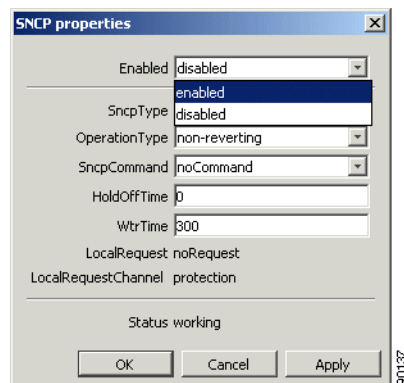


Note By default the protection is disabled and will not work before it is enabled. Follow instructions below to enable SNC protection SNC protection.

5.7.6.1 SNC Protection

- Step 1** Select the cross-connections where you want to enable protection. (SHIFT and CTRL buttons can be used for multiple selection).
- Step 2** Click the **SNCP** button in the toolbar, [Figure 5-47](#).
- Step 3** Set the Enabled attribute to enabled and click **OK**.

Figure 5-47 Select Enabled Attributes



- Step 4** Click **Save** on toolbar.



Note It is not possible to modify the protection termination point after it has been saved. If you want to modify the protection termination point, the ProtectedTP must first be saved as none. Then the protection TP can be modified. Remember to set the ProtectedTP back to a or b.

5.7.6.2 Modifying Protection Parameters of a Cross-connection

A-end or B-end of cross-connections are protected as described in [“5.7.6 Protecting Cross Connections” section on page 5-46](#). The SNC is then set up with a number of default parameters. The parameters can easily be modified.

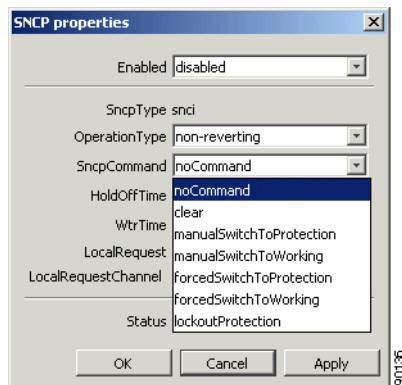
-
- Step 1** Open the Cross-connects window from the Equipment menu.
 - Step 2** Select a cross-connection in the Cross-connect Window.
 - Step 3** Select the cross-connections where you want to modify protection parameters (Shift and Ctrl buttons can be used for multiple selection).
 - Step 4** Click the **SNCP** button in the toolbar.
 - Step 5** Modify the SNC protection parameters and click **OK**.
 - Step 6** Click **Save** on toolbar.
-

5.7.6.3 Commanding Cross-connection Protection Switch

The Cisco Edge Craft user can control the SNC protection switch by sending a command.

-
- Step 1** Open the cross-connects window from the equipment menu.
 - Step 2** Select the cross-connections where you want to modify protection parameters (Shift and Ctrl buttons can be used for multiple selection).
 - Step 3** Click the **SNCP** button in the toolbar, [Figure 5-48](#).
 - Step 4** Select the SncpCommand and click **OK**.

Figure 5-48 Select SNCP Command



- Step 5** Click **Save** on toolbar.
- Depending on the priority of the command and current status of each channel, a switch may now take place for some or all selected cross-connections.
-

5.7.7 Deleting Cross-connections

-
- Step 1** Open the cross-connection GUI by selecting cross-connects from equipment menu.
 - Step 2** Select the panel for the type of cross-connection(s) you want to delete (VC or TU12, VC or TU3 or VC or AU4).

- Step 3** Select the cross-connections that you want to delete.
 - Step 4** Click **Delete** on the toolbar.
 - Step 5** Click **Save** on toolbar.
-

5.7.8 Advanced Cross-connection Operations

For frequent users of Cisco Edge Craft, it is possible to make use of the enhanced editing facilities to speed up the configuration work.

5.7.8.1 Setting up of Multiple Cross-connections by Multiple Selection

- Step 1** Select the Termination points that you want to use as A-ends. Use Shift or Ctrl buttons to select more than one termination point.
- Step 2** Click **Add** on toolbar. The same number of cross-connections as the selected TPs are created with the A-end filled in.
- Step 3** Select the TU-12 termination points that you want to add to the B-ends of the cross-connections in the same way.
- Step 4** Click the **Set B** button on the toolbar.
- Step 5** If you want to protect the connections, select the TU-12 termination points that you want to add to the cross-connections.
- Step 6** Click the **Set Prot** button on the toolbar. Remember to set ProtectedTP to a or b.
- Step 7** Click **Save** on the toolbar.



Note You are only allowed to set the B or protection termination points of cross-connections where B or P are not in use.
If you want to modify the A or B termination point the cross-connection must be deleted and created again.
If you want to modify the protection termination point the ProtectedTP must first be saved as none. Then the protection TP can be modified. Remember to set the ProtectedTP back to a.



Note If you do not select the same number of instances of cross-connections and termination points, the A or B end will be filled in with as many TPs as available, starting from the top of the selected cross-connection list. If more TPs are selected than cross-connections, the last TPs will not be used.

5.7.8.2 Setting up Multiple Cross-connections by Repeated Operations

- Step 1** Double-click the termination point you want to use as A-end. A new cross-connection is created.
- Step 2** Double-click the termination point you want to use as B-end. B-end is filled in.

- Step 3** Repeat [Step 1](#) and [Step 2](#) for as many cross-connections as you want.
- Step 4** Click **Save** on toolbar.
-

5.7.8.3 Entering Termination Points Manually

- Step 1** Add a new cross-connection.
- Step 2** Click on the A, B or Protection termination points. A list of slots appears.
- Step 3** Select a slot. A list of ports appears.
- Step 4** Select a port.
- Step 5** Continue selecting each of the CBKLM values.
- Step 6** Enter the information the same way (or select from list of free TPs) for the other termination points.
- Step 7** Click **Save** on the toolbar.



Note The information can also be entered directly without selecting the numbers from the drop down list. Remember to use the following format: <slot/port/C.B.K.L.M>

5.8 ONS 15305 SDH Protection Management

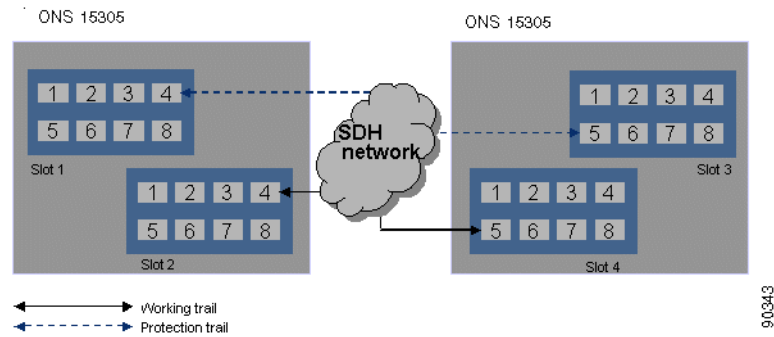
5.8.1 Introduction

The purpose of this section is to guide the user through management of the 1+1 linear multiplex section Protection (MSP) between two SDH ports.

The section involves management of the complete life cycle of an MSP, including creation, presentation, modification, deletion and manual operation the MSP switch.

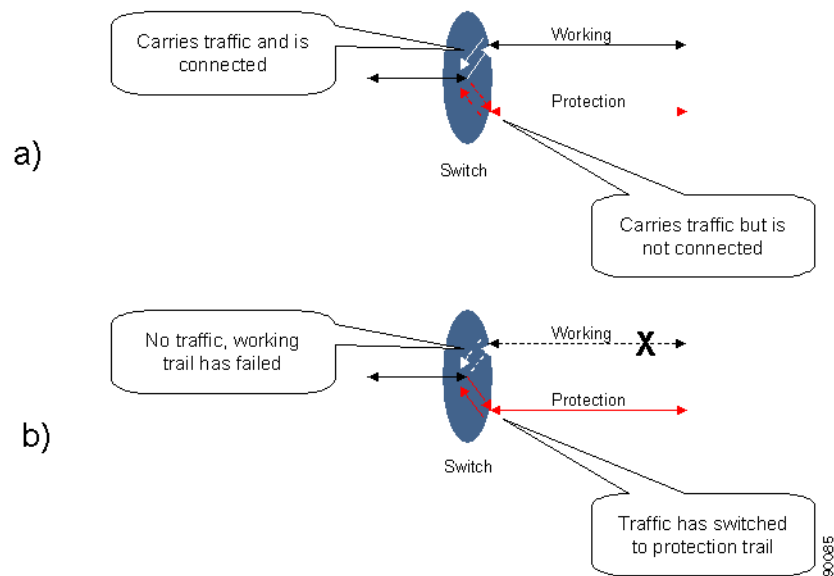
5.8.1.1 Multiplex Section Protection

Figure 5-49 1+1 MSP between two ONS 15305



The 1+1 MSP provides protection of the SDH ports by replacing the supporting trail when it fails as illustrated in Figure 5-49. This is a 100% redundant protection scheme.

Figure 5-50 Protection Switching Scenarios



Both working and protection trails are enabled and the signal is bridged to both, Figure 5-50.

- a. The received signal from the working trail is forwarded to the receiving client while the protection is not. If the working trail fails and a switch is performed, the traffic on the protection trail is received by the client, Figure 5-50.

- b. Traffic from working trail is ignored. The network element uses a bidirectional switching protocol, that means, both ends of the trails switches simultaneously. To synchronize this simultaneously switching, the network elements signal to each other in the K1 and K2 bytes in the MS overhead of the SDH traffic. A bidirectional switching protocol gives a better control of the traffic in the network but uses a little more time to perform the switching than a uni-directional switching protocol does.

The switching has two different modes:

- Revertive traffic returns to the working trail when recovered.
- Non-revertive traffic stays on protection trail indefinitely or until told otherwise.

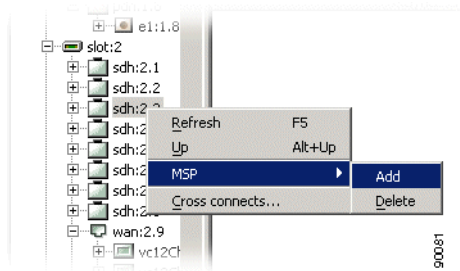
The time to wait before restoring the trail can be defined.

When switching either from or to protection, an event notification will be emitted.

5.8.2 Protect Section by MSP

- Step 1** In the topology browser right click the sdh port that should be the working port.

Figure 5-51 Select SDH Port



- Step 2** Click **Add** in the pop-up menu. A msp object is created below the port, [Figure 5-51](#).

- Step 3** Select the msp object in the topology browser, [Figure 5-52](#).

Figure 5-52 Select MSP Object



- Step 4** Fill in the ProtectionSlot and ProtectionPort attributes, [Figure 5-53](#).

Figure 5-53 Select Protection Port Attributes

Name	Values
Enabled	enabled
LocalRequest	NA
LocalRequestChannel	NA
Mode	unidirectional
MspCommand	noCommand
OperationType	reverting
ProtectionPort	0
ProtectionSlot	0
RemoteRequest	NA
RemoteRequestChannel	NA
Status	NA
WorkingPort	3
WorkingSlot	2
WtrTime	300

Step 5 Use default or fill in new values for the other attributes.

Step 6 Click **Save** on the toolbar.

The MSP scheme is created in ONS 15305 and starts working immediately. You will also see that the same msp object is now available under the protection port. You will also see that if the msp has the same Object identifier (for example 1.2.) as the parent sdh port, the port is a working port. If it has a number that is different from the parent sdh port (for example sdh port is 1.4 and msp is 1.2) it is a protection port for the sdh port with the same object identifier as the msp object.



Note Working and protection port must be selected from slot 1 and 2 or 3 and 4. For example it is not possible to set up MSP protection with working port from slot 1 and protection port from slot 3. Working and protection ports can be selected from the same slot.



Note A protection port must be unstructured, “[5.2.2 Modifying or Removing ONS 15305 SDH Port Structure](#)” section on page 5-3.



Note Working and protection port must both have the same STM-N rate, for example both STM-1.

5.8.3 Modify MSP

Step 1 In the topology browser right click the sdh port that is the working port.

Step 2 Select msp object below the sdh port.

Step 3 Modify the attributes of the MSP scheme.

Step 4 Click **Save** on toolbar.



Note If the link is operating on the protection section in bidirectional mode, you may brake traffic if you set the Mspenabled to disabled or OperatingMode to unidirectional in one of the nodes This is due to the behavior of the APS protocol.



Note To avoid problems always make sure the link is operating on the working section and to command it to lockout of protection before making the modifications.

5.8.4 Delete MSP

-
- Step 1** In the topology browser right click the sdh port that is the working port.
 - Step 2** Select **MSP** and **Delete** in the pop-up menu. The msp object disappears both from the working port and the protection port in the topology browser.
 - Step 3** Click **Save** on the toolbar.



Note Be aware that it is possible to delete an MSP when traffic is on protection section. This will cause a short break during switchover time. (If working section is available).

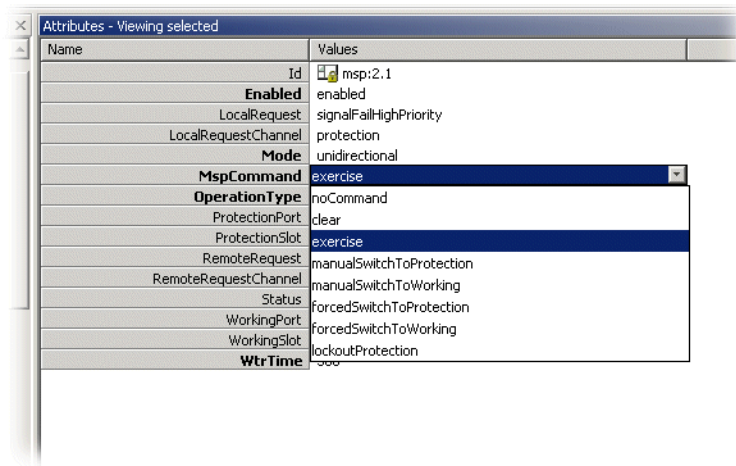


Note To avoid problems always make sure the link is operating on the Working section and to command it to lockout of protection before deleting the MSP.

5.8.5 Command MSP Switch

-
- Step 1** In the topology browser right click the sdh port that is the working port.
 - Step 2** Select msp object below the sdh port.
 - Step 3** Select one of the commands under MspCommand, [Figure 5-54](#).

