

USER MANUAL

FOXMAN-UN

NEM GUI Help System

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1 NEM Help System

NEM Help for FOXMAN-UN

The NEM Help System contains the user manual information on a per GUI dialog basis. Each GUI dialog image is shown and its function, input fields, and action buttons are explained. Help pages for related dialogs can be reached via the incorporated links.

The NEM Help System can be used in two ways:

Application Help Viewer

Calling the Help Viewer as an application via the start icon or the main menu opens it at this location and lets you navigate through all topics with the aid of the tree panel on the left. The topics are grouped logically in the tree. Initially the top level folders are shown expanded, all further folders are shown collapsed. They can be expanded by double click on the icon or text. A search function is provided which lets you find all help topics containing the entered search text.

Context Sensitive Help

Help can also be called in the context sensitive mode from almost each GUI dialog via either a menu selection or a help button. This opens the Help Viewer and displays directly the relevant help topic. From there you can jump to related help topics or you can use the navigation panel and the search function.

Features, Options, and Permissions



Please note:

Most of the features and options described herein are available only to FOXMAN-UN users with appropriate permissions. The definition of permissions for each FOXMAN-UN user is done by the FOXMAN-UN security administrator in “**Role Based Access Control**” (legacy) or “**User and Role Management**” (Web UI).

→ Certain users may not be able to execute or access features or options described in this manual, depending on the permissions assigned to the user. Such restrictions are not individually described or mentioned in this manual for each of the features or options.

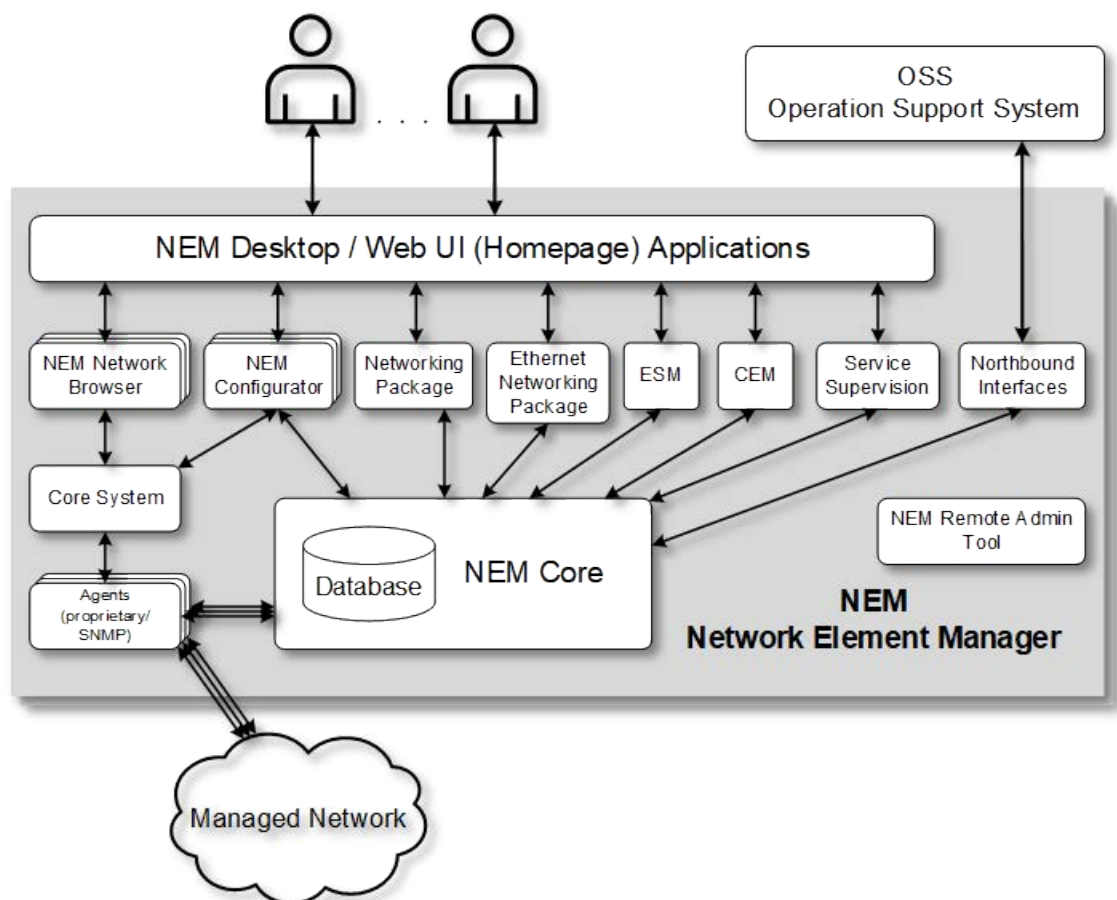
2 NEM Introduction

This section gives a brief introduction to the FOXMAN-UN system. The system architecture is shown, and the two major user interfaces, i.e. the NEM Configurator and the NEM Network Browser are introduced with a view on how the system has to be configured and how it is used to supervise a network. The section includes the following topics:

- [NEM Architecture](#),
- [NEM Desktop](#),
- [NEM Configurator](#),
- [NEM Network Browser](#).

2.1 NEM Architecture

Basic components



Core

FOXMAN-UN is built around a database. This database stores all the relevant information concerning configuration and alarms at the element level. The core component contains the software necessary for managing this information as well as for handling the communication with the other processes.

Agent

The agent handles the communications with the network elements. Several agent processes can be running depending on the number of sub-networks connected to the workstation.

The agent can

- upload and download configurations from and to the network elements,
- poll network elements for alarms,
- retrieve and set status information.

NEM Desktop

The **NEM Desktop** is the control panel from where all NEM functions can be started. This includes the applications NEM Network Browser, NEM Configurator, and the Networking Package.

NEM Network Browser

The **NEM Network Browser** provides the operator with a graphical view of the network in the form of maps to supervise the network and carry out the day to day management of the network elements.

NEM Configurator

The **NEM Configurator** allows setting up all the details of the management network and defining the security aspects. In addition it provides access to the NE configuration management and limited access to the fault management.

Section Management

The **Section Management** allows creation, modification or deletion of section(s), and launch of the NP GUI for the specific section. The dialog likewise displays all sections of the managed network, regardless of any map that may be opened. It allows creation or deletion of section(s)

Networking Package

The **Networking Package** provides an end-to-end TDM (SDH/PDH) provisioning of circuits and trails across FOX51x or FOX61x networks.

Ethernet Networking Package

The **Ethernet Networking Package** allows you to configure, provision, and manage MPLS-TP services.

Ethernet Security Manager

The Ethernet Security Manager provides the user interface for setting up security related network functions such as encrypted transmission.

Service Manager

The **Service Supervision and Reporting** allows end-to-end network services monitoring. It runs regular reports regarding end-to-end service availability, particularly related to any Service Level Agreements that may exist.

Circuit Emulation Manager (CEM)

The **Circuit Emulation** allows you to manage all circuit emulation related services. This includes teleprotection services that use circuit emulation.

North Bound Interfaces

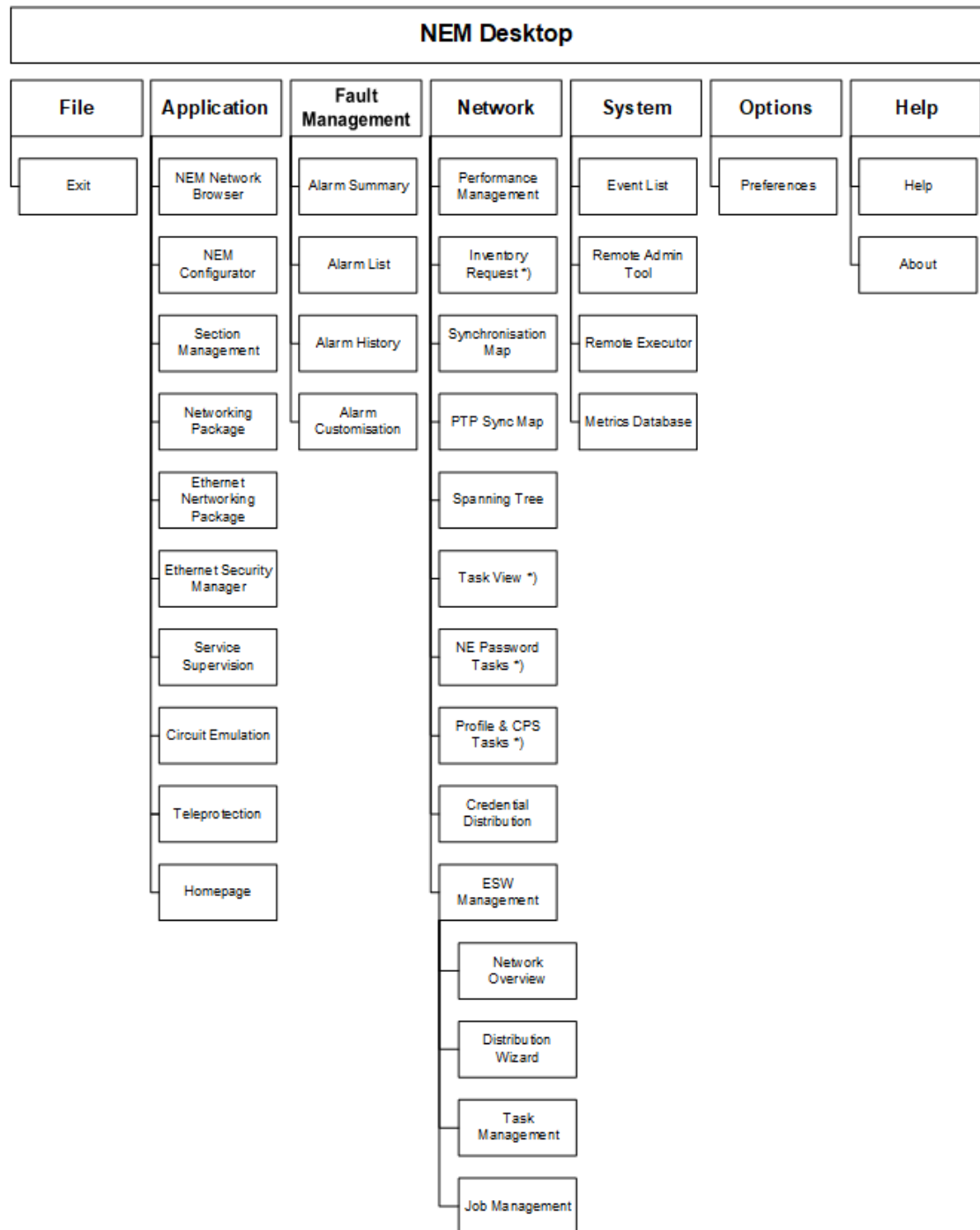
FOXMAN-UN offers a northbound SNMP interface for fault management.

2.2 NEM Desktop

For more details see section **3 NEM Desktop** (on page 15).

The NEM Desktop is the control panel from where all functions of the NEM system are started. The desktop itself is started by connecting it to an active NEM core via the login procedure.

The NEM Desktop has the following menu structure:



*) Legacy menu option

Applications

The **NEM Network Browser**, **NEM Configurator**, **Section Management**, and – if licensed – the **Networking Package**, **Ethernet Networking Package**, and **Service Supervision** can be initialized with the connected NEM core.

Fault management

Alarm functions include summary, list, and history. Additionally, if required, the standard settings alarm severities and alarm texts can be modified on a global, per NE or per unit/subunit basis via the [Alarm Customisation](#) functions.

Network functions

Reporting functions like performance management, inventory, and the network clock synchronization maps as well as network wide distribution of NE credentials, SSH keys, profiles, and embedded software management are handled in this group.

System functions

An event list records all important activities in the managed network. Up to 100'000 entries are stored in the database and can be browsed through. The remote admin tool provides you with administration functions for the NEM core services, database backups, and main/standby server configuration. The remote executor allows you to execute scripts for various purposes. A metrics database provides means for setting up system performance graphs for both the managed network and the NEM server.

Options

Preferences for GUI elements and their look & feel can be set.

2.3 NEM Configurator

For more details see section [4 NEM Configurator](#) (on page 30).

Network configuration

The following steps have to be performed to create a database representing the network to be managed.

Management network

After the physical management network has been set up, the necessary [Agents](#) for the control of the management communication should be created.

Managed objects

The [Network Elements](#) (NEs) to be supervised have to be assigned to each agent.

SNMP compatible third party equipment can be assigned to a specific SNMP agent.

Third party equipment can also be added by creating [Foreign Objects](#) (FOs). ALCAR alarm monitoring units can be used to supervise [external alarms](#) of FOs.

Security configuration

The FOXMAN-UN security system has to be configured to allow structured access to the various system functions. With the system release R17A, role-based access control (RBAC) has been introduced, replacing domain access control (DAC). For details, see section [4 NEM Configurator](#) (on page 30).

Role-Based Access Control (RBAC)

Security in FOXMAN-UN is organized around domains, users, and roles. Role-based access control is described in [NEM Configurator - Main Window](#).

Domains

Domains (see [Domain – Create](#)) contain managed objects of the FOXMAN-UN structure, such as network elements, agents, domains, users, services.

Users

Users can be created, managed, or deleted by a user with appropriate administrator permissions. They are assigned to one or several domains. This allows them to perform the actions defined by their roles on the objects contained in the domains. Assignments can be on a permanent basis, or they can be made to terminate at a specific date and time.

Roles

Roles are assigned to a user by an administrator having the role RBACMNT.

Supervision aspects

The NEM Configurator allows stopping and starting supervision of single NEs. Forced polling can be executed on any NE. Access to the alarm situation of single NEs is possible via alarm list, local craft terminal (FOXCST), or hardware view (legacy).

2.4 NEM Network Browser

For more details see section [5 NEM Network Browser](#) (on page 38).

Maps

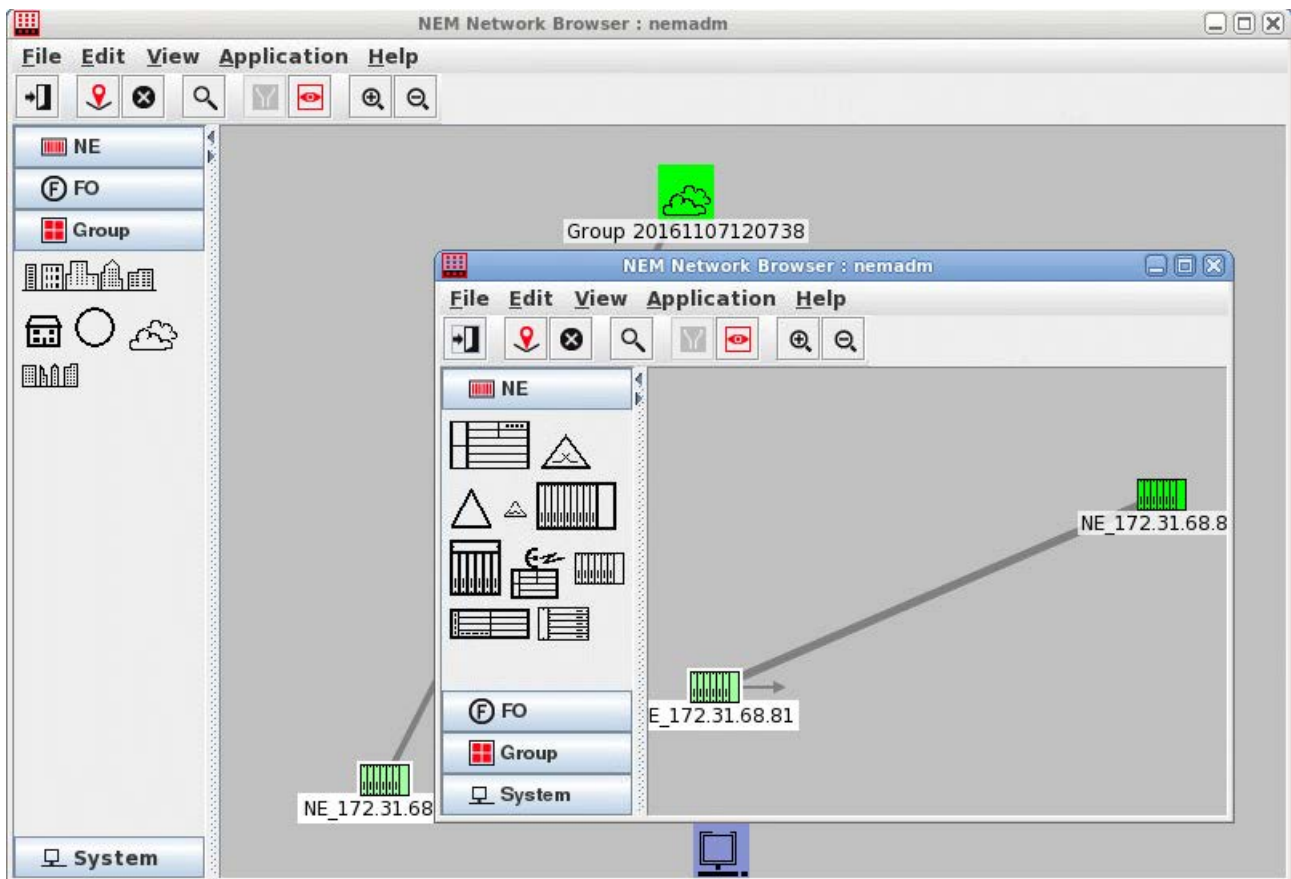
The NEM Network Browser allows creating graphical representations of the managed network or part thereof via the [Open Map](#) function.

These maps are then used to supervise the managed network via the fault and performance management functions or to modify the network using the configuration functions.

Map creation

Maps are populated using the [Map Population](#) functions:

- Symbols for NEs, FOs, and the System can be placed on a map. Any NE, inclusive of type Foreign Object (FO), or System can be represented on any number of map, but only once per map (including its group).
- Group symbols can be used to create secondary maps. This allows structuring a large network into reasonably sized parts. Several levels can be used, a group map can again contain group symbols.



- **Sections** represent traffic or clock connections between NEs. They are shown as straight lines between two NEs. A single line can represent several connections.
- **Background** imported background images can be assigned to maps, e.g. country, city or street maps or floor plans.

Network supervision

Fault management

Fault Management offers various tools to view and analyze alarms produced by the NEs and displayed on the maps.

Configuration management

Configuration Management allows starting the configuration tools for modifying the configuration of any NE in the managed network.

3 NEM Desktop

The NEM Desktop is the control panel from where all functions of the NEM system are started. The desktop itself is started by connecting it to an active NEM core via the login procedure.

This section contains the help information for the NEM desktop as well as for the login and the host management. It includes the following topics:

- [NEM Desktop main window](#),
- [NEM Login](#),
- [Host Manager](#),
- [NEM Remote Admin Tool](#).

3.1 NEM Desktop main window

Purpose

The NEM Desktop dialog serves as the initial control panel which is opened by the NEM login process. The login connects the desktop to an active NEM core. All applications and dialogs opened from the desktop are now automatically communicating with that NEM core.

Dialog image

NEM Desktop



Informational content

Colored field with the label "Connected to:" followed by the name and/or IP address of the core machine. In a main/standby setup, the machine name is followed by its type (in brackets):

- Main
The core machine (server) is the main server in a main/standby setup.
- Standby
The core machine (server) is the standby server in a main/standby setup.
- Standard
The core machine (server) is a standard core machine and not part of a main/standby setup.

The background color of the field indicates the status:

- Green:
The core machine (server) is working normally.
- Orange:
In a main/standby setup, the main server and the standby server are running at the same time. It is strongly recommended to take appropriate action as described in the respective user manual or application note.
- Red:
The connection to the server is lost.

Controls (buttons, menu items, etc.)**File**

Exit	Terminates the NEM Configurator session.

Application

NEM Network Browser...	Opens the NEM Network Browser window.
NEM Configurator...	Opens the NEM Configurator window.
Section Management...	Opens the Section Management window.
Networking Package...	Opens the Networking Package window.
Ethernet Networking Package	Opens the Ethernet Networking Package window.
...	
Ethernet Security Manager...	Opens the Ethernet Security Manager window.
Service Supervision...	Opens the Service Manager window.
Circuit Emulation...	Opens the Circuit Emulation application window (Web UI).
Teleprotection...	Opens the Teleprotection application window (Web UI).
Homepage (Web UI)...	Opens the browser-based NEM home page (Web UI).

Fault Management

Alarm Summary...	Calls the alarm summary showing the currently active alarms of all NEs and FOs managed by FOXMAN-UN.
Alarm List...	Calls the alarm list containing the currently active alarms of all NEs and FOs managed by FOXMAN-UN.
Alarm History...	Calls the dialog for retrieval of cleared and acknowledged alarms. In the default setting, alarms of the past 30 days are stored in the history files.
Alarm Customisation...	Calls the dialog for modification of the alarm criteria on a global or NE basis.

Network

Performance Management...	Opens the user interface for the configuration of the performance data collection.
Inventory Request...	Calls the " Request Inventory Report (legacy dialog) " dialog where a report can be configured by selecting the report type and either the relevant NEs or NE types. Additionally a logic filter can be set. The report can be displayed on the screen or/and saved as a XML or CSV file.
Synchronization Map...	Calls a dialog from where a map of the synchronization paths for a selectable number of NEs can be generated.
PTP Sync Map...	Calls the " Time Synchronization " dialog to show the PTP synchronization status and related information of an MPLS-TP network in case PTP is used.
Spanning Tree...	Calls the " Spanning Tree Map " dialog where NEs can be displayed in a STP map.
Task View (legacy dialog)...	Legacy application. Calls an overview of all NE Password, and Profile/CPS. Selected tasks can be executed, aborted, resumed, retried or deleted.
NE Password Tasks (legacy dialog)...	Legacy application. Calls a list of the current NE Password tasks. Existing tasks can be monitored, modified or deleted. From this dialog, new tasks can be added.
Profiles & CPS Tasks (legacy dialog)...	Legacy application. Calls a list of the current Profile/CPS tasks. Existing tasks can be monitored, modified or deleted. From this dialog new tasks can be added. Also, import/export of profiles/CPS as well as creation of new profiles is possible.

Credential Distribution...	Calls the Network Credential Distribution dialog. This dialog provides features to manage NE passwords and SSH keys.
ESW Management ►	Opens the sub-menu with the following Embedded Software (ESW) related functions:
► Network Overview...	Calls the Network Overview dialog. This dialog provides an overview of all ESW installed in the managed network(s) with different views.
► Distribution Wizard...	Calls the ESW Distribution Wizard used to define ESW distribution jobs and activate related tasks.
► Task Management...	Calls the Task Management dialog. In this dialog, tasks can be managed such as SW distribution tasks and key distribution tasks.
► Job Management...	Calls the Job Management dialog. this dialog, jobs can be managed such as SW distribution jobs and key distribution jobs.

System

Event List...	Opens a list of all major system events kept in the NEM database. Up to 100'000 events can be stored. The overflow is saved into history files.
Remote Admin Tool...	The NEM Remote Admin Tool is used for local and remote administration tasks such as: - viewing license information, - managing authentication keys, - starting and stopping NEM services, - checking disk space, - backing up and restoring the database, - configuring main/standby server options.
Remote Executor...	The Remote Executor allows you to execute scripts for specific purposes.
Metrics Database...	The Metrics Database lets you set up graphical representations of system and network performance monitoring data.

Options

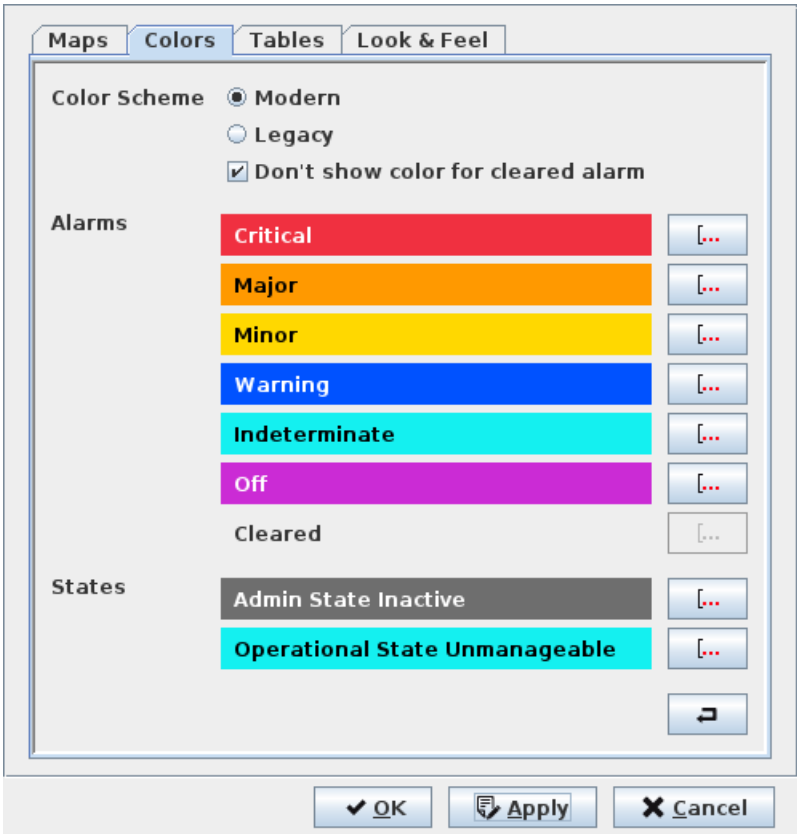
Preferences...	Opens the " Global Preferences " dialog to set GUI preferences.

Help

? Help	Calls the FOXMAN-UN help viewer and opens this page.
About	Displays the software version of the installed FOXMAN-UN.

Dialog image

Global Preferences



Controls (buttons, menu items, etc.)

Maps

Map Style (also see NEM Network Browser Main Window)	
Modern	When selected, the NEM Network Browser (Map) uses new symbols, graphic elements, and information pup-ups. Some settings are only applied for elements that are created after enabling this option.
Legacy	When selected, the NEM Network Browser (Map) uses legacy symbols, graphic elements, and information pup-ups.
Hide legacy graphics on editor palette	When enabled, legacy symbols are not shown anymore in the Edit mode of the NEM Network Browser .
Indicate alarm on node back-ground	When enabled, the background of symbols in the map is tinted with the alarm color of the highest severity alarm.
Enable blinking	When marked, symbols in the map are blinking when an alarm is active. The blink rate can be set (see below).
Blink Period	On: Set the on time for blinking graphic elements. Default is 2500 ms. Minimum is 100 ms.
	Off: Set the off time for blinking graphic elements. Default is 500 ms. Minimum is 100 ms.

Colors

Color Scheme - Modern	Use new color scheme. The colors used for alarms in the GUI are shown below. Each bar is labeled with the respective alarm severity.
Color Scheme - Legacy	Use legacy color scheme. The colors used for alarms in the GUI are shown below. Each bar is labeled with the respective alarm severity.
Don't show color for cleared alarm	If enabled, cleared alarms are shown without color in the alarm lists. If disabled, cleared alarms are shown with the color set in this dialog for the "Cleared" color bar.
Alarm color & severity bars	 Each of the colors assigned to a specific alarm severity can be modified with the edit button right to the color bar.
	 Reset all colors to their individual default.

Tables

Auto resize table columns	When enabled, table columns in GUI dialogs are auto resized to show all information contained in the table cells. When disabled, table columns can be resized manually. Also see more information on Table Column Resizing options.

Look & Feel

CDE/Motif GTK+ Metal Nimbus	Select one of the GUI appearance styles. Default is "Metal".
Enhance Contrast	When enabled, the GUI contrast of certain read-only fields is enhanced to support GUI interaction for individuals with cognitive disabilities.
OK	Applies changes and closes the dialog window.
Apply	Applies changes without closing the dialog window.
Cancel	Closes the dialog without applying changes.

Related dialogs / windows

[NEM Desktop main window.](#)

3.2 NEM Login

Purpose

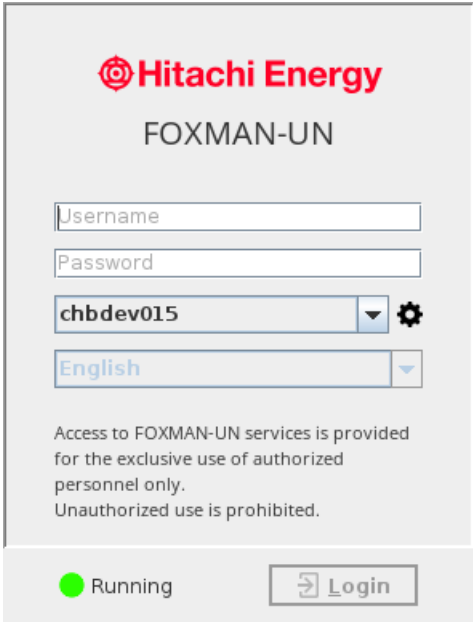
The NEM login dialog and related dialogs ([Host Manager](#), [NEM Remote Admin Tool](#)) allow you to set up one or several core servers, including server redundancy.

Server redundancy is based on a main/standby principle. Main and standby servers are paired with each other. In case of a main server failure, the standby server is either automatically activated (with warm standby) or manually activated (with cold standby).

Once the server setup is completed, the NEM login will start the NEM desktop and connect it to the NEM core. In order to connect to a specific host for the first time you need to accept the server certificate presented in a "SSL Certificate Verification" dialog.

Dialog image

NEM Login



Mandatory entries

Username	Must be a username defined in the security section of FOXMAN-UN; see “ Role Based Access Control ” (legacy) and “ User and Role Management ” (Web UI).
Password	The password assigned to the entered user name.
Host (server) selection	From a drop-down list, select the NEM server to connect to. To manage server connections and Main/Standby servers, click the “settings” icon. Note: When a main / standby setup has been defined, the server name is complemented with its role (Main, Warm Standby, or Cold Standby). To configure a main/standby setup, call the Host Manager via the Settings icon. Note: When logging in on a server with the client installed, the local server is listed as default.
Settings	 Calls the Host Manager dialog. Required for initial setup of hosts to connect form the client.
Language	Select the GUI language if any language pack is installed. Default language is English. A specific language pack is required for any language other than English.
Login	If connecting to a specific host for the first time, opens the “SSL Certificate Verification” dialog: - You need to accept the certificate by clicking the “Yes” button if you want to proceed. When accepting the certificate, you will be logged in to the selected host with the username and password entered. - If you press the “No” button, login will be rejected, and the dialog will be presented again upon the next login attempt. Otherwise, connects to the selected NEM Server and starts the NEM Desktop, provided you have entered a valid user name and password.

Optional entries

Not applicable.

Informational content

List of available FOXMAN-UN servers.
Application Information: Displays the FOXMAN-UN release information.

Controls (buttons, menu items, etc.)

Settings	 Calls the Host Manager dialog.
Login	Connects to the selected NEM Server and starts the NEM Desktop, provided you have entered a valid user name and password, and you have once accepted the server certificate.

Related dialogs / windows

Host Manager,
NEM Remote Admin Tool.

3.3 Host Manager

Purpose

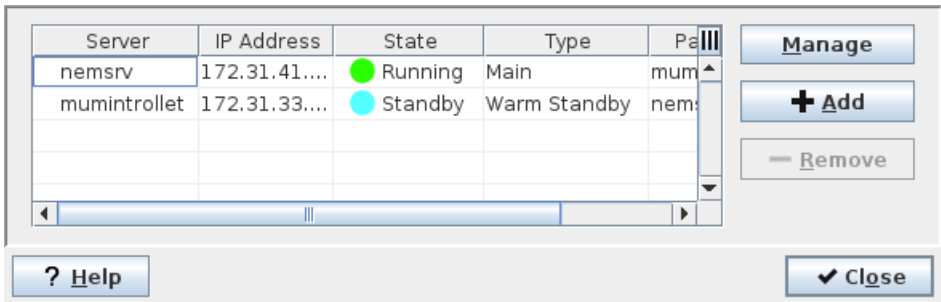
The Host Manager dialog allows you to create a list of FOXMAN-UN servers. A FOXMAN-UN server is a workstation which must have at least the FOXMAN-UN core with the FOXMAN-UN database installed.

In setups where server redundancy is required the main and standby servers are configured here.

In some cases there will only be one server, i.e. a single FOXMAN-UN database. Large networks may be divided into several sections, each served by its own FOXMAN-UN system.

Dialog image

Host Manager



Mandatory entries

None.

Optional entries

Not applicable.

Informational content

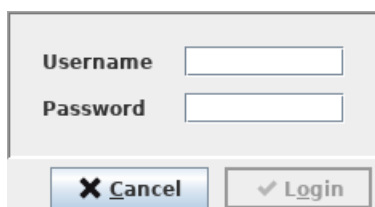
The list of previously defined FOXMAN-UN servers:

Server	The NEM Server name.
IP Address	The NEM Server IP address.
State	The current state of the FOXMAN-UN server. - Active: NEM services are running. - Standby: NEM services are ready to take over Active role in a Main/ Standby setup. - Not running: NEM services are not running.
Type	The server redundancy setup type. "Standard" is a setup without redundancy. "Main / Warm Standby / Cold Standby" are setups supporting server redundancy.
Partner Server	The name of the partner NEM Server.

Controls (buttons, menu items, etc.)

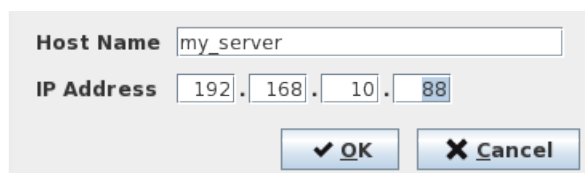
Manage	Calls the NEM Remote Admin Tool for the selected server. You are prompted with the " Login to Server " dialog. You need to enter a valid Username and Password in order to successfully call the NEM Remote Admin Tool.
Add	 Adds a FOXMAN-UN server to the list of available servers via the " Edit Connection " dialog.
Remove	 Deletes the FOXMAN-UN server that has been selected in the list of available servers.
Close	Closes the dialog.

Login to Server



Username	Enter a valid username for managing the selected server.
Password	Enter a valid password for managing the selected server.

Edit Connection



Host Name	Enter the NEM Server name.
IP Address	Enter the NEM Server IP address.

Related dialogs / windows

NEM Login,

NEM Remote Admin Tool.

3.4 NEM Remote Admin Tool

Purpose

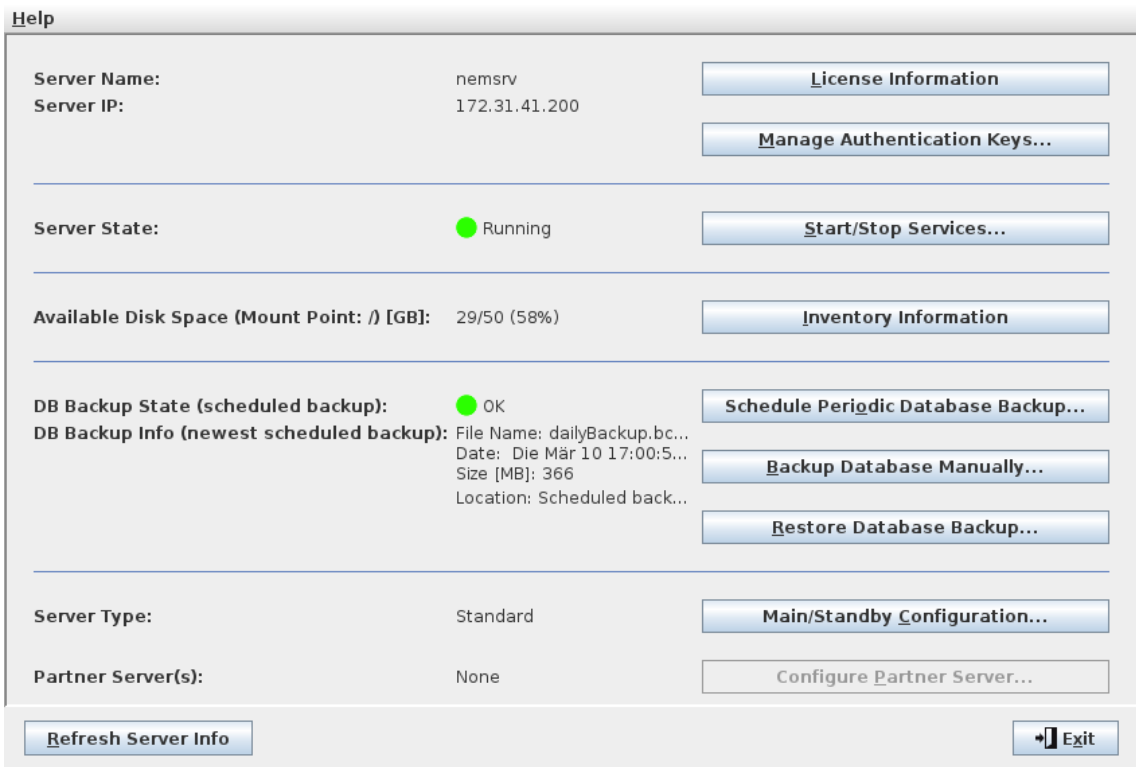
The NEM Remote Admin Tool is used to configure server / database redundancy for FOXMAN-UN. It allows you to set up a cold standby server or a warm standby server in addition to the main NEM server.

A switch-over to a cold standby server needs to be executed manually. A switch-over to a warm standby server is done automatically in case of failure of the main server. The following failures lead to an automatic switch-over in case of warm standby:

- core services are down on the main server, or
- main server is unreachable from warm standby server.

Dialog image

NEM Remote Admin Tool



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Server Name	The NEM Server name.
Server IP	The NEM Server IP address.

Server State	The state of the NEM server.
Available Disk Space	The available disk space in GByte, the total disk space in GByte, and the disk fill rate in %.
DB Backup State	The current state of the DB backup process.
Backup Info	Shows information on the database backup when available. The information includes file name, file date, file size, and location (path).
Server Type	The server redundancy type. - Standard = no redundancy configured. - Main = redundancy configured, main server. - Warm Standby = redundancy configured, warm standby server. - Cold Standby = redundancy configured, cold standby server.
Partner Server(s)	When redundancy is configured, shows the partner server with its server name, IP address, and server type.

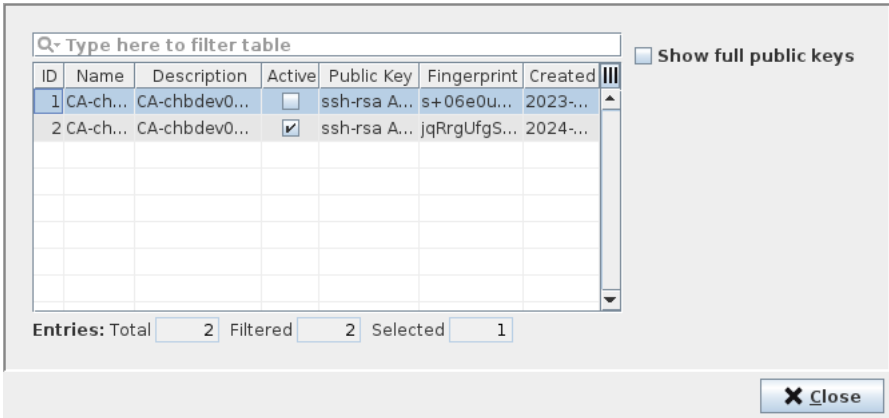
Controls (buttons, menu items, etc.)

License Information	Calls a dialog that collects and displays all available license information.
Manage Authentication Keys...	Calls the “Manage Authentication Keys” dialog to activate, export or delete authentication keys. These keys are used for SSH login of the FOXMAN-UN agent to NEs supporting this login type, e.g. FOX61x, as an alternative to RADIUS login. Creation of authentication keys used for NE login is done in the Credential Distribution dialog.
Start/Stop Services...	Calls the “Services Management” dialog to perform start and stop actions on NEM services.
Inventory Information	Collects and displays NEM server inventory information, such as - Disk information, - Memory information, - CPU information.
Schedule Periodic Database Backup...	Calls the “Schedule Periodic Database Backup” dialog to configure a database backup schedule. You can select from - periodic backup every specific number of minutes, - daily backup at a specific time, - weekly backup on a specific day of the week and a specific time, - monthly backup on a specific day of the month and a specific time, or a combination of the above options. You can also select how many backups shall be kept per backup type. The permitted range is 0 to 100. Please make sure that the disk size is suitable for the backup size and number of backups to be kept.
Backup Database Manually...	Calls a dialogue to back up the database manually. You need to select a location (Manual backups, Scheduled backups) and a backup filename.
Restore Database Backup...	Calls a dialog to manually restore a database backup. You can choose from available servers (Backup Source) and database backups, and restore a selected backup, or you can delete a selected database backup.

Main/Standby Configuration...	Calls the “Main/Standby Settings” dialog to enable Main/Standby server functionality. This dialog allows you to: - Select a Server Type (Main, Warm Standby, Cold Standby). - Choose a Partner Server. - Pair the Main and Standby servers. - Unpair servers in existing pairings. - Set alarm options to raise alarms/warnings, and to generate events related to the Main/Standby setup. Note: Main/Standby must be enabled on both servers to be able to pair the two servers.
Configure Partner Server...	Calls a dialog to configure the partner server. You can select a configured partner server, log in on the server and configure the server via the “NEM Remote Admin Tool” dialog of the partner server.
Make This Server Active...	In a main/standby setup, calls a dialog to make the currently managed server the active one.
Refresh Server Info	Refreshes the server information displayed in the status part of the dialog.
Exit	Closes the dialog.

Dialog image

Manage Authentication Keys



Informational content

The list of previously created authentication keys:

ID	The authentication key ID in the current list.
Name	The authentication key name.
Description	Shows a description of the authentication key. The description is generated automatically.
Active	When the authentication key is active, the checkbox is marked. To activate a key, select it in the list and click on the “Activate” command from the context menu. You need to confirm activation of a new key pair.
Public Key	The “Public Key” column is activated, showing the full public key. By default, only one of the two columns “Public Key” and “Fingerprint” is shown.
Fingerprint	The authentication key’s fingerprint. As an alternative you can enable “Show full public keys”; in this case the “Public Key” column is enabled which shows the full public key instead of its fingerprint.

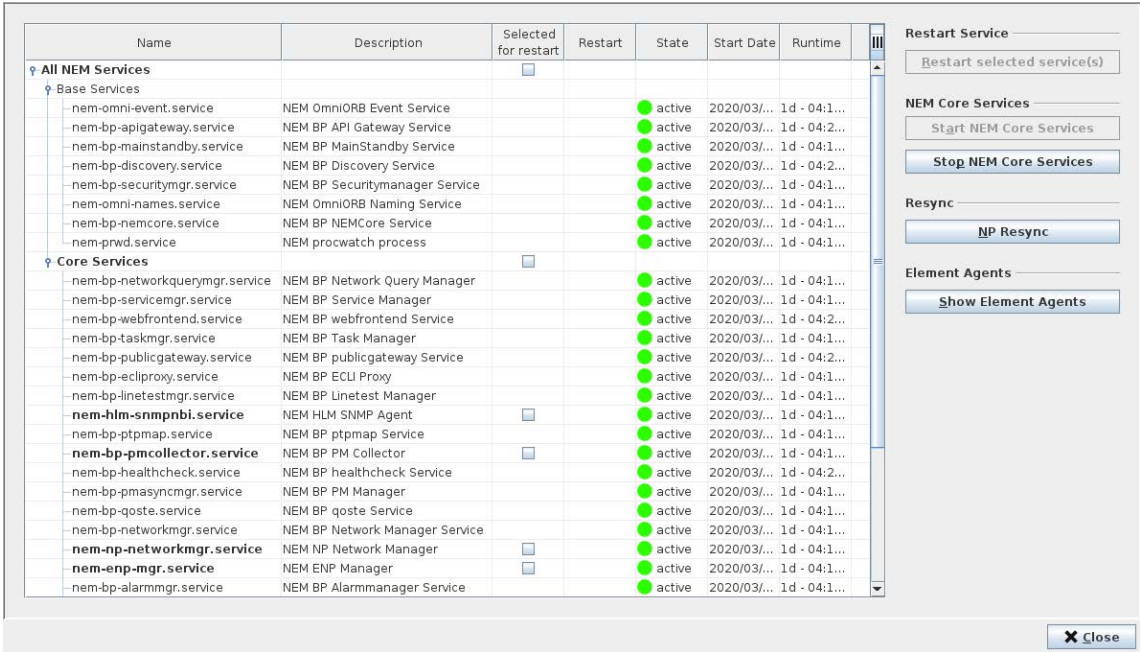
Controls (buttons, menu items, etc.)

The controls allow you to activate a selected authentication key, delete a key or export a key to a file. Only one key can be active at a time. The commands are accessible via the context menu on a selected list entry.

Delete		Delete an existing key pair.
Activate		Activate the selected key pair.
Export		Export the selected public key. Opens a file browser window to select path and file name and to save the file with extension “.pub”.
Show full public keys	☒ ☐	When enabled, switch view to show the full public keys in the “Public Key” column instead of the “Fingerprint” column with the key’s fingerprint. When disabled, show the “Fingerprint” column and hide the “Public Key” column.
Close		Close the dialog window.

Dialog image

Services Management



The current status of the NEM services is shown in a tree structure. The following actions are supported:

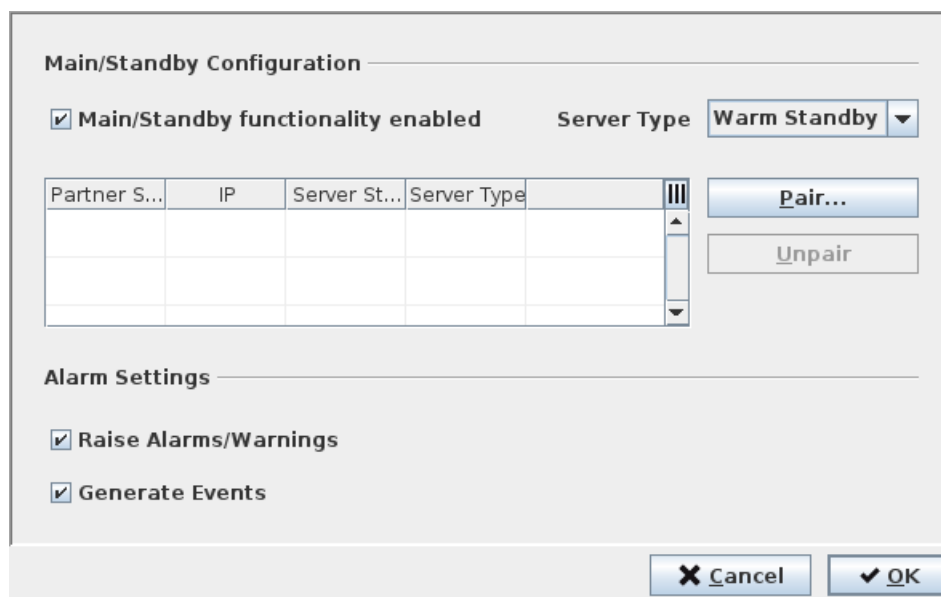
Controls (buttons, menu items, etc.)

Restart Service	- Restart selected service(s) Restarts all services that are selected in the tree on the left (column “Selected for restart”).

NEM Core Services	- Start NEM Core Services Starts the Core Services listed in the tree under “Core Services”. - Stop NEM Core Services Stops the Core Services listed in the tree under “Core Services”.
Resync	- NP Resync Performs a resynchronization of the NP database with the NP resources.
Element Agents	- Show Element Agents Opens a new window listing all configured Element Agents with their Name, Host Name, Server Name, Port, Manager ID, NAT Manager ID, PID, Admin State, Status, and Database ID.
Refresh Services Info	Command to refresh all FOXMAN-UN services listed.
Close	Closes the dialog.

Dialog image

Main/Standby Settings



The dialog box is titled "Main/Standby Configuration". It contains the following elements:

- A checkbox labeled "Main/Standby functionality enabled" which is checked.
- A "Server Type" dropdown menu currently set to "Warm Standby".
- A table with the following columns: "Partner S...", "IP", "Server St...", "Server Type", and a vertical scrollbar icon. The table is currently empty.
- Buttons labeled "Pair..." and "Unpair" to the right of the table.
- A section titled "Alarm Settings" containing two checked checkboxes: "Raise Alarms/Warnings" and "Generate Events".
- At the bottom right, there are "Cancel" and "OK" buttons.

Informational content

The list of previously defined FOXMAN-UN servers:

Partner Server	The name of the partner NEM Server.
IP	The NEM Server IP address.
Server State	The current state of the FOXMAN-UN server. - Active: NEM services are running. - Standby: NEM services are ready to take over Active role in a Main/Standby setup. - Not running: NEM services are not running.
Server Type	The server redundancy setup type. “Standard” is a setup without redundancy. “Warm Standby” and “Cold Standby” are server setups supporting server redundancy.

Controls (buttons, menu items, etc.)



Please note:

Before configuring the main and warm standby server pair, both servers should have only the base services running.

Once server redundancy is configured, the normal state of FOXMAN-UN processes on main and standby servers is:

- Main: base services and core services running.
- Standby: base services running; core services not running (stopped).

After the main and standby servers have been paired, a warm standby server polls the main server every 2 minutes to check for a new database backup. The poll frequency can be configured in the file “/opt/nem/etc/mainstandby.conf”.

In case there is a new database backup it will be loaded to the warm standby server and the database imported. The frequency of loading a new database to the warm standby server is determined by the “**Schedule Periodic Database Backup...**” settings on the main server.

Main/Standby functionality enabled	☒ Server redundancy is enabled, need to choose a server type.
	☐ Server redundancy is disabled.
Server Type	Select the Server Type for the server (selected in the Connection Manager). The following server types are available: - Main This is the Main server, operating on the main database, to which the clients normally connect. - Warm Standby This is a Warm Standby server that automatically takes over control when the Main server is not reachable or when its NEM base/core services are not running. The standby server needs to be configured properly and paired with the main server. - Cold Standby This is a Cold Standby server that takes over control after manual start of the NEM services when the Main server is not reachable or when its NEM base/core services are not running. The standby server needs to be configured properly and paired with the Main server.
Pair	Pair the Main Server and the Partner Server selected in the list.
Unpair	Unpair the Main Server and the Partner Server selected in the list.
Alarm Settings	
Raise Alarms/Warnings	☒ When enabled, alarms and/or warnings related to the server redundancy are raised. ☐ When disabled, no alarms or warnings are raised.
Generate Events	☒ When enabled, events related to the server redundancy are generated. ☐ When disabled, no events are generated.
Cancel	Closes the dialog without applying changes.
OK	Applies changes and closes the dialog window.

Related dialogs / windows

Host Manager,
NEM Login.

3.5 Metrics Database

The system and network performance metrics database is a third party application that provides you with means to create a variety of graphs out of collected monitoring data.

The following is an example for the graphical presentation of PM data collected on network elements in a managed FOX61x network:

Proceed as follows:

- 1 Set up a PM data collection job from the NEM Desktop - Network - Performance Management as described in [Create PM Collection Job](#). In this example, we select core unit front ports of at least one core unit in at least one FOX61x.
- 2 Once the job is activated and has collected the first PM data from the network, open the Metrics Database and select the “Explore” tab on the left hand side of the UI.
- 3 In the Data Explorer, choose the type of graphics you need. The default type is “Graph”; you can select any available type like band, gauge, graph (default), graph + single stat, heatmap, histogram, mosaic, scatter, single stat, table. In this example we select the default, i.e. graph.
- 4 In the pad at the bottom, titled “FROM”, select the “NMS” bucket. This will add a new “Filter: _measurement” pad.
- 5 In the “Filter: _measurement” pad, make sure “measurement” tag is selected. below the measurement tag, select (set a tick in the box) any measurement you want to include, e.g. “ethernet_counters”, “rmon_eth_stat”, or rx_tx_counters”, etc. In this example we select the “rmon_eth_stat” measurement. Upon selecting the filter option, a new pad “Filter: _field” is opened.
- 6 In the “Filter: _field” pad, select any tags presented, e.g. the six tags pkt_64, pkt_125, pkt_255, pkt_511, pkt_1023, pkt_1517.
- 7 In the next pad “Filter: card_model” select the core unit name(s).
- 8 In the next pad “Filter: card_name” select the core unit name(s) and slot(s). You may go on with selecting filtering options until there are no further options left. We stop here to see the results:
- 9 To create a graphical presentation of the data, click the “Submit” button. This will add the graphical view of the data collected up to now for the time range selected (e.g. “Past 3h”) above the filter pads.
- 10 To save this graph for later use, click the “Save As” button in the upper right area. This will open a “Save as” options window.
- 11 Select an existing Target Dashboard (if existing), or create a new one (“Create a New Dashboard”). We create a new one, named “Network PM”. Give the new cell a name, e.g. “Packet Statistics”.
- 12 When done, click “Save as Dashboard Cell”. This will change the view to “Boards” tab and add the “Packet Statistics” cell to that view.
- 13 You can rearrange, resize or move cells by clicking on the upper left or lower right corner of the cell.

End of instruction

3.5.1 Create InfluxDB Dashboard

For VPWS and Links in ENP, performance monitoring dashboards can be created from the ENP context menu command “Create InfluxDB Dashboard...”. This will open a dialog to execute a Remote Executor script.

For more information refer to the related application note “Metrics Database” [1KHW029196] included in the FOXMAN-UN technical documentation.

4 NEM Configurator

The NEM Configurator is the graphical user interface allowing configuration of the management network, the network elements, and foreign objects to be supervised, and the operator security setup. The descriptions of most of the relevant function dialogs can be found under [Network Configuration](#) and [Security Configuration](#).
This section contains help information for the [Main Window](#) of the NEM Configurator.

4.1 Main Window

Purpose

The NEM Configurator dialog is the part of FOXMAN-UN that deals with the setup and configuration of the management network as well as all managed objects. It is also used to configure the access rights of its operators / users.
In addition the NEM Configurator provides access to alarm information and to configuration on a single NE basis.
The dialog window consists of three areas:

Tree panel on the left	The main elements of the FOXMAN-UN system in hierarchical form. Each FOXMAN-UN server contains Domains, Agents, Maps, Foreign Objects, SNMP Security Profiles, Users, and User Security Profiles. Each item in the tree panel likewise has the following menu to show or hide their members: - Expand: shows the members of the selected item in the tree panel. All lower levels of the selected item are expanded simultaneously. - Collapse: hides the members of the selected item in the tree panel. All lower levels of the selected item are collapsed simultaneously. Note: The members of the selected item can likewise be shown/hidden by clicking on its node symbol or double clicking the item in the tree panel.
Details panel on the right	All members of the item selected in the tree panel. The set of attributes to be displayed for each member can be configured (see under "Dialog images"). Not applicable attributes are shown with gray background.
Event list at the bottom	A list of the main events for the current session, with user, FOXMAN-UN server, date/time, and action description. The last 100'000 events are kept in the FOXMAN-UN database and can be browsed through via the Event List dialog.

The following tab sections are available: NE Browser, Role Based Access Control. The desired section is selected via a tab above the tree panel.

NE Browser	Allows creation and configuration of Domains, Agents, SNMP Security Profiles, and Foreign Objects. Domains are basically part of Security. In the NE browser context they are used to show the NEs they contain in the details panel. Agents control the management communication to the NEs, their members are therefore the NEs. Map displays the maps created via the NEM Network Browser. Foreign Objects are used to include third party equipment in the network management. SNMP Security Profiles define the security parameters and are assigned to each SNMP network element.

Role Based Access Control	Allows creation and configuration of domains, users, and roles. - Domains: can have all types of elements as members. All members are displayed in the details panel. Also see Domain – Create, Domain – Choose Members. - Users: can be created and assigned access rights to the different FOXMAN-UN function categories on a per role basis (new, RBAC, also see Context menu in tree panel and commands for tab “Role Based Access Control”). - Roles: is divided into system roles and user-defined roles. There are some pre-defined system roles (Viewer, Operator, Engineer, Installer, Secadm (Security administrator), Rbacmnt (RBAC management)). The user-defined roles are to be added, edited or removed by a user with appropriate permissions (full access permission to RBAC, or nemsec user).

**Please note:**

The columns to be shown in any of the tables of the dialog window can be configured. To hide or show columns, right click anywhere on the table header and set or delete the marks for the listed columns, or click “More...”.

The top right hand corner icon ||| of a table is used for Export and Print options.

Dialog images**NE Browser**

File Edit Help

NE Browser Role Based Access Control

Q- Type here to filter table

Name ^1	Addressing	Alarm State	Operational State	Supervision	Type	Agent ID	Age
NE_56	IP: 172.31.80...	Cleared	Manageable	on	NE	9 IP Only	
NE_57	IP: 172.31.80...	Cleared	Manageable	on	NE	9 IP Only	
NE_58	IP: 172.31.80...	Cleared	Manageable	on	NE	9 IP Only	
NE_59	IP: 172.31.80...	Cleared	Manageable	on	NE	9 IP Only	
NE_80	IP: 192.168.3...	Warning	Manageable	on	NE	1 IP Only	
NE_81	IP: 192.168.3...	Warning	Manageable	on	NE	1 IP Only	

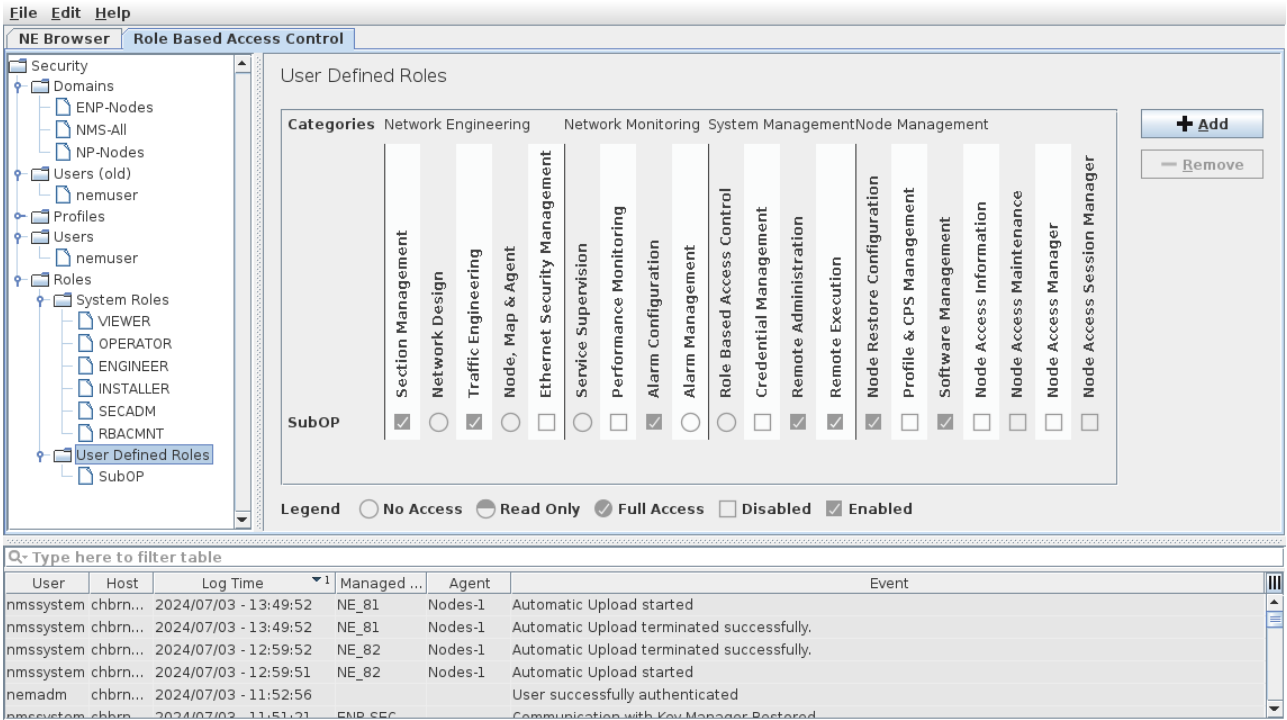
Entries: Total 10 Filtered 10 Selected 1

Q- Type here to filter table

User	Host	Log Time ^1	Managed Object	Agent	Event
nemadm	chbrn3-...	2021/09/15 - 15:42:10	A61 (circuit)	50	cleared/acknowledged alarms deleted due to user acknowle...
nemadm	chbrn3-...	2021/09/15 - 15:42:10	LAN3- VPLS Servic...	53	cleared/acknowledged alarms deleted due to user acknowle...
nemadm	chbrn3-...	2021/09/15 - 15:42:10	VLAN2-DH- VPLS S...	53	cleared/acknowledged alarms deleted due to user acknowle...
nemadm	chbrn3-...	2021/09/15 - 15:42:10	VLAN1-DH- VPLS S...	52	cleared/acknowledged alarms deleted due to user acknowle...
nemadm	chbrn3-...	2021/09/15 - 15:42:10	section-80-82	52	cleared/acknowledged alarms deleted due to user acknowle...
nemadm	chbrn3-...	2021/09/15 - 15:42:10	section-80-81	51	cleared/acknowledged alarms deleted due to user acknowle...
nemadm	chbrn3-...	2021/09/15 - 15:42:10	section-82-83	39	cleared/acknowledged alarms deleted due to user acknowle...
nemadm	chbrn3-...	2021/09/15 - 15:42:10	section-80-83	47	cleared/acknowledged alarms deleted due to user acknowle...

Also see “Context menu in tree panel for tab “NE Browser”” further below.

Role Based Access Control



Also see “Context menu in tree panel and commands for tab “Role Based Access Control”” further below.

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Details panel	Depending on the selection in the tree panel, the details panel shows a list of the appropriate elements with their attributes. The attributes to be displayed can be configured (see Dialog images).

Controls (buttons, menu items, etc.)

Main menu

The following describes the available sub-menus for each item of the main menu.

File

Exit	Terminates the NEM Configurator session.

Edit

Options	Calls a dialog where the global Alarm Forwarding and the Alarm Escalations control and behavior can be enabled or disabled. The parameters for the alarm forwarding are set on a per domain basis in the Domain – Create and Domain – Properties dialogs. Only a NEM administrator is authorized to change the setting.

Help

? Help	Calls the FOXMAN-UN help viewer and opens this page.

Context menu in tree panel for tab “NE Browser”

The following describes the menu items available after placing the cursor over an item in the tree and clicking the right mouse button.

Domains

Item “Domains” in the tree selected:

Create Domain	Allows adding a domain; see Domain – Create .

Any existing domain selected:

Domain Properties	Allows configuration or modification of the selected domain. A domain contains a selection of all FOXMAN-UN elements, including domains. These elements must be created before the domain can be configured.
Delete Domain	Removes the item from the FOXMAN-UN database.

Agents

Item “Agents” in the tree selected:

Create Agent	Allows adding and configuring an agent which will handle the management communication to the NEs. Note: The FOXMAN-UN user’s newly created Agent is automatically added to the Domain it has access to. E.g. FOXMAN-UN user “operator” has access to Domain “south”. When “operator” creates a new Agent, it will automatically be added to Domain “south”.

Any existing agent in the tree selected:

Suspend Agent Run Agent	Suspends the communication from the agent to all its associated NEs. The agent status in the tree changes from “Running” to “Suspended”. The context menu item is changed to “Run Agent” which enables the communication again. Note: Starting many agents controlling many NEs each at the same time via “Run Agent” – e.g., after applying specific changes to the network and/or NE configurations – may have an important impact on system performance and might cause considerable delays in loading configuration changes and alarms from the network to the NEM database. It is therefore recommended to stagger reactivation of several agents over time.
Agent Properties	Allows changing one or all parameters of an existing agent.
Create NE	Calls the Create NE dialog where an NE can be assigned to the agent. If the agent can establish communication to the NE, its configuration and inventory are automatically uploaded and stored in the FOXMAN-UN database. Note: The FOXMAN-UN user’s newly created NE is automatically added to the Domain it has access to.

Discover NEs...	Finds all existing NEs in the specified address range. They are given a unique name and are assigned to the agent. Note: The FOXMAN-UN user's newly discovered NEs are automatically added to the Domain it has access to.
Cancel NE discovery request...	The menu item is only active if one or several discovery requests are being processed. It calls the "Cancel Discovery" dialog where a specific discovery request can be selected for cancellation.
Delete Agent	Removes the agent and all its associated NEs (nodes) from the FOXMAN-UN database.
Agent Statistic	Calls Agent Statistic dialog

Maps

Item "Maps" (root node) in the tree selected:

Alarm Summary	Displays the alarm summary showing the currently active alarms per severity, of all the NEs and FOs contained in all maps or groups
Alarm List	Displays the alarm list containing the currently active alarms of all the NEs and FOs contained in all maps or groups

Item "map node" in the tree selected:

Map Browser	Opens the selected map directly in the Network Browser's map. Likewise the map's Alarm Summary is displayed.
Alarm List	Displays the alarm list containing the currently active alarms of all the NEs, FOs, and system objects contained in this map and in all of its groups and subgroups.

Item "group node" in the tree selected:

Alarm List	Displays the alarm list containing the currently active alarms of all the NEs and FOs contained in the selected group and all its subgroups.

Item "system node" in the tree selected:

Alarm List	Displays the alarm list containing the currently active System Alarms .

Foreign Objects

Item "Foreign Objects" in the tree selected:

Create Foreign Object	Allows creating and configuring a Foreign Object which represents third party equipment within FOXMAN-UN.

SNMP Security Profiles

Item "SNMP Security Profiles" in the tree selected:

Create SNMP Security Profile	Creates an SNMP Security Profile that can be assigned to a SNMP NE during its creation.

Context menu in details panel

The following describes the menu items available after placing the cursor over an item in the details panel and clicking the right mouse button.

NE (Network Element)

Hardware View	Applicable to the NEs of the family FOX51x and for the Windows ^{®1} based NEM client only. Calls the HW view of the selected NE.
Configuration	Calls the configuration tool (GUI) of the selected NE. For FOX61x NEs the user class needs to be selected in the sub-menu.
Restore Configuration...	Applicable to the NEs of the families FOX61x, FOX660, and FOX51x only. At regular intervals, FOXMAN-UN checks if the NE configurations have been modified. Up to 5 (configurable) modified configurations can be recorded per NE. Any of these configurations can be restored via the "Restore Configuration" dialog.
Alarm List	Calls the alarm list filtered for the selected NE.
Synchronise ► Alarm	Updates the alarms in the FOXMAN-UN database to reflect the current situation in the managed network for the selected NE.
Synchronise ► Time	Updates the time (clock) in the NE with the system time. Only available for FOX51x NEs.
Synchronise ► Inventory	Updates the inventory information in the FOXMAN-UN database to reflect the current situation in the NE.
Synchronise ► Service	Updates the service information in the FOXMAN-UN database to reflect the current situation in the NE. Not available for FOX51x NEs.
Force Polling	Requests an immediate poll of the NE. This will read the complete NE configuration, inventory, and alarm status information from the selected NE(s).
Cancel Force Polling	Cancels a force polling while being executed.
Stop Supervision	New alarms of the NE are not reported any more. The menu point changes to "Start Supervision" for that NE.
NE Properties...	Allows changing certain NE parameters or adding an operator message.
Move NE...	Allows moving one or several configured NEs to a different agent.
Delete NE	Removes the NE from the FOXMAN-UN database.
	Note: The removed NE is automatically deleted from the Domain(s).

1. Windows is a trademark of the Microsoft group of companies

NE of type "FO" (Foreign Object)

Note that some of the commands may not be available (shown disabled).

Remote Commands	Calls the Create Remote Command dialog. Lets you execute one of the predefined remote commands (see Create Remote Command).
Activate <application_name>	If configured in the "NE of type FO" properties - Setup - Configuration - "Third Party EM", this calls the third party element manager application.
Alarm List...	Calls the alarm list filtered for the selected FO.
Force Polling	Requests an immediate poll of the NE.
Cancel Force Polling	Cancels a force polling while being executed.
Stop Supervision	New alarms of the NE are not reported any more. The menu point changes to "Start Supervision".
NE Properties...	Allows modifying the parameters of an existing NE of type "FO".
Move NE...	Allows moving one or several configured NEs to a different agent. Only possible are agents supporting the type of NE, i.e., agents of type "FO" in this case.
Delete NE	Removes the selected item(s) from the FOXMAN-UN database.

Context menu in tree panel and commands for tab “Role Based Access Control”

The following describes the menu items available after placing the cursor over an item in the tree and clicking the right mouse button, and commands available in the details dialog for a selected item in the tree.

Domains

See above under “Context menu in tree panel for tab “NE Browser””.

Note that the domain “NMS-All” contains all objects (such as agents, domains, NEs, security profiles, services, SNMP security objects, symbols, users, etc.). This domain is used when you assign a role to a user. It grants access to some functionality defined by the user’s role on objects of that domain.

Users

Item “Users” in the tree selected:

+ Add	From the “+ Add” command on the right hand side of the “All Users” list in the details panel, allows adding a role-based user, selecting a system role or, if defined, a user defined role. The user must exist as a Linux user to be selectable from the drop-down list labeled “User Name”.
— Remove	This command button on the right hand side of the “All Users” list in the details panel, allows the removal of an existing user from the defined RBAC users list. If the user was an OS user before, the selected user is deleted as a FOXMAN-UN user, but still exists as an OS user.

Any existing user in the tree selected:

Details panel	Shows the role(s) assigned to the user with the permissions for each of the function areas as defined while adding the user.
[... Edit	Edit the user’s roles, i.e., - add new roles (“+ Add” button), - remove currently assigned roles (select role first; then press “— Remove” button), - define restrictions (press “Restrictions...” button)
+ Add	In the edit mode, add roles to the user. Confirm with “Apply” or discard with “Cancel”.
— Remove	In the edit mode, remove the selected role for the current user. Confirm with “Apply” or discard with “Cancel”.
Restrictions...	While adding or editing a user, restrictions to the selected profile(s) can be applied; as a default restriction, an expiry date can be added to domain access for any of the defined domains. For restrictions with several domains, use - the “+ Add” button to add existing domains with an expiry date and time, or - the “— Remove” button to remove previously assigned domains with defined expiry date and time.
Cancel	Close the edit mode without applying changes.
Apply	Apply changes and close the edit mode.

Roles

- When “System Roles” is selected: Expand or Collapse.
System roles are predefined by the system and cannot be added or removed.
- When any existing system role is selected in the tree, no specific commands available; system roles are predefined and fixed.

- When “User Defined Roles” is selected: Expand or Collapse.

In the right-hand (details) part of the dialog window:

+ Add	Add a user-defined role to the list of user-defined roles. Confirm with “Apply” or discard with “Cancel”.
— Remove	When an existing user-defined role is selected in the details part of the dialog window, you can remove the selected role from the list of user-defined roles. Confirm with “Apply” or discard with “Cancel”. If the role was assigned to a user, it is immediately removed from the user’s roles.

- When any user-defined role is selected in the tree:

Edit	From the “Edit” command on the right hand side of the user’s permissions details, switch to the edit mode to modify the access permissions for the selected user. Once done, you can either cancel or apply the changes.
Cancel	Close the edit mode without applying changes.
Apply	Apply changes and close the edit mode.

5 NEM Network Browser

The NEM Network Browser is the graphical user interface allowing the graphical representation of the NEs and FOs to be supervised as well as the supervision itself.

This section describes the use of the Network Browser main window, map management, and import /export of graphics for symbols and backgrounds. It includes the following topics:

- [NEM Network Browser Main Window](#),
- [Open Map](#),
- [Create Map](#),
- [Manage Graphics](#).

5.1 NEM Network Browser Main Window

Purpose

The NEM Network Browser dialog is the operational part of FOXMAN-UN. It presents the managed network or parts thereof in a graphical way. Each such view is called a Map.

Maps contain Network Elements and Foreign Objects which are shown as Symbols, their color being dynamically modified to show the highest severity of the currently active alarms. Unacknowledged alarms are indicated by a blinking symbol.

Depending on the map's global preferences and the settings for "[Map Style \(also see NEM Network Browser Main Window\)](#)" and "[Hide legacy graphics on editor palette](#)", the node symbols, flags, and alarm indications are presented in a different style.

With modern map style, a symbol can carry alarm flags and message flags. The alarm flag is colored in accordance with the highest active alarm severity. The message flag indicates that an operator has entered an [Operator Message](#) related to the node:



When placing the mouse pointer over the symbol, information related to the node is displayed such as its

- name,
- address,
- type,
- agent,
- operational state,
- reason (cause) for the operational state being "not manageable",
- supervision status,
- outstanding alarms, and
- alarm severity.

The information banner is updated when the mouse is moved away and back over the NE:

NE_81		
IP Address	192.168.3.181	
Type	FOX 615	
Agent	Agent-1	
Operational State	Manageable	
Reason		
Supervision	on	
Outstanding Alarms		
Severity	All	Not Ack'd
Warning	1	0

Nodes where the last forced polling failed are shown with an “x” in a red circle:



Nodes that are in the “not manageable” operational state are colored cyan (default color):



With legacy settings, a symbol can carry three different colored square flags:



- A light blue flag in the top left corner indicates an unmanageable NE.
- A flag in the top center shows the color for the highest severity of all unacknowledged alarms.
- A black flag in the top right corner indicates that the polling has been stopped (i.e. the element agent has been suspended) by an operator.

Traffic between the elements on a map can be indicated using Sections. These are shown as colored lines between the symbols. The line color indicates either inactive operational state (gray) or when active, the highest alarm severity of the sections. There is an option to indicate the total section bandwidth via the line thickness.

To provide a structuring method for maps of larger networks, Group symbols can be introduced. They represent a collapsed part of the network. A group symbol contains a number of NEs, and its color shows the alarm state of the group. A group symbol can be expanded and then shows an additional map window.

System alarms can be visualized by a special System symbol. It presents the system alarm situation in the same way as NE and FO symbols via color changes and blinking.

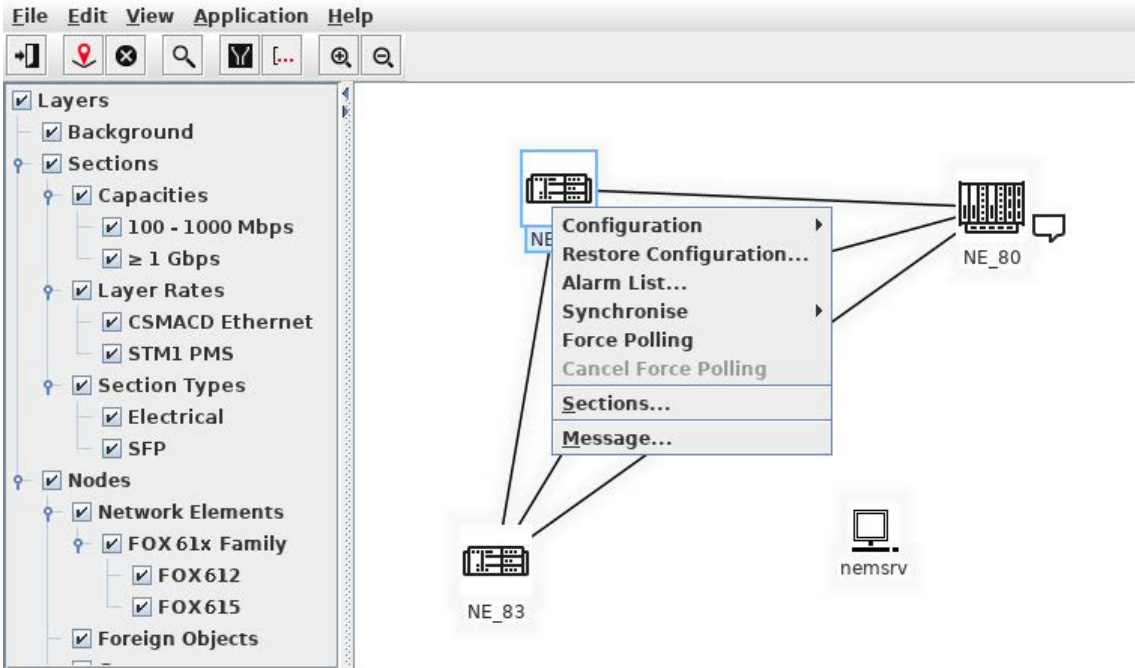
Maps can be assigned a **Map Background**, e.g. a geographical country outline or a floor plan.

The Network Browser dialog allows creating and populating maps, and with their aid, supervising the alarm situation. It gives to NEs configuration tools, provided the user has been granted the relevant access rights.

Dialog image

The dialog below shows the context menu of a selected NE.

NEM Network Browser



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Graphic representation of a network to be managed, containing NE and FO symbols linked with sections (traffic links).

Controls (buttons, menu items, etc.)

File

Open/Manage Maps...		Calls the Open Map dialog, which allows creation, deletion as well as duplication of maps.
Close		Closes the currently open map.
Manage Graphics...		Allows bitmaps for NE symbols, FO symbols, group symbols, system symbols or backgrounds to be imported to, exported or deleted from the FOXMAN-UN system.
Export Map as Image...		Allows the currently opened map to be exported from the FOXMAN-UN system. The map image can be saved as GIF, JPEG or as PNG image file in a specified directory of the server.

Exit



Exits the NEM Browser Window.

Edit: Edit Mode Activated [View Menu > Edit Mode]**Symbol Palette**

Lists all the symbols the user is allowed to create in the map through drag & drop mechanism.

The symbols are grouped as follows:

- NE,
- FO,
- Group,
- System.

New Symbol – NE/FO	Selecting and dragging to the map any of the NE/FO symbols will call the Select NEs/Select FOs dialog showing the available NE(s)/FO(s).
New Symbol – Group	Selecting and dragging to the map any of the Group symbol will create the selected group symbol in the map and automatically assigns it a unique name containing date and time of its creation. This name can be modified via the Rename context menu.
New Symbol – System	Selecting and dragging to the map any of the System symbol will create the selected system symbol in the map. The default name of the symbol is the name of the workstation that contains the FOXMAN-UN core. This name can be modified via the Rename context menu command. Note: a newly created map automatically includes the system symbol with name of the workstation.

Symbol on the map selected

Open Group	Applicable to a Group symbol only. Opens the selected group's map.
Delete/Cut/Rename	Delete/Cut/Rename a symbol. The Cut (and Paste) functions allow moving a symbol between a main map and its group maps (cut & paste is not possible between main maps) Rename calls the Rename Symbol dialog, which allows changing the default NE name.
A-End Section /Z-End Section	Calls the Create Section dialog, with the selected NE or FO as the A/Z End NE. This allows you to create graphically a section between two elements. Note: It is also possible to create new section via Application Menu > Section Management .

No Symbol on the map selected

Paste Undo Cut	The Cut & Paste functions allow moving a symbol between a main map and its group maps.
Change Background	Calls the Select Backgrounds dialog, which lists all available background images.

Edit: View Mode Activated [View Menu > View Mode]**NE Symbol on the map selected**

Context Menu NE

Hardware View	Applicable to the NEs of the family FOX51x and on the NEM client for Windows® only. Calls the HW view of the NE giving a graphical view of the alarm situation.
Configuration (GUI)	Calls the configuration tool and automatically connects to the selected NE.
Information Manager	Applicable for FOX660 only. Calls the configuration tool and connects using the selected user class (Information or Manager)
Restore Configuration	Applicable to the NEs of the family FOX61x, FOX660, and FOX51x only. At regular intervals, FOXMAN-UN checks if the NE configurations have been modified. Up to 5 (configurable) modified configurations can be recorded per NE. Any of these configurations can be restored via the "Restore Configuration" dialog.
Alarm List	Returns the Alarm List for the NE. This menu item is grayed out if there are no alarms.
Synchronize Alarm	Updates the alarms in the FOXMAN-UN database to reflect the current situation in the managed network for the selected NE.
Synchronize Time	Synchronizes the NE time. For some node types this command is not available.
Synchronize Inventory	Updates the inventory of the selected NE by reloading it from the node.
Synchronize Service	Updates the services of the selected NE by reloading them from the node. For some node types this command is not available.
Force Polling	Requests an immediate poll of the NE. This will read the complete NE configuration, inventory, and alarm status information from the selected NE(s).
Cancel Force Polling	Cancels a forced polling while running.
Sections...	Opens the Section Management dialog for the selected NE.
Message	Opens the Operator Message dialog. An existing message can be viewed or a new one added.
Activate	Calls the third party element manager.

FO Symbol on the map selected

Context Menu FO

Activate	Launches a Third party Element manager associated with the FO. The configuration is done via the "Third Party EM" section of Create NE of type "FO" / FO Properties dialog.
Remote Command	Calls the Create Remote Command dialog. Lets you execute one of the pre-defined remote commands (see Create Remote Command).
Alarm List	Returns the Alarm List for the FO.
Synchronise Alarms	Updates the alarms in the FOXMAN-UN database to reflect the current situation in the managed network for the selected FO.
FO Properties	Calls the FO Properties dialog. This dialog does not allow modifications.
Message	Opens the "Operator Message" dialog for the selected FO.

System Symbol on the map selected:

Context Menu Symbol

Alarm List...	Returns the Alarm List for the System.

Group Symbol on the map selected

Context Menu Group

Open Group	Opens the Group map.
Alarm List	Returns the Alarm List for all the members of the Group.
Sections...	Opens the Section Management dialog.

View

Options		Calls the Map Options dialog, which defines the following: - Opacity of the map background. - To show the capacity of the section via line thickness. - Horizontal/Vertical gap in pixels and the Max. Nodes/row.
Parent Map		Returns to the parent group of the currently active group.
Top Map		Returns to the main map of the currently active group.
Find Symbol		Opens the Find Symbol dialog to locate a symbol on currently opened map. The process also finds symbols, which are located on group maps of any level.
Show/Hide Filter	 	Applicable in View Mode. Show / Hide the layer filter tree, which allows filtering the information shown in the map based on Layers.
View Mode		Used to work with the MOs (Managed Objects) represented by symbols and sections. Maps/groups and symbols remain untouched. - Symbol palette is hidden. - Select one or multiple MOs. - Execute MO actions (alarm list, configuration, force polling, etc.). Show/Hide Layer filter tree.
Edit Mode		Used to edit the map. Maps/groups and symbols are modified. - Symbol palette is displayed. - Symbols can be modified as follows: Delete/Cut/Rename. - Change symbol graphics. Change map background.
Zoom	 	The distance between nodes varies with factor 2 between each zoom step. Allows showing more details the deeper one zooms into the map. Zoom In: Increases the distance between nodes. Zoom Out: Decreases the distance between nodes.

Application

Alarm Summary	Calls the alarm summary showing the numbers of currently active alarms per severity, of all symbols (NEs, FOs, System, Group) contained in the currently opened map.
Alarm List	If no symbol on the map selected, calls the Alarm List containing the currently active alarms of all the symbols contained in the currently opened map. If a symbol is selected, calls the Alarm List containing the currently active alarms of the selected symbol only.
Section Management	Calls the Section Management dialog.

Help

? Help	Calls the FOXMAN-UN help viewer and opens this page.

Related dialogs / windows

Open Map,
Create Map,
Manage Graphics,
Map Select NEs/FOs,
Section Management,
Create Section,
Find Symbol,
Rename,
Map Background,
Map Options.

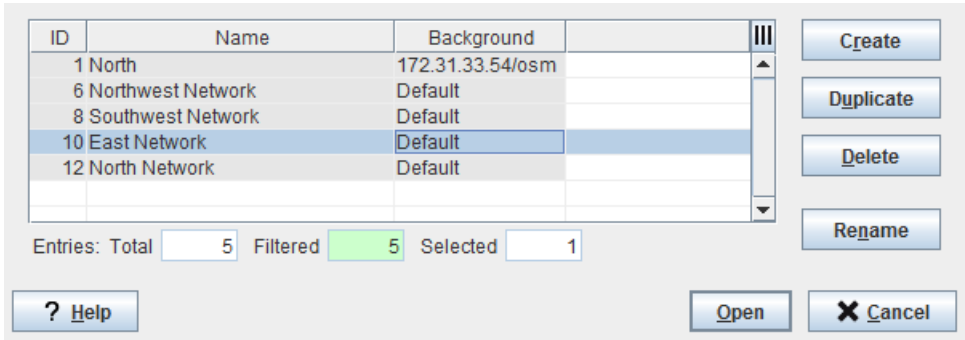
5.2 Open Map

Purpose

The Open Map dialog allows creating, duplicating, deleting, renaming or opening a map. Each map is identified by a unique name.

Dialog image

Open Map



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

List of all existing maps with their background bitmap.

Controls (buttons, menu items, etc.)

Create	Calls the Create Map dialog.
Delete	Deletes the selected map without confirmation.
Duplicate	Creates a new map with identical contents as the selected map and calls the Duplicate Map Name dialog to change the map name.
Rename	Calls the Map Rename dialog to edit the selected map's name.
Open	Opens the selected map and closes the dialog.
Note: a newly created map automatically includes the system symbol with name of the workstation that contains the FOXMAN-UN core.	
Cancel	Closes the dialog.
? Help	Calls the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[NEM Network Browser](#) – Main Window,
[Create Map](#).

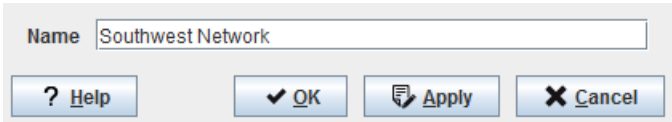
5.3 Create Map

Purpose

This dialog allows entering a name for a map to be created. The name has to be unique.

Dialog image

Create Map



Mandatory entries

Alphanumeric text for map name. Special characters with the exception of asterisk, question mark, backslash, and square brackets may be used. The name has to be unique, i.e. it has to be different from any existing map name.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Calls the FOXMAN-UN help viewer and opens this page.

OK	Applies the entry and closes the dialog.
Apply	Applies the entry without closing the dialog
Cancel	Closes the dialog without applying the entry.

Related dialogs / windows

Open Map.

5.4 Manage Graphics

Purpose

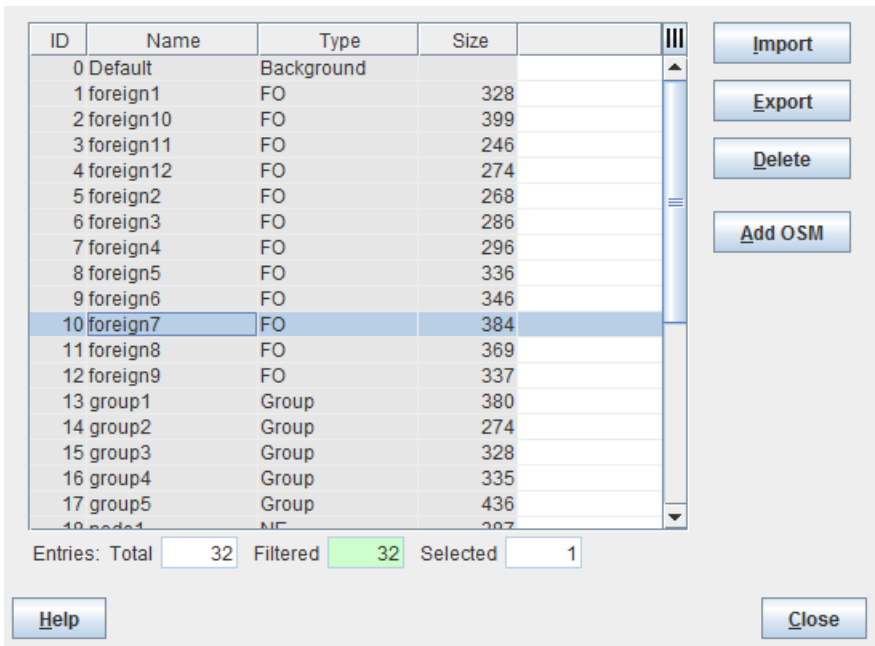
This dialog allows importing, exporting or deleting bitmap files for NE symbols, FO symbols, group symbols, system symbols or background graphics.

It is called from the main window of the NEM Network Browser via the menu option “File – Manage Graphics...”.

Map symbols have to be provided in the “.png” (Portable Network Graphics) format, whereas background images have to be in “.jpg” (Joint Photographic Group) format. Other formats are not accepted by the import dialogs.

Dialog image

Import/Export Graphics



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

List of all available symbol and background files.

Controls (buttons, menu items, etc.)

Import	Allows importing graphics files for: - NE Symbol, - FO Symbol, - Group Symbol, - System Symbol, - Map Background. After selection of the type of symbol, select the directory and the file to be imported. Symbol files must be “.png”, background files “.jpg”.
Export	Allows the selected file to be saved in a specified directory of the server. Determine the destination path and modify the file name if required.
Delete	Deletes the selected file.
Add OSM	Opens a window to enter the URL of a map tiles provider such as, e.g., OpenStreetMap. Once a valid URL has been applied the map can be selected as map background in the “ Select Backgrounds ” dialog.
Help	Calls the FOXMAN-UN help viewer and opens this page.
Close	Closes the dialog.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

NEM Network Browser,
Map Background (Select Backgrounds).

6 Functions

This part contains the help for the FOXMAN-UN functions from management network and security configuration to creation of graphical network representation and fault management. It includes the following topics:

- [Network Configuration](#),
- [Security Configuration](#),
- [Alarm Customisation](#),
- [Map Population](#),
- [Fault Management](#),
- [Performance Management](#),
- [Configuration Management](#),
- [Network Functions](#),
- [Ethernet Traffic Protection Maps](#),
- [System Functions](#).

6.1 Network Configuration

This section explains how to create agents, assign NEs to them, how to automatically discover NEs, how to move NEs between agents, and how to create FOs and their TTPs.

All these functions are called from the [NEM Configurator – Main Window](#).

6.1.1 Create Agent / Properties

Purpose

The Create Agent and Agent Properties dialogs are used for configuring “Element Agents” in the FOXMAN-UN database. Each agent handles the communication to a number of associated NEs over the management network. Specialized agent types, such as FOX61x, FOX51x, FO (Foreign Object) are used to cater for the different types of NEs.

After an agent has been created, NEs of the appropriate type can be assigned to it via the [NE – Create / Properties](#) dialog.

Depending on the access rights of the current user, modifications of the agent parameters may not be permitted in the Agent Properties dialog.



Please note:

A newly created agent is started automatically. It can be stopped or started manually using the command “Stop Agent” or “Start Agent” in the context menu.

Dialog image



Please note:

Apart from the Agent ID which is automatically assigned and only displayed in the Agent Properties, both dialogs are identical. Depending on the existing configuration and the access rights of the current user, not all parameters may be changed in the Agent Properties dialog.

Agent Parameters

Name

Type

SNMP

Access Type

Permanent

Supported NEs

IP Only

Manager Address

172.31.33.46

☐ NAT enabled

Manager NAT Address

0.0.0.0

Serial Port

1

Serial Speed

Agent Host

Host Name

localhost

Polling

☒ Polling On

Polling Interval (sec)

5

Notification

☒ Notification On

UDP Port

162

Hello Time (sec)

30

Route Configuration

Subnet	Subnet Mask	Gateway	

+ Add

- Remove

? Help

✓ OK

⚙ Apply

✗ Cancel

Mandatory entries



Please note:
 Depending on the selection for some parameters, the selection for other parameters is reduced, they are given default values or access to them is blocked (entry fields grayed).

Agent Parameters

Name	A unique name, preferably describing the part of the network that is being handled.
Type	The NE families supported by FOXMAN-UN require appropriate types of agents. NEs belonging to different families of NEs cannot be assigned to the same agent. The combo box shows the NE families available for the current FOXMAN-UN installation. The selectable NE families depend on license options. In addition to agent types for NE families, the following agent types are available: - SNMP - FO
Access Type	Defines the access type to the management network.

Supported NEs	“IP only” accepts only NEs with an Ethernet management interface. “HDLC only” accepts only NEs with an serial management interface. “Any” supports both the above types.
Manager Address	The IP address of the agent. This address is used by the NEs to send their notifications to. Only valid for non-serial communication interfaces. Note: In a distributed installation this may not be the address of the machine where the FOXMAN-UN core is installed.
NAT enabled	Indicates whether Network Address Translation shall be used or not.
Manager NAT Address	If NAT is enabled, this is the translated IP address.
Serial Port	If a serial communication port is used (Access Type set to a serial type like RS-232 or similar) this identifies the serial port number on the core machine.
Serial Speed	The speed of the serial port (in baud).

Agent Host

Host Name	The workstation name where the agent process has to run. This only needs to be modified from localhost in distributed systems where an agent runs on a different machine than the NEM core and database.

Polling

Not applicable for FOX61x agent.

Polling On	Polling of all the NEs assigned to this agent can be disabled (e.g. for commissioning or fault finding purposes).
Polling Interval (sec)	The rate at which assigned NEs are polled. The range is from 1 to 10000 seconds, default is 5. Note 1: If only NEs supporting notification are managed, the polling interval can be made quite large (e.g. 30 seconds). Where notification is not supported, the interval should be as short as possible to keep the delay in reporting alarms low. If using terminal servers, the interval has to be set to a minimum of 5 seconds. If using large SIFOX EOC networks, the interval has to be adapted accordingly. Note 2: The polling interval for SNMP devices is not set here. It is controlled through the parameter “Poll Priority” for each of the assigned SNMP devices individually – see NE – Create / Properties.

Notification

Notification On	Can only be activated for agent type “Permanent”. Enables the NE to send messages to FOXMAN-UN that its alarm state or configuration have changed, that the hello time has expired or that a reboot has occurred.
UDP Port	The port the agent 'listens' at for notification messages. Port number must be in the range 1024 to 65535. Default is 20736. (UDP = User Datagram Protocol). Note: For SNMP and FOX660 agents this is the trap/inform port where devices are expected to send their traps/informs to. Make sure your devices are set-up correctly.

Hello Time (FOX51x NEs only)	Time interval at which a FOX51x NE has to send a Hello notification. If no Hello message arrives for twice the interval time, FOXMAN-UN sets the polling state of the NE to "Unmanageable".

Route Configuration

Subnet	Destination subnet of the route.
Subnet Mask	Mask for the destination subnet.
Gateway	IP address via which the destination subnet can be reached.



Please note:

If you are using a Main/Standby setup (i.e. FOXMAN-UN server redundancy provided via the **NEM Remote Admin Tool**), agent routes properties stored in the database backup on the main server are unsuitable for the standby server. It is therefore strongly recommended to use native Linux routes for this purpose in main server and standby server instead of agent routes.

Optional entries

NAT Enabled	Enables/Disables the Manager NAT Address. This is applicable to FOX61x, FOX660 agents only.
Manager NAT Address	The NAT Device IP address for the agent. If NAT is enabled, this IP address will be used by the NEs to send their notification events to.

Informational content

When calling the dialog, the route list shows all presently active routes.

Controls (buttons, menu items, etc.)

Route Configuration

Add	Calls the dialog for entering subnet, netmask, and gateway address.
Remove	Deletes the route selected in the route list.
? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Not applicable.

6.1.2 NE – Create / Properties

Purpose

The Create NE and NE Properties dialogs are used to assign an NE to a particular agent or to modify an existing assignment.

Dialog image



Please note:

The Create and Properties dialogs are identical except for the not modifiable parameters presented at the top. “ID”, “Operational State”, and “Location” can only be displayed after the NE has been created and the configuration uploaded. “Location” is only applicable to FOX51x and FOX61x NEs and can only be entered or modified in the configuration of the NE via the local craft terminal (UCST or **FOXCST**).

Depending on the settings at creation time, only a part of the parameters can be changed in the NE Properties dialog.

Depending on the access rights of the current user, modifications may not be permitted in the NE Properties dialog.

For agents of type SNMP the maximum recommended number of NEs is 30. If you go beyond 30 NEs per SNMP agent, performance will be insufficient.

The image below shows a sample properties dialog for NEs of the type FOX615.

NE Properties: <NE_name>

Agent Name

Agent-1

Agent Type

FOX61EA

ID

1

Operational State

Manageable ⓘ

Location

CH-BERN251-1535

NE Parameters

Name

NE_205

Type

FOX 615 ▾

Tags

Addressing

IP Address

172 . 31 . 69 . 205

Authentication

Local

SSH

Public Key

Remote

NMS Public Key / CST Remote

Set Passwords...

NE Authentication

Enabled

Show Fingerprint...

Operator

Message

? Help

✓ OK

📄 Apply

✕ Cancel

Mandatory entries (Create)

NE Parameters

Name	Must be unique within the whole FOXMAN-UN application.

Type	The selection available depends on the type of agent. The selected NE type automatically determines the type of addressing (e.g., IP or HDLC). For agent type "FO", only NEs of type "Foreign Object" can be created. For FOX51x, if the wrong member of the family (e.g., a FOX515 instead of a FOX512) is selected, this will be modified automatically after upload of the configuration has been done.
Tags	See Optional entries .

Addressing

IP Address	Addressing for NEs using an Ethernet management interface. The address must be unique within the whole FOXMAN-UN application. Not required for NE of type "FO".
HDLC Address	Addressing for FOX51x NEs using a serial management interface. The address must be unique within the agent that the NE is assigned to. The range is from 1 to 254, default is 1.
Agent port	Applicable for SNMP devices only. Specifies the port where the agent of the SNMP device can be reached.
HTTP port	Specifies the port where the agent can be reached.

Authentication

Requires a selection of one out of four authentication types used to log in to the NE. Some parameters are applicable to specific NE types only.

Local	Authentication is using credentials stored locally on the NE.
SSH	Use encrypted (SSH) connection to the NE. Only available with Local authentication. By default SSH is enabled. Enable or disable SSH for connecting to the NE by setting or removing the mark in the "SSH" checkbox. This option is not available for all NE types. SSH is always enabled (mandatory) for remote authentication or when using a public key.
Set Passwords	See Optional entries .
Public Key	Use a public key for connecting to the NE. When enabled, both FOXMAN-UN and FOXCST use private/public key authentication for connecting to the NE. The public key is created in the NEM Remote Admin Tool via the " Manage Authentication Keys... " button.
Remote	Enables the FOXMAN-UN to manage NEs that have only RADIUS Authentication enabled.
NMS Public Key / CST Remote	Use authentication keys managed by FOXMAN-UN. For details see Manage Authentication Keys... When enabled, FOXMAN-UN uses private/public key authentication for connecting to the NE, while FOXCST uses RADIUS authentication.
NE Authentication (separated group)	
Enabled	Only available when "SSH" is enabled. When activated, the connection to the NE uses authentication with a fingerprint provided by the NE. When enabling NE Authentication, the NE gets unmanageable until the fingerprint is accepted. To accept it, close the dialog, force poll the NE and re-open the NE Properties dialog. Click " Show Fingerprint... ".
Show Fingerprint...	Shows the fingerprint provided by the NE when "NE Authentication" is enabled. To accept the fingerprint click on "Accept". This will paste the fingerprint to the "Configured Fingerprint" field. Click OK to apply the change. Force poll the NE. The operational state should go back to "manageable".

FO Parameters

Applicable for NEs of type “FO” only:

FO Key	Identifier for the FO.
Location	Enter the location of the FO NE.

Third Party EM

Applicable for NEs of type “FO” only:

Label	Application label to be shown for third party element manager application.
Application	Path and executable for the third party element manager application.
Option	Command option(s) to be applied for starting the third party application.

HDLC Routing

Applicable for FOX51x NEs only:

IP Address	Must be unique within the whole FOXMAN-UN application. Depending on the type of NE and the type of interface used for communication with it, either one or both HDLC Address and IP Address fields must be filled in.
Port	Must be unique within the whole FOXMAN-UN application. The range is from 1024 to 65535, default is 20736.

Settings

Applicable for SNMP devices only:

Poll Priority	Controls the polling interval for SNMP devices in five stages (highest, high, medium, low, lowest). Default is “medium”.
Call Timeout	Defines the time the agent manager is waiting for an answer to a normal request. Range is 1 to 60 seconds. Default is 2 seconds.
Call Auto Retries	Defines the number of automatic retries after a normal request has failed. Range is 0 to 9. Default is 0.
Bulk Call Timeout	Defines the time the agent manager is waiting for an answer to a bulk request. Range is 1 to 60 seconds. Default is 5 seconds.
Bulk Call Auto Retries	Defines the number of automatic retries after a bulk request has failed. Range is 0 to 9. Default is 0.

Optional entries

Tags	Free alphanumeric text, e.g. to specify the function of the NE.
Set Password	If a password for the NE is different from the default password, it must be entered here. Otherwise the NE cannot be accessed by FOXMAN-UN. The button calls the Set Password(s) dialog. Not available with remote authentication or when using a public key. Note: If a password is added, deleted or modified via CST GUI in FOXMAN-UN, the NE must be deleted and created again with the new password.
SNMP Security Profile Name (SNMP devices)	This dialog assigns an existing SNMP security profile to a SNMP NE.
Operator Message	A message, e.g. containing instructions can be added. Its presence is indicated by an asterisk in front of the NE name on maps. It can be viewed and modified from there via the context menu.

Informational content

The NE Properties dialog initially displays the currently valid parameters.

NE Properties, general

Agent Name	Name of the agent communicating with the NE.
Agent Type	The agent type depends on the nodes it can communicate to and on the supported protocol(s). The available agent types depend on license options.
ID	The assigned ID of the NE in the NEM Configurator.
Operational State	Shows whether the NE is "Manageable" or "Not manageable". This information is read-only. This is the same information as shown in the NEM Configurator as "Operational State". In case of an unmanageable NE, the most probably cause is given when hovering over the (i) sign with the mouse pointer.
Location	The location of the NE as configured via the local craft terminal.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Create Agent / Properties dialog,
Create NE of type "FO" / FO Properties.

6.1.3 NE – Set Password(s)

Purpose

FOXMAN-UN must be aware of any NE passwords different from the defaults for the user classes "Manager", "Session Manager" (Session), "Maintenance", and "Information". Only then the NE can be accessed via FOXMAN-UN, thus enabling automatic supervision and access via CST. The "Set Password" dialog serves to enter such passwords.

Dialog image

Set Passwords

Information

Enter Password

Repeat Password

Maintenance

Enter Password

Repeat Password

Manager

Enter Password

Repeat Password

Session Manager

Enter Password

Repeat Password

? Help

✓ OK

✗ Cancel

Mandatory entries

Not applicable.

Optional entries

Passwords need to be entered only if they are different from default. For information on default passwords refer to the relevant section in the User Manual “FOXMAN-UN under Linux”. Depending on the NE family, either only the password for “manager” or all passwords are relevant. In the dialog, all not relevant passwords are grayed out. Passwords must be entered twice. If the two entries do not match, an error message is generated on leaving the dialog.

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Please note:

If passwords different from default are used, at least the password for the user class “manager” and, if applicable, for “information” must be entered to enable automatic supervision by FOXMAN-UN and connection via CST. If applicable, the other passwords have to be entered if CST access for the corresponding user classes is required.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

NE – Create / Properties dialog.

6.1.4 SNMP Security Profile – Create / Properties

Purpose

FOXMAN-UN must be aware of the security settings in a SNMP device to be able to communicate with it. The SNMP Security Profile dialog, opened from the **NEM Configurator**, NE Browser tab, context menu on the “SNMP Security Profiles” tree branch, serves to set these parameters for either SNMP V1 & V2c (community strings) or for SNMP V3 (USM). A profile can then be assigned to an SNMP NE during its creation.

Entries have to be made in both sections in the case of a FOXMAN-UN SNMP agent that has both versions of SNMP devices (v1/v2c and v3) assigned to it, or in a discovery request where both versions of SNMP devices shall be discovered.

Dialog image

Create SNMP Security Profile

SNMP Security Profile Parameters

Security Object Name

SNMP Version

auto

SNMP V1 & V2c

Read Community

Write Community

Trap Community

Show Community Strings

SNMP V3

Security Name

Security Model

Security Level

Authorization Protocol

Authorization Password

Repeat Password

Private Protocol

Private Password

Repeat Password

Context Name

Context Engine Id

? Help

OK

Cancel

Mandatory entries

SNMP Security Profile Parameters

Security Profile Name	Enter a name for the security profile.
SNMP Version	Selectable values are V1, V2c, V3 or auto. Selection locks the setting of not applicable parameters.

SNMP V1 & V2c

Read Community	String for read access.
Write Community	String for write access.
Trap Community	String for traps (if applicable).

SNMP V3

Security Name	The security / user name.
Security Model	Only USM is supported.
Security Level	Selection is - “None”, - “Authorization and Privacy”, - “Authorization only”.
Authorization Protocol	Selection is - “None”, - “MD5”, - “SHA”.
Authorization Password	The password must be confirmed in the “Repeat Password” field.
Private Protocol	Selection is - “None”, - “DES”.
Private Password	The password must be confirmed in the “Repeat Password” field.
Context Name	The context name of the sub-entity to address.
Context Engine Id	The engine id of the sub-entity to address. Must be entered in hexadecimal form.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

Show Community Strings	Opens the “SNMP Community Strings” window which shows the contents of the strings. In a SNMP V1 & V2c environment, these strings can be used as extended addressing. In this case it is convenient to show the contents rather than to hide them as for a full fledged password. Note: The dialog is read only. The strings must be set in the “SNMP Security Profile” dialog. The screenshot below shows the default values for the community strings.

dialog for the SNMP community strings:



? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

NE – Create / Properties dialogs.

6.1.5 Create Discovery Request (Discover NEs)

Purpose

The Create Discovery Request dialog is used to set the access type (if applicable) and the address range of a discovery request and to launch the discovery process. The discovery is associated with the specific element agent that the dialog has been started from.

A discovered NE is automatically entered in the FOXMAN-UN database with a unique default name containing time and date of the discovery. This name can be modified later in the **NE – Create / Properties** dialog.

Discovered NEs having an address that already exists in the database are ignored. Also NEs that cannot be put under control because their settings do not match the requirements of successful FOXMAN-UN-NE communication are removed after discovery.

The Discovery Request may be canceled by calling the context menu of the element agent the discovery has been launched from and selecting Cancel NE discovery request

Dialog image

The contents of the dialog depend on the type of agent. The image below shows the dialog for agent of the type FOX61x.



Please note:

For FOX51x agent, depending on the agent's selection in Access Type, either IP Addressing or HDLC Addressing / HDLC Routing will be accessible.

Create Discovery Request on Agent: <Agent_name>

Mandatory entries

Access Type

Applicable for “Agent Type” FOX51x only:

Access Type	IP only for FOX515, FOX512. HDLC only for FOX-U, FOX-U/M, COLT2.

IP Addressing

"From" and "To"	A discovery can only be performed for the last section of the IP address. The first 3 sections must be identical.
Encrypted (SSH)	Use a secure (SSH) connection to the NEs. Not available for all NE types.

HDLC Routing

Applicable for "Agent Type" FOX51x and "Access Type" HDLC only:

"From" and "To"	HDLC address range is from 1 to 254.
IP Address:	The IP address of the terminal server or the gateway Network Element through which the NEs of the type FOX-U, FOX-U/M or COLT2 can be reached.
Port:	The TCP port number of the relevant interface in the terminal server or of the Q1 master interface in the gateway Network Element.

Settings

Applicable for SNMP devices only:

See under **NE – Create / Properties** for details.

NE Access

Applicable for FOX61x and FOX515/FOX512 NEs:

Password	Only NEs with a configuration containing the password entered here will be discovered. This is valid also for an empty password (no password).

Applicable for SNMP devices only:

SNMP Security (SNMP devices)	Only SNMP devices with security settings matching the entries in the selected profile will be discovered.

Applicable for FOX61x NEs only:

Remote Authentication	Enables FOXMAN-UN to discover NEs that only have RADIUS Authentication enabled.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

SNMP Security	See above under "NE Access" for SNMP devices.
? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Not applicable.

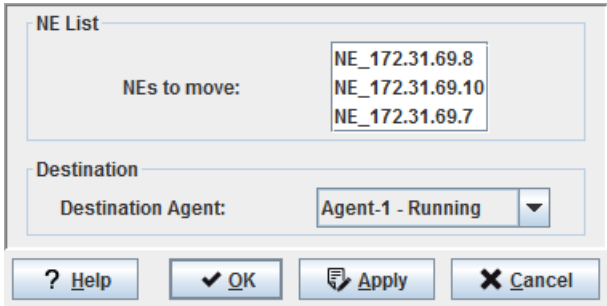
6.1.6 Move NE

Purpose

The “Move NE...” command allows changing the agent assignment of one or several NEs. The agent that the selected NEs are moved to must have been previously created, must provide access to the NEs via the management network, and must support the type of the NE(s) to be moved.

Dialog image

Move NEs



Mandatory entries

Destination Agent	The agent that the selected NEs are being moved to.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Not applicable.

6.1.7 Create NE of type “FO” / FO Properties

Purpose

The “Create FO” and “FO Properties” dialogs are used to define an NE of type “Foreign Object” (FO).

FOs are used to represent third party network elements or other equipment. They can represent interface objects to other networks such as switches, bridges, routers, and other types of access multiplexers from other manufacturers. They can also stand for door contact monitoring, power supply supervision etc.

From FOXMAN-UN R16B onwards they are defined as NEs and can be handled as NEs.

An FO initially has no alarm. However, alarms from different sources can be re-directed to a FO, so that the FO represents the alarming state of these sources. The sources of alarms redirected to FO may be:

- the inputs of **ALCAR** in FOX51x,
- any alarm from FOX61x,
- inputs from FOX61x chassis.

Depending on the access rights of the current user, modification of the FO parameters may not be permitted in the FO Properties dialog.



Please note:

The “Create Foreign Object” dialog is reached via the “Create NE...” context menu of an “FO Agent” item in the NEM Configurator tree panel.

The “NE Properties” dialog is reached via the context menu of any FO in the details panel.

Dialog image



Please note:

The “FO Properties” dialog is different from the “Create Foreign Object” dialog in

- the FO Key which cannot be modified after creation,
- the ID, which is automatically assigned during creation, and
- the Operational State, which is determined after creation.

After creation, there are also the “FO Properties” options to add, remove, and operate remote commands of an FO, provided the FO supports remote commands.

Create NE of type “Foreign Object” on Agent of type “FO” with Tab “Configuration”

Agent Name FO1
Agent Type FO
ID 14
Operational State Manageable
Location

NE Parameters

Name Managed Switch
Type Foreign Object ▼
Tags

Setup

Configuration TTP Commands

FO parameters

FO Key 1
Location

Third Party EM

Label firefox
Application /usr/bin/firefox
Option 192.168.3.99

Operator

Message

? Help ✓ OK ↗ Apply ✕ Cancel

Tab “TTP”

Configuration **TTP** Commands

Address	Label ▲1	Active	N
1/0/1/1	Port-1	✓	
1/0/2/0	Port-2	✓	
1/0/3/0	Port-3	✓	
1/0/4/0	Port-4	✓	
1/0/5/0	Port-5	✓	
1/0/6/0	Port-6	✓	
1/0/7/0	Port-7	✓	
1/0/8/0	Port-8	✓	
1/0/9/0	Port-9	✓	
1/0/10/0	Port-10	✓	

⏪ ⏩

Add
To file
From file
Remove
Properties

Tab “Commands”

Configuration

TTP

Commands

Label	Localisati...	RC Number	Unit Type	

Add

Remove

Operate

NE Properties

NE Parameters group:	
Name	The given name must be unique within all defined Foreign Objects.
Type	Foreign Object
Tags	Free alphanumeric text, e.g. to specify the function of the FO.
“Setup” group, with tabs “Configuration”, “TTP” and “Commands” (the latter being available only after creation):	
Configuration tab:	
FO Parameters group:	
FO Key	Select FO Key (identifier).
Location	Free alphanumeric text, e.g. to indicate the physical site.
Third Party EM group:	A third party Element Manager associated with the FO can be entered directly in the “Application” field. This application has to be installed previously. The name specified in the “Label” field will appear in the “Activate” item of the FO context menu on a map (see Main Window of the NEM Network Browser). The default label is the name of the application. The specified third party EM can be started directly from the context menu of a FO in a map. The “Option” field allows passing parameters to the application. The following predefined parameters are provided: %N FO name %L FO location %I FO Identity %K FO Key
Label	A name for the third part EM to be opened. The name will appear in the context menu of the NE in the NEM Configurator.
Application	Path to the executable third party application.
Option	Option to be added when calling the third party application.
TTP tab:	
TTP table	Table to add Trail Termination Points (TTP). Adding Trail Termination Points offers the possibility of using sections between Foreign Objects and NEs in the network maps. Some of the settings use defaults that cannot be changed. These settings are used to provide enough configuration details for using the TTPs in NP. The table, provides the following columns:
Address	Port identifier of the individual TTP.

Layer Rate	Can be any of the following: - STM1 PMS - STM4 PMS - STM16 PMS - STM64 PMS - E0 - E12 - E22 - O22 - E31 - E32 - E-DSL - E-SHDSL - ADSL Line - E-VDSL - CSMACD Ethernet - OTU1 - OTU2 - OTU2e - OTU3 - OTU3e2 - OTU4 - Clock Distribution - Unknown
Label	Label can be entered as required.
Active	If true, the TTP is active. If false, the TTP is inactive.
Port Type	Can be any of the following: - Ext. electrical - Ext. optical - Ext. radio
Number of 64k / Num 64k	Specifies the number of timeslots in TDM structured signals.
Has CAS	If true, the structured signal has Channel Associated Signaling CAS. If false, the signal does not have CAS.
[Support] CAS in Last TS	If true, the structured signal supports CAS in its last timeslot. If false, the signal does not support CAS in its last timeslot.
Connection Type	Type of connection on the TTP.
Unit Type	Default is "FO-UNIT".
Connected Channels Must Match	If true, the structure of connected channels must match. If false, the structure of connected channels doesn't need to match.
Protection	Default is "No Protection, Revertive: false, Same channel: false, SNCPI: false".
Sector	Default: "0".
Dynamic Channel Allocation	Default: false.
Commands tab (not available during NE of type "FO" creation but only in NE of type "FO" properties):	
Add	Calls the Create Remote Command dialog.
Remove	Deletes the selected remote command in the list.
Operate	Execute/Send remote command to the 3rd party device connected to the selected remote command port. The following remote commands are provided: - Set output to "ON" State, - Set output to "OFF" State.
Operator group:	
Message	A message, e.g. containing instructions can be added. This message can later be modified by any FOXMAN-UN user having access to it.

Informational content

Remote Command

Label on FO	Text representing the “Label on FO” created via the Create Remote Command dialog.
Localisation	NE-ID/unit slot number.
RC Number	Remote Command Number (n=1 to n=6).
Unit	The unit with the created/configured RC.
Label on Unit	The label used on the respective unit.

Controls (buttons, menu items, etc.)

TTP

Add	Calls the TTP – Create / Properties dialog.
To file	Lets you store the properties of a TTP in a file for later use. The button calls the standard file save dialog.
From file	Lets you retrieve the properties of a TTP from a file. The button calls the standard file open dialog.
Remove	Deletes the TTP selected in the list.
Properties	Calls the TTP – Create / Properties dialog for a selected TTP.

General

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Configuration of FO alarms and commands in **ALCAR**.

6.1.8 ALCAR

General

The ALCAR is a special FOX51x unit designed for alarm collection. It has 24 binary alarm inputs, 4 relay outputs, and 4 serial port outputs.

ALCAR alarms and commands can be assigned to Foreign Objects. They then operate independently from the FOX51x the ALCAR is configured in. Only board alarms (HW Failure, Unit Not Available, Power Supply Failure) will be reported as FOX51x alarms.

The alarms and commands assigned to a Foreign Object can be viewed via the FO Properties context menu (Map Population – **Map Background**).

Configuration

FO alarms are directly configured via the ALCAR configuration in UCST. The FO has to be created first using the NEM Configurator.

After placing one or several ALCARs in the subrack, opening ALCAR for configuration calls the “ALCAR Devices” dialog which shows all already configured FOs. Pressing “New” allows selecting one of the available FOs as an ALCAR device in the “New Device” dialog. If a FO is selected that already exists as ALCAR device, the configuration dialog is opened for modifications (this

corresponds to selecting an existing device in the device list and pressing “Configuration”). This calls the “Configure Device” dialog:

Configure Device

Templates

Each ALCAR device has to be assigned to an “Alarm /Command Template”. A template defines a number of alarms with their fault cause text, severity, and input contact polarity as well as a number of commands with name, normally open state text, and normally closed state text. The same template can be assigned to more than one FO.

A new template is created in the “Configure Device” dialog by typing a name in the “Select File” combo box. If no templates exist, the combo box is empty, else the template created first is shown. In this case that name has to be marked and overwritten to create a new template. Pressing “Edit” calls the “Edit Alarms/Commands Template” dialog.

Edit Alarms/Commands Template

To add an alarm to the template:

In “Alarm Text”	Enter a name of maximum 16 characters which will be displayed as Fault Cause in FOXMAN-UN.

In "Severity"	Select a severity according to the following mapping table: "Urgent" is mapped to "Critical", "Non Urgent" is mapped to "Major", "AIS" is mapped to "Minor", "Tributary" is mapped to "Warning". Note: Do not use the ALCAR severity "Indication". It does not cause an alarm in FOXMAN-UN.
In "Alarm State"	Determine whether the alarm is to be reported on closing the input contact or on opening it.
To add a command to the template	
In "Command Text"	Enter a name of maximum 16 characters.
In "NO-State"	Enter a name of maximum 8 characters to identify the normally open state of the relay contact.
In "NC-State"	Enter a name of maximum 8 characters to identify the normally closed state of the relay contact.

**Please note:**

When editing an existing template, the first alarm and the first command will be selected on entering the dialog. To add a new alarm or command rather than edit an existing one, the first empty line after the list must be selected.

When editing existing templates, the alarm and command assignments (see below) of all FOs using that template must be checked and modified accordingly. If "Assign Alarms" and "Assign Commands" is not entered, the modified template will have no effect.

Assigning alarms / commands

Leaving the template dialog returns the "Configure Device" dialog. The FO is now assigned to the template, but no alarm inputs or command outputs are assigned yet. A corresponding message is displayed when trying to leave the dialog at this stage.

The "Assign Alarm Inputs" dialog presents the alarms of the selected template in the "Alarm List":

Assign Alarm Inputs

Alarm Input Assignment for 'FO_01'

Alarm List:

ID	Alarm Text	Severity	Alarm State
1	Fire	Urgent	Closed
2	Door	Non Urgent	Closed
3	Temperature	AIS	Closed
4	Humidity	Tributary	Open

ALCAR in Slot

1

Y

Alarm Input

4

Y

Alarms

Assign

Remove

Command Links...

Assigned Alarms:

ID	Alarm Text	Severity	Alarm State	Slot	Input	Cmd Links
1	Fire	Urgent	Closed	1	1	No
2	Door	Non Urgent	Closed	1	2	No
3	Temperature	AIS	Closed	1	3	No

To assign an alarm:

In "Alarm List"	Select any alarm. On entering the dialog the selection is on the first alarm and moves automatically down to the next one after an assignment.
In "ALCAR in Slot"	If more than one ALCAR is present in the subrack, select the desired slot. Alarms of the same FO can be distributed over several ALCARs.
In "Alarm Input"	Select the desired input number. The lowest free input is automatically presented.
Press "Assign"	Shows the alarm in the "Assigned Alarms" list.

The assignment of commands occurs similarly to the assignment of alarms.

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Please note:

Modifying and deleting entries in a template is recognized by UCST and results in a message when entering the "Assign Alarms Inputs" and "Assign Commands Outputs" dialogs. We recommend answering the question in the message with "No" and proceeding by first removing all assignments and then redoing them.

Command links

Alarms can be made to automatically activate commands, e.g. a fire alarm can turn on a siren or warning light. Command links can be set in the "Assign Alarm Inputs" via the "Command Link" button, provided the corresponding commands have already been assigned to an ALCAR output. Several alarms can be made to activate the same command.

Configuration download

After the configuration of the required alarm inputs and command outputs has been completed, a partial download (menu Files > Partial Download) has to be executed before the FO alarms and commands become active.

Manual command activation

Commands can be activated manually only via UCST. In the "ALCAR Devices" dialog select the required FO and press the "Alarms/Commands" button. In the resulting dialog select the desired

output in the “Commands” list and press “Change”. The current and the new state will be displayed. Press “Change State” to switch the output.

6.1.9 TTP – Create / Properties

Purpose

A Trail Termination Point added to a Foreign Object offers the possibility to create a section with specified properties between the NE of type “FO” and an NE or between two NEs of type “FO”.



Please note:
The “Layer rate” and the “Port type” cannot be modified in the TTP Properties dialog, as this might render an existing section invalid.

Dialog image



Please note:
The Properties dialog is identical to the Create dialog with the exception of the “Address” frame where parameters cannot be modified.

Create TTP

Mandatory entries

Address	A unique TTP address has to be defined. Usually this is the ID (1 to n) of the physical port on the NE.
Properties	These have to be defined to match the attributes of a section or trail that is required and ends in the NE of type “FO”. Notes: - To be usable for routing in NP, a port needs to be active (mark the check-box labeled “Active”). - The Label can be selected during creation of the Trail in NP. - “P12 mode”, “Number of 64K”, “Has CAS”, and “Support CAS in last TS” only need to be set for timeslot structured signals with P12 mode = TERMINATED. They can be left at their defaults for layer rates.

For more detailed information refer to the user manual “Networking Package”.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Create NE of type “FO” / FO Properties.

6.1.10 Create Remote Command

Purpose

This dialog adds remote command(s) to a foreign object.

i

Please note:

The “Create Remote Command” table lists all the created remote controls (rc-1...rc-6) on the unit supporting remote control function. It is a must that these remote controls are created/configured prior to adding remote command(s) to FOXMAN-UN.

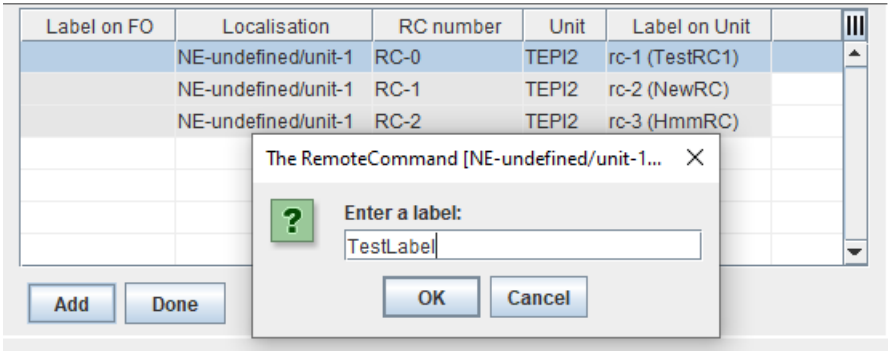
The creation of remote control is possible via **FOX CST**:

- Latched: output keeps the state it is set to, e.g. if the output is set to “ON”, it will remain in that state until the output is set to “OFF”.
- Pulse duration: the time an output will stay in “ON” state until it goes to “OFF” state. The opposite transition cannot be pulsed.

If you want to remove the NE from FOXMAN-UN and add it back later, make sure that you remove the remote controls before you remove the NE. You can create the remote controls again after the NE is added back to FOXMAN-UN.

Dialog image

Create Remote Command



Informational content

- Label on FO: Remote Command label as configured via the “Add” button.
- Localisation: NE-ID/unit slot number.
- RC number: Remote Control logical interface number (n=1...6).
- Unit: the unit supporting Remote Control function.
- Label on Unit: Remote Control label as configured in the unit via **FOXCAST**.

Controls (buttons, menu items, etc.)

Add	Calls a dialog to Enter a “Label on FO” information for the selected RC entry. The label length must be in the range of 3 to 20 characters. Press OK to add the selected RC to the Foreign Object's Remote Command lists after it is labeled (see Create NE of type “FO” / FO Properties).
Done	Closes the dialog.

Related dialogs / windows

Create NE of type “FO” / FO Properties.

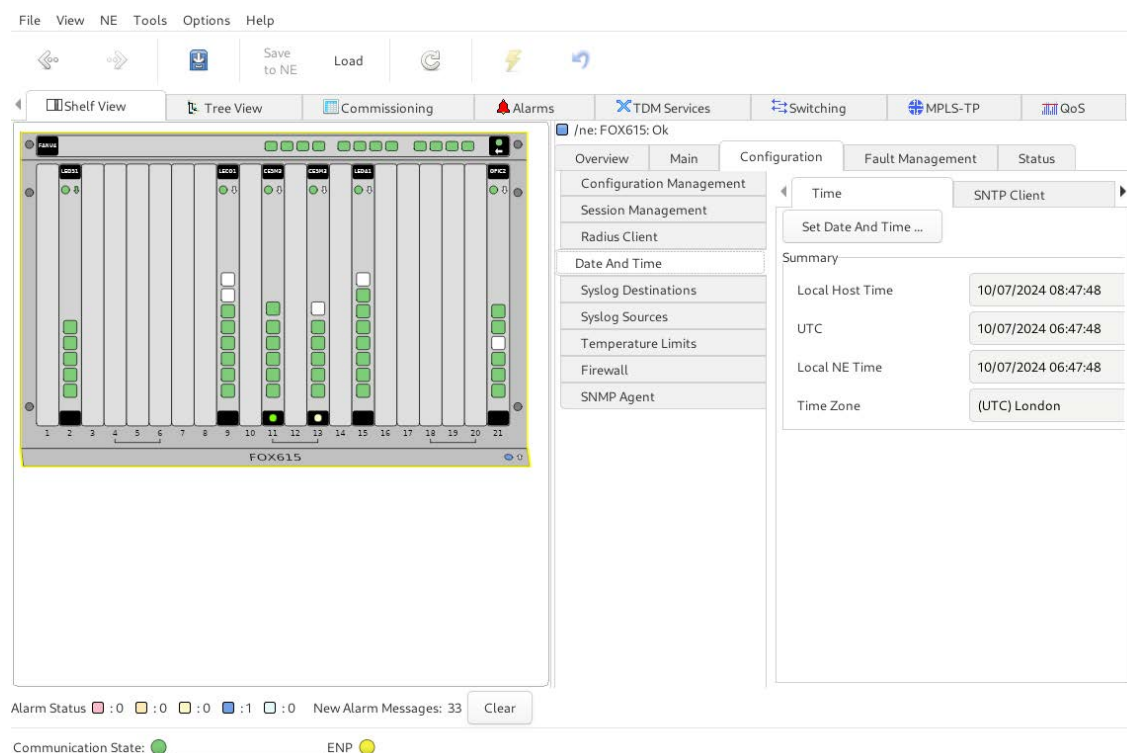
6.1.11 FOXCAST

Purpose

FOXCAST is the local craft terminal GUI for FOX61x NEs. It is used for some specific commissioning and configuration tasks and for the initial configuration of a FOX61x NE when taking the NE into service. FOXMAN-UN uses an integrated version of the FOXCAST. The FOXCAST is described in a separate user manual available in the FOX61x technical documentation.

Dialog image

FOXCAST



6.2 Security Configuration

This section shows the dialogs used to create domains, assign elements (NEs, including NEs of type “FO”, users, profiles etc.) to them, create FOXMAN-UN users, create security profiles, and assign domain/profile combinations to users.

All these functions are called from the **NEM Configurator – Main Window – Role Based Access Control** tab.

6.2.1 Domain – Create

Purpose

The Create Domain dialog adds an empty domain to the existing ones and sets its alarm forwarding parameters. After the domain is created, it has to be populated using the **Domain – Properties** dialog.

Dialog image

Create Domain

Mandatory entries

Domain name	This name cannot be modified once the domain has been created. If it needs to be changed, the domain has to be deleted and recreated.

Optional entries

Description	A text describing the purpose or special properties of the domain may be added.
Alarm Forwarding On	Enables the forwarding of alarm information for the NEs of this domain to the email address specified below, provided the global alarm forwarding is enabled in “File – Options” of the NEM Configurator .
Include System Alarms	Enables forwarding of FOXMAN-UN system related alarms.
email	Specify a valid email address as target for the alarm information.
Minimum Perceived Severity	Specify a severity. Alarms of the specified severity and higher will be forwarded, e.g. for “Major”, major and critical alarms will be included.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Domain – Properties dialog.

6.2.2 Domain – Properties

Purpose

The Domain Properties dialog allows defining the members of the domain out of the complete set of existing elements (domains, agents, NEs, Foreign Objects, users, security profiles). Additionally, the description and the alarm forwarding parameters entered during the creation of the domain can be modified.

A domain and, as a consequence, its members, together with a **Profile** can then be assigned to a FOXMAN-UN user. The user can then make use of the specified access rights of the profile to the members of the domain.

By default, the newly created and/or discovered NE(s) are automatically added as member(s) of the user's domain.

Only a FOXMAN-UN administrator can manually assign new members to the domain.

Dialog image

Domain Properties: <Domain_name>

Domain Parameters

Domain Name

Southwest

Description

Alarm Forwarding

Alarm Forwarding On

☐

Include System Alarms

☐

eMail

Minimum Perceived Severity

Critical

Last check took place at

-

Members

Selected Members (14 out of 97)

Change Selection...

Type	Name	Addressing	Alarm State	Operational State
Security Profile	maintain			
Agent	Agent-1			
Agent	Agent-2			
Domain	NP-Nodes			
Domain	ENP-Nodes			
Domain	Southwest			
NE	NE_80	IP: 192.168.3.106	Cleared	Manageable
NE	NE_82	IP: 192.168.3.122	Minor	Manageable

? Help

OK

Apply

Cancel

Mandatory entries

The members of the domain must be defined.

Change Selection	Opens the “Domain – Choose Members” dialog to change (Add/Remove) selected members.

Optional entries

Description	A text describing the purpose or special properties of the domain may be added.
Alarm Forwarding On	Enables the forwarding of alarm information for the NEs of this domain to the email address specified below, provided the global alarm forwarding is enabled in “File – Options” of the NEM Configurator.
Include System Alarms	Enables forwarding of system alarms.
email	Specify a valid email address as target for the alarm information.
Minimum Perceived Severity	Specify a severity. Alarms of the specified severity and higher will be forwarded, e.g. for “Major”, major and critical alarms will be included.

Informational content

Selected Members	All currently assigned members of the domain.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

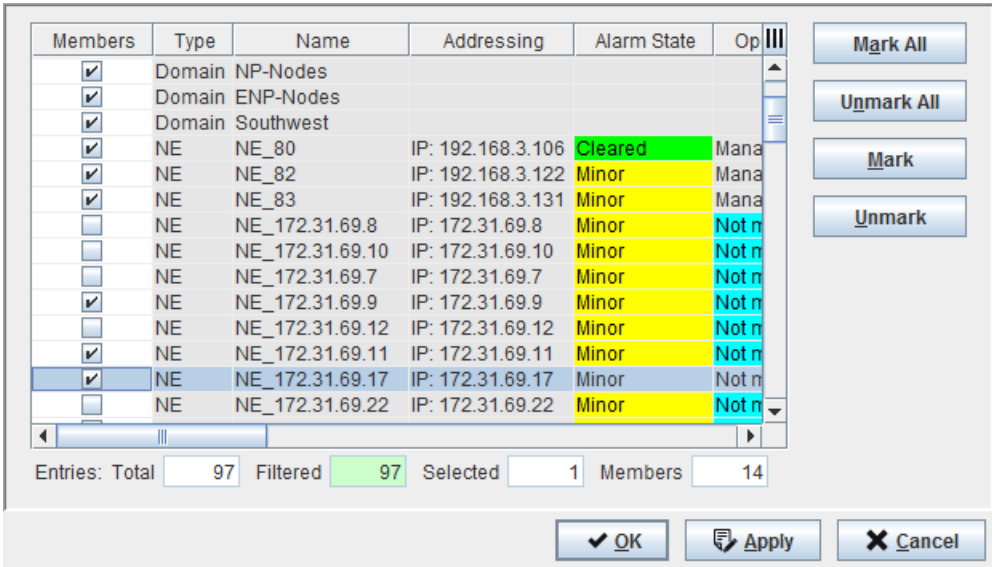
Domain – Create,
Domain – Choose Members.

6.2.3 Domain – Choose Members

Purpose

The “Select Members”, dialog allows the selection of elements (domains, agents, NEs, Foreign Objects, users, security profiles) as members of a domain.

Dialog image



Mandatory entries

Members	Mark the element(s) as Member(s) of a domain.

Optional entries

Not applicable.

Controls (buttons, menu items, etc.)

Mark All	Check mark/tick all the Members in the table.

Unmark All	Clear all the check marks in the table.
Mark	Check mark the selected Member(s) in the table.
	Note: - To select/highlight a single item from the table list: Click on a specific Member. - To select multiple items from the table list: Press “Ctrl key” then click on the required Members. - To select a range of items from the table list: Click on the first Member, Press “Shift key” then click on the last Member to be included in the range.
Unmark	Clear the check mark(s) of the selected/highlighted Member(s) in the table.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Domain – Properties](#).

6.3 Alarm Customisation

Purpose

The Alarm Customisation main frame allows the following:

- Display existing Alarm Customisations.
- Modification/Deletion of existing Alarm Customisations.
- Creation of new Alarm Customisations.
- Transfer the Port Alarm Customisation to a foreign object (applicable to Port Scope only).



Please note:

The alarm customisation for the FOX51x alarms must be done from the [NE Hardware View](#). Such existing customisation will then be displayed in this dialog. The HW View can be launched by clicking on an existing alarm customisation with “Unit” as its Scope.

Dialog image

Alarm Customisation

File

Edit

View

Options

Help

Scope	Selection	Unit	Location	Old Alarm...	Old Severity	New Alar...	New Seve...	Transfer t...	Period	Work Inst...	
Network		SYSTEM		Automati...	Warning	Auto Conf...	Warning		0		

Select Scope

Network

Unit

SYSTEM

Old Alarm Text

Automatic Configuration U...

Old Alarm Severity

Warning

New Alarm Text

Auto Config Upload Done

New Alarm Severity

Warning

Work Instruction

Intermittent Period

sec

☐ Use Template

Create

Modify

Remove

Mandatory entries



Please note:

Conflicts between entries made under different scopes are resolved according to the following list of priorities:

- Port: 1 (highest),
- NE: 2,
- NE Type: 3,
- Domains: 4,
- Network: 5 (lowest).

Alarm Customisations created/modified via the FOX51x NE Hardware Views (Scope: Unit) overrule any Alarm Customisations made for FOX51x unit/subunit. This is discussed separately in Alarm Customisation – Unit/Subunit section.

FOX61x Alarm Customisations made via FOXMAN-UN overrule local alarm customisations via the **FOXCST** (only when Alarm Severity has been changed).

Select Scope		Selects the Scope to which the customized Alarm is to be applied. The content of the scope selector dynamically changes depending on the selected scope. The different scopes are as follows: Network The Alarm Customisation is valid for the selected unit in the entire managed network. The user needs to define the following: - Select Scope, - Unit. Domain The Alarm Customisation is valid for the selected unit NEs within the specified domain only. The user needs to define the following: - Select Scope, - Domain, - Unit. NE Type The Alarm Customisation is valid for the selected unit of the specified NE type only. The user needs to define the following: - Select Scope, - NE Type, - Unit. NE The Alarm Customisation is valid for the selected unit of the specified NE(s) only. The user needs to define the following: - Select Scope, - NE(s) (Select NEs of the same type family), - Unit. Port The Alarm Customisation is valid for the selected unit in the specific slot of the specified NE only. The user needs to define the following: - Select Scope, - NE, - Slot# - Unit.
Domain		Applicable for Domain Scope only. Selects the Domain from the User's assigned Domain(s).
NE Type		Applicable for NE Type Scope only. Selects the NE Type.
NE(s)		Applicable for NE Scope only. Calls the "Select NEs" dialog to select one or more NEs from the user's assigned Domain(s) to which the Alarm Customisation is to be applied.
NE		Applicable for Port Scope only. Calls the "Select NE" dialog to select a specific NE from the user's assigned Domain(s) to which the Alarm Customisation is to be applied.
Unit		Select the specific unit to which the Alarm Customisation is to be applied.

Slot# - Unit	Applicable for Port Scope only. Select the unit in a specific slot of the NE to which the Alarm Customisation is to be applied.
	Note: Once the user has selected an NE, the “Slot# - Unit” combo box is initialized with units that are actually equipped in the selected NE.
Port	Applicable for Port Scope only. Select the specific port to which the Alarm Customisation is to be applied.
Old Alarm Text	Select the default alarm text whose text or/and associated severity you want to modify
Old Alarm Severity	The perceived severity assigned to the selected alarm text. Its value is given by FOXMAN-UN and can't be changed by the user.
New Alarm Text	Edit selected alarm text as required. Calls the “ Select from template ” dialog to select an existing Alarm Text & Severity template.
New Alarm Severity	Modify the Alarm Severity of the selected Alarm Text as required.

Optional entries

Work Instruction	 Attach alarm-specific work instruction to an alarm message. This instruction can be displayed in the Alarm Properties dialog Calls the “ Select from template ” dialog to select an existing Work Instruction template.
Intermittent Period	Intermittent alarm or multiple occurrences of the same alarm can be limited to a single report per a specified period. The shortest period in seconds after which an alarm can be reported again. Maximum value is 86400 seconds (24 hours). Note: If the period is set to zero, the alarm will not be generated anymore.
Transfer to FO	Applicable for Port Scope only. Select a Foreign Object (FO), to which the customized alarm shall be transferred. Note: The transferred customized alarms can be viewed via Map Population > Map Background .

Informational content

The Alarm Customisation Table lists all alarm customisations (including those generated via the hardware views) at the top of the dialog indicating

- Scope,
- Selection,
- Unit,
- Location,
- Old Alarm Text (FOXMAN-UN default alarm text),
- Old Severity (FOXMAN-UN default severity),
- New Alarm text (modified alarm text if applicable),
- New Severity (modified severity if applicable),
- Transfer to FO (applicable to Port Scope only),
- (Intermittent) Period,

- Work Instructions.

Controls (buttons, menu items, etc.)

Use Template

Allows creating Alarm Customisations using template.

Menus

File – Exit		Closes the dialog.
Edit – Create		Adds new Alarm Customisation.
Edit – Modify		Modifies/Edits the selected Alarm Customisation.
Edit – Remove		Deletes the selected existing Alarm Customisation(s).
Edit – Info		Displays the list of involved NE(s). Applicable for Scope: NE and Port only.
Options – Audible Alarm		Calls the Audible Alarm dialog.
Options – Manage Templates		Calls the Manage Template dialog.
Help – ? Help		Calls the help viewer and opens this page.

Buttons

Add	The same as “Edit – Add”. Creates a new Alarm Customisation entry.
Modify	The same as “Edit – Modify”. Edits the selected existing Alarm Customisation entry.
Remove	The same as “Edit – Remove”. Deletes the selected existing Alarm Customisation entry.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

[Alarm Customisation – Select NEs/Select NE](#),
[Alarm Customisation – Manage Templates](#),
[Alarm Customisation – Create Template](#),
[Alarm Customisation – Modify Template](#),
[Alarm Customisation – Use Template](#),
[Audible Alarm](#),
[Alarm Customisation – FOX51x Unit/Subunit](#),
[Create NE of type “FO” / FO Properties](#),
[Map Population – Map Background](#).

6.3.1 Alarm Customisation – Select NEs/Select NE

Purpose

The Select NEs/Select NE dialogs allow the selection of NE(s) for which the Alarm Customisation should be applied.

i

Please note:

The list includes only the member NEs of the user’s assigned Domain(s).

Dialog image

Choose NEs

NEs	Addressing	Agent Acc...	Alarm State	Operation...	Name
☐	IP: 172.31.68...	IP Only	Cleared	Manageab...	NE_172.31...
☐	IP: 172.31.68...	IP Only	Cleared	Manageab...	NE_172.31...
☐	IP: 172.31.68...	IP Only	Cleared	Manageab...	NE_172.31...
☐	IP: 172.31.68...	IP Only	Major	Manageab...	NE_172.31...
☐	IP: 172.31.38...	IP Only	Cleared	Manageab...	NE_172.31...
☐	IP: 172.31.38...	IP Only	Critical	Manageab...	NE_172.31...
☐	IP: 172.31.38...	IP Only	Major	Manageab...	NE_172.31...
☐	IP: 172.31.38...	IP Only	Major	Manageab...	NE_172.31...
☐	IP: 172.31.38...	IP Only	Critical	Manageab...	NE_172.31...
☒	IP: 172.31.38...	IP Only	Cleared	Manageab...	NE_172.31...
☐	IP: 172.31.64...	IP Only	Minor	Manageab...	NE_172.31...
☐	IP: 12.6.120.1	IP Only	Minor	Manageab...	NE_172.31...

Entries: Total 12 Filtered 12 Selected 1 NEs 1

OK

Apply

Cancel

Mark All

Unmark All

Mark

Unmark

Mandatory entries

Check mark the NE(s) for which the Alarm Customisation will be applied.

Optional entries

Not applicable.

Controls (buttons, menu items, etc.)

Mark All	Check mark/tick all the NEs in the table.
Unmark All	Clear all the check marks in the table.
Mark	Check mark the selected NE(s) in the table. Note: - To select/highlight a single item from the table list: Click on a specific NE. - To select multiple items from the table list: Press “Ctrl key” then click on the required NEs. - To select a range of items from the table list: Click on the first NE, Press “Shift key” then click on the last NE to be included in the range.
Unmark	Clears the check mark(s) of the selected/highlighted NE(s) in the table.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.

Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

6.3.2 Alarm Customisation – Manage Templates

Purpose

The Alarm Customisation Templates ease the creation steps of Alarm Customisation as well as ensures consistent texts and mappings applied across a network.

There are 4 types of Alarm Customisation Template:

- Alarm & Severity,
- Work Instructions,
- Unit Alarms,
- Unit Port Alarms.

The Alarm & Severity template offers a collection of Alarm Texts with associated Severity.

The Work Instructions template is a simple collection of texts.

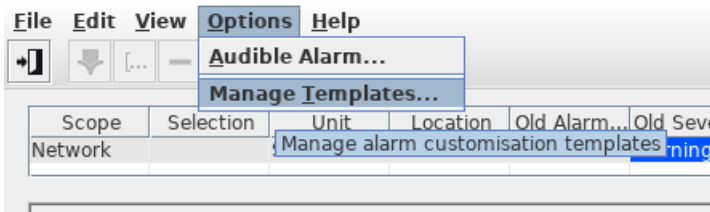
The Unit Alarms template allows a collection of Alarm Texts (with Severity) and Work Instructions to be created for specific Unit type.

The Unit Port Alarms template is the same as a Unit Alarms template with an additional Port address being specified for each Alarm Customisation data item.

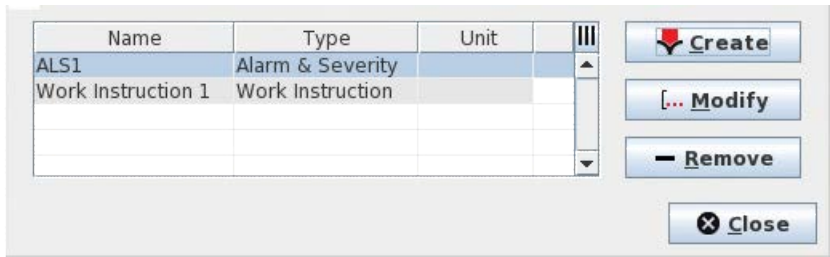
The Manage Template dialog can be accessed from the Alarm Customisation main frame menu: Option > Manage Templates. This dialog lists all of the currently existing template types.

Dialog image

Alarm Customisation



Manage Templates



Controls (buttons, menu items, etc.)

Create	Calls the Create Template dialog to create new template.
Modify	The Modify button is enabled when one existing template is selected. Calls the Modify Template dialog to add, remove, or modify the texts of the selected template.

Remove	Deletes the selected templates.
Close	Closes the dialog.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

6.3.3 Alarm Customisation – Create Template

Purpose

The Create Template dialog allows the creation of any of the four Alarm Customisation template types as listed below:

- Alarm & Severity,
- Work Instructions,
- Unit Alarms,
- Unit Port Alarms.

The newly created template(s) will be added to the Manage Template Table.

Dialog image

Create Template



Mandatory entries

Type

Allows you to select one of the four types of Alarm Customisation Templates:

Alarm & Severity	Creates Alarm & Severity type template.
Work Instructions	Creates Work Instructions type template.
Unit Alarms	Creates Unit Alarms type template.
Unit Port Alarms	Creates a Unit Port Alarms type template.

Name

Specifies a name for the new template.

Unit

Applicable to Unit Alarms and Unit Port Alarms type templates.

Specifies a specific NE Unit to which the template is to be applied.

Controls (buttons, menu items, etc.)

Buttons

OK	Creates/ adds the new template type to the Manage Template Table and closes the dialog.
Cancel	Closes the dialog without creating the template.

6.3.4 Alarm Customisation – Modify Template

Purpose

The Modify Template dialog allows adding, modifying or removing texts to or from the selected template.

The dialog has different layouts depending on the type of the template to be modified. The images below show the Modify layouts for the Alarm & Severity and Unit Port Alarms templates.

Dialog image

Modify Template

Alarm Text	Alarm Severity	
Loss of Link	Critical	

Selected Template
ALS1

Type
Alarm & Severity

Alarm Text

Alarm Severity

Critical

Create

Modify

Remove

Close

Modify Template

Old Alarm Text	Old Alarm...	New Alarm Text	New Alar...	Work Instruction	
Unit Not Assigned	Warning	Unit Not Assigned	Minor	Do not leav units unassigned ...	

Selected Template
Any Unit Alarm

Type
Unit Alarms

Unit
ANY_UNIT

Old Alarm Text

Unit N...

Old Alarm Severity

Warning

New Alarm Text

Unit Not Assigned

New Alarm Severity

Minor

Work Instruction

Do not leav units unassigned in the subbreak

Create

Modify

Remove

Close

Mandatory entries

Alarm & Severity Template

Alarm Text	Specify a new Alarm Text template to be added to the list of the Alarm & Severity template.
Alarm Severity	Assign a severity to the new Alarm Text template.

Work Instruction Template

Work Instruction	Specify new work instruction texts to be added to the list of Work Instruction template.

Unit Alarms/Unit Port Alarms Template

Old Alarm Text	Select the default alarm text from the list whose text and/or associated severity you want to modify.
Old Alarm Severity	The perceived severity of the selected alarm text.
Port	Applicable to Unit Port Alarms Template only. Select the specific port of the unit to which the new Alarm Text & Severity template is to be applied.
New Alarm Text	Edit selected default Alarm Text as required.  Calls the “ Select from template ” dialog to select an existing Alarm Text & Severity template.
New Alarm Severity	Modify the Alarm Text severity of the new/modified Alarm Text template as required.
Work Instruction	Attach an alarm-specific work instruction to the new/modified Alarm Text template as required.  Calls the “ Select from template ” dialog to select an existing Work Instruction template.

Optional entries

Not applicable.

Informational content

The Modify Template Table at the top of the dialog lists the collections of Alarm Customisations texts/ templates of a specific Alarm Customisation type.

The information of the Table varies dynamically depending on the type of Alarm Customisation.

A Table for Alarm & Severity template type displays the Alarm Text and Alarm Severity, whereas the Work Instruction template type displays the texts of the Work Instructions.

A Table for Unit Alarms and Unit Port Alarms template types display the following information:

- Old Alarm Text,
- Old Alarm Severity,
- Port (applicable to Unit Port Alarms template only),
- New Alarm Text,
- New Alarm Severity,
- Work Instruction.

Controls (buttons, menu items, etc.)

Buttons

The enabled state of the Add, Modify, and Remove buttons is dynamic and depends on the current user input.

Create	The Create button is enabled only when the editor field contains a non-empty and not yet existing value. Adds and displays the new Alarm Customisation template in the Modify Templates table.
Modify	The Modify button is enabled when the editor field contains a different value from the selected Alarm Customisation template. Modifies the value(s) of the selected Alarm Customisation.
Remove	Deletes the selected Alarm Customisation(s) from the Modify Templates table.
Close	Closes the Modify Templates dialog.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

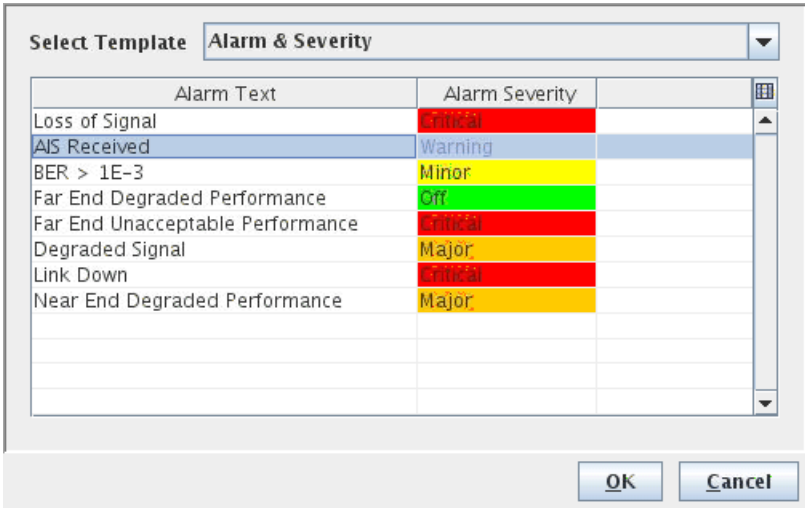
6.3.5 Alarm Customisation – Select from Template

Purpose

The Select from template window allows the user to select an existing Alarm & Severity or a Work Instruction template to apply to a current Alarm Customisation being modified or created.

Dialog image

Select from template



Mandatory entries

Select Template	Select an existing Alarm Text & Severity or Work Instruction template.

Optional entries

Not applicable.

Informational content

The Select from template Table lists all the existing Alarm & Severity or Work Instruction templates.

Controls (buttons, menu items, etc.)

Buttons

OK	Displays the selected template’s texts/values to the Alarm Customisation editor field: New Alarm Text/New Alarm Severity or Work Instruction.
Cancel	Closes the dialog without any changes.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

6.3.6 Alarm Customisation – Use Template

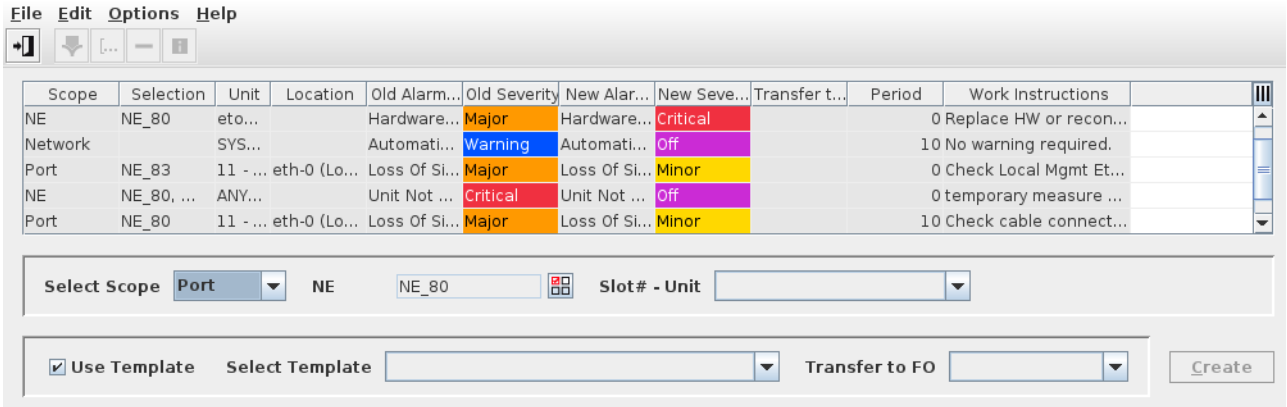
Purpose

The Use Template function allows the user to select a Unit Alarms or a Unit Port Alarms template in order to ease the creation of multiple Alarm Customisations for a specific unit.
 This dialog cannot be used for modifying or removing Alarm Customisations.
 The layout dynamically changes depending on the scope. The dialog below shows the layout with “Port” as the Selected Scope.

Dialog image

When the Use Template button is selected, the Alarm Customisation frame changes to:

Alarm Customisation



Mandatory entries

Select Scope	Selects the Scope to which the template is to be applied. The content of the scope selector dynamically changes depending on the selected scope. Refer to Scope Selector description under the Alarm Customisation main section.
Use Template	Allows the user to navigate between the Use Template frame and Alarm Customisation main frame.

Select Template	Select from the list an existing Unit Alarms or Unit Port Alarms template for the specified Unit/ Slot#-Unit. The Unit Alarms templates can used in the scopes: Network, Domain, NE Types, and NE. The Unit Port Alarms templates can only be used the Port scope.
Transfer to FO	Applicable for Port Scope only. Select a Foreign Object (FO), to which the customized alarm shall be transferred.

Optional entries

Not applicable.

Informational content

The Alarm Customisation Table lists all alarm customisations (including those generated via the hardware views) at the top of the dialog indicating

- Scope,
- Selection,
- Unit,
- Location,
- Old Alarm Text (FOXMAN-UN default alarm text),
- Old Severity (FOXMAN-UN default severity),
- New Alarm text (modified alarm text if applicable),
- New Severity (modified severity if applicable),
- Transfer to FO (applicable to Port Scope only),
- (Intermittent) Period,
- Work Instructions.

Controls (buttons, menu items, etc.)

Buttons

Add	Adds and displays the new Alarm Customisation template (s) in the Alarm Customisation Table.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

6.3.7 Audible Alarm

Purpose

The “Audible Alarm” dialog allows enabling or disabling the audible alarm and selecting the relevant alarm severities responsible for triggering it.

Dialog image

Audible Alarm



Mandatory entries

Not applicable.

Optional entries

Enable Audible Alarm	If ticked, sounds the audible alarm for as long as there is at least one active alarm in the managed network with one of the severities selected below.
Use Audible Alarm for	Select the severities of the alarms that are to sound the audible alarm. Any combination is possible.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
OK	Saves the settings and closes the dialog.
Cancel	Discards any modifications to the settings and closes the dialog.

Related dialogs / windows

Alarm Summary Options.

6.3.8 Alarm Customisation – FOX51x Unit/Subunit

Purpose

The Alarm Customisation dialog for FOX51x units and subunits is used to modify the default Fault Cause text, the default Severity, and the Intermittent Alarm setting of individual alarms. The dialog is called from the [Hardware View Unit](#) or the [Hardware View Subunit](#). The purpose and the actions performed here are identical to those of the global Alarm Customisation dialog, except that modifications are only valid for a single unit or subunit of the connected NE (or FOX51x).



Please note:
 Modifications made for a unit or subunit overrule the ones made in the global alarm customisation.

Dialog image

<NE_name>

Scope	Localisation	Fault Cause	Severity	Period
COBUX <11> Board / EQP		Maintenance Function Active	Warning	
COBUX <11> Board / Flash Card		Almost Full	Warning	
COBUX <11> Board / Flash Card		Storage Capacity Problem	Critical	
COBUX <11> Board / Protecting Unit		Database Synchronisation Problem	Warning	
COBUX <11> Board / Network Element		SW Installation Error	Critical	
COBUX <11> Board / Connection		Maintenance Function Active	Warning	
COBUX <11> Board / Synchronisation		Maintenance Function Active	Warning	
COBUX <11> Board / PBUS Data		Loss of Signal	Major	
COBUX <11> Board / External Input-4		Alarm Active-4	Warning	
COBUX <11> Board / External Input-3		Alarm Active-3	Warning	

Layer

Board : 0

Sub Unit

1

Fault Cause

Perceived Severity

☐ Critical
 ☐ Major
 ☐ Minor
 ☐ Warning
 ☐ Indeterminate
 ☐ Off

Intermittent Alarm

☐ Intermittent
 Intermittent period (secs):

Action

Create

Modify

Revert

Help

Refresh

Ok

Apply

Close

Mandatory entries

Before modifications can be entered, the desired alarm has to be selected in the list.
 To make finding a particular alarm easier, the list can be sorted in ascending or descending order for each column by clicking on its header.

Hint:
 For finding all modified alarms sort the Scope column.

Optional entries

Modify all	This toggle is shown for all layers except the Board layer. It causes modifications to be applied to all subunits of that particular layer.

Fault Cause	The default text can be modified to a more suitable one if required. Maximum length is 50 characters.
Perceived Severity	The default Severity can be increased or lowered. If set to Off, the alarm is either not generated any more (default in the FOXMAN-UN configuration), or it is treated as a sixth severity with the color green.
Intermittent Alarm	Multiple occurrences of the same alarm can be limited to a single report per a specified time period. This is in addition to the persistence filtering applied in the FOX51x (default 2.5 seconds).
Intermittent Period	The shortest period in seconds after which an alarm can be reported a further time. Maximum value is 86400 seconds (24 hours).
	Note: If the period is set to zero, the alarm will not be generated any more.

Informational content

Alarm list	All alarms belonging to the selected layer are shown. The column Scope is empty for unmodified alarms, or shows Units for modified alarms. The list can be sorted in ascending or descending order for each column by clicking on the column header.
Layer / Subunit	The layer name (the name on the tab, e.g. Board, E12/P12) and number as well as the subunit number from where the dialog was called. The layer number for Board is always 0.

Controls (buttons, menu items, etc.)

Create	The changes to the criteria of the selected alarm are entered into the list. They will be saved to the FOXMAN-UN database when using the Apply or the OK button.
Modify	Active if an already customized alarm in the list is selected. Enters subsequent changes of criteria into the list.
Revert	Active if an already customized alarm is selected in the list. Sets the criteria back to their default values.
Refresh	Brings the list of alarms up to date after adding, deleting or reconfiguring NEs.
Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Close	Closes the dialog without applying the modifications.

Related dialogs / windows

[Alarm Customisation](#),
[Hardware View Unit](#),
[Hardware View Subunit](#).

6.4 Map Population

This section contains the dialogs used to place NE, FO, and System symbols on a map, rename them if required, create sections between symbols and select a background image for the map.

All these functions are called from the [NEM Network Browser – NEM Network Browser Main Window](#).

6.4.1 Map Select NEs/FOs

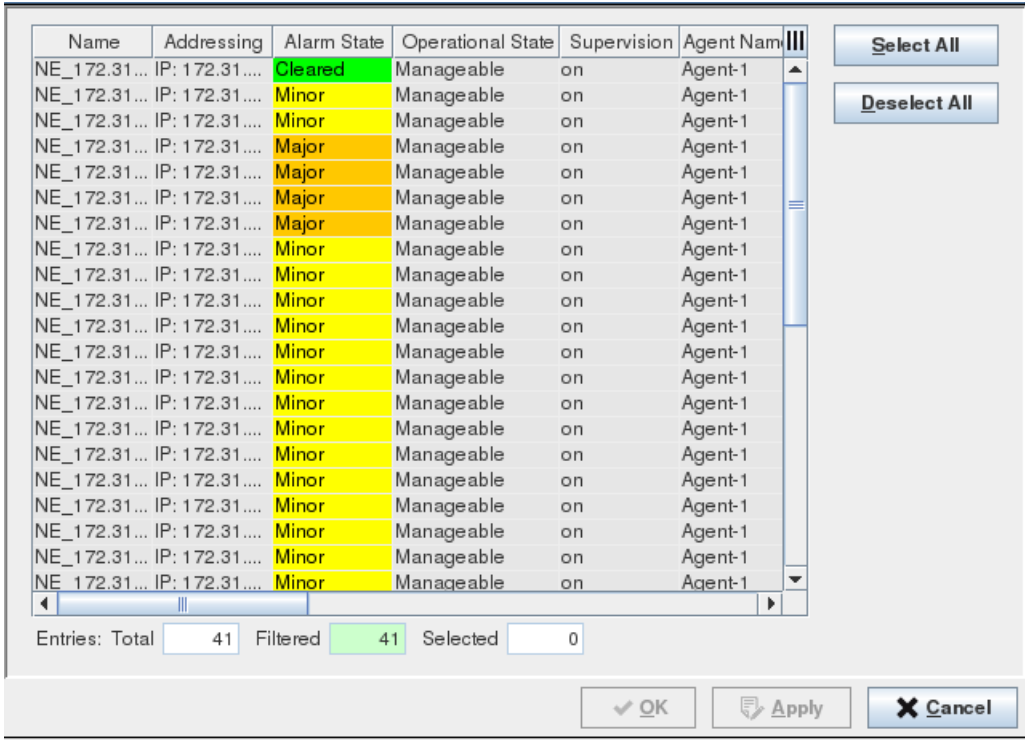
This dialog is called from the NEM Network Browser main window with the Edit Mode activated. To add and select NEs, drag and drop one of the NE symbols to the map.

Purpose

The dialog presents a list of all available objects (NEs or FOs) to which the FOXMAN-UN user has read access (members of the Domain assigned to the user).
 One or more objects can be selected and will be added to the map using the previously selected symbol.
 A table filter is provided to simplify selection when working with large networks.

Dialog image

Select NEs



Mandatory entries

Select at least one Network Element from the table.

Optional entries

Not applicable.

Informational content

List of available objects. The list only presents objects suitable for the selected type of symbol (NE or FO) to which the user has Read access to.

Controls (buttons, menu items, etc.)



Please note:

- To select a single item from the table list: Click on a specific NE/FO.
- To select multiple items from the table list: Press “Ctrl key” then click on the required NEs/FOs.
- To select a range of items from the table list: Click on the first NE/FO, Press “Shift key” then click on the last NE/FO to be included in the range.

Select All	Selects all the NEs/FOs in the table.
Deselect All	Clears the selection.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[NEM Network Browser](#).

6.4.2 Section Management

Purpose

The dialog can be called from the NEM Desktop > Application > Section Management or from NEM Network Browser > Application > Section Management. It displays all sections of the managed network, regardless of any map that may be opened.

A double click on a section line in a map calls a list of sections represented by that line.

This dialog allows section management, i.e.

- new sections can be added or existing sections can be deleted;
- the name of a section can be modified;
- the FOX51x [Hardware View NE](#) or FOX61x [FOX CST](#) GUI of the A end and Z end NE can be called, and
- the NP GUI for a specific section can be launched from here.

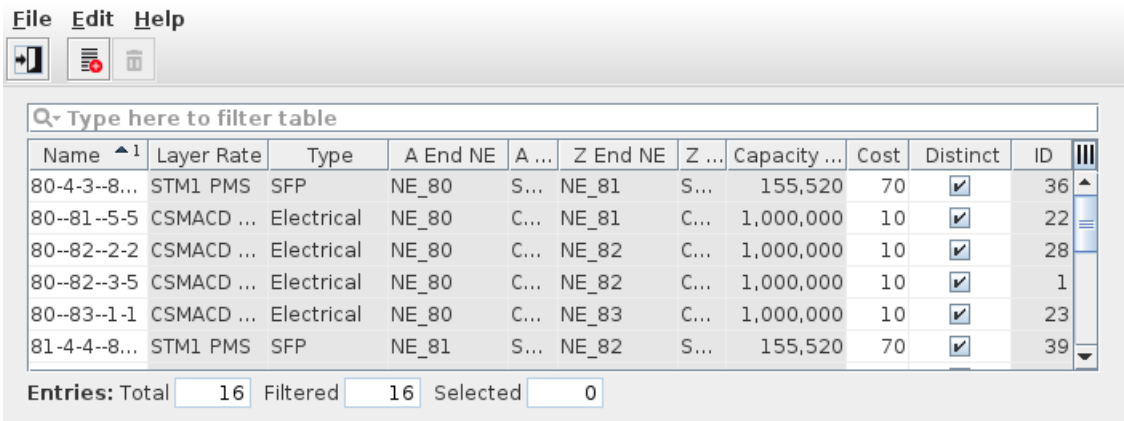


Please note:

When dealing with sections, both endpoints will always be identified by the NE and FO names specified at creation time. NE and FO names modified using the [Rename](#) function in the [NEM Network Browser](#) will be ignored.

Dialog image

Section Management



Mandatory entries

Not applicable.

Optional entries

A name for each section can be added or an existing name can be modified. Click in the name field of a section to start the edit process.

Informational content

List of the sections for the complete managed network.

Name	Name of the section. The name can be edited within the table.
Layer Rate	Physical layer type of the section.
Type	Physical signal type: electrical, optical
Supervision	Service Supervision status, - Running: services are supervised on this section. Supervision can be paused or disabled via the “Supervision ► Pause” or “Supervision ► Disable...” commands in the context menu or the “Edit” menu. - Paused: service supervision is paused on this section. It can be resumed via the “Supervision ► Resume” command in the context menu or the “Edit” menu. - Disabled: service supervision is disabled on this section. It can be enabled via the “Supervision ► Enable...” command in the context menu or the “Edit” menu.
Superv. Oper State	Shows the operational state (up, down) of the service supervision on this section. This field is empty when service supervision is disabled.
Fault State	Shows the highest active fault state of the section.
A End NE	Name of the NE at the A end of the section.
A End TP Label	Termination point label at the A end.
Z End NE	Name of the NE at the Z end of the section.
Z End TP Label	Termination point label at the Z end.
Capacity [kbit/s]	Capacity of the section in kbit/s. In case the capacity cannot be determined the field remains empty.

Cost	Cost of the section.
Distinct	If enabled, use the section for distinct routing. If disabled, only allow indistinct routing. This option can be enabled or disabled within the table.
ID	Database ID of the section.

Controls (buttons, menu items, etc.)

File menu

New Section		Calls the Create Section dialog.
Exit		Closes the current dialog window.

Edit and Context menus

Open A End NE		Calls the FOXCST GUI for FOX61x NEs, or the FO properties dialog for Foreign Objects (FOs).
Open Z End NE		
Open Circuit...		Launches the NP GUI for the specific section. The NP GUI will show the circuits or trails going over the Section.
Show NP Usage ...		
Show Link Details (dialog window) ...		For MPLS-TP links, opens a dialog showing details of the selected link.
Delete		
		Removes the selected sections in the list from the database.
Supervision ► Enable...		Enable supervision of all services on this section. To do that, the service information attributes Customer , Service Level Agreement , and Network need to be selected.
Supervision ► Disable...		
Supervision ► Resume		Enable supervision of all services on this section. Must be confirmed by the user. If any service supervision cannot be disabled, an error message is shown with the respective reason(s).
Supervision ► Pause		
Supervision ► Reload Configuration		Resume service supervision that has been paused before.
Supervision ► Show Details...		
Supervision ► Show in Service Supervision...		Pause service supervision.
		Reloads the configuration from the NEs to make sure it is up to date in case of recent changes to the section.
		Show service supervision details for this section. Opens the services in a view-only window of the Service Editor . The windows also provides an alarm tab showing active alarms of the section.
		Opens the service supervision dialog with a filtered view for the service(s) running via this section.

Help

? Help	Calls the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

NEM Network Browser,
 Create Section,
 Hardware View NE,
 NP Usage,
 Link Details (dialog window),
 FOXCST.

6.4.3 Create Section

Purpose

This dialog allows creating graphical representations of traffic or clock distribution links between NEs and FOs. They are shown as colored lines.
 More than one section can be created between the same two targets. Only one line will be shown in that case. The color of the line is modified to show the highest severity of all currently active alarms for both endpoints of all sections represented by that line.
 A section leading from a symbol on a group map to a symbol on a higher level map is shown as an arrow pointing away from the symbol.



Please note:
 When dealing with sections, both endpoints will always be identified by the NE and FO names specified at creation time. NE and FO names modified using the **Rename** function in the **NEM Network Browser** will be ignored. However when renaming an NE in the **NEM Configurator** via the **NE – Create / Properties** dialog, the name change is also reflected in the present dialog.

Dialog image

Create Section

Name

Cost
☒ Distinct

A End NE

A End TP

Unit ¹	Slot	Label	Layer Rate	Port Type

Z End NE

Z End TP

Unit	Slot	Label	Layer Rate	Port Type

Mandatory entries

“A End NE” and “Z End NE” have to be selected from the list of available NEs. The list includes only the NEs to which the current user has read access (members of the Domain assigned to the user).
 A TP (Termination Point) Label has to be selected in the A End TP and in the Z End TP fields.



Please note:
 A filter based on the Layer Rate and Port Type of the currently selected End TP is applied., e.g. as shown in the dialog image above, Z End TP table is filtered based on the compatible Layer Rate and Port Type of the selected A End TP.

Optional entries

Name	The section can be given a name which can then be used for sorting in the Section Management
Cost	Assigns a cost value to that section for use in the FOXMAN-UN Networking Package.
Distinct	When marked, creates a distinct section.

Informational content

Lists of the available section termination points for the selected NEs.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the selection and closes the dialog
Apply	Applies the selection, without closing the dialog.
Cancel	Closes the dialog without applying the selection.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[NEM Network Browser](#),
[Section Management](#).

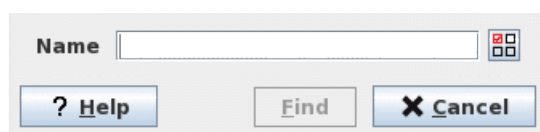
6.4.4 Find Symbol

Purpose

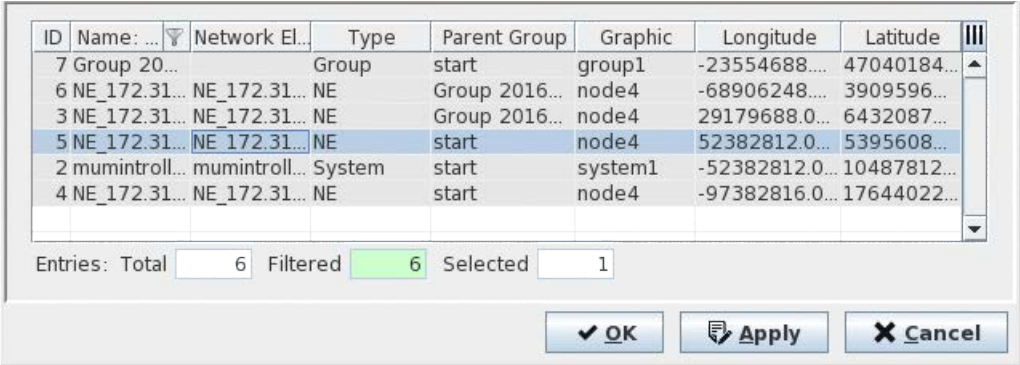
This function helps to locate a symbol on a large map with many symbols which might not all be visible. The process also finds symbols which are located on group maps of any level.

Dialog image

Find Symbol in <Map_name>



Select Symbols



Mandatory entries

Select an object from Select Symbols dialog for Symbol Name.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

Find Symbol dialog:

Name	Displays the name of the symbol to find in the map. Click the Selector button to call the “Select Symbol” dialog. Note: The Name field is automatically filled up with the selected symbol's name.
? Help	Opens the FOXMAN-UN help viewer and opens this page.
Find	Selects the symbol on the map. If the symbol is outside the focus of the map, scrolls the map till the symbol is visible. If the symbol is on a group map, opens that map and scrolls it till the symbol is visible.
Cancel	Closes the dialog without initiating the find process.

Select Symbols dialog:

OK	Applies the selection and closes the dialog
Apply	Applies the selection, without closing the dialog.
Cancel	Closes the dialog without applying the selection.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[NEM Network Browser](#).

6.4.5 **Rename**

Purpose

The NE and FO default symbol name is the name given upon creation of the object (the configured name), a Group symbols default name is “Group” plus the time stamp of its creation, and System symbols carry the name of the workstation that contains the FOXMAN-UN core as default name. These default symbol names can be replaced with a different one using the “Rename” function. This renaming operates on a per map basis. If the same NE is used on several maps, it can carry a different name on each one.

NEs, FOs, and System symbols retain their configured names. If the modified map name is removed (deleted in the Name field), they again show the configured name. A group symbol does not have a configured name. It does not show a name any more if its default name is removed.

Dialog image

Rename Symbol



Mandatory entries

An alpha-numeric name, blanks permitted.

Optional entries

Not applicable.

Informational content

The dialog shows the entry made via the Rename function. If the Name field is empty for an NE, FO or System symbol, then the default name is active.

Controls (buttons, menu items, etc.)

? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Applies the selection and closes the dialog.
Cancel	Closes the dialog without applying the selection.

Related dialogs / windows

NEM Network Browser.

6.4.6 **Map Background**

Purpose

This dialog lets you put a background image, e.g. a geographical country or city map, or a floor plan, on the currently opened map.

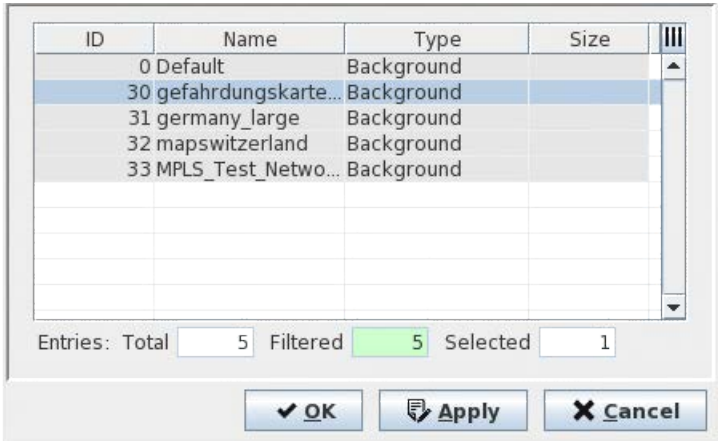


Please note:
The top left corner of the image is always placed at the coordinates 0/0. If you already have symbols on the map which were moved far enough outside the original map frame, they will be outside the background image.

Default background is no image. This corresponds to the background called “(Empty)”. Select it to remove an existing background image.

Dialog image

Select Backgrounds



Mandatory entries

Select an image from the list.

Optional entries

Not applicable.

Informational content

List of available background images.
Background images are added via the NEM Network Browser Main Window: File > Manage Graphics > Import > Map Background.

Controls (buttons, menu items, etc.)

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

OK	Applies the selected background and closes the dialog
Apply	Applies the selected background, without closing the dialog.
Cancel	Closes the dialog without applying the selection.

Related dialogs / windows

[NEM Network Browser](#),
[Manage Graphics](#).

6.4.7 Map Options

Purpose

- This dialog allows:
- setting the map background opacity
 - indicating the total section capacity in line thickness
 - setting the initial horizontal and vertical spacings or distances (in pixels) between nodes as well as the maximum number of nodes per row.

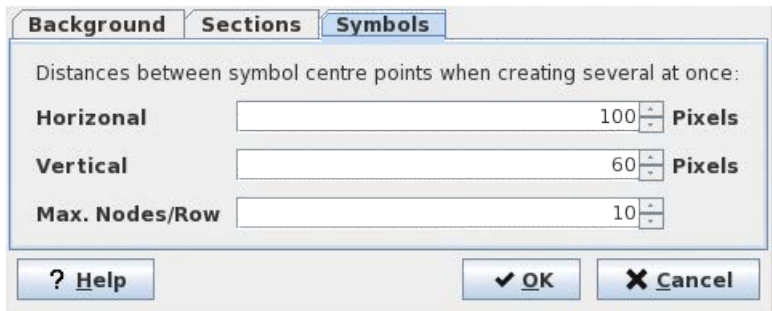
i

Please note:

This feature is available in Edit mode when adding NEs/FOs in a map.

Dialog image

Options



Mandatory entries

Not applicable. You can retain the default values.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

Background

Opacity of the map back-ground in percent	Select the opacity of the map background in percent. The selectable range is 0%...100%. Changes can be verified while moving the marker. Note: 0% opacity hides the background image
Width of background shade-out in pixel	Set the width of the shade-out area around symbols on the map. The select-able range is 0...20 pixels. Changes can be verified while moving the marker.

Sections

Show Capacity	Select the checkbox to indicate the total section capacity in line thickness

Symbol

Horizontal Gap	Defines the initial horizontal distance (in pixels) between nodes.
Vertical Gap	Defines the initial vertical distance (in pixels) between nodes.
Max. Nodes/ Row	Defines the initial maximum number of nodes per row.
? Help	Calls the NEM Help Viewer
OK	Applies the selection and closes the dialog
Cancel	Closes the dialog without applying the selection.

Related dialogs / windows

NEM Network Browser.

6.4.8 FO Properties**Purpose**

This dialog allows viewing the FO properties without having to open the NEM Configurator. No modifications are possible from here.

**Please note:**

The Alarm table lists the alarms/commands assigned to the Foreign Object via **ALCAR** configuration or via the **Alarm Customisation** (Port Scope > "Transfer to FO") configuration.

Dialog image

Properties for <FO_name>

NameFO1FO Key1ID14

TagLocation

Message

Additional Information

Name	Value
emsName	
emsRemC...	
emsScript...	
emsScript...	

TTP

Address	Label	Layer Rate	State	Port Type	Nb of 64k

Alarm

Fault Cause	Severity	Associate...	Localisation

? Help

X Close

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Calls the FOXMAN-UN help viewer and opens this page.
Close	Closes the dialog.

Related dialogs / windows

NEM Network Browser.

6.5 Fault Management

This section shows the dialogs used to generate alarm lists, look at the alarm properties, monitor the alarm status, and inspect the alarm situation in the hardware views.

These network supervision functions are intended to be called from the **NEM Desktop – NEM Desktop main window** “Fault Management” menu. It provides the following functions:

- Alarm Summary
- Alarm List
- Alarm History
- Alarm Customisation



Please note:

The Alarm Summary, Alarm List, and Alarm Customisation are subject to Client Role Based Access Control (RBAC) feature. The FOXMAN-UN client presents only the NEs and other FOXMAN-UN objects based on the current FOXMAN-UN user's security domain(s).

The Alarm list for a specific NE or all NEs in a map can also be called from NEM Network Browser.

For convenience the NE alarm list can likewise be called from the NEM Configurator, but bear in mind that the Configurator is not a supervision tool and binds too many resources for that purpose.

6.5.1 Alarm Summary

Purpose

The Alarm Summary dialog dynamically displays the current FOXMAN-UN user network's total number (counter) of currently active alarms according to their **Severity**: Critical, Major, Warning, or Indeterminate.

A cleared alarm is taken off its severity counter and added to the Cleared Alarms counter for as long as it has not been acknowledged. On acknowledgment it is taken off the Cleared Alarms counter and then moved from the FOXMAN-UN database to the Alarm History.



Please note:

An Alarm Summary belongs either to the FOXMAN-UN user's entire network or to a map. For a map it shows only the alarms of the symbols (NEs, FOs, and System) contained in the current map.

The alarm summary can be displayed in three different configurations:

- Expanded version. This is a full width display showing the summary of the FOXMAN-UN user's complete managed network at the top and a list of all its maps with their summaries below.
- Reduced version. The dialog can be reduced to just the global summary, or a map can be selected in the list and the dialog can be reduced to just the summary of that map.
- Compressed version. The dialog can also be shrunk to help reduce desktop clutter. The reduced version does not show the severity names, it only shows the severity colors.

Any unacknowledged alarm of a severity is indicated by blinking of the respective counter and its color field. As soon as all alarms of the severity have been acknowledged, the blinking is turned off. The severity threshold for the blinking as well as an audible indication can be configured via the **Alarm Summary Options** dialog. Furthermore the blink frequency can be customized in the FOXMAN-UN configuration (alarming.conf file).

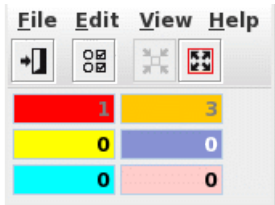
An **Alarm List** filtered for any severity can be called by double clicking on the colored counter field of any severity.

Dialog images

Alarm Summary – Full view



Alarm Summary – Compressed view



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

The title bar of the Alarm summary dialog shows either global or the name of the map for which the main summary at the top is given.

Alarm counters	They show the number of active alarms per severity of all NEs and FOs in a map or in the entire network of the FOXMAN-UN User.
Acknowledgment status	The counter and its color field are blinking if there is at least one alarm not acknowledged. This applies also to cleared alarms.

Controls (buttons, menu items, etc.)

Severity fields	Double click on the colored fields of the severities opens an Alarm List dialog with the filter set for the corresponding severity.

Menu “File”

File – Exit		Closes the current dialog window.

Menu “Edit”

Acknowledge All Cleared		Acknowledges all cleared alarms and moves them from the alarm list to the alarm history.
Acknowledge Cleared of Selected Map		Acknowledges cleared alarms of selected map and moves them from the alarm list to the alarm history.
Options		Allows modification of the flash and audible alarm parameters.

Menu “View”

Alarm Summary of Selected Map		Reduces the dialog to the Alarm Summary of the selected map.
Alarm List of Selected Map		Displays the alarm list of the selected map’s member NEs
Shrink		Shrinks the dialog to the next smaller display version.
Expand		Expands the dialog to the next bigger display version.

Menu “Help”

? Help	Starts the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Alarm Summary Options](#),
[Alarm List](#).

6.5.2 Alarm Summary Options

Purpose

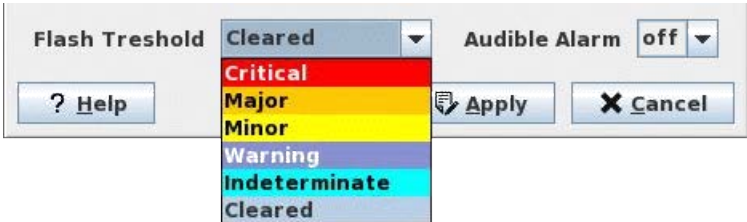
The Alarm Summary Options dialog is used to set the [Severity](#) threshold at which the presence of unacknowledged alarms in the communications network managed by the FOXMAN-UN is indicated by flashing of the alarm counters and colored fields in the [Alarm Summary](#) dialog. It also allows turning on and off the audible alarm which uses the same severity threshold as the flashing.



Please note:
 The filter configuration is only valid till the NEM Browser is closed. Then the default setting is resumed (all counters flashing, no audible alarm).

Dialog image

Alarm Summary Options



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Colored toggle	Identifies each Severity by its color.
Acknowledgment status	One or more unacknowledged alarms cause the respective color field to flash

Controls (buttons, menu items, etc.)

Flash Threshold	Activates the flashing for unacknowledged alarms up to and including the selected severity. Default setting is the severity Off.
Audible Alarm	Turns on the audible alarm for unacknowledged alarms up to and including the severity selected for flashing. Default setting is Off.
? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Alarm Summary dialog.

6.5.3 Alarm List

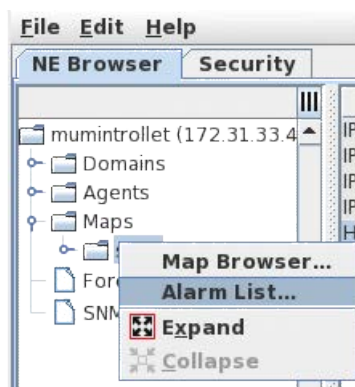
Purpose

The Alarm List dialog displays all current alarms of the current FOXMAN-UN user's managed network, filtered according to where it is called from:

- All alarms of the total managed network:

NEM Desktop > Fault Management > Alarm List

- All alarms of all NEs belonging to a specific map:
 - From NEM Configurator:



- From NEM Network Browser:



- All alarms of selected service(s):

NEM Desktop > Application > Service Supervision > "Select Service(s)" > Alarm List

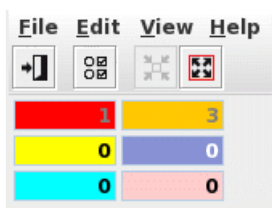
- All alarms of a single severity in the total network:

NEM Desktop > Fault Management > Alarm Summary > "Double click a selected Severity"

- All alarms of a single severity belonging to a specific map:

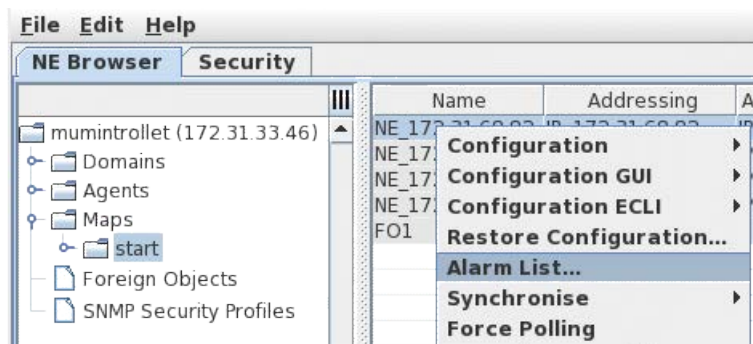
- From NEM Network Browser:

Call the selected map's alarm summary, then double click the selected Severity

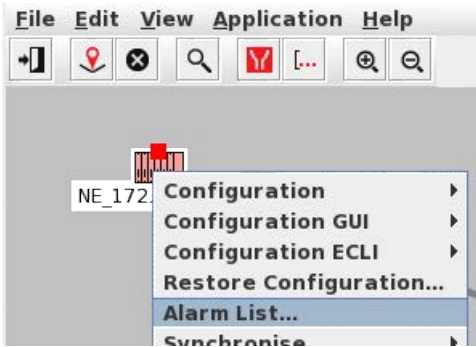


If an NE is added/removed from the map, the alarm lists dynamically shows/removes the corresponding alarms of this NE.

- All alarms of a single NE:
- From NEM Configurator:



- From NEM Network Browser:



- All the alarms of the system:
 - From NEM Network Browser:



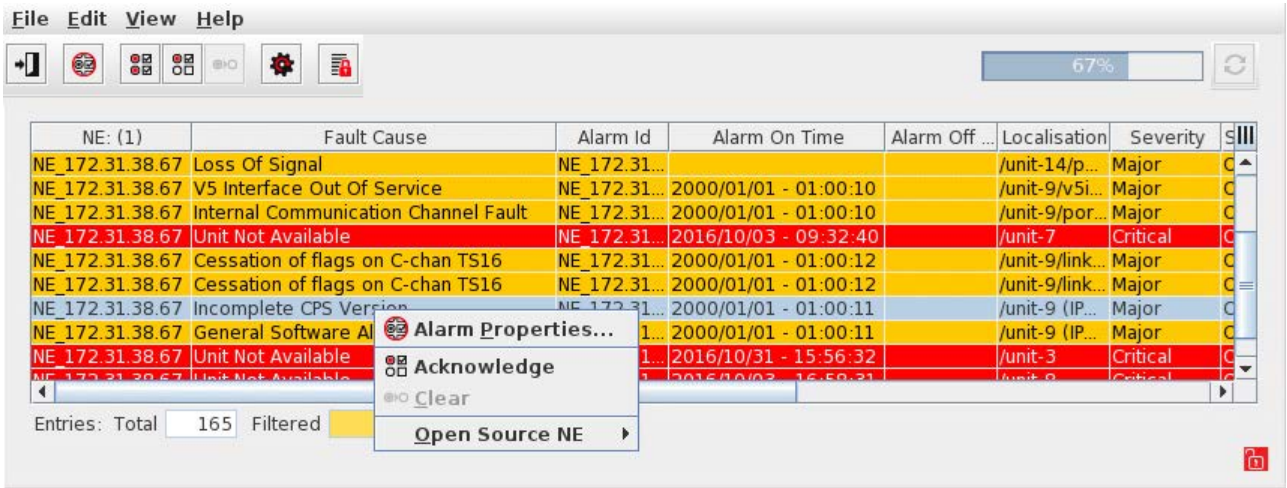
i

Please note:

Double click on an alarm in the list opens the corresponding “Alarm Properties” dialog.

Dialog image

Alarm List



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

The list shows the **Current Alarms** matching the presently active filter settings. The filter is set automatically according to where the alarm list is called from. It can be modified subsequently by the user via the filter (refer to **Table Sorter** section).

Controls (buttons, menu items, etc.)

Menu “File”

Exit		Exits from the alarm list and close the window.

Menu “Edit”

Synchronize Alarms...		Synchronize alarms with the network and update the list accordingly. This will display a progress bar on the left hand side of the icon until all alarms are synchronized.
Alarm Properties		Only available if a single alarm is selected. Calls the “Alarm Properties” dialog for alarms contained in the alarm list.
Acknowledge All		All unacknowledged alarms in the list are getting acknowledged. Cleared alarms are getting acknowledged and then moved from the database to the alarm history and therefore removed from the Alarm List.
Acknowledge		Acknowledge the selected alarm(s). A multiple selection is possible. This menu item is grayed out if there are no alarms selected.
Clear		Clears an outstanding system alarm. This function is not applicable to NE alarms.

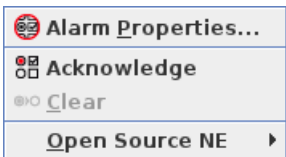
Menu “View”

Options		Opens the Alarm List Options dialog
Open Source NE ► [User Class]		Only available if a single alarm is selected. Opens a device specific view to provide a graphic alarm overview of the whole NE where the alarm originated. For FOX61x NEs, the user class is to be selected in the sub-menu which will open the NE at the specific alarm entry within the FOXCAST.
Freeze List		The list can be frozen (new alarms occurring are not added to the list till the Freeze function is turned off again).

Menu “Help”

? Help	Starts the FOXMAN-UN help viewer and opens this page.	

Context menu on table entries



For the explanations of menu items, please refer to the previous sections.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Alarm Properties](#),
[Alarm Summary](#),
[System Alarms](#).

6.5.4 Alarm List Options

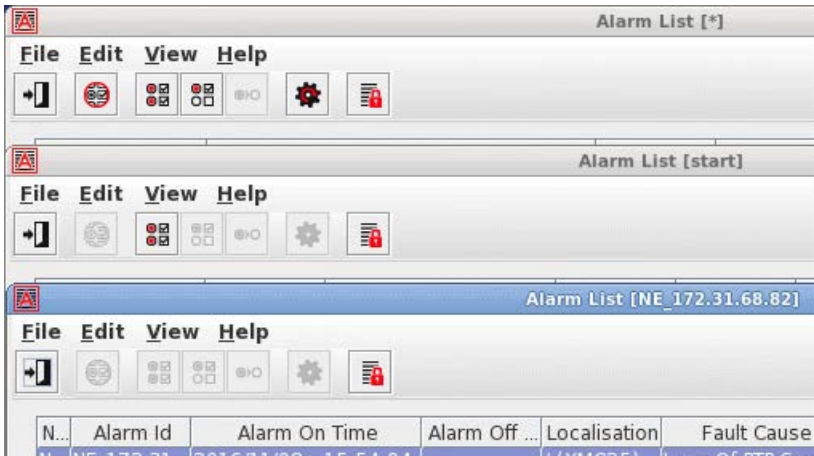
Purpose
Allows the system to indicate an alarm list filter setting in the alarm list window.
The alarms are filtered according to where it is called from, e.g. the window title “Alarm List [*]” indicates that this alarm list is unfiltered and “Alarm List [NE_172.31.68.81]” indicates that this alarm list is filtered to all alarms of this particular NE only.

Dialog images

Options



Alarm List [Name]



Controls (buttons, menu items, etc.)

Allow for multiple alarm lists	Allows the system to indicate an alarm list filter setting in the alarm list window
? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the change and closes the dialog
Cancel	Closes the dialog without applying the change

Related dialogs / windows

[Alarm List](#) dialog.

6.5.5 Alarm Properties

Purpose

The Alarm Properties dialog is used to view the details of a particular NE alarm record and work instructions in the alarm list. It can also be used to add or modify an operator defined Comment or a Predefined Comment related to the alarm occurrence. It is also possible to acknowledge an active or cleared alarm via the Acknowledge button.

Dialog image

Alarm Properties of <NE_name>

General

NE Location	Applicable for FOX51x NEs only. Displays the current location of the NE as configured via the UCST “NE Configuration-Parameters” menu.
Fault Cause	A text describing the type of alarm. The layer-subunit identification given in the localization also has to be considered.
Work Instructions	Displays the work instruction(s) configured in the Alarm Customisation menu.
Comment/Predefined Comment	A freely definable operator comment can be added. The presence of such a comment is indicated by an asterisk (*) in front of the Localization in the Alarm List. Four predefined comments are available. Pressing the Predefined Comment button shows the selection of available generic text. The current date and time, and the user name are automatically added. A predefined comment can subsequently be modified or mixed with operator defined text.
Acknowledge	Indicates a possible acknowledgment of (unacknowledged) alarm.

Details

Localization	The unit name, its card slot, and the layer-subunit identification.
Severity	The Severity of the alarm.

Status	Shows “Outstanding” for a currently active alarm or “Cleared” for an inactive, but not yet acknowledged alarm. When a cleared alarm is acknowledged, it is moved to the Alarm History. The history can be accessed from the NEM Desktop.
Type	One of the five categories each alarm has been assigned to: Communication, Equipment, Environmental, Processing or Quality.
TP	Termination Point (Trail Termination Point)
On Time	The time when the NE registered the alarm. The date and time in brackets indicate when FOXMAN-UN received the alarm.
Off Time	The time when the NE registered the clearance of the alarm. The date and time in brackets indicate when FOXMAN-UN received the alarm cleared message.
On/Off Ack Time	The date and time when a new or a cleared alarm was acknowledged plus the respective user name.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

[Alarm List](#) dialog.

6.5.6 Alarm History

Purpose

This dialog is called from the [NEM Desktop](#)’s Fault Management menu.

To keep the size of the database as small as possible, all cleared alarms are removed from it on acknowledgment. They are transferred to the Alarm History which covers the period of the past 30 days (default setting in the configuration file alarming.conf).

The Alarm History dialog provides access to these past alarms. A time/date window can be set for which the alarms shall be retrieved from history. The maximum span of the date/time window is the complete 30 day period. It can be specified, whether the Alarm On or the Alarm Off time shall be within that window.

Double click on an alarm in the list opens the corresponding [Alarm Properties](#) dialog. This dialog can also be opened via the context menu of a selected alarm in the list.



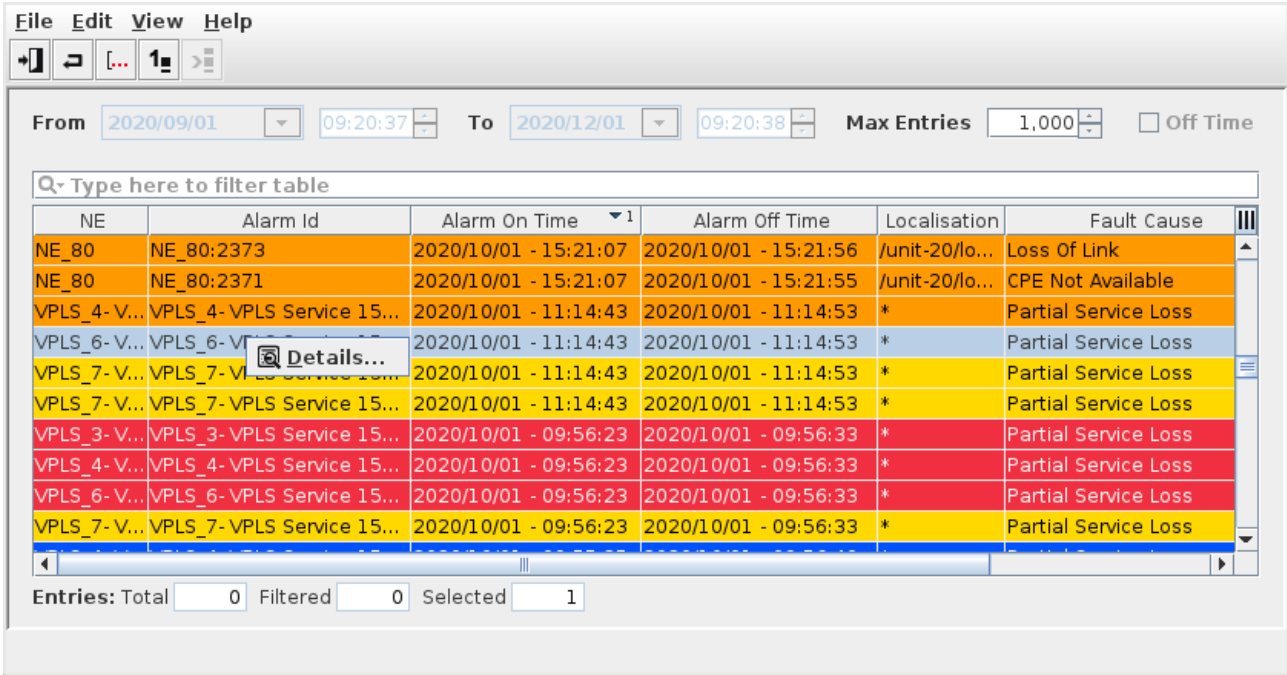
Please note:

To find all relevant alarms for the specified date/time window, the history files have to be searched from the start date/time right up to the most recent entry. This can take a long time, particularly if

- the start date/time is many days in the past
- the value in “Max. Entries” is large
- the number of alarms occurring per day is large

Dialog image

Alarm History



Mandatory entries

Search parameters

Start Date / Start Time	Begin of the date / time window for the retrieval of history alarms. Default is the current day at current time.
End Date / End Time	End of the date / time window for the retrieval of history alarms. Default is the current day at current time.
Max Entries	To speed up the retrieve process, alarms are fetched in batches of a definable size. Default is 500.
Off Time / On Time	Defines whether the Date / Time window shall be applied to Alarm On Time or the Alarm Off Time.

Optional entries

Not applicable.

Informational content

List of history alarms filtered for date / time window and filter settings. The list is sorted in ascending order for the attribute User.

The list can be resorted for each attribute in ascending or descending order by clicking on the column header.

A double click on any alarm in the list calls the **Alarm Properties** dialog.

Controls (buttons, menu items, etc.)

Menu “File”

Get First		Gets the first batch of alarms from the history files.
Get Next		Gets the next batch of alarms from the history files. The button is grayed if there are no more alarms in the history files matching the search parameters.
Exit		Clears the alarm list, resets the search parameters to the default values and closes the dialog.

Menu “Edit”

Details...		Only available if an alarm in the list is selected. Calls the “Alarm Properties” dialog for alarms contained in the alarm history.
Modify		Clears the alarm history list.
Reset		Clears the alarm list and resets the date/time window to default (current date/time).

Menu “Help”

? Help	Calls the FOXMAN-UN help viewer and opens this page.	

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Alarm Properties – History](#).

6.5.7 Alarm Properties – History

Purpose

The Alarm Properties dialog is used to view the details of a particular NE alarm record in the alarm history.

Dialog image

Alarm Properties: History

AlarmId NE_172.31.69.196:50

Localisation /unit-4/pdh/vc12-8/p12 (P12)

Fault Cause

Loss Of Frame

Severity Major

Alarm Type Communication

Alarm On Time 2018/02/26 - 22:38:20

Alarm Off Time 2018/02/26 - 22:44:25

Alarm On Ack. (operator) 2018/02/27 - 02:13:16 (AlarmMgr)

Alarm Off Ack. (operator) 2018/02/27 - 02:13:16 (AlarmMgr)

Comments

? Help ✓ OK

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Alarm Id	The format is "NE_name:index". The index is incremented for each new alarm in the NE, normally providing a unique identification. The index is reset to 1 if the NE is deleted and recreated.
Localisation	The unit name, its card slot, and the layer-subunit identification.
Fault Cause	A text describing the type of alarm. The layer-subunit identification given in the localization also has to be considered.
Severity	The Severity of the alarm.
Alarm Type	One of the five categories each alarm has been assigned to: Communication, Equipment, Environmental, Processing or Quality.
Alarm On Time	The time when the NE registered the alarm. The date and time in brackets indicate when FOXMAN-UN received the alarm.
Alarm Off Time	The time when the NE registered the clearance of the alarm. The date and time in brackets indicate when FOXMAN-UN received the "alarm cleared" message.
Alarm On/Off Ack Time	The date and time when a new or a cleared alarm was acknowledged plus the respective user name.
Ack'd By	User name that acknowledged the alarm.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Closes the dialog.

Related dialogs / windows

Alarm History dialog.

6.5.8 Hardware View NE

Purpose

The NE hardware view provides a graphical presentation of a FOX51x NE subrack. It is the top level of the HW view hierarchy, the lower levels being Unit view and Subunit view.

The display provides details about the units in the subrack including their alarm state as well as information about the FOX51x NE itself.

Dialog image

Shown here is the hardware view of a FOX515. The views of the other FOX51x types are identical except for the subrack frame and the address type (IP address or HDLC address).



Please note:
The FOX51x type is shown in the empty space at the upper left corner of the sub-rack frame.

NE_name

Configuration Fault ManagementHelp

FOX 515

P O S U S					N E B R O					C O B U X									P O S U S	
106					197					219								106		
R0					R2					R5								R0		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Alarm State:

Operational State: Not Manageable

Agent: FOX51EA

Location:

IP Address: 172.31.38.69

Tag:

NE Domains

Domain

Close

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

NE subrack image	Each unit shows the color for the highest Severity of the currently active alarms within the unit.
Alarm State	The color for the highest severity of the currently active alarms within the NE.
Operational State	Manageable: Communication from FOXMAN-UN to the NE is established. Unmanageable: Communication has been interrupted. Not configured: Communication was never established. Configuration could not be uploaded.
Agent	The name of the agent controlling the management communication that this NE has been assigned to.
Location	Text to indicate the physical site. It can only be entered or modified via the UCST “NE Configuration-Parameters” menu
IP Address or HDLC Address	Address under which the NE can be reached by the agent.
Tag	Text specified in the Create NE or NE Properties dialog, e.g. to describe the function of the NE.
Domains	A list of all domains the NE has been made a member of.

Controls (buttons, menu items, etc.)

Configuration > Modify NE...	Calls the configuration tool UCST for the NE shown in the hardware view.
Fault Management > Alarm List...	Calls the alarm list filtered for the NE shown in the hardware view.
Fault Management > Force Polling...	This forces an immediate polling of the NE shown in the hardware view to update the alarm status shown, even if the polling of this NE is turned off.
Help > Help Viewer	Opens the FOXMAN-UN help viewer and opens this page.
Close	Closes this dialog.

Related dialogs / windows

Hardware View Unit,
Hardware View Subunit.

6.5.9 Hardware View Unit**Purpose**

The Unit View is the second level of the Hardware View hierarchy. It provides quick identification of the subunits with active alarms. In addition it offers access to the status and the alarm customisation functionality of the unit.

Each unit is divided into two or more functional layers, the Board layer, and at least one Subunit layer. These layers are presented as tabs. When a tab is not selected, it shows the color for the severity of the highest active alarm that belongs to the layer.

The Board layer view shows only the alarms concerning the general operation of the unit, i.e. everything that is not directly traffic related.

A Subunit layer view gives a graphical representation of the subunits. Enabled subunits are shown in the color of the currently active alarm with the highest severity. Disabled subunits are shown in gray. In addition the subunit name specified in the configuration is displayed.

Dialog images



Please note:

The dialogs are unit specific, as each unit has its own layering and its specific number of subunits. The example below is of the unit COBUX.

Board layer view

Slot Number: 11 SW Version: R5
Equipment Name: COBUX Alarm State: (redacted)

Board PDH ECC Communication IF SDH ECC

Alarm State: (redacted)

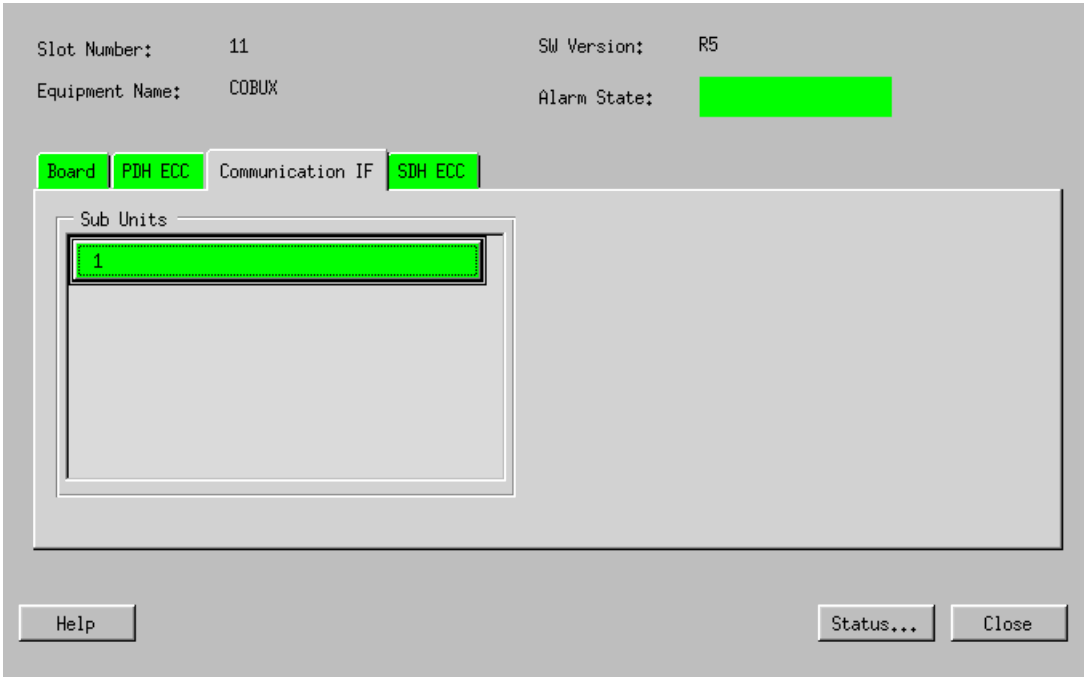
Alarm Customisation...

Unit Alarms

Localisation	Fault Cause

Help Status... Close

Subunit layer view



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Slot Number	The slot number of the FOX51x subrack the unit is residing in.
Equipment Name	The five character name designating the FOX51x unit.
SW Version	The version of ESW that the template used to configure the unit in UCST has been based on. The resident ESW must be same version or higher.
Alarm State	The color for the Severity of the highest current alarm in the unit.
Unit Alarms	A list of the currently active alarms for the board layer only.
Sub Units	Shown when selecting any layer other than Board. Each subunit shows the color of the current alarm with the highest severity and the subunit name if configured. Disabled subunits are shown in gray.

Controls (buttons, menu items, etc.)

Alarm Customisation...	Opens the Alarm Customisation dialog for the unit (board layer) alarms.
Status...	Calls the status dialog for the unit. This is the same dialog reached via the menu Unit Configuration > Status/Maintenance of UCST.
Help	Starts the FOXMAN-UN help viewer and opens this page.
Close	Closes the dialog without applying the modifications.

Related dialogs / windows

Hardware View NE,
Hardware View Subunit.

6.5.10 **Hardware View Subunit**

Purpose

The Subunit View is the third level of the hardware view hierarchy and provides access to the status and the alarm customisation functionality of the subunit.

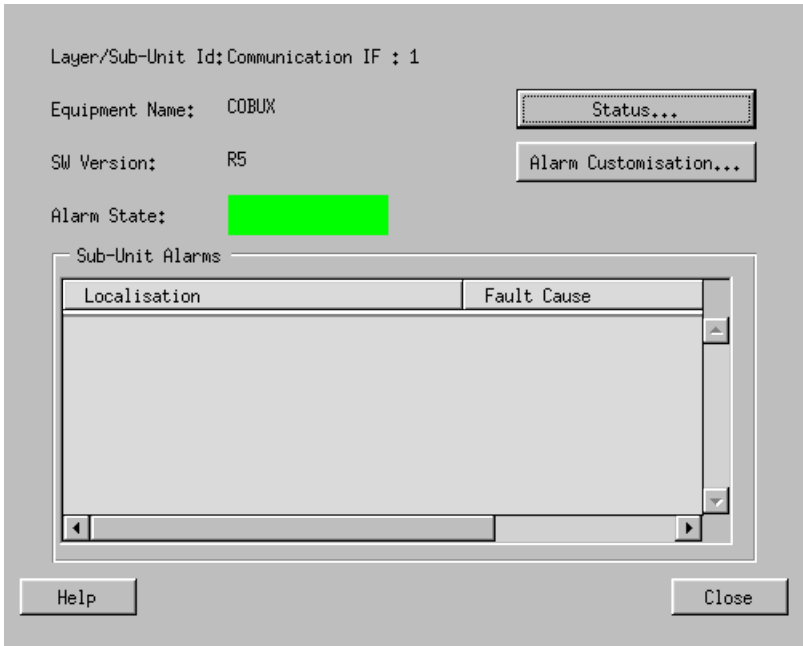
i

Please note:

The Status/Maintenance dialog that can be opened with the Status button is the same as the one reached using the Unit Configuration > Status/Maintenance menu item of the UCST.

Dialog image

NE_name



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Layer / Sub-Unit Id	The layer name (e.g. E12/P12) and the subunit number.
Equipment Name	The five character name designating the FOX51x unit.
SW Version	The version of ESW that the template used to configure the unit in UCST has been based on. The resident ESW must be same version or higher.
Alarm State	The color for the Severity of the highest current alarm in the subunit.
Sub-Unit Alarms	A list of the currently active alarms of the selected subunit only.

Controls (buttons, menu items, etc.)

Status...	Calls the status dialog for the unit. This is the same dialog reached via the menu Unit Configuration > Status/Maintenance of UCST.
Alarm Customisation...	Opens the Alarm Customisation dialog for the subunit alarms.
Help	Starts the FOXMAN-UN help viewer and opens this page.
Close	Closes the dialog without applying the modifications.

Related dialogs / windows

Hardware View NE,
Hardware View Unit.

6.5.11 Operator Message

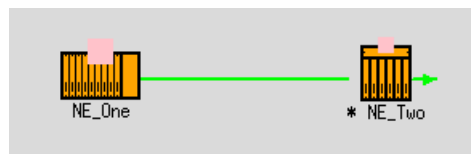
Purpose

The Operator Message dialog provides a mechanism for information transfer between FOXMAN-UN users who are on different shifts or at different geographical locations.

A message can be attached to any NE or FO via the context menu of the NE shown in the map.

The message is a freely editable text and can be used to show e.g. the current state of fault analysis.