Figure 5-54 Select MspCommands Attribute



Step 4 Click **Save** on toolbar.



Note Commands will only take place if there are no higher priority requests in the system.



Note A new command will clear the current command before executing the new command. In this case the new command may not be executed when the new command has lower priority than the old command because the MSP will search for the request with highest priority present. For example sending a manual switch to protection command instead of a forced switch to protection command will not work if there is a signal degrade request on the protection section.



Note All commands can be cleared by the clear command.

5.8.6 Legal combinations of SNCP and MSP

It is possible to use both SNCP and MSP in an ONS 15305 simultaneously, as long as the following is satisfied:

The protected SNCP entity can be part of an MSP protected port, but the working or protection entity can not, for example consider an STM-4 ring where some TU-12s are dropped off the ring and sent to an ONS 15302 via an STM-1 link. In this case, SNCP can be used in the ring, protecting the TU-12s to be dropped from the ring toward the ONS 15302. MSP can then be used for the STM-1 link to protect the traffic between the ONS 15305 and the ONS 15302. This is because the TU-12s that are dropped from the ring are the protected TU-12s, while the TU-12s in the ring are the working and protection TU-12s. Consequently, it is not possible to use MSP on the east or west links of the ring, since the TU-12s that are carried here are the working or protection part of the SNCP protected path's.

5.8.7 SubNetwork Connection Protection

SNCP is strongly related to the cross-connection that is protected in the network element. In Cisco Edge Craft SNCP related issues are handled from the cross-connections GUI.



Note

The maximum number of SNCP instances that can be used with guaranteed switching time below 50 ms, is 252. This corresponds to one full STM-4 (or four STM-1s) structured into TU-12s. These 252 SNCP instances can be a mixture of AU-4, TU-3 and TU-12 in any combination, and taken from any C.B.K.L.M address within an STM-1/4/16. A larger number of instances than 252 may be used, but in this case we cannot guarantee switching times below 50 ms.

The resolution of the Hold-off timer is $N \times 100\text{ms} \pm 60\text{ ms}$. That means for a 500 ms Hold-off timer, the real timer value may be any value between 440 ms and 560 ms. The Working, protection and protected parts of an SNCP protected path can be carried over different link rates. For example for an SNCP protected TU-12, the working TU-12 could be carried over an STM-16 link, while the protection TU-12 could be carried over an STM-4 link.

5.8.7.1 Protect Connection by SNCP

See [“5.7.6.1 SNC Protection”](#) section on page 5-47.

5.8.7.2 Modify SNCP

See [“5.7.6.2 Modifying Protection Parameters of a Cross-connection”](#) section on page 5-47.

5.8.7.3 Command SNCP Switch

See [“5.7.6.3 Commanding Cross-connection Protection Switch”](#) section on page 5-48.

5.9 ONS 15302 SDH Protection Management

5.9.1 Multiplex Section Protection

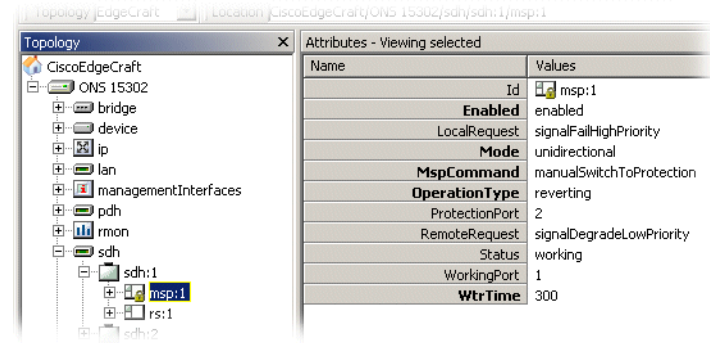
The ONS 15302 offers 1+1 linear multiplex section protection (MSP). The protocol used for K1 and K2 (b1 to b5) is defined in ITU-T G.841, clause 7.1.4.5.1. The protocol used is 1+1 bidirectional switching compatible with 1:n bidirectional switching.

The operation of the protection switch is configurable as described in [“5.9.1.1 Modify MSP Parameters”](#) section on page 5-56.

5.9.1.1 Modify MSP Parameters

Step 1 Select **sdh1** port (working) and click on the **msp** object, [Figure 5-55](#) and [Figure 5-56](#).

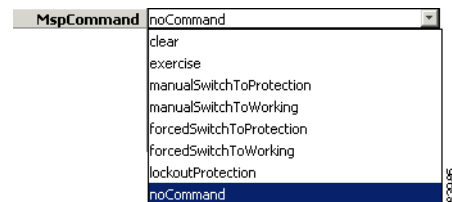
Figure 5-55 Select SDH1/MSP1 Attributes



Modifiable parameters:

- Enabled
Set to enabled or disabled.
- Mode
Set to unidirectional or bidirectional.
- MspCommand
Set one of the following.
- OperatingType
Set to reverting or non-reverting.
- WtrTime
Wait to restore time; number of seconds to wait before switching back to the preferred link after it has been restored (0,1, ...,12 minutes, default 5 min (300 seconds)).

Figure 5-56 Set MSP Command



Step 2 Click Save.



Link Aggregation

The purpose of this section is to describe the tasks involved when managing the link aggregation functionality of the network element. Link aggregation is also called Trunking.

Link aggregation is used to optimize port (link) usage by grouping ports together to form a single aggregate. Link aggregation multiplies the bandwidth between the devices, increases port flexibility and provides link redundancy.

The network element defines the number of link aggregations and a maximal number of ports in each link aggregation.

6.1 View Link Aggregation - ONS15305

- Step 1** Select the **device > Link Aggregation** object in the topology pane to view the specific object properties in the attributes pane, [Figure 6-1](#).

Figure 6-1 Attributes related to Link Aggregation

The screenshot displays several windows from a network management tool:

- Topology:** Shows a tree view of the device configuration, including 'linkAggregation' under the 'interfaces' section.
- Attributes - Viewing selected:** A table listing various attributes and their values for the selected link aggregation configuration.

Name	Id	Values
device	linkAggregation_device	device
Alarms	AlarmConfig	AlarmConfig
ConfigData	ConfigData	ConfigData
ErrNumber		-----
ErrorLevel		0
Features	Features	Features
GalNetModeCurrent	extended	extended
LedAndOutput	LEDandOutput	LEDandOutput
LinkAggregation	LinkAggregation	LinkAggregation
Loops	LogAdministration	LogAdministration
- Attributes - Viewing selected (Link Aggregation List):** A table showing specific link aggregation parameters.

Name	Id	Values
LinkAggregationList	LinkAggregationList	LinkAggregationList
LinkAggregationPort	LinkAggregationPort	LinkAggregationPort
MaxLinkAggregation		8
MaxPortsPerLinkAggregation		8
MbVersion		1
- Attributes - Viewing children:** A table listing child entries for the link aggregation.

Id	MacAddress	LinkAggregationBalancing	IfIndex	IncludedPorts
dot3adAggEntry:65	00:04:7a:0...	LinkAggregationBalancing	65	<input type="checkbox"/>
dot3adAggEntry:66	00:04:7a:0...	LinkAggregationBalancing	66	<input type="checkbox"/>
dot3adAggEntry:67	00:04:7a:0...	LinkAggregationBalancing	67	<input type="checkbox"/>
dot3adAggEntry:68	00:04:7a:0...	LinkAggregationBalancing	68	<input type="checkbox"/>
dot3adAggEntry:69	00:04:7a:0...	LinkAggregationBalancing	69	<input type="checkbox"/>
dot3adAggEntry:70	00:04:7a:0...	LinkAggregationBalancing	70	<input type="checkbox"/>
dot3adAggEntry:71	00:04:7a:0...	LinkAggregationBalancing	71	<input type="checkbox"/>
dot3adAggEntry:72	00:04:7a:0...	LinkAggregationBalancing	72	<input type="checkbox"/>
- Attributes - Viewing selected (Link Aggregation Port):** A table showing port-related attributes.

Name	Values
Id	linkAggregationBalancing.dot3adAggEntry:67
BroadcastType	common
ForwardType	bridging
Layer	2
UsedAddresses	dstAddr
- Attributes - Viewing children (Link Aggregation Port):** A table listing child entries for the link aggregation port.

Id	MacAddress	ActorAdminKey	LinkIfIndex	PortIfIndex	Aggregated
dot3ad...	00:04:7a:00... 0		1	1	false
dot3ad...	00:04:7a:00... 0		2	2	false
dot3ad...	00:04:7a:00... 0		3	3	false
dot3ad...	00:04:7a:00... 0		4	4	false
dot3ad...	00:04:7a:00... 0		5	5	false
dot3ad...	00:04:7a:00... 0		6	6	false
dot3ad...	00:04:7a:00... 0		7	7	false
dot3ad...	00:04:7a:00... 0		8	8	false
dot3ad...	00:04:7a:00... 0		9	9	false
dot3ad...	00:04:7a:00... 0		10	10	false
dot3ad...	00:04:7a:00... 0		11	11	false
dot3ad...	00:04:7a:00... 0		12	12	false
dot3ad...	00:04:7a:00... 0		13	13	false
dot3ad...	00:04:7a:00... 0		14	14	false

6.1.1 Modify Link Aggregation - ONS 15305

You can modify the modifiable Link Aggregation parameters, and this involves:

- Modification of attributes for an aggregation.
- MAC address type for an aggregation.
- Balancing attributes for an aggregation.
- Adding of new port(s) to an aggregation.
- Deletion of port(s) in an existing aggregation.

The link aggregation feature, also known as trunking, allows you to link a group of ports together to form a single trunk (aggregated group). Link aggregation can be used to increase bandwidth between devices and/or to provide link redundancy.

The link aggregation feature has a number of limitations:

- Only LAN and WAN ports can be part of a trunk.
- Maximum 8 trunks can be defined on the network element.
- Maximum 8 ports can be grouped within a single trunk.



Note 8 possible trunks are already created, but they include no port. The trunks are listed under the attribute Device > LinkAggregation > LinkAggregationList. Each trunk is identified by its ifIndex (from 65 to 72).

In order to assign a port to a trunk, the port must comply with the following requirements:

- A layer 3 interface is not configured on the port.
- A VLAN is not configured on the port.
- The port is not assigned to a different trunk.
- An available MAC address exists which can be assigned to the port.
- Auto-negotiation mode is not configured on the port.
- The port is in full-duplex mode.
- All ports in a trunk must operate at the same rate.
- All ports in a trunk must have the same ingress filtering and tagged modes.
- All ports in a trunk must have the same back pressure and flow control modes.
- All ports in a trunk must have the same priority.
- All ports in a trunk must have the same transceiver type.
- All ports in a trunk must belong to the same module, that means they must be located on the same slot.

6.1.1.1 Assigning a Port to a Trunk

To assign a port to a trunk:

-
- Step 1** Make sure that the port to be added to a trunk complies with the requirements listed above.
- Step 2** Click on the ONS 15305 managed object, and then on the device managed object in the topology browser.
- Step 3** Click on the **linkAggregation** attribute in the attribute window.
- Step 4** Click on the **linkAggregationPort** attribute in the attribute window.
- Step 5** Identify the port to add via its ifIndex listed under the portIfIndex attribute.
- Step 6** Verify that the port can be part of a trunk by checking the aggregated attribute. If aggregated displays true, the port can be included in a trunk, please go to the next step. If aggregated displays false, the port can only operate as an individual link, and cannot be part of a trunk. Select another port (go back to [Step 5](#)).
- Step 7** Edit the actorAdminKey attribute. This attribute must be set to the ifIndex of the trunk to which the port shall be assigned. Legal values are [65:72].



Note To find out the ifIndex used by the trunk, check the Device > LinkAggregation > LinkAggregationList attribute

- Step 8** Click **Save**.
-

6.1.2 Trunk Elements used by Management are Named ifindex

Regular ports, LAN and WAN, have ifIndexes from 1 to 64, depending on the slot and port number.

16 ifIndexes are reserved for each slot, although none of today's modules use more than 8. For example, an fast Ethernet (FE) module with 8 ports located in slot 3, have ifindex range from 33 for port 3/1 to 40 for port 3/8.

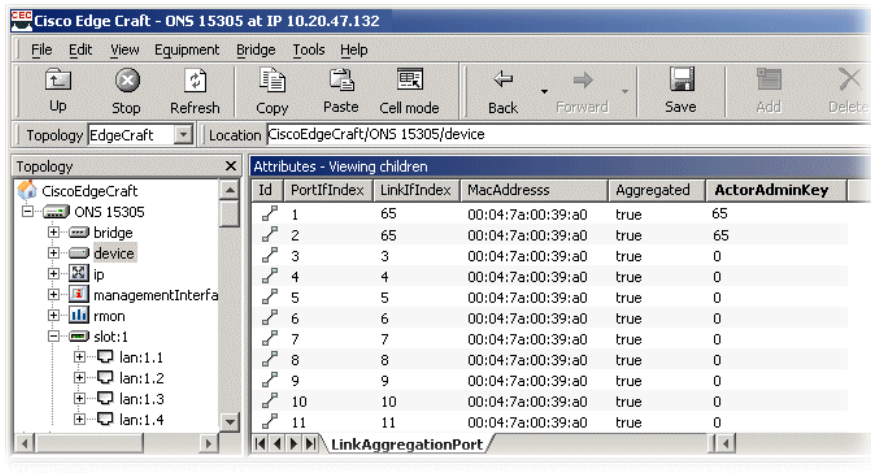
STM-1 modules are special since they are a combination of 8 SDH ports and 8 WAN ports. WAN ports in an 8XSTM1 module are numbered x/9 to x/16 (x is the slot), while the ifIndexes corresponds to x/1. For an 8xSTM-1 module located in slot 2, the ifindex range is 17 to 24(17 for port 2/9, 24 for port 2/16). Giga bit Ethernet (GE) ports use the first ifIndexes for the particular slot. For example, a 2XGE in slot 4 have ifindex numbers 49 for port 4/1 and 50 for port 4/2.

Maximum number of trunks in the system is 8, and the trunk ifindex range is 65 to 72. The trunk ifindex is used as port number when a trunk is assigned to a VLAN.

An example to illustrate the creation of a trunk and adding the trunk to a VLAN, [Figure 6-2](#).