A NE or FO that has a message attached is marked with an asterisk in front of its name or with a speech bubble icon, depending on the selected **Map Style** (also see **NEM Network Browser Main Window**):



A group symbol cannot have a message assigned to it. If there are any messages attached to its members (NEs and FOs) on any level, it shows their total number in front of an asterisk, or in a speech bubble icon, depending on the selected **Map Style** (also see **NEM Network Browser Main Window**).



Please note:

A message can already be attached at NE or FO creation time in the **Create NE** or **Create FO** dialogs.

Dialog image

Operator Message for <NE_name>

Mandatory entries

Not applicable.

Optional entries

Message text.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

NEM Network Browser,
 NE – Create / Properties,
 Create NE of type “Foreign Object” on Agent of type “FO” with Tab “Configuration”,
 Map Style (also see NEM Network Browser Main Window).

6.5.12 Alarm Forwarding

General

For the purpose of forwarding, new alarms are collected during a period (configurable system variable “alarm_forward_interval” in alarming.conf, default 15 minutes) on a per domain basis. To be collected, an alarm must be

- active for longer than a minimum period (the minimum period is configurable via the system variable “alarm_forward_min_ontime” in alarming.conf, default 5 seconds) and
- unacknowledged.

If the collection is not empty, a separate message for each domain is generated at the end of the collection period. Each message contains the start and end time of the period, and all new alarms that occurred during the period.

The messages are then sent as emails to the addresses configured in each domain, provided the alarm forwarding for the domain as well as the global alarm forwarding (menu “Edit – Options” in the NEM Configurator) are enabled.

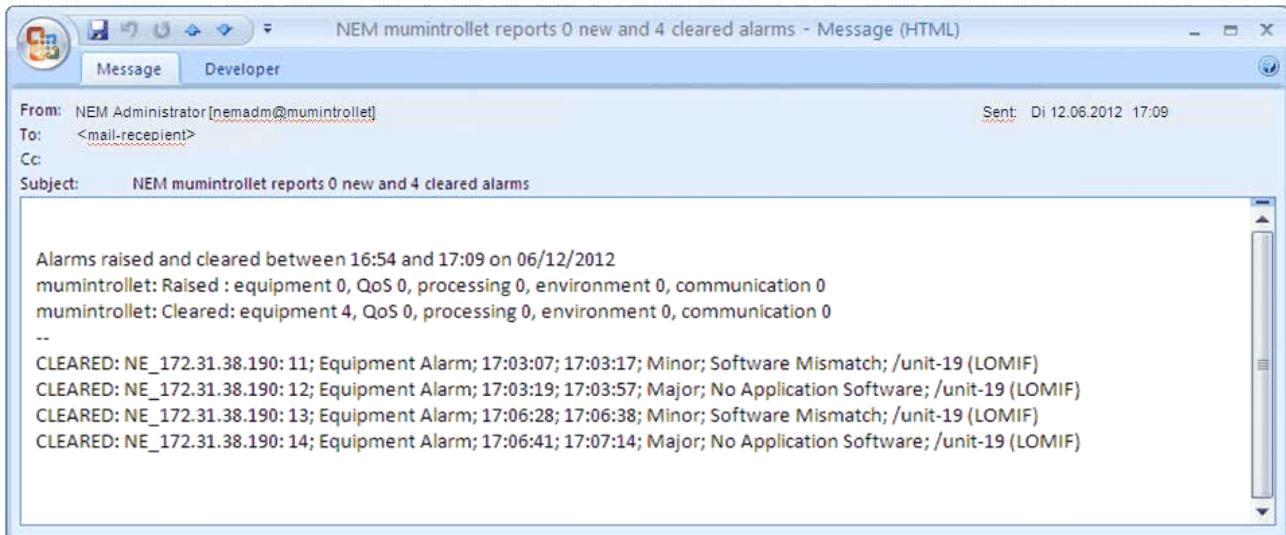
Configuration

The following alarm forwarding parameters can be configured individually for each domain in the Domain Properties dialog:

- Enable alarm forwarding
- Include system alarms in the collection
- email destination address
- Minimum severity of alarms to be collected

Information structure

Alarm information in the emails is formatted as in the following example (host name used here is “mumintrollet”):



Related dialogs / windows

Domain – Create,
Domain – Properties,
NEM Configurator (menu “Files – Options”).

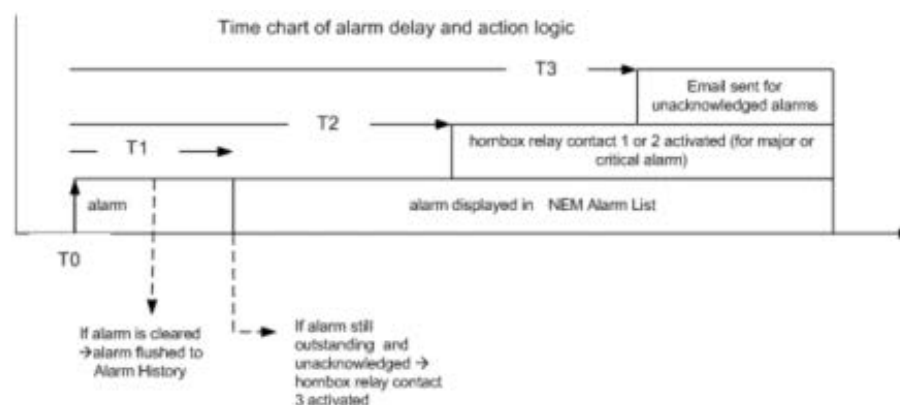
6.5.13 Alarm Escalation

Purpose

This section includes FOXMAN-UN's special handling of alarms that include delayed creation, external indication via horn-box, and sending alarm notifications via email. The Alarm Escalation (AE) parameters, including the timers T1, T2, and T3, are configurable via the “\$NEM_HOME/etc/alarming.conf” file. For more details also refer to the user manual [1KHW002414] FOXMAN-UN under Linux.

The FOXMAN-UN user (with Global Config Access user privilege) can activate/deactivate these functions via the NEM Configurator menu “Edit – Options”

The time chart below provides an overview of the alarm escalation concept (It is assumed that all AE functionalities are enabled):



The alarming.conf timer delay values indicate the number of seconds to delay from the occurrence of the alarm (T0). The default values are as follows:

- T1 (Alarm Activation Delay): 180 secs (3 minutes) from T0. Indicate the number of seconds to delay before activating all alarms.
- T2 (Horn-box Indications Delay): 360 secs (6 minutes) from T0. The number of seconds to delay before turning on horn-box indications.

- T3 (Email Notification Delay): 540 secs (9 minutes) from T0. The number of seconds to delay before sending emails.

The timers (T1, T2, and T3) start when an incoming alarm is detected.

Alarms raised and cleared before T1 time is elapsed will be flushed immediately to Alarm History. Alarms will be logged and displayed into Alarm List only after the T1 time is elapsed.

If the alarm is still outstanding (active) and unacknowledged at the end of T1, the FOXMAN-UN will activate the relay contact 3 of the horn-box. It will remain activated until the last unacknowledged alarm is acknowledged.

If the outstanding alarm is major or critical, FOXMAN-UN will activate the relay contact 1 or 2 of the horn-box when the T2 is elapsed.

- Relay contact 1 is activated for major alarms. It will remain activated until last major alarm is acknowledged.
- Relay contact 2 is activated for critical alarms. It will remain activated until the last critical alarm is acknowledged.

When T3 is elapsed, and the parameter “alarm_auto_acknowledge” is “off” (defined in alarming.conf), and you haven’t manually acknowledged the alarm(s), FOXMAN-UN will forward an email to the specified email address (as defined in the alarming.conf) listing the unacknowledged outstanding alarms.



Please note:

- Only one horn-box per FOXMAN-UN is supported.
- FOXMAN-UN supports the Web-IO Ref 57630 from W&T (<https://www.wut.de/e-57630-ww-daus-000.php?pf=118>). Only this device is supported to fulfill the requirements of a horn-box.
- Only the Outputs are used to connect a lamp:
- +24Vdc : Pin 1/16
- GND : Pin 2/15
- Major Alarms : Pin 3
- Critical Alarms : Pin 4
- Alarm Warning after T1 : Pin 5

Dialog image

Options

Alarm Forwarding

☒ Enable Global Alarm Forwarding

Alarm Escalation Control

☐ Disable

☒ Enable

☐ Enable During Active Hours Only

Alarm Escalation Behaviour

☒ Delay Alarm Activation

☒ Delay Hornbox Indicators

☒ Delay Email Alerts

Alarm Escalation Configuration

Alarm Activation Delay

180

Hornbox Indication Delay

360

Email Notification Delay

540

Email Address

OK

Apply

Cancel

Controls (buttons, menu items, etc.)

Alarm Forwarding

Enable Global Alarm Forwarding	Enable/Disable Global Alarm Forwarding functionality. Refer to section Alarm Forwarding for details.

Alarm Escalation: Control

Disable	Disables the Alarm Escalation handling.
Enable	Activates the Alarm Escalation handling.
Enable during Active Hours only	Alarm Escalation handling is NOT activated during the time period as specified in the “Inactive Times” entries of the alarming.conf.

Alarm Escalation: Behavior

Delay Alarm Activation	Enable/Disable Alarm Activation Delay. If this is enabled, the incoming alarm(s) will be logged and displayed in the Alarm List only after the T1 time is elapsed.
Hornbox Indicators	Enable/Disable Hornbox Indicators. If this is enabled, FOXMAN-UN will activate the relay contact 1 or 2 of the hornbox when the T2 is elapsed (provided that any of the major or critical outstanding alarms is unacknowledged). The relay(s) will remain activated until the last major/critical alarm is acknowledged.
Email Alerts	Enable/Disable email forwarding for unacknowledged alarms after T3 is elapsed. Note: Only one email address can be supported per FOXMAN-UN.

Alarm Escalation Configuration

Shows the Alarm Escalation (AE) parameters' currently configured values in the "\$NEM_HOME/etc/alarmin.conf" file. For details, please refer to the time chart explained at the beginning of this section.

Alarm Activation Delay	Indicate the number of seconds to delay before activating all alarms.
Hornbox Indication Delay	The number of seconds to delay before turning on hornbox indications
Email Notification Delay	The number of seconds to delay before sending emails.
Email Address	The configured email address where to send the notification emails.

Controls (buttons, menu items, etc.)

OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

6.6 Performance Management

The Performance Management (PM) tool enables high volume of performance data collection and storing these data in the database.

The user has a seamless uniformity in the PM configuration for the following supported devices:

- FOX61x,
- FOX51x,
- FOX660.

This section provides details on the following functions:

- [Performance Management \(PM\) Client](#),
- [Create PM Collection Job](#).

6.6.1 Performance Management (PM) Client

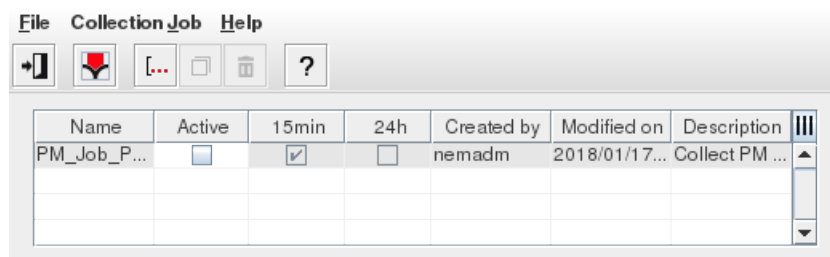
The main functions of the Performance Management (PM) Client dialog are:

- Create PM Collection Job
- Modify PM Collection Job
- Duplicate PM Collection Job
- Delete PM Collection Job(s)

The table lists all the existing PM collection jobs with their corresponding information. These include the Name, data counter periodicity: 15min and/or 24h, creator, time of modification, and description.

Dialog image

PM Client



Controls (buttons, menu items, etc.)

Menu “File”

Exit		Exits the PM Client Window

Menu “Collection Job”

Create		Opens the “Collection Job Wizard” window to create new PM collection job, see Create PM Collection Job .
Modify		Modifies/Edits the properties of the selected PM collection job.
Duplicate		Duplicates the selected PM collection job.
Delete		Deletes the selected PM collection job(s). This will open a pop-up message for deletion confirmation.

Menu “Help”

? Help	Starts the FOXMAN-UN help viewer and opens this page.
About	Displays the software version of the installed FOXMAN-UN.

PM Collection Job List (Table)

Name	Name of the PM collection job entered during job creation.
Active	The box will be ticked if the PM collection job was set to active during creation. If no PM data is required, the collection can be stopped by modifying it and disabling the “Active” option without deleting the job.
15min	Box is ticked if the job was specified to collect 15 minutes interval PM data.
24h	Box is ticked if the job was specified to collect 24 hours interval PM data.
Created by	Name of the user that created the job.
Modified on	Date and time of the latest job modification.
Last Run	Date and time of the last job run.
Next Run	Date and time of the next scheduled job run.
Description	Description of the PM collection job entered during job creation.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

6.6.2 Create PM Collection Job

Purpose

The PM Collection Job Wizard allows the user to create new PM collection job and to modify or duplicate an existing PM collection job.

The wizard has two types of panels: Job Properties and Selection Panel.

The Job Properties panel allows the user to define the Job Name, Statistics, and to activate the Job. The Selection Panel allows the user to specify the PM data collection point(s), which depends on the selected NE and Unit. In general, for FOX61x NEs, the collection point can be on the level: NMS, Network Elements, Units or Ports.

**Please note:**

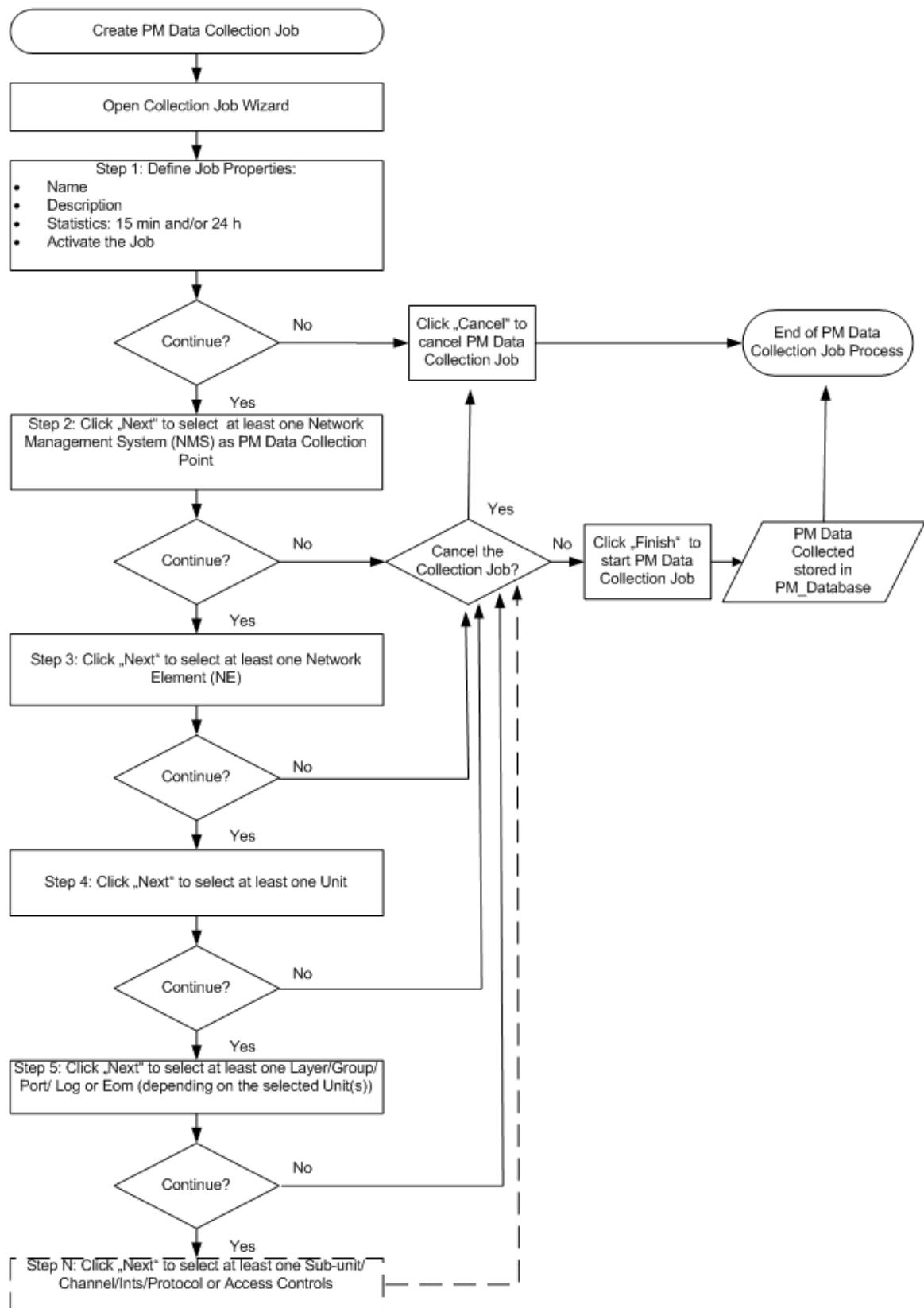
Only select NEs of the same product family when creating a PM collection job. Do not mix NE types like e.g. FOX61x and FOX51x in one job since such mixed jobs will not be saved and applied correctly.

The PM collection process is shown in the diagram below.

**Please note:**

In the PM collection process diagram below, steps 5 and N are applicable only to NEs of type FOX51x. For NEs of type FOX61x, only steps 1 to 4 are available.

Performance Management Data Collection Job Process Overview

**Note:**

Starting at Step 2, the „Back“ button can be used to go back to previous step.

Dialog image

Job Properties

Steps

1. Job Properties

2. Select NMSs

3. Select NEs

4. Select Units

Job Properties for PM_Job_PHY

Name

PM_Job_PHY

Description

Collect PM data from PHY

Active

Statistics

15 min

24 h

? Help

< Back

Next >

Finish

Cancel

Mandatory entries

Name	The name will be used to identify the PM collection job on the list of created PM data collection schedules.
Statistics	PM collection periodicity:15 min or 24 h. At least one of the two types must be selected to proceed to the “Next” step.
Statistics - 15 min	When enabled, the job will collect PM data for 15 minutes PM intervals.
Statistics - 24 h	When enabled, the job will collect PM data for 24 hours PM intervals.

Optional entries

Description	Enter a job collection description that allows other users to understand the purpose of the job.
Active	The box must be ticked for the PM collection job to run. If no PM data is required, the collection can be stopped without deleting the job by editing the job and removing the tick in the “Active” checkbox.

Informational content

Steps	The highlighted step 1: Job Properties is the current step or the currently opened window. Step 2: Select NMSs is the next step or the next window to be opened.

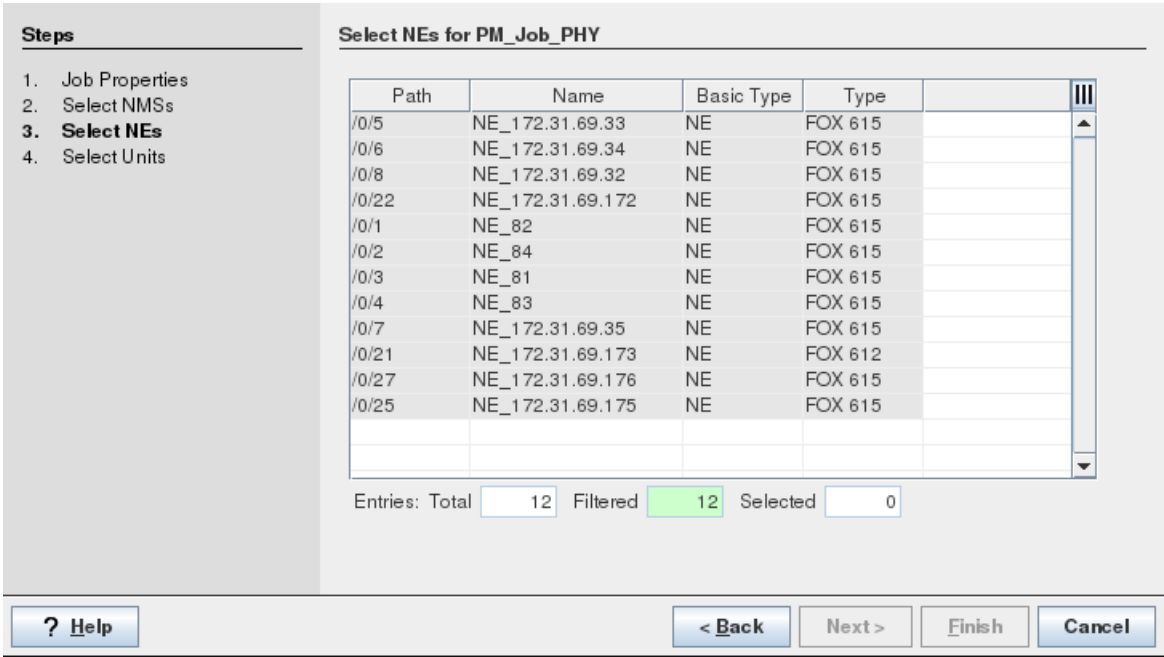
Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
< Back	Disabled for this dialog (see flow diagram above).
Next >	Calls the next step dialog (see flow diagram above).
Finish	Disabled for this dialog.

Cancel	Closes the dialog without applying the modifications.

Dialog image

Selection Panel - NEs



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Steps	Shows the previous step(s) done, the current step (highlighted texts) and the next step.
Table	List the available PM data collection points.
Table - Path	Shows the path address as: / NMS_ID / NE_ID
Table - Name	NE name as specified during NE creation.
Table - Basic Type	Basic type, usually “NE”.
Table - Type	NE type as specified during NE creation.

Controls (table)

Table	Allows the user to select the PM data collection point(s). Ctrl+A: selects all the listed collection points. Ctrl+mouse selection: selects several collection points.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
< Back	Calls the previous step dialog (see flow diagram above).
Next >	Calls the next step dialog (see flow diagram above).
Finish	Starts the PM data collection.
Cancel	Closes the dialog without applying the modifications.

Dialog image

Selection Panel - Units

Steps

1. Job Properties
2. Select NMSs
3. Select NEs
4. **Select Units**

Select Units for temptest

Path	Name	Basic Type	Type	NE
/0/9/13	CESM1 <13>	unit	CESM1	NE_205
/0/9/18	TEPI2 <18>	unit	TEPI2	NE_205
/0/9/19	ELET1 <19>	unit	ELET1	NE_205
/0/9/20	OPIC2 <20>	unit	OPIC2	NE_205
/0/9/21	OPIC2 <21>	unit	OPIC2	NE_205
/0/9/240	Pseudowires <240>	unit	Pseudowires	NE_205
/0/9/241	Backplane <241>	unit	Backplane	NE_205
/0/9/242	Sync <242>	unit	Sync	NE_205
/0/9/243	Mgmt <243>	unit	Mgmt	NE_205
/0/9/244	QoS <244>	unit	QoS	NE_205
/0/9/245	Bridge <245>	unit	Bridge	NE_205

Entries: Total Filtered Selected

? Help < Back Next > Finish Cancel

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Steps	Shows the previous step(s) done, the current step (highlighted texts) and the next step.
Table	List the available PM data collection points.
Table - Path	Shows the path address as: / NMS_ID / NE_ID / Unit_ID.
Table - Name	Unit type followed by <physical or logical slot ID>.
Table - Basic Type	Basic type, usually "unit".
Table - Type	Unit type, either - the type (name) of physical (pluggable) unit as configured during NE setup or inherent to the NE, - or - the type of a logical unit that is part of the NE.
Table - NE	NE type as specified during NE creation.

Controls (table)

Table	Allows the user to select the PM data collection point(s). Ctrl+A: selects all the listed collection points. Ctrl+mouse selection: selects several collection points. Single mouse click; selects a collection point.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
< Back	Calls the previous step dialog (see flow diagram above).
Next >	Calls the next step dialog (see flow diagram above).
Finish	Starts the PM data collection.
Cancel	Closes the dialog without applying the modifications.

6.7 Configuration Management

Configuration of FOX61x and FOX51x NEs is handled by the family specific configuration tools, i.e., FOXCST and UCST, respectively. These tools are basically stand-alone applications, but are also integrated in FOXMAN-UN. Note that UCST is available with the FOXMAN-UN client for Windows®, but not with the FOXMAN-UN client for Linux.

There are some additional, FOXMAN-UN specific configuration functions which are described in this section.

6.7.1 Restore Configuration

Purpose

FOXMAN-UN creates a configuration history of configurable length (maximum 10, default 5, defined in the “tasks.conf” file) for each FOX61x and FOX51x NE.

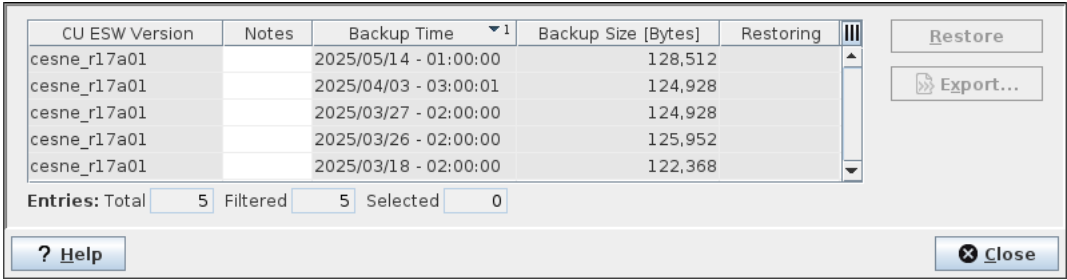
At a configurable time offset after midnight (default at 01:00 FOXMAN-UN server local time, defined in the “tasks.conf” file), the current configuration is compared with the most recent one recorded in the history. It is added to the history if it was modified.

The “Restore Configuration” dialog is called from the context menu of an NE in the NEM Network Browser or the NEM Configurator. It shows the recorded configuration history. For a newly created NE, the history list will initially be empty.

Any configuration in the list can be selected and downloaded to the NE, provided the user has the appropriate access rights.

Dialog image

Restore Configuration: <NE_name>



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

List of recorded NE configurations for the selected NE with

- CU ESW Version (Core Unit NE ESW, for FOX61x NEs only),
- Notes (optional),
- Backup Time (Date and Time),
- Backup Size [Bytes],
- Restoring (showing restoring status),
- Configuration ID (hidden by default).

Controls (buttons, menu items, etc.)

Menus

Restore	Restores the selected configuration backup file to the NE. For FOX61x NEs, before restoring, the backend verifies whether there is a matching Core Unit ESW (main version must match) available on the NE. For FOX61x NEs, the configuration backup is only restored if the version of the Core Unit ESW in the backup matches the Core Unit ESW running or at least downloaded on the NE. Note: - If there is no match, the user must choose whether to abort the restore process or to continue with the risk that the NE will get unavailable due to incompatibility of ESW available on the node and ESW configured in the backup. → If there is no match and the restore process is aborted, the configuration backup can be exported and then compared with the running configuration on the NE using the FOXCAST.
Export...	Export the selected NE configuration backup from the NEM database to a file. Opens a dialog to select a folder to store the NE configuration backup file. The default filename includes the NE name and the current date and time. The filename can be modified before applying. The filename extension must remain ".tar".

? Help	Starts the FOXMAN-UN help viewer and opens this page.
Close	Closes the dialog without applying the modifications.

6.8
 Network Functions

This section contains information on all functions related to the managed network as a whole. It deals with analysis of the network timing (synchronization map), with inventory reports, with alarm, date/time, and inventory synchronization between database and managed network as well as with centralized management of NE passwords, NE profiles, CPSs, and embedded software (ESW).

6.8.1
 Synchronization Map

Purpose

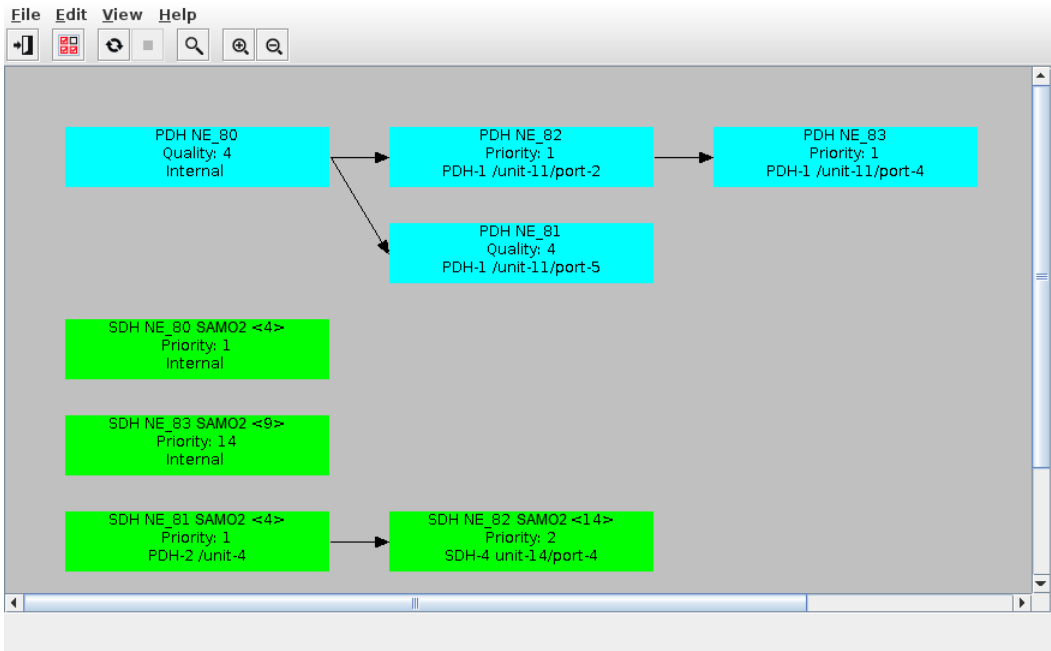
Displays a graphical view of the synchronization setup in all or part of the FOXMAN-UN user’s managed network. The SDH and PDH synchronization can be displayed simultaneously in one map. All or only a subset of the NEs and FOs can be selected for the generation of the synchronization map.
 The Application is launched by the NEM Desktop via Network > Synchronization Map.



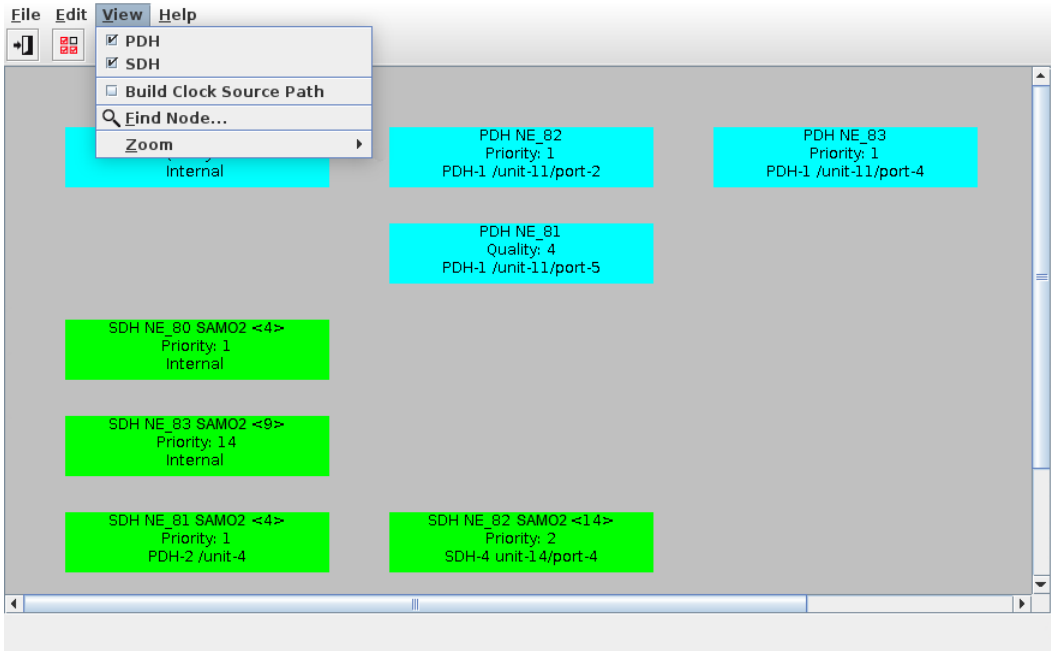
- Please note:**
- The selection includes all currently manageable NEs of the user’s managed network, which have SETS and/or PETS. The clock source information of these NEs are used to create nodes in the synchronization map.
 - The FOs provide no clock source information. FO clock source nodes are created for FOs, which have a section connected to a clock source TP (external clock source). All other FOs are ignored.
 - The nodes of the synchronization map are not necessarily NEs, but could be individual units of an NE (i.e. for FOX61x).
 - A clock connection can only be shown on a synchronization map if a **Section** has been defined between the NEs concerned.
 - No map needs to be open to generate a synchronization map

Dialog images

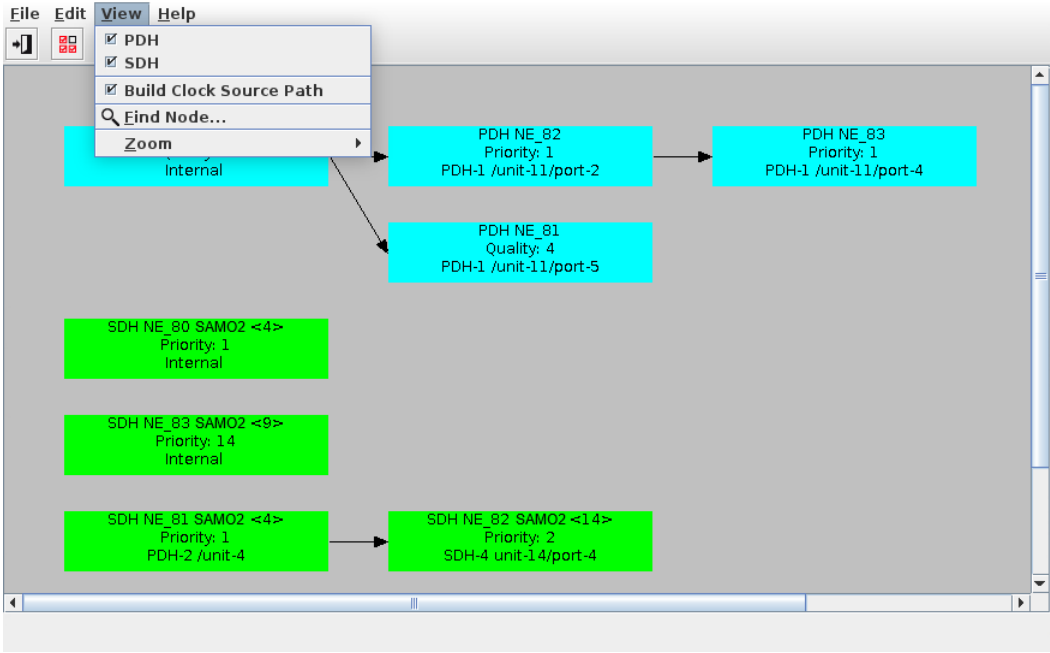
Synchronization Map



Synchronization Map – PDH & SDH – No Clock Source Path



Synchronization Map – PDH & SDH – Build Clock Source Path



Mandatory entries

Selection of the NEs to be included for the generation of the map, entered via the Sync Map – Select NEs dialog.

Optional entries

Not applicable.

Informational content

- Symbol for each selected NE and FO showing name, currently valid clock priority or quality level, currently active clock source.
- Currently active clock connections shown in black.
- Currently active clock loops shown in red.
- Clock connections involving an external clock input shown using dashed lines.

Controls (buttons, menu items, etc.)

File menu

Select NEs	Calls the Select NEs dialog, which lists all the currently manageable NEs and FOs in the user’s managed network.
Export as Image	Allows the currently opened sync map to be exported from the FOXMAN-UN system. The map image can be saved as a GIF, JPEG or as PNG image file in a specified directory of the server.
Exit	Closes the dialog.

Edit menu

Open Timing Sources Status	Calls the selected node's Timing Sources Status. Note: - The menu item is only enabled when one node in the currently displayed clock synchronization tree or clock source path is selected. - Contrary to the same dialog called via the CST GUI, the entries cannot be edited - A double click on the selected NE will likewise calls the Timing Source Status of that particular NE.
Refresh	Refreshes the map to reflect the current synchronization configuration changes.
Abort	Abort the refresh of the map.

View menu

PDH/SDH	Displays the PDH/SDH clock synchronization tree or clock source path. Note: - Changing these parameters will cause a recalculation of the clock distribution tree adding or removing a node type. - It is not possible to disable both PDH and SDH. - If you enable SDH, an error message will be issued for nodes that do not provide SDH clock synchronization.
Build Clock Source Path	Finds the clock sources of a node. The Synchronization tree is build back to the root clock source for every selected NE. Note: - This menu is applicable only if one specific NE is selected from the Select NEs dialog, e.g. NE_172.31.68.81. - The dialog images above show sample outputs when a specific NE is selected and the "Build Clock Source Path" menu item is selected/not selected. - In case of Build Clock Source Path menu item not selected, the map shows only the nodes of the selected NE. - In case of Build Clock Source Path menu item selected, the map shows all the nodes of the selected NE as well as the nodes' parent clock sources. - The clock distribution path is build with the time source information of the nodes and the corresponding sections.
Find Node	Calls the Find Node dialog. The user can enter the name of a node or select a node from the Select Nodes dialog. Note: If several nodes match the Node Name entry, a repeated click on the Find button will jump to the next matching node.
Zoom	- Zoom In Increases the size of the nodes. - Zoom Out Decreases the size of the nodes. Note: You can click and zoom multiple times, each mouse click or scroll wheel click zooms in or out by a factor of 2.

Help menu

? Help

Calls the FOXMAN-UN help viewer and opens this page.

Related dialogs / windows

Sync Map – Select NEs,
 Sync Map – Error Message,
 Sync Map – Timing Sources Status.

6.8.2 Sync Map – Select NEs

Purpose

This dialog presents the user's currently manageable NEs and FOs for the generation of a **Sync-chronization Map**. From the selected NEs and FOs, the time source information is collected, and nodes are created and loaded in the synchronization map.

**Please note:**

- The NEs presented for selection are not filtered, i.e. all the user's currently manageable NEs are shown regardless of whether they are synchronized via PETS or SETS.
- The NEs belonging to the wrong synchronization type will be listed in the **Error Message** dialog and will not be included in the generation of the synchronization map.
- All the FOs are presented for selection. However, only FOs, which have sections connected to an external clock source will be considered for the generation of the synchronization map. All other FOs will be listed in the Error Message dialog and will be ignored.

Dialog image

Choose NEs

NEs	Name	Address	ID	Operational State	
☒	NE_172.31.69.8	IP: 172.31.69.8	4 Manageable	Agent	
☒	NE_172.31.69.17	IP: 172.31.69.17	10 Manageable	Agent	
☒	NE_172.31.69.22	IP: 172.31.69.22	11 Manageable	Agent	
☒	NE_172.31.69.20	IP: 172.31.69.20	12 Manageable	Agent	
☒	NE_172.31.69.21	IP: 172.31.69.21	13 Manageable	Agent	
☒	NE_172.31.69.18	IP: 172.31.69.18	15 Manageable	Agent	
☒	NE_172.31.69.23	IP: 172.31.69.23	16 Manageable	Agent	
☒	NE_172.31.69.55	IP: 172.31.69.55	19 Manageable	Agent	
☒	NE_172.31.69.61	IP: 172.31.69.61	24 Manageable	Agent	
☒	NE_172.31.69.141	IP: 172.31.69.141	34 Manageable	Agent	
☒	NE_172.31.69.142	IP: 172.31.69.142	35 Manageable	Agent	
☒	NE_172.31.69.143	IP: 172.31.69.143	36 Manageable	Agent	
☒	NE_172.31.69.144	IP: 172.31.69.144	37 Manageable	Agent	

Entries: Total 48 Filtered 48 Selected 1 NEs 48

? Help OK Apply Cancel

Mark All Unmark All Mark Unmark

Mandatory entries

Check mark the NE(s) that are to be included in the Synchronization map.

Optional entries

Not applicable.

Controls (buttons, menu items, etc.)

Mark All	Check mark/tick all the NEs in the table.
Unmark All	Clear all the check marks in the table.
Mark	Check mark the selected NE(s) in the table.
	Note: - To select/highlight a single item from the table list: Click on a specific NE. - To select multiple items from the table list: Press “Ctrl key” then click on the required NEs. - To select a range of items from the table list: Click on the first NE, Press “Shift key” then click on the last NE to be included in the range.
Unmark	Clears the check mark(s) of the selected/highlighted NE(s) in the table.
? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Synchronization Map](#).

6.8.3 Sync Map – Error Message

Purpose

During the process of adding NEs to the Synchronization map via the [Sync Map – Select NEs](#) dialog, NEs are identified that do not meet the required synchronization configuration. This dialog lists the NEs or FOs, selected by the user, which do not meet the requirements. E.g. the NEs belonging to the wrong synchronization type will be listed in this dialog, with synchronization error specific messages, and these NEs will not be included in the generation of the synchronization map.

6.8.4 Sync Map – Timing Sources Status

Purpose

Displays the timing source status of the selected node. Contrary to the same dialog called via the CST GUI, the entries cannot be edited. This dialog is called from the Synchronization Map dialog via the menu “Edit - Open Timing Sources Status...”.

The status contains the following:

- **Source Status**,
 - Source,
 - Priority,
 - Quality,
 - Status,
- **Selected Clock Source**,
- **Selection Algorithm**,
- **Clock Operation Mode**,
- **Clock Operation Type**,
- **Output Status**.



Please note:

For details of the synchronization aspects and configuration details at system level, please refer to the following related technical documents:

- User Manual “TDM Services and Cross Connections in FOX61x”,
- User Guide “FOX51x Synchronization”.

Dialog image

Timing Sources Status: PDH/SDH <NE_Name>

Source Status

Source	Priority	Quality	Status
PDH-1 /unit-11/port-4	1	7	Available
Internal	7	11	Available

Selected Clock Source PDH-1 /unit-11/port-4

Selection Algorithm Priority

Clock Operation Mode PhaseLocked

Clock Operation Type Automatic

Output Status

Port	Status
ESO-2	Squelched

? Help Close

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Source Status

Reflects the status of the PETS or SETS timing sources of the selected node. Contrary to the dialogs called directly from the CST GUI, no modifications are possible.

Source (PDH Nodes)	List the available PETS clock sources for the selected PDH node. A PDH network element requires a Plesiochronous Equipment Timing Source (PETS) traceable to a Primary Reference Clock (PRC). The PRC timing is fed to the FOX61x NE via any of the following: External synchronization clock inputs (ESI-1 and ESI-2) of the control unit; PDH-1 to 4 (PDH Clock Source 1 to 4), which can be any of the following: - Ethernet Ports 1 to 5 of the control unit, - E1 ports of on the 2 Mbit unit, - SHDSL span on the SHDSL unit (SHDSL NT clock, NT payload clock, or LT clock), - SETS on the SDH units, - PDH P12 clock signal on the SDH units. The PETS can likewise use one of the following internal clock sources: - Internal clock oscillator of the control unit, - SETS on the SDH unit (configured to internal).
Source (SDH Nodes)	List the available SETS clock sources for the selected SDH node. All SDH ports and SDH processing on an SDH service unit are synchronized to the synchronous equipment timing source (SETS). Each SDH service unit provides one SETS that is used for the unit. It is possible to synchronize the SETS functions of several SDH service units to one common clock source. The SETS synchronization signal can be derived from any of the following: - Up to four SDH Interfaces of the SDH service unit, - PDH- 1 to 4 (PDH Clock Source 1 to 4), - External synchronization clock inputs (ESI-1 and ESI-2) of the control unit.
Priority	The configured Priority for the timing source. - Disable: The clock is not available. - 1...10: The clock source is available. Note that "1" is the highest priority. The PETS clock source can have priority between 1 and 7. The SETS clock source can have priority between 1 and 10.
Quality	The received or configured Quality Level (QL) of the timing source. If the Selection Algorithm is set to "Quality", the SETS and PETS system considers the clock sources' received or configured Quality Levels for the selection of their reference timing source. The signal with the highest level of quality (QL= lowest number) is selected. The following values are defined: QL=0: Quality unknown, QL=2: ITU-T G.811, QL=4: ITU-T G.812 (SSU-A), QL=8: ITU-T G.812 (SSU-B), QL=11: ITU-T G.813 Option I (SEC), QL=15: Do not use for synchronization.

Status	- Available: The clock source can be used as reference timing source. - Failed: Received or configured QL=15 (Do not use for synchronization). - Not Supervised: The timing source Priority is set to Disabled.

Selected Clock Source

Displays the currently selected reference timing source.

Selection Algorithm

From the available clock sources, the PETS/SETS automatically selects the reference timing source with the best quality. Two basic selection modes for system synchronization are provided: Priority based and Quality Level (QL) based

Priority	The selection process is controlled by the configured Priorities assigned to the clock sources. The signal with the highest priority (lowest number) is selected. It disregards the sources' quality levels (QLs).
Quality	The selection process considers the clock sources' received or configured Quality Levels. The signal with the highest level of quality (lowest number) is selected. If two timing sources provide the same QL, the timing system selects the timing source with higher priority.

Clock Operation Mode

Locked	Normal operation mode. The output SETS/PETS clock signal is controlled by an external input reference so they have long term average frequency.
Holdover	The PETS/SETS is running with previously stored clock data. The following conditions can bring operation mode to Holdover: - If the Clock Operation Type is set via CST to "Auto Selection or Automatic" and if the clock reference fails, SETS/PETS continues operating in hold-over mode. - If the Clock Operation Type is set via CST to "Forced Holdover".
FreeRunning	The PETS/SETS is synchronized to the internal clock oscillator. This status is likewise shown if the Clock Operation type is set via CST to "Forced Free Running".

Clock Operation Type

Auto Selection Mode /Automatic	The Clock Operation Type is set to "Auto Selection" via CST. The SETS/PETS selects its Clock Operation Mode (Locked, Holdover or FreeRunning) by itself, depending on the conditions given by the availability of synchronization sources.
ForcedFreeRun/ForcedFree	The Clock Operation Type is set to "Forced Free Running/Forced Free Run" via CST, which brings the Clock Operation Mode to "FreeRunning":
ForcedHoldover	The Clock Operation Type is set to "Forced Holdover" via CST, which brings the Clock Operation mode to "Holdover":

Output Status

Displays the current status of the External Synchronization Output (ESO) interfaces. The ESO timing signal (leaving the NE) can be used for the synchronization of external elements, e.g. another FOX61x or FOX51x NE.

Port	Refers to the ESO interfaces available in the control unit: FOX51x: - ESO-1...3/PDH, - ESO-4/SDH. FOX61x: - ESO-1/PDH, - ESO-2/SDH.
Status	- Active: The timing signal can be used for synchronization purposes. - Squelched: The timing signal is suppressed and cannot be used for synchronization purposes.

Controls (buttons, menu items, etc.)

Table Sorting and Filtering / Export and Printing

Please refer to [Table Sorter](#) section for details

? Help	Calls the FOXMAN-UN help viewer and opens this page.
Close	Closes the dialog.

Related dialogs / windows

[Synchronization Map](#).

6.8.5 Inventory Report (legacy dialog)

You can call an inventory report from the NEM Desktop via the menu “Network - Inventory Request...”. It opens the Inventory Reports dialog, and, on top of it, the Request Inventory Report dialog window. Once an Inventory Report has been requested, the Inventory Reports table (see [Dialog image](#) below) is shown.

There is also an [Inventory](#) request application in the Web UI that provides the same features and will substitute the legacy dialog.

Purpose

The “Request Inventory Report” dialog generates reports containing different types of inventory data of selected NEs. Data to be included can be NE inventory, unit inventory, port inventory, FOX51x configuration inventory, or service inventory (for FOX61x only).

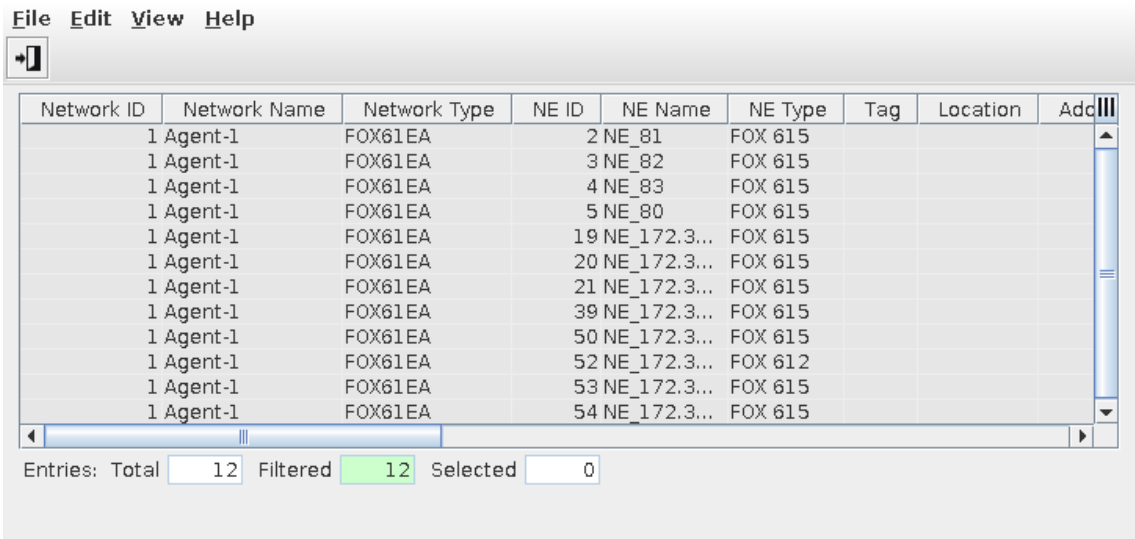
A report is configured in the [Request Inventory Report \(legacy dialog\)](#) dialog. The information retrieved is displayed in the dialog “Inventory Report” if “Report to Screen” is active.

The status line at the bottom of the dialog “Inventory Report” displays a confirmation if “Report to File” is active.

A new report can be requested via the menu “Edit – Request Inventory Report”.

Dialog image

Inventory Reports NE Inventory



Optional entries

Not applicable.

Informational content

The retrieved inventory data is displayed as a table if the “Report to Screen” was activated in the request.

The data can be sorted and / or filtered via the context menu available from the top right corner of the table.

The status displays a confirmation of the path and file saved if “Report to File” was activated in the request.

Controls (buttons, menu items, etc.)

Menus

File – Exit	Closes the dialog.
Edit – Request Inventory Report	Opens the “Request Inventory dialog” for configuring a further inventory report.
Help – ? Help	Calls the help viewer and opens this page.

Table Sorting and Filtering /Export and Printing

Please refer to [Table Sorter](#) section for details

Related dialogs / windows

[Request Inventory Report \(legacy dialog\).](#)

6.8.6 Request Inventory Report (legacy dialog)

Purpose

The “Request Inventory Report” is used to configure the required report. The report type and the location where the results are to be placed have to be determined. The NEs for which the report should be generated have to be selected.



Please note:

The selection of NEs list includes only the member NEs of the FOXMAN-UN user's assigned domain(s).

Dialog image

Inventory Reports: Request Inventory Report

Report Details

Report Type
NE Inventory

☒ Report to Screen
☐ Report to File

File Type
CSV

File
Browse

Reporting NEs

Selected NEs (12 out of 12)
Change Selection...

Addressing	Agent Acc...	Agent ID	ID	Alarm State	Location	Operational S...
IP: 172.31.6...	IP Only	1	1	Cleared		Manageable
IP: 172.31.6...	IP Only	1	2	Cleared		Manageable
IP: 172.31.6...	IP Only	1	3	Cleared		Manageable
IP: 172.31.6...	IP Only	1	4	Cleared		Manageable
IP: 172.31.3...	IP Only	2	5	Cleared		Manageable
IP: 172.31.3...	IP Only	1	6	Critical		Manageable
IP: 172.31.3...	IP Only	2	7	Major		Manageable
IP: 172.31.3...	IP Only	2	8	Major		Manageable
IP: 172.31.3...	IP Only	2	9	Critical		Manageable
IP: 172.31.3...	IP Only	2	10	Cleared		Manageable
IP: 172.31.6...	IP Only	2	11	Major		Manageable
IP: 12.6.120.1	IP Only	1	12	Minor		Manageable

Logic Filter

☒ Access Type equals Any

+
-

? Help
OK
Cancel

Mandatory entries

Report Type	Select the required type from - NE Inventory, - Unit Inventory, - Port Inventory, - Configuration Inventory, - Service Inventory. Note: The service inventory does not provide data for FOX51x NEs.
Change Selection	Calls the "Select NEs" dialog.

Logical Filter

Additional fine tuning can be achieved via the "Logic Filter". Pressing the "+" button displays a condition which can be specified. Several conditions can be sequenced. The "-" button removes the selected condition. Alternatively, the "Logic Filter" alone can be used to determine the NEs for which the report is generated

Optional entries

Not applicable.

Informational content

Selected NEs	List the NEs for which the report should be generated.

Controls (buttons, menu items, etc.)

? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Generates the report if all set parameters are valid and closes the dialog. Otherwise displays the relevant error message.
Cancel	Closes the dialog without generating a report. The dialog "Inventory Report" remains open. From there a new request dialog can be opened via the menu "Action – Request Inventory Report".

Related dialogs / windows

Select NEs,
Inventory Report (legacy dialog).

6.8.7 Inventory Request – Select NEs (legacy dialog)

Purpose

The Select NEs dialog allows the selection of NE(s) for which the inventory report should be generated.

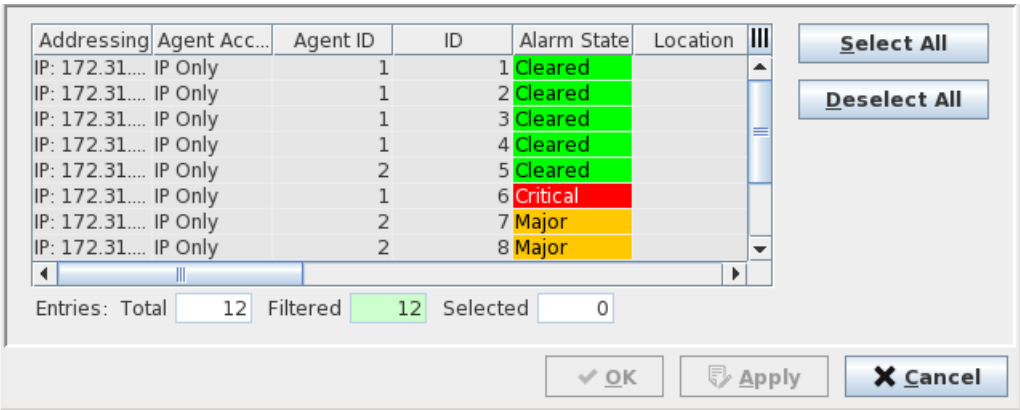


Please note:

The list includes only the member NEs of the FOXMAN-UN user's assigned domain(s).

Dialog image

Select NEs



Mandatory entries

Select at least one NE in the table.

Optional entries

Not applicable.

Controls (buttons, menu items, etc.)



Please note:

- To select a single item from the table list: Click on a specific NE.
- To select multiple items from the table list: Press “Ctrl key” then click on the required NEs.
- To select a range of items from the table list: Click on the first NE, Press “Shift key” then click on the last NE to be included in the range.

Select All	Selects all the NEs in the table.
Deselect All	Clears the selection.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

6.8.8 Task View (legacy dialog)



Please note:

This dialog is only available by default if the FOXMAN-UN client is running on the FOXMAN-UN server machine. In all other cases the dialog is not available. It can be enabled by setting the parameter

`blm.legacy = true`

in the NMS.properties files on both server (in /opt/nem/etc) and client (in /opt/nem/client/etc). However, the use of this feature in a setup where FOXMAN-UN server and client are running on different machines is insecure as it is based on TCP connections and required opening certain ports on the firewall for insecure communication.

Purpose

This dialog shows a list of all types of user created tasks (Profiles / CPS, and ESW), regardless of their status. Tasks can be monitored, and the existing schedule of user created tasks can be reconfigured.

The automatically created system task “ServiceSynch” for FOX61x services is also shown. It synchronizes all FOX61x services in the NEs with the FOXMAN-UN database. This task cannot be manipulated by the operator.

Completed or aborted tasks can be removed, provided the FOXMAN-UN user has the required access rights.



Please note:

This dialog does not allow creating tasks. Creation has to be done via the specific task creation dialogs (Profiles/CPS, ESW).

Dialog image

Task View

#	NE	Type	Originator	Status	State	Schedule ...	Progr
1.		ESW	nemadm...	Completed	Success	2016/09/1...	100%
1.1	NE_172.31...	ESW	nemadm...	Completed	Success		100%
2.		ESW	nemadm...	Completed	Success	2016/09/1...	100%
2.1	NE_172.31...	ESW	nemadm...	Completed	Success		100%
3.		ESW	nemadm...	Completed	Success	2016/09/1...	100%
3.1	NE_172.31...	ESW	nemadm...	Completed	Success		100%
4.		ESW	nemadm...	Aborted	Failure	2016/11/1...	100%
4.1	NE_172.31...	ESW	nemadm...	Aborted	Failure		100%

Entries: Total 9 Filtered 9 Selected 1

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

List of all created tasks, whether aborted, already completed or still pending.

A task consists of one or several sub-tasks, each dealing with a single NE. While a task is still pending, no sub-tasks are shown. After execution, the sub-tasks also appear in the list.

Controls (buttons, menu items, etc.)

Menu – File

Exit		Closes the current dialog window.

Menu – Edit

Depending on its status, the following functions may be available for the **selected** task:

Hold Task		Prevents a scheduled task from being executed (status “Held”).
Resume Task		Returns a task with status “Held” to status “Scheduled”.
Abort Task		Aborts the existing schedule of a task. The task is kept in the list of current tasks.
Retry Task		Opens the Schedule Task (legacy dialog) dialog where the existing schedule of a completed, scheduled or aborted task can be modified.
Delete Task		Removes the task from the list. Only completed tasks (failed or successful) can be deleted. Scheduled tasks must be aborted first. Single sub-tasks cannot be deleted.
Task Properties		Opens the dialog Task Properties (legacy dialog) which provides detail information of the task. Applicable to both tasks and sub-tasks.



Please note:
 To call the above functions it is also possible to use the context menu instead of selecting a task and using the main menu.

Menu – Help

? Help	Starts the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

NE Password Tasks (legacy dialog),
Profiles & CPS Tasks (legacy dialog),
ESW Management.

6.8.9 Task Properties (legacy dialog)

Purpose

The **Task Properties** dialog shows the current details of a task or a sub-task. It is opened from the **Task View (legacy dialog)** dialog.

Dialog image

Task Properties

Task Type:

ESW

NE:

NE_172.31.68.83

Task Status:

Completed

Completion S...

Success

Completed:

100%

Creation Time:

2016/09/13 09:04:36

Schedule Time:

2016/09/13 09:04:36

Start Time:

2016/09/13 09:04:37

End Time:

2016/09/13 09:08:50

Error Text:

no errors on group-task level

Progress Text:

Finished all child tasks (1 total; 1 completed successfully, 0 failed, 0 aborted)

Description:

Download and Activate ESW"ledel_r5b03" for 1 unit type(s) on NE "NE_172.31.68.83" for user "nemadm" on host "mumintrollet"

Comment:

? Help

✓ OK

✗ Cancel

Mandatory entries

Not applicable.

Optional entries

A message can be entered in “Comment”.

Informational content

Task Type	The Task Type can be one of the following: - Profiles / CPS, - ESW, - FOX61x Service Sync, - NE Configuration restore.
NE	Only for sub-tasks.
Task Status	Scheduled, Completed, Aborted.
Completion State	Not Applicable, Success, Partial Success, Failure.
Completed	Completion ratio in percent.

Creation Time	Date and time at which the task has been created.
Schedule Time	Date and time to which the task has been scheduled.
Start Time	Date and time at which the task has started.
End Time	Date and time at which the task has ended.
Error Text	A message that shows the most probable reason if a task has failed.
Progress Text	A report about the progress of the task.
Description	A descriptive message for the task.
Comment	A message can be entered, e.g. regarding action to be taken after a failed execution.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Saves modifications in “Comment” and closes the dialog.
Cancel	Closes the dialog without saving modifications in “Comment”.

Related dialogs / windows

Task View (legacy dialog),
 NE Password Tasks (legacy dialog),
 Profiles & CPS Tasks (legacy dialog),
 ESW Management.

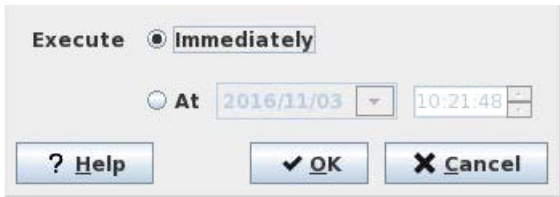
6.8.10 Schedule Task (legacy dialog)

Purpose

This dialog is opened from the “Task View (legacy dialog)” dialog via the menu selection “Edit – Retry Task”, or from the “Retry” icon. It allows re-scheduling an existing task, provided it is either completed (failed or successful) or aborted, or pending (scheduled).

Dialog image

Schedule Task



Mandatory entries

Immediately	Tick this box if the task is to be executed immediately after closing the dialog using “OK”.

At (date and time)	On opening the dialog, date and time is preset to current date and time. - Clicking in the date field opens the calendar where a new date can be selected. - Clicking in the two digits of hours, minutes, or seconds allows you to change the hh, mm or ss with the up or down arrow keys. - Double clicking in the two digits of hours, minutes, or seconds allows you to enter a new value for hh, mm or ss. - Triple click in the time field selects the complete field. Enter the new time using 6 digits with colon separators in the form HH:mm:ss.

Optional entries

Not applicable.

Informational content

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

Task View (legacy dialog),
NE Password Tasks (legacy dialog),
Profiles & CPS Tasks (legacy dialog),
ESW Management.

6.8.11 NE Password Tasks (legacy dialog)



Please note:

This dialog is only available by default if the FOXMAN-UN client is running on the FOXMAN-UN server machine. In all other cases the dialog is not available. It can be enabled by setting the parameter

blm.legacy = true

in the NMS.properties files on both server (in /opt/nem/etc) and client (in /opt/nem/client/etc). However, the use of this feature in a setup where FOXMAN-UN server and client are running on different machines is insecure as it is based on TCP connections and required opening certain ports on the firewall for insecure communication.

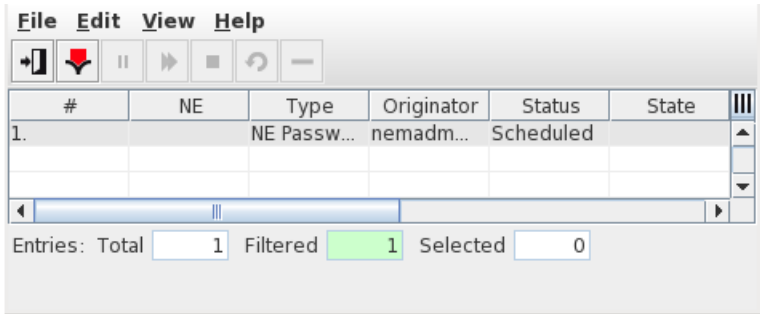
Purpose

This dialog shows a list of all created NE password tasks regardless of their status. Tasks can be monitored and their existing schedule reconfigured. Completed or aborted tasks can be removed, provided the FOXMAN-UN user has the required access rights.

New tasks can be created via the dialog **NE Password – Create Tasks (legacy dialog)** which can be opened from here.

Dialog image

NE Password: Tasks



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

List of all presently active tasks, whether completed or still pending.
A task consists of one or several sub-tasks, each dealing with a single NE. While a task is still pending, no sub-tasks are shown. After execution, the sub-tasks also appear in the list.

Controls (buttons, menu items, etc.)

Menu – File

Create Tasks		Opens the dialog NE Password – Create Tasks (legacy dialog) dialog where a new password task can be configured.
Exit		Closes the current dialog window.

Menu – Edit

Depending on the status, the following functions may be available for the **selected** task:

Hold Task		Prevents a scheduled task from being executed (status “Held”).
Resume Task		Returns a task with status “Held” to status “Scheduled”.
Abort Task		Aborts the existing schedule of a task. The task is kept in the list of current tasks.
Retry Task		Opens the Schedule Task (legacy dialog) dialog where the existing schedule of a completed, scheduled or aborted task can be modified.
Delete Task		Removes the task from the list. Only completed tasks (failed or successful) can be deleted. Scheduled tasks must be aborted first. Single sub-tasks cannot be deleted.

Task Properties	Opens the dialog Task Properties (legacy dialog) which provides details. Applicable to both tasks and sub-tasks.



Please note:
To call the above functions it is also possible to use the context menu instead of selecting a task and using the main menu.

Help – ? Help	Starts the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

NE Password – Create Tasks (legacy dialog).

6.8.12 NE Password – Create Tasks (legacy dialog)

Purpose

This dialog allows creating a new task that will modify the password for one user class in one or several FOX61x and FOX51x NE(s).



Please note:
The list of NEs offered for selection is filtered to the member FOX61x and FOX51x NEs of the domain(s) assigned to the current FOXMAN-UN user.
The user should have “NE Password Change Access” and “Update – Network Element” defined in its **User Privileges** and **Profile Properties**, respectively.

Dialog image

NE Password: Create Task

Selected NEs (4 out of 4)

Change Selection...

Addressing	Agent Acc...	ID	Agent ID	Alarm State	Foreign Key	Agent Nar	
IP: 172.31.38.71	IP Only	1	1	Major		North	▲
IP: 172.31.38.70	IP Only	2	1	Major		North	
IP: 172.31.38.212	IP Only	3	1	Critical		North	
IP: 172.31.68.43	IP Only	7	1	Cleared		North	▼

User Class

information

Password

.....

Reenter Password

.....

Execute

☐ Immediately

☒ At

2016/12/07

08:57:52

? Help

OK

Cancel

Mandatory entries

Change Selection	Calls the “ Select NEs ” dialog. At least one NE has to be selected.

User Class	Select the user class (information, maintenance, manager, session manager) for which the password is to be modified.
Password	Enter the new password to be applied to the selected NEs in both fields "Password" and "Reenter Password"
Execute	Immediately: If this box is ticked, the task is started immediately after leaving the dialog via "OK". At (a specific date and time): On opening the dialog, date and time are preset to current date and time. Clicking in the date field opens the calendar where a new date can be selected. Clicking in the hh, mm, or ss part of the time selects the hh, mm, or ss part. a new hour, minute or second can be entered, or the existing entry can be modified with the up and down arrows on the right hand side of the field, or with the up and down arrow keys of your keyboard. Triple click in the time field selects the complete field. Enter the new time using 6 digits with ":" separators.

Optional entries

Not applicable.

Informational content

Selected NEs list the NEs whose password will be modified.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Creates the task and closes the dialog.
Cancel	Closes the dialog without creating a task.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[NE Password Tasks \(legacy dialog\)](#),

[NE Password – Select NEs \(legacy dialog\)](#).

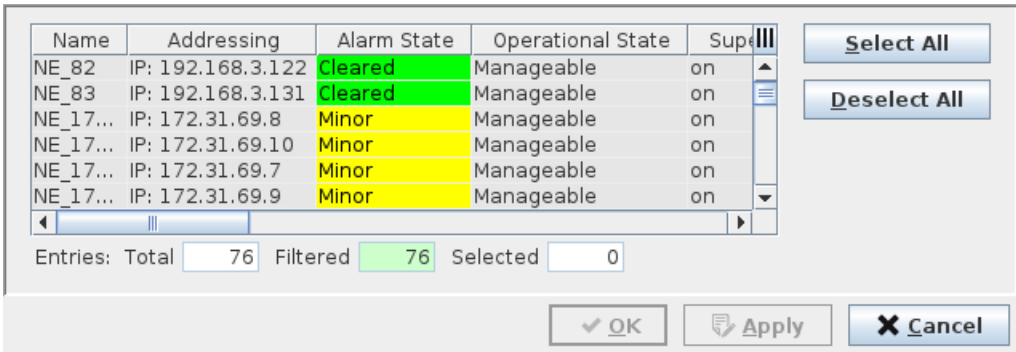
6.8.13 NE Password – Select NEs (legacy dialog)

Purpose

The "Select NEs" dialog allows the selection of NE(s) for which the NE Password will be modified.

Dialog image

Select NEs



Mandatory entries

Select the NE(s) to which the NE Modify Password is to be applied.

Optional entries

Not applicable.

Controls (buttons, menu items, etc.)



- Please note:**
- To select a single item from the table list: Click on a specific NE/FO.
 - To select multiple items from the table list: Press “Ctrl key” then click on the required NEs/FOs.
 - To select a range of items from the table list: Click on the first NE/FO, Press “Shift key” then click on the last NE/FO to be included in the range.

Select All	Selects all the NEs in the table.
Deselect All	Clears the selection.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

6.8.14 Profiles & CPS Tasks (legacy dialog)



- Please note:**
- This dialog is only available by default if the FOXMAN-UN client is running on the FOXMAN-UN server machine. In all other cases the dialog is not available. It can be enabled by setting the parameter
- blm.legacy = true**
- in the NMS.properties files on both server (in /opt/nem/etc) and client (in /opt/nem/client/etc). However, the use of this feature in a setup where FOXMAN-UN server and client are running on different machines is insecure as it is based on TCP connections and required opening certain ports on the firewall for insecure communication.

Purpose

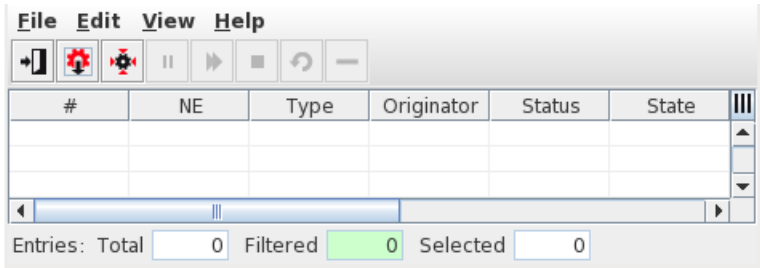


Please note:
 Profiles and CPS tasks are only applicable to FOX61x NEs.

This dialog shows a list of all created Profiles and CPS tasks regardless of their status. Tasks can be monitored and their existing schedule reconfigured. Completed or aborted tasks can be removed, provided the FOXMAN-UN user has the required access rights.
 New tasks can be created via the dialog [Profiles & CPS – Create Task \(legacy dialog\)](#).
 Profiles and CPS can be imported into or deleted from the FOXMAN-UN database via the dialog [Profiles & CPS – Administration \(legacy dialog\)](#).

Dialog image

Profile & CPS: Tasks



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

List of all presently active tasks, whether completed or still pending.
 A task consists of one or several sub-tasks, each dealing with a single NE. While a task is still pending, no sub-tasks are shown. After execution, the sub-tasks also appear in the list.

Controls (buttons, menu items, etc.)

Menu “File”

Create Tasks		Opens the dialog Profiles & CPS – Create Task (legacy dialog) where a new profile or CPS task can be configured.
Administration		Opens the dialog Profiles & CPS – Administration (legacy dialog) where profiles and CPS can be imported or profiles can be created.
Exit		Closes the current dialog window.

Menu “Edit”

Depending on the status, the following functions may be available for the selected group task:

Hold Task		Prevents a scheduled task from being executed (status “Held”).
Resume Task		Returns a task with status “Held” to status “Scheduled”.
Abort Task		Aborts the existing schedule of a task. The task is kept in the list of current tasks.
Retry Task		Opens the Schedule Task (legacy dialog) dialog where the existing schedule of a completed, scheduled or aborted task can be modified.
Delete Task		Removes the task from the list. Only completed tasks (failed or successful) can be deleted. Scheduled tasks must be aborted first. Single sub-tasks cannot be deleted.
Task Properties		Opens the dialog Task Properties which provides detail information of the task. Applicable to both tasks and sub-tasks.



Please note:
 To call the above functions it is also possible to use the context menu instead of selecting a task and using the main menu.

Help – ? Help	Starts the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Profiles & CPS – Create Task \(legacy dialog\)](#),
[Profiles & CPS – Administration \(legacy dialog\)](#),
[Profiles & CPS – Create Profile \(legacy dialog\)](#).

6.8.15 Profiles & CPS – Create Task (legacy dialog)

Purpose

This dialog allows creating new tasks that will download one or several profiles or CPS to one or several NEs. A separate task is generated for every selected profile and every selected CPS.



Please note:
 The list of NEs offered for selection is filtered to the member NEs of the domain(s) assigned to the current FOXMAN-UN user.
 The user should have “NE Profile Update” and “Update – Network Element” defined in its [User Privileges](#) and [Profile Properties](#), respectively.

Dialog image

Profile & CPS: Create Task

Selected NEs (4 out of 4)

Change Selection...

Addressing	Agent Acc...	Agent ID	Agent Name	Agent Type	Alarm State	
IP: 172.31...	IP Only	1	North	FOX61EA	Major	▲
IP: 172.31...	IP Only	1	North	FOX61EA	Major	▼
IP: 172.31	IP Only	1	North	FOX61EA	Critical	▼

Name	Type	Version	
			▲
			▼

Execute ☒ Immediately

☐ At 2016/12/07 09:29:05

? Help

OK

Cancel

Mandatory entries

Change Selection	Calls the “Select NEs” dialog.
Profiles & CPS	Select the required profile(s) and/or CPS(s) in the list of available profiles and CPS. The list includes only the FOX61x profiles and CPS imported in the FOXMAN-UN database. Notes: - Ctrl-click selects single elements in the lists - Ctrl-a selects all the elements in the lists If the required profile or CPS does not exist in the list, use the dialog “Profile & CPS – Administration” to import or create it.



Please note:
A separate task is generated for every selected profile and every selected CPS.

Optional entries

Not applicable.

Informational content

The “Selected NEs” table lists the NEs to which one or several profiles or CPSs will be down-loaded.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Creates the task(s) and closes the dialog.
Cancel	Closes the dialog without creating a task.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

Not applicable.

6.8.16 Profiles & CPS – Select NEs (legacy dialog)

Purpose

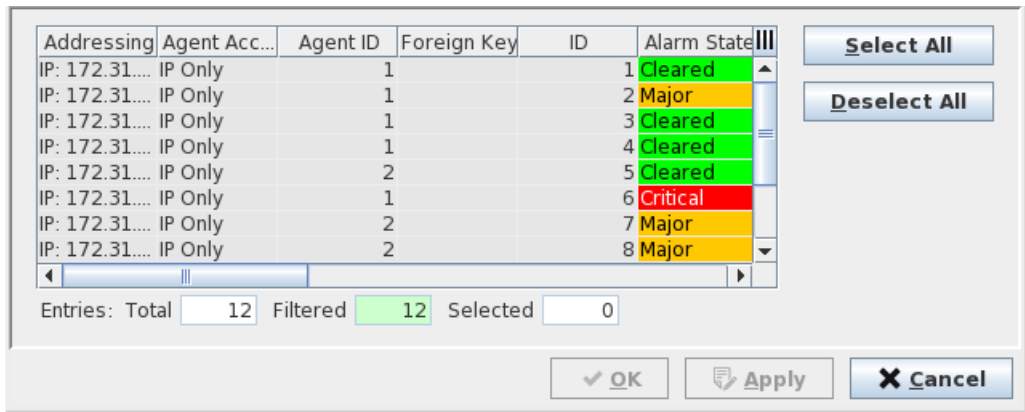
The Select NEs dialog allows the selection of NE(s) for which the selected profile(s) and/or CPS will be downloaded.



Please note:
The list includes only the member FOX61x NEs of the domain(s) assigned to the current user.

Dialog image

Select NEs



Mandatory entries

Select the NE(s) to which profile(s) and/or CPS will be downloaded.

Optional entries

Not applicable.

Controls (buttons, menu items, etc.)



- Please note:**
- To select a single item from the table list: Click on a specific NE/FO.
 - To select multiple items from the table list: Press “Ctrl key” then click on the required NEs/FOs.
 - To select a range of items from the table list: Click on the first NE/FO, Press “Shift key” then click on the last NE/FO to be included in the range.

Select All	Selects all the NEs in the table.
Deselect All	Clears the selection.
OK	Applies the modifications and closes the dialog.

Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

6.8.17 Profiles & CPS – Administration (legacy dialog)

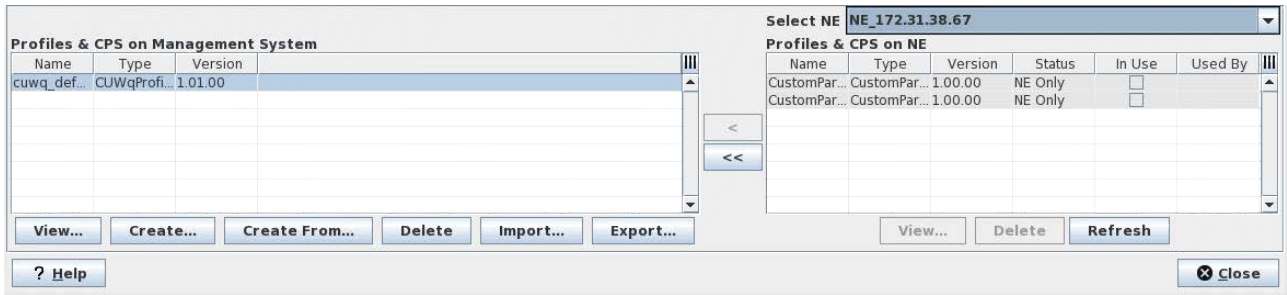
Purpose

The “Profile & CPS – Administration” dialog is used for importing/exporting profiles and CPS from and to the file system to and from the FOXMAN-UN database. In addition profiles and CPS resident in NEs can be uploaded into the database.

New profiles can be created from either a template or by modifying an existing profile.

Dialog image

Profile & CPS



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

- List of all profiles and CPS stored in the FOXMAN-UN database.
- List of all profiles and CPS stored in the local database of the selected FOX61x NE.

Controls (buttons, menu items, etc.)

In “Profiles & CPS on Management System”

View...	Shows the details of the selected profile or CPS in the list “Profiles & CPS on Management System”.
Create...	Calls the Profiles & CPS – Create Profile (legacy dialog) dialog where a new profile based on any of the available templates can be generated.
Create From...	Calls a Create dialog based on the profile selected in the list “Profiles on Management System”. The template used cannot be modified. The name must be modified. All parameter values can be modified as required.
Delete	Removes the selected profiles in the list “Profiles on Management System” from the FOXMAN-UN database.

Import...	Copies a profile from the file system and saves it in the database.
Export...	Copies a profile from the database and saves in the file system.

In “Profiles & CPS on NE”

Select NE	Select the NE from where profiles and/or CPS are to be uploaded and saved in the management system (FOXMAN-UN database).
View...	Shows the “View Profile” dialog of the selected profile in the list “Profiles on NE” with template used, name, description, and data.
Delete	Removes the selected profile(s) in the list “Profiles on NE” from the local database of the selected NE.
Refresh	Updates the list of all resident profiles and CPS of the selected NE.

On the bottom of the dialog:

? Help	Starts the FOXMAN-UN help viewer and opens this page.
Close	Closes the dialog.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

Not applicable.

6.8.18 Profiles & CPS – Create Profile (legacy dialog)**Purpose**

The “Create Profile” dialog allows adding a new profile based on one of the available templates to the FOXMAN-UN database. From there it can be downloaded to any FOX61x NE in the managed network via [Profiles & CPS Tasks \(legacy dialog\)](#).

Dialog image

Profile & CPS: Create Task

Profile Templates

Template: PolicerProfile_1.01.00

Profile

Information

Name: My_Policer_Profile

Description:

Data

Policer Profile

Policer Type

Type: 1 Rate 2 Colors

Color Mode

Mode: Color blind

Committed Rate

Rate: 4 kbit/s

Committed Burst

Size: 1024 byte

Excess Rate

Rate: 8 kbit/s

Excess Burst

Size: 1024 byte

? Help

OK

Apply

Cancel

i

Please note:

The above is an example dialog. Depending on the selected template, the dialog will have different contents.

Mandatory entries

Template	The required template must be selected.
Name	An adequate name must be specified.
Data	Modify the relevant parameter values in the “Data” frame.

Optional entries

Description	A short description stating purpose and/or content may be added. Maximum length of string 63 char, character set A-Z, a-z, 0-9, _

Informational content

List of all parameters contained in the profile and their values. The parameters and values are dependent on the profile template selected.

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.

OK	Creates the profile using the data entered, saves it in the FOXMAN-UN database and closes the dialog.
Apply	Creates the profile using the data entered and saves it in the FOXMAN-UN database without closing the dialog. A further profile can be created.
Cancel	Closes the dialog without creating a profile.

Related dialogs / windows

Not applicable.

6.8.19 Credential Distribution

Purpose

The dialog window “**Network Credential Distribution**” provides distribution functions for passwords and SSH keys. It includes tabs for

- Password management (tab name: Passwords),
- SSH keys management (tab name: SSH Keys),
- Tasks for credential distribution (tab name: Tasks).



Please note:

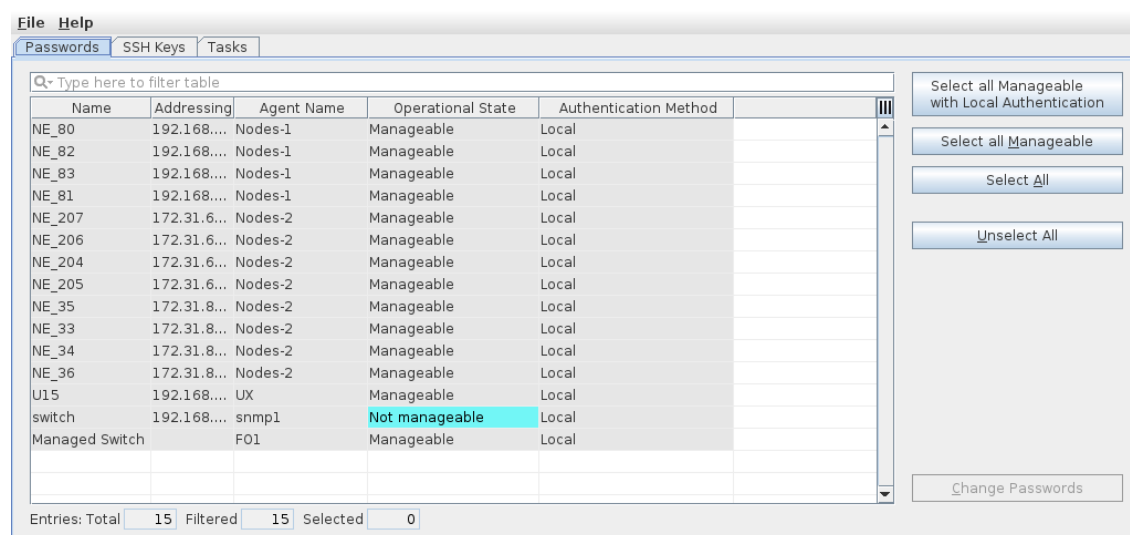
The “SSH Keys” tab is only visible to users with user privilege “Administrator” enabled.

In the “Passwords” and “SSH Keys” tabs, the related network credentials can be managed. To make changes to existing settings, jobs can be created which can be executed for specific tasks.

The “Tasks” tab lists tasks, sub-tasks and involved NEs and allows you to abort, retry, delete tasks and show detailed information on network credential distribution tasks and jobs.

Dialog image

Network Credential Distribution - Passwords



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

List of all NEs as defined in the “NE Browser” tab of the **NEM Configurator** with the following columns:

Name	Name of the NE.
Addressing	Network address of the NE.
Agent Name	Agent name for the NE.
Operational State	Operational state of the NE,
Authentication Method	Authentication method configured for the NE (local, remote).

Controls (buttons, menu items, etc.)

Select all Manageable with Local Authentication	Selects all nodes that are manageable and use passwords.
Select all <u>M</u> anageable	Selects all nodes that are manageable and use passwords.
Select <u>A</u> ll	Selects all nodes.
<u>U</u> nselect All	Unselects all nodes.
<u>C</u> hange Passwords	Opens the “Network Credential Distribution - Enter Job Information for Password Change” dialog window to define a job for applying password changes to the selected nodes.
Menu commands on top of the dialog window:	
File - Exit	 Closes the current dialog window.
Help – ? Help	Starts the FOXMAN-UN help viewer and opens this page.

Dialog image

Network Credential Distribution - Enter Job Information for Password Change

[illegible]

Mandatory entries

Name	Name of the password change job (mandatory entry).
Description	Description of the password change job (optional entry).

Change Password for User Class	At lest one user class needs to be marked, and the respective new password needs to be entered to start the job. Note: The entered password(s) must comply with the password policy applicable to NE passwords. For more information on NE password policies refer to the NE documentation.
Execution Time	Immediately - this is fixed and cannot be selected.

Optional entries

Description	Description of the password change job (optional entry).

Informational content

The selected NE or NEs are shown in the right-hand table named “Selected NEs”.

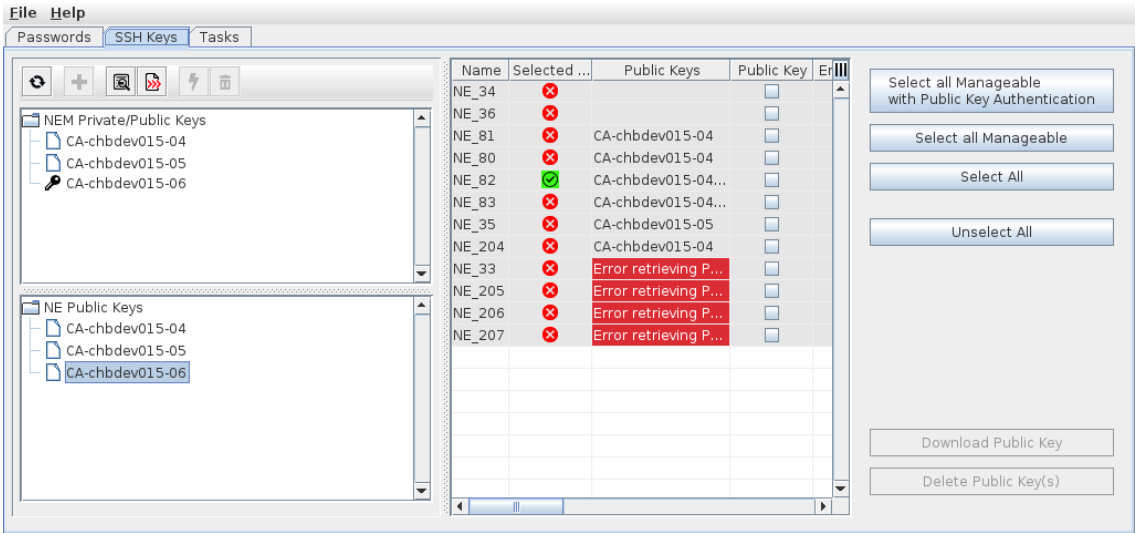
Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
OK	Creates the password change job using the data entered and closes the dialog.
Cancel	Closes the dialog without creating a job.

Dialog image

Network Credential Distribution - SSH Keys

The “SSH Keys” tab is only visible to users with user privilege “Administrator” enabled.



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

- A list of all NEM Private/Public Keys (upper left area); this is a tree list of all generated private/public key pairs with their individual key pair name. Such a key pair is generated via the “+” icon.

Inactive keys are marked with a “white sheet” icon, whereas active keys are marked with a “key” icon.

An active key pair cannot be deleted.

- A list of all NE Public Keys (lower left area); this is a tree list of all generated NE public keys with their individual public key name.
- A list of all NEs (center area table of NEs) defined in the “NE Browser” tab of the **NEM Configurator** with the following columns (most of the columns are described in **NEM Configurator**):

Information in the center area table of NEs:

Marked		Indicates that the table entry is marked for further actions such as “Delete Public Key(s)”.
		Indicates that the table entry is not marked for further actions.
NEs can be marked, e.g., by manually selecting NEs from the table and clicking on “Mark Selected”. Other options to mark NEs for key actions are available via the mark / unmark command buttons in the right area of the dialog.		
Name	NE properties or NE communication properties. For details see Create Agent / Properties, NE – Create / Properties, Create Discovery Request (Discover NEs), and Create NE of type “FO” / FO Properties .	
NE Type		
Addressing		
Agent Name		
Selected Key(s)		The public key selected in the “NE Public Keys” tree is present on the NE.
		The public key selected in the “NE Public Keys” tree is not present on the NE.
Public Keys	Listing of the public keys on the NE. If the NE settings don’t allow SSH keys, this field is marked as “Forbidden”. If keys cannot be retrieved, e.g. due to a networking issue, the error message “Error retrieving Public Keys” is shown.	
Public Key	NE properties or NE communication properties. For details see Create Agent / Properties, NE – Create / Properties, Create Discovery Request (Discover NEs), and Create NE of type “FO” / FO Properties .	
Encrypted (SSH)		
Operational State		
Supervision		
Alarm State		
ID		
Agent Type		
Agent Access Type		
Agent ID		
Foreign Key		
Location		
Tag		
Type		
Security Profile		

Controls (buttons, menu items, etc.)

Icon commands on top of the NEM Private/Public Keys listing:

Refresh		Refresh the contents of all windows of this dialog.
Add		Add a private/public key pair. Execution of this command will request a name for the new key pair. After entering a unique name, the new key pair will be created and added to the list of NEM Private/Public Keys. A success window will pop up, which needs to be confirmed by clicking "OK".
Details		Show details of the selected key. The details include - Name, - Description, - Fingerprint, - Public Key, - Active (checkbox marked or not marked)
Export		Exports the selected public key or the public key of a selected private/public key pair to a file. A file save dialog is opened to select a folder and a file name. The public key is stored with the OpenSSH file extension ".pub". Applicable to a selected key from the list of NEM Private/Public Keys or from the list of NE Public Keys.
Activate		Activate the selected private key. This initiates creation and execution of a job to activate the selected private key. To proceed, the following Job Information needs to be entered: - Name (mandatory), enter a new job name or confirm the proposed name; - Description (optional) Click OK, to continue. The job will be executed, and once done, the private/public key pair will be marked active. Any previously active key pair will be set to inactive state.
Delete		Delete the selected private/public key pair. Applicable only to one selected, inactive key pair from the list of NEM Private/Public Keys.

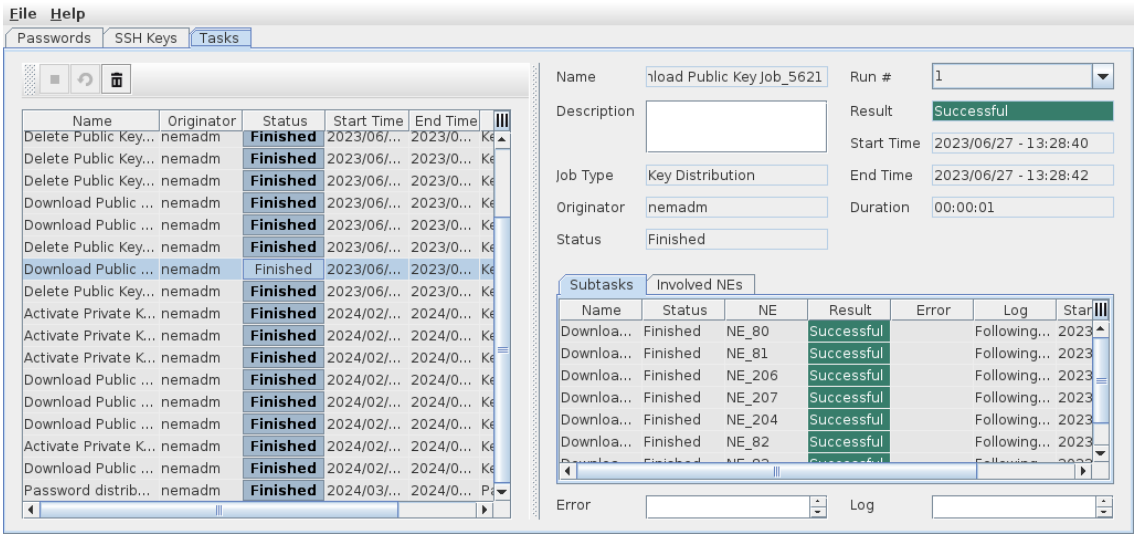
Command buttons on the right hand side of the dialog window:

Mark All	Marks all nodes in the list of nodes, i.e., sets a mark in the checkbox in column "Marked".
Mark MGD	Marks all managed nodes.
Mark All MGD w. Public Key	Marks all managed nodes with public keys.
Mark Selected	Marks the selected nodes. Select nodes by clicking on the table entry using the pointer device. Several nodes are selected using the "Ctrl"/"Strg" key.
Unmark All	Unmark all nodes.

Download Public Key	Creates a job for downloading the public key of a selected private/public key pair to the selected NEs. To be executable, this command requires one selected private/public key pair and at least one selected NE. For job execution, the following Job Information needs to be entered: - Name (mandatory), enter a new job name or confirm the proposed name; - Description (optional) Click OK, to continue. The job will be added to the job list in the "Tasks" tab (left area). The related task will be executed and listed in the details view (right area) of the selected job.
Delete Public Key(s)	Delete selected public keys. This is only applicable to keys that are not installed on any NE.
Menu commands on top of the dialog window:	
File - Exit	 Closes the current dialog window.
Help – ? Help	Starts the FOXMAN-UN help viewer and opens this page.

Dialog image

Network Credential Distribution - Tasks



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

- Left-hand table: A list of all Network Credential Distribution jobs.
In this table, the following information is provided:

Name	Name of the task entered during job creation.
Description	Task description entered during job creation.

Originator	Name of the user that has created the job.
Predecessor Task	Name of the predecessor task, if such task has been defined during job creation.
Predecessor Task must succeed	If a predecessor task has been defined, indicates whether the predecessor must be successful to execute the current task.
Status	Status of the latest task run for this job, such as “Scheduled”, “Running” or “Finished”.
Start Time	Start date and time of the latest task run.
End Time	End date and time of the latest task run.
Type	Type of the job, such as “Key Distribution” or “Password Distribution”.

- Right-hand information: Task details for the task selected in the left-hand table.
In the details area, the following information is provided:

Name	Name of the task (as selected in the left-hand table).
Description	Task description entered during job creation.
Job Type	Type of the job, such as “Key Distribution” or “Password Distribution”.
Originator	Name of the user that has created the job.
Predecessor Task	Name of the predecessor task, if such task has been defined during job creation.
Predecessor Task must succeed	If a predecessor task has been defined, indicates whether the predecessor must be successful to execute the current task.
Status	Task status, such as “Scheduled”, “Running” or “Finished”.
Run #	If a task has been run more than once, lets you select the run # (>1) to see its details.
Result	Result of the task run # (1...n), such as “Successful” or “Failed”.
Start Time	Start date and time of the task run # selected.
End Time	End date and time of the task run # selected.
Duration	Duration (hh:mm:ss) of the task run # selected.
Subtasks table tab (table with more details on the sub-tasks):	
Sub-Task Name	Name of the sub-task(s).
Result	Result of the individual sub-task.
Error	If a sub-task failed, shows the error message related to the failure.
Involved NEs table tab (table with more information on the involved NEs):	
Name	Name of the NE(s) involved in the task execution.
Addressing	Network address of the NE(s) involved in the task execution.
Operational State	Operational state of the NE(s) involved in the task execution.
Encrypted (SSH)	Indicates whether or not the communication to the NE is encrypted as defined in the NE properties (NE – Create / Properties).

Controls (buttons, menu items, etc.)

Icon commands on top of the jobs table (default place):

Abort		Aborts the selected job if any tasks are still running.
Retry		Retry running the tasks for the selected job. This may be useful if any of the tasks have failed on the previous run, e.g. due to temporary unavailability of one of the NEs.

Delete		Delete the selected job. Applicable only to one or several selected job(s). The delete action will also delete the records for tasks and subtasks of the selected job(s) if deletion is confirmed.
Menu commands on top of the dialog window:		
File - Exit		Closes the current dialog window.
Help – ? Help		Starts the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[NEM Configurator](#),
[Create Agent / Properties](#),
[NE – Create / Properties](#),
[Create Discovery Request \(Discover NEs\)](#),
[Create NE of type “FO” / FO Properties](#),
[Task Management](#),
[Job Management](#),
[View Job](#).

6.8.20 ESW Management

Provides the sub-menu options for the following Embedded Software (ESW) distribution related dialogs:

- [Network Overview...](#)
- [Distribution Wizard...](#)
- [Task Management...](#)
- [Job Management...](#)



Please note:

This feature provides ESW management for FOX61x nodes only.

6.8.21 Network Overview

Purpose

This dialog provides an overview of Embedded Software in the managed network(s) in different tabs. Each of the tabs shows its specific list of items. The lists can be expanded and collapsed. When collapsed, the tabs list the following information in the column “Network Element”:

- ESW (tab):
In the collapsed view, lists all ESW installed in the network, with the applicable number of NEs and units having the ESW installed.
- Units (tab):
In the collapsed view, lists all Units installed in the network, with the number of NEs and units having the ESW installed.
- Network Elements (tab):
In the collapsed view, lists all NEs in the network having installed ESW, with the number of units having the ESW installed.

- System Releases (tab):

In the collapsed view, lists all system releases installed in the managed network(s). In brackets you will find the number of items of the child category (NE).

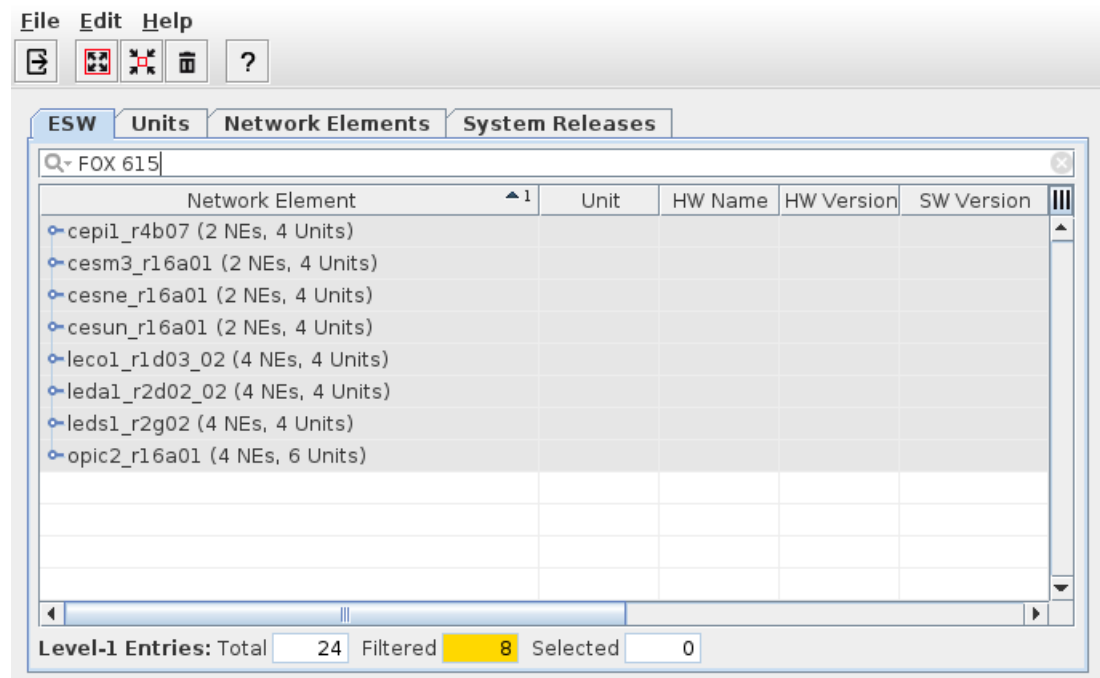
When expanded, each of the lists in the tabs described above show the following additional information:

- Network Element (Name),
- NE Type,
- NE Release,
- Unit,
- HW Name,
- HW Version,
- SW Version,
- Configuration Description,
- Installed Memory,
- Free Memory,
- Manufacturer S/N,
- NE ID,
- Bootloader Version.

It also provides a function to delete unused ESW files. Unused ESW files are available on some units in the network, but are not used currently. It is up to the operator to decide whether or not to delete them. When deleting these files, more space is made available in the memory of the respective units in the network.

Dialog image

Network Overview



Informational content

List of all Embedded Software (ESW) installed in the network. The lists are grouped in three tabs:

- **ESW**, lists all ESW found in the network (name and version, number of NEs and units),
- **Units**, lists all unit names found in the network (unit name, number of NEs and units)

- **Network Elements**, lists all NEs found in the network (NE name, number of units)
 - **System Releases**, lists all system release IDs found in the network (System release ID, number of NEs with ESW of the system release installed).
- Each of the entries in the lists can be expanded / collapsed. When expanded, additional information is shown for each of the expanded entries.

Controls (buttons, menu items, etc.)

Menu “File”

Exit		Closes the current dialog window.

Menu “Edit”

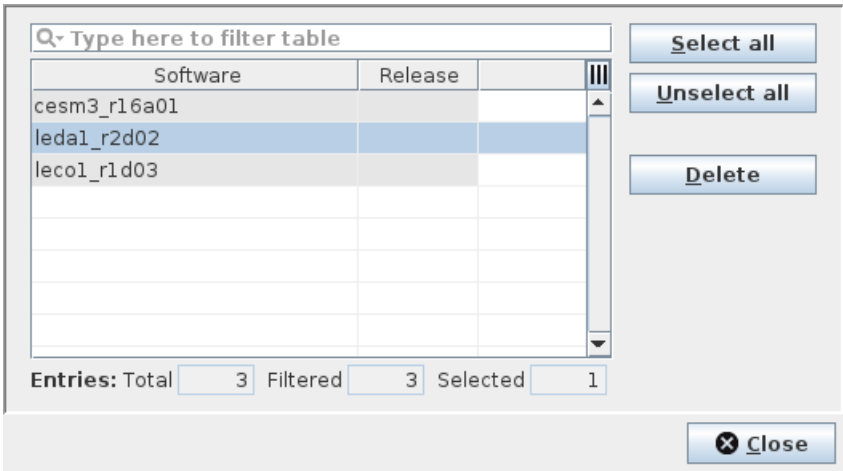
Expand All		Expands all table entries to show more details.
Collapse		Collapses all table entries to show basic information only.
Delete unused ESW		Opens the “Delete Unused ESW” dialog window. The window will display ESW (with ESW name and version, and the related system release if appropriate) found to be unused in the network, i.e., not used on any of the nodes. You can select one or several of the ESW entries and delete theses ESW files from the NEM database by clicking the “Delete” button. You can close the dialog window via the “Close” button.

Menu “Help”

? Help		Calls the FOXMAN-UN help viewer and opens this page.

Dialog image

Delete Unused ESW





Please note:

When opening the dialog, all ESW that has been added to the NEM database and is not known to be used (i.e., not assigned or running) in the network is listed and can be selected for deletion. When deleting a selected ESW, it is removed from the Element Manager, i.e. from the NEM database. This will decrease the space required for the NEM database.

To get deleted ESW back to the NEM database in case it is still used on an NE which was not available in the network when deleting the ESW, it can be manually uploaded from the NE using the FOXCAST, or it is automatically uploaded when connecting to the NE via FOXCAST.

To remove unused ESW in the network, use the **Distribution Wizard**.

Informational content

List of all Embedded Software (ESW) found unused in the network.

Software	Shows the ESW name and version of the unused ESW found in the network.
Name	The name of the ESW (in capital letters).
Revision	The revision of the ESW (in capital letters).
System Releases	If the ESW can be unambiguously assigned to a specific system release or to specific system releases, the system release(s) is (are) shown here.

Controls (buttons, menu items, etc.)

Select all	Selects all entries in the list.
Unselect all	Deselects all entries in the list.
Delete	Deletes the selected ESW from the NEM database. The execution of the delete command must be acknowledged by the user. Successful deletion is indicated by a confirmation message. Deleted ESW will be removed from the list. ESW belonging to a system release will be removed from that release, i.e., they will no longer be part of the respective imported system release and hence not be available for ESW distribution unless the system release ESW package is imported again.
Close	Closes the dialog and returns to the “ Network Overview ” dialog.

Related dialogs / windows

[Distribution Wizard](#),
[Task Management](#),
[Job Management](#).

6.8.22 Distribution Wizard

The ESW Distribution Wizard creates ESW distribution jobs and results in ESW distribution tasks. An ESW distribution job is listed in the “**Job Management**” window. It can have one of the following states:

- Defined

An activated job is in a state where it has a valid definition and has resulted in corresponding tasks.

- Draft

A draft job is not active, e.g. because it has been deleted, but can be used as a template for new tasks.

ESW distribution tasks are listed in the “**Task Management**” window. An ESW distribution task can have one of the following states:

- Scheduled

A scheduled task has not been executed, but is scheduled for execution at a specific date and time.

- Running

A running task is currently being executed.

- Finished

A finished job has been executed. The execution result can be “successful” or “failed”.



Please note:

The ESW Distribution Wizard does not support ESW distribution to FOX61x units running bootloader software. Only units running application ESW can be upgraded. To install application ESW to units running bootloader ESW use the FOXCAST.

Dialog image

ESW Distribution Wizard

Purpose

This wizard guides you through the 9 steps required to create an ESW distribution job.

To create and activate an ESW distribution job,

Proceed as follows: (steps 1 to 9)

1. Job Identification:

- Use the proposed job name or edit the name to match your requirements.
- Enter a description (optional).
- Click “Next >” to continue or “X Close” to cancel.

2. Actions, Start Algorithm, Execution Policy:

Define actions across all NEs:

- Enable or disable “Download ESW on all Units” (set or clear the mark in the checkbox); when enabled, select one of the following:
 - Do not delete ESW before (i.e. before downloading new ESW);
 - Delete oldest unassigned ESW before (i.e. before downloading new ESW);
 - Delete all unassigned ESW before (i.e. before downloading new ESW).
- Enable or disable starting new ESW on all units (set or clear the mark in the checkbox “Start ESW on all Units”).

Define Start Algorithm (i.e., the algorithm applied for the correct restart sequence per NE); select one of the following:

- Minimal Service Interruption - Revertive EQP
This includes a warning related to NEs not supporting this algorithm will use the start algorithm “System Release Upgrade”. The revertive EQP algorithm will use switch-over to the protecting unit for units installed with equipment protection, and will switch back to the working unit after ESW installation is completed.
- Minimal Service Interruption - Non-Revertive EQP
The non-revertive EQP algorithm will use switch-over to the protecting unit while installing ESW on the working unit and will not switch back to the working unit after ESW installation is completed.
- System Release Upgrade
This algorithm will not specifically minimize service interruption while upgrading the system release ESW on all affected units.
- Unit Upgrade
This algorithm is to be used for single or multiple service units only, without restart of the core unit(s).

Define the execution policy:

- Enable or disable the Execution Policy “Abort on first Error”.

Click “< Back” to go back to the previous step, “Next >” to continue or “X Close” to cancel.

3. ESW Selection:

- There are two options to select the required ESW:
 - Select the “Desired System Release” from the drop-down field. This requires a valid system release ESW zip archive. To import a system release, click on “Import ESW...” and import the system release ESW zip archive from the file system where you have stored the archive. The import process will take some time.



Please note:

Importing a system release ESW zip archive requires considerable space in the NEM_DATABASE.

→ To save space in the database only import the system release zip files that are really required.

Once a system release is selected, the related units and their ESW are shown in the “Select ESW” list. If you make any manual changes to the list, the “Desired System Release” will be canceled.

- Select a set of single unit ESW from the list on the right-hand side of the dialog window by marking one or several entries. If no ESW is available, import ESW by clicking on the “Import ESW...” button and navigate to the folder where you have stored the required ESW files. Select file type “*.esw”, then select the required ESW file and click “Open” to upload the file to the NEM database. This steps must be repeated for each ESW file.

After importing ESW files make sure that the selected ESW is as required for each of the activated unit entries in the list.

- Click "< Back" to go back to the previous step, "Next >" to continue or "X Close" to cancel.
4. NE Selection:
- This step shows a list of NEs in your network eligible for ESW installation. If the list is empty, none of the NEs are eligible for installation of the ESW selected in the previous step. This may be due to several reasons such as:
 - ESW on all NEs is up to date already,
 - none of the NEs uses the selected units / ESW.
 - To see the list of all NEs, including those not eligible for ESW distribution with the current settings, mark the checkbox "Show all NEs".
 - In the list of NEs, mark the ones required for the current job. Use the "Mark All" or "Unmark All" buttons to mark or unmark all NEs in the list. Use the "Mark" or "Unmark" buttons to mark or unmark selected NEs in the list.
 - Click "< Back" to go back to the previous step, "Next >" to continue or "X Close" to cancel.
5. Overview:
- Shows a list of selected NEs and applicable units with the following information fields under each NE:
 - Name: unit address (e.g., unit-1),
 - HW Name (e.g., CESM3),
 - HW Key,
 - Board ID,
 - Current ESW Name,
 - Current Release/ESW,
 - Desired Release/ESW,
 - ESW Deletion,
 - ESW Download,
 - ESW Start,
 - Start Algorithm (MSI = Minimum Service Interruption),
 - Release Compatibility,
 - EQP Compatibility,
 - Upgrade Compatibility,
 - Downgrade Compatibility.
 - In the "Desired Release/ESW" column of the list, select the ESW to be installed on each applicable unit via the drop-down field in the table, if required, or use the proposed entry.
 - The command "Set Default ESWs" will reset all values in the "Desired Release/ESW" column to default values. Execution of the command must be confirmed by the user.
 - To prevent compatibility checks as required, set a mark in any of the checkboxes
 - Release Compatibility,
 - EQP Compatibility,
 - Upgrade Compatibility,
 - Downgrade Compatibility.
 - Click "< Back" to go back to the previous step, "Next >" to continue or "X Close" to cancel.
6. Processing Order:
- Select the "Processing Order of NEs" by choosing one of the two options:
 - Process all NEs in sequence (no grouping). The sequence will be shown in the next step.

- Assign NEs to sequentially processed groups. When selecting this option, you may use the default number of NEs per group (2) or set a required number of NEs per group (depending on the total number of NEs selected in step 4). This option is suitable e.g. in case of in-band management for specific NEs which requires a stable management connection via gateway NEs during ESW delivery and installation. The Sequence will be shown in the next step.
- Click "< Back" to go back to the previous step, "Next >" to continue or "X Close" to cancel.

7. NE Order:

- In "Sequentially processed groups of NEs" the NE groups are shown with a default arrangement of NEs per group. The number of groups and the number of NEs per group depend on
 - the number of NEs selected in step 4,
 - the number of NEs per group selected in step 6.
- If all NEs shall be processed in sequence, only one group including all NEs is shown.
- If NEs are assigned to sequentially processed groups, and the number of NEs per group is smaller than the total number of NEs, several groups are shown. These groups will be processed in sequence, i.e. once the job will be executed, NEs in group 1 will be processed in parallel, but before NEs in group 2, etc.
- You can now rearrange any NE within a group, move an NE to a different group or park an NE in the "Group of unassigned NEs" field. Do this with the pointing device by dragging and dropping the NEs listed in any of the groups.
- Click "< Back" to go back to the previous step (only possible if the "Group of unassigned NEs" is empty), "Next >" to continue or "X Close" to cancel.

8. Schedule:

- If the start of the first selected action of the job shall depend on a predecessor job, mark the checkbox "After a predecessor job" and select the required condition in the drop-down field from a list of previously created jobs. If no jobs exist, the list will be empty.
- Depending on the selected actions from step 2, you can now define further details (a "Schedule of Actions", and "Conditions of Actions") for these actions.
- Schedule of Actions:
 - Immediately (after selected predecessor job, if enabled), or
 - At a specific Date and Time: enter a date and a specific time for the action. Note that the time selected will be the start time of the job execution.
- Condition of Actions:
 - Enabled or disable the condition "Execute only if <previous action> successfully completed" if applicable. The <previous action> depends on your settings and can be, e.g., a predecessor job or an ESW download.
- Click "< Back" to go back to the previous step, "Next >" to continue or "X Close" to cancel.

9. Activation:

- If required, select the option to launch the task viewer by setting a mark in the 'Launch the "Task Viewer" upon <Activate>' checkbox. This will open the **"Task Management"** window after activation of the job.
 - Click "< Back" to go back to the previous step, "Activate >" to activate the job or "X Close" to cancel.
- After clicking "Activate", a confirmation is required to activate the job. When selecting "Yes", the job will be activated; "No" or "Cancel" will get you back to the wizard step 9.

Result: After confirming activation, an information on successful job activation is issued, the ESW Distribution job is activated and the related task(s) is (are) started.

End of instruction

Controls (buttons, menu items, etc.)

? Help	Starts the FOXMAN-UN help viewer and opens this page.
< Back	Go back to the previous step of the wizard. Button only active if the conditions to go back are fulfilled.
Next >	Proceed to the next step of the wizard. Button only active if the conditions to proceed are fulfilled.
Activate	Activate the distribution job. Button only active if the conditions are fulfilled.
X Close	Closes the dialog, asking for confirmation to - save your current changes (“Yes”), - close without saving the changes and without creating a job (“No”), or - cancel closure of the wizard and continue job creation (Cancel”).

Related dialogs / windows

[Network Overview](#),
[Task Management](#),
[Job Management](#).

6.8.23 Task Management

Purpose

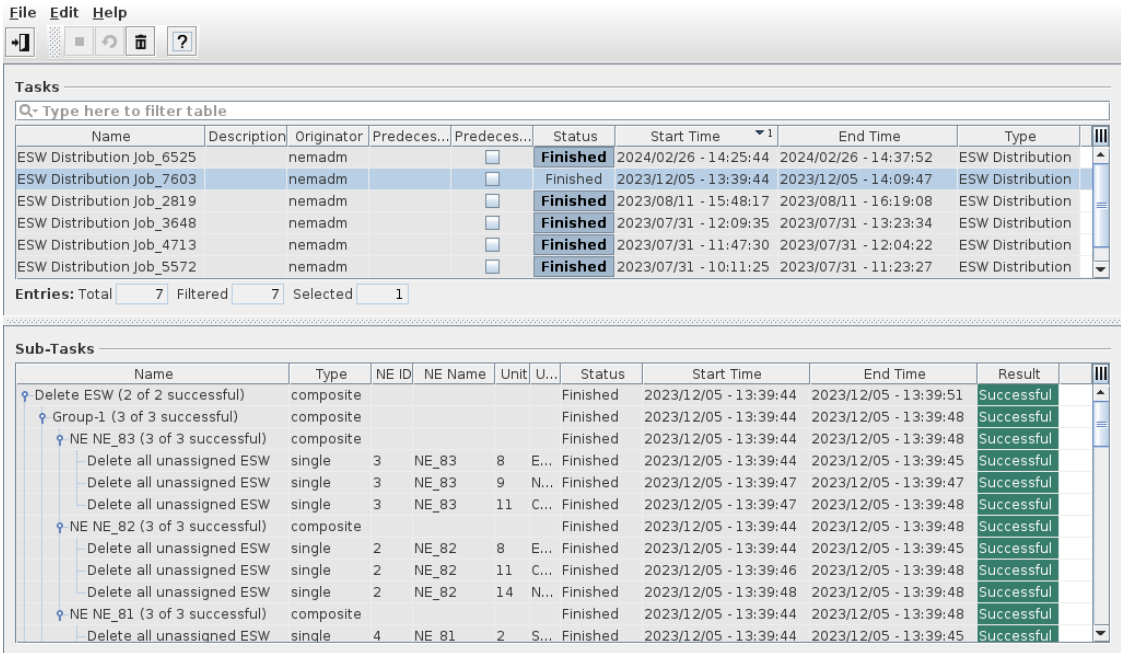
This dialog window shows a list of all tasks related to ESW distribution. Tasks can be retrieved, aborted or deleted depending on their status, and task details can be displayed.

Finished or aborted tasks can be deleted, provided the FOXMAN-UN user has the required access rights.

Tasks have sub-tasks, for which a detailed list is displayed in the lower part of the dialog window.

Dialog image

Task Management



Mandatory entries

None.

Optional entries

None.

Informational content

Tasks:	
Name	Name of the task.
Description	Task description
Originator	User name of the user having defined the task.
Predecessor Task	Name of the defined predecessor task. The predecessor task is or was due for execution before the execution of the selected task.
Predecessor Task must succeed	True or false.
Status	Status of the task (Scheduled, Running, Finished).
Start Time	Date and time at which the task has started.
End Time	Date and time at which the task has ended.
Type	The task type (ESW Distribution).
Sub-Tasks:	
Name	Name of the sub-task. This name is automatically composed of available task definition details.
Type	Type of the sub-task (single, composite). Sub-tasks on level 4 are single tasks.
NE ID	ID of the involved NE.
NE Name	Name of the involved NE.
Unit ID(s)	Slot of the involved unit.
Unit Name	Name of the involved unit.
Status	Status of the sub-task.
Start Time	Start time of the sub-task. The start time of each sub-task is individually recorded. Not available for scheduled tasks.
End Time	End time of the sub-task. The end time of each sub-task is individually recorded. Not available for scheduled tasks.
Result	Result of the sub-task execution (successful, failed).

Controls (buttons, menu items, etc.)**Menu “File”**

Exit		Closes the current dialog window.

Menu “Edit”

Abort Task		Aborts a running task.

Retry Task		Retries to run an aborted task.
Delete Task(s)		Deletes selected task(s). Requires confirmation before deletion is executed. A deleted job is removed from the list of jobs.

Context menu on selected task

Show Task Details...	Calls the “Task Details” window to display details of the selected task.

Context menu on selected sub-task

Show Sub-Task Details...	Calls the “Sub-Task Details” window to display details of the selected sub-task.

Menu “Help”

? Help		Calls the FOXMAN-UN help viewer and opens this page.

Dialog image

Task Details

Task Name

Description

Job Type

Originator

Involved NE(s)

Predecessor Task

Predecessor Task must succeed

Status

Results

Run #

Result

Starttime

Endtime

Duration

Failed Sub-Tasks

ESW Distribution Job_7603

ESW Distribution

nemadm

NE_83, NE_82, NE_81, NE_80

none

Finished

1

Successful

2023/12/05 - 13:39:44

2023/12/05 - 14:09:47

30:02

Name	Status	NE	Result	Error	Log	Start Time	End Time

? Help

Close

Mandatory entries

None.

Optional entries

None.

Informational content

Task Details:	
Task Name	Name of the task.
Description	Task description.
Originator	User name of the user having defined the task.
Involved NEs	IDs of the NEs involved in the task execution, separated by commas.
Predecessor Task	Name of the defined predecessor task, or “none”. The predecessor task is or was due for execution before the execution of the selected task.
Predecessor Task must succeed	“true” or “false” if a predecessor task is defined. “---” if no predecessor task is defined.
Status	Status of the task (Scheduled, Running, Finished).
Results:	
Run #	Shows how many times the task has run. Empty if not run yet.
Result	The result of the last run (Successful, Failed). Empty if not run yet.
Starttime	Date and time when the task last started. Empty if not run yet.
Endtime	Date and time when the task last finished. Empty if not run yet.
Duration	Execution duration of the task during the last run. Empty if not run yet.
Failed Sub-Tasks	Lists failed sub-tasks in a table with information on - Name, - Status, - NE, - Result, - Error, - Log, - Start Time, - End Time.

Controls (buttons, menu items, etc.)

? Help	Calls the FOXMAN-UN help viewer and opens the Task Management page.
Close	Closes the dialog window.

Dialog image

Sub-Task Details

Details for level-4 entries:

Sub-Task NameDelete all unassigned ESW

DetailsN/A

NE Id3

NE NameNE_83

Unit8

Unit NameELET1

StatusFinished

Results

Run #1

ResultSuccessful

Starttime2023/12/05 - 13:39:44

Endtime2023/12/05 - 13:39:45

Duration00:00

Log MessageNo firmware found for deletion.

Error Message

? Help

Close

Mandatory entries

None.

Optional entries

None.

Informational content

Sub-Task Details:	
Sub-Task Name	Name of the sub-task. The sub-task is a level-4 entry in the list of sub-tasks of the Task Management dialog window.
Details	Details of the sub-task, if available.
NE Id	ID of the NE affected by the sub-task execution.
NE Name	Name of the NE affected by the sub-task execution.
Unit	Slot(s) of the unit(s) affected by the sub-task.
Unit Name	Name of the unit(s) affected by the sub-task.
Status	Status of the sub-task (Scheduled, Running, Finished).
Results:	
Run #	Shows how many times the task has run. Empty if not run yet.
Result	The result of the last run (Successful, Failed). Empty if not run yet.
Starttime	Date and time when the task last started. Empty if not run yet.
Endtime	Date and time when the task last finished. Empty if not run yet.

Duration	Execution duration of the task during the last run. Empty if not run yet.
Log Message	If applicable, shows a message related to the task execution.
Error Message	If applicable, shows a message related to error(s) that have occurred during task execution.

Controls (buttons, menu items, etc.)

? Help	Calls the FOXMAN-UN help viewer and opens the Task Management page.
Close	Closes the dialog window.

Related dialogs / windows

[Network Overview](#),
[Distribution Wizard](#),
[Job Management](#).

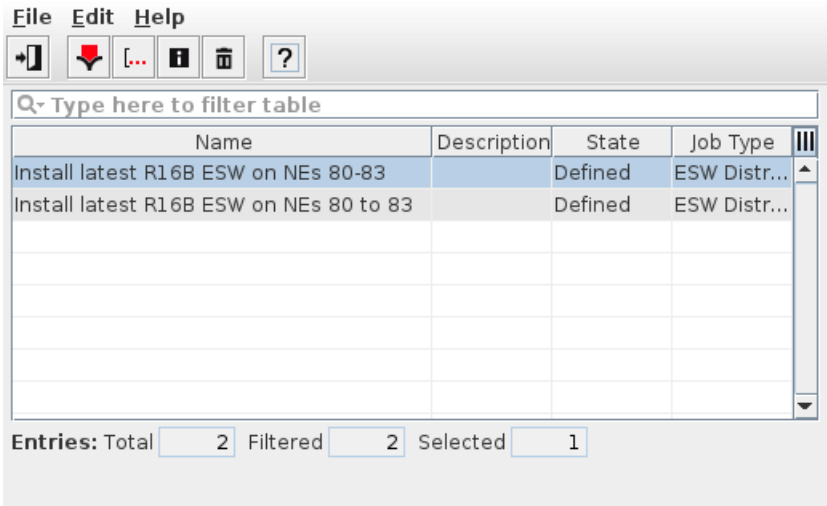
6.8.24 Job Management

Purpose

This dialog shows a list of all jobs such as ESW or SSH keys distribution, regardless of their status. Jobs can be edited, deleted, and copied. Jobs are the basis (template) for related tasks.

Dialog image

Job Management



Informational content

General information:	
Name	Name of the job. The job name is determined during the definition of the job in the Distribution Wizard .
Description	Description entered as “Job Description” when creating the job.
State	Current state of the job, see Distribution Wizard .
ID	Job ID; this column is hidden by default.
Job Type	Shows the type of the job; possible options depend on feature availability.

Controls (buttons, menu items, etc.)

Menu “File”

Exit		Closes the current dialog window.

Menu “Edit”

Copy Job		Creates a copy of the selected job. The copy gets the name of the original job, complemented with “_clone” and a number starting from 1. The copy will have “Draft” state and can be edited and activated in the wizard.
Edit Job		Edit a job. This will open the Distribution Wizard , which allows you to edit the job name and its further properties, and to activate the job. Editing is possible for activated jobs if the corresponding task has not been executed yet, or if a job has “Draft” state. Jobs with scheduled tasks can be edited, but, their related task will be deleted and replaced by the task resulting from the modified job properties. Jobs with corresponding tasks that are running or have already finished cannot be edited.
View Job		Shows job details in a separate window, see View Job .
Delete Job(s)		Deletes selected job(s). Requires confirmation before deletion is executed. A deleted job is removed from the list of jobs.

Menu “Help”

? Help		Calls the FOXMAN-UN help viewer and opens this page.

Related dialogs / windows

[Network Overview](#),
[Distribution Wizard](#),
[Task Management](#).

6.8.25 View Job

Purpose

This dialog shows details about the selected job. The details include the job name, actions, an overview, its processing order, and schedule steps and conditions.

Dialog image

View Job (sample: ESW distribution)

FileEditHelp

Job Name

ESW Distribution Job_2819

Job State

Defined

Description

Actions

☒ Delete (All unassigned ESW)

☐ Abort on first error

☒ Download

☒ Start ESW (System Release Upgrade)

Overview

Name	Layer	HW Name	ESW to install	Start Algorithm	
NE_83				System Release Upgrade	
NE_80				System Release Upgrade	
NE_82				System Release Upgrade	

Level-1 Entries: Total 4 Filtered 4 Selected 0

Processing Order

Process NE groups in sequence(NEs within groups are processed in parallel)

Group-1

NE_83

NE_82

NE_81

Group-2

NE_80

Schedule

☐ Predecessor Job

☒ Download (with deletion)

☐ only if predecessor successfully completed

☒ Immediately

☐ only if deletion successfully completed

☐ At Date and Time:

☒ Start ESW

☐ only if download successfully completed

☒ Immediately after ESW download

☐ At Date and Time:

Informational content

General information:	
Job Name	Name of the job. The job name is determined during the definition of the job in the Distribution Wizard .
Description	Description entered as “Job Description” when creating the job.
Job State	Current state of the job, see Distribution Wizard .
Actions:	
Delete (all unassigned ESW)	If marked, ESW present on the NEs shall be deleted as defined in the job definition done in the Distribution Wizard .
Download	If marked, ESW shall be downloaded.
Start ESW (<Start Algorithm>)	If marked, ESW shall be started after download. The start algorithm is shown in brackets.
Abort on first error	If marked, the task shall abort on the first encountered error. If not marked, the task shall continue attempting a “best effort” execution.
Overview:	
Name	Name of the NE(s). When expanded, additional information includes the unit name(s).

Layer	Shows the layer from 0 (corresponds to unit) to n, "1" is a subset of the unit.
HW Name	The unit HW name.
ESW to install	Name and version of the ESW to install.
Start Algorithm	Start algorithm selected in the job definition.
Expand All (can be set/unset)	If marked, all table entries are expanded. If not marked, the entries are collapsed to the NE name.
Processing Order:	
Group-n	For all defined groups 1 to n, the order for processing the tasks (groups from left to right) and the NEs assigned to each group are listed.
Schedule:	
Predecessor Job	If marked, predecessor job(s) has (have) been defined for the job.
Download (with deletion)	If marked, the job includes the download of ESW. Further options are shown that apply for the "Download" sub-task(s).
Start ESW	If marked, the job includes the start of downloaded ESW. Further options are shown that apply for the "Start ESW" sub-task(s).

Controls (buttons, menu items, etc.)

Menu "File"

Exit		Closes the current dialog window.

Menu "Edit"

Copy Job		Creates a copy of the selected job. The copy gets the name of the original job, complemented with "_clone" and a number starting from 1. The copy will have "Draft" state and can be edited and activated in the wizard. It is listed in the "Job Management" dialog.
Edit Job		Edit a job. This will open the Distribution Wizard , which allows you to edit the job name and its further properties, and to activate the job. Editing is possible for activated jobs if the corresponding task has not been executed yet, or if a job has "Draft" state. Jobs with scheduled tasks can be edited, but, their related task will be deleted and replaced by the task resulting from the modified job properties. Jobs with corresponding tasks that are running or have already finished cannot be edited.
Delete Job(s)		Deletes selected job(s). Requires confirmation before deletion is executed. A deleted job is removed from the list of jobs.

Related dialogs / windows

Distribution Wizard,
Job Management,
Task Management.

6.9 Ethernet Traffic Protection Maps

This section provides information regarding the FOXMAN-UN topology graphical displays that allow identifying the network protection topologies and their components, such as:

- Rapid Spanning Tree:
 - current tree structure,
 - spanning tree instance(s),
 - VLAN associations,
 - node and port statuses.

The map can be organized into a set of sub-maps that allow a network to be represented from different groupings or hierarchical levels.



Please note:

The Ethernet traffic protection maps are applicable only for managed FOX61x NEs running on system release R1 Embedded Software (ESW).

For FOX61x R2, R3, R14, and R15 NEs, the limitations below apply:

- There is no service level agreement provided covering the use of L2 VLAN bridging feature.
- The ERPS protocol cannot be enabled.
- The Spanning Tree on the control unit uplink ports are used exclusively for the IEEE1588 (PTP) and management applications.
- The Spanning Tree can be configured on service units after a warning confirmation. The warnings emphasize that the switching protocol features should not be used together with MPLS-TP in the network.

For NEs of FOX61x R16A and following system releases, the ERPS functionality is available on the NE but Ethernet Traffic Protection Maps cannot be used with these NEs due to discontinued support in FOXMAN-UN.

Detailed information regarding provisioning using the **FOXCST** is available in the following document:

- FOX61x User Manual “Ethernet Switching” [1KHW028566].

6.9.1 Traffic Protection Maps Introduction

Overview of traffic protection topologies

All networks need redundancy for enhanced reliability. Redundancy improves the availability of the network by implementing multiple paths for data to traverse the network. This allows the networks to be fault tolerant by providing an alternative path in case of a failure of a link, port or networking device.

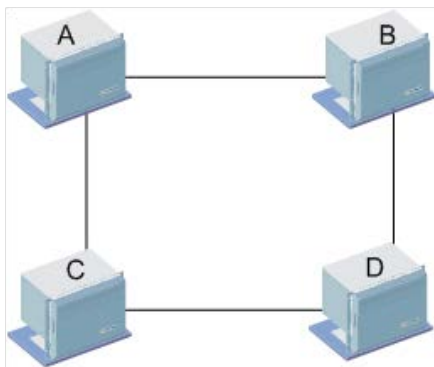


Figure 1: Physical Topology with redundant paths (looped)

However, redundant paths can introduce physical loops into the network. In a switched or bridged network, these loops cause broadcast storms, multiple frame transmissions, and Media Access Control (MAC) database instability. Network loops should therefore be avoided.

FOX61x R1C, R1D support the following protocols for loop avoidance solutions:

RSTP (Rapid Spanning Tree Protocol)

STP is a layer 2 link management protocol that is used to maintain a loop free network. A loop-free topology is accomplished when the switch or bridge recognizes a loop in the topology, and logically blocks one or more redundant ports automatically as shown in figure **RSTP Loop-Free Topology: redundant path blocked**.

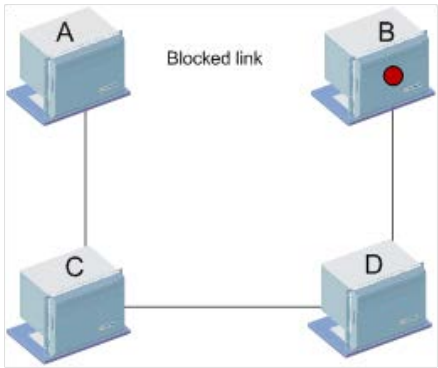


Figure 2: RSTP Loop-Free Topology: redundant path blocked

RSTP is designed to significantly speed up the calculation of the spanning tree (convergence time) when network topology changes as compared to STP convergence time of 50 seconds. With RSTP, the convergence time or the time required to reconfigure the network is roughly in the range of 300 ms (for the point-to-point link between 2 switches) to 5 seconds (for ring topologies with up to 19 switches).

6.9.2 Rapid Spanning Tree Protocol (RSTP)

The RSTP is a layer 2 link management protocol used to provide network with alternative redundant paths with loop avoidance solution.

If a change occurs to the network topology e.g. due to a bridge or link failure, recalculation of the spanning tree is done to maintain a loop free topology.

The recalculation involves transitioning the Discarding ports to Forwarding ports or vice versa. During this transition the ports are not sending traffic data.

The network converges when all the switch and bridge ports have transitioned to either the Forwarding or Discarding state.

Rapid Spanning Tree Operation

RSTP initially converges on a logically loop-free network topology by doing the following steps:

- 1 Electing a root bridge
The protocol has a process to elect a root bridge. Only one bridge can act as root bridge in a given network. On root bridge, all ports are designated ports, which are forwarding (D) traffic data.
 - Root bridge has the lowest BID (Bridged ID). The BID includes the priority and the MAC address of the bridge.
 - An administrator can influence the decision by setting the switch priority to a smaller value than the default to make the BID smaller.
- 2 Selecting the root port on the non-root bridges
RSTP establishes one root port, which is forwarding data traffic, for each non-root bridge. The root port is the lowest-cost path from the non-root bridge to the root bridge.

Table 1: Cost Settings for RSTP

Link Speed	Cost
10 Gbps	2

Table 1: Cost Settings for RSTP

Link Speed	Cost
1 Gbps	4
100 Mbps	19
10 Mbps	100

3 Selecting one designated port per segment

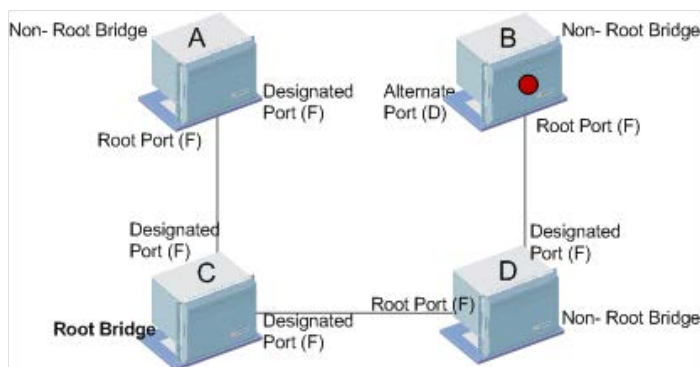


Figure 3: RSTP Operation

Port Roles and Port States

The Port role is variable, assigned to a given port.

- The Root Port and Designated Port are used for forwarding (F) data traffic.
- Alternate Port is in Discarding state

A backup of the Root port. If the Root port fails it can immediately transition into the Forwarding state and become the new Root port.

- Other port roles

- Backup Port

A backup of the Designated port and is in a Discarding state. If the Designated port in a shared segment fails, it will take over the role of the new Designated port.

Backup port is not often used as this would require connecting the bridge with multiple links to shared medium, e.g. a hub.

- Edge Port

A port that is the candidate for a quick transition to forwarding state as it connects device that cannot create the loop (no BPDUs received on that port).

Table 2: RSTP Port Roles

Port States	Is Port Included in Active Topology?	Is Port Learning MAC Addresses?
Discarding - No data traffic is sent over the port.	No	No
Learning - Not forwarding data yet, but is populating its MAC-address table.	Yes	Yes
Forwarding - Port is forwarding data traffic.	Yes	Yes



- Please note:**
Current FOXMAN-UN release will display:
- “Forwarding” port state only,
 - “N/A” or not applicable port role for RSTP network.

6.9.3 Spanning Tree Map Preconfiguration and Operation

Preconfiguration via FOX CST

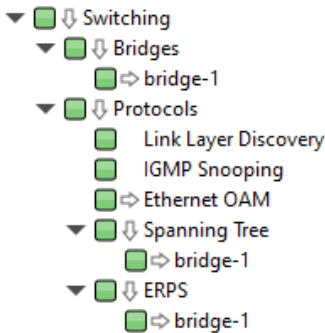
The RSTP parameters should be configured/provisioned via FOX CST.
Detailed information regarding provisioning are available at the following document:

- User Manual Ethernet Switching [1KHW028566].

Sample RSTP configuration via FOX CST

The spanning tree parameters configured via FOX CST are reflected in the FOXMAN-UN spanning tree map. A sample FOX CST configurations of the node “Audi” are shown below:

- 1 From NEM Configurator, launch the FOX CST of the NE to be configured by selecting the context menu “Configuration > Manager”
- 2 Select the  Switching tab from the main tabs of the FOX CST GUI.
- 3 Select “Spanning Tree” from the “Switching” tree on the left hand side of the FOX CST GUI.



- 4 Select “bridge-1 Spanning Tree RSTP” from the list view on the right hand side of the “Switching tree”. This will preselect RSTP as the spanning tree protocol to be used on the NE.

Spanning Trees		
Bridge	Instance	Protocol
bridge-1	Spanning Tree	Rstp

- 5 Select the “Configuration” tab to configure the RSTP settings. The default values are shown below:

RSTP (Rapid Spanning Tree)

Status

Configuration

Spanning Tree

Priority

32768

–

+

Tx Hold Count

6

–

+

Timing Parameters

Maximum Age

20

–

+

s

Hello Time

2

–

+

s

Forward Delay

15

–

+

s

Dual Homing

TC Propagation to/from VPLS

☒

TC Persistency Time

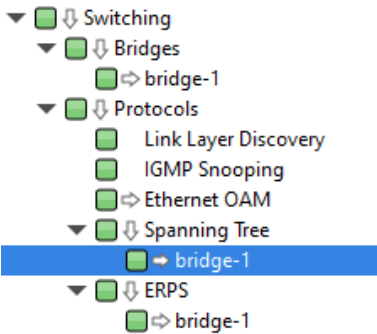
60

–

+

s

- 6 Select “bridge-1” from the tree view.



- 7 From the list of ports that support RSTP, you can now enable RSTP on all required switch ports by activating the “STP Enabled” checkbox.

Then click “Apply changes to the NE” icon .

- 8 Click on the “Configuration” tab for the selected port to configure “Priority” and “Path Cost”. The default values are shown below (if only STP is enabled but not R-L2GP):

Status

Configuration

Port Properties

Priority

128

–

+

Auto Edgeport

☒

Restricted TCN

☐

Restricted Role

☐

Path Cost

Automatic Cost

☒

Manual Cost

1

–

+

If R-2LGP is enabled, also the Pseudo Root Bridge MAC address and priority are shown, and Restricted Role is not available.

- 9 Click on “Apply changes to the NE” icon  to check the current status of the Spanning Tree and selected port (see sample screenshots below).



Please note:

The screenshots below show the RSTP and selected port status of an NE.

- Designated Bridge/ Local Bridge:
The MAC Address of Local bridge.
- Designated Root/ Root Bridge:
The MAC address of Root bridge.
- Root Port:
The Local bridge's port towards the Root bridge.
- Cost/Path Cost/Designated Cost:
The calculated cost from the Root bridge to the Local bridge.

- Priority (samples shown below):
The assigned Bridge priority (32768),
The assigned Port priority (8).

RSTP (Rapid Spanning Tree)

Status

Configuration

Spanning Tree

Local Bridge	00:E0:DF:90:B2:ED	Priority	32768
Root Bridge	00:E0:DF:90:B2:ED	Priority	32768
Root Port		Cost	0

Timing Parameters

Maximum Age	20.00	s
Hello Time	2.00	s
Forward Delay	15.00	s
Hold Time	0.00	s

Status

Configuration

Port Status

Port State	Forwarding
Path Cost	20000
Edgeport	☒
Point-To-Point	☒
Port Role	Designated
Disputed State	☐

Spanning Tree

Designated Root	00:E0:DF:90:B2:ED	Priority	32768
Designated Bridge	00:E0:DF:90:B2:ED	Priority	32768
Designated Port	1104	Priority	8
Designated Cost	0		

Preconfiguration via FOXMAN-UN client

License

In order to enable the Spanning Tree application, the <STP> element of the license file "license.xml" should be enabled.

Section Management

The required sections/links between the bridge nodes should be provisioned in advance via FOXMAN-UN **Section Management** application.

DAC

The available NEs depend on the domains assigned to the user. It is up to the FOXMAN-UN administrator to choose the NEs for the user domains such that a meaningful spanning tree can be drawn.



Please note:

For detailed information, please refer to section **Domain – Choose Members**.

If some of the needed NEs are missing, then a spanning tree fragment will result, which is of very limited value.

Spanning Tree Map GUI Operation

- 1 Launch the Spanning Tree Map Application

NEM Desktop > Network > Spanning Tree

- 2 Select one of the RSTP configured NE, e.g. “Audi”, from the “Select NE” dialog.

Name ▲ ¹	Addressing	Agent Access Type	Agent ID	Alarm
Aarau	IP: 200.200.200.11	IP Only	1	Cleared
Aarberg	IP: 200.200.200.150	IP Only	1	Cleared
Adliswil	IP: 200.200.200.77	IP Only	1	Cleared
Affoltern am Albis	IP: 200.200.200.89	IP Only	1	Cleared
Airolo	IP: 200.200.200.175	IP Only	1	Cleared
Allschwil	IP: 200.200.200.108	IP Only	1	Cleared
Altdorf	IP: 200.200.200.23	IP Only	1	Cleared
Altstätten	IP: 200.200.200.54	IP Only	1	Cleared
Amriswil	IP: 200.200.200.60	IP Only	1	Cleared
Amsteg	IP: 200.200.200.173	IP Only	1	Cleared
Appenzell	IP: 200.200.200.8	IP Only	1	Cleared
Arbon	IP: 200.200.200.58	IP Only	1	Cleared
Arosa	IP: 200.200.200.187	IP Only	1	Cleared
Arth	IP: 200.200.200.145	IP Only	1	Cleared
Audi	IP: 172.31.66.3	IP Only	3	Cleared
Baar	IP: 200.200.200.90	IP Only	1	Cleared
Bad Ragaz	IP: 200.200.200.194	IP Only	1	Cleared
Baden	IP: 200.200.200.101	IP Only	1	Cleared
Basel	IP: 200.200.200.13	IP Only	1	Cleared
Bellinzona	IP: 200.200.200.17	IP Only	1	Cleared
Bergün	IP: 200.200.200.191	IP Only	1	Cleared

Entries: Total 222 Filtered 222 Selected 1

OK Apply Cancel



Please note:

The STP Map application will request the selected NE for its STP information including the states and roles of its STP ports.

The STP Map application will then calculate the path from the selected NE towards the root bridge.

6.9.4 Spanning Tree Map

Purpose

Displays the Spanning Tree view of a selected NE with STP configured.

**Please note:**

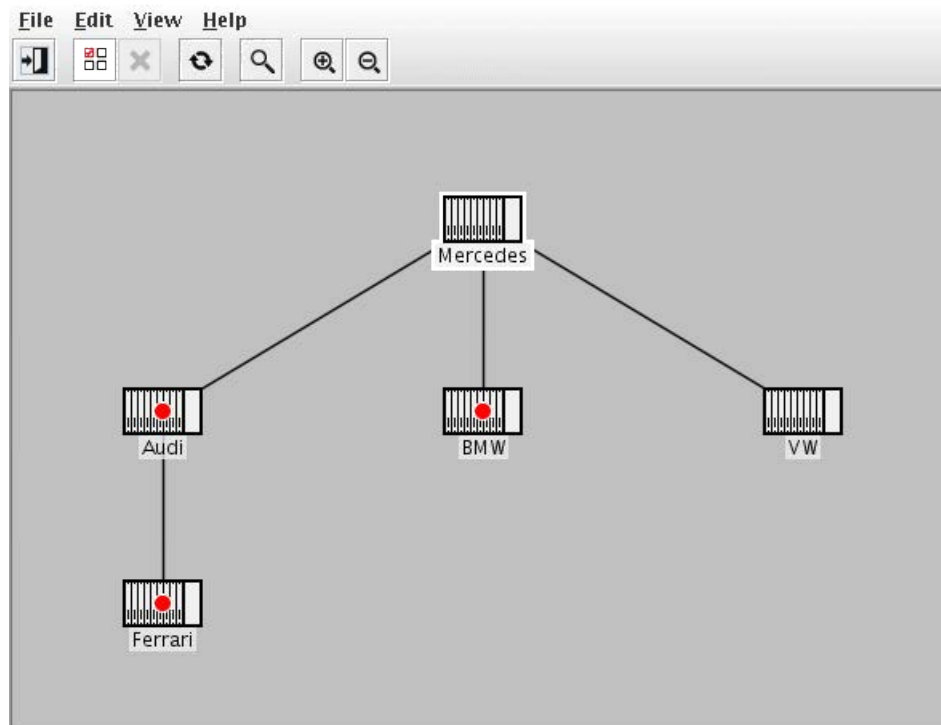
For background information, please refer to section [Rapid Spanning Tree Protocol \(RSTP\)](#).

For Spanning Tree provisioning, please refer to section [Spanning Tree Map Pre-configuration and Operation](#).

The tree is only built and shown over sections configured in [Section Management](#). Missing sections will prevent showing the full tree.

Dialog image

Spanning Tree



Mandatory entries

Select an NE from the Select NEs dialog.

Optional entries

Not applicable.

Informational content

- Bridge node
 - All bridge nodes show the bridge name (the NE name known in FOXMAN-UN). If the bridge has a port with status Blocking, this is indicated by a red circle marker.
 - a tool-tip on the bridge node shows additional information of the bridge:

Bridge node (RSTP)

Name	The RSTP Bridge Name.
	Note: Currently "Customer Bridge" is the only bridge.
Priority	The configured Local/Root bridge priority.
Own MAC Address	The Local bridge MAC address.
Root MAC Address	The Root bridge MAC address.
Blocking ports	The slot/port# of ports which are in Discarding state.

- a double click on bridge node opens the **FOXCAST** of the corresponding NE with user class "Information".

Note:

Verify that the **FOXCAST** is defined in the "client_cst_doubleclick_default" parameter of /opt/nem/etc/cst.conf.

- Links
 - Links are represented with dark gray lines between bridge nodes. Only links with forwarding endpoints are shown.
 - a double click on a link opens the Section Manager and the section on which the link relies is shown.
 - a tool-tip on the link shows additional information of the link end ports.

Link end ports

Port Roles	Shows the link end port's role.
	Note: In RSTP, the port role is not applicable and will be shown as "N/A".
Priorities	Shows the configured port priority.
Port State	Shows only the Forwarding port state (since only forwarding links are shown in the map).
Path Cost	Shows the administratively assigned value for the contribution of this port to the path cost towards the spanning tree root.

Controls (buttons, menu items, etc.)**File menu**

Export as Image		Allows the currently opened spanning tree map to be exported from the FOXMAN-UN system. The map image can be saved as GIF, JPEG or as PNG image file in a specified directory of the server.
Exit		Quit Spanning Tree application.

Edit

Select NE		Calls the Select NE dialog to start a new spanning tree detection.

Cancel		Cancels current spanning tree detection.
Refresh		Restarts spanning tree detection by re-reading the configuration and states of the nodes and ports and redraws the spanning tree using the previously selected node as starting point.
View		
Find Symbol		Finds a bridge in the spanning tree.
Zoom In		Zooms into the spanning tree.
Zoom Out		Zooms out of the spanning tree.
Help		
? Help		Calls the help viewer and opens this page.

Related dialogs/windows

[Spanning Tree Map Preconfiguration and Operation](#),
[Ethernet Traffic Protection Maps](#),
[Traffic Protection Maps Introduction](#),
[Rapid Spanning Tree Protocol \(RSTP\)](#).

6.10 System Functions

This section deals with the [Event List](#), the agent to NE communication statistics ([Agent Statistic](#)), the [System Alarms](#), the [NEM Remote Admin Tool](#), the [Remote Executor](#), and the [Metrics Database](#).

The event list is called from the NEM Desktop under the main menu "System". The agent statistics are accessed from context menu of a specific Agent in the NEM Configurator main dialog under NE Browser → Agents. System alarms are part of the alarm list.

6.10.1 Event List

Purpose

This dialog shows a list of the events occurring during the management of the network. This provides confirmation of recent activities or tracing past activities as to what, when and who.

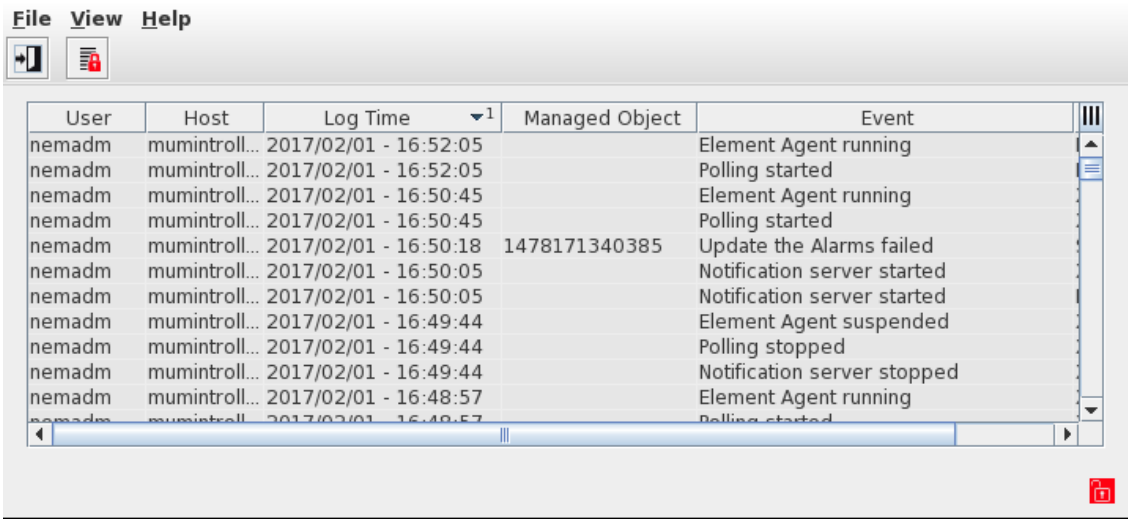
The most recent 100'000 events are stored in the FOXMAN-UN database and can be recalled via this dialog. The overflow is saved in event history files.

The list is dynamically updated. Events being logged are creation and deletion of agents, creation and deletion of NEs, configuration uploads and downloads for NEs, start/stop of agent, start/stop of individual polling, alarm flooding, forced polling, task creations, etc.

The list can be filtered, searched, and sorted.

Dialog image

Event List



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Dynamically updated list of events occurring during the management of the network.

Controls (buttons, menu items, etc.)

Menus

File – Exit		Resets the filter to unfiltered, the number of events to be retrieved initially from the database to 100, and closes the dialog.
View – Freeze List		The list can be frozen. New events occurring are not added to the list till the Freeze function is turned off again. The current status is indicated in the lower right corner of the dialog window.
View – Unfreeze List		Unfreeze the list when frozen. New events occurring are added again to the list. The current status is indicated in the lower right corner of the dialog window.
Help – ? Help		Calls the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

Not applicable.

6.10.2 Agent Statistic

Purpose

After selecting one of the active agents in the management network, this dialog presents the polling statistic for all NEs assigned to it.

The data provides information on the current state of the management communication to the NEs as well as a history of past failures. This allows judging the reliability of the management network and detecting problems with alarm flooding.

This dialog is called from the Agent’s context menu under NEM Configurator → NE Browser.

Dialog image

Agent Statistic: Main EA

NE	Address	Supervision	State	Last Polling	Last Comm Lost	Last Comm Resto...	Polling List	Delay	
NE_172...	IP: 172.31.68...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	▲
NE_172...	IP: 172.31.68...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	
NE_172...	IP: 172.31.68...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	
NE_172...	IP: 172.31.38...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	
NE_172...	IP: 172.31.38...	on	Manag...	2014/03/04...	2014/03/03 16:...	2014/03/03 16:...	waiting	0	
NE_172...	IP: 172.31.38...	on	Manag...	2014/03/04...	2014/03/03 16:...	2014/03/03 16:...	waiting	0	
NE_172...	IP: 172.31.38...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	
NE_172...	IP: 172.31.38...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	
NE_172...	IP: 172.31.38...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	
NE_172...	IP: 172.31.38...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	
NE_172...	IP: 172.31.38...	on	Manag...	2014/03/04...	2014/03/03 12:...	2014/03/03 12:...	waiting	0	▼

? Help
Close

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

List of the polling statistic for all NEs assigned to the selected agent.

NE	Shows the name of the NE.
Address	Shows the address of the NE. For NEs that are addressed via IP, the IP address is shown.
NE Type	Shows the NE type.
Supervision	Shows whether supervision of the NE is on or off.
State	Shows the NE management state, i.e. whether the NE is manageable or not.
Last Polling	Date / time of the most recent polling. Apart from the regular polling each Severity causes a poll out of sequence of the NE.
Last Comm Lost	Date / time when the NE became unmanageable (most recent occurrence).
Last Comm Restored	Date / time when the NE became manageable again (most recent occurrence). Together with “Last Comm Lost” shows the duration of the last unmanageable period.
Polling List	Waiting: Normal situation, the NE is polled in the normal sequence. Delayed: The event filtering of FOXMAN-UN has counted too many alarms at the last poll and has delayed the next poll by a time it calculated

Delay	Remaining time to the next poll. Click “Refresh” for an update.
Successful Requests	Number of successful polls since the agent was started.
Failed Requests	Number of polls without or with a corrupt answer from the NE.
Comm Lost Count	Count of “Communication Lost” events since the agent was started.

Controls (buttons, menu items, etc.)

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

? Help	Calls the FOXMAN-UN help viewer and opens this page.
Close	Closes the dialog.

Related dialogs / windows

[NEM Configurator](#).

6.10.3 System Alarms

Purpose

A number of alarms independent of the NEs are raised and displayed in the alarm lists by the FOXMAN-UN system. Source can be the FOXMAN-UN management communication (via the agents), the SNMP interface (if installed), the file system of the workstation (via the smtool) or the FOXMAN-UN Networking Package (if installed).

The system alarms can be visualized on a map via a System Symbol, which is automatically created. The symbol shows system alarms via changing color and blinking, the same way as the NE symbols. The default name of the symbol is the name of the workstation that contains the FOXMAN-UN core. This name can be modified. Several copies of the system symbol may be used, e.g. one on the main and one on every group map.

Identification

All system alarms are identified in the “Alarm Id” column of the [Alarm List](#) with the workstation name where the FOXMAN-UN core is installed, plus a running number.

Generated alarms

Communication

“Communication Failure”



Please note:

This function must be enabled in the alarming.conf file under “Auto generation of communication lost alarms”. Default setting is “off”.

Alarm is raised when communication to an NE is lost. This alarm is cleared automatically when communication is restored. “Localization” shows name of the NE. Severity is “Critical”.

“Alarm Flooding”

Alarm is raised when polling is delayed due to the number of alarms being in excess of the configured limit. This alarm is cleared automatically when polling is resumed. “Localization” shows name of the NE. Severity is “Major”.

File System

“File system xx is over zz percent full”

Alarm is raised by the smtool when a specified partition reaches the configured threshold. Default configuration in the smtool.conf contains the partitions “/” with 90% and “/opt” with 90%. Default severity is “Minor”. These alarms can only be cleared by the operator.

“File system xx does not exist”

Alarm is raised by the smtool if a file system specified in the smtool.conf under “File systems to check” does not exist. Severity is “Minor”. This alarm can only be cleared by the operator.

Database synchronization

“Database Synchronization Problem”

Alarm is raised for a specific NE if an incoming unit alarm cannot be resolved because the corresponding configuration data is missing in the database. This can happen if the configuration of an NE is changed via a local terminal causing new alarms, and the database has not been updated yet.

To solve the problem, first clear the system alarm (can only be done by the operator), then force a polling of the relevant NE and check that the system alarm is not raised again.

Alarm Count

“Overload”

This alarm can only be raised on starting up the FOXMAN-UN system. It indicates that there may be too many alarms in the database and that hence the system performance might be poor. This alarm can only be cleared by the operator.

Clear the “Overload” alarm, acknowledge all cleared alarms and then stop and restart the FOXMAN-UN system. If the “Overload” alarm reappears, make note of the number of active alarms (use “Fault Management > Alarm Summary (Global)” in the NEM Configurator) and contact our technical support.

“NE Register For Notifications Failure”

Alarm is raised if an NE is not registered for notifications. It indicates that an NE is not sending alarm notifications, or notifications are not received by FOXMAN-UN, possibly because there is no valid route from the NE to the FOXMAN-UN server, or the port used is inappropriate.

“NE Notifications Missed”

Alarm is raised if notifications from an NE are not received in a consecutive order, or the NE is sending an indication that it cannot send all notifications, e.g. due to overload of the NE.

Configuration Upload

“Automatic Configuration Upload Performed”

Alarm is raised for any NE individually on termination of a configuration upload. This happens immediately after an NE is created or after the configuration of an NE has been modified locally (not through FOXMAN-UN), e.g. via the **FOXCST**. This alarm can only be cleared by the operator.

SNMP

“No SNMP daemon was found”

The alarm is raised by the smtool if the SNMP daemon is not active. Default setting in the smtool.conf for this check is disabled, default severity is “Warning”. This alarm can only be cleared by the operator.

Networking Package

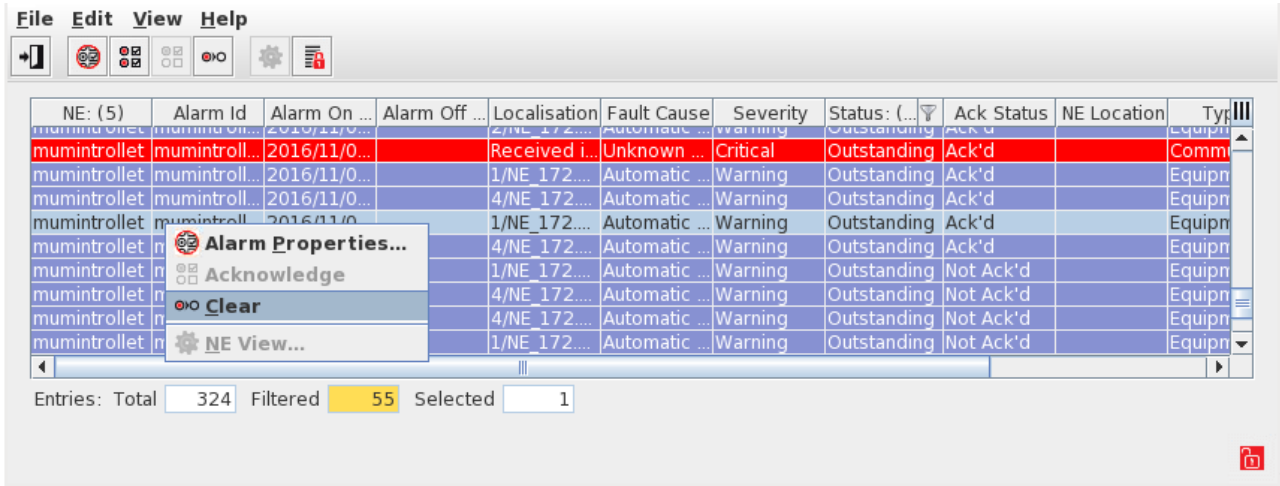
The Networking Package can raise approximately 20 different alarms. Please refer to the User Manual “Networking Package” for a list. All these alarms can only be cleared by the operator.

Service Supervision

Service Supervision can raise service alarms “Partial Service Loss” and “Total Service Loss” if the service availability falls below the threshold configured. This alarm is cleared if the service quality and/or availability exceeds the required threshold again.

Clearing of system alarms

Clearing of system alarms has to be done either via the context menu or via the corresponding icon in the alarm list: Select one or more system alarms and call the context menu. The item “Clear Alarms” will be enabled.



Please note:
 Also the system alarms that are cleared automatically (“Communication lost” and “Alarm flooding”) can be cleared prematurely via this menu.

Related dialogs / windows

Alarm List dialog.

6.10.4 Remote Admin Tool

See NEM Remote Admin Tool.

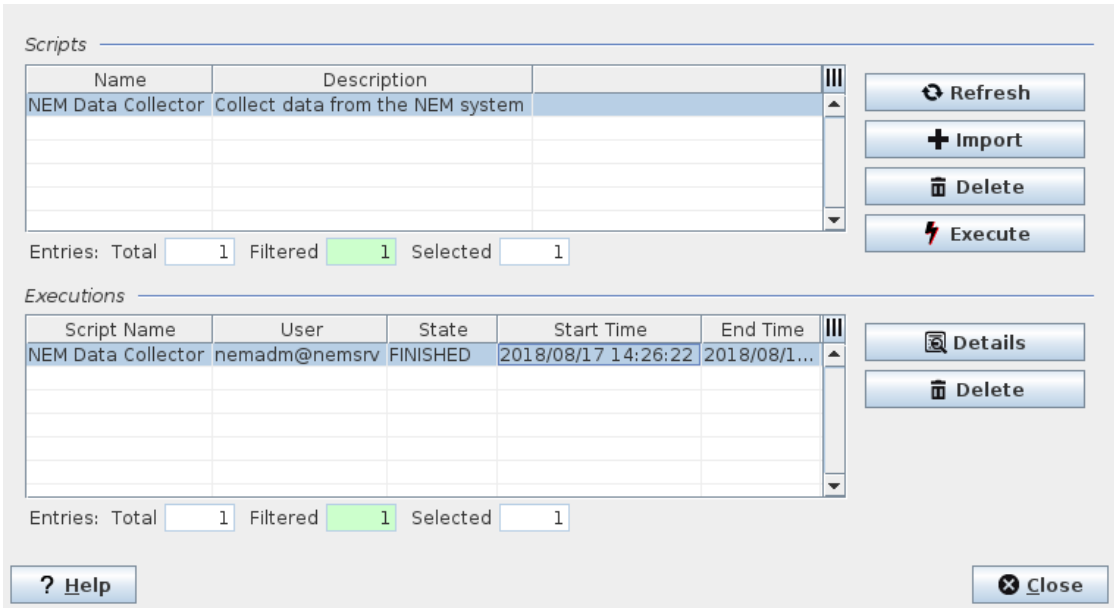
6.10.5 Remote Executor

Purpose

The Remote Executor allows you to execute signed scripts on the FOXMAN-UN server for specific purposes. Scripts may be provided with the FOXMAN-UN installer (system level scripts), or they can be installed as customer specific scripts (user level scripts).
 The creation of scripts requires assistance by technical support.
 An example for a system level script is the NEM data collector: In case of issues observed with the NEM application the Remote Executor allows you to execute scripts for collection of log information. The collected logs can be provided to technical support to analyze the issue. The Remote Executor dialog should only be used upon advice by technical support.

Dialog image

Remote Executor



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

The “Scripts” table shows available scripts with name and description.
 The “Executions” table shows running or terminated executions of scripts with their Script Name, User, State, Start Time, and End Time (if execution is terminated).

Controls (buttons, menu items, etc.)

“Scripts” related commands	
Refresh	Refresh the list of available scripts.
Import	Import scripts. Valid scripts must be signed.
Delete	Delete the selected script(s).
Execute	Execute the selected script. Usually, before the script is executed a dialog window is opened that provides... - a more detailed description, - script specific execution options.
“Executions” related commands	
Details	Show details of the selected execution results. This opens the Execution Details dialog.
Delete	Delete the selected execution results.
? Help	Calls the help viewer and opens this page.
Close	Closes the dialog.

Related dialogs / windows

Execution Details.

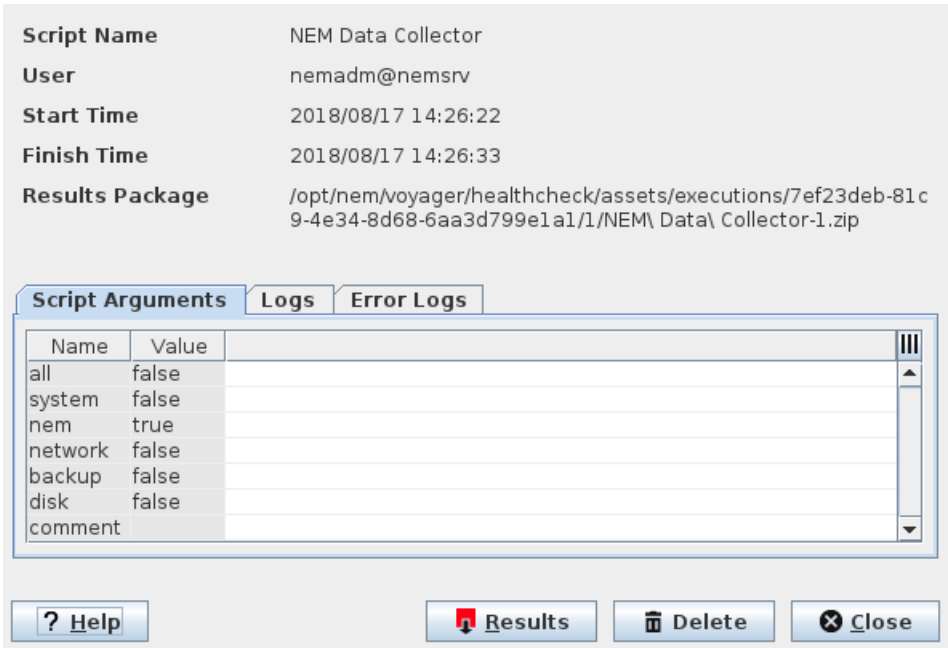
6.10.6 Execution Details

Purpose

This dialog shows details of the script execution from Remote Executor. It is called via the “Details” command button for an executed script in the Remote Executor dialog.

Dialog image

Execution Details (sample dialog - each script may provide different details)



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

The information provided in this dialog includes details on the script execution and its results.

Script Name	Shows the name of the executed script.
User	Shows the user that initiated the script execution.
Start Time	Shows to script execution start date and time.
Finish Time	Shows to script execution end date and time.
Results Package	Shows the path and file name of the resulting archive file.
“Script Arguments” tab	
Name	Shows the options that were available with the script execution.

Value	Shows whether an execution option was selected or deselected for script execution.
"Logs" tab	Shows the log for the script execution.
"Error Logs" tab	Shows errors that were logged during script execution. If no errors were logged, the window shows "Log empty".

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
Results	Download the results of the script execution and store it to the file system as a zip file. This command opens a window to select a path and file name, and save the file.
Delete	Delete the selected execution results.
Close	Closes the dialog.

Related dialogs / windows

[Remote Executor](#).

6.10.7 Metrics Database

See [Metrics Database](#).

7 Networking Package

This part contains the help information for the FOXMAN-UN Networking Package (NP). It is called either from the legacy “Networking Package” application or from the “TDM Map” application of the Web UI.

For the **Web UI based TDM Map** go to the help page for the **TDM**.

Related to the legacy application, it includes the following topics:

- [Introduction to Networking Package \(NP\)](#),
- [Circuit Provisioning Processes](#),
- [Main Window](#),
- [Application Manager List](#),
- [Filter](#),
- [Application \(View/Create/Edit\)](#),
- [Transport Entity \(New/Modify\)](#),
- [NP Select NEs](#),
- [TTP Trail Termination Point](#),
- [Manual Routing: Next Hop List](#),
- [Manual Routing: Channel Selection](#),
- [Set Auto Routing Parameters](#).

7.1 Introduction to Networking Package (NP)

FOXMAN-UN NP is an integrated function of FOXMAN-UN that automates network and service provisioning for FOX51x and FOX61x networks.

It provides a system for fast and efficient:

- TDM end-to-end provisioning
 - Existing end-to-end connections can be modified or deleted.
 - New end-to-end connections can be created using the available network capacity.
- Network documentation
 - Makes the discovery of all end-to-end connections.
 - Keeps the information in its own database.
 - Keeps its database synchronized with network changes.



Please note:

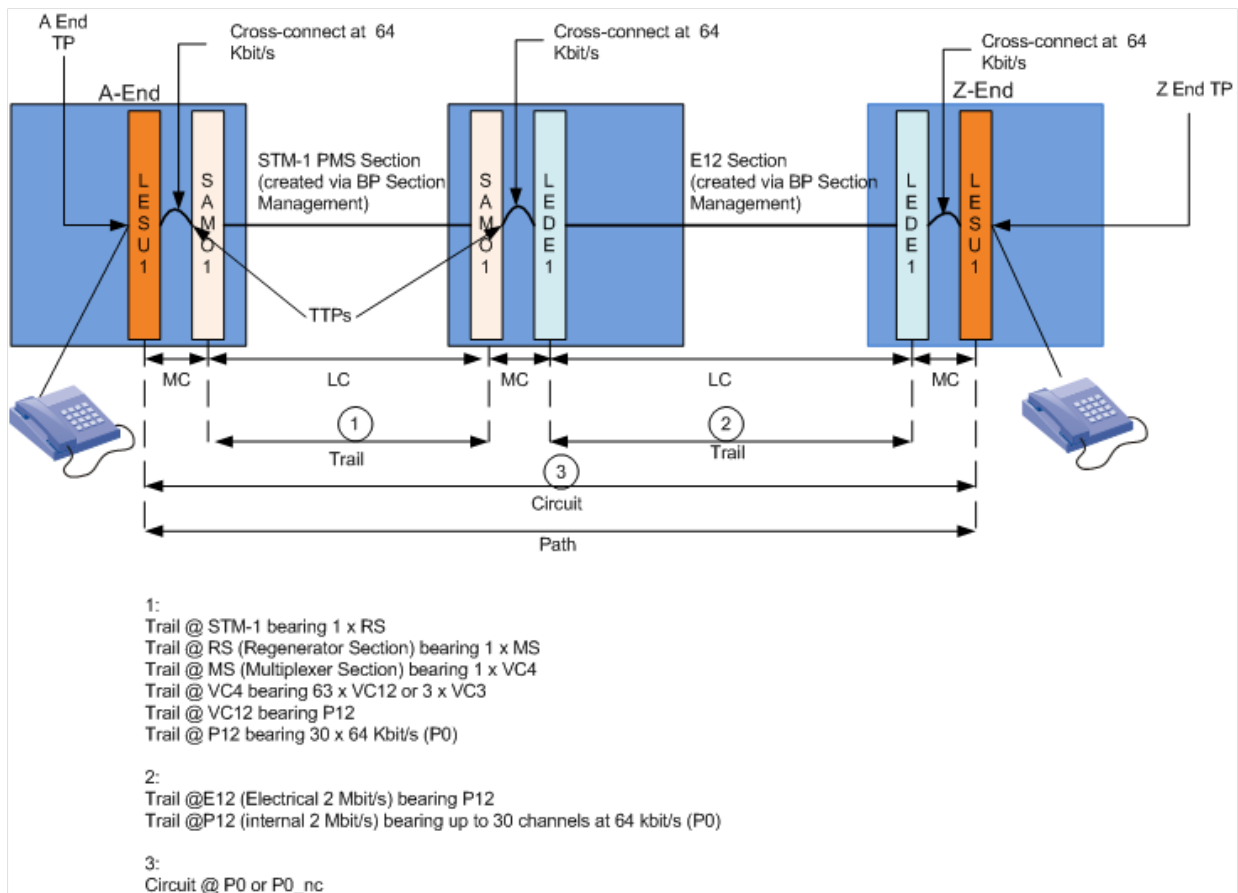
The end-to-end connection shall be referred to as Transport Entity (TE) throughout the document.

Application, Transport Entity (TE) and Path

The NP model is built of Application, Transport Entity (TE) and Path elements:

- The Application is a container of TEs. It contains at least one TE. (An empty Application is automatically deleted).
- The TE can be a circuit, a trail, a sub network circuit (SNC) or unknown.
- TE has a Path, which connects the a-end TP (Terminating Point) with the z-end TP with path elements. The path elements can be a SNC, a LC, a MC or a Hole.

The diagram below illustrates the relationship of TEs and Path elements.



Transport Entity (TE)

The TE can be:

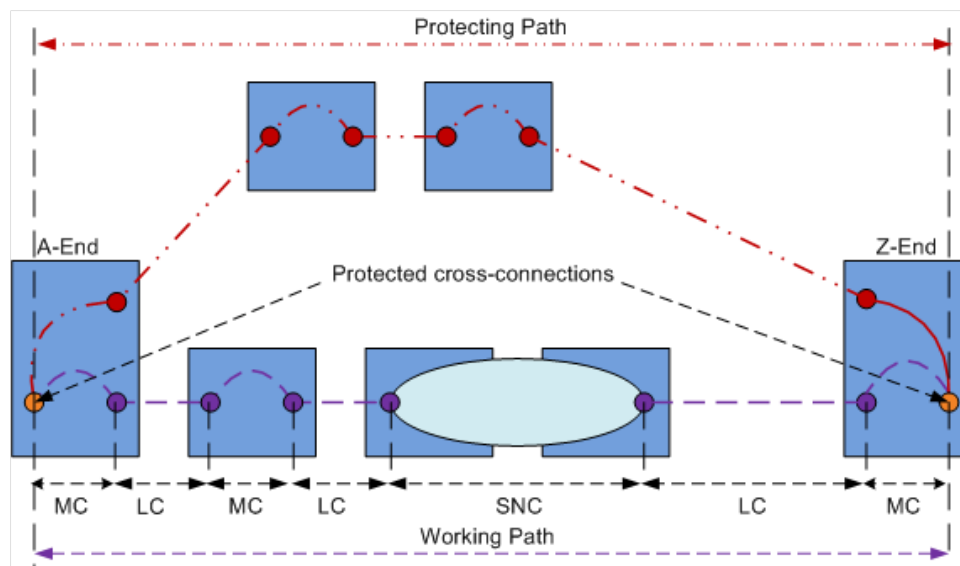
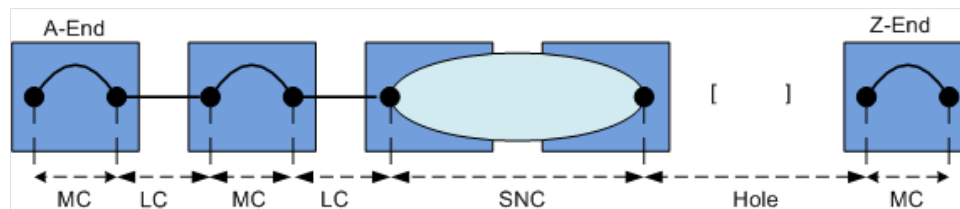
- Circuit
 - User oriented connections between points at the border of the network.
 - Has end-points that are connected to external equipment.
 - Is always carried by one or more Trails.
- Trail
 - A bandwidth resource that carries a multiplexed signal from one point to another in the network. The signal is demultiplexed at the extremities (Trail Termination Point, TTP) into points that can be cross-connected with other points in the same NE.
 - Typical Trails seen in NP:
 - VC4 Trail, which demultiplexes into VC3,
 - P12 Trail, which demultiplexes into P0_nc.
- Subnetwork Connection (SNC)
 - A partial circuit or Trail.
 - Represents the transmission portion of a circuit (or trail) with one or both end points unterminated.
 - Additional configuration must be added in order to complete the path necessary for traffic to pass.
- Unknown
 - Any TE that is not a Circuit, Trail or SNC

Path

A TE has a Path. A protected TE has two Paths. Topological TEs have no paths.

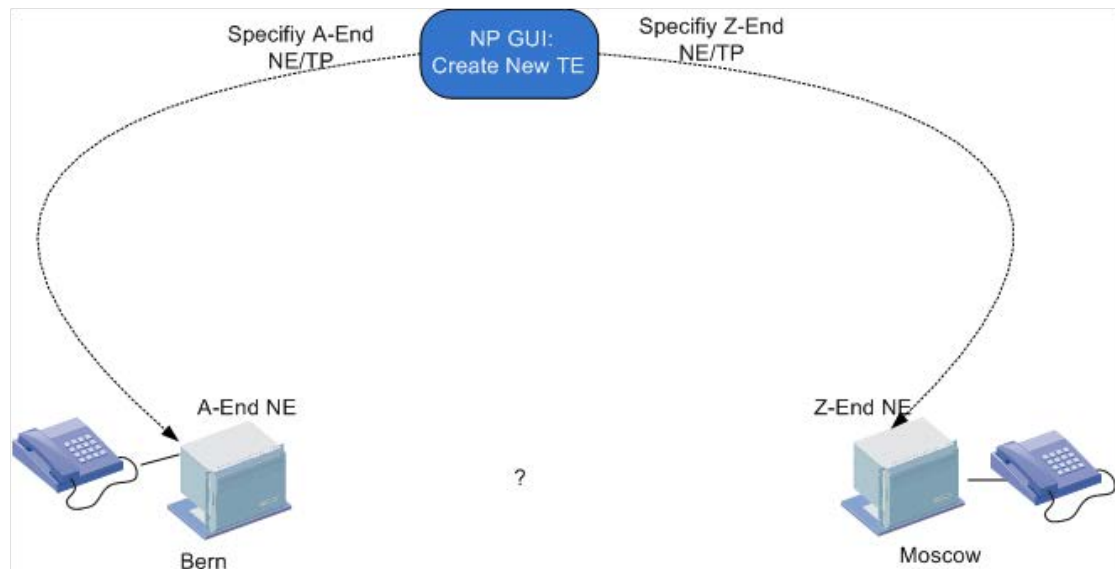
A Path is a collection of:

- Matrix Connection (MC)
 - Cross-connections in the FOX51x and FOX61x.
- Link Connection (LC)
 - Sections created in the FOXMAN-UN BP,
 - Trail will generate one or more LCs.
- Subnetwork Connection (SNC)
 - Parts of the network at a single layer (e.g. at P0_nc layer).
- Hole
 - The routing has not been completed by the user. The FOXMAN-UN NP allows only one hole.



NP Routing

TEs, e.g. circuits are created with an empty route.

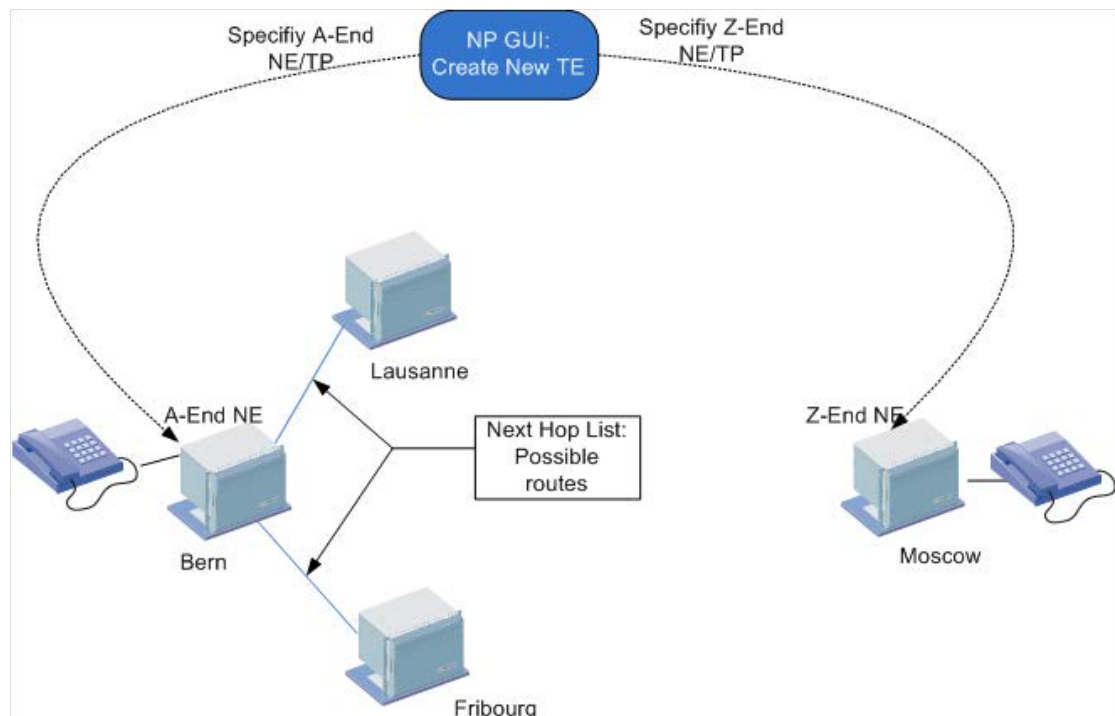


There are two methods of selecting the preferred route or Path in provisioning a circuit:

- Manual Routing,
- Automatic Routing.

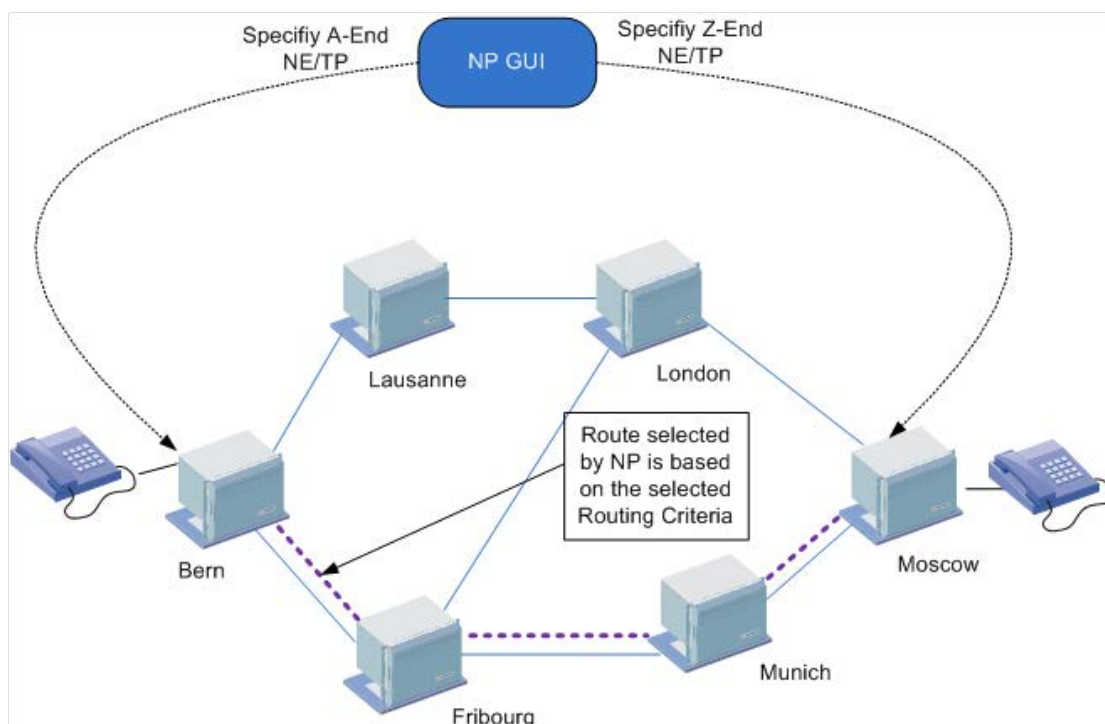
Manual Routing

- at each node where one or more routes are possible, each valid “next hop” are offered and is selected by the user.
- The “next hop” list are end-to-end connections that are either Trails or SNCs that can be used to transport data from A-End to the next NE, thereby reducing the distance of incomplete Path. This process is repeated until the Path A-End and Z-Endpoint is complete.



Automatic Routing

NP makes a selection based upon the user's configured automatic routing parameters.



7.2 Circuit Provisioning Processes



Please note:

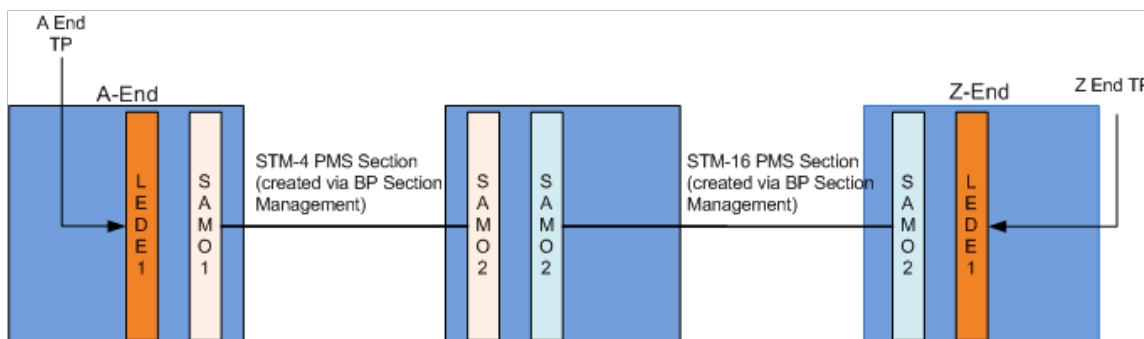
The provisioning example described in this section assumes the following:

- NP database is initialized,
- NP/BP databases are synchronized,
- No pending changes indications,
- No application conflict detected.

In case of any of the above listed issues, please refer to section 4.2 “NP User Work Flow” of “Networking Package User Manual” [1KHW002416].

1 Check the prerequisites for running NP

- Check the FOXMAN-UN Release Note if all parameters regarding network size and WS type have been set as recommended.
- Ports must be linked with Sections (via Section Management).
- Unit and Port (Sub-Unit) parameters should already be configured via CST.



- Verify that the current user has access rights to the Networking Package user Privileges and Domain Access to NP-Nodes Domain:

NEM Desktop > NEM Configurator > Security > Users > “User” > User Properties

“NP Open Access”: the operator can launch the FOXMAN-UN NP user interface and browse the content of the network.

“NP Update Access”: the operator can make modifications.

“Domain Access”: NP nodes.

- Networking Package is supported in the License. The number of supported NEs of each type should likewise be defined:

```
$ lslicense
```

- Ensure that NP Network Manager Daemon is running:

```
$ lscore or via Remote Admin Tool
```

- Ensure correct interworking of BP and NP databases, run the script:

```
$ npresynch
```

Note:

Ensure that the user is not logged in to the NEM Desktop.

- Ensure that all NEs to be reported to NP are members of the automatically generated NP-Nodes Domain.

Add Members to NP-Nodes Domain via:

```
NEMDesktop > Application > NEM Configurator > Domains > right click  
on "NP-Nodes" > Domain Properties > Change Selection > Choose  
Members
```



Please note:

To enable the option to automatically add the subsequently discovered/created NEs, add the parameter below to /opt/nem/etc/nem.conf:

```
np_add_ne_to_domain true
```

- 2 Call the NP Main Window via:

```
NEM Desktop > Application > Networking Package...
```

- 3 (Optional) Create Application Filter.

- The “All” filter is created by default. A new filter can be created via:

```
NP main Window menu: File > Create
```

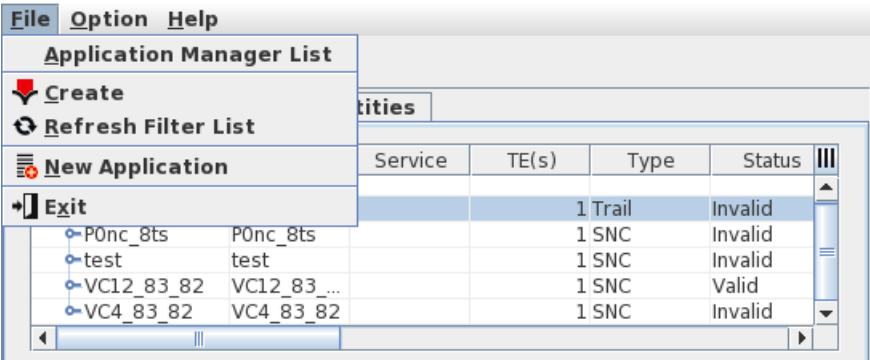
- Select the filter, and Retrieve the filtered Applications.

- 4 (Optional) Define Automatic Routing Parameters via:

```
NP Main Window menu: Options > Set Auto Routing Parameters...
```

- 5 Create a New Application by calling the Application dialog:

```
NP main Window menu: File > New Application
```

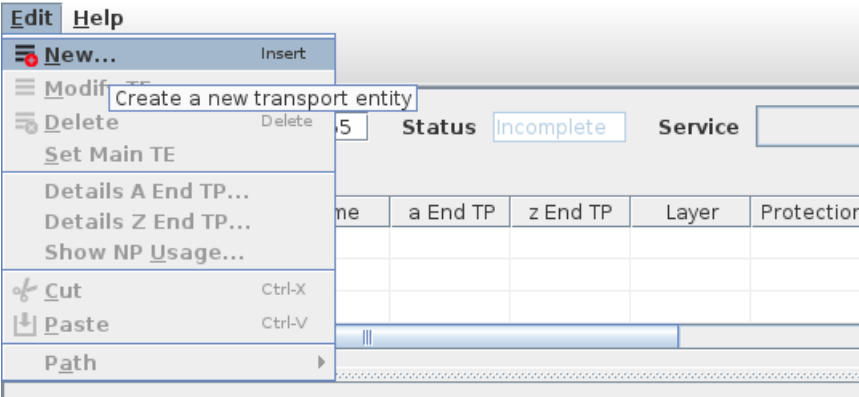


or Edit an existing Application via its context menu: “Details”.

- 6 From the Application dialog, click the “Edit” button (Note: New Application dialog is automatically in Edit mode), or edit an existing Application via its context menu “Edit”.
- 7 For a new Application call the New TE dialog via:

menu **Edit > New**

or via the context menu “New”



- 8 Create New TEs by specifying the following between A End and z End NEs:
 - VC4 Trail
 - V12 Trail
 - P0_nc Circuit
- 9 Click OK to go back to Application dialog.
- 10 Select the new TEs and select the route: Manual Routing, Automatic Routing or Advanced Routing.

Edit Help

Name Status Service

Transport Entities

Type	Status	Name	a End TP	z End TP	Layer	Protection	PO_nc	
Circuit	Incompl...	A_1101 2...	NE_172...	NE_172...	P0_nc	No Prot.	1	CAS

Selected Transport Entity

Working Path **Protecting Path** **Specific Data**

Type	Status	Name	a End TP	z End TP	Channel	Protection	Cost	
Hole								

Manual Routing...
Manual Routing (Hops Calculation)...
Automatic Routing
Advanced Routing...
Automatic Channel Selection
Manual Channel Selection...
Clear Channels
Set Protected
Set Non Protected
Promote SNC
Demote SNC
Details...
Delete

11 Routing

- If Automatic Routing is selected, the NP completes the Route based on the user's configured Automatic Routing Parameters.
- If Advanced Routing is selected,
 - Set the parameters "Maximum Hops", "Maximum Cost", and "Routing Order".
 - As required, select NEs to be avoided and Rates (i.e. physical or logical layer rates) to be avoided while routing.
 - When ready, click on the "Route" button.
- If Manual Routing is selected,
 - Select the Next Hop from the list. Click Apply.
 - Repeat the process until the Path is complete. Select the Final Hop, and click OK.
 - The Selected Transport Entity: Working Path details shows list of LC(s). The Channel(s) is "undefined". Right Click and select "Automatic Channel Selection".

Selected Transport Entity

Working Path **Protecting Path** **Specific Data** **TE Graph**

Type	Status	Name	a End TP	z End TP	Channel	Protection	Cost	Topo	Fixed	TE ID
LC	Valid	CES	NE_80 -	NE_82 -	undefined	Not Prote...	140	☐	☐	te_2015

Manual Routing...
Manual Routing (Hops Calculation)...
Automatic Routing
Advanced Routing...
Automatic Channel Selection
Manual Channel Selection...
Clear Channels
Set Protected
Set Non Protected
Promote SNC
Demote SNC
Details...
Delete

Modified

- The next available timeslot is selected for the path and required MCs are displayed, with Status "Waiting".
- Click the Apply button. NP Commits the configuration to the network. Configuration changes are made and automatically downloaded/applied to the Nodes.

Selected Transport Entity									
Working Path		Protecting Path		Specific Data					
Type	Status	Name	a End TP	z End TP	Channel	Protection	Cost	Topo	Fixed
MC	Valid	A_1 20140401 09:36:55							
LC	Valid	T_1 20140331 11:34:17	NE_172.31.68.80 - N...	NE_172.31.68.82 - S...	T1	No Prot.	0		
MC	Valid	A_1 20140401 09:36:55							

- When Status becomes "Valid" the circuit is created. Note the Channel selected (e.g. T1) is displayed.
- Click the entry "LC" and right click "Details" to see the Trails' details.

Edit Help

Name

A_1101 20161104 15:00:36

Status

Based Incomplete

Service

[... Edit]

Transport Entities

Type	Status	Name	a End TP	z End TP	Layer	Protection	P0_nc	CAS	D
Circuit	Incompl...	A_1101 2...	NE_172....	NE_172....	P0_nc	No Prot.	1	CAS On	↔
Trail	Incomplete	A_1101 20...	NE_172.31...	NE_172.31...	VC12	No Prot.			↔
Trail	Based Inc...		NE_172.31...	NE_172.31...	P12	No Prot.	30	CAS On	↔

Selected Transport Entity

Working Path		Protecting Path		Specific Data					
Type	Status	Name	a End TP	z End TP	Channel	Protection	Cost	Topo	Fixed
MC	Enabled					No Prot.			☒
LC	Incomplete	A_1101 20...	NE_172.31...	NE_172.31...	P12	No Prot.	0	☐	☐
MC	Enabled					No Prot.			☒

? Help

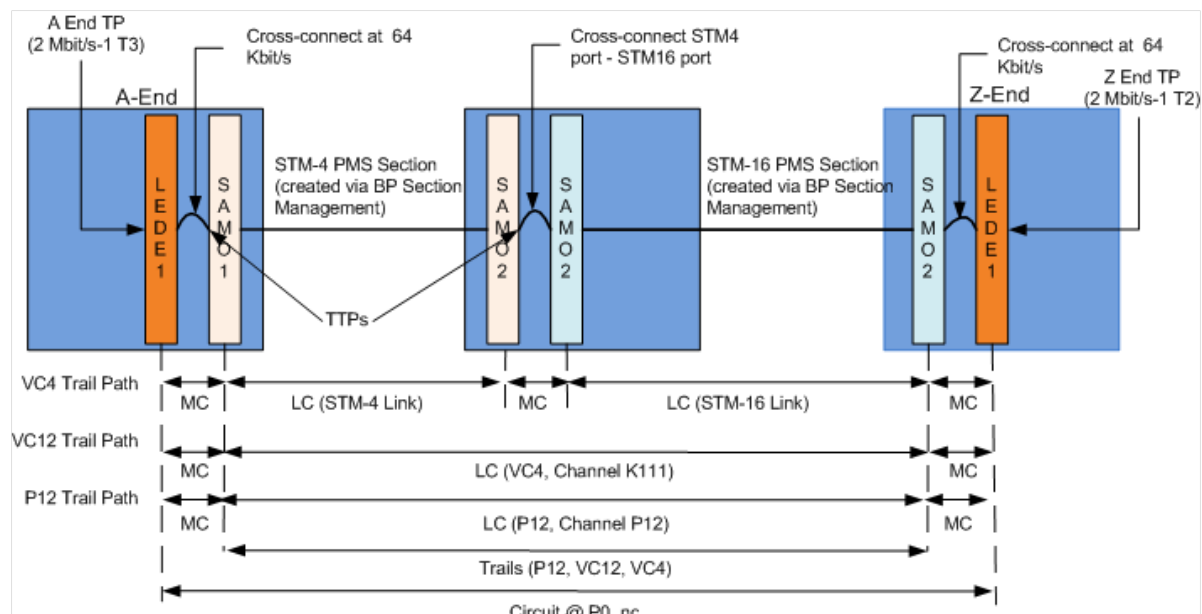
Modified

OK

Apply

Cancel

The provisioned circuit and details are shown in the diagram below:



12 Click “Cancel”, then “OK” to go back to NP main menu.

13 Select the Filter and click context menu “Retrieve” to view the new Application.

7.3 Main Window

Purpose

Displays the list of all existing Filters, Applications and Transport Entities (TEs).

There is likewise an event logger at the bottom, which can be cleared as required.

The Main Window allows you to:

- Create/Edit/Delete Filter.

The Filter is used to retrieve and display only a specific list of Applications or Transport Entities (TEs)

- Refresh Filter List.

- Create/Edit/View Application.

- Create/Edit/View TEs.

- View a graphical representation of any selected TE (in the **TE Graph Tab**); this includes a logical graph and / or a physical graph.

- View the Application Mgr. list, which displays all currently on-going Application Edits.

- Display the “Out of Synch” and “Pending Changes” indications.

The “Out of Sync” indication means the NP/BP Databases are desynchronized. The NP User has to run “npresynch”

The “Pending Changes” indication displays the number of pending changes or downloads of changes to the NE(s). The user has to wait until this indication is cleared before he can continue with Application Edit.



Please note:

For background information to Networking Package and sample configuration, please refer to Introduction to **Networking Package** section.

For detailed information and NP troubleshooting, please refer to “Networking Package User Manual” [1KHW002416].

Dialog image

Networking Package – Applications

FileOptionsHelp

Applications

Transport Entities

Q> Type here to filter table

Applic...	Main TE	Service	TE(s)	Type	Status	a End TP	z End TP	Layer	Protection
A_1...	Auto-cre...		1		Valid	NE_81 - N...	NE_81 - N...	P0_nc	Not Prote..
A_1...	Auto-cre...		1		Valid	NE_81 - N...	NE_81 - N...	P0_nc	Not Prote..
A_1...	Auto-cre...		1		Valid	NE_81 - N...	NE_81 - N...	P0_nc	Not Prote..
A_1...	Auto-cre...		1		Valid	NE_81 - N...	NE_81 - N...	P0_nc	Not Prote..
A_1...	Auto-cre...		1		Valid	NE_81 - N...	NE_81 - N...	P0_nc	Not Prote..
A_1...	Auto-cre...		1		Valid	NE_81 - N...	NE_81 - N...	P0_nc	Not Prote..
A_1...	Auto-cre...		1		Valid	NE_81 - N...	NE_81 - N...	P0_nc	Not Prote..
A_1...	Auto-cre...		1		Valid	NE_81 - N...	NE_81 - N...	P0_nc	Not Prote..

Level-2 Entries: Total64Filtered64Selected0

Event ListTE Graph

Log Time	Event
2020/11/16 - 09:46:57	64 Application(s) retrieved
2020/11/16 - 09:34:40	78 TE(s) retrieved
2020/11/16 - 09:34:16	78 TE(s) retrieved
2020/11/16 - 09:34:16	Application <Commit> 'A61'
2020/11/16 - 09:33:58	TE Path <Set Channel> 'A61 (462.462.462)'
2020/11/16 - 09:33:56	TE Path <Automatic Routing> 'A61 (462.462.462)'

Clear

Networking Package – Transport Entities

FileOptionsHelp

Applications

Transport Entities

Q> Type here to filter table

Applic...	TE	Type	Status	a End TP	z End TP	Layer	Protection	P0_nc	CAS	Dir
CE1	T_2 2020...	Trail	Valid	NE_80 - N...	NE_82 - N...	VC4	Not Prote...			↔
CE1	T_2 2020...	Trail	Valid	NE_80 - N...	NE_82 - N...	P12	Not Prote...	30	CAS On	↔
CE2	CE2 (te_2...	Circuit	Valid	NE_82 - S...	NE_80 - S...	P0_nc	Not Prote...	1	CAS On	↔
CE3	CE3 (te_2...	Trail	Valid	NE_82 - N...	NE_80 - N...	P12	Not Prote...	30	CAS On	↔
CE3	CE3 (te_2...	Trail	Valid	NE_82 - N...	NE_80 - N...	VC12	Not Prote...			↔
CE4	CE4 (te_2...	Circuit	Valid	NE_82 - S...	NE_80 - S...	P0_nc	Not Prote...	30	CAS On	↔
CE5	CE5 (te_2...	Trail	Valid	NE_82 - N...	NE_80 - N...	VC12	Not Prote...			↔
CE5	CE5 (te_2...	Trail	Valid	NE_82 - N...	NE_80 - N...	P12	Not Prote...	30	CAS On	↔

Level-2 Entries: Total78Filtered78Selected1

Event ListTE Graph

Log Time	Event
2020/11/16 - 09:46:57	64 Application(s) retrieved
2020/11/16 - 09:34:40	78 TE(s) retrieved
2020/11/16 - 09:34:16	78 TE(s) retrieved
2020/11/16 - 09:34:16	Application <Commit> 'A61'
2020/11/16 - 09:33:58	TE Path <Set Channel> 'A61 (462.462.462)'
2020/11/16 - 09:33:56	TE Path <Automatic Routing> 'A61 (462.462.462)'

Clear

Mandatory entries

Not applicable.

Optional entries

Create Filters,
Set Automatic Routing Parameters,
Multi- Layer Routing.

Informational content

Applications Tab

List all the Filters and Applications:

- Application's Main TE, number of TEs, Service, Type (Circuit, Trail, SNC), Status, End-point Connections, etc.,
- List of Application TEs.

Transport Entities Tab

List all the Filters and Transport Entities without the Applications.

Event List Tab

Shows a list of NP events with their log time and event description.

TE Graph Tab

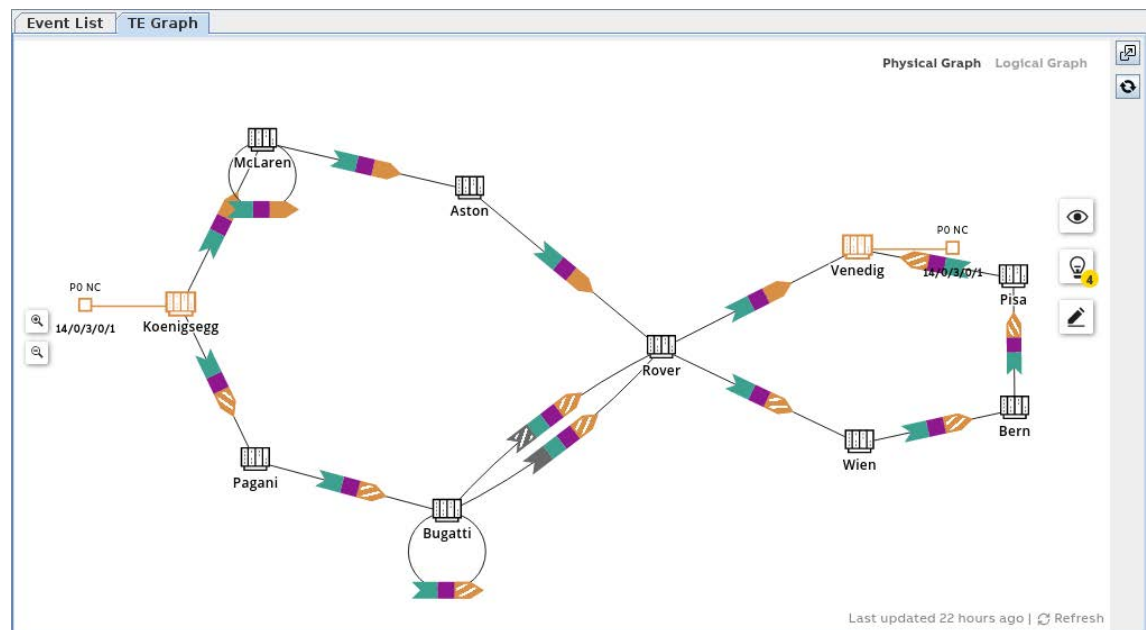
Shows a graphical presentation of the currently selected entity (TE). The graph includes all known layers relevant for the TE. Different graphical views are presented in the window:

- Physical Graph view: shows the involved NEs, Circuit connections, and sections.
- Logical Graph view: shows the logical layers of the TE, with SNCs, trails, NEs and circuit end points.
- Split view: both Physical Graph and Logical Graph in one window, separated by a split line. The separator between the two graphs can be moved to resize the space for the two graphs by dragging the separator line.
The split view may not be available in the original window due to limited space. You can open the graph in a separate window to get the split view.

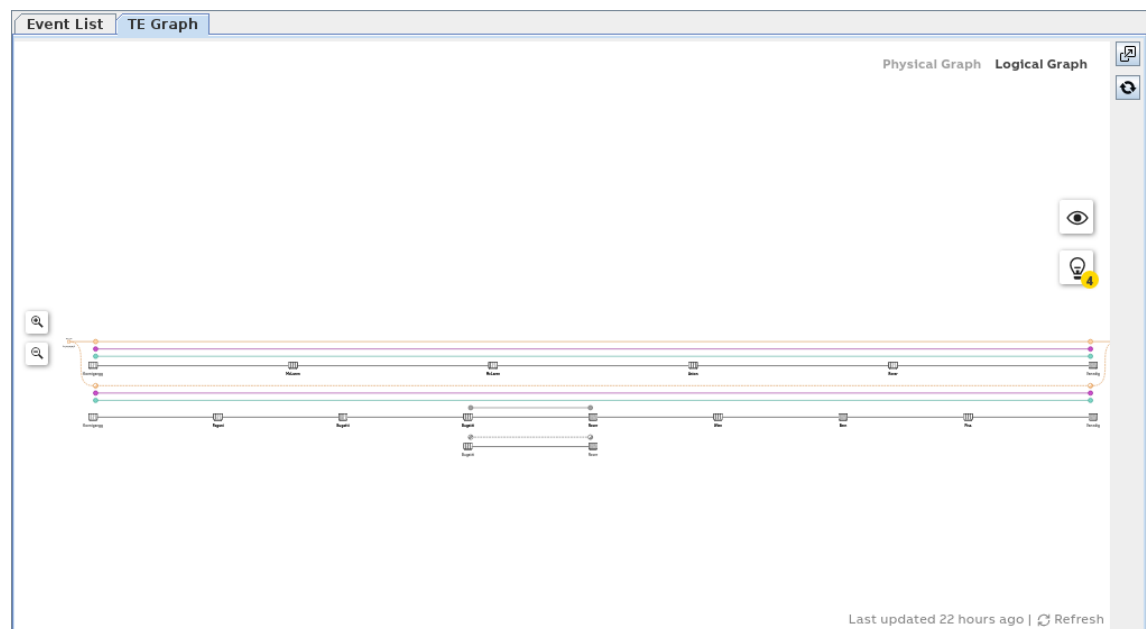
The graph can be opened in a separate window for better resolution. In this window you can choose from any of the three views.

An auto-resize function optimizes the space for the graph(s). If this is not the best choice for you, you can zoom in or zoom out in either of the graphs.

Below is an example for the physical graph of a P0_nc circuit over a network with 10 nodes:



Below is an example for the logical graph of the same P0_nc circuit as above:



Note that for some TEs a physical graph cannot be displayed, e.g. when there is no physical section associated with the TE. In such cases the physical graph only includes the NE where the logical TE resides. This applies e.g. for SNCs.

When hovering over a circuit, a section or a trail, additional information is displayed in a pop-up banner. Example for a protected P0_nc circuit:



Controls (buttons, menu items, etc.)

File

Application Manager List		Calls the Application Manager List dialog, which displays all currently ongoing Application Edits.
Create		Calls the Create Application Filter dialog.
Refresh Filter List		Refreshes the Application Filter List when the BP and NP databases are not in sync. The out of sync indication uses an amber colored icon.
New Application		Calls the Application dialog to create a new Application
Exit		Quits Networking Package
Event List tab		
Clear		Clears the Event list shown in this dialog.

Options

Set Auto Routing Parameters		Calls the Set Automatic Routing Parameters dialog to specify parameters used by the Automatic Routing facility of the NP.
Multi Layer Routing		Select if client rates and higher rates should be included in the Manual Routing: Next Hop List dialog when creating a path/trail. If higher rate is selected, NP will automatically create the missing trails when a higher rate is selected. Note: The higher rate should per default not be suggested. They are confusing and in most cases the higher rates are already provisioned.

Help

? Help		Calls the help viewer and opens this page.

Application Filter Context Menu

Retrieve Application		Generates a list of NP Applications (data extracted from the NP database) that matches the defined filter attributes.
Modify Filter...		Edits the selected Filter.
Delete Filter...		Deletes the selected Filter.
Expand		Retrieves and shows all the Applications under the selected Filter.
Collapse		Hides the Applications under the selected Filter.

Application/Transport Entity Context Menu

Details...		Calls the Application dialog to view details of the selected Application.
Edit		Calls the Application dialog to edit details of the selected Application.

Show NP Usage ...	Opens a dialog to show information on the usage of the selected NP transport entity; see NP Usage .
Supervision ► Enable...	Enable supervision of this TE. To do that, the service information attributes Customer , Service Level Agreement , and Network need to be selected.
Supervision ► Disable...	Enable supervision of this TE. Must be confirmed by the user. If service supervision cannot be disabled, an error message is shown with the respective reason(s).
Supervision ► Resume	Resume service supervision that has been paused before.
Supervision ► Pause	Pause service supervision.
Supervision ► Reload Configuration	Reloads the configuration from the NEs to make sure it is up to date in case of recent changes to the TE.
Supervision ► Show Details...	Show service supervision details for this TE. Opens the TE in a view-only window of the Service Editor . The windows also provides an alarm tab showing active alarms of the TE.
Supervision ► Show in Service Supervision...	Opens the service supervision dialog with a filtered view for the TE.

TE Graph

Open in separate window		Open the TE Graph in a separate window for maximum space.
Reload		Reloads and rebuilds the graph

TE Graph, context sensitive

Options		Legend: Shows a legend of the graphical symbols and colors used in the graph. View Options: choose from the following options: - PATHS: - Working Path; - Protecting Path; - Sub Protecting Path. - VIEW SETTINGS: enable or disable the following options: - Show fixed TEs; - Show SNCs as Cloud; - Show Indistinct Sections. - LABELS: - Show TE labels; - Show NE IDs; - Show Shared Resource Counts; For protected TEs, indicates with a digit the number of TEs routed over shared resources.
Issues		Shows possible issues that apply to the selected TE such as - Shared resources that represent a potential single point of failure, - resources that have a status issue, - Holes present in a TE due to incomplete routing.
Edit		Toggle between Edit and View mode. In Edit mode you can edit the layout of the elements in the graph. You can move NEs to get a customized arrangement of NEs and sections. This is applicable to the physical graph only.