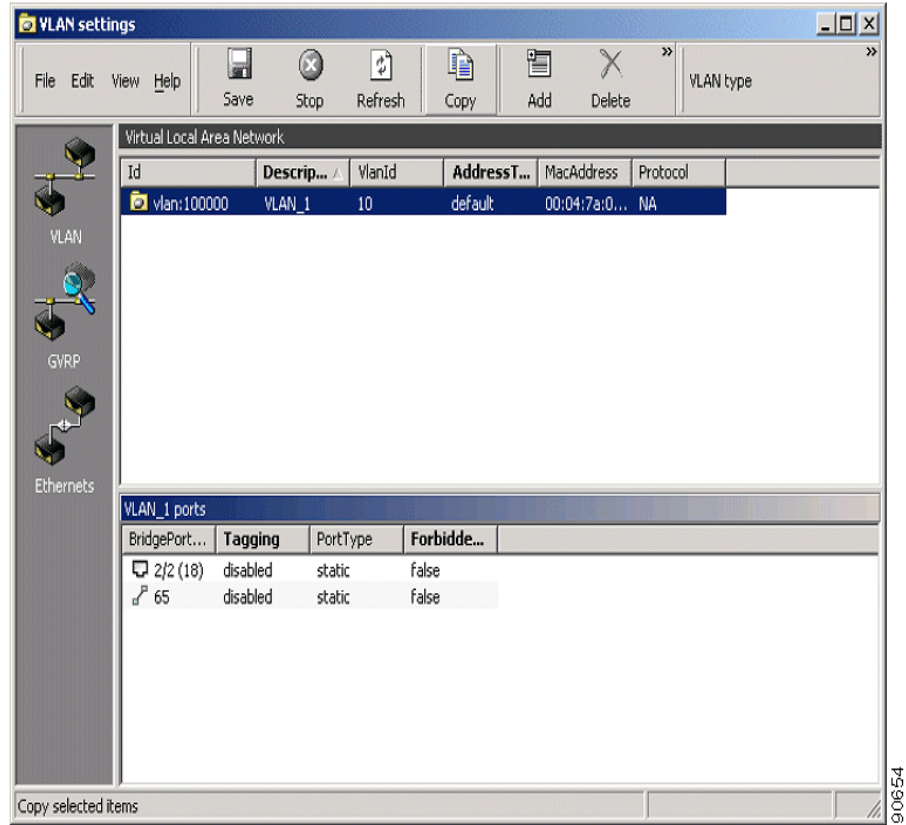
The first two WAN ports of slot 1 are used to create a trunk with ifindex 65.

Figure 6-2 Creating and Editing a trunk to a VLAN



The trunk and the second GE port in slot 2 are put together in a VLAN, [Figure 6-3](#).

Figure 6-3 VLAN settings for a Trunk with GE





Layer 2 Configuration

The purpose of this chapter is guide you through management of the bridging service (L2 forwarding) on the network element.

This includes:

- Presentation and modification of the bridge.
- Presentation and modification of MAC Multicast and IGMP Snooping.
- Presentation and modification of spanning tree protocol (STP) and Rapid STP (RSTP).
- Presentation and modification of traffic control.
- Presentation and modification of virtual local area network (VLAN).



Note

The following examples focus on ONS15305, but the the features described, also applies for ONS 15302.

7.1 Bridge

This chapter describes the configuration operations supported by the Bridge M.O. It is organized in two sections:

- Introduction
- Examples: this chapter is a repository of simple, but yet typical configuration scenarios.

Troubleshooting and FAQ, see [Chapter 9, “Troubleshooting and FAQ.”](#) This chapter contains a few tips, and gives answers to a number of Frequently Asked Questions.

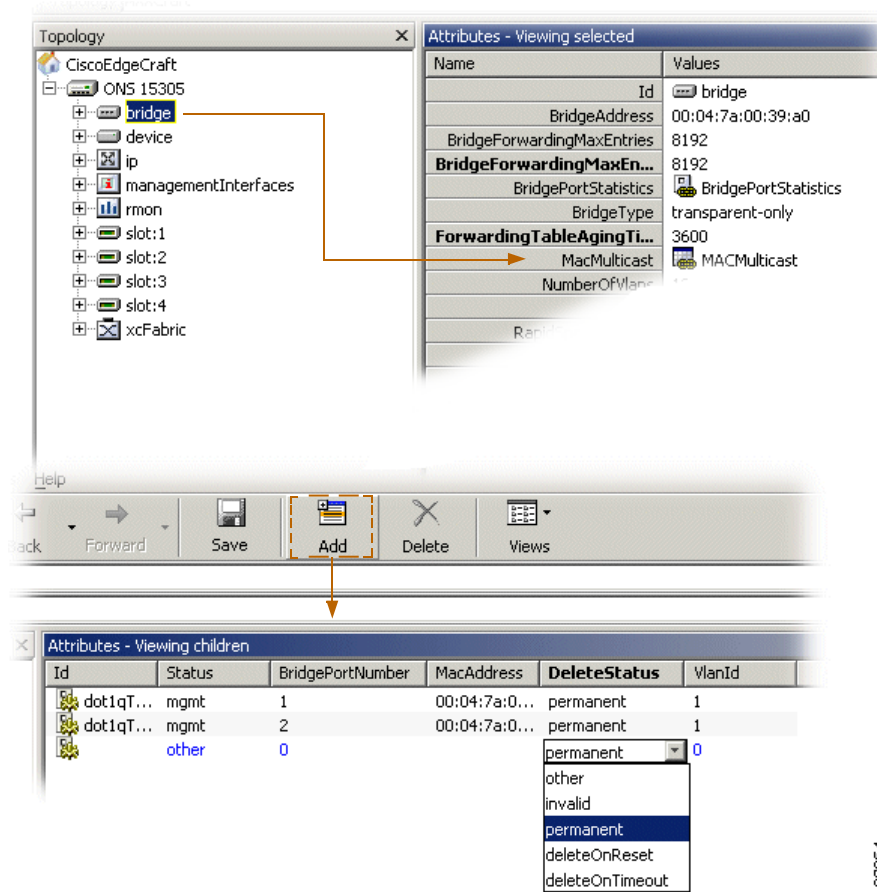
7.1.1 Examples

7.1.1.1 Configuration of Static Unicast Forwarding Information

Configure an entry in the MAC unicast forwarding table, [Figure 7-1](#).

-
- Step 1** Click on the ONS 15305 managed object, and then the **Bridge** managed object in the topology browser.
- Step 2** Double-click on **unicastForwarding** in the attributes window.

Figure 7-1 Configuration of Static Unicast Forwarding Information



Step 3 Click **Add** on the toolbar.

Step 4 The following attributes have no default values, and must be defined:

- **bridgePortNumber**
Set the bridge port number of the port through which the MAC address can be reached.
- **macAddress**
Set the MAC address. The MAC address must be a unicast address.
- **vlanId**
Set the VLAN ID for which this entry applies.
- **deleteStatus**
Set permanent if the entry should not be removed dynamically from the table (such an entry will stay over a reset of the bridge). Set deleteOnReset if the entry should be removed dynamically from the table after the next reset of the bridge. Set deleteOnTimeout if the entry should be dynamically aged out by the bridge.

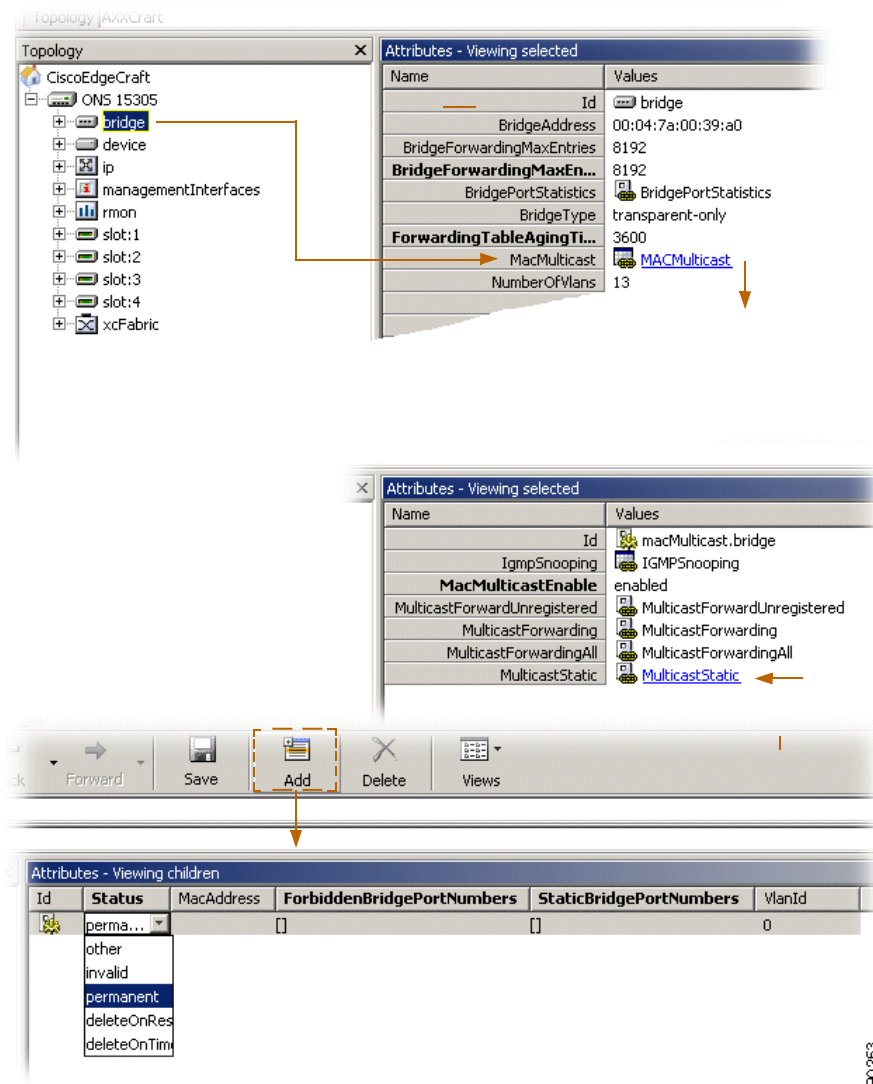
Step 5 Click **Save** on the toolbar.

7.1.2 Configuration of Static Multicast Forwarding Information

Please see [Question 5, page 9-2](#) before you start Configure an entry in the MAC multicast forwarding table, [Figure 7-2](#).

- Step 1** Click on the ONS 15305 managed object, and then the **Bridge** managed object in the topology browser.
- Step 2** Double-click on **MACMulticast**, than on **MulticastStatic** in the attributes window.

Figure 7-2 Configuration of Static Multicast Forwarding Information



- Step 3** Click **Add** on the toolbar.
- Step 4** The following attributes have no default values, and must therefore be defined:
- vlanId
Set the VLAN ID for which this entry applies.
 - MacAddress

Set the MAC address. The MAC address must be a multicast address.

- `staticBridgePortNumbers`

Set the set of ports through which the multicast/broadcast frame must be forwarded regardless of any dynamic information. The set of ports is entered as an octet string where each bit represents one port, for further information see also [Chapter 9, “Troubleshooting and FAQ.”](#)

- `forbiddenBridgePortNumbers`

Set the set of ports through which the frames must not be forwarded regardless of any dynamic information. The set of ports is entered as an octet string where each bit represents one port, for further information see also [Chapter 9, “Troubleshooting and FAQ.”](#)

- `status`

Set permanent if the entry should not be removed dynamically from the table (such an entry will stay over a reset of the bridge). Set `deleteOnReset` if the entry should be removed dynamically from the table after the next reset of the bridge. Set `deleteOnTimeout` if the entry should be dynamically aged out by the bridge.

Step 5 Click **Save** on the toolbar.



Note When a multicast forwarding information is added to the table, the same entry is automatically added to the `Bridge > macMulticast > multicastForwarding` attribute. The `multicastForwarding` attribute contains both static, that means user-defined, and learned entries related to group (multicast) addresses.

7.1.3 IGMP Snooping

When a host wants to receive multicast traffic, it must inform the routers on its LAN. The IGMP is the protocol used to communicate group membership information between hosts and routers on a LAN. Based on the information received through IGMP, a router forwards multicast traffic only via interfaces known to lead to interested receivers (hosts).

On the contrary, bridges flood multicast traffic out all ports per default, and therefore waste valuable network resources. IGMP snooping on a bridge can eliminate this inefficiency. IGMP snooping looks at IGMP messages to determine which hosts are actually interested in receiving multicast traffic. Based on this information, the bridge will forward multicast traffic only to ports where multicast receivers are attached.

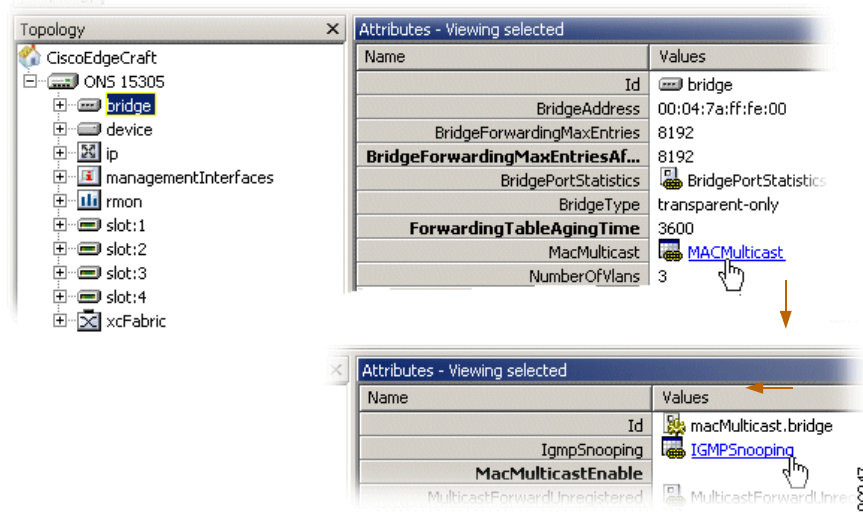
7.1.3.1 Enabling IGMP Snooping

Enable IGMP snooping on the network element, [Figure 7-3](#).