Refresh		Refreshes the graph.
Separator		In the split view, move the graph separator upwards or downwards: - upwards: give more space to the logical graph; - downwards: give more space to the physical graph.
Zoom in		Zoom in to the graph. Applicable separately to each graph.
Zoom out		Zoom out of the graph. Applicable separately to each graph.
Fit		Fit the graph sub-window with the following options: - Fit to screen, - Fit to height, - Fit to width.
Download		Save a graphics file to your machine. The file is stored in the default download folder. Applicable separately to each graph. You can choose among two formats: - PNG, - SVC.

TE Graph, selected Circuit or Trail

Details		Opens the Application dialog for the selected element to show details on the selected application and TE.
Show NP Usage		Opens the NP Usage dialog for the selected element.

TE Graph, selected NE

Configuration		Opens the Local Craft Terminal for the selected NE, using the chosen user class.
Alarm List		Opens the list of active alarms for the selected NE.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

[Section Management](#),
[Application Manager List](#),
[Filter](#),
[Application \(View/Create/Edit\)](#),
[Set Auto Routing Parameters](#),
[Manual Routing: Next Hop List](#),
[NP Usage](#).

7.3.1 NP Usage

Purpose

Shows details on a selected TE from the Transport Entities table, including the usage of TEs that have a specific multiplex structure.

As an example, for E1 signals that are multiplexing 64 kbit/s timeslots, being cross connected as logical P12 layer signals, the number of used timeslots is shown.

For sections between two NEs of type Foreign Object, the “Show NP Usage” is grayed out in the section table of the **Section Management** dialog.

Dialog image

Usage of <TE Application name>

Type here to filter table

Name	A End TP	Z End TP	Type	Layer	Usage	Protection	Status
CE3	NE_82 - P...	NE_80 - P...	Trail	P12	30 / 30	☐	Valid

Level-1 Entries: Total 1 Filtered 1 Selected 1

Name

CE3

A End TP

NE_82 - P12-10

Z End TP

NE_80 - P12-10

Type

Trail

Layer

P12

Dir

☒ CAS

Usage

30 / 30

Status

Valid

P0_nc

30

Protection

Not Protected

ID

te_2005

Cost

140

☐ Topo

☐ Fixed

? Help

Close

The NP Usage dialog can also be opened from a selected section in the “Section Management” dialog. A sample dialog image is shown below.

Usage of <TE Application name> for a section

Type here to filter table

Name	A End TP	Z End TP	Type	Layer	Usage	Protection	Status	
81-4-4-...	NE_81 - S...	NE_82 - S...	Trail	STM1 PMS		☐	Valid	
81-4-...	NE_81 - S...	NE_82 - S...	Trail	STM1 RS		☐	Valid	
8-...	NE_81 - S...	NE_82 - S...	Trail	STM1 MS		☐	Valid	
NE_80 - V...	NE_82 - V...	Trail	VC4	3 / 63	☐	Valid		
NE_80 - P...	NE_82 - P...	Trail	VC12		☐	Valid		
NE_80 - P...	NE_82 - P...	Trail	P12	11 / 30	☐	Valid		
NE_82 - P...	NE_80 - P...	Trail	VC12		☐	Valid		
NE_82 - P...	NE_80 - P...	Trail	P12	30 / 30	☐	Valid		
NE_82 - P...	NE_80 - P...	Trail	VC12		☐	Valid		
NE_82 - P...	NE_80 - P...	Trail	P12	2 / 30	☐	Valid		

Level-1 Entries: Total 1 Filtered 1 Selected 0

Name0200915 10:13:53

A End TPNE_80 - VC4-1

Z End TPNE_82 - VC4-1

TypeTrail

LayerVC4

Dir↔☐ CAS

Usage3 / 63

StatusValid

P0_nc0☐ Topo

ProtectionNot Protected

IDte_1990

Cost140☐ Fixed

? Help

Close

Informational content

Lists all components of the selected TE. Shows information related to structure, usage, layer, TPs, and further information of the selected TE. The usage information is shown as n / m, where n is the number of used structure elements, and m is the maximum number of structure elements of the next lower layer.

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
Close	Closes the dialog.

7.4 Application Manager List

Purpose

Displays all currently on-going Application Edits. It allows determining if another user's Edit will overlap.
NP supports multi-user Edit as long as different nodes are being edited simultaneously.

Dialog image

Application Manager List

User Name	Host Na...	Start Time	ID	Label	Note	Availability...	
nemadm	mumintr...	2016/11/04 -...	applicatio...	A_1103 2...		Incomplete	

Entries: Total 1 Filtered 1 Selected 0

? Help

Refresh

Close

Fast Conflict Detection

Error

Application Conflict detected.
Conflicting Application Details:
Name(A_5 20140407 11:05:18)
UserName(nemadm)
NEName(NE_172.31.68.82)
Please confirm your changes with the other Application user.
If you apply your changes the NP database could be desynchronised.

OK

i

Please note:

You will receive an error message as soon as you select an NE, which is already selected for update by another user.

For more details, please refer to section 4.2 “NP User Work Flow” of “Networking Package User Manual” [1KHW002416].

Mandatory entries

Not Applicable

Optional entries

Not applicable.

Informational content

List all on-going Application edits.

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
Refresh	Refreshes/update the List.
Close	Closes the dialog.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs/windows

NP [Main Window](#),
[Application \(View/Create/Edit\)](#).

7.5 Filter

Purpose

The concept of FOXMAN-UN NP contains five different Application/TE filters as listed below:

- Transport Entity Information
- Application Information
- Route Information
- Customer Information
- Path Protection Information

The filter entries provide the possibility to search for particular information regarding the network in order to retrieve and display only Applications that meet the selected filter search criteria. This limits the amount of data that must be displayed and therefore improves the updating performance of the GUI.



Please note:

- The maximum number of Applications to be retrieved can be configured in the file: /opt/nem/etc/np.conf. The default value is set to: np_querylistmaxsize 2000.
- The default filter is named "All", which shows all available entries (Applications, Transport Entities). It is shown in the main window under Applications, Transport Entities, as a node that can be expanded or collapsed.
- A filter set to * (wildcard operator) does not filter.

Transport Entity

The NP Transport Entity contains filters to retrieve Transport Entities based on end-to-end filter types:

- Name
- CPE Trails
- Type
- Layer
- P0_nc
- Topological
- Fixed
- Status

Application

It allows the search of a particular Application in the network. This end-to-end detail of the Applications can be of a TE type: Trail, SNC Circuit, Unknown. The Application filter provides 3 sub-filters:

- Name
- Manager
- Service

Route

It used to filter the Application based on the TEs' Routing Information.

The NP Route Information lists the TE's Routing information in the application. It is used to display the end-to-end routing details that have been added in FOXMAN-UN application of types: With Direct, Through Direct, With All, Through All, Term At, Don't Care.

It bridges the gap between the FOXMAN-UN BP and the FOXMAN-UN NP manual alarm correlation. In some cases it is necessary to find the relation between a unit or a sub unit alarm to their used transport layer.

Customer

The NP Customer Information lists the Customer specific information for the particular application. It is used to display the end-to-end circuit details. Any circuit used by customer can be listed/filtered by the specific data information criteria, as specified in the Customer and/or Note sub-filters.

Path

The NP Path Protection Information lists the TE's Path Protection information in the application. It is used to display the Protected and the Not Protected paths. There is also a Protection Mode criterion available for filter

Dialog image

Create Application Filter

NameP0_nc Circuit

Transport Entity

Name

CPE TrailsIgnore

TypeCircuitLayer*P0_nc*

Status*Topological*Fixed*

Application

Name

Service*Manager*

Route

RoutingWith DirectNE NameUnit Type*

TP LabelSlot*

Port LabelPort Number*

Customer

Customer

Note

Path Protection

Path Prot.*Prot. Mode*

? Help

✓ OK

📄 Apply

↺ Reset

✕ Cancel

Mandatory entries

Not applicable.

Optional entries

All entries are optional

Informational content

Shows the filter criteria used to search for Applications.

Controls (buttons, menu items, etc.)

Name	Specifies Name of the Filter.
	Note: The Name must be unique and shall not contain characters like [] / * ? { } =
Transport Entity	
Name	Specifies the name of the Transport Entity. Generic forms are accepted (e.g. “*Line” “*ISDN”)
CPE Trails	- Ignore, - Include.
Type	Specifies the type of Transport Entity - * (no filter), - Unknown, - Trail, - SNC, - Circuit.
Layer	Specifies the layer of the Transport Entity - * (no filter), - STM1 MSP, P0_nc, VC12, etc.
P0_nc	Specifies the capacity of the Transport Entity. This filter is applicable on TEs where layer is P12 or P0_nc - * (no filter), - 1...32.
Status	Specifies the Status of the TE: - * (no filter), - Valid, the NP managed object is fully supported by resources in the network. - Waiting, the NP managed object is fully defined and scheduled to be downloaded later in the network. - Invalid, the NP managed object is not supported by some resources in the network. - Based Invalid, the NP managed object is based on other application with invalid state. - Incomplete, the NP managed object is not fully defined and cannot be scheduled for download. - Based Incomplete, the NP managed object is based on other application with incomplete state.
Topological	Specifies if the TE is: - * (no filter), - Topological, represents the physical connection between two TTP that are external ports. - Not Topological.

Fixed	Specifies if the TE is: - * (no filter), - Fixed, the user can not delete the Matrix Connection (MC) - Not Fixed.
Application	
Name	Specifies the name of the Application.
Service	Specifies the type of service - * (no filter), - Service 1, - Service 2, - Service 3. Note: By default, Service 1 to 3 are defined. The number of the services can be enhanced by adapting the np.conf file (\$NEM_HOME/etc/np.conf). For each Application a service level can be allocated (e.g. Voice, Data, Leased Line).
Manager	Specifies the manager who is responsible for the provisioned Application. If FOXMAN-UN NP has provisioned such an Application then the Manager is type 'NP'. If it is FOXMAN-UN BP or CST in the field then the manager is type of 'Other'.
Route	
Routing	Specifies the routing criteria as described below: - * (no filter), - With Direct, Retrieves any Transport Entity which path goes through specified Termination point or NE. Since only the TE path is considered, the retrieve TEs are those with the same layer rate specified in the Termination Point. - Through Direct, Same as "With Direct" but the TE extremities are not considered in the search. - With All, Retrieves any TE which path goes through or is multiplexed in a specified TP or NE. Retrieved TEs may have different layer rate than the specified TP. E.g. if an E1 port is specified, all P0/P0_nc TEs, which are multiplexed through the port are retrieved. - Through All, Same as "With All" but the TE extremities are not considered in the search. - Term At, Retrieves any TE (Circuit/Trail/SNC) which A or Z extremity in the specified Termination Point or NE name.
NE Name	Specifies the name of the FOX51x or FOX61x NE. Likewise, the NP Select NEs dialog can be launched by clicking on the icon next to the NE Name field.
Port Label	Specifies the Port Label. Note: The Port Label can be modified via the CST, otherwise the default port label can be used.
TP Label	Specifies the Termination Point Label (Sub-unit of a Unit). The TP label is selected from the Transport Entity (New/Modify) dialog, This can be launched by clicking on the icon next to the TP label field.
Unit Type	Specifies a unit for the specified or selected NE.

Slot	Specifies the slot position of the unit type selected in the NE subrack.
Port Number	Specifies the port number of the unit type selected.
Customer	
Customer	Specifies the customer name who owns the Application as defined in the Specific Data menu.
Note	Specifies the End Point Data (EP Data) or Circuit Information Value as defined in the Specific Data menu.
Path Protection	
Path Prot	Specifies the protection mode of the Application: - * (no filter), - Protected, - Not Protected.
Prot. Mode	In a protected Application, the following values can be associated: - * (no filter), - SNC/I, - SNC/N, - LTP.
OK	Creates the Filter and closes the dialog.
Apply	Creates the Filter without closing the dialog.
Reset	Returns the attributes of the dialog back to their default values.
Cancel	Closes the dialog without creating the Filter.
? Help	Calls the help viewer and opens this page.

Related dialogs/windows

NP [Main Window](#).

7.6 Application (View/Create/Edit)

Purpose

An Application is a container of TE(s). It contains at least one TE. An Application dialog can be in two modes:

- View
- Edit

The View mode allows viewing the details of the Application, such as:

- the TEs contained in the Application
- the Path(s) and Specific Data, and a-end/z-end TP properties of the selected TE
- likewise, it allows you to cut TE(s) to be pasted to another Application.

The Edit mode allows creation of new Application and modification of an existing application, such as:

- Creating/Modifying/Deleting TE(s)
- Adding existing TE(s) from other Application(s) via Paste function.
- Routing (Path selection) of the selected TE

The user of the Application Edit mode is listed in the [Application Manager List](#).

The Application dialog to create new Application is called from the NP Main Window menu: File > New Application.

The dialog to view or edit an existing Application is called from the NP Main Window's Application context menu > Details.

Dialog image

Application – [Name]

EditHelp

Name

A_1 20191204 15:34:02

Status

Incomplete

Service

Service3

[... Edit]

Transport Entities

Type	Status	Name	a End TP	z End TP	Layer	Protection	P0_nc	CAS	Dir	Cost
Circuit	Incompl...	A_1 201...	NE_80 - ...	NE_82 - ...	P0_nc	No Prot.	1	CAS Off	↔	0

Selected Transport Entity

Working Path

Protecting Path

Specific Data

TE Graph

Type	Status	Name	a End TP	z End TP	Channel	Protection	Cost	Topo	Fixed
Hole								☐	☐

? Details... Delete

OKApplyCancel

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

- Details of all the Transport Entities contained in the selected Application.
- Working/Protecting Path and Specific Data details of the Selected Transport Entity, as listed below:

Working Path/Protecting Path	
Type	Shows a list of the path elements. A path element can be a: - Hole, represents a missing piece in the path. - MC (Matrix Connection), on board cross connection. - LC (Link Connection), a section between nodes. - SNC (subnetwork circuit).

Status	Indicates the availability status of the selected TE: - Valid, The FOXMAN-UN NP Managed Object is fully supported by resources in the network. - Waiting, The FOXMAN-UN NP Managed Object is fully defined and scheduled for a later time, e.g. configuration has yet to be committed (downloaded) to the network. - Invalid, No resources in the network support the Managed object. - Based Invalid, The FOXMAN-UN NP Managed Object is based on other NP Managed Object with availability status set to invalid. - Incomplete, The FOXMAN-UN NP Managed Object is partially but not fully defined, e.g. part of the route is missing or unspecified. - Based Incomplete, The Managed Object is based on other FOXMAN-UN NP Managed Object with availability status set to incomplete.
Name	Name of the Transport Entity
a End TP/z End TP:	Details of the Circuit (or Trail) End Points
Channel	Channel/TS or bytes used to carry the Circuit or Trail
Protection	Shows the path protection mode of the Application possible entries are: - LTP, SNC/I, SNC/P, - No Protection.
Topological	Indicates if the Trail is "Topological", i.e. if its extremities are linked with a cable (electrical or optical).
Fixed	Indicates that the MC cannot be deleted.
	Specific Data
	The Specific Data are: - LCs used by and some details of those LCs, in case of a trail; - TE Name and Used by, in case of a SNC; - End point info and circuit info for a circuit.

Controls (buttons, menu items, etc.)

Edit (Application View Mode)

Details A End TP/Details Z End TP		Calls the TTP Trail Termination Point dialog of the selected TE, which displays the details of the A End TP/Z End TP.
Cut		Allows you to cut TE(s) into another Application. Activated only in View mode.
Paste		Allows you to paste one or more TEs from another Application. Activated only in Edit mode.
Conflict State		When grayed out, no TE editing conflict is present. When colored orange, there is a conflict of simultaneous TE editing by two users.

Edit (Application Edit Mode)

New		Calls the New TE dialog to create new Transport Entity (TE).

Modify TE		Calls the Modify TE dialog to edit the selected Transport Entity.
Delete TE		Calls the Confirm delete dialog to confirm the deletion of the selected TE(s).
Set Main TE		Set the selected TE as the main TE. The main TE is marked bold in the TE list. The main TE is shown in the NP Main Window allowing the user to give information about the application.
Details A End TP/Details Z End TP		Calls the TTP dialog of the selected TE, which displays the details of the A End TP/Z End TP.
Show NP Usage...		Opens a dialog to show information on the usage of NP transport entities, see NP Usage.
Path		Refer to Working/Protecting Path context menu.

Help

? Help	Calls the help viewer and opens this page.

Filter Area

Name	This specifies the name of the Application. Similar to TE Name in the TE Information mask. It is possible to add a new self explanatory name. The format of the auto generated name is: "A_" + NUMBER + SPACE + DATE + SPACE + TIME It is a label for information text string of longer than 64 characters (can also be an empty string) that can be associated with Transport Entity described in the Main Window. this can be used by the operator to provide descriptive information about the TE. The NP TE Name can be entered at the time the new TE is created.
Status	Displays the state of the Application. It indicates if the Application is established and running. This field cannot be edited. The entries in the status field can be: - Valid: The NP managed object is fully supported by resources in the network. - Waiting: the NP managed object is fully defined and scheduled to be downloaded later in the network. - Invalid: the NP managed object is not supported by some resources in the network. - Based Invalid: the NP managed object is based on other application with invalid state. - Incomplete: the NP managed object is not fully defined and cannot be scheduled for download. - Based Incomplete: the NP managed object is based on other application with incomplete state.
Service	Specifies the type of service assigned to a TE in an Application. For example Service 1 can be Voice, Service 2 can be Data and Service 3 can be ISDN etc. By default there is Service 1 to 3 defined. The number of services can be enhanced by adapting the parameter "np_service_values_list" of the file \$NEM_HOME/etc/np.conf.

Edit button

Edit	Changes the dialog to Edit Mode. Allows: - Creation of new TE, - Modify TE, - Delete TE.

Transport Entities Context Menu

	Refer to Edit menu (Application View /Edit).

Working/Protecting Path Context Menu

Manual Routing	Calls the Manual Routing: Next Hop List dialog to search for all possible hops having enough capacity for the service to be routed. The user can select one of these hops. NP search then for all possible hops from the selected hop.
Manual Routing (Hops Calculation)	Calls the Manual Routing: Next Hop List dialog to search for all possible hops having enough capacity for the service to be routed with the additional indication of minimum number of hops to reach the final. The user can select one of these hops. The NP search then for all possible hops from the selected hop.
Automatic Routing	Enables the route completion in one operation based on the values specified in the Set Auto Routing Parameters dialog.
Advanced Routing...	Select parameters before executing the routing process. The parameters are the same as in the Set Auto Routing Parameters dialog but are applied directly when clicking on "Route". You can either "Route" with the parameters set in the dialog, or "Abort".
Automatic Channel Selection	Selects a channel automatically. Note: Once routed, the Circuit knows on which hops the End-to-End signals are multiplexed. The next step is to select a dedicated TS in all Trails of the Path.
Manual Channel Selection	Calls the Select Possible Channels dialog, which displays a list of all possible channels to choose from.
Clear Channels	Clear the channels from the path elements.
Set Protected	Add protection to the TE. The path has to be build before TE gets valid or waiting.
Set Non Protected	Choose between Keep Working or Keep Protecting Path. The chosen path is used as working path.
Promote SNC	The SNC is removed from the TE list and replaces the SNC with the original MC to MC (e.g. MC-LC-MC...MC) path sequence.
Demote SNC	Paths from MC to MC can be defined as SNC. This adds the SNC in the TE list.
Details	Calls the Application Trail View.
Delete	Delete the path elements. Holes cannot be deleted.

TE Graph

	Shows the graphical representation of the selected TE as described in TE Graph Tab . This tab is not available during creation of a new application, but only with at least one existing TE.

Specific Data Context Menu

This field is used to allocate specific information to the Endpoint of a TE.

e.g. for a TE based on a Circuit:

To change the default attributes of the Endpoint Info and Circuit Info: /opt/nem/etc/np.conf

```
#np_circuit_data_fields      Data1;Data2;Data3
```

```
#np_circuit_ep_data_fields   EPData1;EPData2
```

It is recommended to do the definition during the commissioning process of NP.

Furthermore, in the settings file "/opt/nem/etc/np.conf" a Path Cost Calculation Model can be chosen. The three options available are:

- Model 1: (CostWorking + CostProtecting)
- Model 2: (CostWorking + CostProtecting) / 2
- Model 3: (CostWorking * CostProtecting) / (CostWorking + CostProtecting)

The parameter "path_cost_calc_model" can be set to 1, 2, or 3. Default is 1, but by default the parameter is disabled. To enable the parameter, remove the # in front of the entry.

? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs/windows

NP [Main Window](#),

[Application Manager List](#),

[NP Usage](#).

7.7 Transport Entity (New/Modify)

Purpose

This dialog is called from the Application dialog Edit menu.

The dialog is used to create new Transport Entity (TE) or modify an existing TE.

It is used to specify characteristics of a Transport Entity consisting of:

- TE Name
- Type: Trail, SNC or Circuit
- Layer rate, which is defined by the Type.
- Direction: unidirectional or bidirectional
- The Endpoints NEs (a End NE and z end NE)
- The Endpoints of unit location on Endpoint NEs (a End TP and z End TP)

Dialog image

New TE [Section Name]

NameNE82-NE80

TypeCircuit

LayerP0_nc

Direction↔

☐ Topological

a End NENE_82

z End NENE_80

a End TP

xTP	Layer	P0_nc	CAS	Protection
CTP	P0_nc	1	CAS On	SNC/I
CTP	P0_nc	1	CAS On	SNC/I
CTP	P0_nc	1	CAS On	SNC/I
CTP	P0_nc	1	CAS On	SNC/I

z End TP

xTP	Layer	P0_nc	CAS	Protection
CTP	P0_nc	1	CAS Off	SNC/I
CTP	P0_nc	1	CAS Off	SNC/I
CTP	P0_nc	1	CAS Off	SNC/I
CTP	P0_nc	1	CAS Off	SNC/I

Details...

☐ Grouping

? Help

OK

Apply

Cancel

Mandatory entries

- Type
- Layer
- Direction
- a End NE/TP
- z End NE/TP

Optional entries

- change the default Name
- Details
- Grouping

Informational content

All presently configured characteristics of the new Transport Entity.

Controls (buttons, menu items, etc.)

Name	Any string to help identify the new Transport Entity.
Type	Possible entries are Circuit / Trail / SNC.
Layer	Only a possible layer rate for each Transport Entity type can be selected.
Direction	Possible entries are Unidirectional (->) or Bidirectional (<->).
Topological	Indicates if the Trail is “Topological”, i.e. if its extremities are linked with a cable (electrical or optical).
a End NE z End NE	Calls the Select NE dialog to select the A End NE/Z End NE.
a End TP z End TP	a End/Z End Termination Point (TP) Browser table Note: The TP of the selected NE will automatically appear on the TP Browser table
Details...	Calls the TTP Trail Termination Point dialog for the selected TP label.

Grouping	When more than one Endpoint is selected, Each Endpoint will be used as extremity for Circuit. When the checkbox is selected, the NP will group selected endpoints to create one TE.
? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Application \(View/Create/Edit\)](#),
[TTP Trail Termination Point](#).

7.8 NP Select NEs

Purpose

The dialog is called from [Transport Entity \(New/Modify\)](#) dialog, which allows you to select the A End NE or Z End NE.

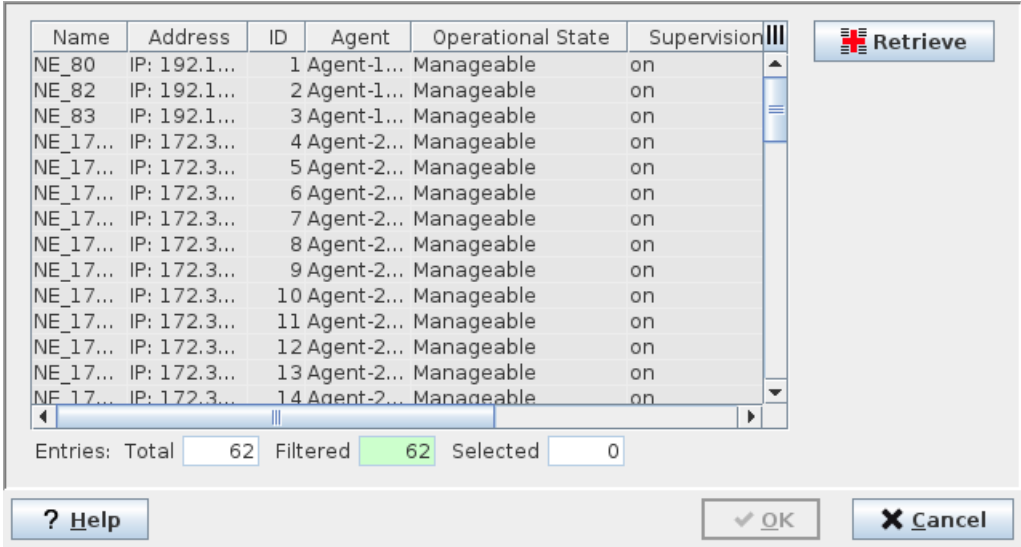


Please note:

- If the NP license specifies a specific number of NEs to be reported to NP, the listed NEs are members of the NP nodes Domain.
- If NP license specifies max. NP NEs, the listed NEs include all the available NP supported NEs in the network.

Dialog image

Select NEs



Mandatory entries

Select one of the listed NEs.

Optional entries

Not applicable.

Informational content

List of all NEs that can be reported to NP. These NEs are members of the NP nodes Domain.

Controls (buttons, menu items, etc.)

Retrieve	Refreshes the NE list by starting the scanning process of all available NEs (members of the NP nodes Domains) in the network.
? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Transport Entity \(New/Modify\)](#).

7.9 TTP Trail Termination Point

Purpose

This dialog is called from the [Transport Entity \(New/Modify\)](#) dialog via the “[Details...](#)” button.
 The dialog is used to provide physical characteristics of a TTP. This is a read-only dialog, no modification can be made to the displayed information. Those configuration parameters can be modified in the NE configuration using the CST.

Dialog image

TTP

TP Label

SAM02<4> P12-38 T5

Layer

P12

☒ Active

P0_nc

30

CAS

CAS On

☐ Support CAS in Last TS

Port Type

Int. fixed

Sector

0

Protection

No Protection

☐ Need Prot. Same Chan.

☐ Can Protect SNC/I

☐ Support Retrieve Prot.

Connection

Fixed

☐ Channel Must Match

Other Parameters

Name	Value

CTP

Channel	Layer	P0_nc	CAS	Connection
T1	P0_nc	1	CAS On	Full
T2	P0_nc	1	CAS On	Full
T3	P0_nc	1	CAS On	Full
T4	P0_nc	1	CAS On	Full
T5	P0_nc	1	CAS On	Full
T6	P0_nc	1	CAS On	Full

? Help

Close

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

- TTP attributes are:
- TP Label,
 - Layer,
 - Active,
 - P0_nc (in case of TTP with P0 channels),
 - CAS (On or Off),
 - Support CAS in Last TS (TS = timeslot),
 - Port Type,
 - Sector,
 - Protection,
 - Need Protection Same Channel,
 - Can protect SNC/I,
 - Support Revertive Protection,
 - Connection,
 - Channel Must Match,
 - Other parameters (name and value list),

- CTP list (Channel, Layer, P0_nc, CAS, Connection).

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
Close	Closes this dialog.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

Application (View/Create/Edit).

7.10 Manual Routing: Next Hop List

Purpose

The dialog is called from **Application (View/Create/Edit)** dialog.

This window is used to select a Hop computed by the FOXMAN-UN NP server to further complete the current Path of the Transport Entity being routed. One hop has to be selected in the list. Each entry matches a specific hop.

- “a End TP” and “z End TP” are the TP extremities of the current Hole.
- “Local TP” and “Remote TP” are the extremities of the Hop. If a Hop is selected, then “a End TP” is set to “Remote TP”.
- TE Name/Status/Type/Layer/Protection/CAS/Cost are attributes of each Hop.
- Final tag is computed by the FOXMAN-UN NP. It indicates that the path will complete the Hop if selected. OK and Apply buttons both close the window.

Dialog image

Next Hop

[illegible]

Mandatory entries

Select one of the Trails from the Hop List.

Optional entries

Not applicable.

Informational content

List the possible Hop(s) to complete the route.

Controls (buttons, menu items, etc.)

? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Application \(View/Create/Edit\)](#).

7.11 Manual Routing: Channel Selection

Purpose

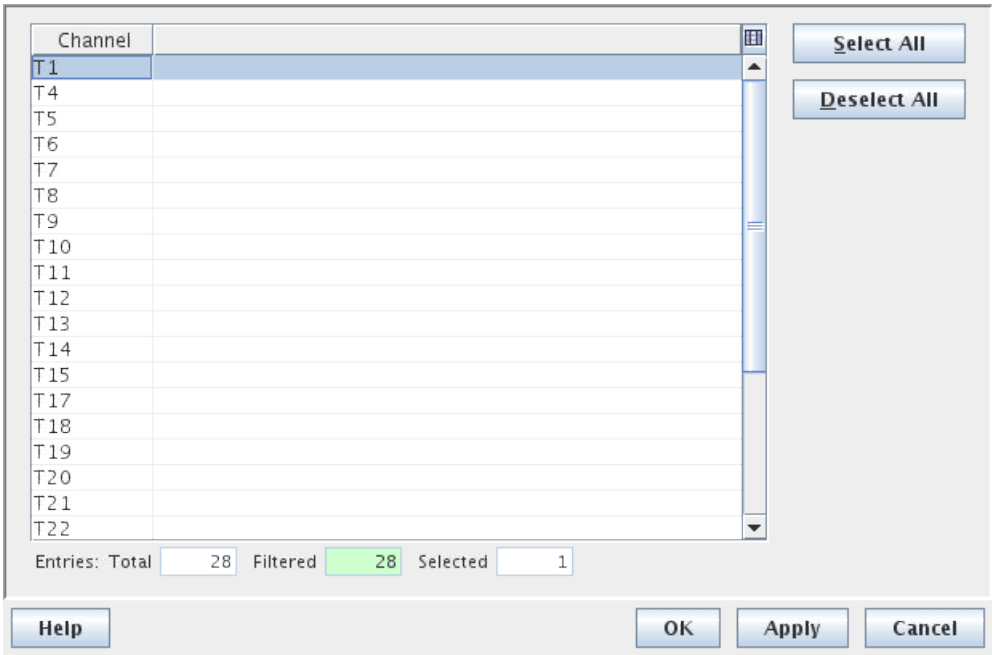
Once routed, the Circuit knows on which hops the End-to-End signals are multiplexed. The next step to definitely have the signal going from end to end is the selection of dedicated channel(s) in all Trails of the Path.

There are two possibilities:

- Automatic channel selection based on residual capacity of each Trail (recommended)
- Manual channel selection calls the Select Possible Channels dialog, which displays a list of all possible channels to choose from.

Dialog image

Select Possible Channels



Mandatory entries

At least one channel has to be selected from the list.

Optional entries

Not applicable.

Informational content

List of available channels.

Controls (buttons, menu items, etc.)

Select All	Selects all the listed channels.
Deselect All	Deselects all selected channels.
? Help	Calls the FOXMAN-UN help viewer and opens this page.
OK	Applies the modifications and closes the dialog.
Apply	Applies the modifications without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[Application \(View/Create/Edit\)](#).

7.12 Set Auto Routing Parameters

Purpose

The dialog is called from the “Options” menu of the NP **Main Window** dialog.
This dialog is used to specify the parameters used by the Automatic Routing facility of the FOXMAN-UN NP:

- Max Hops,
- Max Cost,
- Routing order,
- Network Element to be avoided in the Route,
- Layer Rates of Trails to be avoided in the Route.

Dialog image

Set Automatic Routing Parameters

The dialog box is titled "Set Automatic Routing Parameters". It features several input fields and buttons. At the top left, there are two checkboxes: "Maximum Hops" (checked) and "Maximum Cost" (unchecked). Next to "Maximum Hops" is a text field containing the value "10". Next to "Maximum Cost" is a text field containing the value "1". To the right of these is a "Routing Order" dropdown menu currently set to "Shortest". Below these are two list boxes: "Avoided NEs" on the left and "Avoided Rates" on the right. The "Avoided NEs" list contains three entries: "NE_172.31.69.12", "NE_172.31.69.21", and "NE_172.31.69.23". The "Avoided Rates" list contains two entries: "STM64 PMS" and "STM64 RS". Below the "Avoided NEs" list is a button labeled "Select NEs". Below the "Avoided Rates" list is a button labeled "Select Rates". At the bottom left is a button labeled "? Help". At the bottom right are two buttons: "OK" and "Cancel".

Mandatory entries

Not applicable.

Optional entries

All entries are optional.

Informational content

Maximum Hops	The route should not exceed specified value.
Maximum Cost	The cost of the route should not exceed specified value.
Routing Order	The route should be either Shortest or Cheapest, depending on your requirements.
Avoided NEs	Used to specify Network Elements through which the routing is not allowed.
Avoided Rates	Used to specify Layer Rates of Trail through which the routing is not allowed.

Controls (buttons, menu items, etc.)

Maximum Hops toggle	Activates or deactivates the Max Hops text field.
Maximum Cost toggle	Activates or deactivates the Max Cost text field.

Routing Order	- Shortest, - Cheapest.
Select NEs	Calls the "Choose Avoided NEs" dialog.
Select Rates	Calls the "Choose Avoided Rates" dialog.
? Help	Calls the help viewer and opens this page.
OK	Applies the entries and closes the dialog.
Cancel	Closes the dialog without applying the entries.

Related dialogs / windows

NP [Main Window](#),
[Application \(View/Create/Edit\)](#).

8 Ethernet Networking Package

This section contains the help for the overview of the FOXMAN-UN MPLS-TP implementation and describes how to configure, provision, and monitor MPLS-TP services using FOXMAN-UN Ethernet Networking Package (ENP). It includes the following main topics:

- [MPLS-TP Introduction](#),
- [Service Provisioning and Deployment via ENP GUI](#) (basics),
- ENP GUI starting with [ENP Main Window](#),
- [HQoS Configuration Manager](#),
- [Class Type \(HQoS Class Type Definition\)](#),
- [Create Service Profile](#),
- [Create Service \(Create VPLS, Create VPWS\)](#),
- [Create Tunnel, Tunnel Details](#).



Please note:

The ENP is applicable only for networks with FOX61x NEs with at least FOX61x system release R2 state.

8.1 MPLS-TP Introduction

The ENP Introduction includes the following main topics:

[ENP Terminology](#),
[Overview of VPWS Implementation](#),
[Overview of VPLS Implementation](#),
[Traffic Engineering](#),
[QoS \(EXP\)](#),
[LSP Path Calculation](#),
[OAM and BFD](#),
[Protection Mechanism](#),
[MPLS-TP In FOXMAN-UN](#).

8.1.1 ENP Terminology

This section describes the basic MPLS-TP concepts to provide background information in understanding the ENP implementation. It includes the following topic:

[MPLS-TP Overview](#),
[MPLS-TP Architecture and Operations](#),
[Tunnel and Label Switched Path \(LSP\)](#),
[Pseudo Wire \(PW\)](#).

MPLS-TP Overview

Multiprotocol Label Switching – Transport Profile (MPLS-TP) enables MPLS-TP to be deployed in a transport network and operated in a similar manner to existing transport technologies, namely SDH. The objective is to achieve the transport characteristics of SDH that are connection oriented with a high level of availability, quality of service, and OAM capabilities¹.

MPLS-TP network provisioning can be achieved via a centralized Network Management System (NMS) for static provisioning and/or a distributed control plane for dynamic provisioning. FOXMAN-UN current version supports static provisioning.

1. Networks and Services: Carrier Ethernet, PBT, MPLS-TP and VPLS, M. Toy

The main characteristics of MPLS-TP are:

- Connection oriented:
MPLS-TP uses Label Switched Paths (LSPs) and Pseudo Wires (PW) to deliver services.
- MPLS-TP can carry any type of client traffic such as ATM, SDH, Ethernet, etc.
- Transport layer agnostic:
MPLS-TP can run over Ethernet, SDH, OTN, Generic Framing Procedure (GFP) and Wavelength Division Multiplexing (WDM).
- Provides OAM capabilities similar to those provided by SDH and OTN.

Provides end-to-end protection and restoration mechanisms including:

- supports 1+1 protection and 1:n protection,
- LSP and PW protection.



Please note:

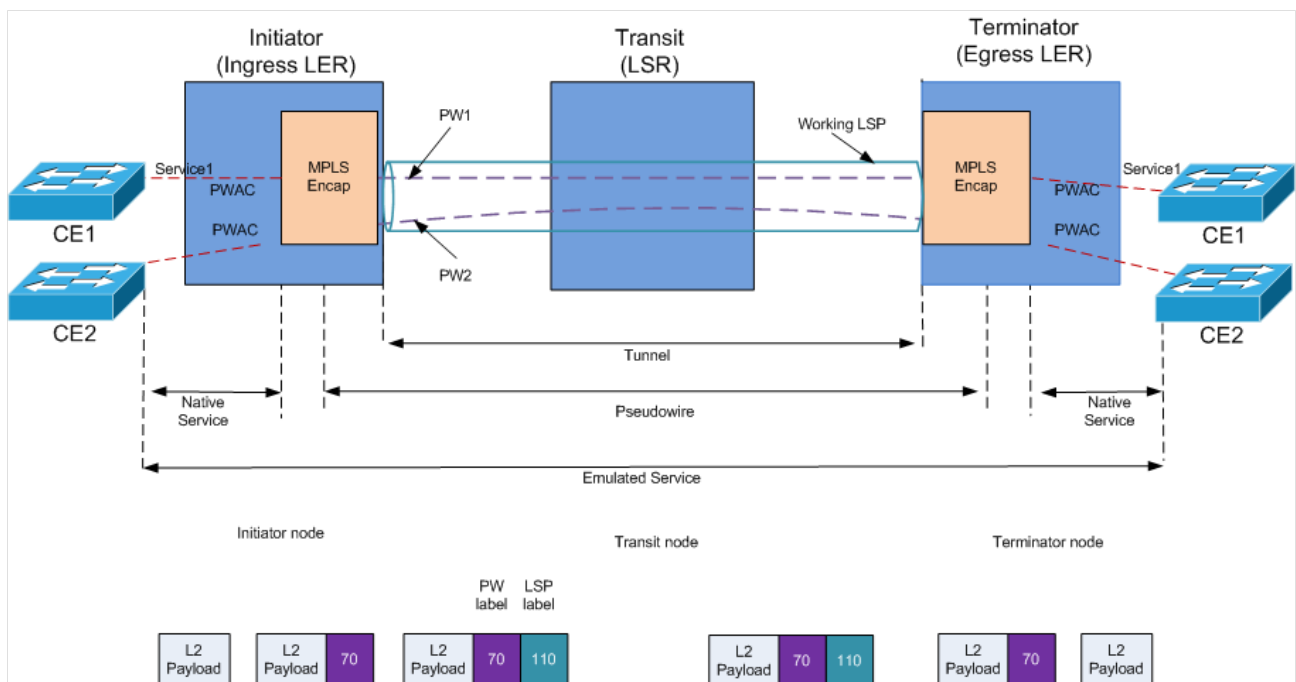
FOXMAN-UN supports 1:1 bidirectional LSP protection.

- guaranteed 50 ms recovery time,
- MPLS-TP restoration mechanisms support revertive and non-revertive behavior.

MPLS-TP Architecture and Operations

This section provides an overview of MPLS-TP forwarding mechanism as well as the major components of an MPLS-TP network.

The figure below illustrates the MPLS-TP operation as connection-oriented transport system for packets. Traditionally packet transport switches each packet independently. However, with MPLS-TP, the connection is first setup between the endpoints and then all the traffic for that connection follows only this path through the network.



In all instances the forwarding of a packet is based on the LSP label (outer label).

In order for a packet to travel through a tunnel, the node at the transmitting side of the tunnel pushes a label relating to the tunnel on to the stack and send the packet to the next hop in the tunnel.

The intermediate nodes then use the label to make packet forwarding decisions.

Customer Edge (CE)

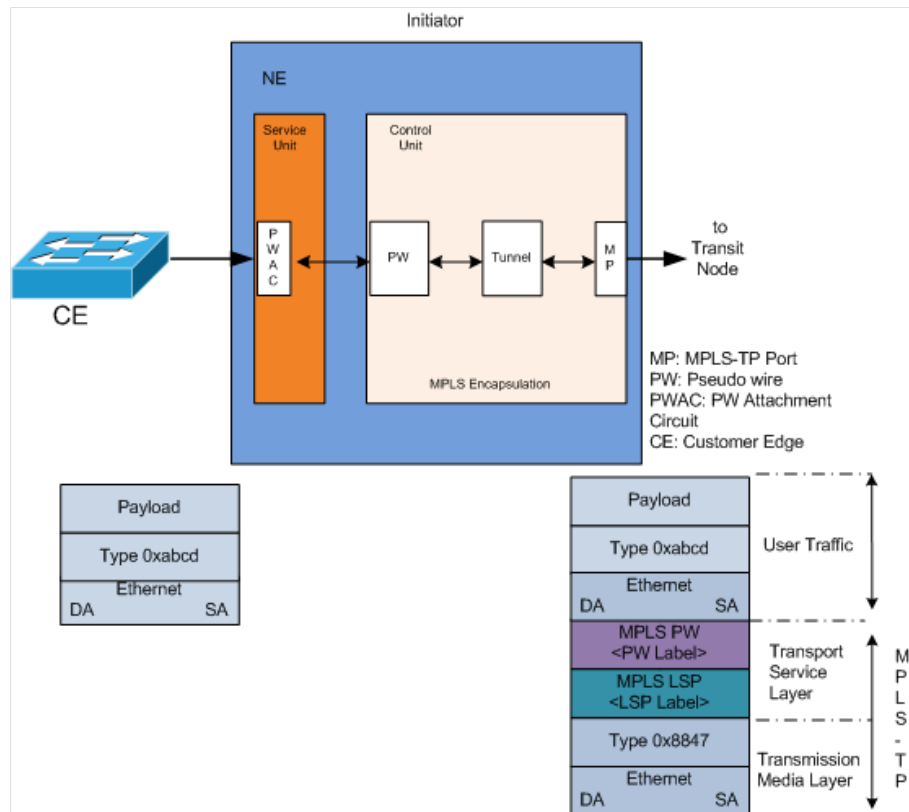
An MPLS-TP CE is in charge of interfacing with MPLS-TP networks.

Initiator node (Ingress LER)

This is the ingress Label Edge Router (LER). It can be found at the edge of an MPLS-TP network.

The PWAC port receives Ethernet user traffic (untagged, priority or VLAN tagged). The ingress LER then encapsulates the Ethernet frames into MPLS-TP frames by adding PW Header, LSP Header and the Ethernet destination and source addresses.

The figure below shows the entire encapsulation an untagged user traffic is given before it is transported via MPLS-TP.



The Initiator's components perform the following:

- **Pseudo Wire Attachment Circuit (PWAC)**
The PWAC maybe an Ethernet port or Ethernet VLAN attaching a CE to the edge router.
- **MPLS-TP Encapsulation: PW Forwarder**
Binds a PWAC to a particular Pseudo Wire (PW). The PW encapsulates service-specific PDU or circuit data received from PWAC.
Each PW is identified by a unique PW Label (inner label).
- **MPLS-TP Encapsulation: Tunnel (LSP)**
The encapsulated data are then carried over Label Switched Path (LSP) tunnel, a path through an MPLS-TP network. LSP can transport multiple PWs. Each LSP is identified by a unique LSP label (transport or outer label). This outer label serves to forward data through the network.

The Initiator performs label push. The remote or destination PW label and the next hop LSP label are added to the packet before sending the labeled packet through an outgoing NNI interface / SNI interface (MPLS-TP port) to the next node (see the illustration above).

An MPLS-TP port can be set up via the **FOXCAST** GUI on a core unit front port either by...

- setting the Port Type Usage to “MPLS-TP”,

or by...

- setting the Port Type Usage to “VLAN Subinterfaces”,
- creating a VLAN Subinterface with a specific VLAN ID,

- setting this VLAN Subinterface’s Usage to “MPLS-TP”.
- The corresponding settings need to be done on the remote end of the link (Transit, LSR and/ or Terminator, Egress LER) as well.

Transit node

This is the Label Switch Router. Transit node maintains a mapping of an incoming label and incoming interface to one or more outgoing labels and outgoing interfaces in its forwarding data-base. When a labeled packet is received, the LSR examines the LSP label and performs LSP label switching before sending the labeled packet to the next hop.

Along the route, LSP labels are replaced or swapped with new LSP labels that are meaningful to next MPLS-TP node or next hop.

Terminator node

This is the egress LER. Terminator node pops the LSP label and sends the data to the appropriate PWAC based on its PW label. From the sample setup, the egress LER determines the attached PW label as its Local PW1 label. It will then send the packet to PWAC1 and finally to CE1.

Emulated Service

The emulated service refers to the transmission service that is provided to customers to allow them to transmit e.g. Ethernet frames. It connects the switch interfaces of the CE devices, thereby covering the entire transmission path.

i

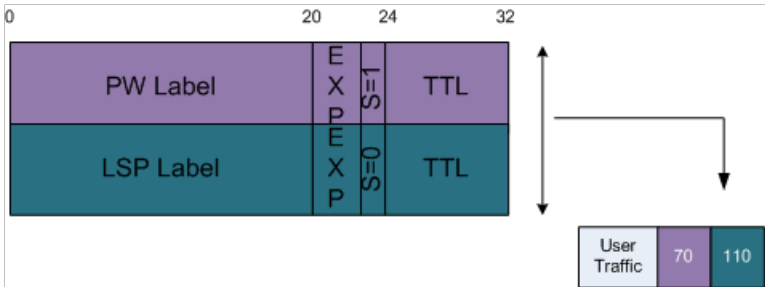
Please note:

MPLS-TP enabled NEs, which are referred to as MPLS-TP nodes in this document, can act as Initiator, Transit or Terminator node.

- The control unit ports can be configured as MPLS-TP, PWAC or as CVP ports.
- The service units ports can be configured as PWAC or CVP ports.

LSP Label and PW Label

The MPLS-TP uses the MPLS-TP frame format and MPLS-TP label (shim header) for packet forwarding.



The MPLS-TP shim header is composed of:

- Label
- This 20-bit field contains the value of the label. The MPLS-TP node uses the LSP label (outer) to forward the MPLS-TP packet over a specific LSP path.

**Please note:**

The 3-bit Experimental Use (EXP) field is mapped to Traffic Class (TC) to indicate the class of service (eight packet priorities) designated to the packet. Please refer to **QoS (EXP)** for further details.

- S

The 1-bit Stack (S) is used to identify the bottom of the stack.

S=0 means another label follows.

S=1 means this is the last label.

- TTL

The 8-bit Time to Live (TTL) is meant to avoid loops caused by configuration error. Every MPLS-TP node decrements the TTL field in the outer shim header by one whenever it receives a packet with a shim header. If the TTL reaches zero, the frame is discarded.

One or more labels are pushed on the packet at the ingress node. The first label is called the LSP label. This is also referred to as Transport or outer label.

The inner label is called the PW label, which identifies the specific client traffic or service. The PW label is sometimes referred to as Interworking label.

The ingress and egress LERs need to manage the PW labels. The intermediate LSR nodes in the network only manage LSP labels, e.g. for LSP label swapping.

Tunnel and Label Switched Path (LSP)

Label Switched Path (LSP) a path or route for switching MPLS-TP packets between the ingress and egress MPLS-TP nodes. An LSP is contained within a tunnel.

A tunnel starts at the Ingress LER, where LSP label is pushed and ends at the egress LER, where the LSP label is popped out of the stack. It may be composed of multiple LSPs. It manages the working and optionally a protecting LSP.

The Point-to-point LSPs are categorized into three types:

- Point-to-point unidirectional,
- Point-to-point associated bidirectional,
- Point-to-point co-routed associated bidirectional.

FOXMAN-UN supports co-routed bidirectional LSP. The forward and reverse directions of a bidirectional LSP follow the same path, that is the same nodes and links from MPLS-TP node A to Z or from MPLS-TP node Z to A.

Pseudo Wire (PW)

Pseudo Wire (PW) is an emulation of the service attributes over a packet switched network. The client service is mapped to the Tunnels by using PW label to identify the service.

In MPLS-TP protocol, PWs are carried by Tunnels. Multiple PWs can be carried over a single tunnel.

8.1.2 Overview of VPWS Implementation

The Virtual Private Wire Service (VPWS). VPWS is a point-to-point service. There is one PW connecting two end points.

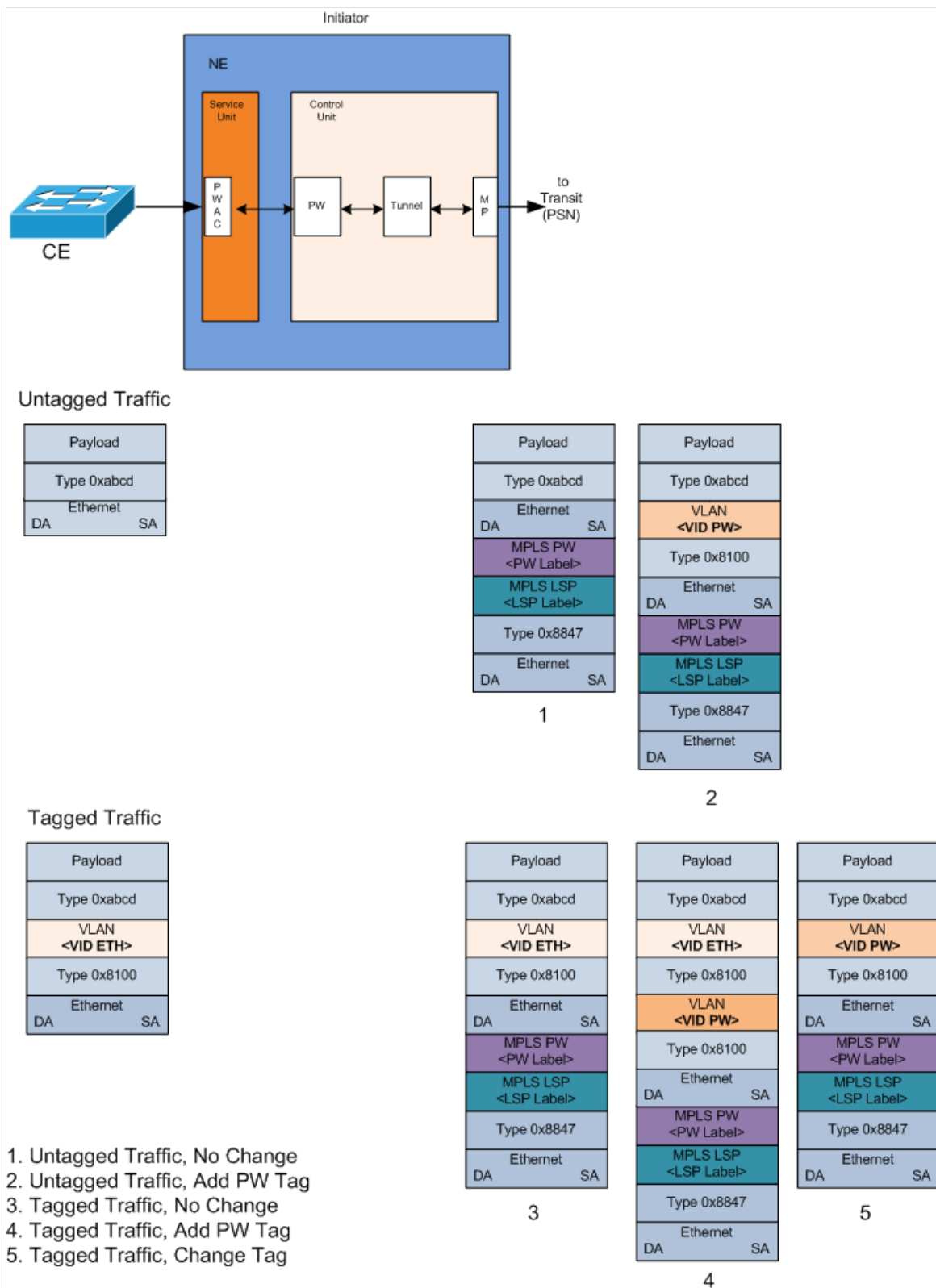
The LER processes the received Ethernet frames before encapsulating them with PW and LSP Headers.

The untagged Ethernet frames can be forwarded to the “MPLS-TP Encapsulation”

- without changes,
- or
- with added PW tag.

The tagged Ethernet frames can be forwarded

- without changes,
- with changed tag (the ETH VLAN ID is changed to PW VLAN ID),
- or
- with added PW tag.



The ENP Service creation defines how the Ethernet frames are handled based on the configured Service type.

Port Based means the AC frame can be untagged, priority or VLAN (PW) tagged.

- AC Port Based, No Change (figures 1 and 3),
- AC Port Based, Add PW Tag (figures 2 and 4).

With VLAN Based, the AC frame must be VLAN tagged.

- AC VLAN Based, No Change (figure 3),
- AC VLAN Based, Add PW (figure 4),
- AC VLAN Based, Change Tag (figure 5).

With Untagged Based, the AC frame must be untagged.

- AC Untagged, No Change (figure 1),
- AC Untagged, Add PW Tag (figure 2).

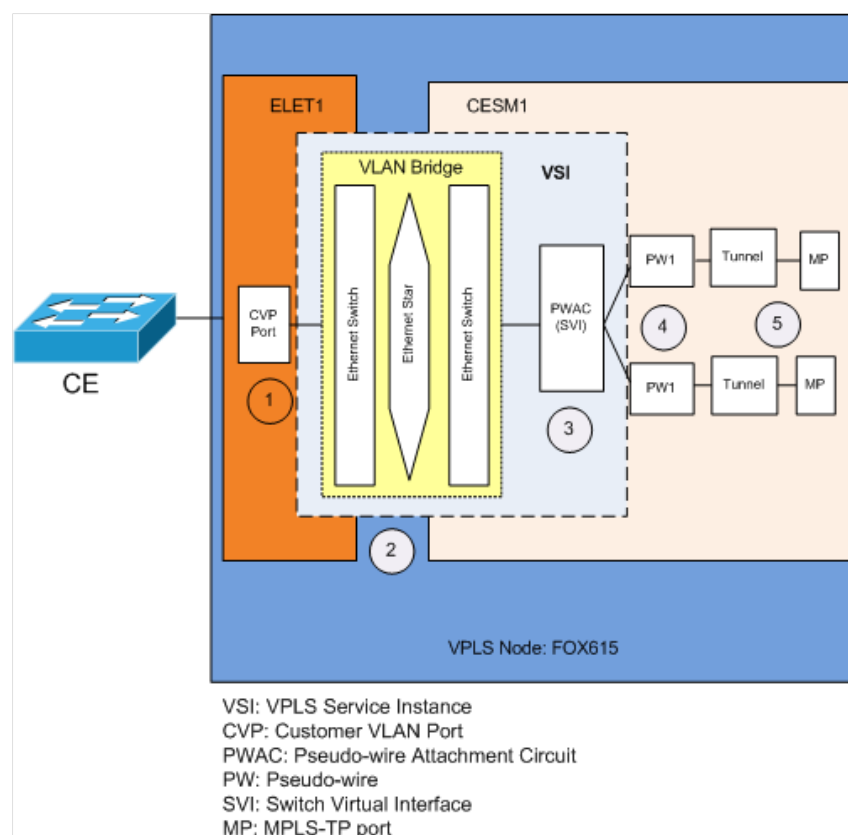
8.1.3 Overview of VPLS Implementation

Virtual Private LAN Service (VPLS) is a multipoint-to-multipoint Ethernet bridging service over an MPLS-TP network. All customer sites connected to the same VPLS instance appear to be in the same Local Area Network (LAN).

VPLS is based on fully meshed MPLS-TP network architectures. H-VPLS is solving scalability issues by introducing spoke Pseudo Wires. Both VPLS and H-VPLS are listed in the same hierarchical table in the ENP.

VPLS Components

The FOX61x which acts as VPLS node has an Ethernet switch with VLAN support. This function is implemented on the core unit(s) and on the Ethernet service units. All switch elements implemented on the core unit and Ethernet service units are interconnected via the GbE or the 10 GbE star. Together they constitute one bridge instance.



- 1 The **Bridge port** is the Ethernet service unit port with port type set to “CVP” (Customer VLAN Port). Any port configured as CVP connects to the VLAN bridge. This port accepts VLAN tagged or untagged user traffic.

- 2 **VLAN Bridge** component handles the local VLAN provisioning. These include the local VLAN creation, bridge port VLAN membership configurations and bridge port mode setting. These configurations are done via **FOXCAST**. If the user specifies a non-existing VLAN when creating VPLS, the ENP automatically creates this VLAN.



Please note:

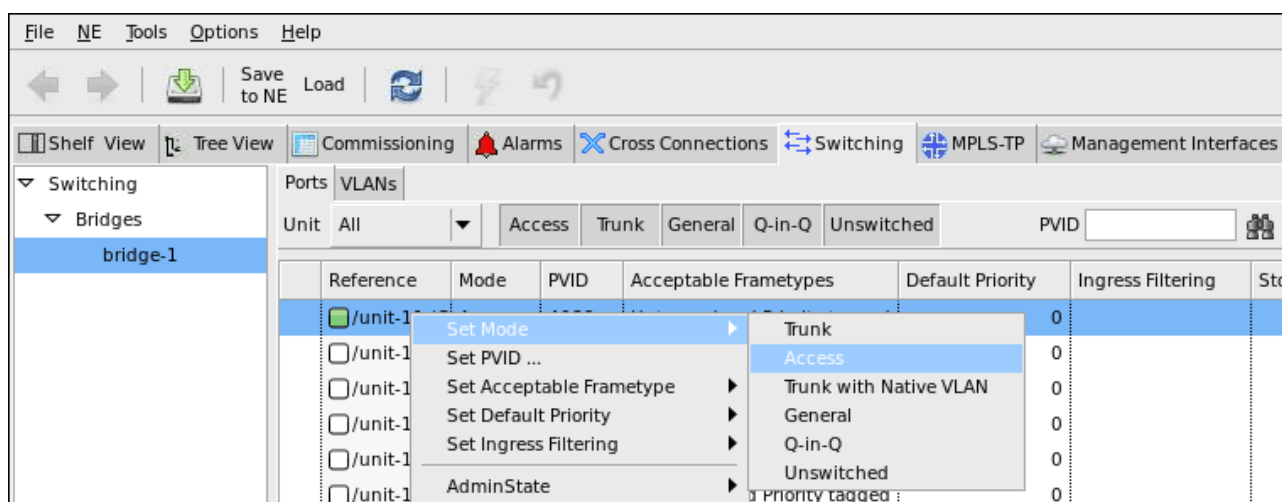
For more details please refer to Ethernet Switching User Manual [1KHW028566].

The bridge ports can be attached to the (H-)VPLS service if it shares the same VLAN ID with the corresponding Switch Virtual Interface (SVI).

The FOX61x supports the following bridge port modes on the chassis switch:

- Access ports mode:

The access port's ingress direction accepts only untagged or priority tagged frames, which become tagged with port VLAN ID (PVID). The PVID must be member of the bridge VLANs.



- Q-in-Q port mode:

The Q-in-Q port's ingress direction accepts all frames, be they VLAN tagged or untagged. The frames become tagged with the port VLAN-ID (PVID), e.g. untagged ingress frames become single tagged, single tagged ingress frames become double tagged. The PVID must also be member of the bridge VLANs.

- Trunk port mode:

The trunk port's ingress direction accepts tagged frames whose VLAN ID is member of the bridge VLANs. Untagged or priority tagged frames are dropped. Inside the chassis switch, the frames keep their VLAN-ID. Note that the trunk port has no PVID. This port mode is not suitable for VPLS services.

- Trunk with Native VLAN mode:

The trunk with native VLAN port's ingress direction accepts tagged frames whose VLAN ID is member of the bridge VLANs. Untagged or priority tagged frames are tagged with PVID. The PVID must be member of the bridge VLANs. This port mode is not suitable for VPLS services.

- General port mode:

The general port's ingress frame handling is defined by the "Acceptable Frametype" and "Ingress Filtering" settings.

A general port provides a VLAN membership table. When "Ingress Filtering" is enabled, the general ingress port drops all Ethernet frames whose VLAN ID is not listed in the VLAN membership table.

Table 3: Port Mode Settings

Acceptable Frametype	Ingress Filtering	Description
Untagged and Priority Tagged	Disabled	General port acts like access port.
	Enabled	General port acts like access port, drops frames whose VLAN ID is not member of the VLAN membership table.
Tagged	Disabled	General port acts like trunk port.
	Enabled	General port acts like trunk port, drops frames whose VLAN ID is not listed in the VLAN membership table.
All	Disabled	General port acts like trunk with native VLAN port.
	Enabled	General port acts like trunk with native VLAN port, drops frames whose VLAN ID is not listed in the VLAN membership table.

3 Switch Virtual Interface (SVI)

The SVI is the attachment circuit (AC) of a (H-)VPLS. The SVI is automatically created by ENP and its VLAN ID mapped to the local VLAN ID. That is, SVI VLAN ID = local VLAN ID.

VPLS instance, VPN OUI:

The SVI associates the SVI VLAN with one (H-)VPLS Service Instance (VSI) identified by VPN ID (VPN OUI). The unique VPN OUI is calculated by ENP and is set up on all NEs participating in the VSI.

The VSI is composed of the Pseudo Wires belonging to the respective (H-)VPLS instance. The (H-)VPLS instance forwards the SVI VLAN tagged user traffic to all these Pseudo Wires.

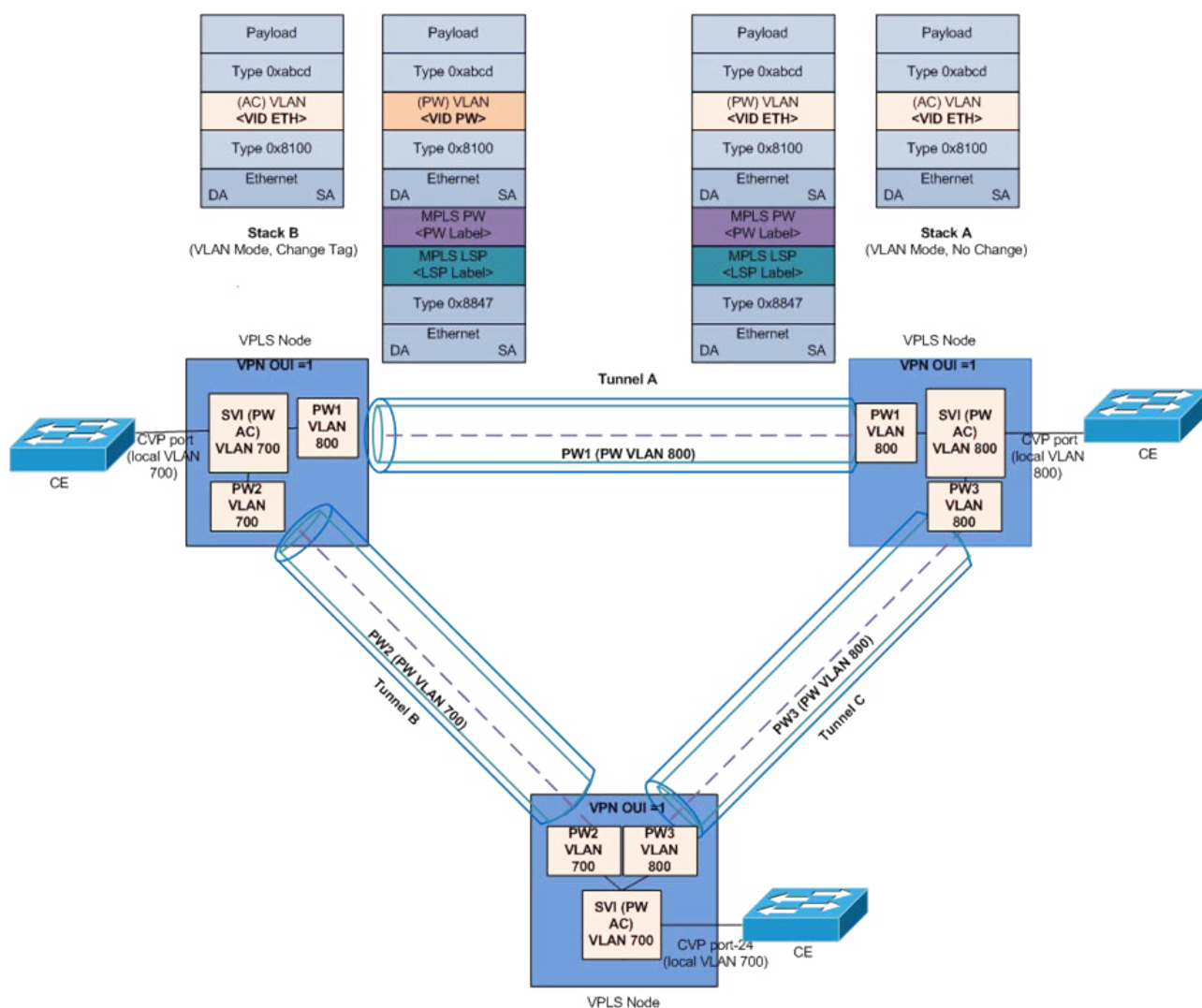
4 Pseudo wires are created automatically to achieve full mesh connectivity between all VPLS nodes.

The figure below shows that three Pseudo Wires (PW1, PW2, PW3) are created to connect all the three VPLS nodes.

The endpoints AC type is strictly dependent on the local VLAN configuration (VID ETH) on the node. All Pseudo Wires with the VPLS Service will be set up between SVIs with the PWAC VLAN Based type. However, the local VLAN ID used on every node maybe different. In that case the PW VLAN rewriting on both sides is required (Stack B). Otherwise, no PW VLAN rewriting is needed (Stack A).

The **PW VLAN** ID of each Pseudo Wire attached to SVI are controlled using the VLAN Mode:

- AC Type VLAN-Based, No Change (Stack A):
The PW VLAN ID is the same as the SVI (AC)VLAN ID: VID <ETH>.
- AC Type VLAN-Based, Change VLAN (Stack B):
The SVI (AC) VLAN ID is modified to a new PW VLAN ID: VID <PW>.



- The **control unit** (CESM1, CESM2 or CESM3) encapsulates the PW VLAN tagged frames into MPLS-TP frames by adding the PW label, the LSP label and the Ethernet destination and source addresses before forwarding the frames to the MPLS-TP (MP) port connected to the MPLS-TP network.

8.1.4 Traffic Engineering

For mission critical applications an end-to-end packet transport service requires, among others, Traffic Engineering in order to provide the transport service for user service packets (e.g. mapping of user service to Pseudo Wire on top of the MPLS-TP tunnels) between two (point to point) or more (multi-point to multi-point) user-network-interfaces (UNI), or service-network-interfaces (SNI).

Mission critical traffic can only fulfill the QoS requirements by setting packet priorities, bandwidth parameters, queuing polices and routing criteria.

For this purpose the FOXMAN-UN and the MPLS-TP capable nodes provide an appropriate Traffic Engineering.

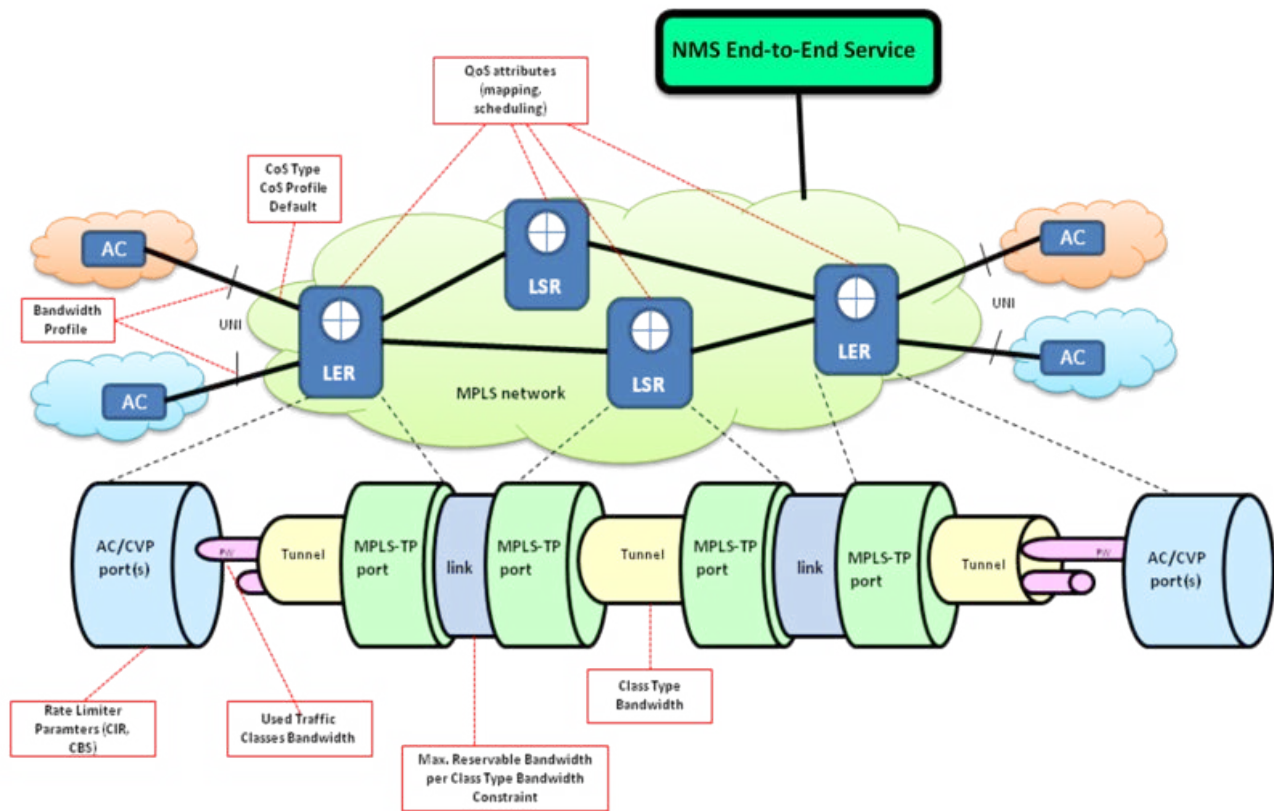


Figure 4: NMS End-to-end Service View

For the implemented MPLS-TP traffic engineering the following subjects are considered:

- Traffic Classification Scheme and Network-wide management of QoS reference tables (see e.g. [Manage QoS Reference Tables](#)),
- Mapping of Priorities to Traffic Classes (see e.g. [Manage QoS Reference Tables](#)),
- Queue Scheduling Policy (see e.g. [Class Type \(HQoS Class Type Definition\)](#)),
- Service Bandwidth Allocation (see e.g. [Class Type \(HQoS Class Type Definition\)](#), [Create VPLS](#), [Create VPWS](#)),
- Class Type Concept (see [Class Type \(HQoS Class Type Definition\)](#)),
- [Service Profiles](#) (available only with a valid Traffic Engineering license option),
- Network Audit function (see [Schedule Network Audit](#), [Schedule Network Alignment](#), [Network Audit Result](#)). The network audit function assures alignment of QoS tables over all nodes in the network, typically performed during the initial installation of the network.
- Backplane audit function (see [Schedule Backplane Audit](#), [Backplane Audit Result](#)). This audit function enables the operator to check whether the traffic bandwidth reserved for services and tunnels exceeds the available capacity. In case the sum of the CIR of the services transported on an NE backplane is exceeded, the audit will trigger an alarm.
- A mechanism to indicate to a local craft terminal ([FOXCST](#)) user that a node underlying Traffic Engineering is managed by ENP, and that changing the configuration on the node could break up data consistency between the network element and the network management system. All nodes included in the ENP Domain are subject to this mechanism.

Traffic Engineering includes all of the above items. During the Traffic Engineering setup the following activities are recommended:

- Define a traffic classification scheme: define how the user traffic (e.g. incoming traffic at the UNI) is classified to a distinct traffic class. The traffic class is derived either from the packets PCP, DSCP or EXP value, or from the default priority assigned by the management. The traffic class is used to define the queue in which a packet is mapped at the egress port, and

to set the priority (EXP) in the MPLS-TP packet header (E-LSP), used in the next MPLS-TP node for the Traffic Class selection.

QoS reference tables defined in at least one node via the **FOXCAST** can be uploaded to the FOXMAN-UN and can be used/downloaded to other nodes (see **Manage QoS Reference Tables**).

- Define the queue scheduling via **FOXCAST** by configuring up to 5 scheduling profiles. Define a QoS scheduling profile assignment (1...5) on each egress port.

It is required that the scheduling algorithm – Strict Priority (SP) or Weighted Round Robin (WRR) and the assignment of the profiles' traffic class at the ports are kept consistent in the network.

For mission critical traffic a strict priority queuing scheme shall be used, whereas a weighted queuing can be applied for non-mission critical traffic.

- Assign bandwidths to services. For mission critical services no bandwidth over-subscription is acceptable.
- Define Class Types (see **Class Type (HQoS Class Type Definition)**). A sample Class Types concept could look as follows:

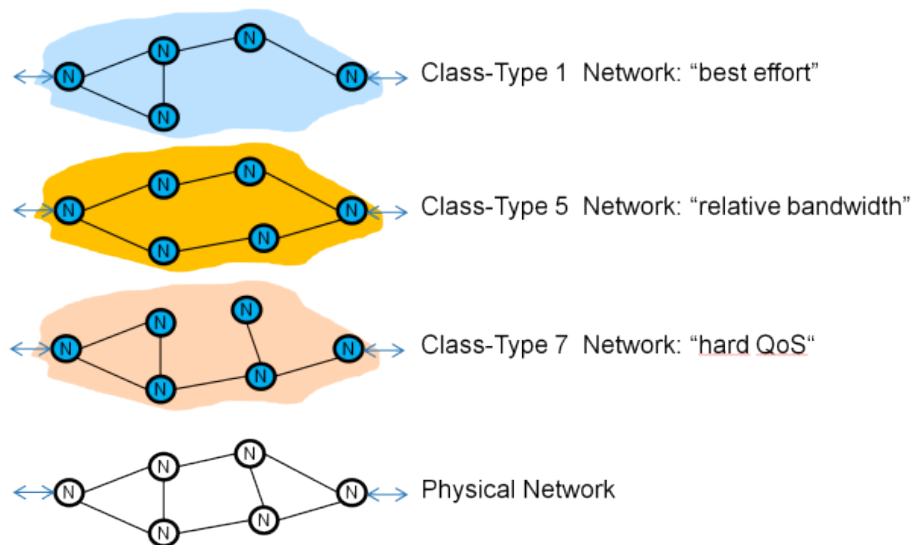


Figure 5: Sample Class Type Concept

For the initial deployment, you may use a traffic model based on two Class Types; one for Mission Critical services (e.g. hard QoS) and one for Non Mission Critical services (best effort). However, when required by the traffic model, additional Class Types are configured.

An output queue scheduler also supports the use of Traffic Classes within the Class Type, as shown in the following sample. In this figure, CT7 has the highest priority (only traffic class 6), the CT6 supports two traffic classes (5 and 4) in a WRR mode. The CT5 supports traffic class 0, best effort mode.

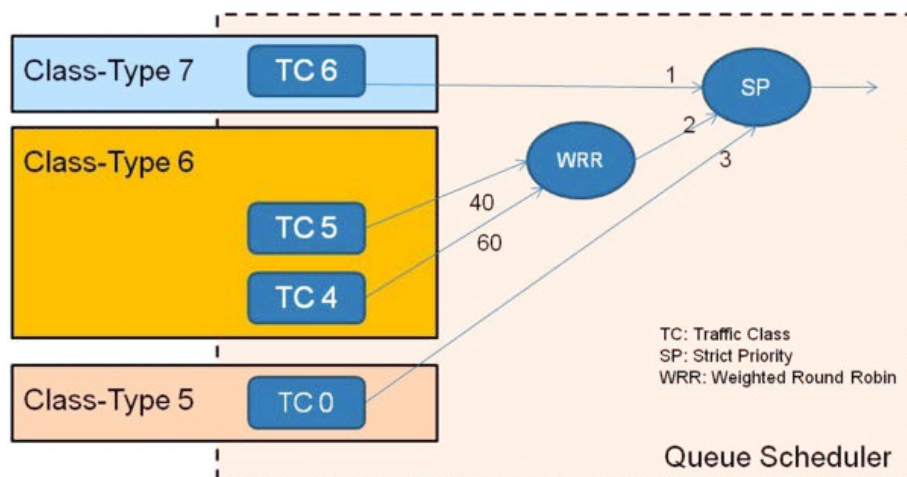


Figure 6: Sample Use of Class Types and QoS Scheduling

In order to have a fair setup in the above example, the CT7 and CT6 have to support bandwidth constraints (policing) and be subject to the Admission Control calculations. Furthermore the Queue Buffers allocated to each traffic class must be dimensioned in an optimal way for this setup. The Class Type 0 shall be reserved for services which are not allocated to a particular Class Type and for the case when a system release is upgraded from prior to the introduction of the Class Type.

- **Create Service Profiles.** A **Service Profile** – provided you have acquired a Traffic Engineering license option – is a mandatory requirement for creating services. **Service Profiles** can be created for VPLS services, and for VPWS services. In any case a valid **Class Type (HQoS Class Type Definition)** is required for this (also see previous bullet point).



Please note:

The FOX61x supports up to 5 scheduling profiles. The assignment of a scheduling profile to a port is done by the scheduling profile index configured for each port.

For the MPLS-TP network it is required that all nodes have a common definition of the scheduling profile. Adding a new Class Type would in most cases also require a change to the scheduling profile definition.

For the link bandwidth calculation and management the “Russian Dolls” model according to RFC 4127 is implemented. The formula used for bandwidth calculations can be generalized to 8 active Class Types (CTs) and expressed as follows:

```
"Unreserved TE-Class [i]" =
MIN[
  [BCC-SUM(Reserved(CTb,q))] for q≤p and c≤b≤7,
  [BC(c-1)-SUM(Reserved(CTb,q))] for q≤p and (c-1)≤b≤7,
  ...
  [BC0-SUM(Reserved(CTb,q))] for q≤p and 0≤b≤7,
]

where:
TE-Class [i] <--> <CTc, preemption p>
in the configured TE-Class mapping.
```

8.1.5 Hierarchical QoS (HQoS)

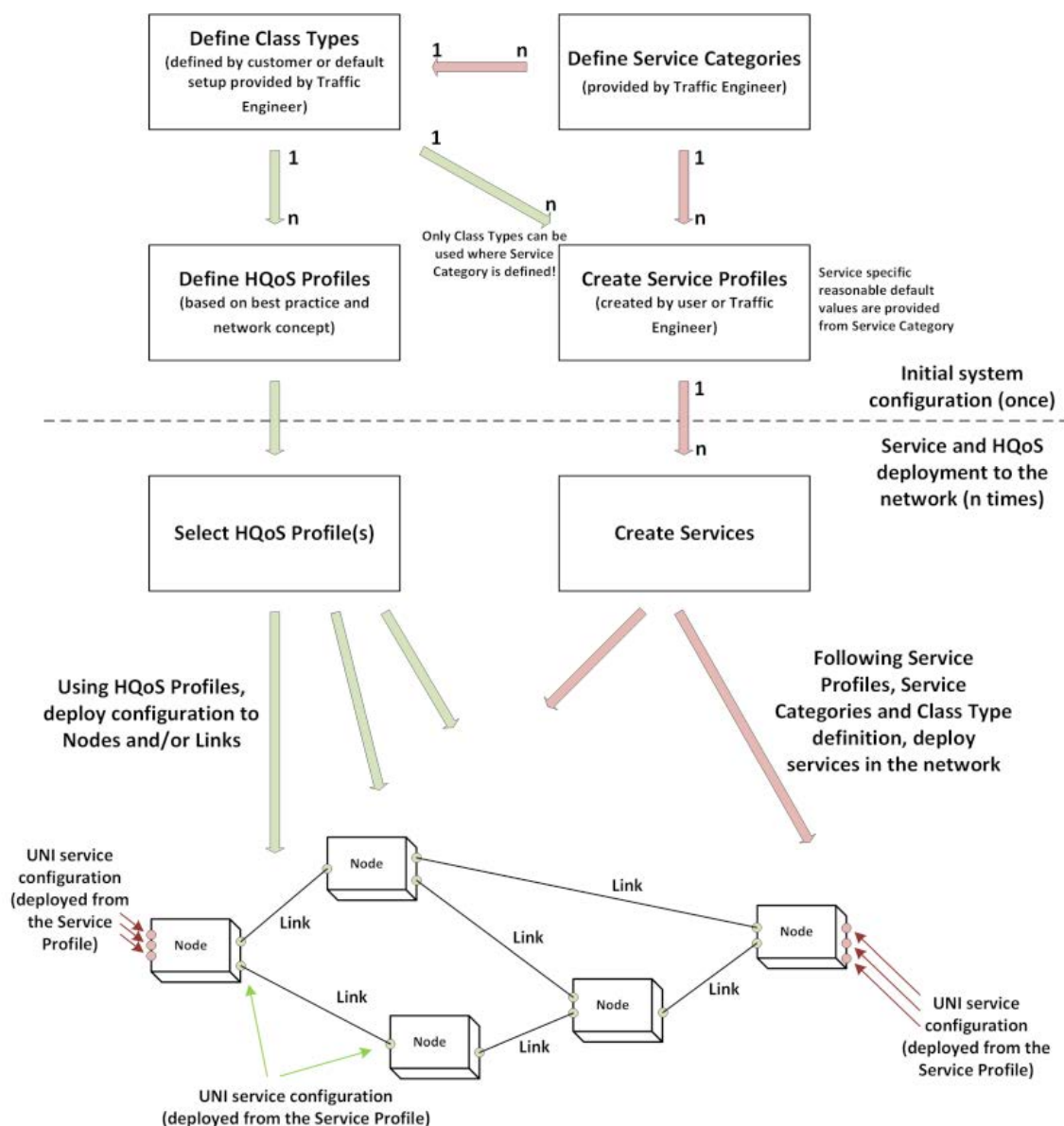
HQoS provides means for setting up the MPLS-TP network with differentiated services. With HQoS, a scheduling level is introduced which enables the Hierarchical QoS mechanism. This 2-level scheduling can distinguish service-specific and class-specific traffic and provide BW management when used together with shaping capabilities.

**Please note:**

The BW enforcement feature availability depends on the HW and SW used in your FOX61x nodes. BW enforcement is required for setting up HQoS in your network.

**Please note:**

It is assumed that you have already configured a number of nodes and links in your network to which you want to apply HQoS now.

Workflow

To configure the basics of HQoS, we recommend adhering to the workflow above and the steps as listed below.

Proceed as follows:

1. Define appropriate Service Categories via the “**Create Service Category**” wizard. This is done by a traffic engineer in the **HQoS Configuration Manager**, “Service Category” tab (**Service Category (HQoS Service Category Definition)**):
 - Verify that the service categories provided as default are appropriate.

- If required, modify these or create your own additional service categories. When done, save the changes.
2. Define Class Types that you want to use throughout the network. This is done in the **HQoS Configuration Manager**, “Class Type” tab (**Class Type (HQoS Class Type Definition)**):
 - Go to “Edit” mode, then activate the “Used” checkbox for the Class Types you want to use in your network.
 - Fill in the required parameters for each of the Class Types used.
 - Select a traffic model (RDM, MAM).
 - Save the Class Types.
 3. To apply the modified Class Types restart the ENP core. In a terminal execute the following commands:


```
../bin/private/enpcorestop
../bin/private/enpcorestart
```

After the ENP Core has restarted you need to re-open the ENP GUI.
 4. **Create Service Profiles**. This is done by the user or a traffic engineer from the ENP main window, “Service Profile” tab.
 5. Define the major HQoS profiles, e.g. one for the network core, and one for the network edge. This is done in the **HQoS Configuration Manager**:
 - In the “HQoS Profile” tab (**HQoS Profile (Definition)**), click on the “Create” (Add a new configuration) button.
 - Give it a name, e.g. “Core”.
 - Select the appropriate strategy, e.g. “1-rate BW enforcement - drop non-eligible TC packets”.
 - In the list of available HQoS profiles select the profile just created. If required, click the “Edit” icon and adjust specific settings of the profile.
 - Save the modifications.
 - In the “HQoS Profile” tab (**HQoS Profile (Definition)**), click on the “Create” (Add a new configuration) button to add a second HQoS profile.
 - Give it a name, e.g. “Edge”.
 - Select the appropriate strategy, e.g. “1-rate BW enforcement - drop non-eligible TC packets”.
 - In the list of available HQoS profiles select the profile just created. If required, click the “Edit” icon and adjust specific settings of the profile.
 - Save the modifications.
 6. Select the HQoS profiles and apply them to your network, i.e. specifically to nodes or links you have set up already. To do this, go to the **HQoS Configuration Manager**, “HQoS Profile” tab (**HQoS Profile (Definition)**), select the HQoS profile from the left-hand list, then select the “Network View” tab:
 - Click on the “Align” button above the left-hand NE table to add nodes (NEs) to the HQoS profile and/or
 - click on the “Align” button above the left-hand Link table to add links to the HQoS profile. Confirm the alignment of the selected item(s) with the current HQoS profile.
 - To remove an NE or a Link from the profile usage, select the NE or Link and click the respective “Clear” button above the table. Confirm clearing of the selected item from using the current HQoS profile.
 - Confirm the alignment of the selected NEs and/or links with the current HQoS profile. In order to fully align links with that profile, both ends of the links must support BW enforcement.
If a node is not supporting this feature, the HQoS profile with BW enforcement cannot be applied on that end of the link. It will hence be shown as partially enabled.
If the nodes on both ends of the link are supporting BW enforcement the feature will be shown as enabled on the link and on both terminating nodes.

- Repeat these steps with the core profile on the links of your core network, and with the edge profile for edge links of your network.
7. Create Services. This is done on the ENP, VPWS or VPLS tab via the **Create Service** wizard.

Result: You have done the basic HQoS setup in your network.

End of instruction

To create services (VPLS, VPWS) with HQoS applied, the above steps need to be done; otherwise you won't be able to have BW enforcement activated.

8.1.6 QoS (EXP)

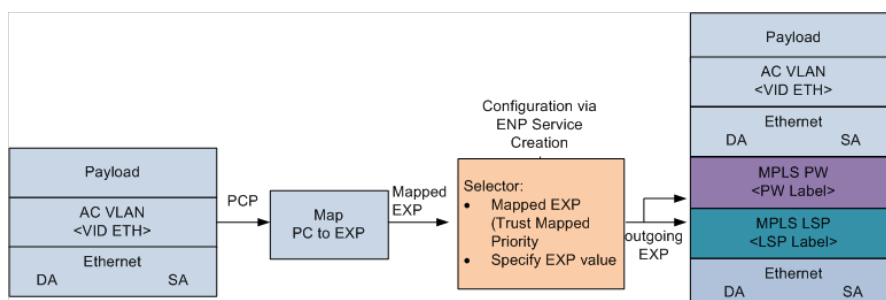
There are necessary conditions for QoS: guaranteed bandwidth, class related scheduling and packet discarding treatment.

The MPLS-TP label has a 3-bit EXP field. These bits define the QoS treatment, e.g. the class of service and dropping priority (Per-Hop-Behavior or PHB) that an MPLS-TP node should give to a packet. For example, a high priority, delay sensitive packet should not be held up in queue by low priority traffic during periods of congestion.

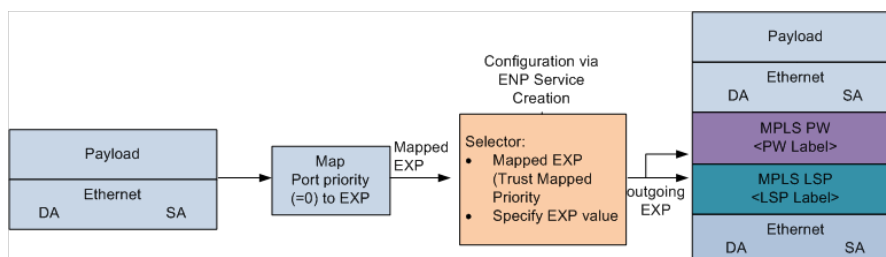
At the Initiator

The mapped EXP value is determined by FOX61x as follows:

- In case of tagged incoming user traffic, the received PCP (Priority Code Point) value of the VLAN tag is automatically mapped to EXP value.



- In case of untagged incoming user traffic, the classification of the outgoing traffic is done using a fixed port priority of the PWAC port (=0).



The outgoing EXP value is then determined via ENP Service Creation wizard by:

- selecting the mapped EXP value (Trust mapped priority),
- or
- specifying the outgoing EXP value.

The method of specifying the outgoing EXP value applied for the operator to have better control of the EXP bits modification. For example, the operator can specify outgoing EXP value as zero on all packets coming from an interface (PWAC) connected to a non-QoS paying customer.

At the Transit nodes and Terminator node

The incoming LSP label's EXP value is mapped to Per Hop Behaviour (PHB), which consists of scheduling class, drop precedence and traffic class.

8.1.7 LSP Path Calculation

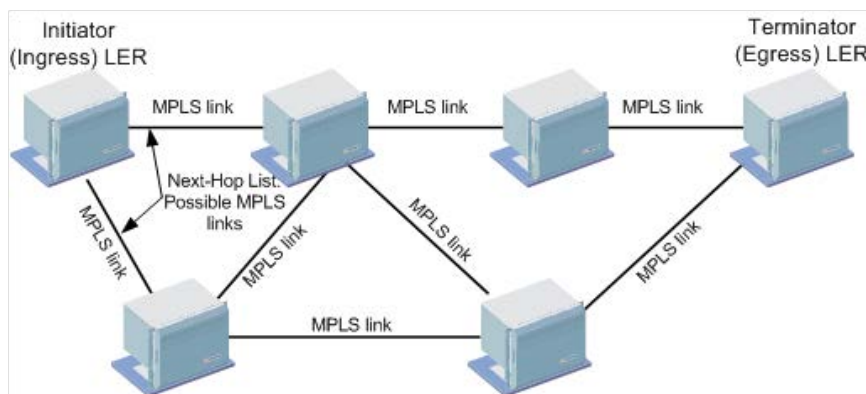
The Label Switched Path (LSP) is calculated via ENP's Manual, Automatic and Advance Routing features.



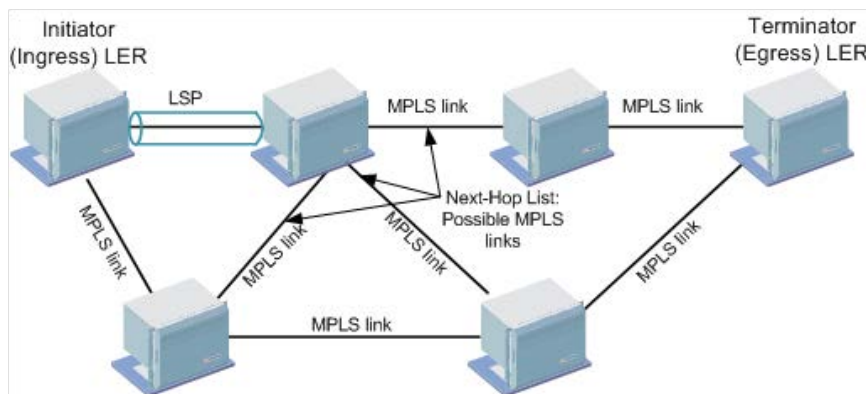
ENP supports calculating an LSP with bandwidth reservation. The routing engine takes into consideration only the links with enough available bandwidth to accommodate the tunnel bandwidth requirement.

For example, an LSP requires 60 Mbit/s of reserved bandwidth. The routing engine prunes the links whose available link bandwidth are less than 60 Mbit/s

- **Manual Routing** allows the user to route the LSP manually.
 - The Next Hop dialog lists all possible MPLS-TP links with enough available bandwidth to reach the Next-Hop node.



- When the user selects a next-hop link, the hop is added to the path, the bandwidth is reserved for the tunnel and new possible next hop links are shown. This procedure can be repeated until a complete path is defined.



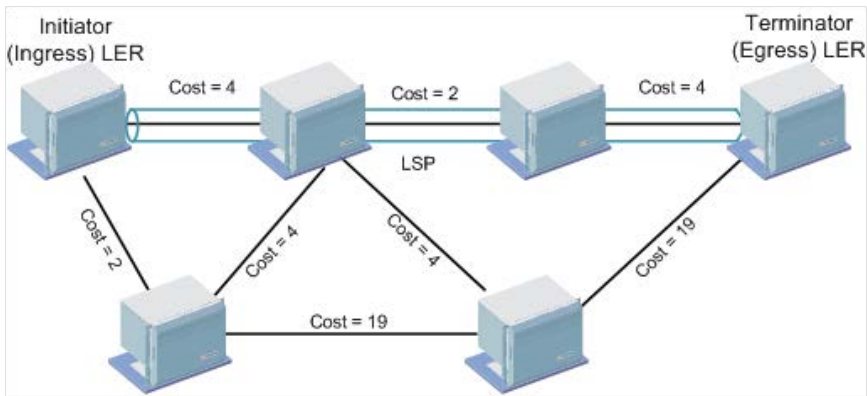
- **Automatic Routing** automatically creates a complete LSP based on the cheapest route between the Initiator and Terminator.
 - All the MPLS-TP links along the possible routes to destination have enough available bandwidth.

- The selected route has a minimal metric, which is computed by adding the link costs charged for all the connections along the route.
- The arbitrary metric values are typically single integers with lower values indicating better paths. Example of recommended costs are as follows:

Table 4: Recommended Cost Settings

Link Speed	Cost
10 Gbit/s	2
1 Gbit/s	4
100 Mbit/s	19
10 Mbit/s	100

The figure below shows an example of calculated path after automatic routing.



- If a **Tunnel template** is used, the automatic routing engine creates a complete LSP automatically based on the configured Automatic Routing Parameters of the template.
- **Advanced Routing** creates a complete LSP automatically based on the configured Automatic Routing Parameters.

Advanced Routing allows the network operator to define constraints other than the path cost in calculating the LSP path. The key aim of Advanced Routing is to distribute traffic across the links to ensure that the load is shared. The bandwidth utilization should not exceed the link’s available bandwidth.

The following network constraints can be configured by the operator:

Routing Order

The operator can select one of the routing orders:

- “BW_Optimized” takes into account the current bandwidth utilization. The administrative cost is ignored. The calculated path uses the less utilized links.
- “**Cheapest**” (**Default**) takes into account the administrative cost of the link. The calculated path has the lowest overall cost in the network. Current bandwidth utilization and number of hops are not taken into consideration.
- “Shortest” takes into account the number of hops on the path. Calculated path has the lowest number of hops in the network. Current bandwidth utilization and cost are not taken into consideration.

Note:

The Cheapest and Shortest routing orders take into account the bandwidth in a way that it is prohibited to exceed the link’s available bandwidth.

Additional network constraints listed below can be used together with the routing order:

- Maximum Hop:
The maximum allowed number of hops in the path.

- Maximum Cost:
The maximum allowed cost of the total path.
- Excluded NEs:
The list of nodes for the LSP path to avoid.
- Included NEs:
The ordered list of node hops for the LSP path to go through.

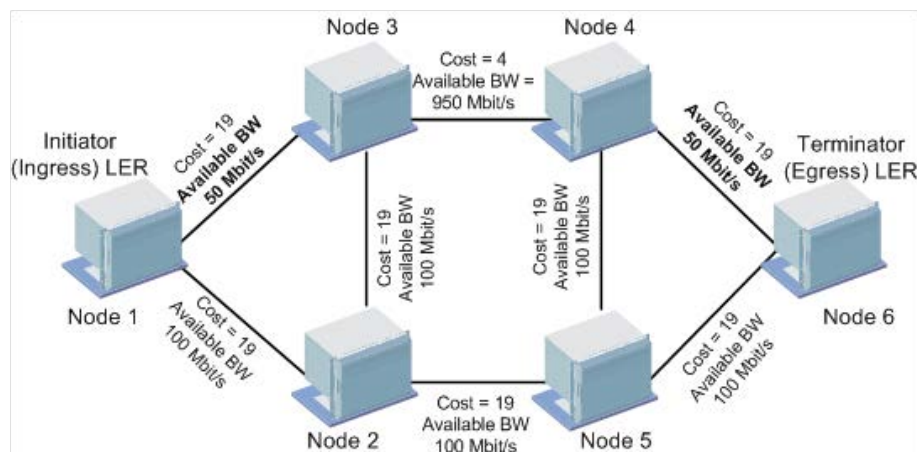
Note:

If this constraint is used, the maximum hop and maximum cost constraints are disabled.

The sample network below has already one LSP established between Node 1 and Node 6 reserving 50 Mbit/s of bandwidth. Assume that the routing engine needs to find a path for another LSP with requirements:

- 60 Mbit/s of reserved bandwidth,
- routing order: cheapest (use the cheapest route),
- included NEs: Node 2, Node 4, Node 5.

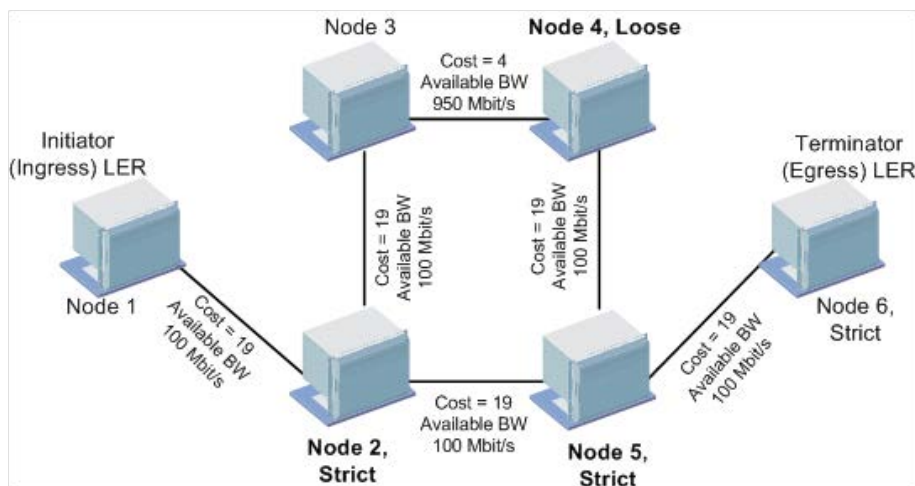
The routing engine starts the process by pruning the links that do not meet the reserved bandwidth requirement of 60 Mbit/s.



The following network constraints are considered in the path calculation towards the Terminator node:

- explicit-path constraints.

The routing engine uses the Included NE's ordered lists of nodes as input to form an explicit route. FOXMAN-UN applies the concept of Explicit Route Order (ERO) based on RFC 3209. Explicit routes are specified as a well-ordered series of node hops. The LSP traverses the nodes in the order that they are specified in the explicit route. The node hops in the explicit route may each be defined by the routing engine as strict or loose. Loose and strict nodes are always interpreted relative to their prior nodes.



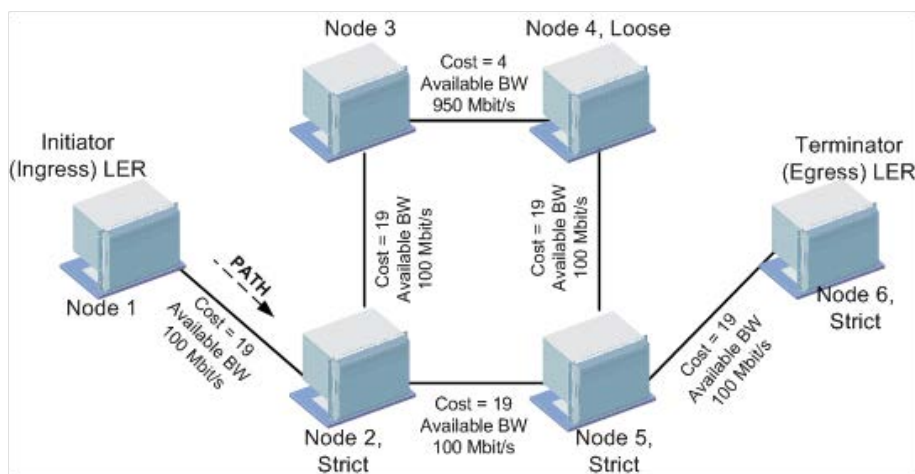
If a node is strict, it has to be a direct neighbor of the previous node.

If a node hop is loose, it does not have to be a direct neighbor of the previous node and the routing engine may fill in additional nodes in between necessary to reach a loose node hop.

Node 2 is defined as strict hop node because it is an intermediate node next to the Initiator node. Node 4 is defined as loose hop node because it is not a direct neighbor of previous node (Node 2).

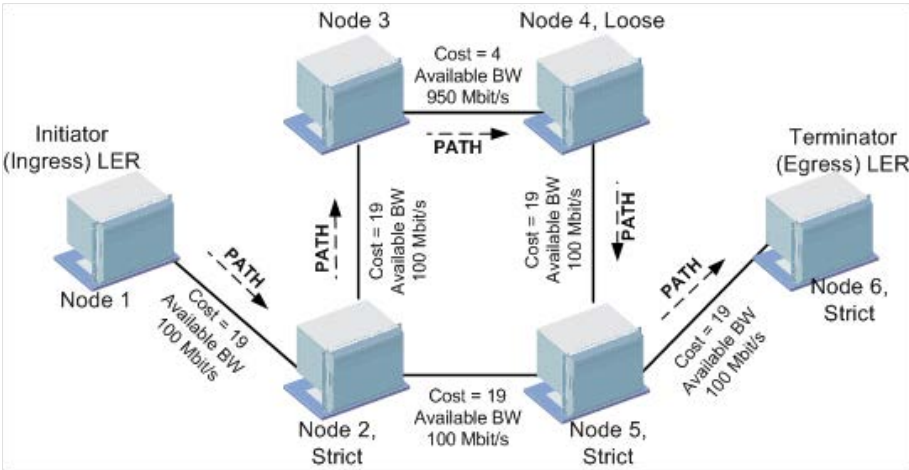
- the metric (cost) of each remaining links.

The ERO list of node hops is used as an input to decide the route that the PATH message must travel. The Initiator node calculates the immediate next-hop node of the LSP path by consulting the ERO. It then sends a PATH message to that immediate next hop node (Node 2) using a direct link with lowest cost.



This link is then excluded from the next hop calculation as a link can only be used once in an LSP Path. Node 2, then processes and regenerates the PATH message and sends it using the lowest cost to Node 4. In this example, the routing engine selects the route "Node 2-Node 3-Node 4" since it has lower cost compared to the route "Node 2-Node 5-Node 4". The used links are then excluded from the next hop calculation.

This process continues until the PATH message reaches the Terminator node.



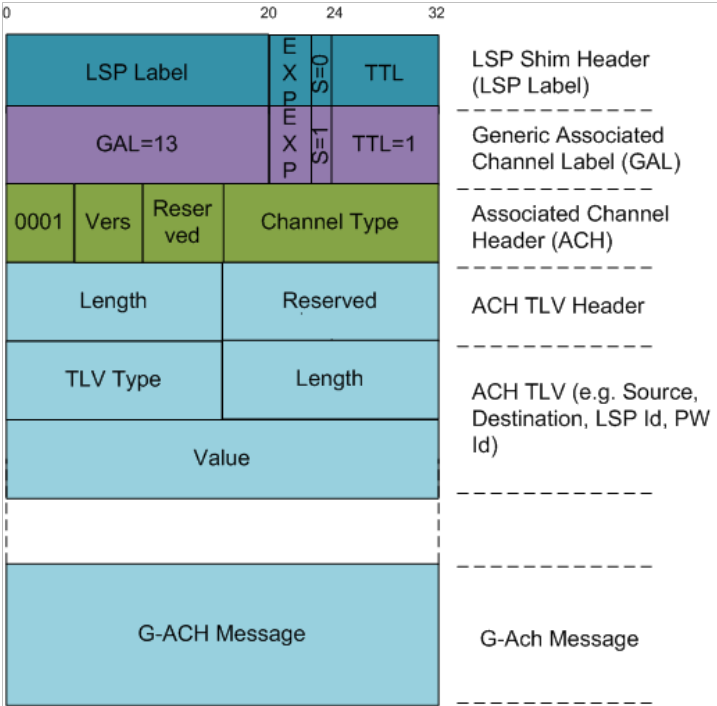
8.1.8 OAM and BFD

LSPs and PWs are monitored through the use of OAM packets. The OAM is used for fault detection, raising alarms as well as in detecting when traffic should be switched to the pre-provisioned protection LSP(s).

OAM packets are co-routed with data packets (in-band) to detect data plane faults. The channel used for OAM, protection switching protocols and other maintenance traffic is the Generic Associated Channel (G-Ach).

To distinguish the OAM packets from other data packets, a standardized MPLS-TP label, GAL (G-Ach label) with value 13 is used. The terminating device uses the GAL to determine that the packet is an OAM packet. The G-Ach header is used to determine what sort of OAM traffic it is.

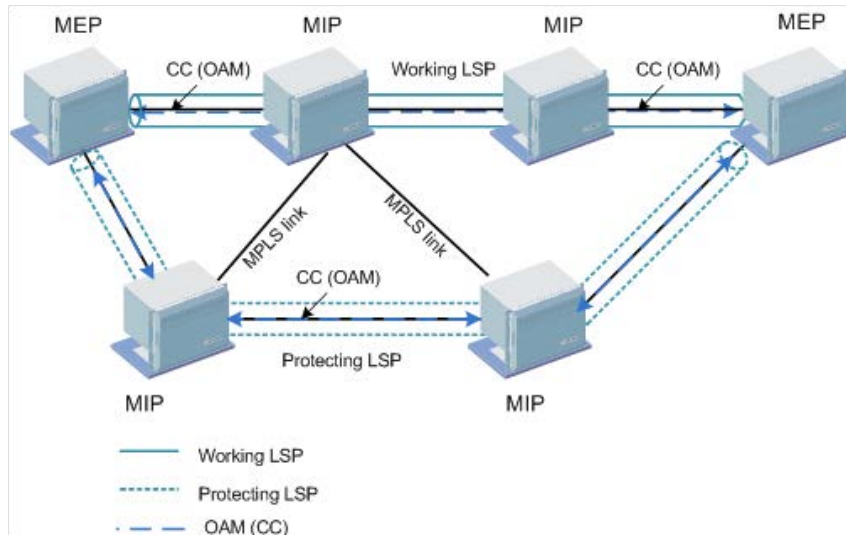
The OAM is available at LSP and PW levels. Current FOXMAN-UN implementation does not supports OAM on PW. The data packet below illustrates an OAM at LSP level in details.



MPLS-TP introduces concept of maintenance domains to be managed and monitored. The main components are explained below:

- Maintenance Entity Group End Points (MEPs):
MEPs are edges of a maintenance domain. MEPs typically reside at the end points of LSPs and PWs.
- Maintenance Intermediate Points (MIPs):
MIPs define intermediate nodes to be monitored.
- Maintenance Entity Groups (MEGs):
Comprise all the MEPs and MIPs on an LSP or PW.

The NE supports OAM at the LSP level, that means the LERs are the MEPs, while the LSRs are the MIPs on this LSP.



BFD Session Establishment and Operation

Bidirectional Forwarding Detection (BFD) is an OAM mechanism that provides bidirectional continuity check to detect faults between two MEP endpoints connected by a link.

The BFD establishes a session between these endpoints over a particular link by exchanging control packets. The local MEP sends Continuity Check (CC) packets at a defined “CC Interval” and the remote MEP monitors the arrival of the CC packets and detects loss of Continuity (LOC) if the packets fail to appear over a certain time period.

If the link or path is protected, separate BFD sessions (BFD CC Supervision) are automatically established in the working and protection LSP to monitor both links.

8.1.9 Protection Mechanism

In order to provide fast protection switching times, working and protection LSPs are preconfigured and relevant bandwidth is reserved.

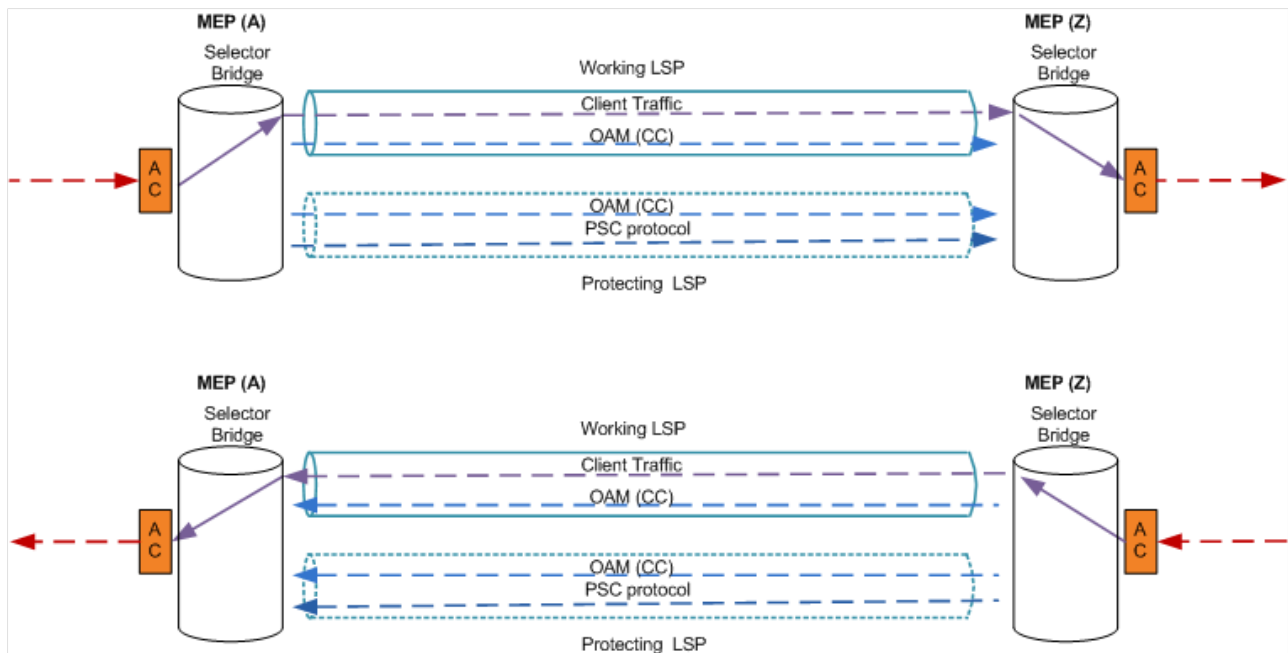
In the 1:1 bidirectional protection switching, a selector at the source of the protection domain selects the path that carries the client or user traffic.

Since both endpoints (MEP A and MEP Z) need to be coordinated to ensure that the selector at both ends select the same path, this architecture supports a protection state coordination (PSC) protocol, which is transmitted on the protecting path.

The figure below details the kind of traffic carried by the working and protecting LSPs during normal state.

Normal State

Under normal state, both working and protection paths are fully allocated and active. The user traffic is sent and received on the working LSP.

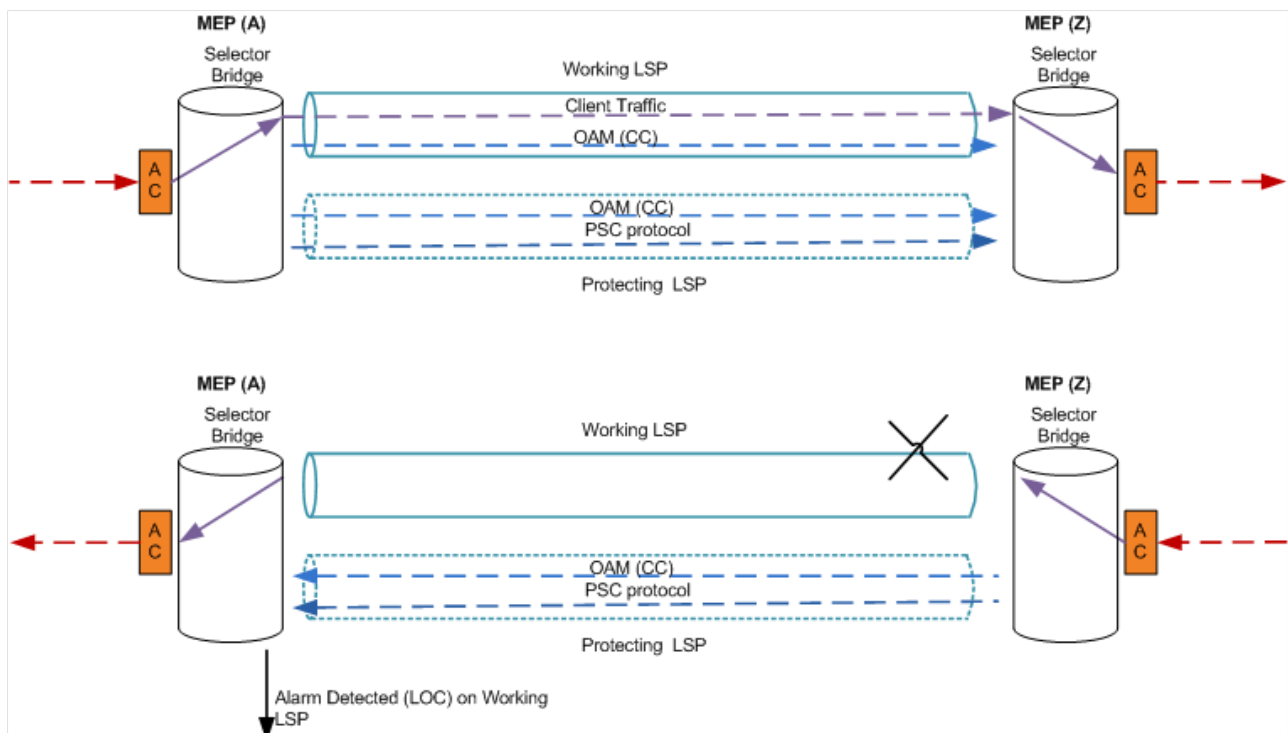


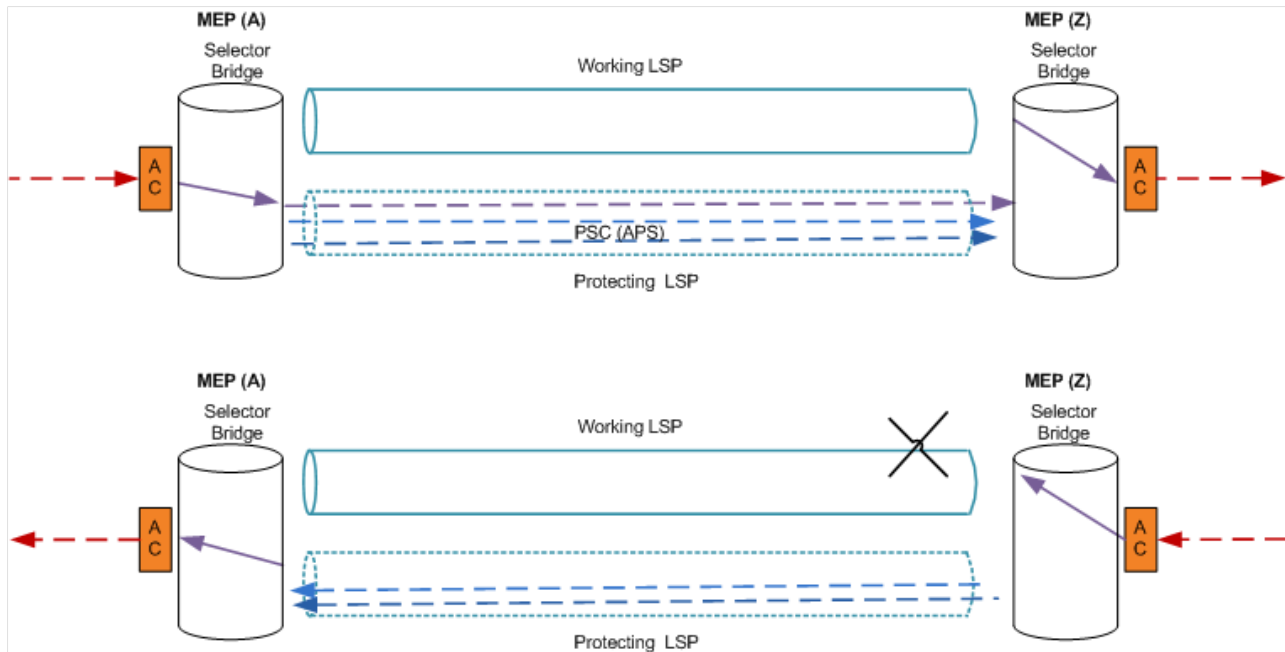
Continuity check packets are sent at a defined “CC Interval” on both the working and protecting LSPs. In order to achieve 50 ms switching during protection, CC packet should be sent every 3.3 or 10 ms.

The PSC protocol packets indicating no state change are transmitted on a regular interval on protecting LSP.

Failure State

The graphics below show a failed condition is detected in the direction from MEP Z to MEP A. MEP A, detects a Loss of Continuity (LOC) on working LSP because it failed to receive CC packets within 3 times the configured “CC Interval”.



Failure State: Switching at A

Upon detection of LOC, the PSC initiates protection switching.

The selector bridge at MEP A is switched to protecting LSP to send and receive user traffic.

**Please note:**

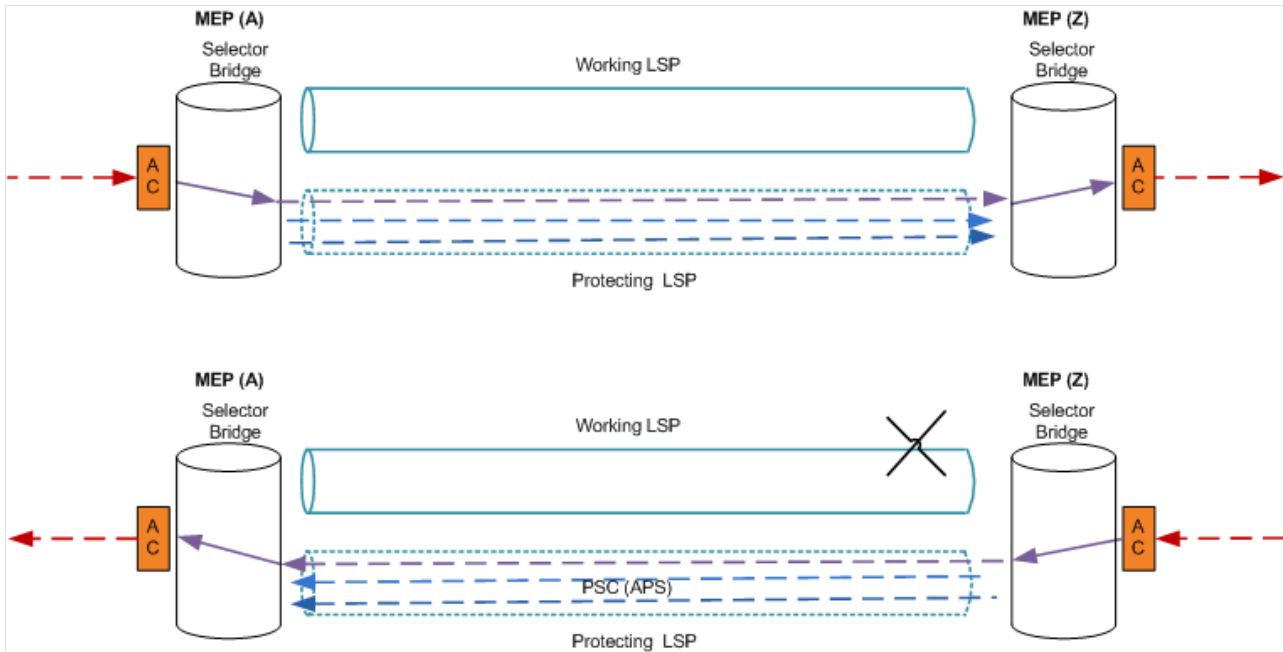
The switching from working to protecting LSP can be triggered by:

- various failure conditions (e.g. link failures) or
- administrator/operator interventions (such as shut-down, lockout of working/ forced switch, and lockout of operation.) These manual interventions can only be done via **FOXCST**.

MEP A also sends three rapid PSC messages to MEP Z indicating signal fail on the working LSP and switching from working to protecting LSP. This set of three rapid PSC messages must be transmitted as quickly as possible, e.g. 3 ms, to allow for fast protection switching.

Failure State: Switching at Z

After MEP Z validates the PSC messages from MEP A, the selector at MEP Z switches to protecting LSP. It then sends an acknowledgment PSC packet to MEP A, informing it about the switching.



Wait-to-Restore and Do-not-Revert State

Under Wait-to-Restore (WTR) state, the protection domain is recovering from a signal fail or signal degradation condition on the working path that is being controlled by Wait-to-Restore timer. Under the revertive mode, the user traffic is automatically switched from the protection path to the working path after the expiration of the Wait-to-Restore (WTR) time.

Under Do-not-Revert state, the protection domain has recovered from a protecting state (no signal fail), but the operator has configured the protection domain as non-revertive mode. Under this mode the protection domain does not automatically revert to normal state upon recovery. The protection domain shall remain in this state until the operator issues a command to revert to the normal state or there is a new trigger to switch to a different state.

8.1.10 MPLS-TP In FOXMAN-UN

Supported Features

The current FOXMAN-UN release supports the following key features:

- Static network provisioning.
- Creation of Virtual Private Wire Service (VPWS).
- Creation of Virtual Private LAN Service (VPLS).
- Provisioning of tunnel between two nodes in the MPLS-TP enabled network. The provisioned tunnel can have a working and an optional protection Label Switched Path (LSP).
- Bandwidth management at the link level.
- Bandwidth management at Pseudo Wire level.
- VPLS services synchronization.
- Bridge Ports, VLANs and SVIs synchronization.
- All MPLS-TP LSPs are bidirectional co-routed as detailed in RFC5654.
- LSP manual or automatic routing. The recommended case is for FOXMAN-UN to automatically calculate the working and protecting paths.
- LSPs are monitored through the use of OAM.
- 1:1 LSP bidirectional protection with sub-50 ms recovery.

Supported FOX61x Units

The following units support MPLS-TP:

Table 5: Units supporting MPLS-TP

Unit Name	Description	Ports	MPLS-TP Port Role
CESM1 CESM1-F	Core Unit	Front Ports: 2 x (1000BASE-xx/10GBASE-xx) 3 x (10BASE-T/100BASE-TX/ 1000BASE-T) Internal Ports: /unit-11/iports/iport-x connecting the Ethernet stand-alone ser- vice units: - CEPI1, - EPSI1, - SAMO1, - COSI1.	MPLS-TP port PWAC port PWAC port
CESM2 CESM2-F	Core Unit	Front Ports: 4 x (1000BASE-xx/10GBASE-xx) 1 x (10BASE-T/100BASE-TX/ 1000BASE-T) Internal Ports: /unit-11/iports/iport-x connecting the Ethernet stand-alone ser- vice units: - CEPI1, - EPSI1, - SAMO1, - COSI1.	MPLS-TP port PWAC port PWAC port
CESM3	Core Unit	Front Ports: 4 x (1000BASE-xx/10GBASE-xx) 1 x (10BASE-T/100BASE-TX/ 1000BASE-T) Internal Ports: /unit-11/iports/iport-x connecting the Ethernet stand-alone ser- vice units: - CEPI1, - EPSI1, - SAMO1, - COSI1.	MPLS-TP port PWAC port PWAC port
ELET1	Ethernet Service Unit	24 x 1000BASE-T	PWAC port
ETOP1 ETOP1-F	Ethernet Service Unit	12 x 1000BASE-X	PWAC port
EPOI1	Ethernet Service Unit	12 x (10/100/1000) BASE-T	PWAC port
SAMO2 SAMO2-F SAMO3 SAMO5 SAMO5-F	SDH Service Unit providing four SDH and four Ethernet front interfaces	4 x (10/100/1000) BASE-T	PWAC port

**Please note:**

When using core unit redundancy with Ethernet stand-alone service units, **FOXCST** configuration instructions as described in the following example should be adhered to:

- Assume an Ethernet stand-alone service unit is assigned in slot 5. In this case the stand-alone service unit is connected to iport-5 of the core units in slots 11 and 13.
- Configure both core unit internal ports, unit-11/iports/iport-5 and unit-13/iports/iport-5, to the port type “PWAC”.
- Configure the QoS parameters on both core unit internal ports, unit-11/iports/iport-5 and unit-13/iports/iport-5.
- When configuring the VPWS, attach the working core unit internal port unit-11/iports/iport-5 to the Pseudo Wire.

At a core unit switch-over and with the redundant core unit becoming active, the following behavior applies:

- Traffic will flow over unit-13/iports/iport-5. However, this is not reflected in the **FOXCST**. **FOXCST** still shows unit-11/iports/iport-5 as configured “PWAC”. Even if the working core unit is not plugged in slot-11, **FOXCST** still shows unit-11/iports/iport-5 as configured “PWAC”.
- Statistics counters are available on unit-13/iports/iport-5.

Limitations

The current FOXMAN-UN release does not support the following MPLS-TP features:

- Modifications of labels (LSP and Pseudo Wire).
- Re-routing.

8.2 Service Provisioning and Deployment via ENP GUI

This section includes the following topics:

Network Requirements,
Preconfiguration Process via FOXCST,
Preconfiguration via FOXMAN-UN,
Create a Virtual Private LAN Service (VPLS),
Verify VPLS Details,
Create a Virtual Private Wire Service (VPWS),
Verify VPWS Details,
Create a Tunnel.

The FOXMAN-UN MPLS-TP service provisioning is possible via the ENP GUI.

**Please note:**

The term “ENP >” will be used as a shortcut for “NEM Desktop > Application > Ethernet Networking Package” to launch the ENP GUI.

The current release additionally requires the operator to assign the MPLS-TP port roles via **FOXCST**. The MPLS-TP node label range is fixed at 16-1048575.

The service configuration via the ENP GUI is in principle done in 2 steps:

1 Provisioning

- Provisioning of MPLS-TP tunnel between two MPLS-TP nodes.
 - Manual or automatic selection of new paths to build Label Switched Paths (LSPs).
- The provisioned tunnel can have one or two paths, a working and an optional protection LSP.

- Creating the Service (see details further below).
- 2 Deployment
- Apply the MPLS-TP configuration changes to the nodes.
 - FOXMAN-UN verifies that the required resources are still available.

**Please note:**

Fiber connectivity is recommended to be in place between nodes prior to configuration. Routing of paths won't be possible unless links are defined between the involved nodes.

The creation of a Service Profile and of services based on such Service Profiles requires a valid **Traffic Engineering** concept and includes the following steps:

- 1 Create a Class Type definition in FOXMAN-UN, based on your **Traffic Engineering** concept. Use the "**Class Type (HQoS Class Type Definition)**" dialog for this purpose.
- 2 Create an appropriate set of Service Profiles. Use the "**Create Service Profile**" dialog. The number of required service profiles depends on the variety of services you have planned in your network.
- 3 Create VPWS or VPLS services, using the Service Profiles created in the previous step 2.
- 4 If required change the service parameters of service instances that have been set to "Variable" during the Service Profile creation. Service parameters that have been set to "Fixed" cannot be modified on a service instance.
- 5 Save the Service.
- 6 Deploy the (changed or new) Service.
- 7 The routing algorithm takes these (new) conditions into consideration.

8.2.1 Network Requirements

Full mesh of MPLS-TP tunnels between the three nodes.

The application transports an untagged Ethernet signal over a packet network using an Ethernet port of a FOX61x:

- The Ethernet signal is connected to ELET1 unit.
- The core unit encapsulates the user Ethernet traffic MPLS-TP tunnels.

VPWS

- A point-to-point VPWS has to be created by ENP between NE80 and NE82.

VPLS

- A VPLS instance has to be created by ENP between NE80, NE82 and NE83.
- NE81 does not participate in the VPLS instance.
- Mesh Pseudo wire Binding.

Table 6: Sample Settings for VPWS / VPLS

NE/Unit	Slot/port	Port type/role	VLAN	Port mode
NE80 (VPLS NE): Global ID:1; Node ID:80				
CESM1	11/3	MPLS-TP		
	11/4	MPLS-TP		
ELET1	20/1	PWAC		
	20/2	CVP	700	Access
NE81: Global ID:1; Node ID:81				
CESM1	11/3	MPLS-TP		

Table 6: Sample Settings for VPWS / VPLS

NE/Unit	Slot/port	Port type/role	VLAN	Port mode
	11/4	MPLS-TP		
NE82 (VPLS NE): Global ID:1; Node ID: 82				
CESM1	11/3	MPLS-TP		
	11/4	MPLS-TP		
ELET1	16/2	PWAC		
	16/3	CVP	800	Access
NE83 (VPLS NE): Global ID: 1; Node ID:83				
CESM1	11/3	MPLS-TP		
	11/4	MPLS-TP		
ELET1	14/24	CVP	700	Access

8.2.2 Preconfiguration Process via FOXCST

The **FOXCST** configuration steps described in this section assign:

- The MPLS-TP port types:
 - MPLS-TP,
 - PWAC (for VPWS only),
 - CVP (for VPLS only).
- The Switching configuration for VPLS service
 - Port Mode: Access, or General,
 - VLAN IDs (optional), or PVID, depending on your requirement.

Note:

It is also possible to create VLANs via ENP during service creation.

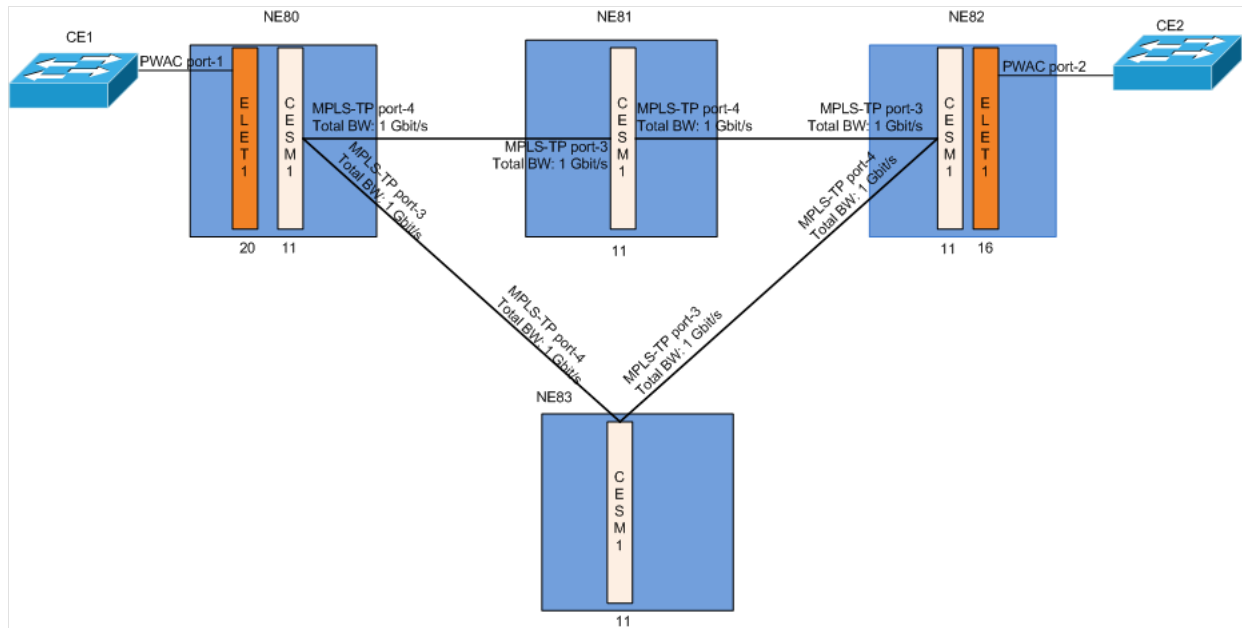
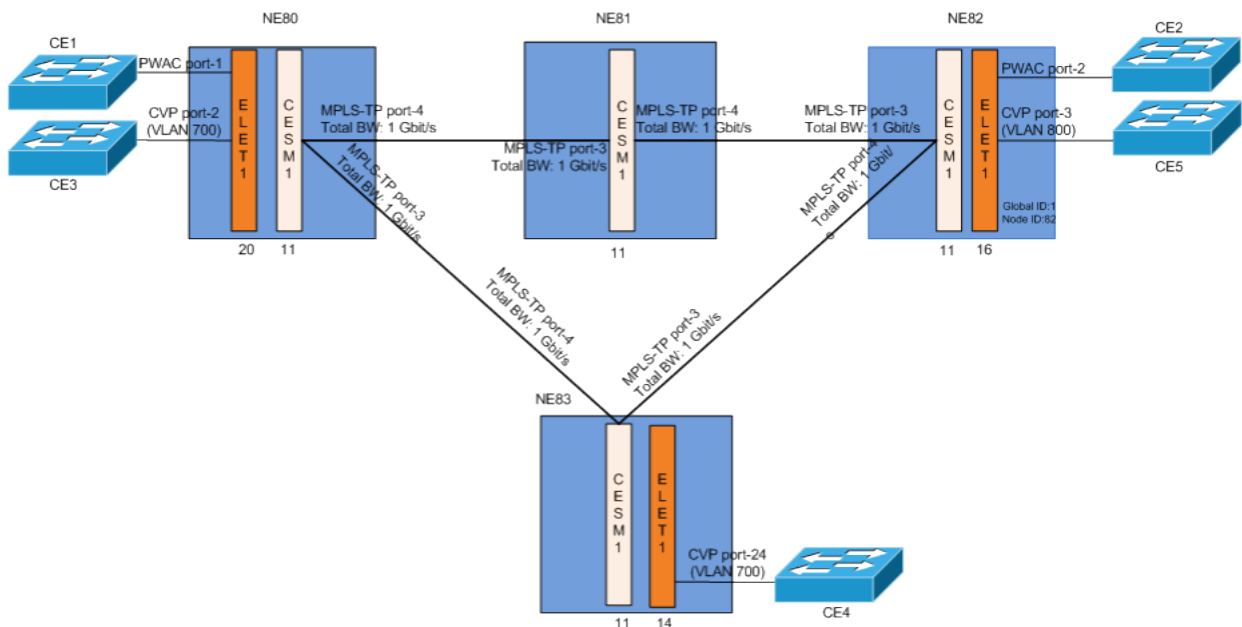
- VLAN membership.



Please note:

For details refer to the following document:

- MPLS-TP user manual [1KHW028618].

FOXCAST preconfiguration for VPWS**FOXCAST preconfiguration for VPWS and VPLS**

- 1 Launch the **FOXCAST** of the selected MPLS-TP node:

**NEM Desktop > Application > NEM Configurator > NE Browser > Agents
> Agent with your MPLS NEs > right click on the required NE, e.g.
NE80 > Configuration > Manager**

- 2 Configure NEs Global ID and Node ID:

FOXCAST > MPLS-TP Tab > Select "MPLS-TP" in the tree

A possible combination of these IDs are listed below:

Table 7: FOX61x Global ID and Node ID

NE	Global ID	Node ID
NE80	1	80
NE81	1	81
NE82	1	82
NE83	1	83

- The pair of Global ID and Node ID must be unique
 - Add all Known Network Elements with their Global ID, Node ID and Description.
 - Export the Known Network Elements to a file via the “Export...” button.
 - An all other nodes you can import this file via the “Import...” button so that all NEs have the same set of Known Network Elements.
- 3 Configure the CE and MPLS-TP network facing interfaces:
- Select the “Tree View” of the **FOXCS**T. Navigate to the port type configuration dialog of the Ethernet user port:

AP:ne/unit-<x>/port-<x>, Main - Port Type - Set Port Usage

The Port Usage allows flexible configuration of any Ethernet interface in the FOX61x chassis to support specific functions as listed below:

- MPLS-TP
These are Ethernet ports on CESM1. These ports can be used for LSP or node label switching: ingress, switch or egress ports (NNI)
- PWAC (Pseudo Wire Attachment Circuit)
These are Ethernet ports on the control unit or Ethernet service units. These ports can be used as A End or Z End of attachment circuits (UNI) for VPWS
- CVP (Customer VLAN Port)
These can be Ethernet ports on Control unit and Ethernet service units
Any port that is configured as CVP connects to the VLAN bridge. These ports can be used as “A End” or “Z End” of attachment circuits for VPLS.
- VLAN Subinterfaces
Any port that is configured as “VLAN Subinterfaces” port, having at least one VLAN and a bandwidth assigned, can be configured as MPLS-TP port. Such MPLS-TP ports are used to transport MPLS-TP traffic through a layer 2 network, using specific VLAN ID(s).
The “None” and “Analyzer” functions are not relevant here.
- Set up bridge VLANs, e.g. VLAN 700 (for VPLS only, optional since VLANs can also be created during service creation in ENP):
 - Select “Switching” view of the **FOXCS**T. Navigate to the ports configuration dialog:

AP:/Switching/Bridges/bridge-1 - Ports

- Configure the /unit-<x>/port-<x>:
e.g. ELET1-20/port-2,
Mode= Access,
PVID=700,
Default Priority=0.
- Configure the MPLS-TP related port types on CESM1 unit
 - Select the “MPLS-TP” view of the **FOXCS**T. Navigate to the configuration dialog of the MPLS-TP interfaces:

AP:/MPLS-TP/MPLS Interfaces, Interfaces

- Click the  button to open the “Select Port” dialog.
 - Select the CESM1 front port connecting to the packet switched network to be an “MPLS-TP” port, e.g. /unit-11/port-4.
 - Repeat the steps for unit-11/port-3.
 - Execute “OK”.
- 4 Set the administrative state of all involved managed objects to up:

**Please note:**

The total MPLS-TP port bandwidth is computed from the physical port characteristics of the MPLS-TP interfaces, e.g. CESM1 port-1 is 1 Gbit/s.

- 5 Save the **FOXCAST** configurations to the nodes.

**Please note:**

The ENP does not have to wait for the **FOXCAST** configuration “Save” to synchronize its ENP tables.

- 6 Repeat steps 1 to 4 with NE82, NE81 and NE83. Refer to **Network Requirements** table for the required parameters.

8.2.3 Preconfiguration via FOXMAN-UN

- 1 Verify that the Ethernet Networking Package and the MPLS-TP nodes are defined and activated in the FOXMAN-UN license. For full functionality it is also required to have an activated TESServiceProfile license option.

```
$ lslicense
```

**Please note:**

Check the number of nodes for the Ethernet Networking Package defined in the license.

- The total number of MPLS-TP NEs in your network should not exceed 250.
- The total number of ENP services in your network should not exceed 2500.

- 2 Verify the capability of the Element Agent (EA) to read MPLS-TP data on NEs via \$NEM_HOME/etc/mplstp.conf parameter: “mplstp_data_koap_support”.

**Please note:**

This parameter is enabled by default.

- 3 Discover or create all the required NEs under the “FOX61EA” type agent(s).
- 4 Add the required MPLS-TP NEs to the ENP-Nodes domain:

```
ENP > NE Tab > Edit > Add NEs > “Select the MPLS-TP NEs” > Add to ENP Domain
```

- The “ENP-Nodes” Domain is automatically created when FOXMAN-UN is started for the first time. It is possible to change the domain name via \$NEM_HOME/etc/mplstp.conf parameter:

```
enp_node_domain_name ENP-Nodes
```

- Only MPLS-TP enabled NEs or NEs with defined Global and Node IDs based on requirements described in previous step are accepted as FOXMAN-UN domain member.
- The number of nodes should not exceed the number of MPLS-TP NEs defined in the FOXMAN-UN license key.
- When an MPLS-TP NE is added to ENP-Nodes domain, its Global and Node IDs are not possible to be modified via ENP.

5 Create the required MPLS-TP links:

- The sections are considered MPLS-TP links and added to the ENP Link Tab if both endpoints are MPLS-TP interfaces.

NEM Desktop > Application > Section Management > File > New Section

Table 8: Sample MPLS-TP Link Settings

MPLS-TP Link		Link Speed	Cost
NE80-NE81	NE80 CESM1 11/4 - NE81 CESM1 11/3	1 Gbit/s	4
NE81-NE82	NE81 CESM1 11/4 - NE82 CESM1 11/3	1 Gbit/s	4
NE80-NE83	NE80 CESM1 11/3 - NE83 CESM1 11/4	1 Gbit/s	4
NE82-NE83	NE82 CESM1 11/4 - NE83 CESM1 11/3	1 Gbit/s	4

6 Verify that the MPLS-TP links are reported in the ENP GUI's Link Tab:

NEM Desktop > Application > Ethernet Networking Package > Link Tab

- It is possible to change the link's cost and link's bandwidth via the ENP Link tab (Link Details).
- The ENP system calculates the available link bandwidth on each LSP path as follows:

Available BW = Link BW - Reserved BW

Where:

- Link (MPLS-TP port) BW is – per default – the link bandwidth computed from the physical port characteristics of the selected MPLS-TP endpoint ports, e.g. NE80's CESM1 port-4 = 1 Gbit/s.

**Please note:**

- Over-subscription, the factor in [%], which changes the available bandwidth, is not supported any more as an explicit parameter since the user can determine/modify the link bandwidth in order to achieve over-subscription.
- Reserved BW is the total allocated bandwidth of all configured (saved in the database or deployed) tunnels using this link.

7 Configure HQoS by following the instructions in **Hierarchical QoS (HQoS)**. Note that this requires core units supporting BW enforcement. This feature may not be available with CESM1 or CESM2 core units.

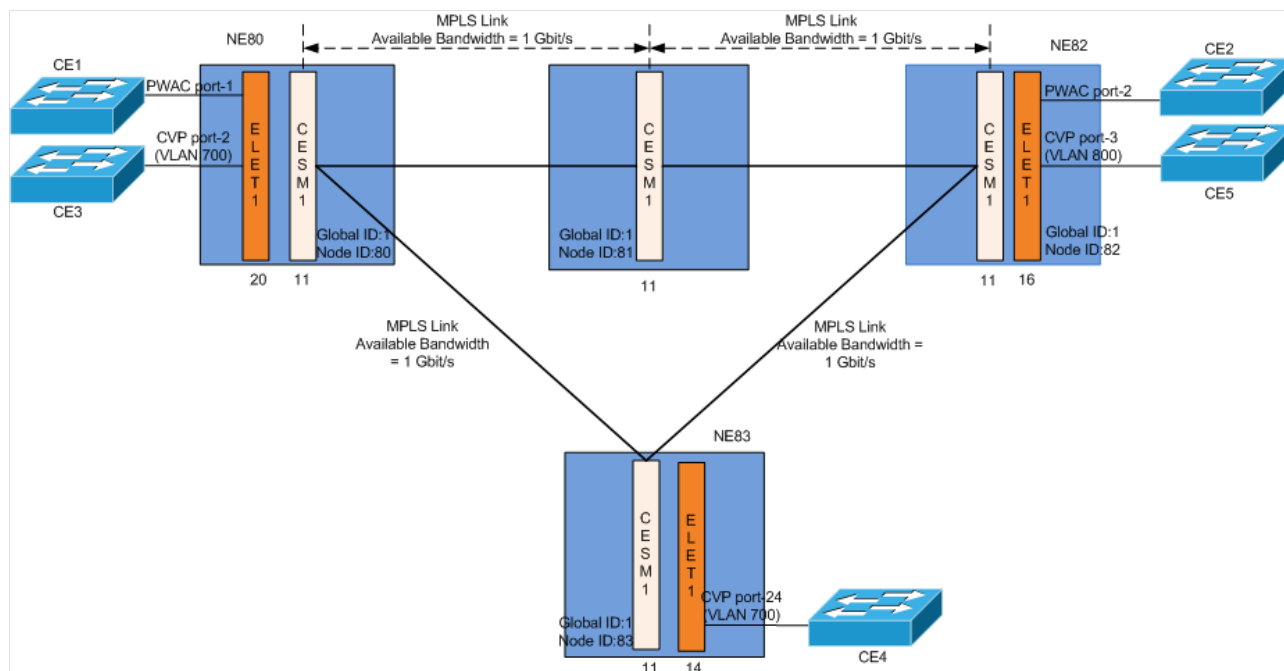
If you prefer not using HQoS, configure **Class Types**.

8 Create Service Profiles (available only when the TESServiceProfile license option is active):

The **Service Profiles** are required for appropriate Quality of Service settings in your MPLS-TP network. Service profiles are based on Class Types. For more details please refer to **Create Service Profile**.

9 Verify that all the nodes' preconfigurations are reported to ENP:

NEM Desktop > Application > Ethernet Networking Package > NE Tab > Select a node, e.g. NE80 > select "NE Details" from the context menu



8.2.4 Create a Virtual Private LAN Service (VPLS)

The Virtual Private LAN Service (VPLS) is set up by first creating a switching forwarding instance (VSI) on each participating node. This process doesn't need an explicit user action but is implicit to the VPLS creation process. The nodes use the VSI to establish full-mesh Pseudo Wires and LSPs to all the VPLS instance member nodes. The nodes obtain the membership of a VPLS instance via static configuration using the ENP Create Service wizard.

Note:

- As a prerequisite for service creation, appropriate PWAC and/or PVC ports on the service units, and MPLS-TP interfaces on the core units are required. The basic configuration of these ports needs to be done beforehand via the **FOXCST** GUI.
- The following steps usually require a service profile, i.e. before creating a service an appropriate service profile is required (see **Create Service Profile**).
- If you want to create an asymmetric rate VPLS (i.e. with per-port rate limiters) you need to select "Type=2 Rate - 3 Color" during Service Profile creation and set all Ingress Rate Limiting options to "Variable". When creating the VPLS based on that profile, you will be able to set individual ingress rate limits per service port; see step 1 below.

Once you have an appropriate service profile ready,
Proceed as follows:

ENP > VPLS Service Tab > Edit > Create VPLS >

1 (a) Define Service:

Steps

1. Define Service
2. Define VPLS NEs
3. Define VPLS Topology
4. Define Tunnels
5. Create Tunnel(s) Manually
6. Summary

Summary

Name: LAN2-DH
Type: VPLS
Service Profile: VPLS-DHCap
Class Type: Prio
BW [kbit/s]: 10000
Pseudo Wires: 6
NEs [4] SVI VLAN
NE_80 74
NE_81 74
NE_82 74
NE_83 74

Define Service

Service | Quality of Service / Rate Limiting

Name: LAN2-DH
Type: VPLS
EVC ID: 8a87d4ef-553e-4b41-a922-6fb8126059b0
Description:
Service Profile: VPLS-DHCap
Service Category: General
Dual Home / PW Control Word:
☒ Dual Home Capable
PW Control Word: Enabled
Service Supervision:
☒ Add To Service Supervision
Network: red
Customer: customer_1562138628981
SLA: sla_1562138637823

? Help < Back Next > Save Cancel

- Enter a service name.
- Accept the Type: VPLS (this is the default in this dialog).
- Select a Service Profile.
- Optional parameters: Description.
- If required, set a mark in the “Dual Home Capable” checkbox.
- If required, set a mark in the “Add To Service Supervision” checkbox, and
- select Network, Customer, and SLA (Service Level Agreement).

Note:

The selection of a Service Profile assures a consistent use of the relevant parameters throughout the MPLS-TP network.

- Select the “Quality of Service / Rate Limiting” tab.

1 (b) Define Quality of Service / Rate Limiting:

Note:

Some of the parameters may not be selectable when a **Service Profile** is used.

- Select the CoS Type.
- Select the Default Priority (0...7).
- Select CoS Overwrite.
- Select Overwrite Priority.
- Enable Rate Limiting if required.
- If Rate Limiting is enabled, enter the CIR, CBS, EIR, and EBS values (or leave them on their defaults).
- Select the Scheduling Profile (1...5). The 5 scheduling profiles are as configured via the **FOXCST** (NE – QoS – TC Scheduling Profiles – Profile 1...5). Profile 1 is always a strict priority profile.
- Click “Next” button.

2 Define VPLS NEs

- Mark the member NEs of the VPLS instance.
e.g NE_172.31.68.80 (NE80) , NE_172.31.68.82 (NE82) ,
NE_172.31.68.83 (NE83)
- Enter a SVI VLAN Id for each node.

Steps
1. Define Service
2. Define VPLS NEs
3. Define VPLS Topology
4. Define Tunnels
5. Create Tunnel(s) Manually
6. Summary

Summary
Name VPLS_01
Type VPLS
Service Profile VPLS-var-PCP-Priority
Class Type Prio

BW [kbit/s] 10000

NEs SVI VLAN
NE_80 27
NE_82 27
NE_83 27
NE_81 27

Define VPLS NEs

VPLS NE	NE	SVI VLAN	VLAN Name	Role	Prim...	Sec...		NE	Re...	VLAN Mode	Status	Conflict	Reason
☒	NE_80	27	VLAN_27	Hub				NE_80	C...	Trunk	Unsaved	☐	
☒	NE_82	27	VLAN_27	Hub				NE_80	S...	Trunk	Unsaved	☐	
☒	NE_83	27	VLAN_27	Hub				NE_80	ET...	Trunk	Unsaved	☐	
☒	NE_81	27	VLAN_27	Hub				NE_80	ET...	Trunk	Unsaved	☐	
								NE_82	C...	Trunk	Unsaved	☐	
								NE_83	C...	Trunk	Unsaved	☐	
								NE_81	C...	Trunk	Unsaved	☐	

? Help
< Back
Next >
Save
Cancel

Note:

- If the VLAN Id specified by user does not exist on the node, the ENP automatically creates this VLAN.
- The provisioned bridge ports and VLANs for each node are displayed in the ENP GUI > NE Tab > "NE details". If no ports have been provisioned for the SVI VLAN no ports are listed.

Note:

The prerequisite for provisioned ports is the assignment of VLANs to CVP ports via the **FOXCAST** GUI. For that purpose open the **FOXCAST** GUI (as manager) for the required node(s), select the "Switching" tab, then "Switching – Bridges – bridge-1", and assign a VLAN ID or a PVID to the required port(s), depending on the selected port mode. Apply the changes to the NE.

Also see **Preconfiguration Process via FOXCAST**.

- The "Role" for each node is set to "Hub".
This means, the node will be connected to all VPLS nodes, e.g. NE_172.31.68.80 (NE80) will be connected to NE82 and NE83 by Pseudo Wire 1 and 2. NE82 and NE83 will be connected by Pseudo Wire 3. No traffic is forwarded between two Pseudo Wires.
If you only have NEs with Mesh Binding do not select nor define any VPWS ports in the following two step 3.
- If you need to add spoke NEs select "Spoke" in the "Role" column for the respective NE.
In this case you will need to select and define VPWS ports for the Spoke NE(s) in the following two step 3.
- As an option the Role for a specific NE can be set to "PE Dual Home" if this is the required architecture for the NE. In this case the role of the NE in the network is not represented by a fully meshed PW binding, but by a dual home based PW binding for the respective services.

When the Role is set to "PE Dual Home", select the Primary Node and Secondary Node to the PE Dual Home NE for this specific service. Also select the Protection Mode, either "Revertive" or "Nonrevertive".

Note:

The use of the "PE Dual Home" role requires NE software that supports the PE Dual Home feature.

→ Click "Next" button.

3 Define VPLS Topology (optional).

Here you can make further changes to the topology of the service's view of the network.

(a) Tab "VPLS Topology":

- These two lists show the topology of NEs for the current service.

(b) Tab “VPWS Ports”:

- You can add VPWS ports to the service. Select an NE from the list of NEs, then select the required ports that are available on the NE. Each added port needs to be confirmed.
- Only ports of the type “PWAC” or “CVP” can be selected. The port Type is given by the configuration done via the **FOXCSST** GUI.
- Select VPWS ports to be added to the service; for each port select the following (options available for selection are depending on the Port Type):
- VPWS Type:
 - AC Port Based, No Change,
 - AC Port Based, Add PW Tag,
 - AC VLAN Based, No Change,
 - AC VLAN Based, Change Tag (enter a AC VLAN ID and a PW VLAN ID as required),
 - AC VLAN Based, Add PW Tag,
 - AC Untagged, No Change,
 - AC Untagged, Add PW Tag.
- AC VLAN (where applicable),
- PW VLAN (where applicable).
- Attached to NE: select the NE to which the port is attached.
- Status (read-only),
- Reason (read-only).

“Show all ports” also shows ports that are not suitable for being added. This is for information purposes only.

(c) Tab “Pseudo Wire”:

The Pseudo Wires between each VPLS NEs are automatically created with default values.

- Use the default values for the following parameters (or change where required):
 - Pseudo Wire Name,
 - Description,
 - Min Label / Max Label,
- Enter or modify the bandwidth for each of the Pseudo Wires in the “BW [kbit/s]” column / field.

(d) Tab “Port Rate Limiter”

Rate limiter settings can be done here, provided that the ingress rate limiting parameters of the service profile used for this service have been set to “Variable”.

- From the list of ports, select any of the ports that are part of the service.
- On the right-hand side of the dialog, enter the required port specific rate limiting values (CIR, CBS, EIR, EBS).
- If rate limiting shall not be applied to the selected port, disable port rate limiting by removing the mark in the “Enable Rate Limiting” checkbox.
- Do these steps for all ports as required, or leave the settings as defaulted by the service profile.
- Click “Next” button.

4 Define Tunnels

Lists the tunnels required for implementing the service. Where suitable tunnels already exist, these are used. Where no suitable tunnel exists, a new tunnel needs to be created. You can select to create the tunnel(s) manually or automatically.

- Select a tunnel.

Accept the automatically proposed tunnel, or click on the tunnel name (in the “Tunnel” column) to choose a different tunnel.

- If you prefer more options, click on “Tunnel Details”, which allows you to:

- Enable/disable protection,
 - Enable/disable forcing distinct path,
 - Use advanced routing,
 - Enable encryption by selecting an encryption profile,
 - Modify minimum and maximum tunnel label.
- Close the tunnel details dialog window.
- If required, modify the PW bandwidth by entering a different value. The “Tunnel Action” and “Error” fields are updated accordingly to show details about the modifications.

Note:

If any of the existing tunnels or “create automatically” option is selected, the Wizard will proceed directly to the final step “Summary”. If “create manually” is selected the tunnel(s) need to be selected in the next step.

- Depending on the tunnel routing status, click the “Automatic Routing” or “Next” button.
- If manual routing is required, the window contents changes to the tunnel details view where you can execute the routing.

5 Create Tunnels Manually

Where required, route the tunnels manually. For this purpose, select the appropriate tunnel end points.

- When done, click “Next” to get back to the “Define Tunnels” (step 4) view.
- Click “Next” button

6 Summary

Shows a summary of the settings done in the previous steps.

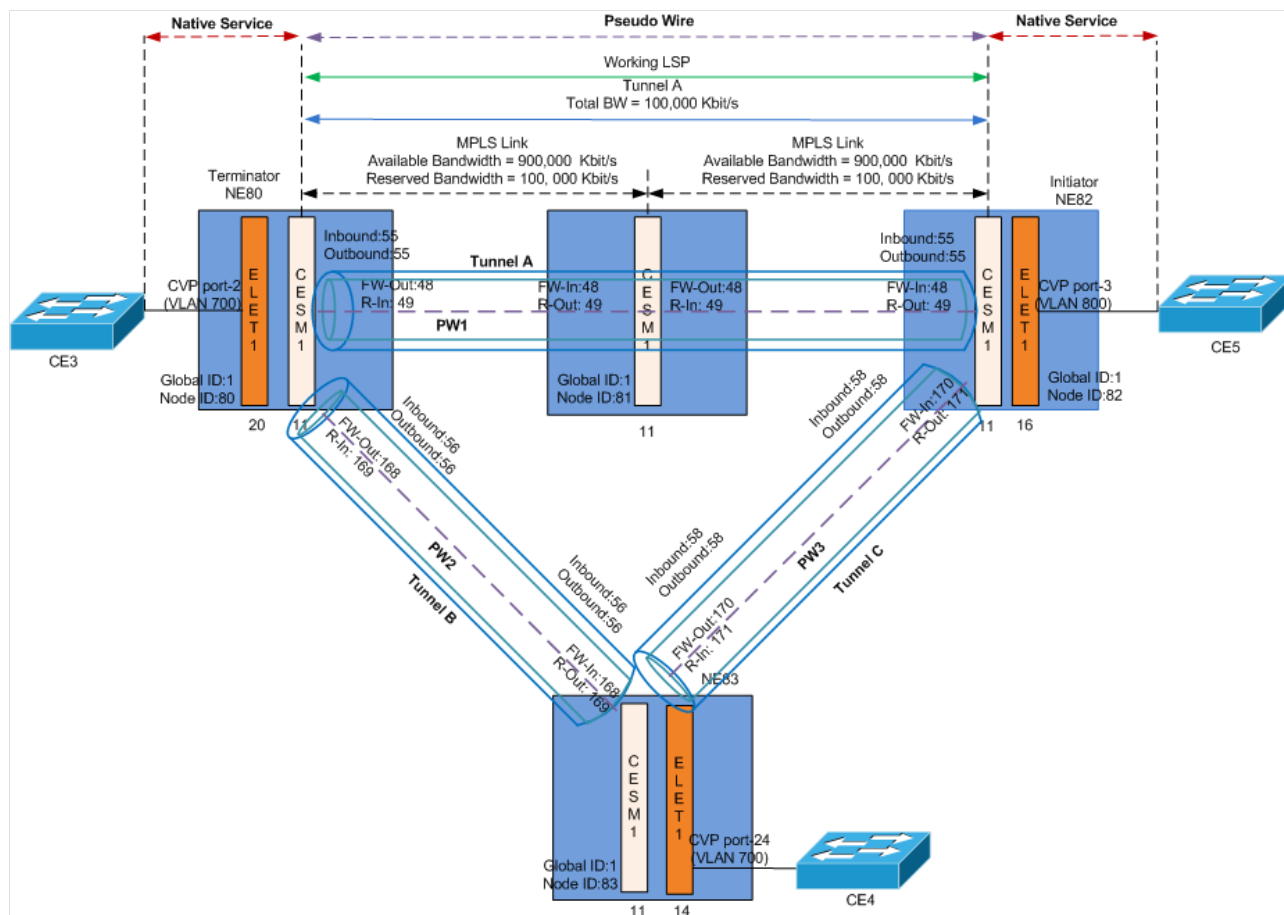
- If you need to make modifications, go back to previous step.
- If the service definition is as required, click “Save” to save the service to the database.
- To deploy the service to the network, select the saved service in the list of VPLS services, then select “Deploy VPLS” from the icon list or from the context menu. The following sequence is checked:
- checks that the path is still valid,
 - adds configuration to devices,
 - validates that the configuration is accepted and the tunnel is up.

8.2.5 Verify VPLS Details**1 Verify the status of the Service**

```
ENP > VPLS Tab > "VPLS Service", e.g. VPLS_NE80_NE82_NE83 > select
"Details VPLS..." context menu
```

2 Verify that each PW is bound to the required tunnel.

Please refer to [VPLS Details](#).



8.2.6 Create a Virtual Private Wire Service (VPWS)

The Virtual Private Wire Service (VPWS) Pseudo Wire connects two PWAC ports together.

The sample configuration will bind the VPWS to a tunnel (named Tunnel A in this example) without Protection.



Please note:

For background information, refer to [Overview of VPWS Implementation](#)

For detailed descriptions of all the mandatory and optional parameters, please refer to section [Create Service](#).

ENP > VPWS Service Tab > Edit > Create Service >

1 (a) Define Service:

Steps

1. Define Service
2. Define Attachment Circuit
3. Define Tunnels
4. Create Tunnel(s) Manually
5. Summary

Summary

Name	Wire8
Type	VPWS
Service Profile	vpws-std
Class Type	STD
BW [kbit/s]	10000
Initiator NE	
Initiator TP	
Terminator NE	
Terminator TP	

Define Service

Service **Quality of Service / Rate Limiting**

Name	Wire8	Description	
Type	VPWS	Service Profile	vpws-std
EVC ID	f0bb59b9-f1f7-4b18-8795-d40fd154229b	Service Category	General
Dual Home / PW Control Word			
		PW Control Word	Enabled
Link Loss Forwarding			
☒ Link Loss Forwarding			
Service Supervision			
☒ Add To Service Supervision		Network	green
Customer	customer_1562138628981	SLA	sla_1562138637823

? Help
< Back
Next >
Save
Cancel

→ Enter required values for the mandatory parameters, i.e.

- Name: Accept the automatically generated name, or enter your own VPWS name, e.g. VPWS_NE80_NE82
- Type: VPWS (this is the default in this dialog)
- Service Profile

→ Enter the values for optional parameters

- Description

→ If required, set a mark in the “Add To Service Supervision” checkbox, and

→ select Network, Customer, and SLA (Service Level Agreement).

1 (b) Define Quality of Service / Rate Limiting:

Note:

Some of the parameters may not be selectable when a **Service Profile** is used.

→ Select the CoS Type.

→ Select the Default Priority (0...7).

→ Select CoS Overwrite.

→ Select Overwrite Priority.

→ Enable Rate Limiting if required.

→ If Rate Limiting is enabled, enter the CIR, CBS, EIR, and EBS values (or leave them on their defaults).

→ Select the Scheduling Profile (1...5). The 5 scheduling profiles are as configured via the **FOXCST** (NE – QoS – TC Scheduling Profiles – Profile 1...5). Profile 1 is always a strict priority profile.

→ Click “Next” button

2 Define the Attachment Circuit:

(a) Tab “Attachment Circuit”:

→ Select the mandatory parameters, i.e.:

- Initiator AC: NE_80 ELET1 <20> port-1.
- Terminator AC: NE_82 ELET1 <16> port-2.
- Initiator/Terminator Type: AC Port Based, No Change.

→ Where required enter the VLAN IDs, i.e.:

Note:

Whether or not the VLAN IDs need to be entered depends on the selected Type.

- Initiator AC VLAN,

- Initiator PW VLAN,
- Terminator AC VLAN,
- Terminator PW VLAN.

For the type “AC Port Based, No Change” no VLAN ID is entered.

“Show all ports” also shows ports that are not suitable for being added. This is for information purposes only.

(b) Tab “Pseudo Wire”:

A new Pseudo Wire (PW) with default parameters is automatically created connecting the two PWAC ports.

→ Use the default parameters for the following parameters:

- Min Label / Max Label,
- BW [kbit/s]; the bandwidth can be set as required.

(c) Tab Port Rate Limiter:

Rate limiter settings can be done here, provided that the ingress rate limiting parameters of the service profile used for this service have been set to “Variable”.

- From the list of ports, select any of the two ports that are part of the service.
- On the right-hand side of the dialog, enter the required port specific rate limiting values (CIR, CBS, EIR, EBS).
- If rate limiting shall not be applied to the selected port, disable port rate limiting by removing the mark in the “Enable Rate Limiting” checkbox.
- Do these steps for both ports as required, or leave the settings as defaulted by the service profile.

→ Click “Next” button.

3 Define Tunnel(s)

→ Click on the Tunnel icon to choose among manual and automatic tunnel creation.

→ Depending on the tunnel routing status, click the “Automatic Routing” or “Next” button.

4 Create Tunnel(s) Manually

Where required, route the tunnels manually. For this purpose, select the appropriate tunnel end points.

- When done, click “Next” to get back to the “Define Tunnels” (step 3) view.

Note:

If any of the existing tunnels or “create automatically” option is selected, the Wizard will proceed directly to the final step “Summary”. If “create manually” is selected the tunnel(s) need to be selected in the next step.

5 Summary

Shows a summary of the settings done in the previous steps.

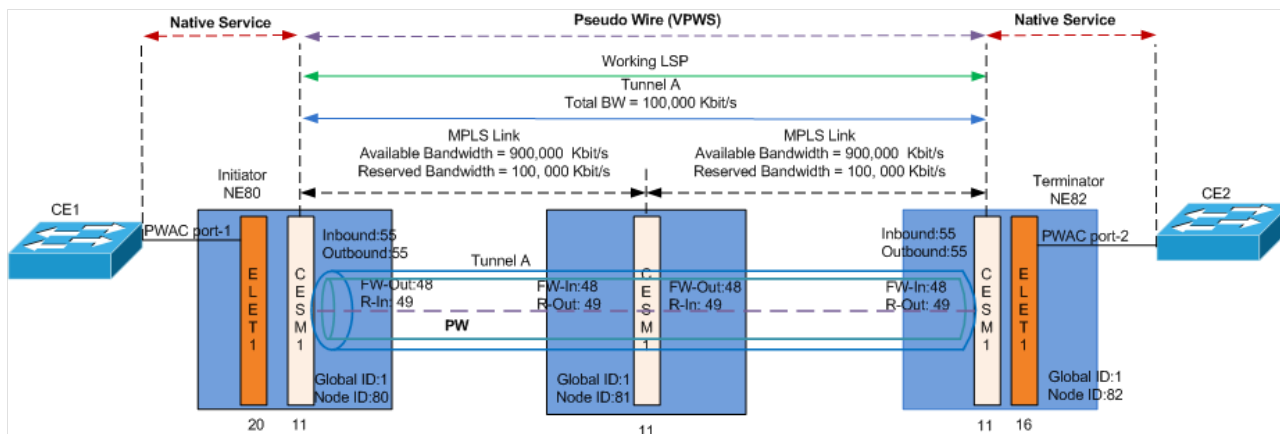
→ If you need to make modifications, go back to previous step.

→ If the service definition is as required, click “Save” to save the service to the database.

→ To deploy the service to the network, select the saved service in the list of VPWS services, then select “Deploy VPWS” from the icon list or from the context menu. The following sequence is checked:

- checks that the LSP is still valid,
- adds configuration to devices,
- validates that the configuration is accepted and the tunnel is up.

8.2.7 Verify VPWS Details



- 1 Verify the status and details of the VPWS in the "VPWS" tab.

ENP > VPWS Tab > Select the VPWS, e.g. "VPWS_NE80_NE82" > Select "Details Service" context menu

Please refer to [VPWS Details](#).

- 2 Verify that the PW is bound to the required tunnel.

ENP > Tunnel Tab > Select and right click the Tunnel, i.e. "TunnelA" > Details Tunnel/Modify Tunnel > Attached Pseudo Wires

Name	/57196100_tunnel_NE_83_NE_82	Description		BW [kbit/s]	10010	Status	Deployed Valid
Initiator	NE_83	Terminator	NE_82	Service Profile		Used BW [kbit/s]	10010

Path Protection		Encryption		Attached Pseudo Wires		Diagnostic	
Working LSP (Deployed Valid)				Protection LSP (Deployed Valid)			
Name	Description	Initiator	Terminator	Service	Tunnel	BW [kbit/s]	Class-Type
VPLS_150...		NE_83	NE_82	VPLS_150...	VPLS_150...	10,000	Mission Cri...

Class Type: **Mission Critical**

Buttons: ? Help, [... Edit], Save, Deploy, Delete, Close

8.2.8 Create a Tunnel

Tunnel without Protection

The VPWS and VPLS can share the transport tunnel(s). We will see later that Tunnel A will be used as transport by both the VPWS and VPLS, whereas Tunnels B and C will be used only by VPLS in the example shown here.

Tunnel A

- 1 Launch the Create Tunnel dialog:

ENP > Tunnel Tab > Edit > Create Tunnel

- 2 Select the node endpoints, i.e. NE80 as Initiator and NE82 as Terminator. Enter the allocated tunnel bandwidth. This creates a tunnel connecting the two endpoints.

Name: nel_1570788529260 Description: BW [kbit/s]: 10010 Status: Unsaved

Initiator: NE_80 Terminator: NE_82 Service Profile: VPLS-var-crit Used BW [kbit/s]: 10

Working Path

Protecting Path

Type	Designation	A End	Z End	Cost	Status	Used BW ...	FW-In	FW-Out	R-In	R-Out
XC	Initiator-Te...	NE_80 C...	NE_82 C...	10	Unsaved	120,020	0	16	17	0
XC	Initiator-Te...	NE_80 C...	NE_82 C...	Unsaved	Unsaved	16	0	0	17	

Protection

☒ Force Distinct Path

Class Type: **Mission Critical**

Min Label: 16

Max Label: 1048575

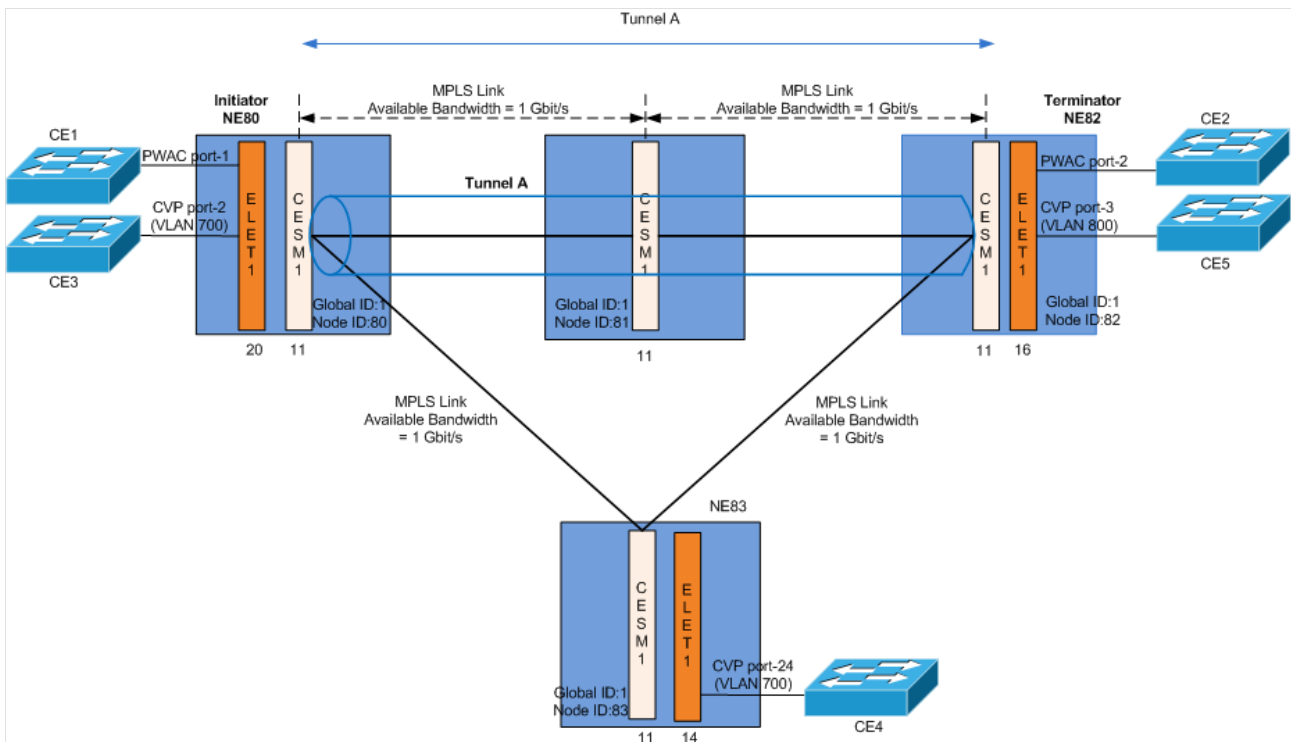
Manual Routing...

Automatic Routing

Advanced Routing...

Delete LSP Element

? Help Edit Save Deploy Delete Cancel



- 3 Create the Working LSP or Working Path

When a tunnel is being created, the route has not been defined thus the Path contains a “Hole”. The user can select Automatic (recommended), Manual Routing or Advanced Routing to complete the route.

→ Click on “Working LSP” tab.

→ Select the “Hole” and Click on “Automatic Routing” button.

The ENP creates Working LSP automatically based on the cheapest routing order. This means the routing engine takes into account the configured link’s cost. The calculated path has the lowest overall link cost in the network.

Name: tunnel_150347876505 Description: BW [kbit/s]: 10010 Status: Incomplete

Initiator: NE_80 Terminator: NE_82 Service Profile: vpls_var_crit Used BW [kbit/s]: 10

Working LSP (Incomplete) Protection LSP (Incomplete) BFD Path Protection Encryption Attached Pseudo Wires Diagnostic

Type	Designation	A End	Z End	Cost	Status	Used BW [k...]	FW-In	FW-Out	R-In	R-Out
Hole										

Protection

☒ Force Distinct Path

Class Type: **Mission Critical**

Manual Routing... Automatic Routing Advanced Routing... Delete LSP Element

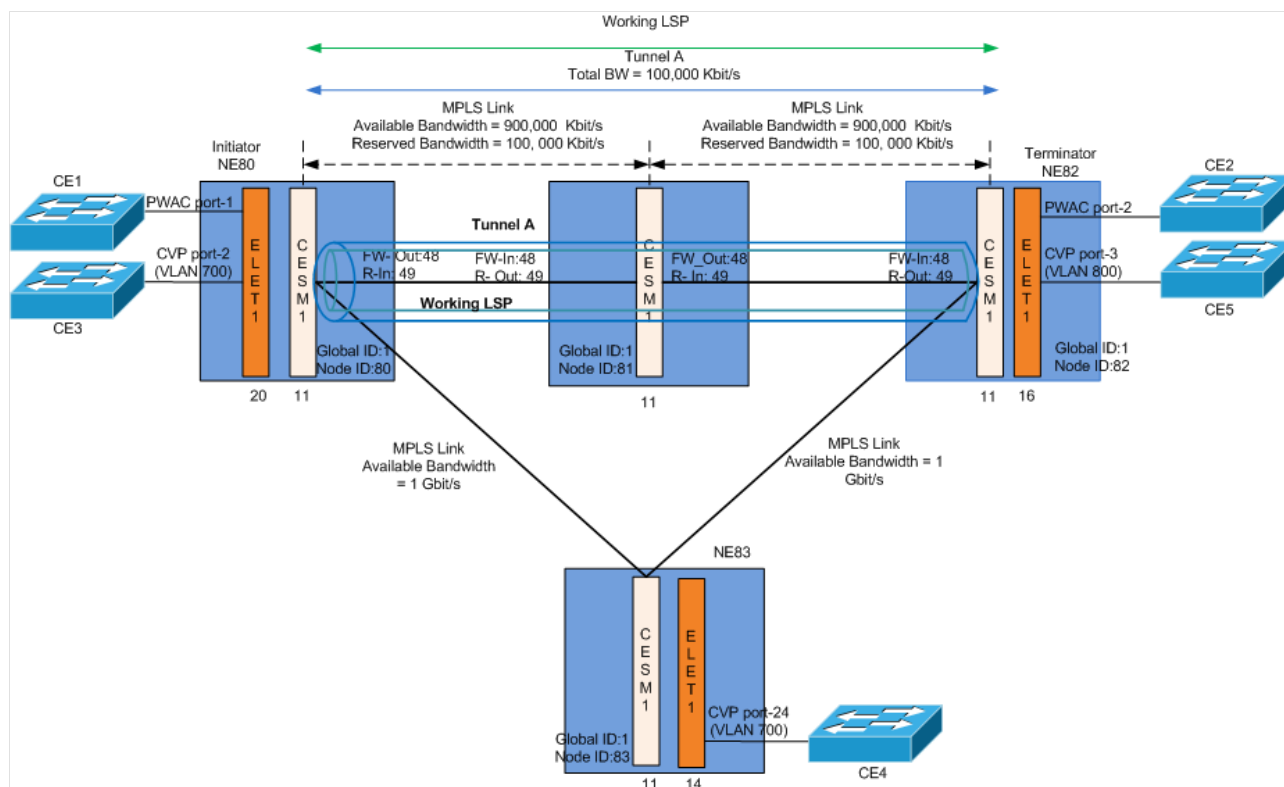
? Help Edit Save Deploy Delete Cancel

**Please note:**

Regardless of the routing selected, the link will not be taken into consideration in the path selection if its available bandwidth is not enough to accommodate the tunnel bandwidth requirement.

The path can be modified by removing the LSP elements. Select the LSP elements that you want to remove and then click on "Delete LSP Element" button and invoke again the Automatic (or Manual) routing on the missing section.

- Validate the path by clicking "Save" button. The ENP system then:
 - assigns the LSP labels (FW-Out/FW-In, R-In/R-Out),
 - updates the Used and Reserved link bandwidth.



- For VPWS only, proceed back to step 4 of **Create a Virtual Private Wire Service (VPWS)**.

Full Mesh Tunnels

To create an emulated LAN based on VPLS architecture, a full mesh consisting of Pseudo Wires is set up to connect all VPLS instances of member edge routers. Therefore full mesh tunnels (LSPs) between all these nodes should be created.

For H-VPLS spoke NEs are also admitted; however each spoke NE needs to be attached to a mesh NE.

To simplify the discussion, we shall configure unprotected Tunnels only.

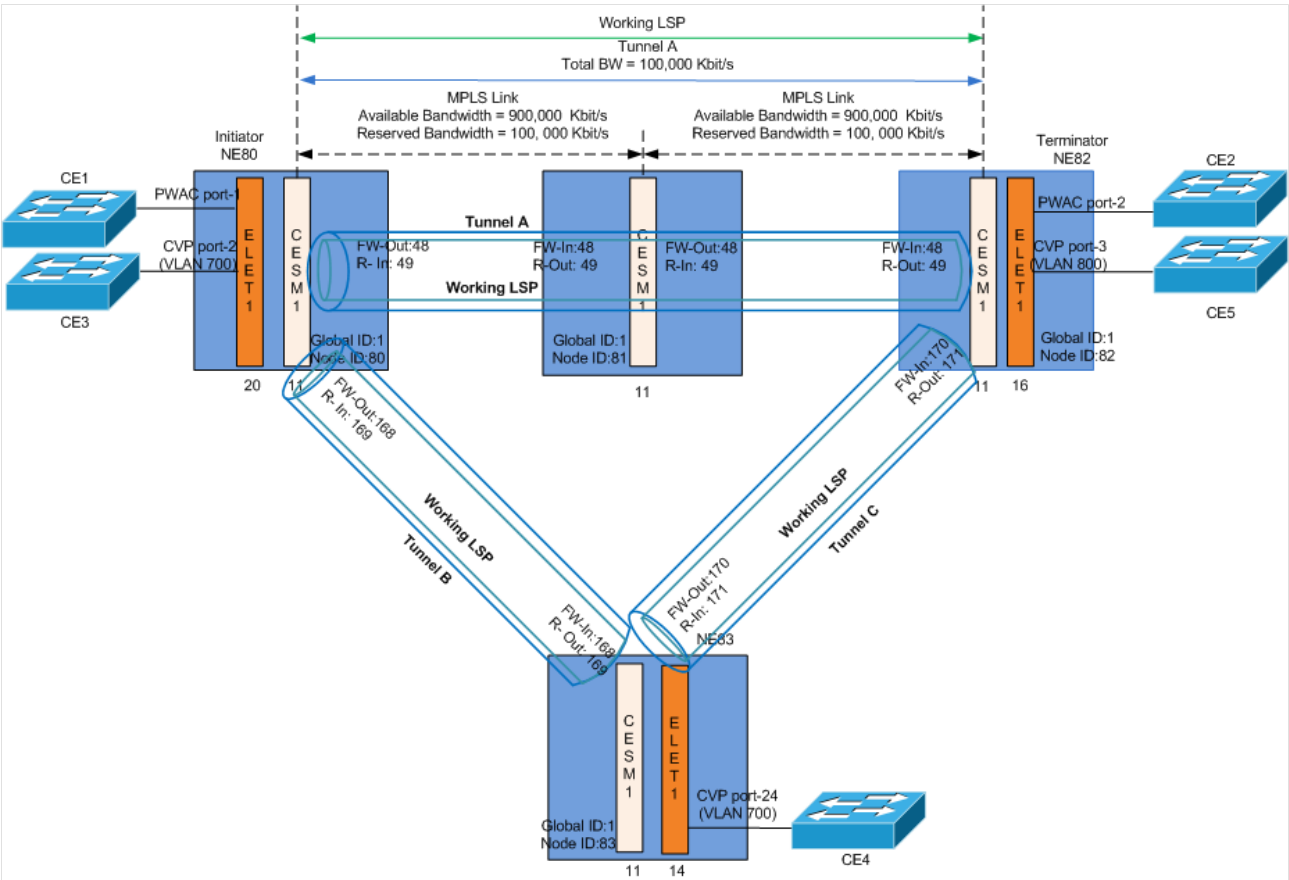
Tunnel A, Tunnel B, Tunnel C (without Protection)

In this use case, NE80, NE82 and NE83 are all member edge routers of the VPLS instance. (Note NE81 is not VPLS member). The tunnels without protection as listed in the table below, will serve as transport to carry the full mesh VPLS Pseudo Wires over the MPLS-TP provider network.

- 1 Tunnel A can likewise be used to carry the VPLS Pseudo Wire as long as there is enough bandwidth to carry the additional load.
- 2 Tunnels B and C can be created by repeating steps 1 to 4 described in creation of Tunnel A. Change the Initiator and Terminator NEs for each tunnel as listed in the table below:

Table 9: Sample Initiator and Terminator Settings

Tunnel	Initiator	Terminator	Carried Service(s)
Tunnel A	NE80	NE82	VPWS, VPLS
Tunnel B	NE80	NE83	VPLS
Tunnel C	NE82	NE83	VPLS



- 3 Proceed back to step 4 of **Create a Virtual Private LAN Service (VPLS)**

Tunnel with Protection

For background information about OAM and Protection switching, please refer to Introduction sections [OAM and BFD](#) and [Protection Mechanism](#).

Tunnel A with Protection

- 1 Launch the Create Tunnel dialog:

ENP > Tunnel Tab > Edit > Create Tunnel

- 2 Click the “Protected” Checkbox.
 - This activates the Protection LSP tab, Path Protection tab and BFD sessions for the working and protection LSP.
- 3 Select the node endpoints, i.e. NE80 as Initiator and NE82 as Terminator. Enter the allocated tunnel bandwidth. This creates a tunnel connecting the two endpoints.
- 4 Select the “BFD” tab and select the Continuity Check (CC) Interval for the Working and Protection LSPs.

The local MEP sends CC OAM packets periodically every CC interval. The remote MEP monitors the arrival of these packets and detects loss of continuity (LOC) if no CC packet is received within the period of 3 x CC Interval. The user data is then switched to the protection LSP.

In case of revertive switching, a short CC interval is only required on the Working LSP. To achieve sub-50 ms path protection switch over time, a 3.3 ms CC interval is recommended. A longer CC Interval can be selected for the protection LSP since the switch-over from the protection LSP to working LSP is controlled by the Wait-to-Restore (WTR) timer.

- 5 Select the “Path Protection” tab and define the Path Protection parameters:

Table 10: MPLS-TP Protection Settings

Parameter	Description
Protection Mode: Revertive	When the signal fail condition is no longer active and after the expiry of the wait-to-restore (WTR) timer, the user traffic is switched back from the protection LSP to the working LSP.
Protection Mode: NonRevertive	The user traffic remains on the protection LSP even if the signal fail condition is no longer active.

Table 10: MPLS-TP Protection Settings

Parameter	Description
WTR Time [s]	Wait-To-Restore time for the revertive protection mode. The user traffic is switched from protection to working LSP only after the expiration of the wait-to-restore timer. Accepts values from 0 to 720 ms
State Change Tx Interval [ms]	The time interval to send three protection state coordination (PSC) protocol packets when there is a state change, e.g. a defect. Accepts values 3.3, 10 and 20 ms.
Steady State Tx Interval [s]	The time interval to send the protection state coordination (PSC) protocol packets when there is no state change.
Protection Status, Command	Not relevant during tunnel creation, but only for deployed tunnels. For details refer to Path Protection .

6 Select the “Working LSP” tab.

The user can select Automatic (recommended), Manual Routing or Advanced Routing to complete the route.

- Select the “Hole” and click on “Automatic Routing” button.

The ENP creates Working LSP automatically based on the cheapest route.

7 Select the “Protection LSP” tab.

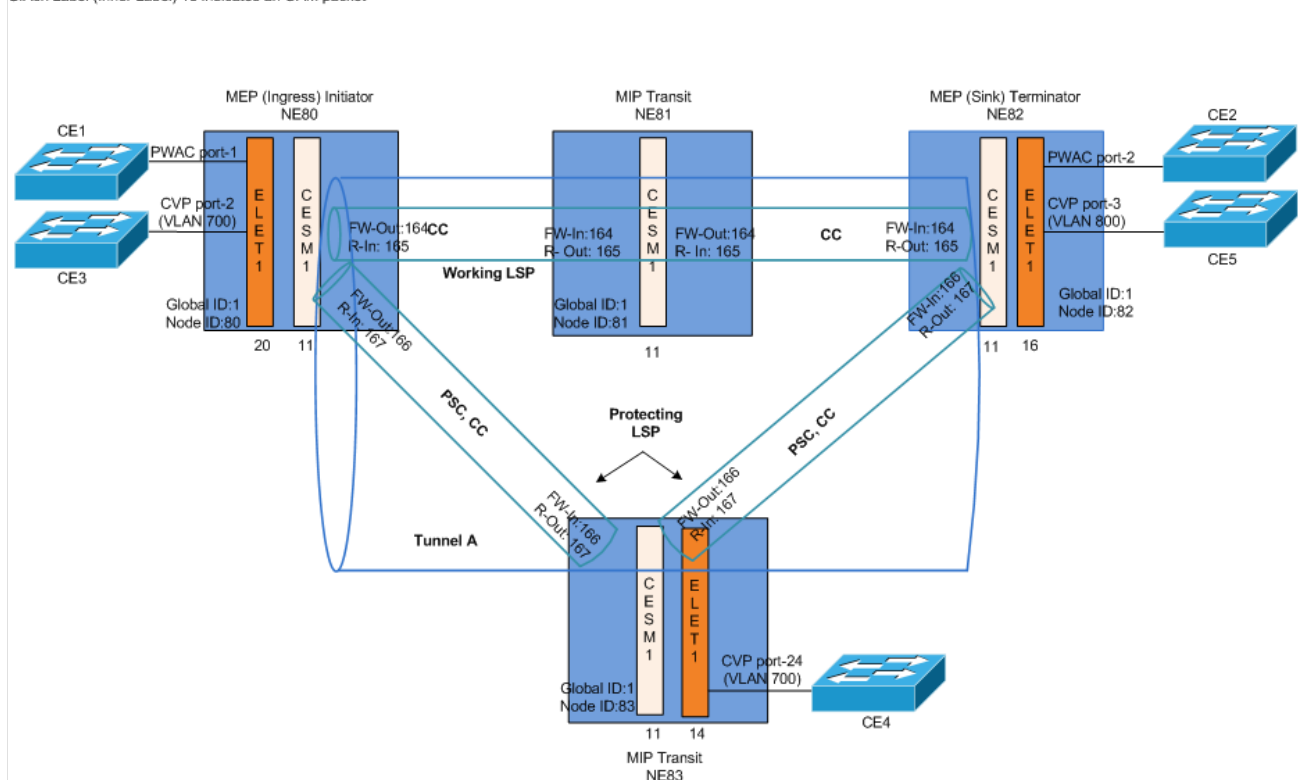
The user can select Automatic (recommended), Manual Routing or Advanced Routing to complete the route.

- Select the “Hole” and click on “Automatic Routing” button.

The ENP creates Protection LSP automatically based on the cheapest route.

8 Click “Save”. Modify the tunnel configurations as required.

MEP: Management Edge Points
MIP: Management Intermediate Points
G:Ach Label (Inner Label) 13 indicates an OAM packet



8.3 ENP Main Window

Purpose

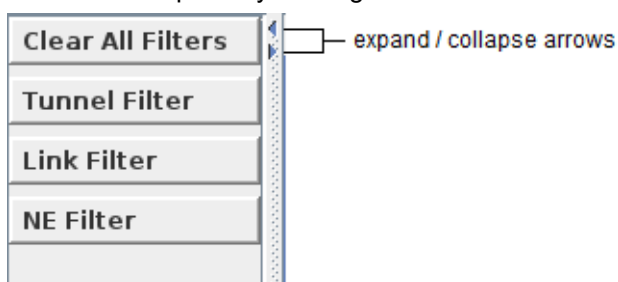
The main window displays the list of all existing VPWS and VPLS services, Pseudo Wires, Tunnels, Links, NEs, and Service Profiles. It likewise allows you to:

- Set and clear filters such as:
 - Class Type filter; this filter hides / shows entries that match the Class Type filtering criteria. Undefined Class Types are marked in red.
 - Tunnel filter;
 - Link filter;
 - NE filter;
- Create/Edit/Add/Delete:
 - Services (VPLS, VPWS),
 - Tunnels,
 - Links (Sections),
 - NEs,
 - Service Profiles.
- Deploy:
 - Services (VPLS, VPWS),
- Align:
 - Services (VPLS, VPWS),
- View Details of:
 - Services (VPLS, VPWS),
 - Pseudo Wires,
 - Tunnels,
 - Links,
 - NEs,
 - Service Profiles.



Please note:

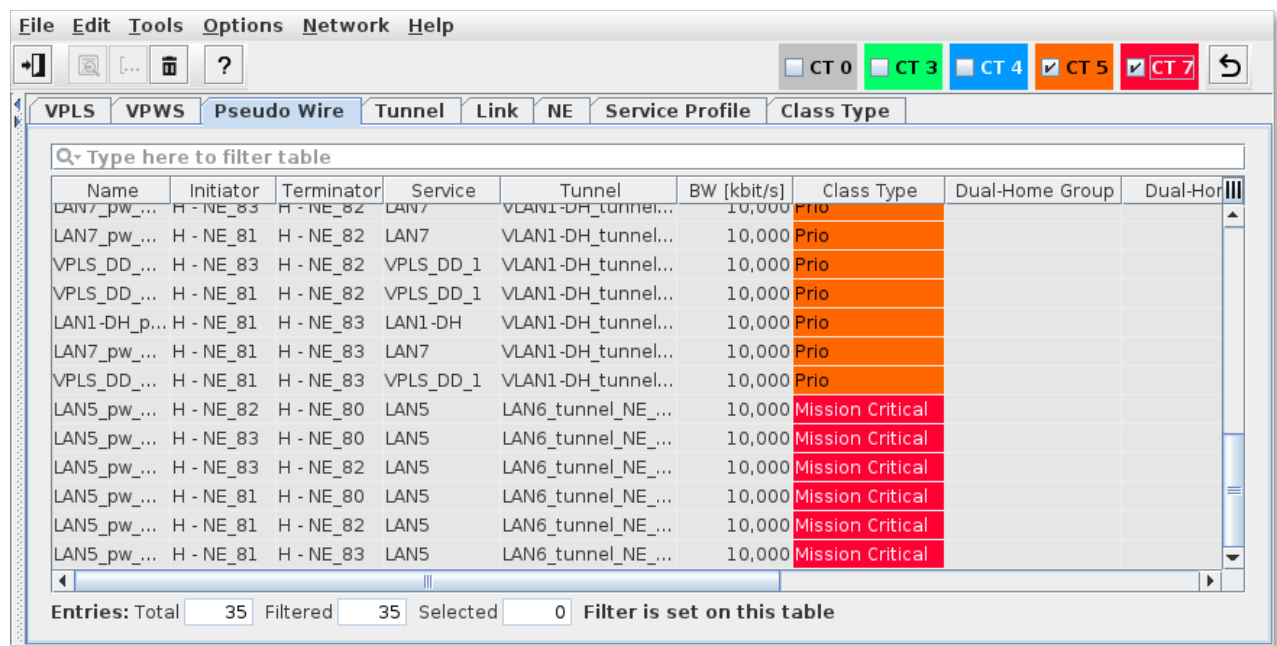
The left-hand side “Filter” section of the dialog window can be expanded or collapsed by clicking on the window section border left or right arrows.



A click on one of the filter buttons expands or collapses the related filter options. To select a filter option, click on the filter type and set a mark in the respective checkbox.

In addition to the above filters, Class Type filters are available in the icon bar of the ENP main window. For Class Type filters only the Class Type named “Default” is available per default, unless further Class Types are created. Refer to “[Class Type \(HQoS Class Type Definition\)](#)” for more details. When a Class Type is marked only the items using the selected Class Type are shown as illustrated in the following example showing filtered Pseudo Wires:

Ethernet Networking Package



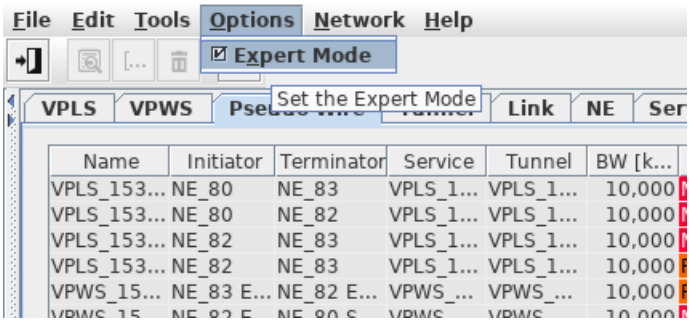
The menu of the ENP main window is context sensitive, i.e. the available menu selections are adopted to the selected tab. Also the NEM Help is context sensitive.

A Class Type that is used in a service configuration but not available in the list of Class Types is marked with a red background and named “UNDEFINED (n)”. Also all related services, Pseudo Wires, tunnels, links, and service profiles that use such a Class Type are marked in red.

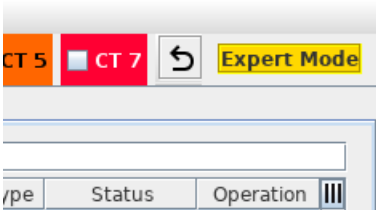
Undefined Class Types may possibly have a severe impact on the traffic engineering related behavior of your network. You should therefore make sure that all required QoS settings are stored and provided in well defined Class Types.

Options - Expert Mode

The Expert Mode is activated from the ENP main menu under “Options”.



While the Expert Mode is active a highlighted “Expert Mode” note is displayed in the upper right corner of the ENP window.



Network - Synchronize

Used to synchronize ENP with the network. See [Synchronize](#).

Network - Clear and Synchronize

Only available in Expert Mode. See [Clear and Synchronize](#).



Please note:
For background information on ENP and sample network provisioning configuration, please refer to sections:

- [MPLS-TP Introduction](#),
- [Service Provisioning and Deployment via ENP GUI](#).

Network - Session Manager...

Lists all currently open “Create” and “Edit” sessions in ENP. See [Session Manager....](#)

Controls (buttons, menu items, etc.)

Clear All Filters

Clear All Filters	Clears all filters. The result of this action is that all contents are shown in the individual tables.

Tunnel Filter

Tunnel	☒☐ Marking the respective tunnel’s checkbox sets a filter for that tunnel. Applies to the lists of VPLS, VPWS, and Pseudo Wires.

Link Filter

Link	☒☐ Marking the respective link’s checkbox sets a filter for that link. Applies to the lists of VPLS, VPWS, Pseudo Wires, and Tunnels. Note: The filtering is applied so that e.g. tunnels are filtered (visible) for which the selected link(s) are carrying either the working or the protecting LSP.

NE Filter

NE	☒☐ Marking the respective NE’s checkbox sets a filter for that NE. Applies to the lists of VPLS, VPWS, Pseudo Wires, and Tunnels. Note: The filtering is applied so that e.g. tunnels are filtered (visible) for which the selected NE(s) are either Initiator, Terminator, or Transit node of at least a Pseudo Wire. VPLS that are only involving one NE (i.e. local VPLS limited to a single NE) are only displayed when no NE is selected in the NE Filter.

File

Exit	Quit Ethernet Networking Package.

Edit

The menu options available under the “Edit” menu depend on the currently selected tab in the ENP main window. For more details see the links under “Related dialogs / windows” at the end of this chapter.

Tools

The “Tools” menu provides the dialogs for some of the basic settings for ENP networks used for definition of Class Types and QoS control.

Edit Class Types	Calls the Class Type (HQoS Class Type Definition) dialog.
HQoS Configuration Manager...	Calls the HQoS Configuration Manager dialog.
Basic TE Configuration	Expands to the following menu options:
Show Network Audit Result...	Calls the Network Audit Result dialog.
Schedule Network Alignment...	Calls the Schedule Network Alignment dialog.
Schedule Network Audit...	Calls the Schedule Network Audit dialog.
Manage Reference Data...	Calls the Manage QoS Reference Tables dialog.
Backplane Audit	Expands to the following menu options:
Show Backplane Audit Result...	Calls the Backplane Audit Result dialog.
Schedule Backplane Audit...	Calls the Schedule Backplane Audit dialog.

Options

Expert Mode	☒ When the checkbox is marked, the expert mode is enabled and an indication is activated in the upper right corner of the ENP main window: Expert Mode The expert mode allows you to - Modify the binding of the Pseudo Wires. The default binding setting gives you an H-VPLS. All nodes, ports are connected to each other and can send packets to each other. With modifying the binding it is possible to create an E-Tree. However, the correctness of the service is not checked in this mode. - Clear and Synchronize ENP with node configurations. - Modify HQoS Constants.  Caution! This advanced GUI mode does not do additional checks (like e.g.: only one VPLS node is allowed). Only recommended if you are a highly experienced user since you run the risk of corrupted configurations if you make any inconsistent changes.
Class Type Filter	☒ Select one of the two Class Type filter identifications: - Long: ☐ The Class Type Name is shown as Class Type identification in the icon bar filter, e.g. “Default”. - Short: The abbreviation “CT” and the Class Type [0...7] are used as Class Type identification in the icon bar filter, e.g. “CT 0”.

Network

Synchronize



The command “Network - Synchronize” forces a synchronization of the node configurations with the ENP database. This may be required when node configurations have been modified e.g. using the local craft terminal **FOXCST**.

Synchronization duration depends on the network size; a synchronization may take several minutes to complete.



Caution!

When you confirm and execute a synchronization, all open sessions for modifying ENP related objects will be closed. Any user that was using the sessions will encounter non-expected behavior.

Such behavior can e.g. cause the user not to be able to save changes made to ENP objects, or not to conclude an ENP object creation process.

The sessions will not be re-opened after the synchronization has been terminated. They will have to be restarted by the user.

Clear and Synchronize

The “Clear and Synchronize” command is only active when the **Expert Mode** is enabled. This command forces the removal of all saved but not deployed ENP objects and a synchronization of the node configurations with the ENP database.

It also removes all ENP objects (such as services, PWs, tunnels) from the database and reloads them from the network.



Caution!

When you confirm and execute the “Clear and Synchronize” command, all ENP objects that are saved but not deployed will be deleted, and all open sessions for modifying ENP related objects will be closed. Any user that was using the sessions will encounter non-expected behavior.

Such behavior can e.g. cause the user not to be able to save changes made to ENP objects, not to deploy a created service, or not to conclude an ENP object creation process.

The sessions will not be re-opened after the synchronization has been terminated. They will have to be restarted by the user.

Session Manager...

Lists all currently open “Create” and “Edit” sessions in ENP with Name (tunnel or service name), Type, Location, Owner, Host Name, and Parent ID.

The list can be updated with the “Refresh” button.

When you create or modify a tunnel or service in ENP, that session can be revoked by an administrator if required via the button “Shut down Session...” if **Expert Mode** is enabled. This may be required if, for whatever reason, there is an issue with the current session.

You need to confirm the shutdown of the session(s).

Help

? Help



Calls the help viewer of the currently active Tab.

Class Type Filter (in icon bar)

Default, (specified Class Types)	☒ ☐	Enable (show) or disable (hide) table entries in the Main Window's tables per Class Type. For each Class Type that has been defined (see Class Type (HQoS Class Type Definition)) entries that depend on that specific Class Type can be shown or hidden in the tables. Applies to the lists of VPWS, Pseudo Wires, Tunnels, and Service Profiles. The Class Type Filter switches are listed with colored background in the icon bar of the ENP main window. The Class Type filter IDs can be toggled between short or long IDs using the menu selection "Options - Class Type Filter - Short" or "Options - Class Type Filter - Long". Note: With no Class Types selected all table contents are displayed (equal to all Class Types selected).
Clear Class Type Filter		Clears the settings made to the Class Type filter so that no filtering is applied anymore.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[VPLS](#) tab,
[VPWS](#) tab,
[Pseudo Wire](#) tab,
[Tunnel](#) tab,
[Link](#) tab,
[NE](#) tab,
[HQoS Constants](#),
[Service Profile](#) tab, [Service Profile Details](#) (depend on license option),
Tools: [Class Type \(HQoS Class Type Definition\)](#),
Tools: [Schedule Network Audit](#),
Tools: [Schedule Network Alignment](#),
Tools: [Network Audit Result](#),
Tools: [Manage QoS Reference Tables](#),
Tools: [Backplane Audit Result](#),
Tools: [Schedule Backplane Audit](#),
[FOXCST](#).

8.3.1 VPLS

Purpose

A Virtual Private LAN Service (VPLS) is a multipoint-to-multipoint Ethernet bridging service. Within the VPLS instance, all member nodes of the mesh type are connected with Pseudo Wires in a full-mesh topology. Member nodes attached as spoke nodes are not fully meshed with the other nodes, but usually connected to one mesh-type node via a single link.

On each node, the Pseudo Wires are connected to a Switching Virtual Interface (SVI). A local VLAN of the node is associated to the SVI. Bridge ports are attached to the VPLS if they share the same VLAN ID with the SVI.

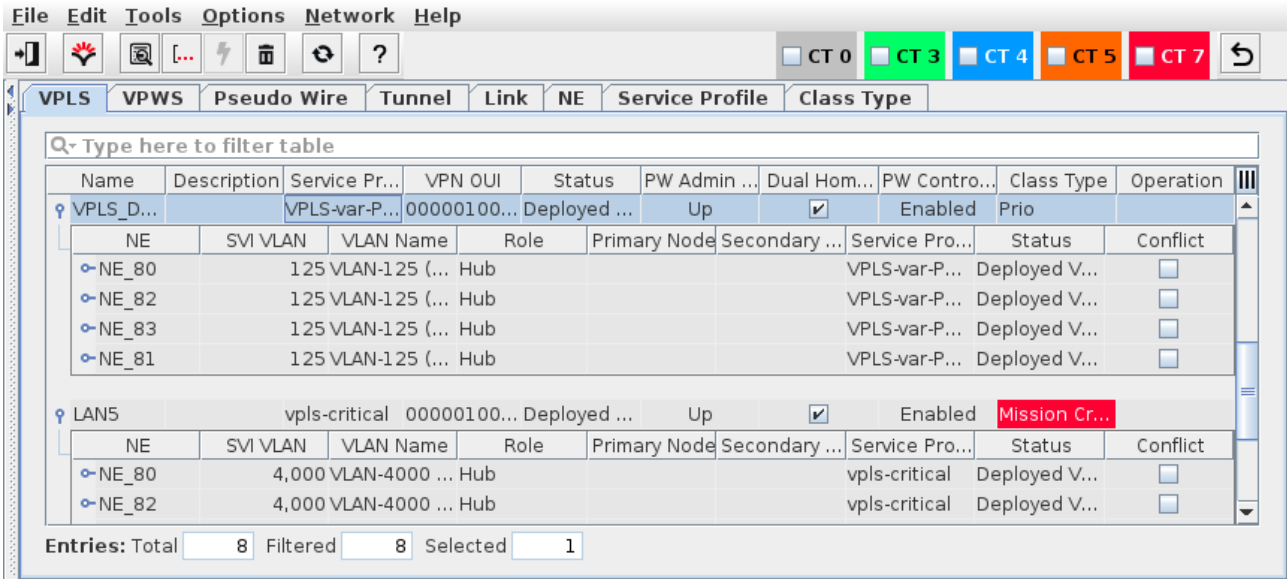
The VPLS Tab displays all the saved and deployed VPLS. It likewise allows you to create, modify, see details, deploy or delete VPLS.

The VPLS are listed in a hierarchical table. The top level displays all the VPLS services. The second level displays all the member VPLS nodes. Under each node, all member ports, Pseudo Wires and tunnels are displayed.

For background information, please refer to [Overview of VPLS Implementation](#).

Dialog image

ENP – VPLS



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Name	The specified Name of the VPLS service.
Description	The specified Description of the VPLS service.
Service Profile	Shows the Service Profile that was used to create the VPLS.
VPN OUI	VPN authority Organizationally Unique Identifier (OUI) or VPN id.

Status	The VPLS status: - Deploying/Removing: Display the Progress bar Indicating the current progress of deploying or deleting the selected Service(s). - Deployed Valid: The Service is deployed to the MPLS-TP nodes. A deployed VPLS service can be modified (add/remove nodes). - Deployed Invalid: One of the VPLS nodes or VPLS Pseudo Wire is missing or was not correctly deployed. It is saved in the FOXMAN-UN database. - Deployed Deleted: One of the VPLS nodes and the related VPLS Pseudo Wire has been removed from the Service. Changes are saved in the database but not yet removed from the node. - Saved OK: The Service, Pseudo Wires are saved in the database but not yet deployed in the MPLS-TP nodes. - Unaligned: A deployed VPLS has been modified via the FOXCST GUI and is therefore not aligned any more with the ENP database. As an example, when a VLAN is added to a UNI port of the service by opening the FOXCST for one of the nodes involved in the service, and adding a VLAN to a port, or adding a port to the service VLAN, the service is not as originally configured any more. To get the VPLS aligned again, the VPLS needs to be modified. See the steps given in Modify VPLS.
PW Admin State	Shows the current Pseudo Wire administrative status (Up/Partially Down/Down). During the transition between up and down the status may be shown as "Invalid".
Dual Home Capable	Indicates whether the VPLS has been configured as dual home capable service, based on a service profile that allows dual home capable services.
PW Control Word	Indicates the status of the Pseudo Wire Control Word. For dual home capable services the PW Control Word must be enabled. For non-dual home capable services the PW Control Word can be disabled if required. A service with PTP mode "Transparent Clock" can only be used for PTP if the PW Control Word is disabled. For PTP mode "Transparent Clock with CW" Control Word must be enabled. When using an EPEX1 unit in any of the involved nodes, the use of "Transparent Clock with CW" is mandatory for PTP mode "Transparent Clock".
Class Type	The Class Type assigned to the service.
Class Type Id	The ID of the Class Type assigned to the service. This parameter is hidden by default. It can be made visible via the table header context menu.

Supervision	Note: A VPLS must at least have one path to be supervised. Incomplete services with only one end point cannot be supervised. Service Supervision status, - Running: this VPLS is supervised. Supervision can be paused or disabled via the “Supervision ► Pause” or “Supervision ► Disable...” commands in the context menu or the “Edit” menu. - Paused: service supervision is paused on this VPLS. It can be resumed via the “Supervision ► Resume” command in the context menu or the “Edit” menu. - Disabled: service supervision is disabled on this VPLS. It can be enabled via the “Supervision ► Enable...” command in the context menu or the “Edit” menu.
Superv. Oper State	Shows the operational state (up, down) of the service supervision on this VPLS. This field is empty when service supervision is disabled.
Fault State	Shows the highest active fault state of the VPLS.
Operation	The operation status during deployment or removal: - Deploy Pending, - Deploy Executing, - Remove Pending, - Remove Executing, - Success.

Controls (buttons, menu items, etc.)

Edit (also via Context Menu)

Create VPLS...	 Calls the Create Service Wizard. Note: When Expert Mode is enabled the Create VPLS wizard allows you to create on a VPLS based on a single NE two VPWS with split horizon, or other VPLS without consistency check.
Details VPLS...	 Shows details of a VPLS. Displays the whole Service in one view (Member NEs, Pseudo Wire, and Selected Tunnel). From the Details view, the possible actions are: - Edit Calls the Modify Service dialog. It is possible to remove VPLS NEs, add VPLS NEs, create tunnel(s) and PWs for the newly added VPLS NEs. - Deploy: Deploys the Service to the MPLS-TP nodes. - Delete: Deletes the Service. - Close: Closes the dialog. For details, please refer to VPLS Details section.
Show Status Reason...	Opens a window with additional information on the most probable reason for an unaligned or invalid status if applicable to the selected item.

Modify VPLS...		Calls the Modify Service dialog. It is possible to: - remove VPLS NEs, - add VPLS NEs, - create tunnel(s) and PWs for the newly added VPLS NEs, - align an unaligned VPLS. For details, please refer to Modify VPLS section
Deploy VPLS		Deploys the currently selected Service(s) to the nodes. A confirmation is required to start the deployment.
Align VPLS...		Aligns the Service such that any misalignment between the ENP database configuration and the Service present in the network is corrected.
Delete VPLS...		Deletes the currently selected Service(s). A confirmation is required to delete the service.
Synchronize VPLS		Synchronizes the selected VPLS with the configuration present in the network (i.e. present on the NEs included in the service).
Open in Service Supervision...		Opens the service in a filtered view of the Service Supervision dialog.
PW Admin State		- Up: Sets the administrative state of the Pseudo Wires used for this service to "up". - Down: Sets the administrative state of the Pseudo Wires used for this service to "down".
Supervision ► Enable...		Enable supervision of all services on this VPLS. To do that, the service information attributes Customer , Service Level Agreement , and Network need to be selected.
Supervision ► Disable...		Disable supervision for this VPLS. Must be confirmed by the user. If any service supervision cannot be disabled, an error message is shown with the respective reason(s).
Supervision ► Resume		Resume service supervision that has been paused before.
Supervision ► Pause		Pause service supervision.
Supervision ► Reload Configuration		Reloads the configuration from the NEs to make sure it is up to date in case of recent changes to the service.
Supervision ► Show Details...		Show service supervision details for this VPLS. Opens the service in a view-only window of the Service Editor . The windows also provides an alarm tab showing active alarms of the VPLS.
Supervision ► Show in Service Supervision...		Opens the service supervision dialog with a filtered view for the VPLS.