-
- Step 1** Click on the ONS 15305 managed object, and then on the **Bridge** managed object in the topology browser.
 - Step 2** Click on the **macMulticast** attribute in the attribute window.
 - Step 3** Set the **macMulticastEnable** attribute to **enabled**.
 - Step 4** Click on the **igmpSnooping** attribute in the attribute window.

- Step 5** Set the **igmpSnoopingEnable** attribute to **true**.
- Step 6** Click **Save**.

Figure 7-3 Enabling IGMP Snooping



7.2 Miscellaneous

7.2.1 Spanning Tree Protocol (STP) Configuration

The STP allows layer 2 devices to discover a subset of the topology that is loop-free, but still with a path between every pairs of LANs.

The network element can run either one single STP algorithm for the whole device (perDevice type), or one STP algorithm per VLAN (perVLAN type). The type of STP algorithm can be selected by setting the ONS 15305> Bridge > SpanningTree > stpTypeAfterReset attribute. The network element must be restarted for the new STP type to become effective.

7.2.1.1 Configuring the STP Algorithm per Device

Configure the STP algorithm per device.

- Step 1** Make sure that the STP type is per device (check the ONS 15305 > Bridge > SpanningTree > stpType attribute which indicates the current STP type).
- Step 2** Click on the ONS 15305 managed object, and then on the **Bridge** managed object in the topology browser.
- Step 3** Click on the **SpanningTree** attribute in the attribute window.
- Step 4** Set stpEnable to true.

- Step 5** Edit the forwardDelay, helloTime, maxAge, and priority attributes if required.
 - Step 6** Click **Save**.
 - Step 7** Click on the **SpanningTreePerDevice** attribute in the attribute window.
 - Step 8** Edit the BelongToVLAN attribute as required (if this attribute is set to true, only ports members of a VLAN will participate in the STP algorithm).
 - Step 9** Click **Save**.
 - Step 10** Optionally, the priority, cost, and portEnable attributes can be edited per port. To do so, click on the SpanningTreePort attribute, and modify the attributes as required.
 - Step 11** Click **Save**.
-

7.2.1.2 Configuring the STP Algorithm per VLAN

Configure STP algorithm per VLAN.

- Step 1** Make sure that the STP type is perVLA (check the ONS 15305> Bridge > SpanningTree > stpType attribute which indicates the current STP type).
 - Step 2** Click on the ONS 15305 managed object, and then on the **Bridge** managed object in the topology browser.
 - Step 3** Click on the **SpanningTree** attribute in the attribute window.
 - Step 4** Set stpEnable to true.
 - Step 5** Edit the forwardDelay, helloTime, maxAge, and priority attributes if required.
 - Step 6** Click **Save**.
 - Step 7** Click on the **SpanningTreePerVLAN** attribute in the attribute window.
 - Step 8** Edit the vlanEnable attribute as required (if this attribute is set to true, the VLAN will run the STP algorithm).
 - Step 9** Click **Save**.
 - Step 10** Optionally, the priority, cost, and portEnable attributes can be edited per port for a VLAN. To do so, click on the SpanningTreePerVlanPort attribute belonging to the desired VLAN, and modify the attributes as required.
 - Step 11** Click **Save**.
-

7.2.2 Rapid Spanning Tree Protocol (RSTP) Configuration

The original STP uses rather long time to recalculate paths after a topology change. Because of the growing use of larger switched networks, this has become a potential reason for performance degradation in certain cases. Rapid STP is one of several attempts to improve on this issue. The ONS15302 and ONS15305 support only a partial RSTP implementation which offers the same type of service as e.g. PortFast on Cisco equipment, as it does not support the actual creation of a spanning tree among the bridges. It will however get the ports facing customers to Forwarding mode without having to wait for 2 x Forwarding delay as is the case with the original STP. The regular STP must be running

to prevent loops in network. RSTP is to be used only on ports facing end-user equipment. If the ONS15302 or ONS15305 detects normal STP BPDUs on an interface configured for RSTP it will switch back to normal STP for that interface.

Due to the partial implementation, only the Port-Table and its commands are operational at the first release of ONS15302 and ONS15305.

7.2.2.1 Configure RSTP on a port.

-
- Step 1** Click on the ONS 15305 managed object, and then on the **Bridge** managed object in the topology browser.
 - Step 2** Click on the **RapidSpanningTree** attribute, and then on the **RapidSpanningTreePort** attribute in the attribute window.
 - Step 3** Identify the (vlanId, port) pair for which the RSTP is to be configured.



Note vlanId is relevant only if the network element is running STP per VLAN. If STP per device is run, RSTP can be enabled per port only, and vlanID is always set to 1.

- Step 4** Set the status attribute to true for the selected pair.
 - Step 5** Click **Save**.
-

7.2.3 MAC Multicast

Multicast is a method of sending one packet to multiple destinations. Multicasting is used for applications such as video conferences, and for distribution of certain information like some routing protocols. A standard IEEE 802.1D bridge will forward multicast frames on all ports that are members of the same VLAN as the port receiving such frames. This might not be desirable if there is a lot of multicast traffic being transported through a multi-port bridge where the recipients are connected on only one (or a few) of the bridge ports. To alleviate unnecessary bandwidth consumption, the ONS15302 and ONS15305 supports specific tables to control the forwarding of Multicast traffic if desired. Both devices also supports IGMP (Internet Group Management Protocol) snooping which is used to update the multicast tables based on the IGMP messaging between end nodes and IP multicast routers.

Note that multicast traffic will be forwarded as usual if this feature is not enabled, and that the use of these tables are only necessary for performance tuning.

7.2.3.1 Configuring MAC Multicast

Multicast menu has the following menu options:

- IGMP Snooping
- MacMulticastEnable
- MulticastForwardUnregistered.
- MulticastForwarding.
- MulticastForwardingAll.
- MulticastStatic

The parameter MacMulticastEnable is for enabling/disabling of the MAC Multicast control tables.

7.2.3.1.1 MulticastForwarding

The Forwarding-Table contains multicast filtering information configured into the bridge, or information learned through IGMP Snooping. The Forwarding-Table information specifies the allowed egress ports for a given multicast group address on a specific VLAN, and indicates for which ports (if any) this information has been learnt from IGMP snooping.

VLAN-TAG-ID: Identifies the VLAN to which the filtering information applies.

MULTICAST-ADDRESS: Identifies the destination group MAC address to which the filtering information applies.

EGRESS-PORTS: Indicates the configured egress ports for the specified multicast group address. This does not include ports listed in the Forward All Ports list for this address.

LEARNT: Indicates a subset of ports from the Egress Ports list which were identified by IGMP Snooping and added to the multicast filtering database.

7.2.3.1.2 MulticastForwardingAll

The Forward-All-Table allows ports in a VLAN to forward all multicast packets.

VLAN-TAG_ID: Identifies the VLAN to which the filtering information applies.

EGRESS-PORTS: Specifies which ports on a VLAN can participate in a Forward Unregistered group. The default setting is all ports.

FORBIDDEN-PORTS: Specifies which ports on a VLAN are restricted from participating in a Forward All group.

STATIC PORTS: Indicates if the egress ports are static or dynamic configured.

7.2.3.1.3 MulticastForwardUnregistered

The Multicast-Forward-Unregistered-Table defines the behavior of ports regarding forwarding of packets that is not covered by any of the other tables.

VLAN-TAG_ID: Identifies the VLAN to which the filtering information applies.

EGRESS-PORTS: Specifies which ports on a VLAN can participate in a Forward Unregistered group. The default setting is all ports.

FORBIDDEN-PORTS: Specifies which ports on a VLAN are restricted from participating in a Forward Unregistered group.

STATIC PORTS: Indicates if the egress ports are static or dynamic configured.

7.2.3.1.4 MulticastStatic

The Static-Table contains manually configured filtering information for specific multicast group addresses. This includes information about allowed and forbidden egress ports, and is also reflected in the Forwarding-Table.

VLAN-TAG_ID: Identifies the VLAN to which the filtering information applies.

MULTICAST-ADDRESS: Identifies the destination group MAC address of a frame to which the filtering information applies.

STATIC-EGRESS-PORTS: Indicates a set of ports to which packets received from, and destined to, are always forwarded. This is regardless of the IGMP Snooping setting.

FORBIDDEN-PORTS: Indicates the set of ports to which packets received from and destined to a specific port must not be forwarded. This is regardless of the IGMP Snooping setting.

STATUS:

The possible values are:

Permanent—The table entry is currently in use. When the bridging status is reset this table entry remains in use.

Delete on Reset—This table entry is currently in use. However, when the bridging status is reset the entry is deleted

Delete on Timeout—This table entry is currently in use. However when the bridge times out the entry is deleted.

7.2.4 Traffic Control

The TrafficControl menu has the following menu options:

- PortPriority
- PriorityGroup
- TrafficClass

7.2.4.1 PortPriority

BridgePortNumber: a port number identifying one of the on the device. For each row, the information in the row applies to the port identified in this column.

DefaultPriority: this is the priority value assigned to frames arriving at this port, when implicit priority determination is used. Any frames arriving at this port, not carrying a priority value in a tag, will get the DefaultPriority value as priority. The value is an IEEE 802.1p priority level. Range is 0 – 7, inclusive.

NumberOfTrafficClasses: gives the number of classes of service – that is, the number of output queues, for the port. All ports on the device will always use 4 queues.

7.2.4.2 PriorityGroup

BridgePortNumber: a port number identifying one of the on the device. For each row, the information in the row applies to the port identified in this column.

PriorityGroup: indicates which ports are located on the same module, and are thus using the same priority configuration. The ONS 15305 has a theoretical maximum of 65 ports, which are all listed in this table whether or not they are present. PriorityGroup 32 indicates that the port is not present (i.e. the corresponding slot holds a STM-n module which has no Ethernet interfaces).

7.2.4.3 TrafficClass

Classification of Ethernet frames are done according to the information in the TrafficClass table. The device use four queues for differentiating traffic, and as 802.1p defines eight different priorities, the priorities must be mapped into those four queues. The default mapping scheme is as recommended by IEEE, but this is configurable by the operator.

Priority Level	Class of Service
6, 7	3
4, 5	2
0, 3	1
1, 2	0

Recommended mapping when using four queues.

BridgePortNumber: a port number identifying one of the on the device. For each row, the information in the row applies to the port identified in this column.

Priority: priority value according to 802.1p. Legal values 0-7.

TrafficClass: indicates which service queue the selected priority value is to be mapped to. Legal values 0-4 (4 is highest priority).

7.3 Manage VLAN

The purpose of this section is to guide you through management of a VLAN on the network element. A network element can be configured to run either VLAN per port or VLAN per port and per protocol. The section also involves management of the complete life cycle of a VLAN, including:

- Creation, presentation, modification, and deletion of a VLAN.
- Creation, presentation, modification, and deletion of an Ethernet User Defined Protocol.

- Presentation and modification of Generic Attribute Registration Protocol VLAN Registration Protocol (GVRP).

7.3.1 Virtual Local Area Networks (VLAN)

A LAN consists of a number of computers that share a common communication line within a small geographical area. A Virtual LAN is a LAN where the grouping of computers are based on logical connections, for example by type of users, by department etc. It is easier than for a physical LAN to add and delete computers to/from a VLAN and to manage load balancing. The management system relates the virtual picture and the physical picture of the network.

The network element supports two types of VLAN

- Per port
- Per port and protocol

Both types of VLANs cannot be run simultaneously on the network element, that means either all VLANs per port or all per port and per protocol. The protocol can either be one from a set of predefined protocols or from Ethernet protocols defined by you. Different Ethernet protocol types can be IP, IPX, Appletalk, etc.

The maximum number of available ports to be members of a VLAN on one network element, is 32, that means maximum eight interfaces on each of the four possible modules on ONS 15305.

There are three steps involved in the definition of VLAN on the network element.

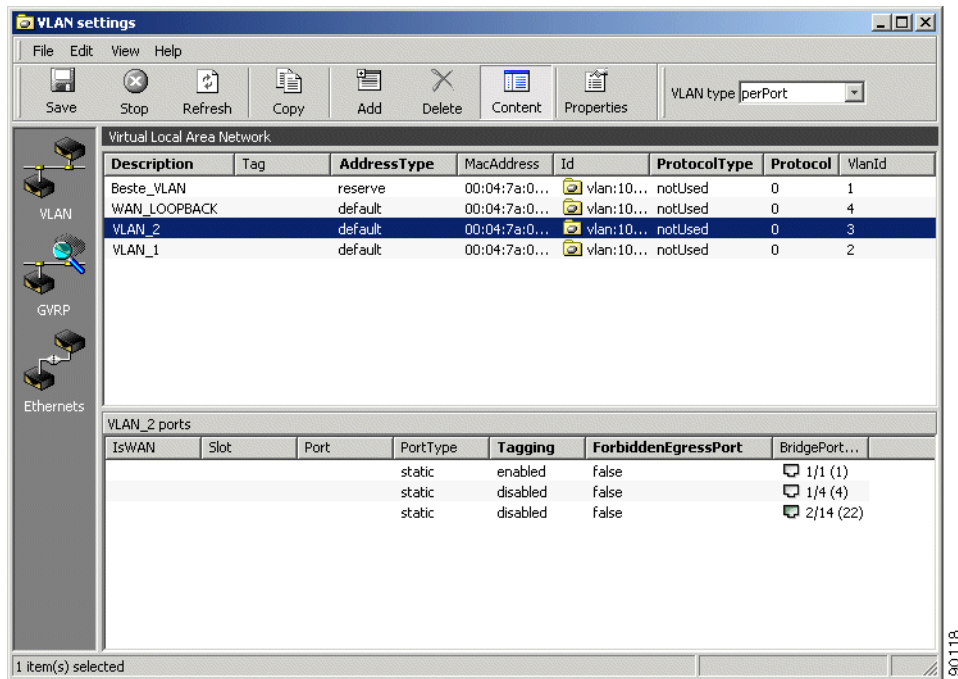
- A common VLAN type is defined for the Bridge.
- A set of common parameters for a new VLAN is defined.
- New ports can be added to a VLAN.

It is assumed you have the appropriate rights to perform management operations.

7.4 VLAN provisioning

Cisco Edge Craft has a custom GUI for VLAN provisioning, [Figure 7-4](#). The VLAN GUI makes VLAN related configuration easier for the user by grouping together a number of managed objects and attributes under a unique GUI.