NE instance, informational content (when expanded)

Name	The specified NE Name.
SVI VLAN	The specified Service VLAN ID on the NE.
VLAN Name	The specified Name for the SVI VLAN.

Role	The role of the node for the currently selected service: - Hub (default), - Spoke, - PE Dual Home.
Primary Node	- When the NE role for the current service is “Hub” the field remains empty. - When the NE role for the current service is “Spoke” the attached hub NE is shown here. - When the NE role for the current service is “PE Dual Home” the primary dual home NE is shown here.
Secondary Node	When the NE role for the current service is “PE Dual Home” the secondary dual home NE is shown here.
Service Profile	The name of the Service Profile used for creating the VPLS on this NE.
Status	The VPLS status: - Deployed Valid, - Deployed Invalid, - Saved OK, - Unaligned.
Conflict	A mark in the checkbox is set if there is a conflict occurring on the VPLS on this NE instance. Possible conflicts are inappropriate QoS settings or an inappropriate port VLAN mode.

Port instance, informational content (when expanded)

Reference	The port address with unit name, slot, and port number.
Type	The port type (CVP, PWAC) as set via FOXCST , Main - Port Type - Usage.
VLAN Mode	The VLAN Mode as set via FOXCST , Switching tab, bridge-1, Mode.
PVID	The port VLAN ID for the service.
Service Profile	The name of the Service Profile used for creating the VPLS on this NE.
Status	The VPLS status: - Deployed Valid, - Deployed Invalid, - Saved OK, - Unaligned.
Conflict	A mark in the checkbox is set if there is a conflict occurring on the VPLS on this NE instance. Possible conflicts are inappropriate QoS settings or an inappropriate port VLAN mode.

PW instance, informational content (when expanded)

The service can be further expanded to show Pseudo Wires and Tunnels used. For details on parameters shown for these levels, refer to the **Pseudo Wire** and **Tunnel** sections.

Name	The specified Name of the Pseudo Wire.
Description	The specified Description of the Pseudo Wire.
Initiator	The ingress LER.
Terminator	The egress LER.
Tunnel	Tunnel Name.
BW [kbit/s]	Configured bandwidth.
Class Type	Shows the configured Class Type as configured in the Class Type (HQoS Class Type Definition) dialog.
Dual-Home Group	Shows the Dual-Home group name.
Dual-Home Role	Shows the Dual-Home role.
Status	Indicates the Status of the Pseudo Wire.

Tunnel Status	Indicates the status of the related tunnel.
Admin State	The administrative state of the Pseudo Wire. It can be set to “up” or “down” via ENP menu or context menu.
Operation	The operation status during deployment or removal: - Deploy Pending, - Deploy Executing, - Remove Pending, - Remove Executing, - Success.

Related dialogs / windows

[ENP Main Window](#),
[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Create Tunnel](#),
[Create Service](#),
[Create VPLS](#),
[VPLS Details](#),
[Modify VPLS](#),
[Pseudo Wire](#),
[Tunnel](#),
[FOXCST](#).

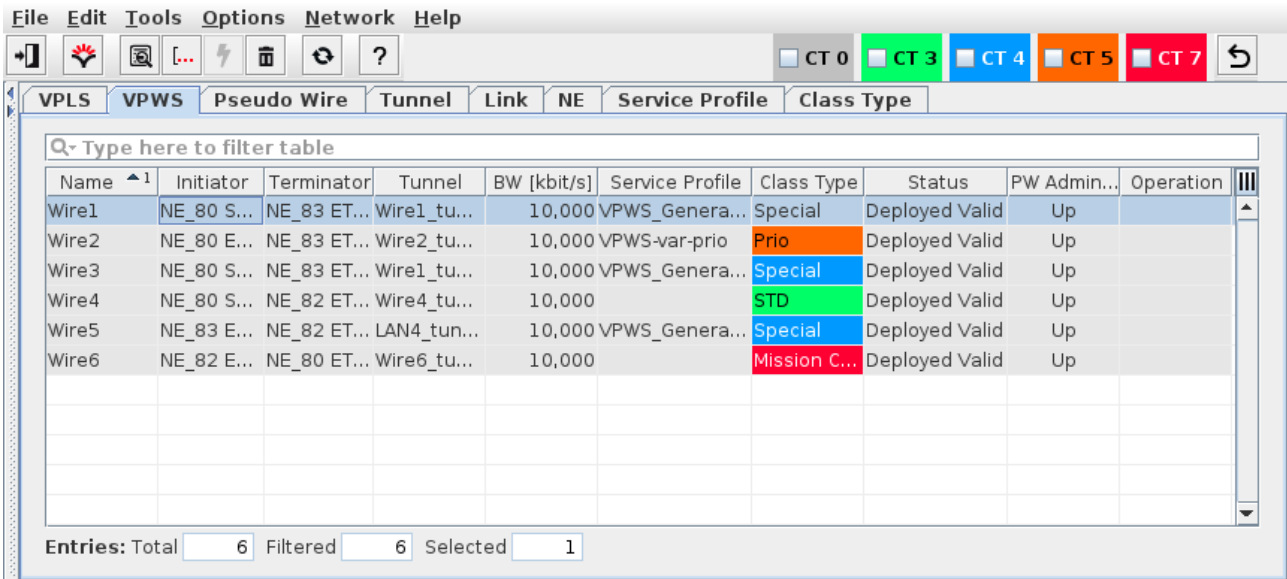
8.3.2 **VPWS**

Purpose

Displays all the existing VPWS services.
 Allows you to create, modify, see details, deploy or delete VPWS services.
 Entries in the VPWS table are filtered with the Class Type Filter on the left hand side (see [ENP Main Window](#)).

Dialog image

ENP – VPWS



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Name	The specified Name of the service.
Description	The specified Description of the service.
Initiator	The ingress Label Edge Router (LER)
Terminator	The egress LER
Tunnel	The name of the tunnel used for the service.
BW [kbit/s]	The allocated service bandwidth.
Service Profile	The Service Profile that was used to create the VPLS.
Class Type	The Class Type that was used to create the VPLS.
Class Type Id	The ID of the Class Type assigned to the service. This parameter is hidden by default. It can be made visible via the table header context menu.

Status	The Pseudo Wire status: - Deploying/Removing: Display the Progress bar Indicating the current progress of deploying or deleting the selected Service(s). - Deployed Valid: The Service (both Pseudo Wire endpoints) is deployed to the MPLS-TP nodes. - Deployed Invalid: One side of the Pseudo Wire is missing or was not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes.
PW Admin State	The current Pseudo Wire administrative status (Up/Partially Down/Down). During the transition between up and down the status may be shown as "Partially Down" or "Invalid" until both ends are done.
Supervision	Service Supervision status, - Running: this VPWS is supervised. Supervision can be paused or disabled via the "Supervision ► Pause" or "Supervision ► Disable..." commands in the context menu or the "Edit" menu. - Paused: service supervision is paused on this VPWS. It can be resumed via the "Supervision ► Resume" command in the context menu or the "Edit" menu. - Disabled: service supervision is disabled on this VPWS. It can be enabled via the "Supervision ► Enable..." command in the context menu or the "Edit" menu.
Superv. Oper State	The operational state (up, down) of the service supervision on this VPWS. This field is empty when service supervision is disabled.
Fault State	The highest active fault state of the VPWS.
PW Control Word	The setting (Enabled, Disabled) for the PW Control Word of the selected VPWS.
LLF	The Link Loss Forwarding state (On, Off).
Operation	The operation status during deployment or removal: - Deploy Pending, - Deploy Executing, - Remove Pending, - Remove Executing, - Success.

Controls (buttons, menu items, etc.)

Edit (also via Context Menu)

Create VPWS



Calls the Create Service Wizard.

Details VPWS...		Calls the VPWS Details dialog in view mode. Displays the whole VPWS in one view (The Defined Service, Pseudo Wire, and Selected Tunnel). From the Details view, the possible actions are: - Deploy: Deploys the Service to the MPLS-TP nodes. - Delete: Deletes the Service. - Close: Closes the dialog. For more information refer to VPWS Details section.
Show Status Reason...		Opens a window with additional information on the most probable reason for an unaligned or invalid status if applicable to the selected item.
Modify VPWS...		Calls the VPWS edit dialog.
Deploy VPWS		Deploys the currently selected Service(s) to the nodes Note: The progress of the Service(s) deployment can be monitored in the "Status" column.
Align VPWS...		Aligns the Service such that any misalignment between the ENP database configuration and the Service present in the network is corrected.
Delete VPWS...		Deletes the currently selected Service(s) Note: The progress of the Service(s) deployment can be monitored in the "Status" column.
Synchronize VPWS		Synchronizes the selected VPWS with the configuration present in the network (i.e. present on the NEs included in the service).
Open Initiator		Open the Initiator NE in the local craft terminal (FOXCST). For this purpose you need to select a user class in the sub-menu.
Open Terminator		Open the Terminator NE in the local craft terminal (FOXCST). For this purpose you need to select a user class in the sub-menu.
Open in Service Supervision...		Opens the service in a filtered view of the Service Supervision dialog.
PW Admin State		- Up: Sets the administrative state of the Pseudo Wires used for this service to "up". - Down: Sets the administrative state of the Pseudo Wires used for this service to "down".
Create InfluxDB Dashboard...		Create a new dashboard in the metrics database application for the selected service. This will execute a script on the server to create a performance monitor. The dashboard with the given "Service_name" will appear in the Metrics Database in the tab "Boards". Start and end of the execution will be logged in the event list.
Supervision ► Enable...		Enable supervision of all services on this VPWS. To do that, the service information attributes Customer , Service Level Agreement , and Network need to be selected.
Supervision ► Disable...		Disable supervision for this VPWS. Must be confirmed by the user. If any service supervision cannot be disabled, an error message is shown with the respective reason(s).

Supervision ► Resume		Resume service supervision that has been paused before.
Supervision ► Pause		Pause service supervision.
Supervision ► Reload Configuration		Reloads the configuration from the NEs to make sure it is up to date in case of recent changes to the service.
Supervision ► Show Details...		Show service supervision details for this VPWS. Opens the service in a view-only window of the Service Editor . The windows also provides an alarm tab showing active alarms of the VPWS.
Supervision ► Show in Service Supervision...		Opens the service supervision dialog with a filtered view for the VPWS.

Related dialogs / windows

[ENP Main Window](#),
[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Class Type \(HQoS Class Type Definition\)](#),
[Create Tunnel](#),
[Create Service](#),
[Create VPWS](#),
[VPWS Details](#).

8.3.3 Pseudo Wire

Purpose

Displays all existing Pseudo Wires in the ENP.

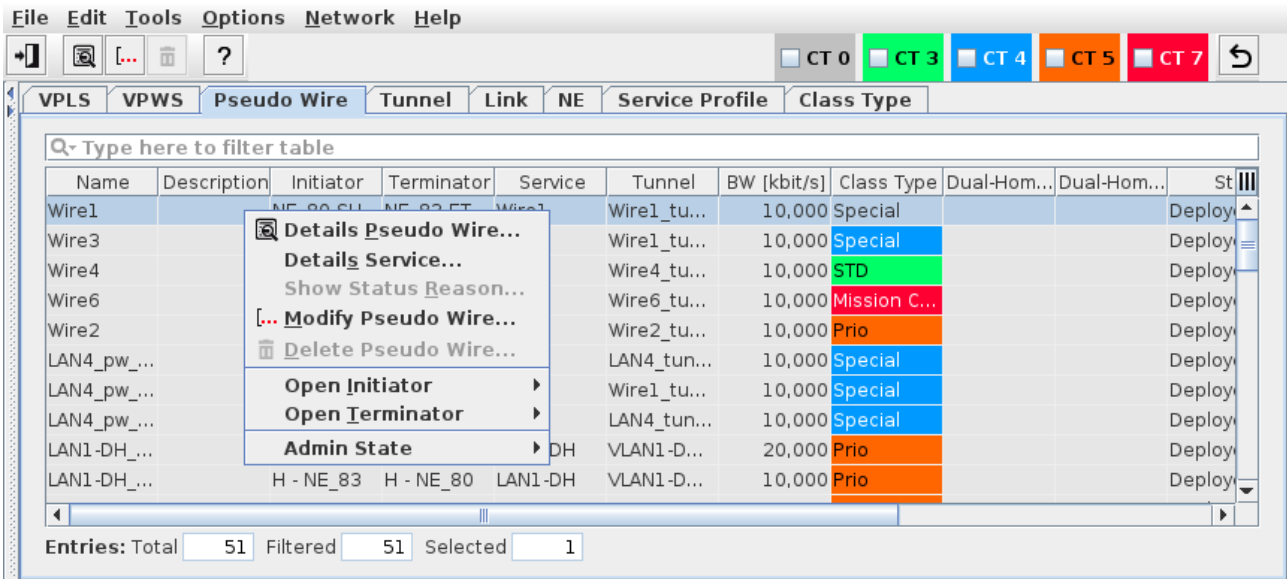
Allows you to show details of a selected Pseudo Wire.

Allows you to modify a selected Pseudo Wire, and to set its Admin State to “up” or “down”.

Entries in the Pseudo Wire table are filtered with the Class Type Filter on the left hand side (see [ENP Main Window](#)).

Dialog image

ENP – Pseudo Wire



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Name	The specified Name of the Pseudo Wire.
Description	The specified Description of the Pseudo Wire.
Initiator	The ingress LER.
Terminator	The egress LER.
Service	Name of the VPLS or VPWS.
Tunnel	Tunnel Name.
BW [kbit/s]	Configured bandwidth.
Class Type	Shows the configured Class Type as configured in the Class Type (HQoS Class Type Definition) dialog.
Class Type Id	The ID of the Class Type assigned to the service. This parameter is hidden by default. It can be made visible via the table header context menu.
Dual-Home Group	The Dual-Home group name.
Dual-Home Role	The Dual-Home role.
PW Control Word	Shows whether PW Control Word is enabled or disabled.
LLF	The Link Loss Forwarding state (On, Off).

Status	Indicates the Status of the Pseudo Wire: - Deploying: Indicates the progress of deploying the selected Pseudo Wire. - Removing: Indicates the progress of deleting the selected Pseudo Wire. - Deployed Valid: The path is complete. The Pseudo Wire and LSP(s) are saved in the FOXMAN-UN database and are deployed to the nodes. - Deployed Invalid: The Pseudo Wire is incomplete, i.e. there is a hole in the path. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The path is complete. The Pseudo Wire and LSP(s) are saved in the FOXMAN-UN database. - Saved Incomplete: The Pseudo Wire is incomplete, i.e. there is a hole in the path. It is saved in the FOXMAN-UN database.
Tunnel Status	Indicates the status of the related tunnel.
Admin State	The administrative state of the Pseudo Wire. It can be set to “up” or “down” via ENP menu or context menu.
Supervision	Service Supervision status, - Running: this Pseudo Wire is supervised. Supervision can be paused or disabled via the “Supervision ► Pause” or “Supervision ► Disable...” commands in the context menu or the “Edit” menu. - Paused: service supervision is paused on this Pseudo Wire. It can be resumed via the “Supervision ► Resume” command in the context menu or the “Edit” menu. - Disabled: service supervision is disabled on this Pseudo Wire. It can be enabled via the “Supervision ► Enable...” command in the context menu or the “Edit” menu.
Superv. Oper State	Shows the operational state (up, down) of the service supervision on this Pseudo Wire. This field is empty when service supervision is disabled.
Fault State	Shows the highest active fault state of the Pseudo Wire.
Operation	The operation status during deployment or removal: - Deploy Pending, - Deploy Executing, - Remove Pending, - Remove Executing, - Success.

Controls (buttons, menu items, etc.) / Context Menu

Edit

Details Pseudo Wire...		Opens the Pseudo Wire Details dialog window to view all details of the Pseudo Wire, the Attachment Circuits, and related QoS and rate limiting settings. See Pseudo Wire Details dialog.
Details Service...		Opens the details view of the related service using the Pseudo Wire, preselects the Pseudo Wire, and shows the Pseudo Wire details in that dialog.
Show Status Reason...		Opens a window with additional information on the most probable reason for an unaligned or invalid status if applicable to the selected item.

Modify Pseudo Wire...		Opens the Pseudo Wire settings in Edit mode. In the Pseudo Wire dialog window you can select a different Tunnel for changing the allocation between Tunnel and Pseudo Wire and deploy the change. See Pseudo Wire Details dialog.
Delete Pseudo Wire...		Deletes a Pseudo Wire provided it has an invalid state, and it is not used by any service. The “Delete Pseudo Wire” menu option is not available for regularly deployed Pseudo Wires.
Open Initiator ►		Open the Initiator NE in the local craft terminal (FOX CST). For this purpose you need to select a user class in the sub menu. The FOX CST GUI will open in a new window.
Open Terminator ►		Open the Terminator NE in the local craft terminal (FOX CST). For this purpose you need to select a user class in the sub menu. The FOX CST GUI will open in a new window.
Admin State		- Up: Sets the admin state of the Pseudo Wire to “up”. - Down: Sets the admin state of the Pseudo Wire to “down”.
Supervision ► Enable...		Enable supervision for this Pseudo Wire. To do that, the service information attributes Customer , Service Level Agreement , and Network need to be selected.
Supervision ► Disable...		Disable supervision for this Pseudo Wire. Must be confirmed by the user. If any service supervision cannot be disabled, an error message is shown with the respective reason(s).
Supervision ► Resume		Resume service supervision that has been paused before.
Supervision ► Pause		Pause service supervision.
Supervision ► Reload Configuration		Reloads the configuration from the NEs to make sure it is up to date in case of recent changes to the Pseudo Wire.
Supervision ► Show Details...		Show service supervision details for this Pseudo Wire. Opens the service in a view-only window of the Service Editor . The windows also provides an alarm tab showing active alarms of the Pseudo Wire.
Supervision ► Show in Service Supervision...		Opens the service supervision dialog with a filtered view for the Pseudo Wire.

Related dialogs / windows

[ENP Main Window](#),
[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Pseudo Wire Details](#),
[Class Type \(HQoS Class Type Definition\)](#),
[Create Tunnel](#),
[Create Service](#).

8.3.4 Tunnel

Purpose

Displays all the existing Tunnels in the ENP.

Allows you to create, see details, modify, deploy or delete Tunnels.

Allows you to create services within a tunnel.

Entries in the tunnel table are filtered with the Class Type Filter on the left hand side (see [ENP Main Window](#)).

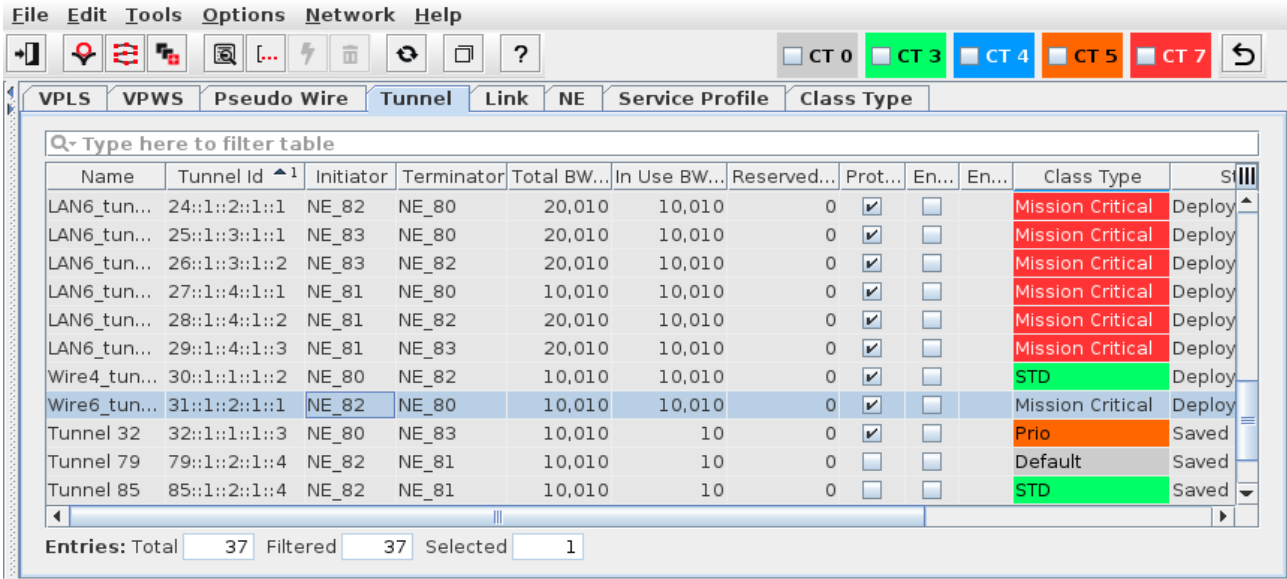
i

Please note:

It is possible to create Tunnels without using them directly in services.

Dialog image

ENP – Tunnel



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Name	The specified Name of the tunnel.
Tunnel ID	The Tunnel ID is composed of the five sub identifiers: Tunnel#::Initiator Global ID::Initiator Node ID::Terminator Global ID::Terminator Node ID
Description	The specified Description of the tunnel.
Initiator	The ingress LER.
Terminator	The egress LER.
Nbr of Pseudo Wires	Shows the current number of PWs that are using the respective tunnel. This column is hidden per default but can be made visible via the column header context menu.
Total BW [kbit/s]	Configured bandwidth allocated to the tunnel.

In Use BW [kbit/s]	The total allocated bandwidth of all configured (saved in the database) and deployed services using this tunnel. Note: BFD sessions use an additional bandwidth of 10 kbit/s even if no Pseudo Wire is attached to the tunnel. Also see BFD (Bidirectional Forwarding Detection).
Reserved BW [kbit/s]	The total allocated bandwidth of all configured (saved in the database) but not yet deployed services using this tunnel.
Protected	Indicates if tunnel is protected/unprotected.
Encrypted	A mark in the checkbox indicates that the tunnel has been set up as encrypted tunnel.
Encryption Status	Indicates if the tunnel actually is encrypted.
Class Type	Indicates the Class Type used for the tunnel.
Class Type Id	The ID of the Class Type assigned to the service. This parameter is hidden by default. It can be made visible via the table header context menu.
Status	Indicates the Status of the tunnel: - Deploying: Indicates the progress of deploying the selected tunnel. - Removing: Indicates the progress of deleting the selected tunnel. - Deployed Valid: The path is complete. The tunnel and LSP(s) are saved in the FOX-MAN-UN database and are deployed to the nodes. A deployed tunnel can be deleted, provided its "In Use" and "Reserved" bandwidths are "0". It cannot be modified and be set to a Saved Tunnel. - Deployed Invalid: The tunnel is incomplete, i.e. there is a hole in the path. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The path is complete. The tunnel and LSP(s) are saved in the FOX-MAN-UN database. A saved tunnel can be modified, deployed and deleted. - Saved Incomplete: The tunnel is incomplete, i.e. it is not deployed, or there is a hole in the path. It is saved in the FOXMAN-UN database.
Supervision	Service Supervision status, - Running: this tunnel is supervised. Supervision can be paused or disabled via the "Supervision ► Pause" or "Supervision ► Disable..." commands in the context menu or the "Edit" menu. - Paused: service supervision is paused on this tunnel. It can be resumed via the "Supervision ► Resume" command in the context menu or the "Edit" menu. - Disabled: service supervision is disabled on this tunnel. It can be enabled via the "Supervision ► Enable..." command in the context menu or the "Edit" menu.
Superv. Oper State	Shows the operational state (up, down) of the service supervision on this tunnel. This field is empty when service supervision is disabled.
Fault State	Shows the highest active fault state of the tunnel.

Operation	The operation status during deployment or removal: - Deploy Pending, - Deploy Executing, - Remove Pending, - Remove Executing, - Success.

Controls (buttons, menu items, etc.)

Edit

Create Tunnel	 Calls the Create Tunnel dialog.
Create Tunnel Mesh	 Calls the “ Create Tunnel Mesh ” wizard to create a tunnel mesh over several NEs.
Create Tunnel Based On...	 Create a tunnel based on an existing tunnel that is currently selected in the table of tunnels.
Details Tunnel...	 Calls the Tunnel Details dialog, where all information of the tunnel is shown including the attached Pseudo Wire(s). From the Details view, the following actions are possible: - Edit Switches to edit mode, where the currently selected tunnel name, description and bandwidth allocation can be changed. - Save: Saves the modified tunnel to the FOXMAN-UN database. - Deploy: Deploys the tunnel to the nodes. - Delete: Deletes the tunnel. - Close: Closes the dialog.
Show Status Reason...	For a selected tunnel, the reason for any irregular status indication can be displayed in a separate Status window.
Modify Tunnel...	 Calls the Tunnel dialog in Edit mode, where all information of the tunnel is shown including the attached Pseudo Wire(s). The currently selected tunnel’s Name, Description, and bandwidth (BW) can be changed. In the tunnel graph and in the table of tunnel components you can select any of the components of the working LSP or the protection LSP (where configured). The selected component is marked with a light blue color. From the Edit mode, the following actions are possible: - Set Unprotected / remove Protection (requires Options - Expert Mode): For protected tunnels protection can be removed either by removing the mark in the “Protection” checkbox, or by selecting “Set Unprotected” from the context menu of any tunnel component in the table of the Working LSP or Protection LSP. Note: Deployed tunnels cannot be set to unprotected.

-
- Set Protection (requires **Options - Expert Mode**):
For unprotected tunnels protection can be added. Once you have activated protection you need to select the "Protection LSP (Incomplete)" tab and route the protection LSP either manually ("Manual Routing") or automatically ("Automatic Routing" or "Advanced Routing").

 - Modify routing (Manual Routing / Automatic Routing / Advanced Routing):
Any link based segment, when selected in the Working LSP or Protection LSP table, can be deleted via the context menu selection "Delete LSP Element". If required you can cancel such modification before saving it to the database by clicking the "Cancel" button.
When a segment is deleted, the entry in the LSP table shows "Hole" in the "Type" column. To define a new segment, use one of the three routing buttons on the right hand side of the LSP table.

 - Add BFD (requires **Options - Expert Mode**):
For tunnels without BFD session you can activate BFD. In the Edit mode of the tunnel go to the "BFD" tab and set the mark in the "BFD Session" checkbox of the Initiator. You may also select the CC interval.

 - Create End-To-End Encryption (requires appropriate crypto configurations in the **Ethernet Security Manager** to be successful).
The following profiles are available:
 - [1] Discard:
Discard all traffic,
 - [3] Encrypted & Authenticated without OAM:
Encrypt and authenticate all traffic; do not use OAM,
 - [5] Encrypted & Authenticated with OAM:
Encrypt and authenticate all traffic; use OAM.

 - Create Hop-By-Hop Encryption (requires appropriate crypto configurations in the **Ethernet Security Manager** to be successful).
The following profiles are available:
 - [1] Discard:
Discard all traffic,
 - [3] Encrypted & Authenticated without OAM:
Encrypt and authenticate all traffic; do not use OAM,
 - [5] Encrypted & Authenticated with OAM:
Encrypt and authenticate all traffic; use OAM.

 - Delete Encryption:
Removes the encryption from the selected tunnel.

 - Save:
Saves the (modified) tunnel to the FOXMAN-UN database and returns the dialog to view mode.

 - Deploy:
Deploys the tunnel to the nodes.

 - Delete:
Deletes the tunnel.

 - Cancel:
Closes the dialog without tunnel modification.

Deploy Tunnel		Deploys the currently selected saved tunnel(s) to the nodes. This option is only available when the selected tunnel is saved, but not deployed yet. Notes: - No check is done between the modified tunnel and the service profile tunnel routing parameters. - The progress of the tunnel deployment can be monitored in the "Status" column.
Delete Tunnel		Deletes the currently selected tunnel(s). This option is only available for tunnels without any Pseudo Wire attached. To check this, select "Tunnel Details" and choose the "Attached Pseudo Wires" tab. If you want to delete a tunnel with "In Use" and/or "Reserved" bandwidth you need to delete any Pseudo Wires using the tunnel beforehand. Tunnels without Pseudo Wire attached only use bandwidth when they have active BFD (Bidirectional Forwarding Detection) sessions. Note: It is not possible delete a tunnel with attached Pseudo Wire(s). Note: The progress of the tunnel delete can be monitored in the "Status" column
Synchronize Tunnel...		Synchronizes the selected tunnel(s) among ENP database and network so that misalignments are removed if technically possible.
Encryption - Encrypt Tunnel...		From the context menu of the tunnel table, opens a dialog to select the encryption profile to be applied to the selected tunnel(s). Requires appropriate crypto configurations in the Ethernet Security Manager to be successful. The following profiles are available: - [1] Discard: Discard all traffic, - [3] Encrypted & Authenticated without OAM: Encrypt and authenticate all traffic; do not use OAM, - [5] Encrypted & Authenticated with OAM: Encrypt and authenticate all traffic; use OAM. As an option, hop-by-hop encryption can be selected. A confirmation is required; click "Yes" to confirm or "No" to cancel the operation.
Encryption - Decrypt Tunnel...		From the context menu of the tunnel table, removes the applied encryption from the selected tunnel(s).
Copy Tunnel(s)...		Copy one or several selected tunnel(s). This opens a dialog to create one or several copies of selected tunnel(s). See ENP – Copy Tunnel .
Supervision ► Enable...		Enable supervision for this tunnel. To do that, the service information attributes Customer , Service Level Agreement , and Network need to be selected.
Supervision ► Disable...		Disable supervision for this tunnel. Must be confirmed by the user. If any service supervision cannot be disabled, an error message is shown with the respective reason(s).
Supervision ► Resume		Resume service supervision that has been paused before.

Supervision ► Pause		Pause service supervision.
Supervision ► Reload Configuration		Reloads the configuration from the NEs to make sure it is up to date in case of recent changes to the tunnel.
Supervision ► Show Details...		Show service supervision details for this tunnel. Opens the service in a view-only window of the Service Editor . The windows also provides an alarm tab showing active alarms of the tunnel.
Supervision ► Show in Service Supervision...		Opens the service supervision dialog with a filtered view for the tunnel.

Tunnel Context Menu

See “Edit” above.

ENP – Copy Tunnel

☐ Default

☐ STD

☒ Special

☐ Prio

☐ Mission Critical

Number of Copies

New Tunnel(s)

Old Tunnel	Name	Description	Total BW ...	Class Type	Co
LAN4_tunnel...	Tunnel33		10,010	Special	

Entries: Total Filtered Selected

? Help

✓ OK

✗ Cancel

Mandatory entries

None.

Optional entries

- Class Type,
- Number of Copies,
- Name,
- Description,
- Total BW,
- Copy Bfd,
- Copy Protection,
- Coy Encryption,
- Min Label,
- Max Label.

Informational content / controls

Select Class Type	Lists existing Class Types, of which one or several can be applied to the new tunnel copies by setting a mark in the check box. For each of the selected Class Types a tunnel copy is created. If no Class Type is selected the Class Type(s) of the original tunnel(s) remain valid.
Number of Copies	Enter the number of required tunnel copies. The maximum is 100.
Old Tunnel	Name of the original tunnel. This field is read-only.
Name	Name of the new tunnel; the default name is the name of the original tunnel, supplemented by “_copy_N”, where N ranges from 1 to 100. The name can be edited in-line.
Description	Description of the tunnel. This field can be edited.
Total BW [kbit/s]	The total bandwidth in kbit/s of the new tunnel. This field can be edited.
Class Type	The Class Type of the new tunnel. The default Class Type is the same as for the original tunnel. A different Class Type can be set by selecting an existing Class Type in the upper left area. For each selected Class Types a tunnel copy is created.
Copy Bfd	Defines whether the BFD setting shall be copied from the original tunnel. Depending on the original settings, this may or may not be changed.
Copy Protection	Defines whether the protection settings shall be copied from the original tunnel. Depending on the original settings, this may or may not be changed.
Copy Encryption	Defines whether the encryption settings shall be copied from the original tunnel. Depending on the original settings, this may or may not be changed.
Min Label	The minimum for the tunnel label range.
Max Label	The maximum for the tunnel label range.

Related dialogs / windows

[ENP Main Window](#),
[Options - Expert Mode](#),
[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Class Type \(HQoS Class Type Definition\)](#),
[Create Tunnel](#),
[Tunnel Details](#),
[Create Service](#).

8.3.5 Link**Purpose**

Displays all MPLS-TP or ENP links. These links can be equivalent to sections, created via the [Section Management](#) dialog, or they are links created via the [Create Link](#) dialog, whose end-points are MPLS-TP interfaces, including VLAN sub-interfaces with usage set to MPLS-TP.

An ENP link has a bandwidth attribute (Available BW) used for the LSP path computation. The default link bandwidth is computed from the physical port characteristic of the end points. The user can overwrite this default bandwidth for the LSP path computation by modifying the “Link BW” value.

A link based on a VLAN sub-interface has a bandwidth attribute specified during creation of the VLAN sub-interface.

Allows you to modify the following Link parameters via the **Link Details (dialog window)** dialog:

- Name,
- Link Bandwidth (Total BW),
- Use for Routing,
- Cost.

The Link's Name and Cost are taken from the section as default values upon link creation. Once created they are not related to the section anymore. The section and the link names and costs can be modified independent of each other.

A subset of the entries in the Link table is filtered with the Class Type Filter on the left hand side (see **ENP Main Window**).



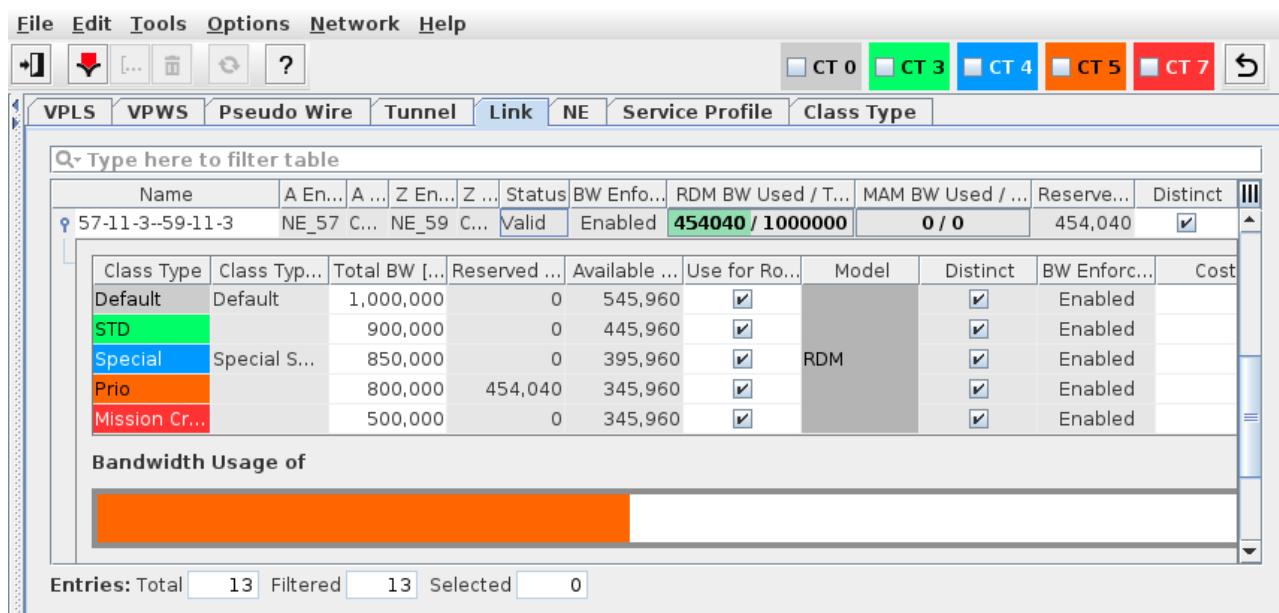
Please note:

An ENP link is removed from ENP when:

- The user deletes the section.
- The user removes one of the ENP interface end points.
- The user removes one of the NE endpoints from the ENP domain.
- The user deletes one of the NE endpoints.

Dialog image

ENP – Link



Mandatory entries

Not applicable.

Optional entries

The following parameters can be modified:

- Name (there is only one name per link, independent of the Class Type),
- Total Bandwidth (BW) of the link (requires **Traffic Engineering** user privileges); can be modified individually per CT link,
- Use for Routing; can be modified individually per CT link,

- Cost; can be modified individually per CT link.

Informational content

Name	The specified link Name as configured via section management or via link creation. Note: There is only one name per link, independent of the Class Type. An existing section name is only taken as the default name upon link creation.
A End NE	The A End NE.
A End TP	The A End Termination Point Label or unit/slot#/MPLS-TP port#. If this is a VLAN sub-interface, the VLAN is also shown.
Z End NE	The Z End NE.
Z End TP	The Z End Termination Point Label or unit/slot#/MPLS-TP port#. If this is a VLAN sub-interface, the VLAN is also shown.
Status	The link status. A link with a status other than “Valid” usually requires operator intervention. More information on possible reasons for a non-valid link can be found in “Link Details...”. Possible actions are “Synchronize Link” or “Reset Bandwidth”. The link status can be - Missing Section: No physical section exists for the link. Use the context menu option “Create Section”. - Missing Interface: An interface (mplsif) of the link is missing. - Missing Section and Interface: Both section and interface(s) are missing and need to be created for the link getting valid.
BW Enforcement	Indicates whether bandwidth enforcement is applied or not. BW enforcement is possible when a HQoS profile has been applied to the link and/or the NEs terminating the link. The following options are possible: - Enabled: all “BW Enforcement” options are enabled on the link; - Disabled: None of the “BW Enforcement” options are enabled on the link; - Partial Enabled: Some of the “BW Enforcement” options are enabled on the link, some aren't; - Unsupported: HQoS (egress shapers) not supported on the link; - Unknown: Default status (as long as ENP is not synchronized with the NE).
Supervision	Service Supervision status, - Running: this link is supervised. Supervision can be paused or disabled via the “Supervision ► Pause” or “Supervision ► Disable...” commands in the context menu or the “Edit” menu. - Paused: service supervision is paused on this link. It can be resumed via the “Supervision ► Resume” command in the context menu or the “Edit” menu. - Disabled: service supervision is disabled on this link. It can be enabled via the “Supervision ► Enable...” command in the context menu or the “Edit” menu.
Superv. Oper State	Shows the operational state (up, down) of the service supervision on this link. This field is empty when service supervision is disabled.
Fault State	Shows the highest active fault state of the link.

Oversubscription [kbit/s]	Shows the amount of over-subscription in kbit/s of the link bandwidth if any over-subscription is present. The column is only visible if over-subscription occurs on at least one link.
Encryptable	Indicates the capability of the link to encrypt tunnels / tunnel segments. Options are: - None: tunnel cannot be encrypted. - A End: tunnel can be encrypted only on A End. - Z End: tunnel can be encrypted only on Z End. - A/Z End: tunnel can be encrypted on both ends.
RDM BW Used / Total [kbit/s]	Link bandwidth for RDM model-based services. The used bandwidth vs. total bandwidth are shown as numeric values and as a graphical bar.
MAM BW Used / Total [kbit/s]	Link bandwidth for MAM model-based services. The used bandwidth vs. total bandwidth are shown as numeric values and as a graphical bar.
Reserved BW [kbit/s]	Total reserved bandwidth of all configured (saved in the database or deployed) Tunnels using this link. Note: When a link carries Tunnels with BFD (Bidirectional Forwarding Detection) Sessions, a bandwidth of 10 kbit/s per tunnel with active BFD is added to the Reserved BW of the link.
Distinct	Indicates whether the link is a distinct link or not. If distinct, the link is used as physically separate link for working and protected LSPs.

Controls (buttons, menu items, etc.)

Edit

Create Link		Calls the Create Link dialog.
Link Details...		Calls the Link Details (dialog window) dialog. In this dialog you can edit / modify some of the link parameters for a selected Class Type.
Open A End NE <user class>...		Open the NE configuration of the A End NE of the link. You need to select the user class in the sub menu. The FOXCST GUI will open in a new window.
Open Z End NE <user class>...		Open the NE configuration of the Z End NE of the link. You need to select the user class in the sub menu. The FOXCST GUI will open in a new window.
Split Link...		This command is only available when Expert Mode is enabled (see Options - Expert Mode). Opens the " Split Link " dialog. In this dialog you can split an existing link to insert a new NE.
Create Section		For a link without section, a section can be created. For links with an underlying section this command is not available.

Manage Tunnel...		This command is only available when Expert Mode is enabled (see Options - Expert Mode). Opens a dialog to manage all tunnels on the selected link. Any selected tunnel(s) can be: - edited (also see Modify Tunnel...), - automatically re-routed if required, - saved, - deployed, - reset, as far as their current configuration status is appropriate for any of these actions. E.g. a deployed, non-modified tunnel cannot be saved or deployed. Note: When you edit a tunnel, its Status can become "Deployed Invalid" because it has been "Deployed" but some parameters have been modified. In order to get back to a valid state you should Deploy the changes by selecting the tunnel and choose "Deploy Tunnel".
Synchronize Link		Synchronize the settings for the selected link as they are present to the database.
Reset Bandwidth		You can reset the Link Bandwidth to the originally configured value if you have modified the bandwidth of the link.
Switch BW Enforcement		Opens a sub menu to select bandwidth (BW) enforcement. On Link level only Class Type Shapers of the interface are changed. The following options are available: - On (BW enforcement may be partial); - Off (BW enforcement may be partially allowed).
Delete Link...		Delete the selected link. This will cause all tunnels over this link to get invalid and will delete the underlying section. You need to confirm this action.
Create InfluxDB Dashboard...		Create a new dashboard in the metrics database application for the selected link. This will execute a script on the server to create a performance monitor. The dashboard with the given "Link_name" will appear in the Metrics Database in the tab "Boards". Start and end of the execution will be logged in the event list.
Supervision ► Enable...		Enable supervision of all services on this link. To do that, the service information attributes Customer , Service Level Agreement , and Network need to be selected.
Supervision ► Disable...		Enable supervision of all services on this link. Must be confirmed by the user. If any service supervision cannot be disabled, an error message is shown with the respective reason(s).
Supervision ► Resume		Resume service supervision that has been paused before.
Supervision ► Pause		Pause service supervision.
Supervision ► Reload Configuration		Reloads the configuration from the NEs to make sure it is up to date in case of recent changes to the link.
Supervision ► Show Details...		Show service supervision details for this link. Opens the services in a view-only window of the Service Editor . The windows also provides an alarm tab showing active alarms of the link.
Supervision ► Show in Service Supervision...		Opens the service supervision dialog with a filtered view for the service(s) running via this link.

Link Details (expanded Link entry)

The expanded Link entry includes a graphical diagram of the bandwidth usage per Class Type of the selected link.

The Class Type Filter criteria (see [ENP Main Window](#)) apply to this diagram.

Class Type	Class Type as defined via the Class Type (HQoS Class Type Definition) dialog.
Class Type Description	Class Type Description as defined via the Class Type (HQoS Class Type Definition) dialog.
Total BW [kbit/s]	Total bandwidth assigned per Link and Class Type. This parameter can be edited in-line. Note: You require Traffic Engineering privileges in order to edit this parameter. With Class Type “None” selected, the Physical Bandwidth is shown.
Reserved BW [kbit/s]	Reserved bandwidth per Link and Class Type, including the bandwidth reserved for BFD (Bidirectional Forwarding Detection) sessions, if applicable.
Used / Total BW [kbit/s]	Shows the used vs. total bandwidth, and a colored graphical bar as background.
Available BW [kbit/s]	Available bandwidth per Link and Class Type.
Use for Routing	Indicates if the link is used by Manual or Auto Routing engine for path calculation. The mark in the checkbox can be set or removed in-line individually for each CT link / Class Type.
Model	Indicates the model
Distinct	Indicates whether the link is distinct or not.
BW Enforcement	Indicates whether bandwidth enforcement is enabled or disabled, or unsupported.
Cost	The configured link cost. This parameter can be edited in-line individually for each CT link. Note: Recommended values for each link speed are as follows: 10 Gbit/s: 2 1 Gbit/s: 4 100 Mbit/s: 19 10 Mbit/s: 100

Dialog image

Link Details (dialog window)

The dialog is opened in a separate window, called from the “Link” tab of the ENP main dialog window.

Link [Name]

File
Edit
Options
Help

☐ Default
☒ STD
☐ Special
☐ Prio
☐ Mission Critical

Link
VPLS
VPWS
Pseudo Wire
Tunnel
QoS
Statistics

Name
-57-
A End NE - TP
-CESM3 <11> port-1
Z End NE - TP
11> p1
Capacity [kbit/s]
10000000

RDM Total BW [kbit/s]
0000
RDM Available BW [kbit/s]
9355960
MAM Total BW [kbit/s]
0
MAM Available BW [kbit/s]
0

Reserved BW [kbit/s]
6440
BW Enforcement
Enabled
☐ A End Encryptable
☐ Z End Encryptable

☒ Distinct

Class Type Links

Class Type	Class Type De...	Total BW [kbit/s]	Reserved BW [...]	Available BW [...]	Use for Routing	Model	Distinct	BW Enforcement	Cost
Default	Default	10,000,000	0	9,326,970	☒	RDM	☒	Enabled	1
STD		9,000,000	50,000	8,326,970	☒		☒	Enabled	1
Special	Special Services	8,500,000	60,000	7,876,970	☒		☒	Enabled	1
Prio		8,000,000	473,030	7,436,970	☒		☒	Enabled	1
Mission Critical		5,000,000	90,000	4,910,000	☒		☒	Enabled	1

Class Type
Special
☒ Use for Routing
Cost
1
Model
RDM

Total BW [kbit/s]
0000
Reserved BW [kbit/s]
60000
Available BW [kbit/s]
35960

☒ Total bandwidth of selected: 8,500,000 kbit/s (85.0%)
☐ Total link bandwidth: 10,000,000 kbit/s

☐ Available bandwidth of selected: 7,876,970 kbit/s (78.8%)
☐ Overused bandwidth of selected: 0 kbit/s (0.0%)

☒ Used bandwidth of selected: 60,000 kbit/s (0.6%)

Shows details on bandwidths for all Class Types if no specific Class Type is selected.

Allows the following information to be displayed **per Class Type**; if required the Class Type Filter is chosen in the icon bar of the dialog window:

- Link details,
- VPLS details,
- VPWS details,
- PW details,
- Tunnel details,
- QoS details,
- Statistics.

Link

In the Link tab, when a specific Class Type is selected in the table of Class Type Links, the following Link parameters can be modified:

- Name (only one name per link, independent of the Class Type),
- Use for Routing,
- Cost,
- Total BW [kbit/s] (requires **Traffic Engineering** user privileges),
- Distinct.

The following further tabs are available in the Link Details dialog:

VPLS

Lists all the VPLS in which the selected link is used. For a selected VPLS you can open the details view and other options via the context menu.

For more details, please refer to **VPLS**.

VPWS

Lists all the VPWS in which the selected link is used. For a selected VPWS you can open the details view and other options via the context menu.

For more details, please refer to **VPWS**.

Pseudo Wire

Lists all the Pseudo Wires for which the selected link is used. For a selected PW you can open the details view and other options via the context menu.

For more details, please refer to [Pseudo Wire](#).

Tunnels

Lists all the Tunnels in which the selected link is used. For a selected tunnel you can open the details view and other options via the context menu.

For more details, please refer to [Tunnel](#).

QoS

Controls (buttons, menu items, etc.)

Edit Shaper settings		Changes to edit mode. Only available when in view mode. While in Edit mode, specific parameters can be modified, and changed shaper and/or drop profile settings can be deployed.
Deploy Shaper settings		Modified shaper and/or drop profile settings are deployed to the link, and to the involved NE(s), respectively. Only available while in edit mode.
Cancel		Cancel any modifications made to the shaper and/or drop profile settings. Only available while in edit mode.
Align Both Sides - [HQoS Profile]		Align both ends of the link with the (modified) settings of the specific HQoS profile. The HQoS profiles are only aligned on both ends if any HQoS profiles are defined (see HQoS Profile (Definition)) and if both ends of the link support BW enforcement. Only available while in edit mode.
Align A End - [HQoS Profile]		Align the A End of the link with the (modified) settings of the specific HQoS profile. To align, the A End must support BW enforcement. Only available while in edit mode.
Align Z End - [HQoS Profile]		Align the Z End of the link with the (modified) settings of the specific HQoS profile. To align, the Z End must support BW enforcement. Only available while in edit mode.
Re-Align - [HQoS Profile]		Re-align both ends of the link with the (modified) settings of the specific HQoS profile. Only available while in edit mode.
Clear		Deletes all Shaper settings for the current link. This can be applied via "Deploy Shaper settings" or canceled via "Cancel" . Only available while in edit mode.
Switch BW Enforcement		On Link level only Class Type Shapers of the interface are changed. The following options are available: - On (BW enforcement may be partial); - Off (BW enforcement may be partially allowed).

Shows details on QoS settings for the link. The details are sub-divided into two tabs, "Shaper" and "Drop Profile".

If a port (or its NE) is not supporting BW enforcement, a corresponding information is shown instead.

QoS - Shaper

In the "Shaper" tab, all used Class Type Shapers are shown with their Class Type, Model, and further QoS settings on both the Initiator and Terminator ports, such as (table 1):

- HQoS Profile,

- Status,
 - BW Enforcement,
 - CIR,
 - CBS,
 - EIR,
 - EBS,
 - Priority,
 - Scheduling Profile,
- and (table 2):
- DP TC0 ... DP TC7.

QoS - Drop Profile

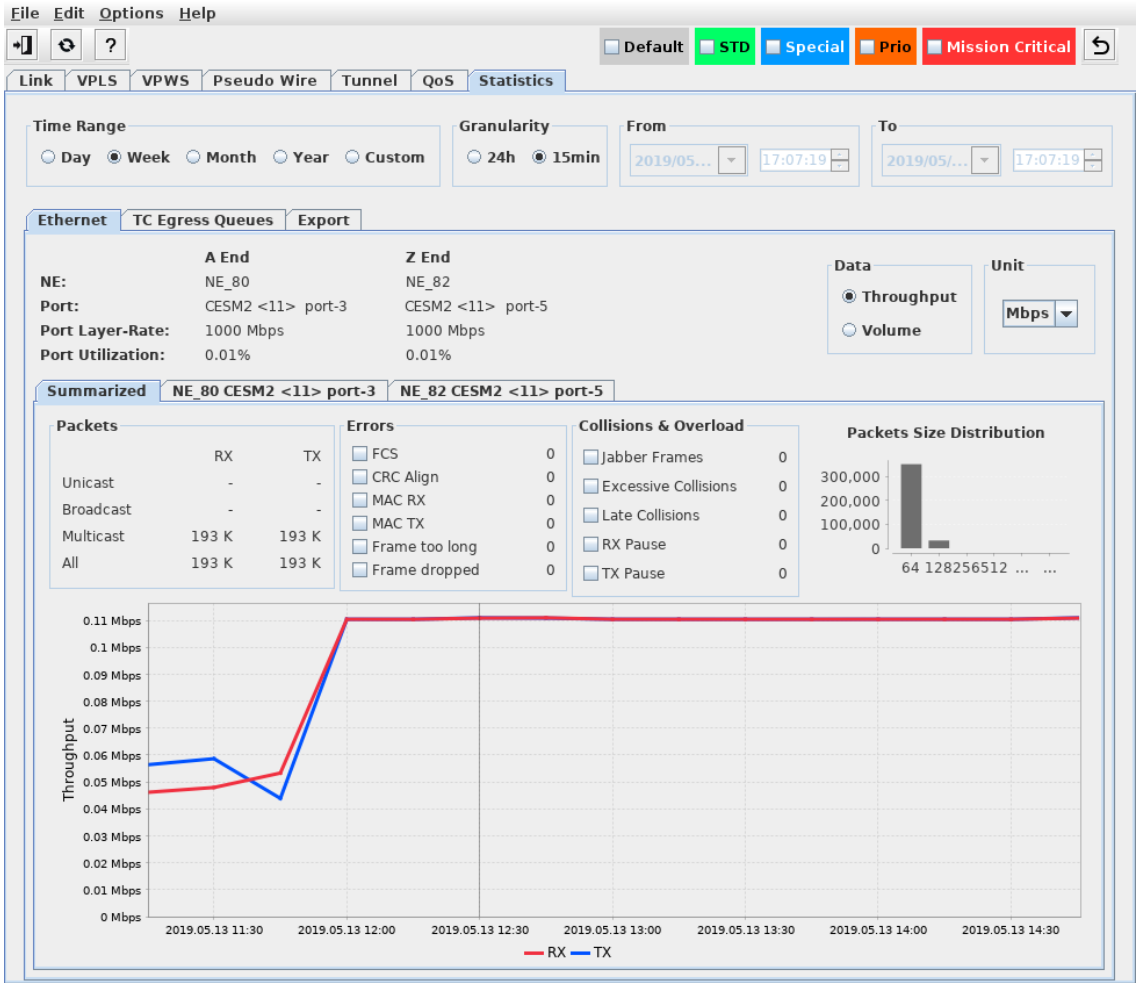
In the “Drop Profile” tab, provided the related NE supports egress shaping, NE related information on drop profiles is shown, such as:

- Initiator NE Drop Profiles with
 - Index,
 - Threshold,
 - Status.
- Terminator NE Drop Profiles with
 - Index,
 - Threshold,
 - Status.

With the “Edit” icon Drop Profiles can be added (as long as the maximum is not reached) and/or deleted. When adding a Drop Profile the Threshold for the new profile is requested.

While in Edit mode, the “Set Change on Both Side” option defines how the changes are applied, either to one end of the link only, or to both ends.

Statistics



Shows statistics for the link. The availability of statistics presumes the setup of a PM data collection job (see [Create PM Collection Job](#)). The following options are available:

Time Range	Select from the following time ranges: - Day, - Week, - Month, - Year, - Custom.
Granularity	Select the required granularity (measurement interval): - 24h, - 15min.
From	When a custom time range is required, enter the start date and time for the required interval.
To	When a custom time range is required, enter the end date and time for the required interval.
Ethernet	Shows graphical diagram of the collected Ethernet PM data for this link, provided an appropriate PM data collection job has been defined.

TC Egress Queues	Shows traffic details on the link's traffic class egress queues. This includes: - information on the A End and Z End NE, port, port layer rate, port utilization, traffic class usage, traffic class packet loss, and loss ratio (where applicable); - a selector for the Data options (Throughput, Volume), - a selector for the display type (Stacked, Line), - a selector for the display unit (kbps, Mbps, Gbps), - a summarized view with a time diagram of throughput and loss ratio, with a diagram of used and available bandwidth, and a table of throughput and loss ratio per TC. - a view for the A End port with a time diagram of throughput and loss ratio, with a diagram of used and available bandwidth, and a table of throughput and loss ratio per TC, - a view for the Z End port with a time diagram of throughput and loss ratio, with a diagram of used and available bandwidth, and a table of throughput and loss ratio per TC.
Export	Allows you to set export or print options for the statistics data. The following options are available: - Data Source (Ethernet, Egress Queue), - Unit (Packets, Octets), - Output Port (A End, Z End), - Direction (Received, Transmitted), - Additional Info (Errors, Collisions/Overload). The following command buttons are available to export the data with the options selected: - Print, - Export. A table lists the records that are prepared for export, matching the selected options.

Related dialogs / windows

[Create Link](#),
[Split Link](#),
[ENP Main Window](#),
[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Class Type \(HQoS Class Type Definition\)](#),
[Create Section](#),
[NE Details: Statistics](#),
[FOXCST](#).

8.3.6 Create Link

Purpose

Allows you to create a link, which may have MPLS-TP interfaces equivalent to a physical section as end points, or which may have MPLS-TP interfaces consisting of VLAN sub-interfaces as end points. VLAN sub-interfaces are logical VLAN interfaces as configured via the [FOXCST](#) GUI on a physical, MPLS-TP capable port of the core unit.

To create a VLAN sub-interface, open the respective NE in the [FOXCST](#) GUI,

- select a front port of the core unit;
- go to the “Main” dialog of the port;
- select the “Port Type” tab and set the port’s “Usage” to “VLAN Subinterfaces”;

- apply the setting, and you will have a “VLAN Subinterfaces” tab in the “Main” dialog of this port;
- click on the “Create a new VLAN subinterface” button;
- in the “Create Subinterface” dialog add the required VLAN ID and set the required “Assigned Bandwidth”;
- click OK to add the VLAN sub-interface;
- back in the “Main” dialog set the “Usage” of the added VLAN sub-interface to “MPLS-TP”.

Once you have added a VLAN sub-interface it will be available for selection A End TP or Z End TP of a link.

Dialog image

Create Link

Name80-82-vlan-2234

Cost10

A End NE

NE_80

A End TP

Interface	Port	Slot	VLAN ID	BW [kbit/s]
mplsif-3	C...	11	2,234	100,000

☐ Show all Interfaces

Z End NE

NE_82

Z End TP

Interface	Port	Slot	VLAN ID	BW [kbit/s]
mplsif-1	C...	11	0	10,000,000
mplsif-2	C...	11	2,234	100,000

☐ Show all Interfaces

? Help

OKApplyCancel

Mandatory entries

The following parameters can be modified:

- Name (there is only one name per link, independent of the Class Type),
- Cost; can be modified individually per CT link.
- A End NE; the name of the NE on the A end of the link,
- Z End NE; the name of the NE on the Z end of the link,
- Use for Routing; can be modified individually per CT link,

Optional entries

The following parameters can be modified:

- Name (there is only one name per link, independent of the Class Type),
- Total Bandwidth (BW) of the link (requires **Traffic Engineering** user privileges); can be modified individually per CT link,
- Use for Routing; can be modified individually per CT link,
- Cost; can be modified individually per CT link.

Controls (buttons, menu items, etc.)

Name		The name of the new link.
Cost		The cost of the new link.
A End NE		Select the A End NE and Z End NE from the list of available NEs.
Z End NE		NEs are available only if they have been added to the ENP domain.

A End TP	The A End Termination Point.
Z End TP	The Z End Termination Point. In case of a physical interface the VLAN ID is 0. In case of a VLAN sub-interface, the VLAN ID is as configured for this VLAN sub-interface (other than 0).
Interface	MPLS-TP interface ID. The ID is "mplsif-n", where "n" is a number starting from 1. As a default only interfaces suitable for link creation are shown. Also see " Show all interfaces ".
Port	Port ID, consisting of - unit name, - slot no., - port ID, - VLAN ID (in case of VLAN sub-interface).
Slot	Slot no.
VLAN ID	VLAN ID: "0" in case of a physical interface, "1" to "4089" in case of a VLAN sub-interface.
BW [kbit/s]	The link bandwidth in kbit/s.
Link	When " Show all interfaces " is enabled, this column shows the link name of interfaces used for existing links.
Show all interfaces	When enabled, all MPLS-TP interfaces of the NE are shown, including those being already used for an existing link. This is for information purposes only. When disabled, only unused interfaces are shown that are available for creation of a new link.
? Help	Calls the help viewer and opens this page.
OK	Applies the link creation and closes the dialog.
Apply	Applies the link creation without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Related dialogs / windows

[Link tab](#),
[ENP Main Window](#),
[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Class Type \(HQoS Class Type Definition\)](#),
[Create Section](#),
[Split Link](#).

8.3.7 Split Link

Purpose

Allows you to insert an NE into an existing link by splitting the link into two parts, inserting the NE, connecting the new links, and re-connecting the previous tunnels and services. While using protected tunnels this can be done without service interruption. Requires [Expert Mode](#).

You will need an NE that is:

- of the same type as the existing A End and Z End NEs (FOX61x),
- member of the ENP domain,

- fully commissioned with at least two MPLS-TP interfaces configured having the same physical layer characteristics as the MPLS-TP interfaces on both sides of the existing link,
- in operation (or ready to be put into operation), and
- ready to be physically inserted between the previous A End and Z End NEs.

Splitting a link without service interruption can only be executed for protected services. In this case the services will run over the redundant (protection) link that remains untouched. Meanwhile the other (working) link can be split and reconnected via an inserted NE, and the services can be switched back to the new (working) links when both the changes in the ENP and the physical implementation have been completed, and the new links are up and running.

For unprotected services (tunnels) running over a link that shall be split, a service interruption cannot be avoided.

The procedure of splitting an existing link and inserting a new NE is described below.

Dialog images

Split Link

Steps

1. Define New Link(s)

2. Finish

Define New Link(s)

New Link(s)

Old Link

NE_80

CESM2 <11> port-3

CESM2 <11> port-5

NE_82

Define Link

Name

Cost

0

A End NE

NE_80

A End TP

Interface	Port	Slot	BW
mplsif-2	CESM2 <11> port-3	11	1.00

Z End NE

Z End TP

Interface	Port	Slot	VLA

☐ Show all Interfaces

ABB

? Help

< Back

Next >

Finish

Cancel

Manage Tunnels

Q- Type here to filter table

Name	Status	Total B...
VPLS_15621361319...	Deployed Valid	10.010
VPLS_3_tunnel_NE_8...	Deployed Valid	10.010
VPLS_15621361319...	Deployed Valid	10.010
tunnel_40	Deployed Valid	0
tunnel_25	Deployed Valid	10.000
VPWS_15621588017...	Deployed Valid	10.010
tunnel_39_vpws	Deployed Valid	10.010
tunnel_19	Deployed Valid	10.010
VPLS_4_tunnel_NE_8...	Deployed Valid	10.010
VPLS_4_tunnel_NE_8...	Deployed Valid	10.010
VPLS_4_tunnel_NE_8...	Deployed Valid	10.010
tunnel_38	Deployed Valid	0
VPLS_3_tunnel_NE_8...	Deployed Valid	20.010
VPLS_5_tunnel_NE_8...	Deployed Valid	10.010
VPWS_15621586267...	Deployed Valid	10.010
tunnel_1570786742...	Deployed Valid	10.010

Edit

Reroute Automatic

Reset

Name

tunnel_38

Description

BW [kbit/s]

0

Status

Deployed Valid

Initiator

NE_81

Terminator

NE_83

Service Profile

Used BW [kbit/s]

0

Working Path

NE_81

→ 3064

→ 3065

<11> port-5

NE_80

← 3065

← 3064

<11> port-4

NE_83

Protecting Path

4

Path Protection

Encryption

Attached Pseudo Wires

Diagnostic

BFD

Working LSP (Deployed Valid)

Protection LSP (Deployed Valid)

Type	Designation	A End	Z End	Cost	Status	Used BW ...	FW-In	FW-Out	R-In
XC	Initiator-T...	NE_81 CO...	NE_83 CO...		Deployed ...	0	3,008	3,009	
Link		NE_81 CO...	NE_83 CO...	10		0			
XC	Initiator-T...	NE_83 CO...			Deployed ...	3,008	0	0	

Protection

Class Type

Prio

Save All

Cancel

Procedure to split a link / insert an NE into an existing link

To split an existing link and insert an NE into the existing link,

Proceed as follows:

1. Make sure you have activated the ENP Expert Mode (see ENP - **Options - Expert Mode**).
2. Make sure all services (tunnels) that need to run without interruption are actually running over the protecting link(s), and not over the link that shall now be split. To see a list of all tunnels on the link, select the link from the **ENP Main Window**, and choose **"Manage Tunnel..."** from the context menu.
 - If you want to manually switch over protected tunnels to the unaffected LSP, select the tunnel from the list, and execute a "Manual Switch" command in the "Path Protection" tab. After this you can close the "Manage Tunnel" dialog.
3. Select the link to be split from the list of links (see **Link** tab) of the ENP main window.
4. Choose "Split Link" from the context menu. This will open the "Split Link" dialog.
5. For the new link (first part) enter a suitable name in the "Name" field.
6. Enter the correct cost for the new link (first part) in the "Cost" field.
7. Click on the Z End NE selection icon, select the new Z End NE (which will be the new inserted NE), and confirm with OK.
8. From the list of Z End TPs (interfaces) of the Z End NE select the suitable Z End TP (interface).
9. Click the "Next >" button.
 - This will show the new link (first part) as a dashed line in the graph. You will now have to define the second part.
10. For the new link (second part) enter a suitable name in the "Name" field.
11. Enter the correct cost for the new link (second part) in the "Cost" field.
12. Click on the Z End NE selection icon, select the Z End NE (which should be the previous Z End NE), and confirm with OK.
13. From the list of A End TPs (interfaces) select the suitable A End TP (interface) of the newly inserted NE.
14. From the list of Z End TPs (interfaces) select the suitable Z End TP (interface), which should be the previous, original Z End TP (interface).
15. Click the "Next >" button.
 - This will show the updated graph with the new links (dotted lines) and inserted NE added.
 - In the table below the graph, the new links will be listed accordingly.
 - As a default the "Open Manage Tunnel?" option is enabled. This will automatically open the "Manage Tunnels" dialog upon clicking the "Finish" button.
16. If everything is correct, click the "Finish" button, otherwise use the "< Back" button to do required modifications.
 - If you have the NEM Network Browser (map) open, the map view will be updated with the new NE inserted and new links created.
 - If enabled in the previous dialog, the "Manage Tunnels" dialog will be opened for the original, non-split link with all tunnels listed that were previously running over the original link (also see **Manage Tunnel...**). When selecting any of these tunnels in the list of tunnels you will see the statement "Missing Section" in the Status column of the Working LSP.
17. In the "Manage Tunnels" dialog select all tunnels in the tunnel list in the left hand table and click the "Reroute Automatically" button.
 - A dialog will be opened for confirming the removal of the base link and automatic rerouting of the tunnel over the new links.

18. Click “Yes” if you want to confirm the removal of the old link from the configuration and the automatic rerouting of the selected tunnels over the new links.
 - This will build the new tunnels over the inserted NE and update the graph and LSPs accordingly. The status of the working LSP XCs will show “Deployed Modify”, or “Unsaved”, respectively.
19. Click “Save All” to save the changes to the database.
 - This will update the tunnel graph with the settings for the End NEs (Initiator-Terminator) to “Deployed Valid”, and will leave the newly inserted NE (Transit) in the status “Saved OK”.
20. Select all tunnels in the tunnel list in the left hand table (with status “Deployed Invalid”) and click “Deploy” from the context menu to deploy the tunnel changes to the network. Confirm the deployment.
 - Deployment will take some time, depending on the number of tunnels that are being rerouted.
 - When all tunnels have been deployed, the corresponding alarms that had been activated due to the changes in the network, are being cleared.

Result: The link has been split, the new NE has been inserted, the tunnels (and protection LSPs for the services) have been rerouted without service interruption for the services running over protected tunnels, and the network is alarm free again as soon as the physical implementation has been completed and the services are switched back from Protection LSPs to Working LSPs for tunnels with revertive protection mode.

End of instruction

Related dialogs / windows

Link tab,
ENP Main Window,
Manage Tunnel....

8.3.8 NE

Purpose

Displays the ENP nodes domain's member NEs.

Allows you to add/remove NEs to/from the ENP-Nodes domain. Only NEs added to the domain named “ENP-Nodes” will be correctly manageable as MPLS-capable NEs.

Allows you to set/modify the Global ID, Node ID and Description of NEs not yet added to the ENP-Nodes domain. For an NE to be added to the ENP-Nodes domain, the combination of Global ID and Node ID must be unique.

Displays the selected NE details, which include the following information:

- MPLS-TP details including the node's Global/Node ID and Description,
- List of VPLS/VPWS and tunnels in which the NE is involved,
- MPLS-TP interfaces and labels with bandwidth, port, and encryption information,
- List of the NE's available bridge ports and VLANs. The bridge port is the Port attached to the bridge on the node with type CVP,
- Ethernet packet statistics of ports with PM data collection jobs defined.

Synchronizes the NE's “Known Network Element” table. This process automatically updates the table with all the NEs of the ENP domain.

The number of selected entries in the NE table is shown in the bottom fields (Entries: Total, Filtered, Selected).

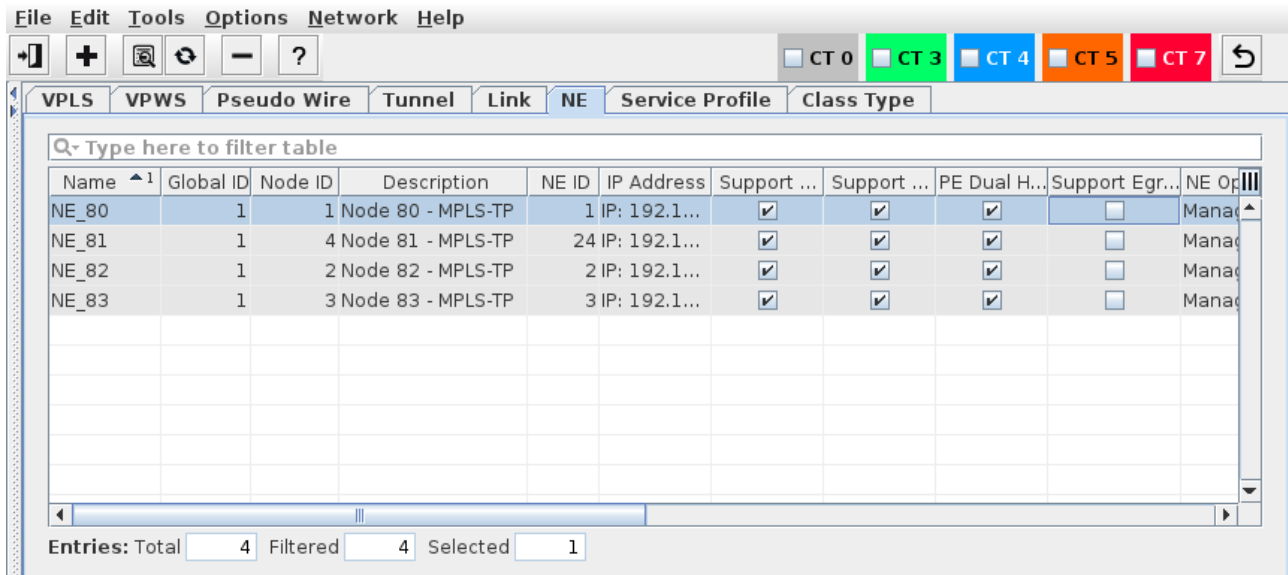


Please note:

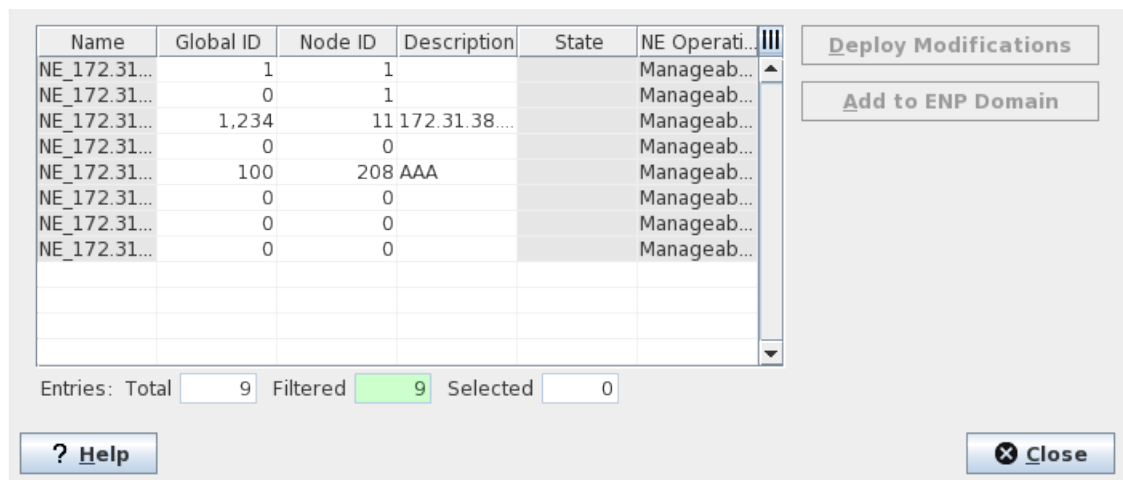
To deploy a tunnel, every NE in the path has to know the ingress and egress NEs. These endpoint NEs should be stored in every NE's "Known Network Element" table, otherwise a tunnel instance on the NE cannot be created.

Dialog image

ENP – NE



ENP – Add NEs to ENP-Nodes Domain



Mandatory entries

Add to ENP Domain

Optional entries

Synchronize NE...

NE Details

Informational content

Name	Configured NE name.
Global ID Node ID	The pair of Global ID and Node ID should be unique.
Description	The specified Description of the node.
NE ID	The NE ID automatically set by the FOXMAN-UN system.
Addressing	IP address of the node.
BW Enforcement	Indicates whether bandwidth enforcement is applied or not. BW enforcement is possible when a HQoS profile has been applied to the link and/or the NEs terminating the link. The following options are possible: - Enabled: all "BW Enforcement" options are enabled on the link; - Disabled: None of the "BW Enforcement" options are enabled on the link; - Partial Enabled: Some of the "BW Enforcement" options are enabled on the link, some aren't; - Unsupported: HQoS (egress shapers) not supported on the link; - Unknown: Default status (as long as ENP is not synchronized with the NE).
Support QoS	Indicates whether the node supports QoS / Service Profiles or not. A mark in the checkbox indicates that QoS is supported. Older node software may not support the current QoS implementation.
Support Encryption	Indicates whether the node supports encryption. A mark in the checkbox indicates that encryption is supported. Older node software may not support encryption.
PE Dual Home Capable	Indicates whether the NE is Dual Home capable or not.
Support Egress Shaping	Indicates whether the NE supports the Egress Shaping feature or not. The feature depends on the software version of the NE core unit.
NE Operational State	The status of the node as defined by the core.
Alarm State	Shows the highest active alarm severity of the NE.
Tag	The Tags configured in the NE properties.
Services Usage	Plenty [of space available] (<90%, green), Little [space available] (≥90%, orange), Full (100%, red), Exceeded (>100%, red), with color indication.
Tunnels Usage	Plenty [of space available] (<90%, green), Little [space available] (≥90%, orange), Full (100%, red), Exceeded (>100%, red), with color indication.
VPLS Instances	Current / maximum of Terminated VPLS Instances, with colored bar usage graph (green: <90%; orange: ≥90%; red: ≥100% usage).
Pseudo Wires	Current / maximum of PWs, with colored bar graph (green: <90%; orange: ≥90%; red: ≥100% usage).
Tunnels	Current / maximum of Tunnels, with colored bar graph (green: <90%; orange: ≥90%; red: ≥100% usage).
LSPs	Current / maximum of LSPs, with colored bar graph (green: <90%; orange: ≥90%; red: ≥100% usage).
Transit LSPs	Current / maximum of Transit LSPs, with colored bar graph (green: <90%; orange: ≥90%; red: ≥100% usage).
Fast BFD Sessions ¹	Used / (used + available), with colored bar graph (green: <90%; orange: ≥90%; red: ≥100% usage).
Medium BFD Sessions ¹	Used / (used + available), with colored bar graph (green: <90%; orange: ≥90%; red: ≥100% usage).
Slow BFD Sessions ¹	Used / (used + available), with colored bar graph (green: <90%; orange: ≥90%; red: ≥100% usage).

- 1 Since slow, medium, and fast BFD sessions share resources, the maximum available number of BFD sessions per type is only valid if no other BFD session types are used. Due to that, the usage number shown in the bar graph for BDF sessions per BFD type (slow, medium, fast) is not calculated as [used / maximum] but as [used / (used + available)].

Software Version	Indicates what SW version is used on the core unit(s). The software version determines some of the features available on the NE.

Controls (buttons, menu items, etc.)

Edit

Add NEs...		Calls the ENP – Add NEs to ENP-Nodes Domain dialog.
NE Details...		Calls the NE Details dialog.
Configuration <user class>...		When selected from the context menu of an NE, opens the NE configuration in the FOXCST GUI with the chosen user class.
Force Polling		Requests an immediate poll of the NE. This will read the complete NE configuration, inventory, and alarm status information from the selected NE(s).
Synchronize NE...		Synchronizes the selected NE configuration with the ENP database. Where the ENP database does not have information available about the number of current / maximum instances it is synchronized with the NE / network.
Remove NEs...		Remove selected NE(s) from ENP-Nodes domain. Note: The saved configuration for the removed node will be lost. This means the VPLS nodes, the LSP and all related MPLS-TP objects are removed from the FOXMAN-UN database. The deployed configurations on that particular node will not be lost.
Switch BW Enforcement		Opens a sub menu to select bandwidth (BW) enforcement. The following options are available: - On (this will only change the shapers which are managed by FOXMAN-UN and which had BW Enforcement by the profile); - Off (on node level this switch off all CT Shapers and Default Shapers).
Basic TE Configuration		Opens one of the Basic TE Configuration functions (see below).
Backplane Audit		Opens one of the Backplane Audit functions (see below).

Tools

Basic TE Configuration functions

Show Network Audit Result...	Calls the "Network Audit Result" dialog.
Schedule Network Alignment...	Calls the "Schedule Network Alignment" dialog.
Schedule Network Audit...	Calls the "Schedule Network Audit" dialog.
Manage Reference Data...	Calls the "Manage QoS Reference Tables" dialog.

Backplane Audit functions

Show Backplane Audit Result...	Calls the "Backplane Audit Result" dialog.
Schedule Backplane Audit...	Calls the "Schedule Backplane Audit" dialog.

NE Details

Opens the NE Details dialog, also see the dialog image below.

Dialog image

NE [name]

FileEditQoSOptionsHelp

CT 0CT 3CT 4CT 5CT 7

Transit / TerminatedAll

MPLSOverviewBridge PortsVLANsQoSStatistics

NameNE_58NE ID71Support QoSServices UsagePlenty

Global ID100IP Address172.31.80.58Support EncryptionTunnels UsagePlenty

Node ID4NE Operational StateManageablePE Dual Home CapableUsed Shaper Buffer [Bytes]2097152

DescriptionBW EnforcementEnabledSupport Egress ShapingAvailable Shaper Buffer [Bytes]8192000

Resource	Saved	Deployed	Total	Max	Usage [%]
VPLS Instances	0	5	5	100	5.0
Pseudowires	0	12	12	2,000	0.6
Terminated Tunnels	1	9	10	2,000	0.5
Terminated LSPs	1	12	13	2,000	0.7
Transit LSPs	0	0	0	3,500	0.0
Transit LSPs [unit 11]	0	0	0	3,500	0.0
Transit LSPs [unit 13]	0	0	0	3,500	0.0
Fast BFD Sessions	0	0	0	500	0.0
Medium BFD Sessions	0	0	0	1,000	0.0
Slow BFD Sessions	1	10	11	2,000	0.6

? Help	Calls the help viewer and opens this page.
Exit	Closes the dialog.

NE Details: MPLS

Name	Configured NE name.
Global ID Node ID	The pair of Global ID and Node ID should be unique.
Description	The specified Description of the node.
NE ID	The NE ID automatically set by the FOXMAN-UN system.
Addressing	IP address of the node.
NE Operational State	The status of the node as defined by the core.
BW Enforcement	The status of bandwidth enforcement on the node (Unsupported, Disabled, Partial Enabled, Enabled).
Support QoS	Indicates whether the node supports QoS / Service Profiles or not. A mark in the checkbox indicates that QoS is supported. Older node software may not support the current QoS implementation.
Support Encryption	Indicates whether the node supports encryption. A mark in the checkbox indicates that encryption is supported. Older node software may not support encryption.
PE Dual Home Capable	Indicates whether the NE is Dual Home capable or not.
Support Egress Shaping	When marked, indicates that the NE supports egress shaping.
Services Usage	Plenty [of space available] (<90%, green), Little [space available] (≥90%, orange), Full (100%, red), Exceeded (>100%, red), with color indication.
Tunnels Usage	Plenty [of space available] (<90%, green), Little [space available] (≥90%, orange), Full (100%, red), Exceeded (>100%, red), with color indication.
Used Shaper Buffer [Bytes]	Shows the number of bytes used in the shaper buffer (only visible if egress shaping is supported).

Available Shaper Buffer [Bytes]	Shows the number of available bytes in the shaper buffer (only visible if egress shaping is supported).
In the table the following parameters are listed with their Saved, Deployed, Total, Available, Max, and Usage values and a colored bar graph (green: <90%; orange: ≥90%; red: ≥100% usage):	
VPLS Instances	Current / maximum of Terminated VPLS Instances.
Pseudo Wires	Current / maximum of PWs.
Terminated Tunnels	Current / maximum of Tunnels.
Terminated LSPs	Current / maximum of LSPs.
Transit LSPs	Current / maximum of LSPs transiting the NE.
Transit LSPs (unit 11)	Current / maximum of LSPs transiting the NE in the core unit in slot 11.
Transit LSPs (unit 13)	Current / maximum of LSPs transiting the NE in the core unit in slot 13.
Fast BFD Sessions	Current / maximum of fast BFD sessions.
Medium BFD Sessions	Current / maximum of medium BFD sessions.
Slow BFD Sessions	Current / maximum of slow BFD sessions.

NE Details: Overview

In the left hand part, shows the NE and its units and ports in a tree view. In the right hand part, the tabs described below are available:

NE Details: Overview: VPLS

Lists all VPLS in which the selected NE, unit or port is part of the service. You can expand or collapse each VPLS and its components.

For details, refer to [VPLS](#). In addition to the parameters shown in the ENP main window, the NE details also provide the parameter “Transit” which indicates, if marked, that the VPLS is a transit service to this NE, i.e. no termination is done on the NE.

NE Details: Overview: VPWS

Lists all VPWS in which the selected NE, unit or port is part of the service.

For details, refer to [VPWS](#). In addition to the parameters shown in the ENP main window, the NE details also provide the parameter “Transit” which indicates, if marked, that the VPWS is a transit service to this NE, i.e. no termination is done on the NE.

NE Details: Overview: Pseudo Wire

Lists all Pseudo Wires in which the selected NE, unit or port is part of the service.

For details, refer to [Pseudo Wire](#). In addition to the parameters shown in the ENP main window, the NE details also provide the parameter “Transit” which indicates, if marked, that the Pseudo Wire is transiting this NE, i.e. no termination is done on the NE.

NE Details: Overview: Tunnel

Lists all Tunnels used by the service(s) in which the selected NE is either the Initiator, Terminator or Transit NE.

For details, refer to [Tunnel](#). In addition to the parameters shown in the ENP main window, the NE details also provide the parameter “Transit” which indicates, if marked, that the tunnel is a transit tunnel to this NE, i.e. the NE is neither Initiator nor Terminator to the tunnel.

NE Details: Overview: Link

Lists all Links for which the selected NE is either the Initiator or Terminator NE. For details, refer to [Link](#).

NE Details: Overview: Port

Lists all ports with their unit name, slot, and port ID that are used or can be used for ENP services on the selected NE or unit. When selected in the list of ports, some of the port details can be edited when Edit Mode is switched on. Modifications to the port settings can be applied by clicking on the “Apply” icon.

Port settings (select a port to display its specific settings; click “Edit” to modify settings):	
Label	The port address (unit name, slot, port ID).
Admin State	The port admin state as read from the unit: - Up, - Down, - Other, - Invalid, - Partially Down.
Unit	The unit name.
Type	The port type as configured, e.g. via the FOXCST GUI: - None, - CVP, - MPLS-TP, - PWAC, - Analyzer, - VLAN-Subinterface.
Family	The port family, e.g. - Front Port, - EOS (Ethernet over SDH), - I-Port (NE internal port between units).
Speed	The port speed in kbit/s.
Label 1	The Label 1 of the port.
Label 2	The Label 2 of the port.
Description	The port description.

NE Details: Overview: MPLS-TP Interface

Lists all MPLS-TP Interfaces configured and the LSP related information of LSPs relevant to the selected NE.

MPLS-TP Interfaces (select an interface to display its specific labels)	
Interface	The interface ID of an MPLS-TP interface.
Port	The port address (unit name, slot, port ID).
Slot	The slot of the unit in the node subrack.
VLAN ID	The VLAN ID configured on a VLAN Subinterface that is used for MPLS-TP. Note: VLAN Subinterfaces need to be configured on core unit front ports via the FOXCST GUI.
Encryptable	The encryption capability of the MPLS-TP interface. A mark in the checkbox indicates that the interface is capable of encrypting the MPLS-TP traffic.
Encryption Status	The encryption status of the interface.
BW [kbit/s]	The total bandwidth of the MPLS-TP interface in kbit/s.
Supports Egress Shaping	When marked, indicates that the MPLS-TP interface supports egress shaping.
BW Enforcement	The status of bandwidth enforcement on the node (Unsupported, Disabled, Partial Enabled, Enabled).

Encryption Port	When configured, indicates the address (unit ID / port ID) of the mapped encryption port, see Mappings .
Encryption Configuration	When marked, indicates that the interface has an active encryption configuration.
Interframe Gap	The current interframe gap of the mapped encryption port.
Encryption SCC Generation	When marked, indicates that signaling communication channel (SCC) bytes are generated.
Encryption EXP Value	The current EXP value of the mapped encryption port.
Link	The link name for the connected MPLS-TP interface.

NE Details: Overview: Label

Lists all MPLS-TP Interfaces configured and the LSP related information of LSPs relevant to the selected NE.

Labels (for the selected MPLS-TP interface). To show all labels for the NE, deselect a selected MPLS-TP interface with CTRL key and a mouse click, or click below the listed MPLS-TP interfaces.

Port	The port address (unit name, slot, port ID).
Label	The LSP label.
In / Out	Indicates whether the label is an In Label or an Out Label.
CE Profile	For encrypted segments: the assigned Crypto Engine profile.
CE Segment ID	The Crypto Engine segment ID.
CE LSP ID	The Crypto Engine LSP ID.

NE Details: Bridge Ports

Shows specific information for a selected bridge port.

List of bridge ports on the selected NE:

Reference	Address of the bridge port. Displays the Ethernet unit / <slot>/<port>
Type	The port Type configured via FOXCST . Any port that is configured as CVP (Customer VLAN Port) connects to the VLAN bridge. These ports can be used as endpoints for VPLS.
VLAN Mode	The port mode configured via FOXCST . The possible port modes are: Access, Trunk, General, Q-in-Q.
PVID	The port VLAN ID configured via FOXCST .
List of VLANs for the selected bridge port on the NE (select any bridge port from the left-hand table):	
VLAN ID	The VLAN IDs configured via FOXCST .
Name	Name of the VLAN configured via FOXCST .
VLAN Type	Indicates the type of the VLAN (typically "Bridge")
VPWS Port	The VPWS port if assigned to a VPWS.
Status	The status of the VLAN: - Deployed Valid, - Deployed Invalid, - Saved OK.

NE Details: VLANs

Lists all current NE's VLAN IDs configured via **FOXCST** or via ENP during service creation, and their associated ports.

List of VLANs on the selected NE:

VLAN ID	The VLAN IDs configured via FOXCST .
Name	Name of the VLAN configured via FOXCST .

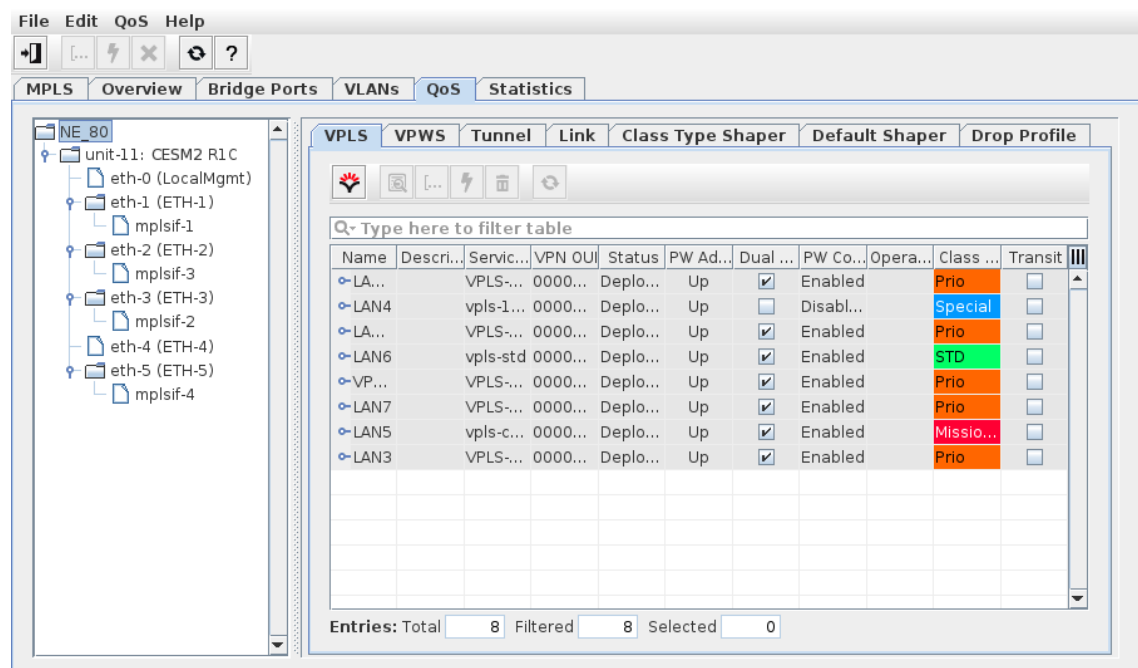
VLAN Type	Indicates the type of the VLAN (typically “Bridge”)
VPWS Port	The VPWS port if assigned to a VPWS.
Status	The status of the VLAN: - Deployed Valid, - Deployed Invalid, - Saved OK.
List of bridge ports for the selected VLAN on the NE:	
Reference	Address of the bridge port. Displays the Ethernet unit / <slot>/<port>
Type	The port Type configured via FOXCST . Any port that is configured as CVP (Customer VLAN Port) connects to the VLAN bridge. These ports can be used as endpoints for VPLS.
VLAN Mode	The port mode configured via FOXCST . The possible port modes are: Access, Trunk, General, Q-in-Q.
PVID	The port VLAN ID.

NE Details: QoS

Provides information related to QoS settings and status on the current NE.

Dialog image

NE - QoS



In the top icon bar, all defined class type based filter options are available to filter the information displayed in the tables below. As a further filter option, a drop down box to select “All”, “Transit” or “Terminated” elements (services, PWs, tunnels) for the NE.

Where applicable, the information shown is filtered by the item selected in the left-hand tree. The context menu on the element in the tree provides the following commands while in edit mode (edit mode is only available while in Expert Mode; see **Options - Expert Mode**):

- **Align** (> any of the HQoS profiles; see **HQoS Profile (Definition)**)
Aligns the NE - QoS - Class Type Shaper settings with the properties of the selected HQoS profile.
- **Clear**
Clear all input fields of the dialog that have been modified in the edit mode.

The information on the right hand side is presented under the following tabs:

- **NE Details: QoS: VPLS**

Provides the same features as the **VPLS** tab in the ENP main window, but filtered for the current NE,

- **NE Details: QoS: VPWS**

Provides the same features as the **VPWS** tab in the ENP main window, but filtered for the current NE,

- **NE Details: QoS: Pseudo Wire**

Provides the same features as the **Pseudo Wire** tab in the ENP main window, but filtered for the current NE,

- **NE Details: QoS: Tunnel**

Provides the same features as the **Tunnel** tab in the ENP main window, including the “Transit” parameter, but filtered for the current NE,

- **NE Details: QoS: Link**

Provides the same features as the **Link** tab in the ENP main window, but filtered for the current NE,

- **NE Details: QoS: Class Type Shaper**

The used Shape Buffer ratio (percentage) and the free bytes are indicated in the upper right corner of the dialog window. Only available if the NE supports BW enforcement.

Operations:

After activating **Options - Expert Mode**, the following operations are available:

- Edit (via Edit icon): edit the shaper settings for any of the entries in the table. Select any entry and modify its settings in the parameter list at the bottom as far as these are editable.

While in Edit mode:

- Deploy: deploy the shaper settings to the NE.
- Cancel: cancel the shaper modifications and return to view-only mode.
- Add: add a new Class Type shaper.
- Remove: delete selected Class Type shaper(s) from the list.
- Align: align the Class Type shaper settings to their default (one of the HQoS profiles is required). Return to the view mode.
- Clear: clear the Class Type shaper settings.

Parameters: Shaper (identifier); Use Defaults; Port; Interface; Class Type; Status; Profile; BW Enforcement; CIR; CBS; EIR; EBS; Priority; Scheduling Profile; Drop Profiles DP TC0, ..., DP TC7).

- **NE Details: QoS: Default Shaper**

Only available if the NE supports BW enforcement.

Operations:

- Edit: edit the default shaper settings for any of the entries in the table. Select any entry and modify its settings in the parameter list at the bottom as far as these are editable.
- Deploy: deploy the default shaper settings to the NE.
- Cancel: cancel the default shaper modifications and return to view-only mode.
- Align: align the default shaper settings to default.
- Clear: clear the default shaper settings.

Parameters: Use Default; Port; Profile; Status; BW Enforcement; CIR; CBS; EIR; EBS; Priority; Drop Profiles DP TC0, ..., DP TC7).

- NE Details: QoS: Drop Profile**

Only available if the NE supports BW enforcement.

Operations: Add, Delete. You can only add a new drop profile if the maximum (50) is not yet reached.

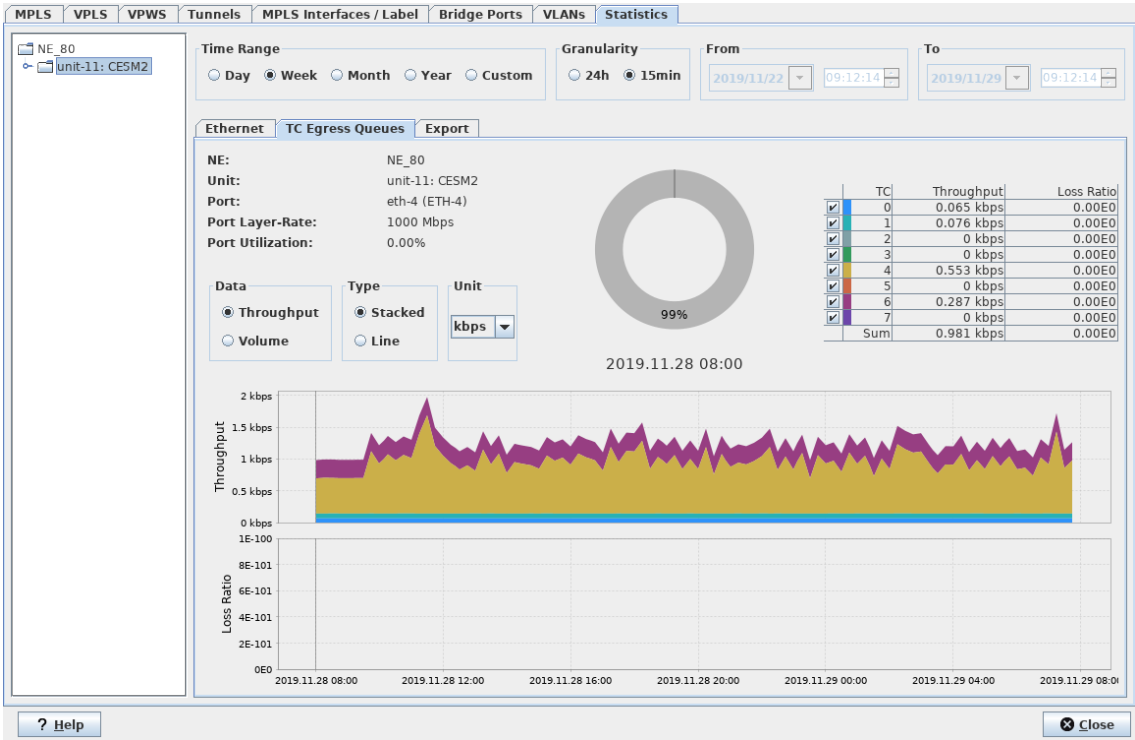
Parameters: Index, Threshold, Status (Deployed Valid, Deployed Invalid, Deployed Delete). Status is available in view mode, but not in edit mode.

NE Details: Statistics

- Lists all MPLS-TP relevant units of the current NE and their Ethernet ports. To see all available ports expand the unit by double-clicking on the unit name in the NE tree window. For any such port Ethernet packet statistics can be displayed provided an appropriate PM collection job has been defined for that port:
- ports with PM data are marked with a green square;
 - ports without PM data are marked with a blank square.

Dialog image

NE - Statistics



The image above shows sample statistics graphs for a core unit front port. For more information on the statistics displayed also refer to Link Details - [Statistics](#).

Related dialogs / windows

Link Details - [Statistics](#).

Add NEs

Name	The Name of the NE given when creating or discovering the NE. This information is read-only.
Global ID	Allows you to set/modify Global ID of NEs which are not yet member(s) of the ENP-Nodes Domain. Double-click the field to edit.

Node ID	Allows you to set/modify Node ID of NEs which are not yet member(s) of the ENP-Nodes Domain. Double-click the field to edit.
Description	Allows you to set/modify Description(s) of NEs which are not yet member(s) of the ENP-Nodes Domain.
State	The modification state of the Node ID, Global ID, and/or Description. - Empty: When no modification has been made to the Node ID, Global ID or Description, this field is empty. - Modified: When Node ID, Global ID and/or Description have been modified the field is set to "Modified". In this case the "Deploy Modifications" button is activated. - Deploying: The modifications are currently being deployed. - Deployed Valid: The modifications have been deployed and are valid. - Deployed Invalid: The modifications have been deployed, but the entered data is invalid. Make sure that especially the Node ID / Global ID set is valid, re-enter corrected values and deploy again.
NE Operational State	Shows whether the NE is "Manageable" or "Not manageable". This information is read-only. This is the same information as shown in the NEM Configurator as "Operational State".
Deploy Modifications	Deploys the modifications (Global ID/Node ID or Description) to the nodes.
Add to ENP Domain	Adds the selected NEs to the ENP-Nodes Domain.
? Help	Calls the help viewer and opens this page.
Close	Closes the dialog.

Related dialogs / windows

[ENP Main Window](#),
[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Manage QoS Reference Tables](#),
[FOXCST](#).

8.3.9 Service Profile

Purpose

The service profile includes a set of parameters which are applied when a service is created and deployed with the ENP.

**Please note:**

The “**Service Profile**” tab is only available if you have purchased a TE service profile license option.

Before **Service Profiles** are edited it is required that the **Class Type (HQoS Class Type Definition)**s are set according to the Traffic Engineering requirements for the network (**Service Profiles** are using the reference to the **Class Type (HQoS Class Type Definition)**s).

Service Profiles can be exported/imported to/from XML files. These files are signed and cannot be modified. Only users with the Traffic Engineering capabilities (license option required) are enabled to create Service Profiles within the Service Profile menu.

Displays the existing service profiles.

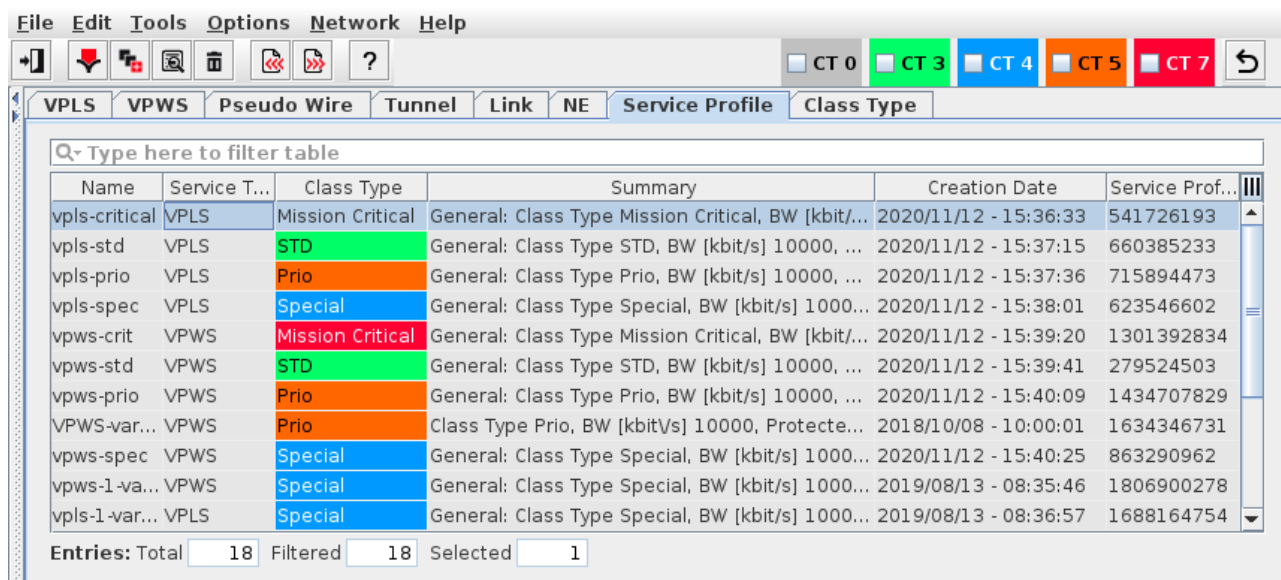
Allows you to create, delete, import, and export service profiles.

Allows you to create service profiles based on an existing service profile.

Displays the service profile details such as:

- Name,
- Description,
- Service Type,
- Summary,
- Creation Date.

Entries in the Service Profile table are filtered with the Class Type Filter on the left hand side (see **ENP Main Window**).

Dialog image**ENP – Service Profile****Mandatory entries**

Not applicable.

Optional entries

The creation of service profiles is optional; however for controlled Class of Service management the use of service profiles is strongly recommended.

Informational content

Name	The specified Name for the service profile.
Description	The configured description of the service profile.
Service Type	The service type, VPLS or VPWS.
Class Type	Class Type as defined via the Class Type (HQoS Class Type Definition) dialog.
Summary	A summary of the profile settings.
Creation Date	The date and time when the profile was created.
Service Profile Id	A unique ID that has been assigned automatically to the service profile.

Controls (buttons, menu items, etc.)

Edit

Create Service Profile...		Calls the Create Service Profile dialog.
Create Service Profile Based on... [an existing Service Profile]		Calls the Create Service Profile dialog for creation of a new Service Profile based on the currently selected Service Profile. Note: This button is only active while one existing service profile is selected.
Details Service Profile...		Calls the Service Profile Details dialog. Note: This button is only active while one existing service profile is selected.
Delete Service Profile...		Deletes the selected service profile. This action needs to be confirmed. Note: This button is only active while one existing service profile is selected.
Import Service Profile(s)...		Imports one or several service profiles from the file system. This action opens a dialog to select XML files from a file system. Usually Service profiles that have been exported before can be imported with this dialog option. While importing from files that include several service profiles, each of the profiles can be selected or deselected individually for import.
Export Service Profile(s)...		Exports the currently selected service profile(s). At least one service profile needs to be selected. This action opens a dialog to specify a file name and location for the service profile(s) to be stored. When several service profiles are selected in the list, they are exported into a single XML file.

Tools

Edit Class Types		Calls the Class Type (HQoS Class Type Definition) dialog.

Context Menu

The context menu options that are available depend on the number of service profiles that are currently selected in the list:

- with no Service Profile selected, the “Create” and “Import” context menu options are available;
- with one Service Profile selected, the “Create”, “Details”, “Delete”, and “Export” context menu options are available;
- with two or more Service Profiles selected, only the “Export” context menu option is available.

Related dialogs / windows

ENP Main Window,
MPLS-TP Introduction,
Service Provisioning and Deployment via ENP GUI,
Create Service Profile,
Class Type (HQoS Class Type Definition).

8.3.10 Service Profile Details

Purpose



Please note:
The “Service Profile” Details dialog is only available if you have purchased a TE service profile license option.

Displays the details of the selected Service Profile. The details are shown in four different tabs, “Service Profile”, “Class Type / UNI Port”, “Tunnel”, and “Routing”.

Dialog image

Service Profile [name]

Mandatory entries

Not applicable.

Optional entries

Not applicable.

For more information on the parameters refer to “Create Service Profile”.

Related dialogs / windows

ENP Main Window,
Create Service Profile,
Service Profile.