Figure 7-4 VLAN GUI - Overview



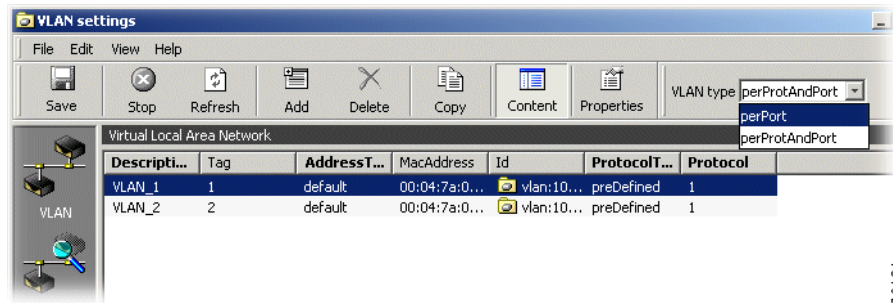
The following examples show how a VLAN per port, and a VLAN per port and protocol can be created and provisioned by using the custom GUI. The VLAN custom GUI can be opened either by clicking on VLAN Setting under the Bridge menu on the Cisco Edge Craft desktop, or by right-clicking on Bridge M.O. in the topology browser, and then selecting VLAN Setting.

7.4.1 Configuration of a new VLAN per port

Create a new VLAN per port.

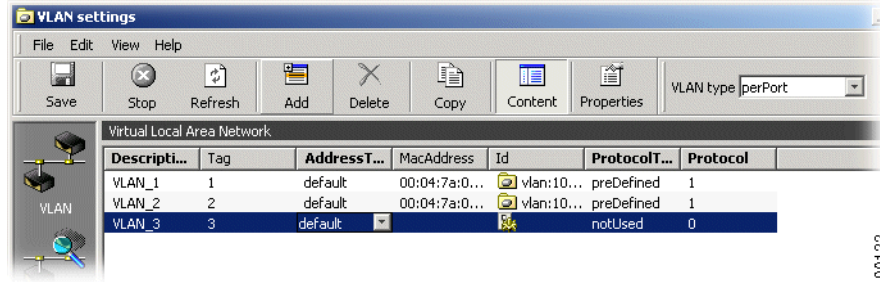
- Step 1** Verify that the VLAN type on the top right corner of the GUI is set to perPort, [Figure 7-5](#). If not, set **VLAN type** to **perPort**, and click **Yes** when asked if the network element should be rebooted.

Figure 7-5 VLAN Settings



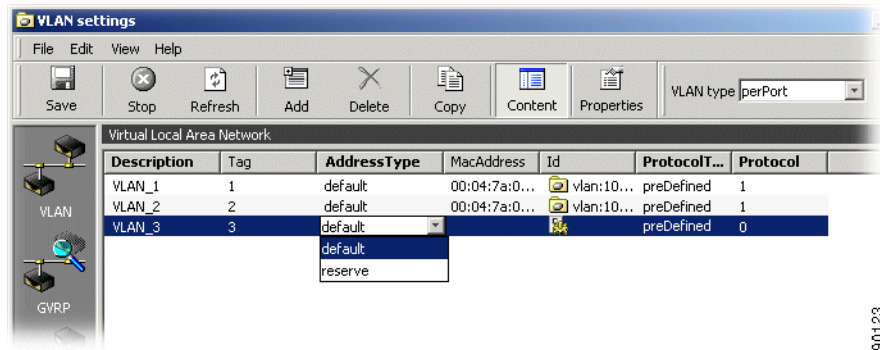
- Step 2** Click **Add** in the GUI, [Figure 7-6](#).

Figure 7-6 Add a VLAN



- Step 3** The GUI suggests default values for all the attributes. Edit the description, tag, and/or addressType attributes if required, [Figure 7-7](#).

Figure 7-7 Set VLAN Attributes



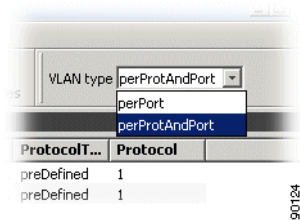
- Step 4** Click **Save**.

7.4.2 Configuration of a new VLAN per Protocol and per Port

Create a new VLAN per protocol and per port.

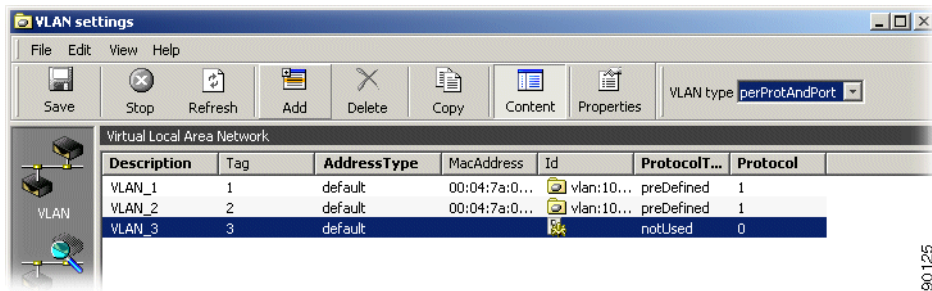
- Step 1** Verify that the VLAN type on the top right corner of the GUI is set to **perProtAndPort**. If not, set **VLAN type** to **perProtAndPort**, and click **Save**. The network element must be restarted before the change is effective.
- Step 2** Click **Add** on the GUI, [Figure 7-8](#).

Figure 7-8 Add a VLAN



- Step 3** Edit the protocolType and protocol attributes to indicate which protocol will be used to determine the VLAN membership of a packet. The user can choose between nine pre-defined protocols, and one Ethernet user defined protocol.

Figure 7-9 Configure a VLAN



Note If protocolType is set to notUsed, and protocol to zero, a VLAN per port is basically defined, that means the protocol carried by a packet does not influence its membership in a VLAN.

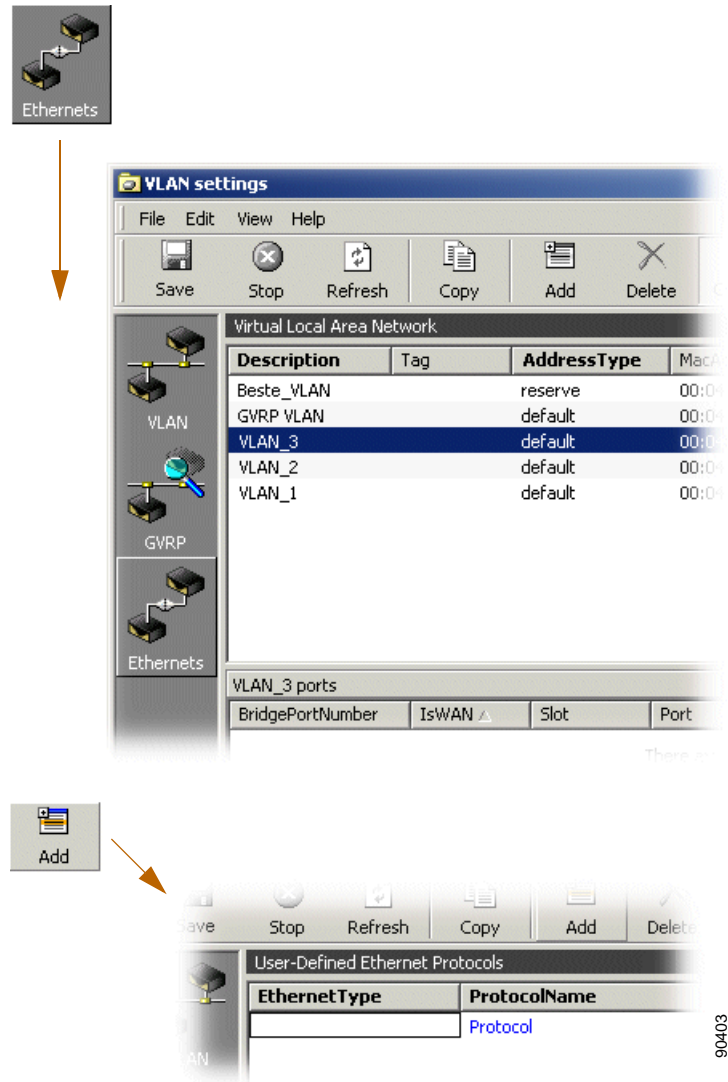
7.4.3 Configuration of an Ethernet User Defined Protocol

7.4.3.1 Use the Ethernet user defined protocol

The ethernetDefinedProtocol attribute allows you to define a non-predefined protocol based on the etherType field of Ethernet frames. This user-defined protocol is further used to create protocol-based VLANs, [Figure 7-10](#).

- Step 1** Select **VLAN Settings** from the **Brigde** menu.
- Step 2** Click **Ethernets** in the content pane.

Figure 7-10 Configuration of an Ethernet User Defined Protocol



- Step 3** Click **Add** on the toolbar (if no protocol is already defined). If a protocol is already defined, both fields described in **Step 4** can be directly edited.
- Step 4** Set the EthernetType attribute to the value of the EtherType indicating the required protocol. The ProtocolName attribute can optionally be used to give a user-friendly name to the protocol.
- Step 5** Click **Save** on the toolbar.



Note The EtherType numbers are maintained by the internet assigned numbers authority (IANA), and can be accessed on the Web at the following address:
<http://www.iana.org/assignments/ethernet-numbers>.

Assuming that a user wants to define a VLAN based on the address resolution protocol (ARP), the ethernetType must be set to 0806 (in hex), and the protocolName attribute could be, for example set to ARP to identify the protocol.

The Ethernet user defined protocol is relevant only when the network element runs VLAN per protocol and port.

Maximum one Ethernet user defined protocol can be currently defined on the network element.

To use the Ethernet user defined protocol as a VLAN protocol for a particular VLAN, set the `protocolType` attribute under `Bridge > VLAN` to `ethUserDefined`. The `protocol` attribute under `Bridge > VLAN`, which is used to identify a specific protocol, must then always be set to 1, since there is maximum one Ethernet user defined protocol.

7.4.3.2 Use one of the pre-defined protocols

- Step 1** Set `protocolType` to `preDefined`.
- Step 2** Set `protocol` to 1 for other, that means the VLAN will include any protocol except the one specified in [Table 7-1](#).

Table 7-1 VLAN Protocol

2	for IP protocol
4	for IPX Raw protocol
5	for IPX Ethernet protocol
6	for IPX LLC protocol
7	for IPX SNAP protocol
8	for DECNET protocol
10	for NETBIOS protocol
13	for SNA protocol

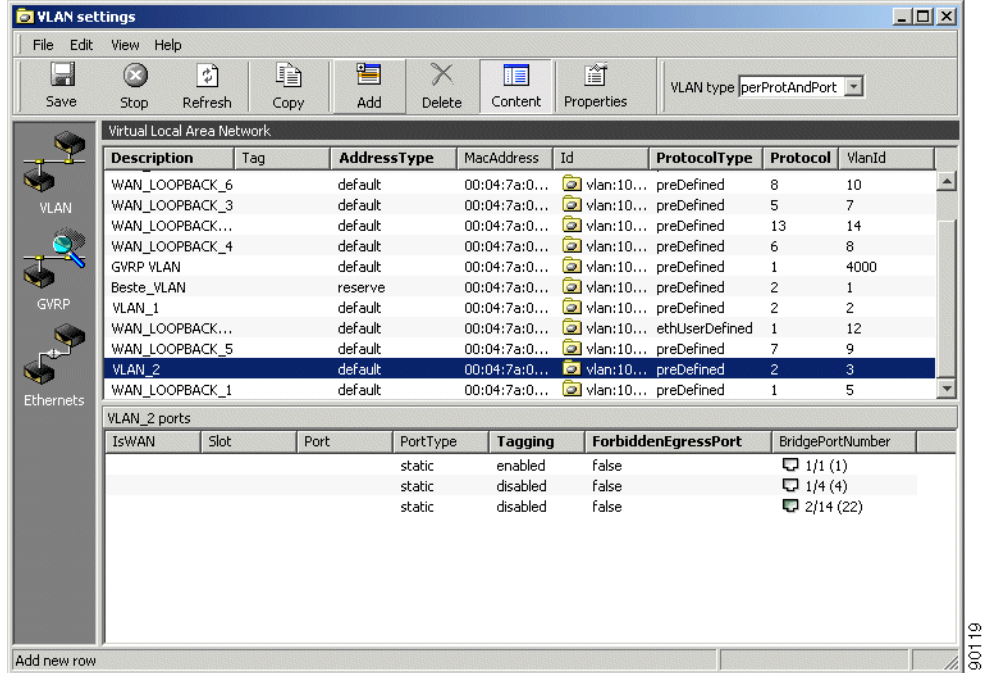
- Step 3** Edit the description, tag, and/or `addressType` attributes if required.
- Step 4** Click **Save**.

7.4.4 Configuration of VLAN Port members

Add port members to an existing VLAN

- Step 1** Select the VLAN to which ports will be added. The VLAN is highlighted in the virtual local area network window (top window in [Figure 7-11](#)). The list of ports already members of the VLAN is displayed in the VLAN ports window (bottom window in [Figure 7-11](#)).

Figure 7-11 Configuration of VLAN Port members

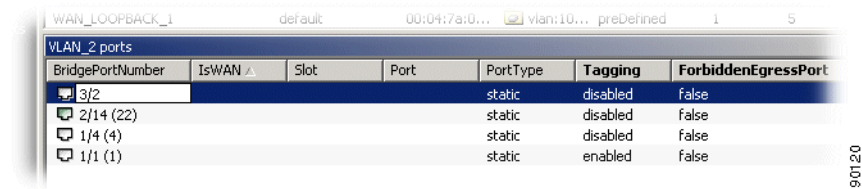


- Step 2** Activate the VLAN ports window by clicking anywhere in the window. The color of the title bar for the VLAN ports window changes to blue to indicate that the window is selected.
- Step 3** Click **Add**.
- Step 4** Edit the bridgePortNumber attribute. The attribute is displayed as slot/port (bridgePortNumber) and can be entered by the user as slot/port or bridgePortNumber (the system will update the display automatically).



Note The value of bridgePortNumber for LAN and WAN ports can be found under the LAN and WAN managed objects respectively.

Figure 7-12 Edit the Bridge Port Number



- Step 5** Edit the tagging and forbiddenEgressPort attributes if required.
- Step 6** Click **Save**.

7.4.5 GVRP

GARP VLAN registration protocol (GVRP).

Step 1 Click **GVRP** in the Content pane, [Figure 7-13](#).

Figure 7-13 GVRP Attributes

BridgePortNumber	PortEnable	JointTime	LeaveTime	LeaveAll...	FailedRegistrations	LastPduOrigin
1	enabled	21	60	1000	0	00:00:00:00:00:00
2	enabled	21	60	1000	0	00:00:00:00:00:00
3	disabled	20	60	1000	0	00:00:00:00:00:00
4	disabled	20	60	1000	0	00:00:00:00:00:00
5	disabled	20	60	1000	0	00:00:00:00:00:00
6	disabled	20	60	1000	0	00:00:00:00:00:00
7	disabled	20	60	1000	0	00:00:00:00:00:00
8	disabled	20	60	1000	0	00:00:00:00:00:00
9	disabled	20	60	1000	0	00:00:00:00:00:00
10	disabled	20	60	1000	0	00:00:00:00:00:00
11	disabled	20	60	1000	0	00:00:00:00:00:00
12	disabled	20	60	1000	0	00:00:00:00:00:00
13	disabled	20	60	1000	0	00:00:00:00:00:00
14	disabled	20	60	1000	0	00:00:00:00:00:00
15	disabled	20	60	1000	0	00:00:00:00:00:00
16	disabled	20	60	1000	0	00:00:00:00:00:00
17	disabled	20	60	1000	0	00:00:00:00:00:00
18	disabled	20	60	1000	0	00:00:00:00:00:00
19	disabled	20	60	1000	0	00:00:00:00:00:00
20	disabled	20	60	1000	0	00:00:00:00:00:00
21	disabled	20	60	1000	0	00:00:00:00:00:00
22	disabled	20	60	1000	0	00:00:00:00:00:00
23	enabled	20	60	1000	0	00:00:00:00:00:00
24	enabled	22	62	1100	0	00:00:00:00:00:00

The following attributes are modifiable:

- PortEnable
Set to enabled or disabled.
- JointTime
Set value in centiseconds.
- LeaveTime
Set value in centiseconds.
- LeaveAllTime
Set value in centiseconds.

7.4.5.1 Legal time values

Click in desired attribute cell and focus the mouse pointer over the cell. A tooltip will display legal value range for the selected attribute, [Figure 7-14](#).

Figure 7-14 Select Legal Time Values

me	LeaveAllTime	FailedRegistrations
	1000	0
	1000	0
	1000	0
	1000	0
	1000	0

7.5 Examples

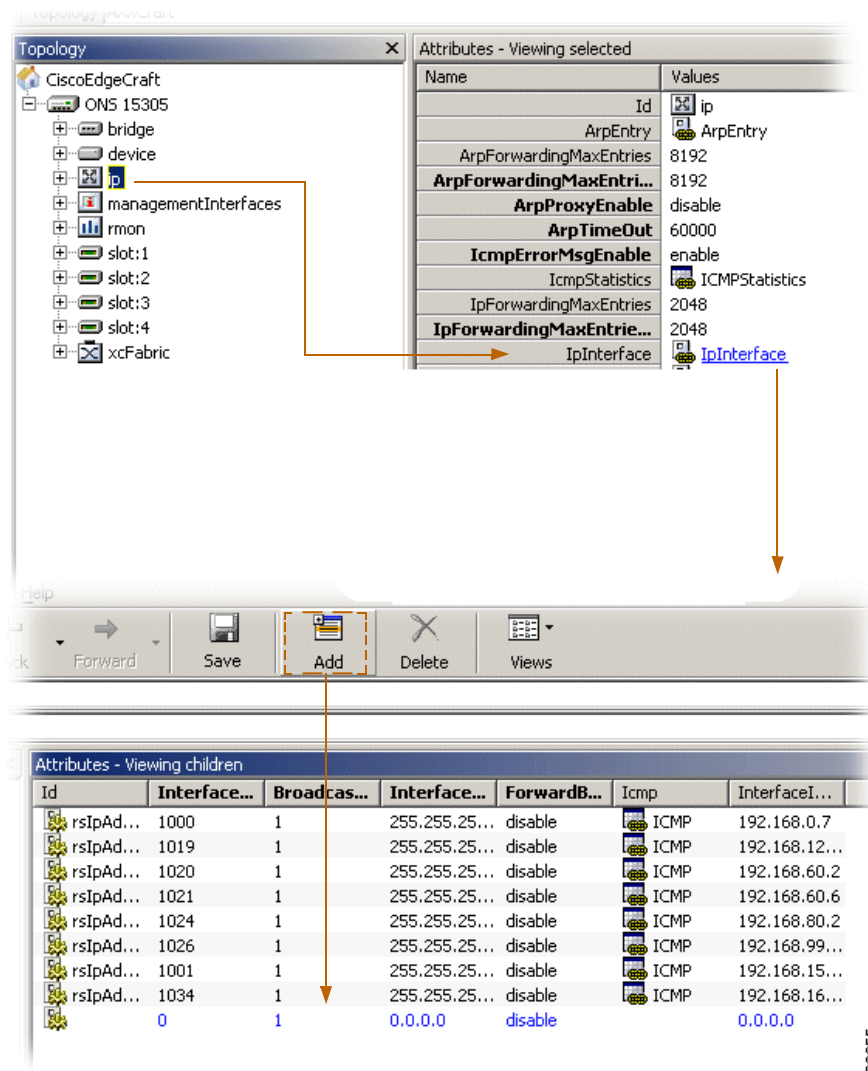
7.5.1 Configuration of an IP Interface

An IP interface can be created only for a physical port, a management interface, or a VLAN (port based VLAN or IP-based VLAN only).

Configure an IP interface with an IP address, [Figure 7-15](#).

-
- Step 1** Click on the ONS 15305 managed object, and then the **ip** managed object in the topology browser.
 - Step 2** Double-click on **IpInterface** in the attributes window.
 - Step 3** Click **Add** on the toolbar.

Figure 7-15 Configuration of an IP Interface



Step 4 The following attributes have no default values, and must therefore be defined:

- `interfaceIpAddress`
set the IP address according to your addressing plan.
- `interfaceNetworkMask`
set the network mask according to your addressing plan.
- `interfaceNumber`
the interface number. An IP interface can be defined for a LAN port, a WAN port, the management port, a DCC running IP or a VLAN. The interface number corresponding to these objects is specified by the `ifIndex` attribute present under their respective M.O.

Step 5 Click **Save** on the toolbar.

**Note**

One interface (identified by a specific ifIndex) can be allocated several IP addresses. This enables the user to connect the interface to a network segment where multiple subnets are defined.

IP addresses and network masks associated with the management interfaces, that means the management port, and the DCC can also be edited via the management interfaces M.O.

7.5.2 Configuration of a Static Route

An IP static route is a route defined by the user through the management system. Such a route does not age out, and will stay in the network element routing table as long as it is not explicitly deleted by the user. As any other route, a static route is active, and therefore included in the forwarding table provided that the interface associated with the route is up.

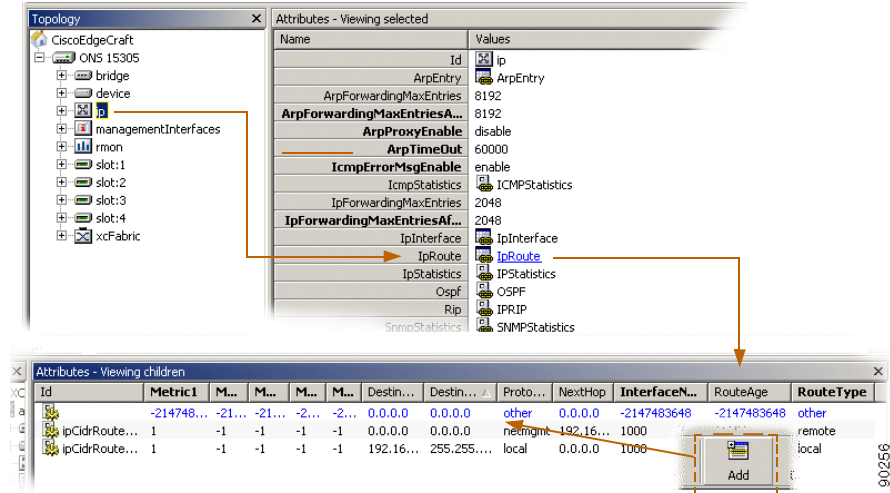
**Note**

The forwarding table is a subset of the routing table. It contains only the active routes, that means routes being used by the network element to forward IP datagrams. Typically, a route becomes inactive, and is removed from the forwarding table when the operational status of its associated interface is down. Only the forwarding table is visible in the Cisco Edge Craft via the ipRoute attribute.

7.5.2.1 Create a Static Route

- Step 1** Click on the ONS 15305 managed object, and then on the **IP** managed object in the topology browser, [Figure 7-16](#).
- Step 2** Double click on the **ipRoute** attribute in the attributes window.
- Step 3** Click **Add** on the toolbar.

Figure 7-16 Create a Static Route



- Step 4** Set the destinationIpAddress, destinationNetworkMask, nextHop, interfaceNumber attributes.
- Step 5** Set the **routeType** attribute to either **Remote** if the route is meant to forward traffic, or **Reject** if the route is meant to discard traffic for the specified destination.
- Step 6** Optionally, one or more metric attributes can be set. Metrics are used by the routing process to select a preferential route (the route with the lowest metric) if there are several possible routes for a given destination.
- Step 7** Click **Save** on the toolbar.



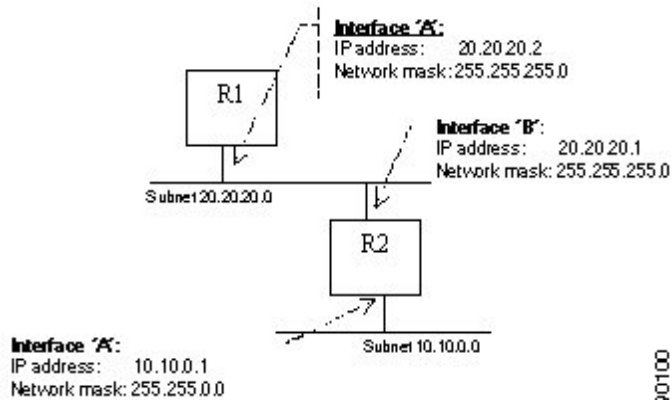
Note The value x set to the destinationNetworkMask attribute will be rejected by the network element if the bitwise logical-and of x with the value of the destinationIpAddress attribute is not equal to the value of the destinationIpAddress attribute.

The IP address of the next router en route specified by the next-hop attribute must be directly reachable via the interface specified by the interfaceNumber attribute, that means the next-hop IP address must belong to the (one of the) subnet(s) defined for the interface identified by the interfaceNumber attribute.

Example

To define a static route to the subnet 10.10.0.0 in router R1, [Figure 7-17](#).

Figure 7-17 Figure - Static Route in Router R1



-
- Step 1 Set destinationIpAddress: 10.10.0.0
 - Step 2 Set destinationNetworkMask: 255.255.0.0
 - Step 3 Set nextHop: 20.20.20.1 (one must choose the IP address of router R2 which lies on the same subnet as the interface identified by the interfaceNumber attribute in R1)
 - Step 4 Set interfaceNumber: ifIndex associated with interface A.
 - Step 5 Set routeType: Remote
 - Step 6 Set metric: 1
-

7.5.2.2 Configuration of a Default Route

A default route is a particular static route which is used to by the network element to send all the traffic for which no other routing information exists. If no default route has been defined, and no specific routing information exists for an IP datagrams requesting forwarding, the datagram is discarded.

The default route is created by setting both the destinationIpAddress and the destinationNetworkMask attributes to 0.0.0.0. The router identified by the next-hop attribute is then referred to as default router, also know as default gateway.



Note There exists only one active default route in the network element. The default gateway can also be edited via the Management Interfaces M.O.

Example

To create a default route on router R1 using router R2 as default gateway, [Figure 7-17](#).

- Step 1 Set destinationIpAddress: 0.0.0.0
- Step 2 Set destinationNetworkMask: 0.0.0.0
- Step 3 Set nextHop: 20.20.20.1
- Step 4 Set interfaceNumber: ifIndex associated with interface 'A'.

- Step 5 Set routeType: Remote
 - Step 6 Set metric: 1
-

7.5.3 Configuration of a RIP Filter

An IP RIP filter allows the user to control the propagation of RIP routing information, and eventually to modify the RIP routing by filtering out information about specific routes. In addition, IP RIP filters help reducing the size of the RIP table allowing for a faster table look-up, and releasing memory for other processes.

7.5.3.1 Create an IP RIP Global Filter:

- Step 1 Click on the ONS 15305 managed object, and then on the **IP** managed object in the topology browser.
 - Step 2 Double click on the **rip** attribute in the attributes window.
 - Step 3 Double click on the **ripGlobalFilter** attribute in the attributes window.
 - Step 4 Click **Add** on the toolbar.
 - Step 5 Set the **type**, **networkAddress**, **numberOfMatchBits**, and **filterAction** attributes.
 - Step 6 Click **Save** on the toolbar.
-

Examples

To define a RIP global filter which prevents the network element from advertising any route to the subnet 10.10.0.0, enter the following filter:

```
Type: output
NetworkAddress: 10.10.0.0
NumberOfMatchBits: 16
FilterAction: Deny
```

To define a RIP interface filter which prevents the network element from accepting routes for the subnet 192.168.0.0, but still accepts routes for the subnet 192.168.1.0, enter the following two filters:

```
#1: Type: input
NetworkAddress: 192.168.0.0
NumberOfMatchBits: 16
FilterAction: Deny
```

```
#2: Type: input
NetworkAddress: 192.168.1.0
```

NumberOfMatchBits: 24

FilterAction: Permit



Note The procedure to define a RIP interface filter is identical to the procedure described above. A RIP interface filter applies only to a specific interface (specified by the ripInterface attribute) instead of applying to every RIP-enabled interface on the network element. RIP interface filters take precedence over RIP global filters.

7.6 Miscellaneous

7.6.1 Open Shortest Path First

The open shortest path first (OSPF) is a link state routing protocol (unlike RIP which is distance vector routing protocol). Configuring the network element to run OSPF can be performed through three basic steps:

-
- Step 1** Configure one or several OSPF areas.
 - Step 2** Configuring the OSPF interfaces.
 - Step 3** Enable OSPF on the network element.
-

7.6.1.1 Supported OSPF Areas: Transit and Stub Areas

Three OSPF area types are currently defined by the standards:

- Transit areas (including the backbone area 0.0.0.0) defined in OSPF version 2 (RFC2328). Transit areas accept intra-area, inter-area, and external routes.
- Stub areas defined in OSPF version 2 (RFC2328). Stub areas come in two flavours: they can either accept intra-area, inter-area, and default routes, or only intra-area and default routes. Stub areas which propagate only intra-area and default routes within the area are sometimes referred to as totally-stub areas.
- Not-so-stubby areas (NSSA) defined in OSPF NSSA option (RFC1587). NSSAs are a hybrid between transit and stub areas. They can import a few external routes into the area via an autonomous system border router (ASBR) present in the area.

The network element currently supports only transit and stub areas. In addition, it is currently not possible to configure a stub area to import only intra-area and default routes, that means it is not possible to configure an area as a totally-stub area.

7.6.1.2 Configuring an OSPF Area

To configure a new OSPF area follow this Steps:

-
- Step 1** Click on the ONS 15305 managed object, and then on the **IP** managed object in the topology browser.
 - Step 2** Click on the **OSPF** attribute, and then on the **OspfArea** attribute in the attribute window.
 - Step 3** Click **Add**.
 - Step 4** Set the **areaID** attribute.
 - Step 5** Set the **importAsExternal** and **metric** attributes as required.
 - Step 6** Click **Save**.



Note Setting the importAsExternal attribute to importAsExternal define a transit area, while setting the importAsExternal attribute to importNoExternal define a stub area.



Note The metric attribute is only relevant for stub areas, that means when the attribute importAsExternal is set to importNoExternal.

7.6.1.3 Configuring an OSPF Interface

To configure an OSPF interface:

-
- Step 1** Click on the ONS 15305 managed object, and then on the **IP** managed object in the topology browser.
 - Step 2** Click on the **OSPF** attribute, and then on the **OspfInterface** attribute in the attribute window.
 - Step 3** Identify the OSPF interface to configure via its IP address listed under the **interfaceIpAddress** attribute.
 - Step 4** Set the **areaId** attribute to the area to which you want to attach the interface. Note that the area must have been previously defined, [7.6.1.2 Configuring an OSPF Area, page 7-25](#).
 - Step 5** Set the **interfaceType** attribute to the required type, and make sure that the **ospfEnable** attribute is set to **Enabled** (this is the default value).
 - Step 6** Edit the **helloInterval**, **metricValue**, **authenticationType**, **authenticationKey**, **transitDelay**, **routerDeadInterval**, **pollInterval**, **retransmissionInterval**, and **priority** attributes if required.
 - Step 7** Click **Save**.
-

7.6.1.4 Enabling OSPF on the Network Element

To enable OSPF globally:

-
- Step 1** Click on the ONS 15305 managed object, and then on the **IP** managed object in the topology browser.
 - Step 2** Click on the **OSPF** attribute in the attribute window.
 - Step 3** Set the **ospfEnable** attribute to **enabled**.
 - Step 4** Click **Save**.
-

7.6.2 DHCP

The network element can be configured as a DHCP server (ONS 15305 > IP > DHCP > dhcpServerEnable set to enable) or as a DHCP relay (ONS 15305 > IP > DHCP > dhcpServerEnable set to disable).

If the network element is configured to relay DHCP requests, the IP address of the next DHCP server must be configured by setting the ONS 15305 > IP > DHCP > **nextServerIpAddress** attribute.

If the network element is configured as a DHCP server, the user can configure the ranges of available IP addresses for every IP interface on the network element, “[7.6.2.1 Configure the Range of IP Addresses for the DHCP Server](#)” section on page 7-27. In addition, by using DHCP manual allocation mechanism, the user can define the IP address to be allocated to a host based on its MAC address and optionally its name, “[7.6.2.2 Configure the DHCP Server for Manual Allocation](#)” section on page 7-27.

7.6.2.1 Configure the Range of IP Addresses for the DHCP Server

Configure the range of IP addresses

-
- Step 1** Click on the ONS 15305 managed object, and then on the **IP** managed object in the topology browser.
 - Step 2** Click on the **DHCP** attribute, and then on the **dhcpAddressRange** attribute in the attribute window.
 - Step 3** Click **Add**.
 - Step 4** Set the **interfaceIpAddress** attribute to the IP address of the network element on which the range of IP address shall be available.
 - Step 5** Set the **ipAddressFrom** and **ipAddressTo** attributes to the **first** and the **last IP address** allocated for the range respectively.
 - Step 6** Edit the **leaseTime**, **defaultRouter**, and **probeEnable** attributes as required.
 - Step 7** Click **Save**.



Note The range of available IP addresses [ipAddressFrom; ipAddressTo] must be on the same subnet as the IP address of the interface (interfaceIpAddress) on which the range applies. If you want to allocate IP address permanently, that means to use the automatic allocation mode of DHCP, the leaseTime attribute must be set to -1.

7.6.2.2 Configure the DHCP Server for Manual Allocation

Configure an IP address for manual allocation

-
- Step 1** Click on the ONS 15305 managed object, and then on the **IP** managed object in the topology browser.
 - Step 2** Click on the **DHCP** attribute, and then on the **dhcpAllocation** attribute in the attribute window.
 - Step 3** Click **Add**.
 - Step 4** Set the **ipAddress** attribute to the IP address to be allocated via the manual allocation mode of DHCP.
 - Step 5** Set the **mechanism** attribute to **manual**.
 - Step 6** Edit the **macAddress**, **hostName**, **defaultRouter**, **configurationServerIpAddress**, and **configurationFileName** attributes as required.
 - Step 7** Click **Save**.



Note To match any incoming MAC address, the `macAddress` attribute must be to “00:00:00:00:00:00”.

7.6.3 Configuration of a RIP filter

An IPX RIP filter allows the user to control the propagation of RIP routing information, and eventually to modify the RIP routing by filtering out information about specific routes. In addition, IPX RIP filters help reducing the size of the RIP table allowing for a faster table look-up, and releasing memory for other processes.

To create an IPX RIP global filter

-
- Step 1** Click on the ONS 15302 managed object, and then on the **IPX managed** object in the topology browser.
 - Step 2** Double click on the **ripGlobalFilter** attribute in the attributes window.
 - Step 3** Click **Add** on the toolbar.
 - Step 4** Set the **type**, **netIpxAddress**, **networkMask**, and **action** attributes.
 - Step 5** Click **Save** on the toolbar.

7.6.3.1 Examples

To define a RIP global filter which prevents the network element from advertising any route to the IPX networks starting with IPX network number 1A 20 3E, enter the following filter:

- Type
output
- NetIpxAddress
1A 20 3E 00
- NetworkMask
FF FF FF 00
- Action
Deny

To define a RIP interface filter which prevents the network element from accepting routes for the IPX networks starting with IPX network number 1A 20 3E, but still accepts routes for the IPX network 1A 20 3E B1, enter the following two filters:

Filter #1

- Type
input
- NetIpxAddress
1A 20 3E 00

- NetworkMask
FF FF FF 00
- Action
Deny

Filter #2

- Type
input
- NetIpxAddress
1A 20 3E B1
- NetworkMask
FF FF FF FF
- Action
Permit



Note

The default behavior for the network element is to permit incoming and outgoing RIP information. To modify this default behavior, a filter with networkMask set to 00 00 00 00 can be created with action set to deny. Such a filter will per default deny any incoming or outgoing (depending on the value set for the type attribute) RIP information for which there is no more specific filter.

The procedure to define a RIP circuit filter is identical to the procedure described above. A RIP circuit filter applies only to a specific circuit (specified by the circuit attribute) instead of applying to every RIP-enabled circuit on the network element. RIP interface filters take precedence over RIP global filters.



Performance Management

The purpose of this section is to present

- current and historical G.826 performance data for the SDH paths and section termination points.
- current values of the various counters available in the network element.

It is possible to clear all PM data on the network element, see [“4.4.2.9 Logs \(Alarm Logs, Performance Data Logs\)” section on page 4-19](#). Clear operation for the PM log is defined in the information model.

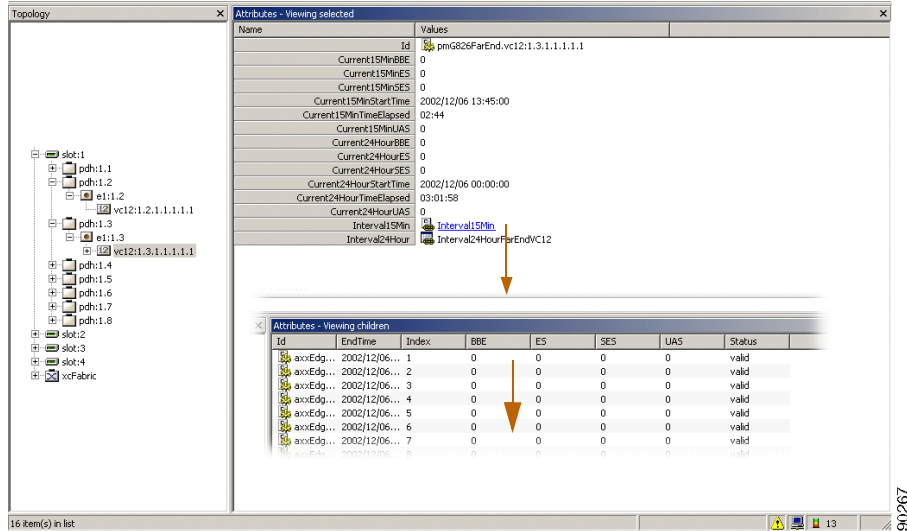
8.1 Present G.826 PM data

You can select in the topology browser, all managed objects that have G.826 performance data, [Table 8-1](#).

Table 8-1 Managed Objects

Parameter	Description	Objects
RS	Regenerator Section	near end
MS	Multiplex Section	near end and far end
VC-3	Virtual Container 3	near end and far end
VC-4	Virtual Container 4	near end and far end
VC-12	Virtual Container 12	near end and far end

Figure 8-1 View PM - Example



With near end and far end data for all managed object except the RS. The managed objects have PM attributes as defined in the information model, [Figure 8-1](#).

Available time periods are:

- 15 minutes
- 24 hours

The system presents current data and historical data. The number of historical stored periods are:

- 16x15 minutes
- 1x24 hours

See also “[5.3.7 Monitoring PDH Port Performance](#)” section on page 5-11 and “[5.5.9 Monitoring WAN Port Performance](#)” section on page 5-25.

8.2 View counters

You can use the topology browser to view all managed objects that are monitored objects. These managed objects are:

- LAN ports
- WAN ports
- Bridge
- IP
- RMON

8.3 Criteria for Counting Valid-data in the ONS15305

Criteria for PM counters: for disabled ports, there is no PM-counting (all BBE, ES, SES, UAS have value 0), valid-data flag not affected (data is set as valid if conditions mentioned below are fulfilled).

For Valid-data flag (used for previous 15-min/24-hour intervals) the following rules apply:

The flag will not be set for any 15-min period (for any levels) if 600 seconds (10 minutes) or less are counted (since counter-reset or device-reset).

- The flag will not be set for any 24-hour period (for any levels) if 20 hours or less are counted (since counter-reset or device-reset).
- For RS/MS/VC-4 levels the flag will not be set for any 15-min if the STM-n port was not defined at the beginning of the period (defined meaning that STM-n port was expected in that slot/port position).
- For RS/MS/VC-4 levels the flag will not be set for any 24-hour period if rule 3) was true for 80 15-min intervals (20 hours) or less.
- For VC-4 level the flag will not be set for any 15-min period if the AUG-1 is not structured as AUG_AU4_TO_XC or AUG_TUG3x3 at the beginning of the period.
- For VC-4 level the flag will not be set for any 24-hour period if rule 5) was true for 80 15-min intervals (20 hours) or less.

In all other cases the valid-data flags are set to

- RS-level valid-data: rules 1,2,3,4
- MS-level valid-data: rules 1,2,3,4
- VC-4-level valid-data: rules 1,2,3,4,5,6
- E3-(/VC-3-) valid-data: rules 1,2
- E1(/VC-12-) valid-data: rules 1,2
- WAN (/VC-12-) valid-data: rules 1,2

■ 8.3 Criteria for Counting Valid-data in the ONS15305



Troubleshooting and FAQ

Question one handled troubleshooting and FAQ from [Chapter 4, “General Management”](#).

Question two to four handled troubleshooting and FAQ from [Chapter 5, “Traffic Port Management”](#).

Question six to eleven handled troubleshooting and FAQ from [Chapter 7, “Layer 2 Configuration”](#).

Question 1

- Q.** I cannot configure the Slot for another module type.
- A.** When the Slot Expected Module attribute is set to a specific module type, the Managed Objects for the expected module type are created in ONS 15305. Likewise, when the Expected Module is already set to a module type and we want to configure the Slot for a different module type, the Managed Objects for the configured module will be deleted before the Managed Objects for the new module type can be created.
- In order to avoid unintentional traffic breaks, ONS 15305 checks whether the existing configured module is involved in cross-connections, carrying management traffic or is used for synchronization purposes.

Question 2

- Q.** Why should I set the Path Trace Identifier attributes?
- A.** You do not have to set the Path Trace Identifier attributes, but it is a very useful tool for checking the connectivity of complex networks. Basically a Path Trace Identifier is inserted at the beginning of a path and extracted at the end of a path. By setting Path Trace Transmitted to a logical value, for example BONN-3-21 you can easily see if this value is received on the other side of the network. If you enter a value for the Path Trace Expected value and enable Path Trace, a TIM alarm will be triggered if the received value is different from the transmitted value.

Question 3

- Q.** What is a WAN port?
- A.** WAN ports perform the mapping between a traditional Lan Port and the SDH network. The WAN port is an internal interface in ONS 15305.

Question 4

- Q.** Why does a WAN port have 50 channels when I can achieve the maximum capacity of 100 Mbit/s using 47 channels?
- A.** The WAN port is mapping the ethernet packets into VC12 containers. Each VC12 container always carry 2.16 Mbit/s. However, the mapping process requires some overhead. The overhead will vary with the actual PDU type mapped into the VC12 channels. This means that the bit rate at the Ethernet interface is a bit less than the bit rate of the VC-12 channel. With a certain type of PDUs, 100Mbit/s is achieved using only 47 channels, while some PDUs may require 50.

Question 5

- Q.** Why is the Mac multicast feature not available in Cisco Edge Craft
- A.** To enable MAC multicast, the user must make sure that the maximum number of VLANs is less than 4000. This is because the maximum number of multicast entries allowed in the network element is fixed by the following equation:

Figure 9-1 VLAN calculation

$$(\text{max number multicast entries}) = 4000 - (\text{max number VLANs})$$

Therefore, if the maximum number of VLANs is greater than 4000, no resources can be allocated for MAC multicast entries, and the MAC multicast feature is then disabled.

The maximum number of VLANs is set via the `vlanMaxEntriesAfterReset` attribute (under Bridge->VlanType). If this attribute is edited, the network element must be reset before the new value becomes effective.

Question 6

- Q.** Why is the STP per VLAN (or STP per Device) attribute not available in Cisco Edge Craft.
- A.** Either the `stpPerDevice` or the `stpPerVlan` attribute is available in the Cisco Edge Craft, but both attributes are not available simultaneously. The attribute `stpType` under Bridge > spanningTree decides which attribute is available. When the value of the `stpType` attribute is 'perDevice', the `stpPerDevice` attribute is available, and the `stpPerVlan` attribute is not. Reciprocally, when the value of the `stpType` attribute is 'perVLAN', the `stpPerVLAN` attribute is available, and the `stpPerDevice` attribute is not.

The attributes `stpPerDevice` and `stpPerVLAN` allows the user to control the spanning tree process(es) on the network element. The network element can either run one single spanning tree for the whole network element, or one spanning tree per VLAN. The `stpType` attribute is used to indicate which type of spanning tree protocol (per device or per VLN) is currently running. To modify the current type, set the `stpTypeAfterReset` attribute (under Bridge > spanningTree) to the desired value, and reset the network element.

Question 7

- Q.** How many VLAN does the network element support?

- A. The maximum number of VLANs supported by the network element is configurable by the user, and is indicated by the `vlanMaxEntries` attribute (under `Bridge > VlanType`). The maximum number of VLANs can be set to a new value via the `vlanMaxEntriesAfterReset` attribute (under `Bridge > VlanType`). If this attribute is edited, the network element must be reset before the new value becomes effective. Note that the network element cannot support more than 4000 VLANs.

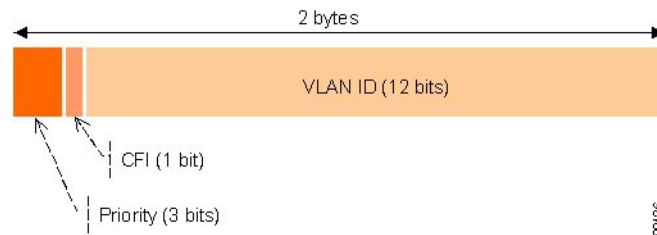
Question 8

- Q. What is the VLAN ID?
- A. IEEE 802.1Q standardizes a scheme for adding additional information, known as VLAN tag, to layer 2 frames in order for a switch to know which VLAN an incoming frame is intended for, and the priority of the frame. The VLAN tag is a two-byte field containing 3 bits for indicating the priority of the frame, 12 bits for indicating the VLAN ID, and 1 bit indicating whether the addresses are in canonical format, [Figure 9-2](#).



Note In the standard (IEEE 802.1Q), layer 2 frames carrying both VLAN identification and priority information in a tag are referred to as VLAN tagged frames. Layer 2 frames carrying priority information, but no VLAN identification information are referred to as priority tagged frames.

Figure 9-2 IEEE 802.1Q Tag header (VLAN tag)



The priority field is interpreted as a binary number, and therefore capable of representing eight priority levels, 0 through 7. The use and interpretation of this field is defined in ISO/IEC 15802-3. The canonical format indicator (CFI) is a single bit flag value. CFI reset indicates that all MAC address information that may be present in the MAC data carried by the frame is in canonical format. The VLAN identifier (VLAN ID) field uniquely identifies the VLAN to which the frame belongs. The VLAN ID is encoded as an unsigned binary number. The user can associate any value in the range 1-4095 to a VLAN ID. The value null is reserved for priority-tagged frames, and the value 4096 (FFF in hexadecimal) is reserved for implementation use.



Note Priority tagged frames are layer 2 frames carrying priority information, but no VLAN identification information.

Question 9

- Q. How to choose the maximum number of GVRP VLAN?

- A. The generic attribute registration protocol (GARP) protocol is a general-purpose protocol that registers any network connectivity or membership-style information. GARP defines a set of devices interested in a given network attribute, such as VLAN or multicast address.

The GARP VLAN registration protocol (GVRP) protocol is specifically provided for automatic distribution of VLAN membership information among VLAN-aware bridges. GVRP allows VLAN-aware bridges to automatically learn VLANs to bridge ports mapping, without having to individually configure each bridge, and to register VLAN membership.

To minimize the memory requirements when running the GVRP protocol, two proprietary tuning variables have been added to the standard variables: `gvrpVlanMaxEntries` and `gvrpVlanMaxEntriesAfterReset` which control the number of GVRP VLANs allowed to participate in GVRP operation. The maximum number of GVRP VLANs includes all the VLANs participating in GVRP operation regardless if they are static or dynamic.

The following should be considered when specifying the maximum number of VLANs participating in GVRP by setting the `gvrpVlanMaxEntriesAfterReset` attribute:

- The default maximum number of GVRP VLANs is equal to 0 because of the memory restrictions.
- The maximum number of VLANs (managed through the `bridge> vlanType > maxVlanEntriesAfterReset` attribute) limits the maximum number of GVRP VLANs.
- To ensure the correct operation of the GVRP protocol, users are advised to set the maximum number of GVRP VLANs equal to a value which significantly exceeds the sum of:

The number of all static VLANs both currently configured and expected to be configured.

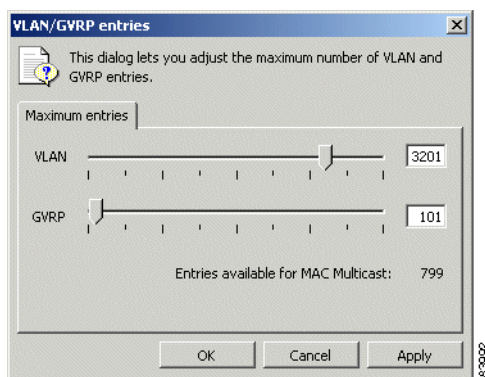
The number of all dynamic VLANs participating in GVRP both currently configured (initial number of dynamic GVRP VLANs is 0) and expected to be configured.

In creasing the value of maximum number of GVRP VLANs to value beyond the sum, allows users to run GVRP, and not reset the device to receive a larger amount of GVRP VLANs. For example, if 3 VLANs exist and another two VLANs are expected to be configured as a result of VLAN static or dynamic registration, set the maximum number of GVRP VLANs after reset to 10.

Adjust the maximum number of VLAN and GVRP entries

- Step 1** Click **Properties** in the VLAN Settings window.
- Step 2** The appearing dialog allows you to adjust the maximum number of VLAN and GVRP entries.

Figure 9-3 Adjustment of VLAN/GVRP entries



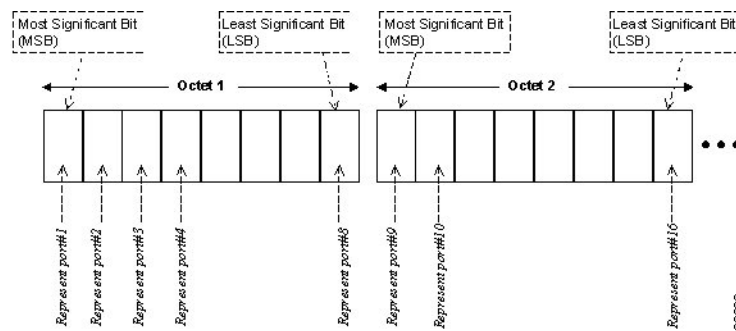


Note To enable GVRP, ensure that the amount of maximum amount of VLANs is less than 4000 (check the bridge > vlanType > maxVlanEntries attribute).

Question 10

- Q.** How to represent a set of ports with an octet string?
- A.** When an octet string is used to represent a set of ports, each octet within the string specifies a set of eight ports, with the first octet specifying ports 1 through 8, the second octet specifying ports 9 through 16, etc. Within each octet, the most significant bit represents the lowest numbered port, and the least significant bit represents the highest numbered port, [Figure 9-4](#). Each port of the bridge is then represented by a single bit within the octet string. If the bit has a value of 1 then the port is included in the set of ports, and the port is not included if the bit has a value of 0.

Figure 9-4 Definition of a set of ports through an octet string



[Table 9-1](#) presents two examples of octet strings and their corresponding sets of ports.

Table 9-1 Octet string and corresponding set of ports

Octet String	Binary Representation	Set of port(s)
52	0101 0010	port #2, port #4, and port #7
0c 01	0000 1100 0000 0001	port #5, port #6 and port #16

Question 11

- Q.** What are the Common UDP Ports?
- A.** The common UDP ports are described in [Figure 9-5](#).

Figure 9-5 Common UDP Ports

UDP Port #	Acronym	Application
37	TIME	Time
42	NAMESERVER	Host Name Server
43	NICNAME	Who Is
53	DOMAIN	Domain Name Server
67	BOOTPS	Bootstrap Protocol Server
68	BOOTPC	Bootstrap Protocol Client
69	TFTP	Trivial File Transfer
111	SUNRPC	Sun Microsystems Rpc
123	NTP	Network time
137	NetBiosNameService	NT Server to Station Connections
138	NetBiosDatagramService	NT Server to Station Connections
139	NetBios SessionService	NT Server to Station Connections
161	SNMP	Simple Network Management
162	SNMP	Simple Network Management Traps
513		Unix Rwho Daemon
514	syslog	System Log
525	timed	Time Daemon

Q. What are the different types of Link State Advertisements?

A. The different link types are listed in [Table 9-2](#).

Table 9-2 Link state type (according to RFC2328, Appendix A.4.1)

Link State (LS) Type	Description
1	Router-LSAs
2	Network-LSAs
3	Summary-LSAs (IP network)
4	Summary-LSAs (ASBR)
5	AS-external-LSAs



GLOSSARY

A

ADM	Add/drop multiplexer
AIS	Alarm indication signal
APS	Automatic protection switching
ARP	address resolution protocol
ASBR	Autonomous system border router
AU-x	Administrator Unit - x

B

BBE	Background block error
BER	Bit error rate

C

CBKLM	Addressing schema for data container
CFI	Canonical format indicator
CLNP	Connection less network protocol
CNLP	Connectionless network rotocol
CPE	Customer premises environment
CTP	Connection termination port
CTS	Clear to send

D

DNU	Do not use
------------	------------

DEG	Degraded signal effect
DCC	Data communications channel
DCN	Data communications network
DHCP	Dynamic host control protocol

E

EMS	Element management system
ETS	European Telecommunications Standard
ETSI	European Telecommunications Standards Institute
ES	Errored seconds

F

FCC	Federal Communications Commission
------------	-----------------------------------

G

GARP	Generic attribute registration protocol
GUI	Graphical user interface
GW	Gateway
GVRP	Generic attribute registration protocol VLAN registration protocol

H

HTML	Hypertext markup language
-------------	---------------------------

I

IANA	Internet assigned numbers authority
ID	Identifier
IEC	International Electrotechnical Commission

IEEE	Institute of Electrical and Electronics Engineers
IF-DN-0101-R1	Network and service forum (NSIE) standard for IP over DCC
IGMP	Internet group management protocol
IP	Internet Protocol
IPX	Internetwork packet exchange protocol
IS	Intermediate system
ISDN	Integrated services digital network
ISO	International standard organization
ITU	International Telecommunications Union
ITU-T	International Telecommunications Union, Telecommunication standards sector

L

L1 IS	Layer 1 intermediate system
L2 IS	Layer 2 intermediate system
LAP-D	Link access procedure on the D channel
LAN	Local area network
LED	Light emitting diode
LLC	Logical link control layer
LL2/LL3	Local loop 2/3
Log4j	Tool for logging from jakarta.apache.org
Los	Loss of signal

M

MAC	Medium access
Mbps	Megabits per second
MHz	Megahertz
MIB	Management information base
M.O.	Managed objects

MS	Multiplex section
MSP	Multiplex section protection

N

NC	not connected
NE	Network element
NET	Network
NMS	Network management system
NSAP	Network Service Access Point
NSSA	Not-so-stubby areas

O

ONS	Optical networking system
ONSCLI	Optical networking system command line interface
OSPF	open shortest path first

P

PC	Personal Computer
PDH	Plesiochronous digital hierarchy (ITU-T Rec. G.702)
PIM	Protocol independent multicast
PIM-DM	Protocol independent multicast - Dense mode
PM	Performance monitoring
PPP	Point-to -point protocol
PRC	Primary reference clock

Q

QL	Quality Level
QLM	Quality Level minimum

R

RFC	Request for comments
RIP	Routing information protocol
RJ-45	Registered jack #45 (8-pin)
RS Layer	Regenerator section layer
RSTP	Rapid spanning tree protocol
RMON	Remote monitoring
Rx	Receive

S

SAP	Server advertisement protocol
SASE	Stand alone synchronization equipment
SEC	SDH equipment clock
SES	Severely errored second
SDH	Synchronous digital hierarchy
SNAP	Subnetwork access protocol
SNC	Sub-network connection
SNC/I	Sub-network connection inherent monitoring
SNC/N	Sub-network connection on-intrusive monitoring
SNMP	Simple network management protocol
SNTP	Simple network timing protocol
SSU	Synchronisation supply units
SSM	Synchronisation status message

STM Synchronous transport module
STP Spanning tree protocol

T

TAC Technical Assistance Center
TCP/IP Transmission Control Protocol/Internet Protocol
Trib Tributary
TFTP Trivial File Transport Protocol
TP Termination point
TU Tributary unit
Tx Transmit

U

UAS Unavailable seconds
URL Uniform Resource Locator (Internet address, including specific document location)

V

VC-x Virtual container
VLAN Virtual local area network

W

WTR Wait to restore
WAN Wide area network
WWW World Wide Web

X

XC Cross connect