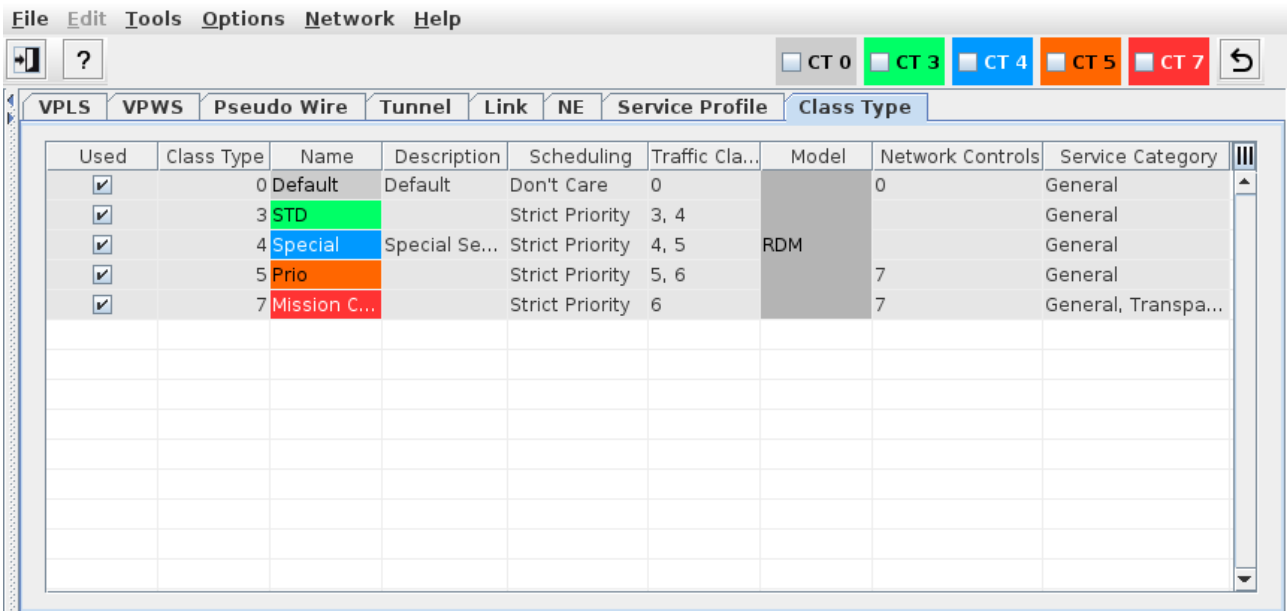
8.3.11 Class Type

Purpose

Displays used (“Active”) Class Types as defined in [Class Type \(HQoS Class Type Definition\)](#). To add, modify, or delete Class Types, go to the Class Type definition dialog in the [HQoS Configuration Manager](#).

Dialog image

ENP – Class Type



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Used	Indicates whether the Class Type is used or not.
Class Type	Class Type as defined via the Class Type (HQoS Class Type Definition) definition dialog of the HQoS Configuration Manager .
Name	The specified Class Type Name.
Description	The configured description of the Class Type.
Scheduling	The scheduling type.
Traffic Classes	Comma separated list of traffic classes from 0 to 7.

Model	The HQoS model as configured in Class Type (HQoS Class Type Definition) .
Network Controls	Comma separated list of network controls from 0 to 7.
Service Category	Comma separated list of service categories, as defined in Service Category (HQoS Service Category Definition) .

Related dialogs / windows

[ENP Main Window](#),
[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Create Service Profile](#),
[Class Type \(HQoS Class Type Definition\)](#).

8.3.12 HQoS Configuration Manager

This dialog is called from the ENP main window menu, “Tools - HQoS Configuration Manager...”. It provides the following tabs:

- [Class Type \(HQoS Class Type Definition\)](#) to add, modify, or delete Class Types,
- [Service Category \(HQoS Service Category Definition\)](#) to add, modify or delete Service Categories,
- [HQoS Profile \(Definition\)](#) to add, modify or delete HQoS Profiles,
- [HQoS Constants](#) to view and modify constants for “Drop Profile”, “First Rate”, and “Second Rate” settings.

It also provides command options for creating, deleting, and editing HQoS configurations like e.g. “[Create HQoS Configuration](#)”, as listed in [HQoS Profile \(Definition\)](#).



Please note:
 For a description of the steps recommended to apply HQoS settings to your network, refer to “[Workflow](#)” in section [8.1.5 "Hierarchical QoS \(HQoS\)"](#).

8.3.13 Class Type (HQoS Class Type Definition)

The “Class Type” dialog is called from the ENP menu “Tools – [HQoS Configuration Manager](#)” by opening the “Class Type” tab.

Purpose

Displays existing (active) Class Types.
 Allows you to define and modify Class Types while in edit mode.
 Allows you to import and export Class Types while in edit mode.
 The dialog window includes some dependencies between Class Types, Class Type Links, and Bandwidths per Class Type. For a smooth configuration please consider the following rules:

- To edit Class Types click on the “Edit” icon.
- Only configure Class Types that will be used, i.e. set a mark in the “Used” column only for Class Types that are used now or in future in your MPLS-TP network. For an example refer to [Sample Class Type Concept](#) and [Sample Use of Class Types and QoS Scheduling](#).
- Select one of the Class Types at a time in the Class Types table, enter a Name and a Description, select the Scheduling, define the Traffic Class(es) and Network Control(s), select the Model (RDM or MAM), and pick a color. Click the “Select Service Categories” icon to choose one or several service categories.

Note:

The model (RDM or MAM) may be predetermined already and depend on the model chosen for the highest Class Type 7 (when RDM was already set) or the lowest Class Type 0 (when MAM was already set).

- Once a Class Type is activated (set to “used”), enter the required bandwidths in the “Total Bandwidths per Class Type [kbit/s]” column of the Class Type Links table. The bandwidths need to be entered before applying any new defined Class Type.



Please note:

Make sure that the bandwidth of a specific Class Type Link / Class Type combination is equal or smaller than the bandwidth of its left-hand side column entry. As an example:

Table 11: Sample Class Types and Bandwidths

Layer Rate Bandwidth		Total Bandwidth per Class Type [kbit/s]					
Bandwidth	Oversubscription	Type	Default (CT0)	CT3	CT4	CT5	CT7
1,000,000	0	External	1,000,000	900,000	850,000	800,000	500,000
10,000,000	0	External	10,000,000	9,000,000	8,500,000	8,000,000	5,000,000
1,000,000	0	Internal	1,000,000	900,000	850,000	800,000	500,000
10,000,000	0	Internal	10,000,000	9,000,000	8,500,000	8,000,000	5,000,000



Please note:

As a default the Class Type 0 (CT0) bandwidth corresponds to the bandwidth of the physical link. The user can however modify the CT0 bandwidth if over-subscription or under-subscription of the link is required. The CT0 cannot be removed by the user.

Over-subscription depends on the Class Type Model used. Special attention to over-subscription has to be taken with the use of the MAM (Maximum Allocation Model).



Please note:

A Class Type that is used in a service configuration but not available in the list of Class Types is marked with a red background and named “UNDEFINED (n)”. Also all related services, Pseudo Wires, tunnels, links, and service profiles that use such a Class Type are marked in red. This happens if you deactivate (remove the mark in the “Used” checkbox) a Class Type that is being used in service profiles and services or import Class Type definitions that do not match the Class Types used.

Scheduling	The scheduling type.
Traffic Class	Comma separated list of traffic classes from 0 to 7. Note: It is strongly recommended not to use class 7 as traffic class.
Model	Defines the Class Type model. As a default, all Class Types are set to RDM. The model can be set to MAM for the highest Class Type only. Once set, it can also be modified to MAM for the next lower Class Type. If all Class Types are set to MAM, changing back to RDM can only be started with the lowest Class Type (0). Select either of the following two options: - RDM (Russian Doll Model), - MAM (Maximum Allocation Model).
Network Control	Comma separated list of traffic classes from 0 to 7. Note: It is recommended to use class 7 for network control.
Service Category	Select one of the service categories defined under the "Service Category" tab.

Informational content, Class Type Links

Layer Rate Bandwidth [kbit/s]	Indicates the bandwidth of existing Class Type links and an over-subscription if applicable. The "Type" indicates whether the interface is an external interface (front ports of a unit) or an internal interface (backplane ports of a unit). Note: The pair of Bandwidth & Type is used as identifier for a physical link, i.e. a 10 Gigabit per second Ethernet link would show as "10'000'000 External". VLAN sub-interfaces are also listed in this table with their assigned bandwidth if they differ from the physical link bandwidth. When in the "Edit" mode, the user can edit the Layer Rate Bandwidth(s) for each Class Type Link, which may result in over- or under-subscription.
Total Bandwidth per Class Type [kbit/s]	Indicates the bandwidth per Class Type of existing links. Note: When in the "Edit" mode, the user can edit the Total Bandwidth per Class Type for each Class Type. The bandwidths entered here are used as the default bandwidths for all new links. Editing the "Default" Class Type bandwidth to a value above the physical link bandwidth results in an over-subscription of the link.

Controls (buttons, menu items, etc.), Class Types

Edit Class Type Definition		Switch to edit mode to modify Class Type definitions. Important Note: In order to apply modifications to the Class Type definition made in the edit mode, the modification need to be saved and the ENP core needs to be restarted. The changes are only effective after an ENP core stop / ENP core start sequence. As an administrator execute the commands: <code>/opt/nem/bin/private/enpcorestop</code> <code>/opt/nem/bin/private/enpcorestart</code> This action will close the HQoS Configuration Manager dialog window.
Save		Save the modifications made to Class Types. Only available in edit mode.
Cancel		Exit edit mode without saving Class Type modifications. Only available in edit mode.
Export		Opens a dialog to select a Class Type file for export of stored Class Types. Exports the "Planned" Class Type definition to a file which is XML-formatted and will be signed. Currently the "Active" Class Type definition cannot be exported. Only available in edit mode.
Import		Opens a dialog to import existing Class Types. Imports a planned Class Type definition from a file which is XML-formatted and must be signed. Only available in edit mode.
Add Class Type Bandwidth		Add a Class Type bandwidth to the list of Class Type Link Bandwidths. You need to configure the new entry in the table of Class Type Link Bandwidths. Only available in edit mode.
Remove Class Type Bandwidth		Remove a selected Class Type bandwidth from the list of Class Type Link Bandwidths. Only available in edit mode.
Help		Calls the help viewer and opens this page.
Exit		Quit HQoS Configuration Manager.

Name	Specify a Name for the selected Class Type. Note: The Name must be unique and shall not contain characters like [] / * ? { } =
Description	Specify a description for the selected Class Type.
Pick Color	Select a color for this Class Type (used for display purposes).
Scheduling	Specify the scheduling type: - Don't Care (use any type), - Strict (use strict scheduling), - WRR (use weighted round robin scheduling).
Traffic Class	Specify classes for traffic by entering a comma separated list in the range 0...7. Example: 0,1,2,3,4,5

Mandatory entries

None.

Optional entries

None.

Informational content

Lists the service categories that have been defined so far. To create a service category, click the “Create a new Service Category” icon. This will open the “Create Service Category” wizard.

Controls (buttons, menu items, etc.)

Create Service Category...		Calls the Create Service Category dialog.
Modify Service Category...		Switch to edit mode to modify service category definitions. The options available are as shown in the Create Service Category dialog.
Show Service Category Details...		Calls the Service Category details dialog. In this dialog, the service category settings are shown as defined in the Create Service Category dialog, however, they are read-only by default. To modify settings, use the “Edit” command button of the dialog window. Note: This button is only active while one existing service category is selected.
Delete Service Category...		Deletes the selected service category. This action needs to be confirmed. Note: This button is only active while at least one existing service category is selected.
Help		Calls the help viewer and opens this page.
Exit		Quit HQoS Configuration Manager.

Related dialogs / windows

HQoS Configuration Manager,
Create Service Category,
HQoS Constants.

8.3.15 Create Service Category

The wizard helps you in defining new service categories in 3 steps. One service category at a time can be created. Service categories are used in the first step of setting up HQoS in your network, or creating a VPLS or VPWS service (see **Create VPLS**, **Create VPWS**).
You can create, modify, and delete a service category, and show details of a selected service category.

Dialog image

Create Service Category

Steps

1. Define Service Category
2. Define Rate Limiting
3. Define MPLS Domain

Define Service Category

Name

Description

Author

Topology

P2P

Routing Parameters

☐ Protected

Not Set

☐ Distinct

Not Set

Encryption Mode

Don't Care

Max Hops

0

Not Set

Max Cost

0

Not Set

? Help

< Back

Next >

Save

Cancel

Mandatory entries

- Step 1 (Define Service Category): Name.
- Step 2 (Define Rate Limiting): None.
- Step 3 (Define MPLS-TP Domain): None.

Optional entries

- Step 1: Description, Author, Topology, Routing Parameters, Encryption Mode, Max Hops, Max Cost.
- Step 2: Rate limiting parameters.
- Step 3: MPLS-TP domain parameters.

Controls (buttons, menu items, etc.)

Where the option “Not Set” or “Set” is available for a specific parameter in the dialog windows of the wizard, select “Set” if you want the parameter to be mandatory for a service based on the service category. If you want the parameter to be optional, select “Not Set”.

Step 1: Define Service Category

Name	Specify a Name for the service category. Note: The Name must be unique and shall not contain characters like [] / * ? { } =
Description	Description for the service category.
Author	The name of the author of the service profile.
Topology	The topology of the service: - P2P (point to point), - P2MP (point to multipoint), - MP2MP (multipoint to multipoint), - Undefined (the topology of the service can be any of the above). Default is “P2P”.
Routing Parameters (group):	

Protected	Protected paths are used for the routing of the service.
Distinct	Distinct paths are used for the routing of the service.
Encryption Mode	Select the encryption mode: - NE Encrypted (only NEs with encryption capability are used), - NE Unencrypted (only NEs without encryption capability are used), - Don't Care. Default is "don't care".
Max Hops	The maximum number of hops allowed for a service.
Max Cost	The maximum cost allowed for a service.
? Help	Calls the help viewer and opens this page.
Next >	Proceeds to the next step.
Cancel	Closes the dialog without creating the service category.

Step 2: Define Rate Limiting

Shaping Allowed	Specifies whether shaping is allowed for services based on the service category.
Average Packet Size [bits]	The average packet size that is expected.
Ingress Shaping (group):	
Enable Rate Limiting	Specify whether rate limiting shall be enabled or disabled for this service category.
Committed Information Rate [kbit/s]	Specify the Committed Information Rate (CIR) in kbit/s for this service category. Note: For VPWS profiles the CIR is set when you enter the Pseudo Wire BW [kbit/s].
Committed Burst Size [Bytes]	Specify the Committed Burst Size (CBS) in bytes for this service category.
Excess Information Rate [kbit/s]	Specify the Excess Information Rate (EIR) in kbit/s for this service category. Note: Depending on the selected rate limiting type this parameter is fixed or may not be available for modification.
Excess Burst Size [Bytes]	Specify the Excess Burst Size (EBS) in bytes for this service category. Note: Depending on the selected rate limiting type this parameter is fixed or may not be available for modification.
? Help	Calls the help viewer and opens this page.
< Back	Returns to the previous step.
Next >	Proceeds to the next step.
Cancel	Closes the dialog without creating the service category.

Step 3: Define MPLS-TP Domain

Bandwidth [kbit/s]	The bandwidth in kbit/s allocated to the service category.
Dual Home Enabled	If marked, PE Dual Home based services are allowed to be configured in this service category.
PW Control Word	If marked, PW control word is applied in the service category.
Min Label	Enter the minimum tunnel label. Default is 3000.

Max Label	Enter the maximum tunnel label. Default is 1048575. It is however recommended to use tunnel labels that are smaller than the PW Min Label to avoid conflicts with the PW label range.
? Help	Calls the help viewer and opens this page.
< Back	Returns to the previous step.
Save	Saves the service category and closes the wizard window.
Cancel	Closes the dialog without creating the service category.

Related dialogs / windows

Service Profile,
 HQoS Configuration Manager,
 Class Type (HQoS Class Type Definition),
 Service Category (HQoS Service Category Definition),
 HQoS Profile (Definition),
 HQoS Constants,
 Create Service Profile,
 Create Service,
 ENP Main Window.

8.3.16 HQoS Profile (Definition)

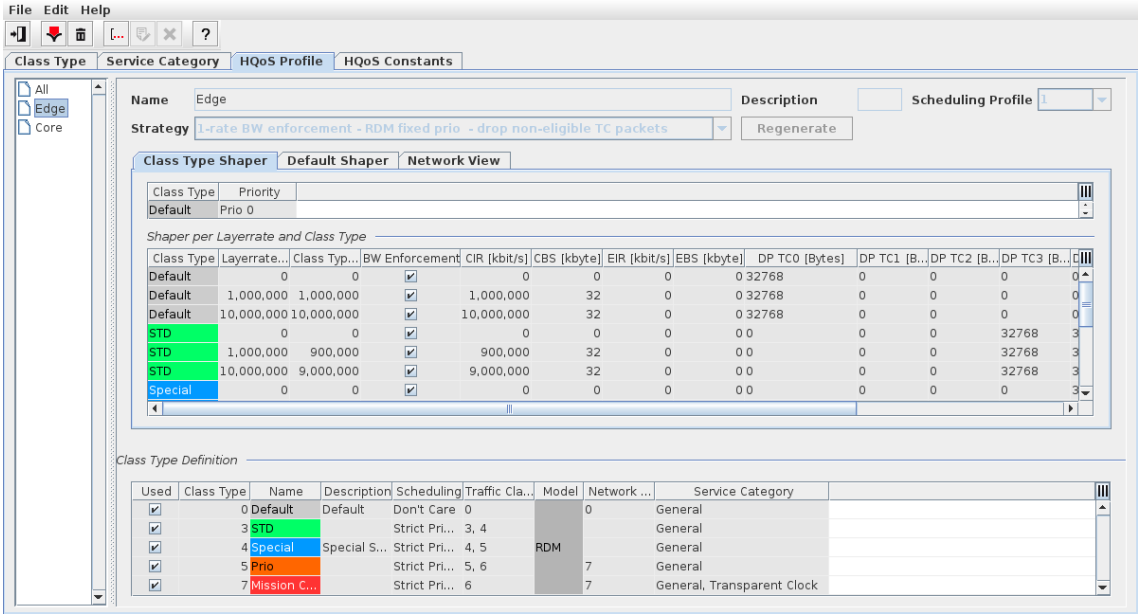
The “HQoS Profile” dialog is called from the ENP menu “Tools – HQoS Configuration Manager...”, and by selecting the “HQoS Profile” tab.

Purpose

The purpose of this feature is to define all required Hierarchical Quality of Service (HQoS) profiles with their Class Type Shapers.

Dialog image

HQoS Configuration Manager - HQoS Profile - Class Type Shaper



Create HQoS Configuration

Name

Description

Strategy

Empty

? Help

✓ OK

✗ Cancel

Mandatory entries

Name,
Strategy.

Optional entries

Description.

Informational content

Class Type Definition; these settings are taken from the [Class Type \(HQoS Class Type Definition\)](#) dialog.

Controls (buttons, menu items, etc.), HQoS Profile - Class Type Shaper

Create HQoS Configuration



Create a new basic HQoS configuration. The “create” dialog requires a name, an optional description, and a strategy. The Strategy is to be selected out of the following options:

- (Empty)
- No BW enforcement,
- 2-rate BW enforcement,
- 1-rate BW enforcement,
- 1-rate BW enforcement - drop non-eligible TC packets,
- No BW enforcement - RDM fixed prio,
- 2-rate BW enforcement - RDM fixed prio,
- 1-rate BW enforcement - RDM fixed prio,
- 1-rate BW enforcement - RDM fixed prio - drop non-eligible TC packets.

Bandwidth enforcement is strongly recommended to make HQoS work.

The newly created HQoS configuration is added to the left-hand list of HQoS configurations. To edit the configuration, select it and click the “Edit” button.

Delete (a configuration)



Delete a selected HQoS configuration.

Edit HQoS Configuration



Switch to edit mode to modify a HQoS configuration.

While in edit mode, a banner “Edit Mode” with yellow background is shown in the upper right corner of the HQoS Profile dialog.

In the edit mode you can view or edit the following parameters:

In the Class Type Shaper tab:

For Class Type:

- Class Type name (view only),
- Priority (can be set to Prio 0 ... Prio 7 or Propagated),

For Shaper per Layer Rate and Class Type:

- Class Type name (view only),
- BW [kbit/s] (view only),
- BW Enforcement (on, off),
- CIR [kbit/s] (settable),
- CBS [kbyte] (settable),
- EIR [kbit/s] (settable),
- EBS [kbyte] (settable),
- DP TC0 ... DP TC7 [Bytes] (settable).

When settable, the above parameters are either selectable from preset values, or you can type in an appropriate value and press <Enter>.

In the Default Shaper tab, separately for each available Layer Rate (BW):

- BW Enforcement (on, off),
- CIR,
- CBS,
- EIR,
- EBS,
- Priority (propagated; not propagated),
- DP TC0 ... DP TC7.

In the Class Type Definition table:

All Class Types defined up to now are listed here in view-only mode.

Regenerate: A selected HQoS profile can be regenerated to set its parameters back to defaults in accordance with the selected Strategy. Specific user-defined parameters need to be set manually before saving the profile again.

Save



Save the modifications made to the HQoS profile. Only available in edit mode.

Cancel



Exit edit mode without saving HQoS profile modifications. Only available in edit mode. You need to confirm that you want to cancel the modifications.

Help



Calls the help viewer and opens this page.

Exit

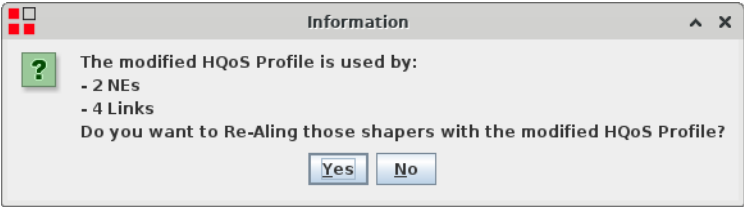


Quit HQoS Configuration Manager.

If you modify a HQoS Profile that is already used in the network, saving the modified profile causes a pop-up message that

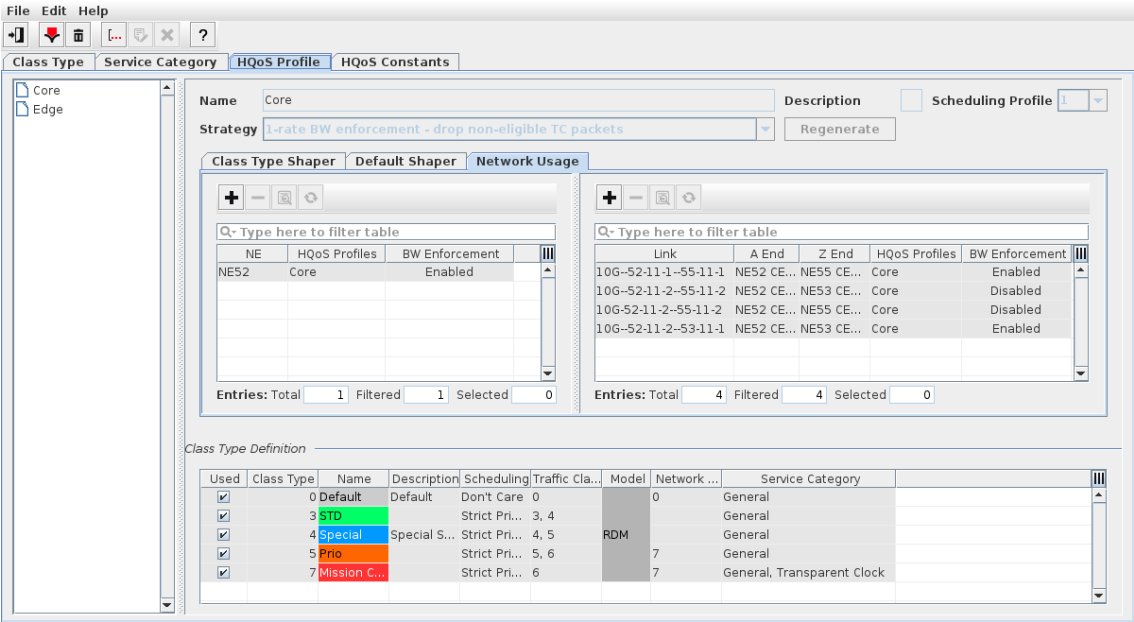
- informs about on where the profile is used (i.e. on how many NEs and links) and
- asks you for a confirmation to re-align the respective shapers with the modified profile.

You can confirm (“Yes”) or deny (“No”) the re-alignment. Sample dialog:



Dialog image

HQoS Configuration Manager - HQoS Profile - Network Usage



Mandatory entries

Not applicable. NEs and/or Links should be added to apply HQoS profiles to parts of a network or to a complete network.

Optional entries

NE,
Link.

Informational content

Lists the relevant parameters (NE name, HQoS Profiles, BW Enforcement) of the NEs that have been added (left hand table).

Lists the relevant parameters (Link name, A End, Z End, HQoS Profiles, BW Enforcement) of the Links that have been added (right hand table).

Controls (buttons, menu items, etc.), HQoS Profile

Add NEs...



When a HQoS profile is selected in the left hand list of created HQoS profiles, calls the “Add an NE to the HQoS profile” dialog.

Clear NE(s)



Remove selected NE(s) from the list of NEs added to the HQoS profile.

NE Details...		Opens the “ NE Details ” dialog for a selected NE.
Re-align HQoS Profile on the NE(s)		Re-aligns the HQoS profile on the selected NE(s). This is useful if there is a difference in settings among database and NE(s).
Add Links...		When a HQoS profile is selected in the left hand list of created HQoS profiles, calls the “Add a Link to the HQoS profile” dialog.
Clear Link(s)		Remove selected link(s) from the list of links added to the HQoS profile.
Link Details...		Opens the “ Link Details (dialog window) ” dialog for a selected link.
Re-align HQoS Profile on the Link(s)		Re-aligns the HQoS profile on the selected link(s). This is useful if there is a difference in settings among database and link(s).

Note:

Using a drop profile with buffer size “0” for a traffic class causes the traffic to be reduced to zero.

- If no traffic is flowing while you would expect it to flow, check the buffer size of all drop profiles. This check can be done e.g. in the NE Details, Class Type Shaper, DP TC0...DP TC7. Identify buffer sizes of “0”. Increase the buffer sizes for required traffic classes.

Related dialogs / windows

ENP Main Window,
HQoS Configuration Manager,
Create Service Category,
Create Service Profile,
Class Type (HQoS Class Type Definition),
HQoS Constants.

8.3.17 HQoS Constants

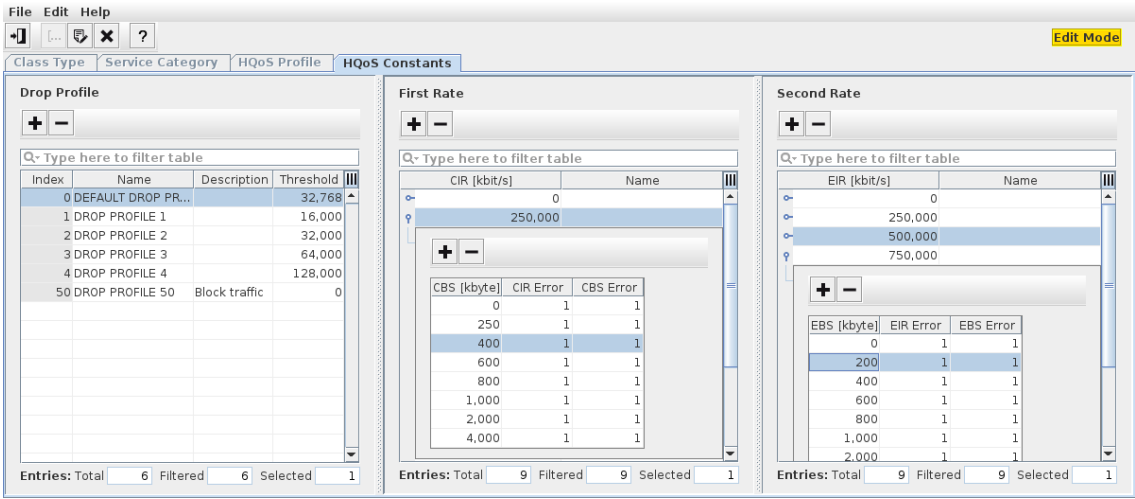
The “HQoS Profile” dialog is called from the ENP menu “Tools – HQoS Configuration Manager...”, and by selecting the “HQoS Constants” tab. This dialog tab is only available in **Expert Mode**.

Purpose

The main purpose of this feature is to provide current constants for “Drop Profile”, “First Rate”, and “Second Rate” settings used in the **HQoS Configuration Manager**. In the “Edit” mode, these settings can be modified, and drop profiles, first rates, and second rates can be added or removed.

Dialog image

HQoS Configuration Manager - HQoS Constants



Mandatory entries

Not applicable.

Optional entries

New drop profiles, first rates, and second rates can be added or removed, or their settings can be modified.

Informational content

Lists available drop profiles, first rates, and second rates.

Controls (buttons, menu items, etc.)

Edit HQoS Constants		Switch to edit mode to modify HQoS constants. While in edit mode, this is indicated by “Edit Mode” shown with amber background in the upper right corner of the HQoS Configuration Manager dialog window.
Save		Save the modifications made to the HQoS constants. Only available in edit mode. You need to confirm that you want to save the modifications.
Cancel		Exit edit mode without saving HQoS constants modifications. Only available in edit mode. You need to confirm that you want to cancel the modifications.
Add (Drop Profile; First Rate; Second Rate)		Add a Drop Profile; First Rate; Second Rate to the respective list. Only available in edit mode.
Remove (Drop Profile; First Rate; Second Rate)		Remove a Drop Profile; First Rate; Second Rate from the respective list. Only available in edit mode.
Help		Calls the help viewer and opens this page.
Exit		Quit HQoS Configuration Manager.

Related dialogs / windows

ENP Main Window,
HQoS Configuration Manager,
Create Service Category,
Create Service Profile,
Class Type (HQoS Class Type Definition),
HQoS Profile (Definition).

8.3.18 Schedule Network Audit

This dialog is called from the ENP menu “Tools – Basic TE Configuration – Schedule Network Audit...”.

Purpose

The main purpose of this feature is to schedule audits for surveillance of the consistency of QoS reference tables throughout the network.

Dialog image

Schedule Network Audit

Task

Description

Network Audit - 2019/05/14 - 11:45:30

Comment

Notification

Email

Schedule Time

☒ Immediate

☐ Start at

2019/05/14

11:45:30

☐ Repeated

Hourly

? Help

✓ OK

✗ Cancel

Mandatory entries

Not applicable.

Optional entries

Description
Comment
Email address
Schedule Time

Informational content

Task

Description	Enter a description for the Network Audit task. This entry is optional.
Comment	Enter a comment for the Network Audit task. This entry is optional.

Notification

Email	Enter an email address for the notification of the audit task. This entry is optional.

Schedule Time

Immediate	Select this option to execute the audit immediately upon clicking “Schedule Audit”.
Start at	Select this option to execute the audit at a specific date and time. Select the date from the calendar and enter the time in the appropriate fields.
Repeated	Enable this option to repeat the audit at a selected interval. Select the interval from the following options: - Hourly, - Daily, - Weekly, - Monthly.

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
OK	Starts the audit task and closes the dialog.
Cancel	Closes the dialog without scheduling the audit.

Related dialogs / windows

[ENP Main Window](#),
[Schedule Network Alignment](#),
[Schedule Backplane Audit](#),
[Network Audit Result](#),
[Backplane Audit Result](#),
[Manage QoS Reference Tables](#).

8.3.19 Schedule Network Alignment

This dialog is called from the ENP menu “Tools – Basic TE Configuration – Schedule Network Alignment...”.

Purpose

The main purpose of this feature is to schedule the alignment of QoS reference tables throughout the network. The alignment of NEs with the set of reference tables stored in the NEM database.

Dialog image

Schedule Network Alignment

Selected	Name
☒	NE_80
☐	NE_82
☐	NE_83

Select AllDeselect All

Selected	Reference Table
☒	DSCP to PHB
☒	EXP to TC
☒	PHB to EXP
☒	Per Hop Behaviour
☒	PSC to TC
☒	Scheduling Profiles
☒	PCP to EXP
☒	PCP to TC

Select AllDeselect All

Task

DescriptionNetwork Alignment - 2018/02/2

Comment

Schedule Time

☒ Immediate

☐ Start at2018/02/2610:31:35

OKCancel

Mandatory entries

- Select at least one NE.
- Select at least one Reference Table.

Optional entries

- Several or all NEs can be selected.
- Several or all Reference Tables can be selected.
- Task Description
- Task Comment
- Schedule Time

Informational content

List of NEs

Selected	Mark a checkbox to select an NE. Any listed NE can be selected.

List of Reference Tables

Selected	Mark a checkbox to select a Reference Table. This requires that Reference Tables have been imported at least once. Any listed Reference Table can be selected.

Task

Description	Enter a description for the Network Alignment task. This entry is optional.
Comment	Enter a comment for the Network Alignment task. This entry is optional.

Schedule Time

Immediate	Select this option to execute the alignment immediately upon clicking “Schedule Alignment”.
Start at	Select this option to execute the alignment at a specific date and time. Select the date from the calendar and enter the time in the appropriate fields.

Controls (buttons, menu items, etc.)

Select All	Selects all Items in the list. Applies to listed NEs or to listed Reference Tables.
Deselect All	De-selects all items in the list. Applies to listed NEs or to listed Reference Tables.
? Help	Calls the help viewer and opens this page.
OK	Starts the alignment task and closes the dialog.
Cancel	Closes the dialog without scheduling the network alignment.

Related dialogs / windows

ENP Main Window,
Schedule Network Audit,
Schedule Backplane Audit,
Network Audit Result,
Backplane Audit Result,
Manage QoS Reference Tables.

8.3.20 Schedule Backplane Audit

This dialog is called from the ENP menu “Tools – Basic TE Configuration – Schedule Backplane Audit...”.

Purpose

The main purpose of this feature is to schedule audits for surveillance of the consistency of QoS reference tables on the node internal backplane ports throughout the network.

Dialog image**Schedule Backplane Audit**

Parameters

Warning Threshold

Task

Description

Comment

Notification

Email

Schedule Time

☒ Immediate

☐ Start at

☐ Repeated

? Help ✓ OK ✗ Cancel

Mandatory entries

Not applicable.

Optional entries

Description
Comment
Email address
Schedule Time

Informational content**Parameters**

Warning threshold	Bandwidth usage threshold in the range 0...100%. Default is 80%. When this threshold is exceeded for a specific node or slot, the corresponding entry in the audit result indicates "Warning" in the status column.

Task

Description	Enter a description for the Network Audit task. This entry is optional. A default is provided with current date and time.
Comment	Enter a comment for the Network Audit task. This entry is optional.

Notification

Email	Enter an email address for the notification of the audit task. This entry is optional.

Schedule Time

Immediate	Select this option to execute the audit immediately upon clicking "Schedule Audit".
Start at	Select this option to execute the audit at a specific date and time. Select the date from the calendar and enter the time in the appropriate fields.
Repeating	Enable this option to repeat the audit at a selected interval. Select the interval from the following options: - Hourly, - Daily, - Weekly, - Monthly.

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
OK	Starts the audit task and closes the dialog.
Cancel	Closes the dialog without scheduling the audit.

Related dialogs / windows

ENP Main Window,
Schedule Network Audit,
Schedule Network Alignment,
Schedule Backplane Audit,
Network Audit Result,
Backplane Audit Result,
Manage QoS Reference Tables.

8.3.21 Network Audit Result

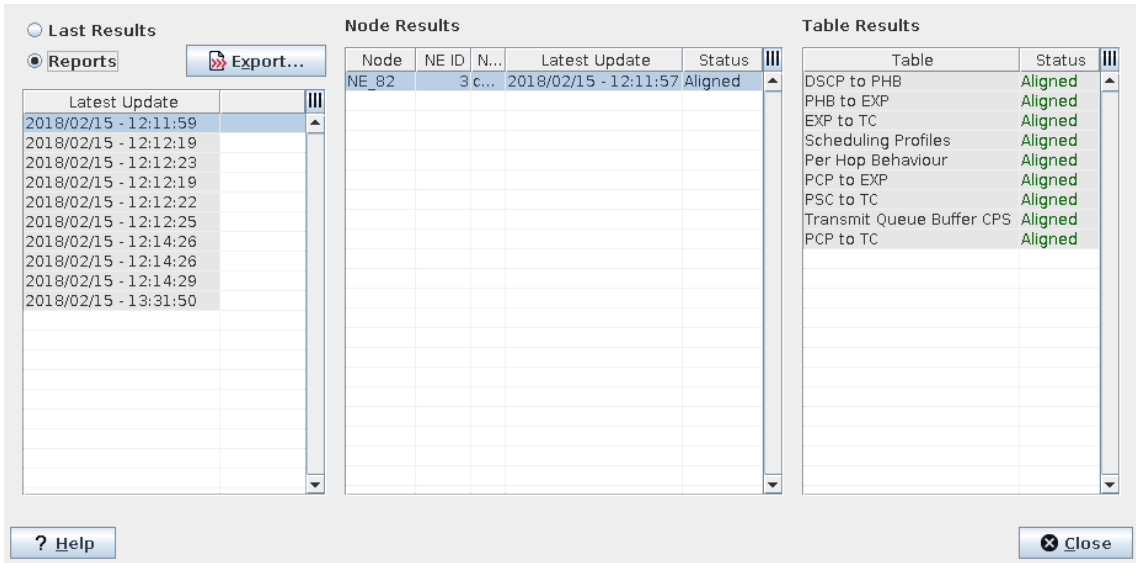
This dialog is called from the ENP menu “Tools – Basic TE Configuration – Show Network Audit Result...”.

Purpose

The main purpose of this feature is to display current audit results from the alignment of QoS reference tables over several nodes throughout the network.
The dialog also allows you to export network audit reports to a CSV file.

Dialog image

Network Audit Result



Mandatory entries

Choose whether to display last audit results, or to display reports for export purposes. The selection is done via radio buttons. You need to select either “Last Results” or “Reports”.

- When choosing “Last Results”, only node results and table results are shown.
- When choosing “Reports”, a list of updates (reports) is shown. You can select one of these reports for export to a CSV file.

Optional entries

A node should be selected in order to display the audited reference tables and the related audit status.

Informational content

List of Reports (only available when the “Reports” radio button is selected)

Latest Update	Date and time of the recorded audit.

List of Node Results

Node	Name of the audited NE.
NE ID	ID of the node within the audit function.

NE Version	The specified NE version. The NE version is identified by the node's NE software name and its version.
Latest Update	Date and time of the latest update of the reference tables for the respective NE.
Status	Alignment status of the reference tables for the selected NE. - Aligned: All reference tables are aligned on this NE. - Unaligned: At least one QoS mapping table is not aligned on this NE. - Error: An error has occurred during the alignment.

List of Table Results

Table	Name of the audited reference table for the selected NE.
Status	Alignment status of the reference table for the selected NE. - Aligned: All parameters are aligned in the respective mapping table. - Unaligned: At least one parameter is not aligned in the respective mapping table. - Error: There was an error during the alignment of the table, e.g. due to an incompatibility.

Controls (buttons, menu items, etc.)

Last Results	Select this button to get a list of Table results for each of the audited nodes.
Reports	Select this button to get a list of Report updates of which the selected report can be exported to a file.
Export...	Command to export the selected contents to a file.
? Help	Calls the help viewer and opens this page.
Close	Closes the dialog.

Related dialogs / windows

[ENP Main Window](#),
[Schedule Network Audit](#),
[Schedule Network Alignment](#),
[Schedule Backplane Audit](#),
[Backplane Audit Result](#),
[Manage QoS Reference Tables](#).

8.3.22 Backplane Audit Result

This dialog is called from the ENP menu "Tools – Basic TE Configuration – Show Backplane Audit Result...".

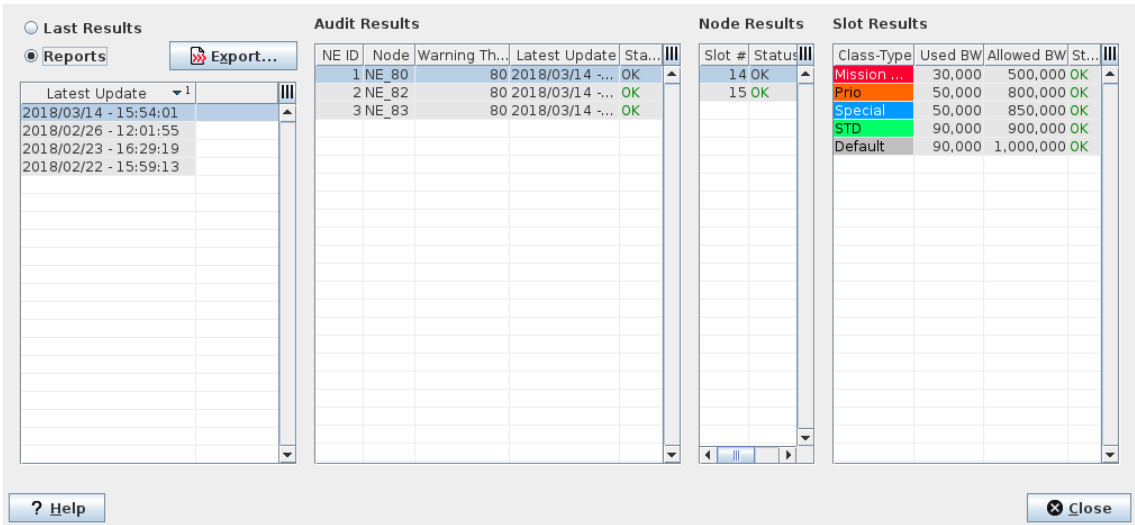
Purpose

The main purpose of this feature is to display current audit results from the alignment of QoS reference tables of backplane ports over several nodes throughout the network.

The dialog also allows you to export backplane audit reports to a CSV file.

Dialog image

Backplane Audit Result



Mandatory entries

Choose whether to display last audit results, or to display reports for export purposes. The selection is done via radio buttons. You need to select either “Last Results” or “Reports”.

- When choosing “Last Results”, only node results and table results are shown.
- When choosing “Reports”, a list of updates (reports) is shown. You can select one of these reports for export to a CSV file.

Optional entries

A node should be selected to display the backplane related node results. A node result (slot) should be selected to display the related slot results.

Informational content

List of Reports (only available when the “Reports” radio button is selected)

Latest Update	Date and time of the recorded audit.

List of Audit Results

NE ID	ID of the node within the audit function.
Node	Name of the audited NE.
Warning Threshold	Threshold set for the backplane audit (see Schedule Backplane Audit).
Latest Update	Date and time of the latest update of the reference tables for the respective NE.
Status	Alignment status of the respective NE. The status can be “OK”, “Warning” or “Error”.

List of Node Results

Slot #	Shows the physical slot no. in the selected node.
Unit	Name of the unit.

Status	Status of the respective slot in the selected NE. The status can be “OK”, “Warning” or “Error”. - OK: The used bandwidth does not exceed the allowed bandwidth warning threshold set for the backplane audit. - Warning: The used bandwidth exceeds the warning threshold set for the backplane audit. - Error: The audit has returned an error.

List of Slot Results

Class Type	The configured Class Types in the selected slot.
Used BW	The used bandwidth of the respective Class Type.
Allowed BW	The allowed bandwidth of the respective Class Type.
Status	Status of the respective bandwidth assignment and usage. The status can be “OK”, “Warning” or “Error”.

Controls (buttons, menu items, etc.)

Last Results	Select this button to get a list of audit results for each of the audited nodes.
Reports	Select this button to get a list of Report updates of which the selected report can be exported to a file.
Export...	Command to export the selected contents to a file.
? Help	Calls the help viewer and opens this page.
Close	Closes the dialog.

Related dialogs / windows

[ENP Main Window](#),
[Schedule Network Audit](#),
[Schedule Network Alignment](#),
[Schedule Backplane Audit](#),
[Network Audit Result](#),
[Manage QoS Reference Tables](#).

8.3.23 Manage QoS Reference Tables

This dialog is called from the ENP menu “Tools – Basic TE Configuration – Manage Reference Data...”. It is available only for users with the TE option enabled.

Purpose

The main purpose of this feature is to manage and provide specific QoS reference tables over the ENP controlled network. This is to assure consistent QoS settings in the network.

Displays QoS reference tables available on a selected NE.

Allows you to upload selected QoS reference tables from the NE.

Allows you to export and import QoS reference tables.

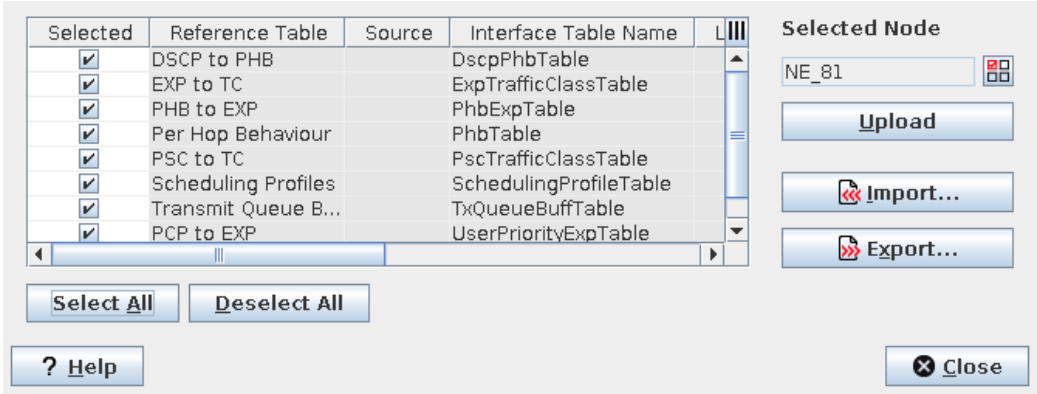
Displays the QoS reference table details from the NE such as:

- Reference Table name,
- Source NE,
- Last Update (date and time),
- ESW Version (of the unit providing the table),
- Interface Table Name (SNMP name),

- Database Table Name (SNMP name),
- Status

Dialog image

Manage QoS Reference Tables



Mandatory entries

Not applicable.

Optional entries

An NE should be selected in order to upload any QoS reference tables.

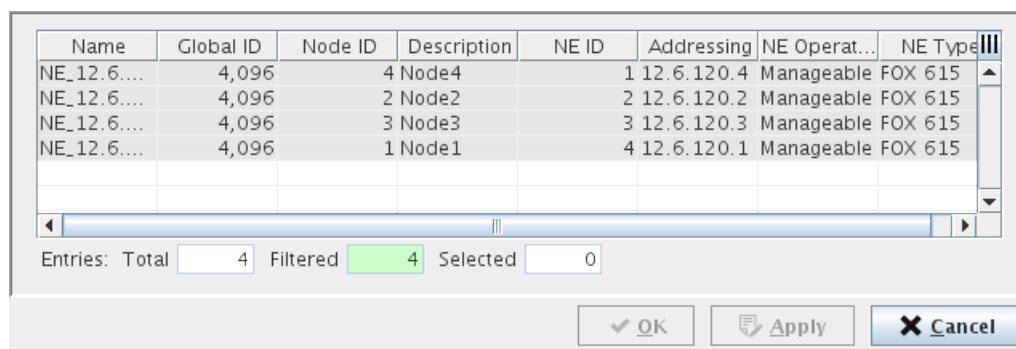
Informational content

Selected	Marked reference tables are being updated/processed when one of the command buttons is pressed. Use the “Select All” or “Deselect All” buttons for all items.
Reference Table	Shows the type of reference table available on the NE.
Source	Shows the name of the NE as selected in the “Selected Node” dialog.
ESW Version	Shows the ESW name and version of the unit providing the table.
Interface Table Name	Shows the NE SNMP interface table name.
Database Table Name	Shows the NE SNMP database table name.
Latest Update	Shows date and time of the last update of the related reference table.
Status	Shows the execution status of the upload or download action.

Controls (buttons, menu items, etc.)

Select Node

Selected Node		Calls the Select Node dialog to select one of the ENP NEs.



General

Select All	Selects all Items in the list.
Deselect All	Deselects all items in the list.
Upload	Upload reference tables from the selected node.
Import...	Import reference tables from a file.
Export...	Export selected reference tables to a file.
? Help	Calls the help viewer and opens this page.
Close	Closes the dialog.

Related dialogs / windows

ENP Main Window,
Schedule Network Audit,
Schedule Network Alignment,
Schedule Backplane Audit,
Network Audit Result,
Backplane Audit Result.

8.4 Create Service Profile

Purpose

This wizard supports you in creating service profiles for use with VPLS or VPWS. The “**Service Profile**” tab is only available, and creation of service profiles is only possible if you have purchased a TE service profile license option.



Please note:

Depending on the license options you may not see the “Service Profile” tab. If you have acquired a service profile license the service profiles will appear in the “Service Profile” tab of the ENP main window.

If you want to create a service profile supporting asymmetric VPLS (i.e. with per-port rate limiters) you need to select **Ingress Rate Limiting, Type = "2 Rate - 3 Color"** and set all Ingress Rate Limiting options to "Variable" instead of "Fixed". When creating a service based on that profile, you will be able to set individual ingress rate limits per service port. Alternatively, you will be able to activate / deactivate rate limiting per port.

Dialog image

Create Service Profile

Steps

1. Service Profile

2. Class Type / UNI Port

3. Tunnel

4. Routing

Service Profile

Name

Description

Service Type

Service Category

General

Dual Home

☒ Dual Home Capable

Variable

BFD Session has to be enabled, Service cannot be used for PTP

? Help

< Back

Next >

Finish

X Cancel

Mandatory entries

Not applicable.

Optional entries

The creation of service profiles is optional.

For each of the parameters the setting can be “Fixed” or “Variable” in the following dialogs, depending on the selection on the right hand side of the parameter field:

- When set to “Fixed” the respective parameter of the service cannot be modified when the service profile is applied. As a consequence none of the service parameters with the “Fixed” option can be changed unless the service is re-created.
- When set to “Variable” the respective service parameter can be modified after the service profile has been applied to the service. This is used to cover use cases where certain parameters do not necessarily need to be fixed to a specific setting.

Controls (buttons, menu items, etc.)

Step 1: Service Profile

Name	Specify a Name for the Service Profile. Note: The Name must be unique and shall not contain characters like [] / * ? { } =
Description	Specify a description for the Service Profile.
Service Type	Select the service type: - VPLS for Virtual Private LAN Services, - VPWS for Virtual Private Wire Services. Note: If the dialog is called via “Create Service Profile Based on... [an existing Service Profile]” the service type is already preselected.
Service Category	Select the service category from the two options - General (used for VPLS or VPWS), - Transparent Clock (used for PTP).
Dual Home (parameters group):	

Dual Home Capable	Can be enabled or disabled. For General services the “Dual Home Capable” option is enabled by default; for “Transparent Clock” services the “Dual Home Capable” option is always disabled. When enabled, the service profile allows you to create PE Dual Home capable services.
(Parameter change option)	This option determines whether the parameter can be changed when the service profile is applied to a service. - Fixed (parameter is fixed during service creation), - Variable (parameter can be changed during service creation). Note: For General services the “Dual Home Capable” option is enabled by default, and the parameter change option default is “Variable”. For “Transparent Clock” services the “Dual Home Capable” option is disabled, and the parameter change option default is “Fixed”.
? Help	Calls the help viewer and opens this page.
Next >	Calls the Step 2 Window.
Cancel	Closes the dialog without creating the service profile.

Step 2: Class Type / UNI Port

Class Type	Specify the Class Type; select from: - Default - any other defined Class Type as configured in Class Type (HQoS Class Type Definition) .
Pseudo Wire BW [kbit/s]	Specify the required bandwidth in kbit/s for the Pseudo Wire(s) carrying the service. Note: The Pseudo Wire BW is also used implicitly for the creation of the tunnel. However the operator is enabled to overwrite at service creation the Tunnel BW with a value which is greater than the Pseudo Wire BW. This may be useful when multiple Pseudo Wires need to be routed over one tunnel.

Ingress Port QoS

Trust Mode	Use the trust mode to apply preselected settings for - CoS Type, - CoS Overwrite. The following settings are preselected. Untrusted: - CoS Type = Interface, - CoS Overwrite = Overwrite. Trust Layer 2: - CoS Type = PCP, - CoS Overwrite = Maintain. Trust Layer 3: - CoS Type = DSCP, - CoS Overwrite = Maintain. Note: If you modify any of the preselected settings after setting the Trust Mode the Trust mode will be reset.

CoS Type	Specify a CoS Type: - Interface, - PCP, - DSCP. Note: - If you modify the CoS Type after setting the Trust Mode the Trust mode will be reset.
Default Priority	Select the default priority for the service in the range 0...7.

Ingress CoS for VLAN Based services

CoS Overwrite	Specify the CoS overwrite mode: - Overwrite, - Maintain. Default is "Maintain". If "Maintain" is selected, no CoS overwrite will be applied, and the "overwrite Priority" will not be used. Note: If you modify the CoS Overwrite after setting the Trust Mode the Trust mode will be reset.
Overwrite Priority	Select the overwrite priority for the service in the range 0...7.

Ingress Rate Limiting

Enable Rate Limiting	Specify whether Rate Limiting shall be enabled or disabled for this profile.
Type	Use the rate limiting type to apply preselected settings for CIR, CBS, EIR, and EBS. The following types are available: - 1 Rate – 2 Color, - 1 Rate – 3 Color, - 2 Rate – 3 Color.
Committed Information Rate [kbit/s] (CIR)	Specify the CIR in kbit/s for this profile. Note: For VPWS profiles the CIR is set when you enter the Pseudo Wire BW [kbit/s].
Committed Burst Size [Bytes] (CBS)	Specify the CBS in bytes for this profile.
Excess Information Rate [kbit/s] (EIR)	Specify the EIR in kbit/s for this profile. Note: Depending on the selected rate limiting type this parameter is fixed or may not be available for modification.
Excess Burst Size [Bytes] (EBS)	Specify the EBS in bytes for this profile. Note: Depending on the selected rate limiting type this parameter is fixed or may not be available for modification.

Egress Scheduling Profile

Scheduling Profile	Select the applicable egress scheduling profile from the 5 available profiles (1...5). Note: Scheduling Profiles need to be configured per node via the local craft terminal in the “NE – QoS – Scheduling Profiles” dialog before they can be applied here. Scheduling Profiles can be distributed to the NEs with the ENP Audit function. See Schedule Network Audit , Schedule Network Alignment , Network Audit Result , and Manage QoS Reference Tables from the ENP Tools menu.
? Help	Calls the help viewer and opens this page.
< Back	Go back to Step 1 Window: Service Profile.
Next >	Calls the Step 3 Window: Tunnel.
Cancel	Closes the dialog without creating the service profile.

Step 3: Tunnel

Protection	Enable or disable protection for the tunnel that is carrying the service. Note: Disabling protection also disables Force Distinct Path , Protection Mode , WTR Time [s] , and State Change Tx Interval [ms] .
Force Distinct Path	Enable or disable enforcement of a distinct path for the protecting LSP. Not available when Protection is disabled.

BFD

BFD Session	Enable or disable BFD session for the tunnel that is carrying the service. Only selectable when Protection is disabled. Always enabled when Protection is enabled.
CC Interval	Select the Continuity Check (CC) Interval from the following possible values: 3.3, 10, 20, 30, 40, 50, 100, 1000 ms. Default is 100 ms. Only selectable when BFD Session is enabled.

LPS

Protection Mode	Select the protection mode: - Non revertive, - Revertive (switching back to default if the working path is available again). Only selectable when Protection is enabled.
WTR Time [s]	Enter the Wait To Restore (WTR) Time in the range 0...720 s. Default is 300 s.
State Change Tx Interval [ms]	Select the transmit interval for state changes from the following possible values: 3.3, 10, 20 ms. Default is 20 ms.

Encryption

Encryption Profile	Select the Encryption Profile from the following possible profiles: - None: No profile applied; this is the default, - [1] Discard: Discard all traffic, - [3] Encrypted & Authenticated without OAM: Encrypt and authenticate all traffic; do not use OAM, - [5] Encrypted & Authenticated with OAM: Encrypt and authenticate all traffic; use OAM.

Label

Min Label	Set the minimum tunnel label; default is 3000.
Max Label	Set the maximum tunnel label; default is 1048575.

? Help	Calls the help viewer and opens this page.
< Back	Go back to Step 2 Window: Class Type / UNI Port.
Next >	Calls the Step 4 Window: Routing.
Cancel	Closes the dialog without creating the service profile.

Step 4: Routing

Routing Order	Select the routing order from one of the following: - BW Optimized, - Cheapest, - Shortest.
Max Hops	Enable or disable a maximum number of hops for routing. When "Max Hops" is enabled, enter the maximum number of hops. The supported range is 1...255.
Max Cost	Enable or disable a maximum cost for routing. When "Max Cost" is enabled, enter the maximum cost allowed in the range 1...32767.

Related dialogs / windows

[Class Type \(HQoS Class Type Definition\),](#)
[Create Tunnel,](#)
[Create Service,](#)
[Create VPLS,](#)
[Create VPWS,](#)
[Service Supervision and Reporting,](#)
[Service Editor,](#)
[Customer Manager,](#)
[SLA Manager,](#)
[Schedule Network Audit,](#)
[Schedule Network Alignment,](#)
[Network Audit Result,](#)
[Manage QoS Reference Tables.](#)

8.5 Create Service

Purpose

The Create Service Wizard allows the user to create Virtual Private LAN Service (VPLS or H-VPLS), or a Virtual Private Wire Service (VPWS).

The Create Service wizard includes six steps:

Create VPLS:

- 1 Define Service (basic properties and Quality of Service / Rate Limiting);
- 2 Define VPLS NEs; modify port types if required;
- 3 Define VPLS Topology;
- 4 Define Tunnels;
- 5 Create Tunnel(s) Manually;
- 6 Summary (Save).

The final step of service creation is not part of the wizard:

- 7 After these steps the service(s) need to be deployed via the “Deploy VPLS” menu command.

Create VPWS:

- 1 Define Service (basic properties and Quality of Service / Rate Limiting)
- 2 Define Attachment Circuit
- 3 Define Tunnel(s)
- 4 Create Tunnel(s) Manually
- 5 Summary (Save)

The final step of service creation is not part of the wizard:

- 6 After these steps the service(s) need to be deployed via the “Deploy VPWS” menu command.



Please note:

For background information, please refer to MPLS-TP Introduction sections [Overview of VPLS Implementation](#) and [Overview of VPWS Implementation](#).

8.5.1 Create VPLS

Purpose



Please note:

When **Expert Mode** is enabled in the Options menu of the ENP main window, the **Create VPLS** wizard allows you to create on a single NE VPLS two VPWS with split horizon, or other VPLS, without consistency check.

→ Use the **Expert Mode** only if you are a highly experienced user.

The “Create Service” dialog allows you to create a VPLS (full mesh), an H-VPLS (mesh/spoke), or to add NEs as PE dual home NEs:

- For VPLS (mesh) execute steps 1 to 7, without doing any selection in step 4.
- For H-VPLS (mesh/spoke) execute steps 1 to 7, while selecting and defining ports of spoke NEs in step 4 as far as required.
- For VPLS with Dual Home option, in step 2 (Define VPLS NEs), select the “Role” of the NE that needs to be attached as PE Dual Home NE.

The dialog supports you with service creation by proposing many default settings. A number of manual settings are required however. These are mentioned in the step explanations under “**Controls (buttons, menu items, etc.)**” below.

When called from the “Modify VPLS...” menu selection the “Create Service” dialog allows you to add VPLS NEs (nodes) to an existing VPLS service or remove VPLS NEs (nodes) from an existing VPLS service. In this case the parameters in **Step 2: Define VPLS NEs** and **Step 3 - “VPWS Ports” tab** can be modified. The other parameters are read-only.



Please note:

A service created with this dialog is saved to the database but not automatically deployed to the nodes. In order to deploy the services to the nodes you need to select the service in the VPLS tab of the ENP main window and execute “Deploy VPLS” from the “Edit” menu or from the context menu.

You can execute this command with a maximum of 5 concurrently selected services at a time.

Dialog image

Define Service

Steps

1. Define Service
2. Define VPLS NEs
3. Define VPLS Topology
4. Define Tunnels
5. Create Tunnel(s) Manually
6. Summary

Summary

Name	LAN2-DH
Type	VPLS
Service Profile	VPLS-DHCap
Class Type	Prio
BW [kbit/s]	10000
Pseudo Wires	6
NEs [4]	SVI VLAN
NE_80	74
NE_81	74
NE_82	74
NE_83	74

Define Service

Service | Quality of Service / Rate Limiting

Name	LAN2-DH	Description	
Type	VPLS	Service Profile	VPLS-DHCap
EVC ID	8a87d4ef-553e-4b41-a922-6fb8126059b0	Service Category	General
Dual Home / PW Control Word			
☒ Dual Home Capable		PW Control Word: Enabled	
Service Supervision			
☒ Add To Service Supervision		Network: red	
Customer	customer_1562138628981	SLA	sla_1562138637823

? Help < Back Next > Save X Cancel

Mandatory entries

Define Service:

- without TE Service Profile license option: none
- with TE Service Profile license option: **Service Profile**
- where required: set “Dual Home Capable”

Define Quality of Service / Rate Limiting: none

Define VPLS NEs

- Select Member NEs
- Enter SVI VLAN
- For PE Dual Home relevant NEs select primary node and secondary node, and protection mode.
- For Spoke NEs select primary node to connect to.

Define VPLS Topology

- where required: add VPWS ports to the service;
- where required: edit Pseudo Wires;
- where required: define / edit port rate limiters.

Define Tunnels

- where required: modify the bandwidth (PW, Tunnel);

- where required: select and/or route the tunnel(s).

Create tunnel(s) – only when tunnels are to be created manually

Summary

- Save

Optional entries

Define Service

- Name (default name is given – this can be edited)
- Type (default is “VPLS”)
- Description

Note:

The use of **Service Profiles** is strongly recommended. It assures a consistent setting of the relevant parameters throughout the MPLS-TP network.

With a valid TE Service Profile license option the selection of a **Service Profile** is mandatory for the service definition.

- Add To Service Supervision
- Network
- Customer
- SLA

Define Quality of Service / Rate Limiting:

- CoS Type
- Default Priority
- Scheduling Profile
- CoS Overwrite
- Overwrite Priority
- Enable Rate Limiting
- CIR
- CBS
- EIR
- EBS

Define VPLS NEs

- For PE Dual Home relevant NEs select primary node and secondary node, and protection mode.
- For Spoke NEs select primary node to connect to.

Define VPLS Topology

- Add selected ports of non-fully meshed NEs to the service;
- Select VPWS type, AC VLAN and/or PW VLAN, depending on VPWS type, and “Attached to NE”.
- where required: edit Pseudo Wires;
- where required: define / edit port rate limiters; set CIR, CBS, EIR, EBS.

Define Tunnels

- where required: modify the bandwidth (PW, Tunnel);
- where required: select and/or route the tunnel(s).

Create tunnel(s) manually – only when tunnels are to be created manually

Summary

- Verify service summary.

Informational content

All dialogs

Steps	Displays the steps to create a Service.
Summary	Displays the currently configured/selected mandatory parameters.

Controls (buttons, menu items, etc.)

Step 1: Define Service, tab “Service”

Name	Specify a Name for the VPLS. A default name is proposed that can be taken over. The name can be edited manually. Note: The Name must be unique and shall not contain characters like [] / * ? { } =
Description	Enter a description for the VPLS.
Type	Specify Service Type: - VPLS (default setting shall be taken over; however, if required you can change the service type here).
Service Profile	Select a Service Profile from the list of existing Service Profiles. This entry is mandatory with a TE Service Profile license option, otherwise it is optional. Note: If you want to create a VPLS based on a Service Profile but need to configure some of the service parameters make sure to use a profile with the relevant parameter options set to “Variable” instead of “Fixed”. For details refer to Create Service Profile .
EVC ID	An automatically generated and assigned Ethernet Virtual Connection ID.
Service Category	Shows the service category defined by the service profile.
Dual Home / PW Control Word settings:	
Dual Home Capable	Can be enabled or disabled as specified by the service profile. For General services the “Dual Home Capable” option is enabled by default; for “Transparent Clock” services the “Dual Home Capable” option is always disabled; for “Transparent Clock with CW” services the “Dual Home Capable” option is enabled.
PW Control Word	Sets the PseudoWire Control Word to enabled or disabled. For dual home capable services the PW Control Word must be enabled. For non-dual home capable services the PW Control Word can be disabled if required. A service with PTP mode “Transparent Clock” can only be used for PTP if the PW Control Word is disabled. For PTP mode “Transparent Clock with CW” Control Word must be enabled.
Service Supervision settings:	
Add To Service Supervision	Click the “Add To Service Supervision” checkbox to activate the Service Supervision parameters: - Network, - Customer, - SLA. Note: These options can only be selected if Service Supervision and Reporting has been configured. If selected, this adds the service to the monitored services under the Service Supervision Service Supervision . A monitored Service must be deployed.

Network	Select the Network attributes for the Service: - red, - green, - blue, - yellow. Note: The network is an attribute that allows coloring and filtering paths and components according to their physical implementation. Refer to Service Editor section for details.
Customer	Select a Customer profile from the Customer Manager list.
SLA	Select a Service Level Agreement profiles from the SLA Manager list.

Step 1: Define Service, tab “Quality of Service / Rate Limiting”

Ingress Port QoS settings:	
CoS Type	Select the Class of Service Type from one of the following: - Interface: Apply a port based traffic classification. - PCP-1: use the PCP to Traffic Class mapping table as configured via the FOXCAST GUI: NE – QoS – To TC Mapping. - DSCP-1: use the DSCP to Traffic Class mapping table as configured via the FOXCAST GUI: NE – QoS – DSCP to PHB, PHB to PSC, PSC to TC Mapping. Note: This parameter and all further parameters of this step cannot be selected when a service profile has been applied in step 1 with this parameter set to “Fixed”.
Default Priority	Select the default priority to be applied from the range 0...7.
Ingress CoS for VLAN Based services settings:	
CoS Overwrite	Defines the CoS overwrite mode as set in the service profile.
Overwrite Priority	Defines the overwrite priority in the range 0...7 as set in the service profile. Applies only when “CoS Overwrite” mode is set to “Overwrite”.
Ingress Rate Limiting settings:	
Enable Rate Limiting	Enable or disable Rate Limiting. Note: This parameter cannot be selected when a service profile with fixed parameters has been applied in step 1.
Committed Information Rate [kbit/s]	If Rate Limiting is enabled, enter the CIR in kbit/s.
Committed Burst Size [Bytes]	If Rate Limiting is enabled, enter the CBS in bytes.
Excess Information Rate [kbit/s]	If Rate Limiting is enabled, enter the EIR in kbit/s.
Excess Burst Size [Bytes]	If Rate Limiting is enabled, enter the EBS in bytes.
Egress Scheduling Profile settings:	
Scheduling Profile	Select one of the available scheduling profiles. The scheduling profile 1 is fixed to strict priority scheduling. The scheduling profiles 2...5 can be edited via the FOXCAST GUI: NE – QoS – TC Scheduling Profiles – Profile 2...5.

Step 1: General Navigation

? Help	Calls the help viewer and opens this page.

Next >	Calls the next dialog. Only available when all the mandatory parameters of the currently opened dialog are entered or selected.
Save	Closes the dialog and saves the Service to the database.
Note: The “Save” button is activated only when all the mandatory parameters of the currently opened dialog are entered or selected. A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPLS tab of the ENP main window, then select “Deploy VPLS” from the menu.	
Cancel	Closes the dialog without creating the Service.

Step 2: Define VPLS NEs

This steps includes an option to modify the Port Type of involved ports on the selected NEs. Modified port types will be applied to the network after user approval and will be confirmed by FOXMAN-UN via a message “Alignment SniPort succeeded”.

Left-hand table with VPLS NEs to be selected for the service:

VPLS NE	Choose the VPLS member nodes from the list of available ENP nodes. The selected NEs appear in the list of VPLS NEs in the Summary on the left hand side.
Note: When a VPLS NE is selected in the table, and a SVI VLAN has been entered all suitable ports for the VPLS are displayed in a sub-table on the right hand side of the dialog window. For the columns of the sub-table see “Right-hand table with ports listed for selected NE:”. A VPLS cannot be saved while it includes ports with active conflicts.	
NE	The specified Name of the NE.
SVI VLAN	Enter a VLAN ID in the range [1...4089] for any NE. If the SVI VLAN does not yet exist it will be created. The entered SVI VLAN ID will be applied to all NEs for the new service.
Note: If a wrong port mode or any other conflicting setting is encountered an error message will be issued.	
VLAN Name	Name for the SVI VLAN. If the SVI VLAN does not yet exist a name for it will be created automatically.
Role	The role of the NE in the network: - Hub (default), - Spoke, - PE Dual Home. Note: - The Hub NEs will be connected to each other by Pseudo Wires full mesh. - Spoke NE role is only applicable if there is a mesh network available for the related NE. When selected, the name of the attached NE appears in the column “Primary Node”. - PE Dual Home role requires primary node, secondary node, and protection mode to be set.

Primary Node	For VPLS NE with “PE Dual Home” role, select the primary NE to which the current VPLS shall be connected. For “Spoke” role, select the primary NE to which the VPLS NE shall be connected. To select a primary node, click into the field and select from the drop-down list.
Secondary Node	For VPLS NE with “PE Dual Home” role, select the secondary NE to which the current VPLS shall be connected. To select a primary node, click into the field and select from the drop-down list.
Protection Mode	Select the PE Dual Home protection mode (Revertive, Non-Revertive) to be applied.
WTR Time	Set the Wait To Restore Time to be applied for switching back after a protection switch-over in the range 5 ... 720 seconds. Default is 300 seconds.
Status	Indicates missing settings or steps. If an SVI VLAN is not set, the field shows “VLAN Id not set”. If an SVI VLAN has been entered, the field shows “Unsaved” to indicate that the VLANs haven’t been saved yet. The VLANs are saved in a later step. If an NE has all required settings available, and which are saved already, the status is “Saved OK”. If an NE has been added but not saved yet, the status is “Unsaved”.
Right-hand table with ports listed for selected NE:	
Edit	 Switch to edit mode. The edit mode allows you to modify ports before adding them to the service. The modification can be applied directly to the network. Also used to switch back to View mode.
Apply	 Apply port modifications. This will apply the modified port settings to the network. A successful deployment will be confirmed with the message “Alignment SniPort succeeded”.
Reload	 Reload SNI ports. This will reload the current port settings from the network, i.e. from the current port settings in the NEs.
While in “View” mode:	
NE	Shows the NE name.
Reference	Shows the port reference.
VLAN Mode	Shows the VLAN mode applicable to the port.
Status	Shows the save status of the VLAN port.
Conflict	Indicates whether there is a conflict that would exclude the port from being added to the service.
Reason	Indicates the most probable conflict reason.
While in “Edit” mode:	
Port	Checkbox to mark a port to be added. A port marked here is added to the VPLS if it can be re-configured accordingly, i.e., when marked, the Port Type and VLAN Mode of a port are modified (to “CVP, Trunk” or “CVP, General”) so that it can be added to the VPLS. If you select a different NE, you will be prompted with a confirmation request asking whether you want to apply the port modifications (Yes, No). - Yes: port modifications will be applied, which will take some time and will be confirmed by a message “Alignment SniPort succeeded”, and the ports are added to the VPLS. Note: Applied port modifications will remain in the network even if you cancel the service creation or modification. - No: port modifications will be canceled, and the ports won’t be added to the VPLS.

Label	Address of the port including unit, slot, and port ID.
Slot	The slot number of the unit in the NE subrack.
Port Type	The port type configured on the port (None, CVP, PWAC).
VLAN Mode	The VLAN mode configured on the port (Unknown, General, Trunk, Access).
Reason	Indicates the most probable conflict reason.
Show all ports	Checkbox to be marked if all ports shall be displayed, including the ones not eligible for being added to the VPLS.

Step 2: General Navigation

? Help	Calls the help viewer and opens this page.
< Back	Calls the previous dialog.
Next >	Calls the next dialog. Only available when all the mandatory parameters of the currently opened dialog are entered or selected.
Save	Closes the dialog and saves the Service to the database.
Note: The “Save” button is activated only when all the mandatory parameters of the currently opened dialog are entered or selected. A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPLS tab of the ENP main window, then select “Deploy VPLS” from the menu.	
Cancel	Closes the dialog without creating the Service.

Step 3: Define VPLS Topology

Step 3 - “VPLS Topology” tab

The “VPLS Topology” tab shows the topology settings made in step 2.

Node	Name of the node that is part of the topology.
Role	The role of the NE in the network: - Hub (default), - Spoke, - PE Dual Home. Note: - The Hub NEs will be connected to each other by Pseudo Wires full mesh. - Spoke NE role is only applicable if there is a mesh network available for the NE. The name of the attached NE appears in the column “Primary Node”. - When the NE has PE Dual Home role, primary node and secondary node NEs are shown in the two respective columns.
Primary Node	For VPLS NE with “PE Dual Home” role, shows the primary NE to which the current VPLS is connected.
Secondary Node	For VPLS NE with “PE Dual Home” role, shows the secondary NE to which the current VPLS is connected.
Connected	Shows whether an NE is connected in the scope of this service.
Node	Name of the NE with preceding short for the mode: H: Hub S: Spoke PE: PE Dual Home
Node PW Binding	PW Binding of the node and its connected node in the scope of the current service. Valid options are “Mesh” or “Spoke”.

Connected To	Name of the connected NE with preceding short for the mode: H: Hub S: Spoke PE: PE Dual Home
Connected To PW Binding	PW Binding of the connected node and its connected node in the scope of the current service. Valid options are “Mesh” or “Spoke”.
Dual-Home Group	Name of the Dual-Home group. You can select among the PE Dual Home node name or “No Dual-Home Group”.
Dual-Home Role	Primary or Secondary node.
PW Name	Name of the PW used for this service between node and “Connected To” node.
PW Description	Description of the PW.
PW BW [kbit/s]	Configured bandwidth of the PW.

Step 3 - “VPWS Ports” tab

Add VPWS Ports to Service (optional). This step is required only if you want to define VPWS NE ports to be attached to the service. Otherwise, go to the “Pseudo Wire” tab.

NE, Name	Select an NE from the list of NEs. The available ports appear in the Ports list on the right. Note: This is applicable only to spoke bindings. No setting shall be done here for full mesh bindings.

Right-hand table with ports of the selected NE:

Port	Select one or several ports from the list by activating the mark in the checkbox. Ports of Port Type “CVP” or “PWAC” are listed here. Repeat this for all required spoke NEs.
Label	Shows the port label composed of <NE Name> <Unit Name> <slot> <port-x>
Port Type	Shows the Port Type. Only CVP or PWAC ports are available.
VPWS Type	Choose the Attachment Circuit (AC) type. The AC type depends on the selected Port Type (CVP, PWAC). The list of Types includes: - AC Port Based, No Change, - AC Port Based, Add PW Tag, - AC VLAN Based, No Change, - AC VLAN Based, Change Tag, - AC VLAN Based, Add PW Tag, - AC Untagged, No Change, - AC Untagged, Add PW Tag. Note: Depending on the Port Type only a part of the above options appear in the “Type” selection list.

AC VLAN	Enter an existing AC VLAN ID (Attachment Circuit VLAN) for each port if “Type” is set to: - AC VLAN Based, No Change, - AC VLAN Based, Change Tag, or - AC VLAN Based, Add PW Tag. No AC VLAN can be entered for “Type” set to: - “AC Port Based, No Change”, - “AC Port Based, Add PW Tag”, - “AC Untagged, Add PW Tag”, or - “AC Untagged, No Change”.
PW VLAN	Enter a PW VLAN ID in the range 1...4089 for each port if one of the following is selected in “Type”: - “AC Port Based, Add PW Tag”, - “AC VLAN Based, Change Tag”, - “AC VLAN Based, Add PW Tag”, or - “AC Untagged, Add PW Tag”.
Attached to NE	From the drop down list select the (spoke) NE to which the port is attached.
Status	Shows the status of the Ports setup. Usually this will show “Unsaved” until the configuration has been saved. In case of any conflict the Status column shows the most probable reason for the conflict. Example: “VLAN Id already in use” is shown if the AC VLAN ID is already used for other VLAN settings.
Reason	Shows the reason for which a port cannot be added to the service.
Show all ports	When enabled, the ports table also shows ports that cannot be added due to a configuration mismatch between port settings and service requirements.

Step 3: “Pseudo Wire” tab

In this tab the determined Pseudo Wires are listed. Some of their properties need to be configured now. If a Service Profile has been selected in step 1 the bandwidth (BW) is already determined.

**Please note:**

Parameters that have been set to “Variable” in the Service Profile can still be edited here. Parameters that have been set to “Fixed” in the Service Profile can no longer be edited here.

The entries can either be done within the table, or in the “Pseudo Wire(s)” details field below the table once an entry has been selected.

Name	Specify a Name for the Pseudo Wire. You can accept the automatically generated name. Note: The Name must be unique and shall not contain characters like [] / * ? { } =
Description	Enter a description for the Pseudo Wire. This entry is optional.
Initiator	Shows the Initiator NE.
Terminator	Shows the Terminator NE.
BW [kbit/s]	Enter the allocated bandwidth for the Pseudo Wire in kbit/s. Example: For a bandwidth of 10 Mbit/s enter 10000.

Tunnel,	When clicking into the “Tunnel” field or on the Tunnel selection icon, you can select/edit the tunnel to be used for the service. Select one of the following:
Select Tunnel: 	- Create Automatically, - Create Manually, - or select one of the existing tunnels (if applicable). Once the “Next >” button is clicked, the Wizard will proceed to Step 6 Create Tunnel.
	Note: - The list includes only applicable Tunnels, i.e. Tunnels with sufficient bandwidth and the same endpoints as the currently being created Service. - If any of the existing tunnels or “create automatically” option is selected, the Wizard will skip the Step 6 “Create Tunnel”.
Min Label	The minimum Pseudo Wire label (recommended default: 500000; allowed range: 16 to 1048575).
Max Label	The maximum Pseudo Wire label (default: 1048575; allowed range: 500000 to 1048575).
Status	Shows the status of the Ports setup. Usually this will show “Unsaved” until the configuration has been saved. In case of any conflict the Status column shows the most probable reason for the conflict.

Step 3: “Port Rate Limiter” tab

In this tab the rate limiting parameters CIR, CBS, EIR, EBS can be modified if modification is allowed in the service profile used. You need to select a port from the **Ports List** for modification of its **Parameters**.



Please note:

Parameters that have been set to “Variable” in the Service Profile can still be edited here. Parameters that have been set to “Fixed” in the Service Profile can no longer be edited here.

Ports List

NE	Shows the NE name.
Reference	Shows the port reference with unit name, slot, and port ID.
VLAN Mode	Shows the configured VLAN mode of the port.
Status	Shows the save status of the port’s assignment to the service.

Parameters

NE	Shows the NE name as selected in the Ports List .
Port	Shows the port reference with unit name, slot, and port ID as selected in the Ports List .
CoS Type	Shows the CoS Type set in the service profile.
Default Priority	Shows the Default Priority set in the service profile.
Scheduling Profile	Shows the Scheduling Profile set in the service profile.
CoS Overwrite	Shows the CoS Overwrite set in the service profile.
Overwrite Priority	Shows the Overwrite Priority set in the service profile.
Enable Rate Limiting	Select whether to enable or disable rate limiting.
Committed Information Rate [kbit/s] (CIR)	If rate limiting is enabled, enter the required CIR for the selected port.
Committed Burst Size [bytes] (CBS)	If rate limiting is enabled, enter the required CBS for the selected port.

Excess Information Rate [kbit/s] (EIR)	If rate limiting is enabled, enter the required EIR for the selected port.
Excess Burst Size [Bytes] (EBS)	If rate limiting is enabled, enter the required EBS for the selected port.

Step 3: General Navigation

? Help	Calls the help viewer and opens this page.
< Back	Calls the previous dialog.
Next >	Calls the next dialog. Only available when all the mandatory parameters of the currently opened dialog are entered or selected. If any manual tunnel creation has been selected, the tunnel creation dialog is now displayed. If all tunnels have been set to "Create Automatically" the tunnel creation runs without showing a specific dialog. Only available when all the mandatory parameters of the currently opened dialog are entered or selected.
Save	Closes the dialog and saves the Service to the database. Note: The "Save" button is activated only when all the mandatory parameters of the currently opened dialog are entered or selected. A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPLS tab of the ENP main window, then select "Deploy VPLS" from the menu.
Cancel	Closes the dialog without creating the Service.

Step 4: Define Tunnel(s)

The table in this step lists Pseudo Wires and their tunnels. The Initiator and Terminator are taken from the Pseudo Wire and cannot be changed. Depending on the number of ports and related settings, this step may take some time. It will be executed for each of the required tunnels before proceeding to [Step 6: Summary](#).

Pseudo Wire	Name of the Pseudo Wire used.
Initiator	Name of the Initiator NE with preceding short for the mode: H: Hub S: Spoke PE: PE Dual Home
Terminator	Name of the Terminator NE with preceding short for the mode: H: Hub S: Spoke PE: PE Dual Home
Pseudo Wire BW [kbit/s]	Current bandwidth of the PW. Edit this if required.
Tunnel BW [kbit/s]	Current bandwidth of the Tunnel. Edit this if required.
Mode	Shows whether the entry has been modified or is saved already.
Tunnel	Name of the Tunnel used.
Tunnel Status	Deployment status of the Tunnel.

Tunnel Action	Shows required action(s) for the Tunnel. The proposed actions can be taken manually by editing the appropriate characteristics, or by clicking on the tunnel selection icon below the table. The following options are available: - Create Manually - Create Automatically - Modified. The “Modified” option allows you to select - the current tunnel but with corrected settings according to the “Tunnel Action” field, or - any other appropriate tunnel.
Error	Shows possible errors that might prevent selecting the tunnel.

Step 4: General Navigation

? Help	Calls the help viewer and opens this page.
< Back	Calls the previous dialog.
Automatic Routing	Starts automatic routing, i.e. creates the required tunnels and/or modifies existing tunnels before the “Next >” button is activated.
Next >	Calls the next dialog. Only available when all the mandatory parameters of the currently opened dialog are entered or selected.
Save	Creates the required tunnels, saves the service to the database and closes the wizard. Note: The “Save” button is activated only when all the mandatory parameters of the currently opened dialog are entered or selected. A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPLS tab of the ENP main window, then select “Deploy VPLS” from the menu.
Cancel	Closes the dialog without creating the Service.

For a description of parameters in the “Details Tunnel” dialog, please refer to the [Create Tunnel](#) section.

Step 5: Create Tunnel(s) Manually

This step is only used when tunnels are set to be created manually in the previous step.

Step 6: Summary

Shows a summary of the service settings.

? Help	Calls the help viewer and opens this page.
< Back	Calls the previous dialog.
Save	Closes the dialog and saves the Service to the database. Note: A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPLS tab of the ENP main window, then select “Deploy VPLS” from the menu.
Cancel	Closes the dialog without creating the Service.

Final step: Deploy Service:

Once the service is created and saved it needs to be deployed to the nodes. This is done by selecting the service from the list of VPLS in the ENP main window and executing the menu option “Deploy VPLS”.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Service Profile](#) (depends on license option),
[Create Tunnel](#),
[Service Supervision and Reporting](#),
[Customer Manager](#),
[SLA Manager](#),
[Create VPWS](#).

8.5.2 Create VPWS

Purpose

The “Create Service” dialog allows you to create a Virtual Private Wire Service (VPWS).

The dialog supports you with service creation by proposing many default settings. A number of manual settings are required however. These are mentioned in the step explanations under “[Controls \(buttons, menu items, etc.\)](#)” below.

**Please note:**

A service created with this dialog is saved to the database but not deployed to the nodes. In order to deploy the services to the nodes you need to select the service in the VPWS tab of the ENP main window and execute “Deploy VPWS” from the “Edit” menu or from the context menu.

You can execute this command with a maximum of 5 concurrently selected services at a time.

Dialog image

Define Service

Mandatory entries

Define Service:

- without TE Service Profile license option: none
- with TE Service Profile license option: **Service Profile**

Define Quality of Service / Rate Limiting: none

Define Attachment Circuit:

- Initiator Type / Terminator Type
- Initiator AC / Terminator AC

Define Pseudo Wire(s):

- Min/Max Label
- Tunnel

Create Tunnel(s)

Finish

- Save

Deploy

Optional entries

Define Service:

- Name (default name is given – this can be edited)
- Type (default is “VPLS”)
- Description

Note:

The use of **Service Profiles** is strongly recommended. It assures a consistent setting of the relevant parameters throughout the MPLS-TP network.

With a valid TE Service Profile license option the selection of a **Service Profile** is mandatory for the service definition.

Define Quality of Service / Rate Limiting:

- CoS Type
- Default Priority
- Scheduling Profile

- CoS Overwrite
- Overwrite Priority
- Enable Rate Limiting
- CIR
- CBS

Define Attachment Circuit (optional parameters depend on Initiator/Terminator Type):

- Initiator AC VLAN
- Initiator PW VLAN
- Terminator AC VLAN
- Terminator PW VLAN
- Port Type for AC port(s)

Service Supervision

BW [kbit/s]

Informational content

All dialogs

Steps	Displays the steps to create a Service.
Summary	Displays the currently configured/selected mandatory parameters

Controls (buttons, menu items, etc.)

Step 1 (a): Define Service, tab “Service”

Name	Specify a Name for the VPWS. A default name is proposed that can be taken over. However the name can be edited manually. Note: The Name must be unique and shall not contain characters like [] / * ? { } =
Description	Enter a description for the Service.
Type	Specify Service Type: - VPWS (default setting shall be taken over; however, if required you can change the service type here)
Service Profile	Select a Service Profile from the list of existing Service Profiles. This entry is mandatory with a TE Service Profile license option. Note: If you want to create a VPWS based on a Service Profile but need to configure some of the service parameters individually make sure to use a profile with the relevant parameter options set to “Variable” instead of “Fixed”. For details refer to Create Service Profile .
EVC ID	An automatically generated and assigned Ethernet Virtual Connection ID.
Service Category	Shows the service category defined by the service profile.
Dual Home / PW Control Word settings:	

PW Control Word	Sets the PseudoWire Control Word to enabled or disabled. For dual home capable services the PW Control Word must be enabled. For non-dual home capable services the PW Control Word can be disabled if required. A service with PTP mode “Transparent Clock” can only be used for PTP if the PW Control Word is disabled. For PTP mode “Transparent Clock with CW” (preferred / default service category for transparent lock) the PW Control Word must be enabled. When using an EPEX1 unit in any of the involved nodes, the use of “Transparent Clock with CW” is mandatory for PTP mode “Transparent Clock”.
Link Loss Forwarding settings:	
Link Loss Forwarding	Click the “Link Loss Forwarding” checkbox to activate LLF for the service. When enabled, LLF will signal a local link down over the PW of a port-based VPWS and replicate the link down on the remote port. This feature is needed where the VPWS is used as a super-transparent wire service, e.g. when transporting an RSTP link over MPLS-TP. Default is “Enabled”.
Service Supervision settings:	
Add To Service Supervision	Click the “Add To Service Supervision” checkbox to activate the Service Supervision parameters: - Network, - Customer, - SLA. Note: These options can only be selected if Service Supervision and Reporting has been configured. If selected, this adds the service to the monitored services under the Service Supervision Service Supervision. A monitored Service must be deployed.
Network	Select the Network attributes for the Service: - red, - green, - blue, - yellow. Note: The network is an attribute that allows coloring and filtering paths and components according to their physical implementation. Refer to Service Editor section for details.
Customer	Select a Customer profile from the Customer Manager list.
SLA	Select a Service Level Agreement profiles from the SLA Manager list.

Step 1 (b): Define Service, tab “Quality of Service / Rate Limiting”

Ingress Port QoS settings:	
CoS Type	Select the Class of Service Type from one of the following: - Interface: Apply a port based traffic classification. - PCP-1: use the PCP to Traffic Class mapping table as configured via the FOXCAST GUI: NE – QoS – To TC Mapping. - DSCP-1: use the DSCP to Traffic Class mapping table as configured via the FOXCAST GUI: NE – QoS – DSCP to PHB, PHB to PSC, PSC to TC Mapping. Note: This parameter cannot be selected when a Service Profile has been applied in step 1 with this parameter set to “Fixed”.

Default Priority	Select the default priority to be applied from the range 0...7.
	Note: For VLAN based services the default priority is ignored.
Ingress CoS for VLAN Based services settings:	
CoS Overwrite	Defines the CoS overwrite mode as set in the service profile.
Overwrite Priority	Defines the overwrite priority in the range 0...7 as set in the service profile. Applies only when "CoS Overwrite" mode is set to "Overwrite".
Ingress Rate Limiting settings:	
Enable Rate Limiting	Enable or disable Rate Limiting.
	Note: This parameter cannot be selected when a Service Profile has been applied in step 1.
Committed Information Rate [kbit/s]	If Rate Limiting is enabled, enter the CIR in kbit/s.
Committed Burst Size [Bytes]	If Rate Limiting is enabled, enter the CBS in bytes.
Excess Information Rate [kbit/s]	If Rate Limiting is enabled, enter the EIR in kbit/s.
Excess Burst Size [Bytes]	If Rate Limiting is enabled, enter the EBS in bytes.
Egress Scheduling Profile settings:	
Scheduling Profile	Select on of the five scheduling profiles. The scheduling profile 1 is fixed to strict priority scheduling. The scheduling profiles 2...5 can be edited via the FOXCST GUI: NE – QoS – TC Scheduling Profiles – Profile 2...5.

Step 1: General Navigation

? Help	Calls the help viewer and opens this page.
< Back	Calls the previous dialog.
Next >	Calls the next dialog. Only available when all the mandatory parameters of the currently opened dialog are entered or selected.
Save	Closes the dialog and saves the Service to the database.
	Note: The "Save" button is activated only when all the mandatory parameters of the currently opened dialog are entered or selected. A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPLS tab of the ENP main window, then select "Deploy VPLS" from the menu.
Cancel	Closes the dialog without creating the Service.

Step 2 (a): Define Attachment Circuit, tab "Attachment Circuit"

For both Initiator and Terminator select the required set of parameters as follows:

AC	 Calls the Attachment Circuit (AC) dialog to select the AC NE.

Type	This type defines the AC's frame handling and VLAN tag handling. Select the Initiator Type and the Terminator Type from the list: - AC Port Based, No Change, - AC Port Based, Add PW Tag, - AC VLAN Based, No Change, - AC VLAN Based, Change Tag, - AC VLAN Based, Add PW Tag, - AC Untagged, No Change, - AC Untagged, Add PW Tag. Note: The type defines first the AC frame handling: - AC Port Based: The AC frame can be untagged, priority tagged or VLAN tagged. - AC VLAN Based: The AC frame must be VLAN tagged. - AC Untagged: The AC frame must be untagged. The type further defines the AC VLAN handling: - No Change: The AC frames are not modified. - Add PW Tag: Add a PW VLAN tag to the AC frames. - Change Tag: The AC VLAN ID is modified to the PW VLAN ID. The list below provides an overview of the possible configuration parameters per type: - AC Port Based, No Change: AC VLAN and PW VLAN are not shown and cannot be modified. - AC Port Based, Add PW Tag: Enter the PW VLAN: <VID PW>. - AC VLAN Based, No Change: Enter the AC VLAN: <VID ETH>. PW VLAN: takes the configured value of AC VLAN. - AC VLAN Based, Change Tag: Enter the AC VLAN: <VID ETH>, Enter the PW VLAN: <VID PW>. - AC VLAN Based, Add PW Tag: Enter the AC VLAN: <VID ETH>, Enter the PW VLAN: <VID PW>. - AC Untagged No Change: AC VLAN and PW VLAN are not shown and cannot be modified. - AC Untagged, Add PW Tag: Enter the PW VLAN: <VID PW>.
AC VLAN	Enter the Initiator/Terminator AC VLAN - <VID AC> Accept only tagged frames with the VLAN ID <VID AC> This parameter value is associated with the "AC VLAN Based" service type and can be modified. The valid range is 1...4089.

PW VLAN	Enter the Initiator/Terminator PW VLAN: - <VID PW> This parameter value is associated with the “Add PW tag” and “Change Tag” service types and can be modified. The valid range is 1...4089. If the service type is “VLAN Based, No Change”, the PW VLAN ID is copied from the AC VLAN ID and cannot be modified.
Port (table)	Select the AC port from the list of available ports. The ports list shows - Label, - Slot, - Port Type: Note: When selecting a port with port type “None” or “CVP”, the port type is automatically set to “PWAC”, and the “Next >” navigation button changes to “Apply Port Types >”. To confirm the port selection and apply the port type modification, click on “Apply Port Types >”. You can manually modify the port type to match the required type “PWAC”; click into the field to modify the port type. The port type cannot arbitrarily be modified. Only types that match the AC Type can be selected. Port types are updated when changing the AC Type. To revert the proposed port type modifications, deselect the port (via <Ctrl>/<Strg>-click), or select a different port, or cancel service creation. Once port types are selected, click on “Apply Port Types >” to apply the modifications to the network. When modifications have been applied, the “Apply Port Types >” button changes back to “Next >”. - VLAN Mode, - Reason (for a port not being selectable when “Show all ports” is enabled).
Show all ports	Enable or disable display of all ports, or only of ports that are suitable to be used as AC. When all ports are shown, ports that are not suitable indicate the reason why they cannot be used as AC.

Step 2 (b): Define Attachment Circuit, tab “Pseudo Wire”

Name	Shows the VPWS name.
Description	Shows the description for the Pseudo Wire. This entry is optional.
Initiator	Shows the Initiator NE.
Terminator	Shows the Terminator NE.
PW Min Label	Enter the minimum Pseudo Wire label. Default is 500000. It is recommended not to decrease this to avoid conflicts with the tunnel label range.
PW Max Label	Enter the maximum Pseudo Wire label. Default is 1048575.
BW [kbit/s]	Enter or edit the allocated bandwidth for the Pseudo Wire in kbit/s.
Example: For a bandwidth of 10 Mbit/s enter 10000.	

Step 2 (c): Define Attachment Circuit, tab “Port Rate Limiter”

In this tab the rate limiting parameters CIR, CBS, EIR, EBS can be modified if modification is allowed in the service profile used. You need to select a port from the **Ports List** for modification of its **Parameters**.

**Please note:**

Parameters that have been set to “Variable” in the Service Profile can still be edited here. Parameters that have been set to “Fixed” in the Service Profile can no longer be edited here.

Ports List

NE	Shows the NE name.
Reference	Shows the port reference with unit name, slot, and port ID.
VLAN Mode	Shows the configured VLAN mode of the port.
Status	Shows the save status of the port's assignment to the service.

Parameters

NE	Shows the NE name as selected in the Ports List .
Port	Shows the port reference with unit name, slot, and port ID as selected in the Ports List .
CoS Type	Shows the CoS Type set in the service profile.
Default Priority	Shows the Default Priority set in the service profile.
Scheduling Profile	Shows the Scheduling Profile set in the service profile.
CoS Overwrite	Shows the CoS Overwrite set in the service profile.
Overwrite Priority	Shows the Overwrite Priority set in the service profile.
Enable Rate Limiting	Select whether to enable or disable rate limiting.
Committed Information Rate [kbits/s] (CIR)	If rate limiting is enabled, enter the required CIR for the selected port.
Committed Burst Size [bytes] (CBS)	If rate limiting is enabled, enter the required CBS for the selected port.
Excess Information Rate [kbits/s] (EIR)	If rate limiting is enabled, enter the required EIR for the selected port.
Excess Burst Size [Bytes] (EBS)	If rate limiting is enabled, enter the required EBS for the selected port.

Step 2: General Navigation

? Help	Calls the help viewer and opens this page.
< Back	Calls the previous dialog.
Next >	Calls the next dialog. Only available when all the mandatory parameters of the currently opened dialog are entered or selected.
Save	Closes the dialog and saves the Service to the database.
Note: The “Save” button is activated only when all the mandatory parameters of the currently opened dialog are entered or selected. A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPLS tab of the ENP main window, then select “Deploy VPLS” from the menu.	
Cancel	Closes the dialog without creating the Service.

Step 3: Define Tunnels

In this step the Pseudo Wire required for the new service is listed. The Initiator and Terminator are taken from the settings in step 2 and cannot be changed.

For descriptions of parameters, please refer to [Create Tunnel](#) section.

Pseudo Wire	The name of the Pseudo Wire used for the new service.
Initiator	Shows the Initiator NE.
Terminator	Shows the Terminator NE.
Pseudo Wire BW [kbit/s]	Enter or edit the allocated bandwidth for the Pseudo Wire in kbit/s, or leave the default setting unchanged. Example: For a bandwidth of 10 Mbit/s enter 10000.
Tunnel BW [kbit/s]	Current bandwidth of the Tunnel. Edit this if required.
Mode	Shows whether the Tunnel has been modified or is saved already.
Tunnel (in the table)	When clicking into the selected "Tunnel" field you can select/edit the tunnel to be used for the service. Select one of the following: - Create Automatically, - Create Manually. Once the "Next >" button is clicked, the Wizard will proceed to Step 5 "Create Tunnel". - One of the existing applicable Tunnels Note: - The list includes only applicable Tunnels, i.e. Tunnels with sufficient bandwidth and the same endpoints as the currently being created Service - If any of the existing tunnels or "create automatically" option is selected, the Wizard will skip the Step 5 "Create Tunnel" and directly proceed with Step 6 "Finish".
Tunnel Status	Deployment status of the Tunnel.
Tunnel Action	Shows required action(s) for the Tunnel. The proposed actions can be taken manually by editing the appropriate characteristics, or by clicking on the tunnel selection icon below the table. The following options are available: - Create Manually - Create Automatically - Modified. The "Modified" option allows you to select - the current tunnel but with corrected settings according to the "Tunnel Action" field, or - any other appropriate tunnel.
Error	Shows possible errors that might prevent selecting the tunnel.
Tunnel (below the table)	Shows the currently selected tunnel. You can select automatic or manual tunnel creation or select an existing tunnel by clicking on the selection icon  .
Save Tunnel...	Modifications to the tunnel used for the service can be changed with this command button.

Step 3: General Navigation

? Help	Calls the help viewer and opens this page.
< Back	Calls the previous dialog.
Next >	Calls the next dialog. Only available when all the mandatory parameters of the currently opened dialog are entered or selected.

Save	Closes the dialog and saves the Service to the database.
	Note: The “Save” button is activated only when all the mandatory parameters of the currently opened dialog are entered or selected. A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPLS tab of the ENP main window, then select “Deploy VPLS” from the menu.
Cancel	Closes the dialog without creating the Service.

Step 4: Create Tunnel(s) Manually

This step is only used when tunnels are set to be created manually in the previous step.

Step 5: Summary

Shows a summary of the service settings. If an existing tunnel needs to be modified to support the newly created service, this is mentioned together with a required action, e.g., “Require increase Tunnel BW to 20010 [kbit/s]”.

? Help	Calls the help viewer and opens this page.
< Back	Calls the previous dialog.
Save	Closes the dialog and saves the Service to the database.
	Note: A confirmation is issued when the service has been saved to the database. To deploy a service select the service in the VPWS tab of the ENP main window, then select “Deploy VPWS...” from the menu.
Cancel	Closes the dialog without creating the Service.

Final step: Deploy Service:

Once the service is created and saved it needs to be deployed to the nodes. This is done by selecting the service from the list of VPWS and executing the menu option “Deploy VPWS”.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Service Profile](#) (depends on license option),
[Create Tunnel](#),
[Service Supervision and Reporting](#),
[Customer Manager](#),
[SLA Manager](#),
[Create VPLS](#).

8.6 Create Tunnel

Purpose

Allows you to create a tunnel with working and optionally protection LSP. The LSPs can be created via Manual or Automatic Routing.

The created LSPs are co-routed bidirectional LSP. This means the forward and reverse directions of a bidirectional LSP follow the same path, that is the same nodes and links from nodes A to Z or from nodes Z to A.

While creating a tunnel, the elements are added to the tunnel graph in the upper part of the dialog window as you proceed with setting the required parameters.

For any node that is added to the LSP graph you can use the context menu to:

- open the “**NE Details**” dialog;
- open the node configuration; select “Configuration - <user class>”. Depending on the user class you will have a specific permission level on the node.

During tunnel configuration, the path bandwidth, Bidirectional Forward Detection (BFD) session to detect failure condition on the path, and the path protection parameters can also be configured.

With the respective license option activated and the required infrastructure installed, you can create encrypted tunnels. For more details refer to the user manuals for the encryption key manager DIRAC, and for the SENC1 series encryption units (SENC1-4, SENC1F4, SENC1-8 or SENC1F8).

Please refer to **LSP Path Calculation** for background information.

This section includes the following major sub-sections:

Select Initiator/Terminator NE,
Manual Routing,
Automatic Routing,
Advanced Routing,
Working and Protection Label Switched Paths (LSPs),
BFD (Bidirectional Forwarding Detection),
Path Protection,
Encryption,
Attached Pseudo Wires,
Tunnel Details.

Dialog image

Create Tunnel

Nameinel_1570788529260DescriptionBW [kbit/s]10010StatusUnsaved

InitiatorNE_80TerminatorNE_82Service ProfileVPLS-var-critUsed BW [kbit/s]10

Working Path

Protecting Path

Path ProtectionEncryptionAttached Pseudo WiresDiagnostic

Working LSP (Unsaved)Protection LSP (Unsaved)BFD

Type	Designation	A End	Z End	Cost	Status	Used BW ...	FW-In	FW-Out	R-In	R-Out
XC	Initiator-Te...	NE_80 C...	NE_82 C...	10	Unsaved	120,020	0	16	17	0
Link										
XC	Initiator-Te...	NE_82 C...			Unsaved		16	0	0	17

Protection

Force Distinct Path

Class TypeMission Critical

Min Label16

Max Label1048575

Manual Routing...

Automatic Routing

Advanced Routing...

Delete LSP Element

? Help

[...] Edit

Save

Deploy

Delete

Cancel

Mandatory entries

- Tunnel Name
- Initiator
- Terminator

Optional entries

- Description
- BW [kbit/s]
- Service Profile
- Protection
- Force Distinct Path

Informational content

Status	- Incomplete: Either mandatory parameters are not yet fully entered or selected, or the routing is not yet complete, i.e. there is a Hole in the path. The tunnel is not yet saved in the FOXMAN-UN database. - Unsaved: The path is complete but the tunnel is not yet saved in the FOXMAN-UN database. - Saved: The tunnel is saved in the database but some nodes or links are missing. - Saved OK: The path is complete and the tunnel has been saved in the FOXMAN-UN database. The tunnel can now be deployed. - Deployed Valid: The path is complete and the tunnel is saved in the FOXMAN-UN database as well as deployed in the nodes. - Deployed Invalid: The tunnel is saved in the database as well as deployed in the nodes. Some nodes could not be deployed or some nodes and links are missing.
Used BW [kbit/s]	The total bandwidth allocation of the deployed services using this tunnel. Note: Service bandwidth allocation is currently not supported.
LSP Graphical View	The LSP graph shows graphical symbols of NEs and LSPs with NE Name, unit and port of the link carrying the LSP, and FW-IN, FW-Out, R-In, and R-Out labels. For Tunnels with Protection enabled both the Working LSP and Protection LSP are shown. For deployed tunnels the currently active LSP background is shaded white if the status can be read. Either the label “Working Path” or “Protecting Path” is bolded to indicate the current selection. The LSP of the currently selected LSP tab (Working or Protection) is colored. For tunnels with encryption see more details in 8.6.8 "Encryption". You can zoom in and out in the LSP graph by using either - the “CTRL” key and the mouse wheel, or - the “CTRL” key and the plus (+) and minus (-) keys of the keyboard. Note: The “CTRL” key may also be named “Strg” on some keyboards. When zooming out some or all of the labels are not displayed any more.

Controls (buttons, menu items, etc.)

Name	Specify a Name for the tunnel.
Description	Enter a description for the tunnel.
BW [kbit/s]	Enter the tunnel bandwidth in kbit/s.
Initiator / Terminator 	Calls the Select Initiator/Terminator NE dialog. Once an Initiator or Terminator has been selected the NE symbol is added in the upper part of the dialog window (if enabled in the Global Preferences).

Service Profile	Select any previously created service profile. Note: When a Service Profile is selected, parameters such as BW [kbit/s], Protection, and Class Type are applied as defined in the service profile. When parameters are defined as “fixed” in a service profile they cannot be modified any more during tunnel creation. Parameters defined as “variable” can still be modified during tunnel creation.
Protection	Click the checkbox to activate the Protection LSP tab, Path Protection tab and BFD sessions. This cannot be modified when a Service Profile with fixed settings is used. Note: When a service profile has protection defined as “fixed”, protection cannot be enabled or disabled during tunnel creation. In this case you would need to create and apply a service profile with protection enabled (or disabled, according to your requirements), or with protection defined as “variable”, which would allow you to enable or disable it during tunnel creation.
Force Distinct Path	Force the routing algorithm to select a distinct path for the protecting LSP. Cannot be modified when a Service Profile with fixed settings is used.
Class Type	The specified the Class Type as configured in Class Type (HQoS Class Type Definition) , and applied to the Service Profile . This cannot be modified when a Service Profile is used.
Min Label	Enter the minimum tunnel label. Default is 3000.
Max Label	Enter the maximum tunnel label. Default is 1048575. It is however recommended to use tunnel labels that are smaller than the PW Min Label to avoid conflicts with the PW label range.
Manual Routing	Allows the user to route the LSP manually. Once routing is completed the path is added to the graphical diagram. For protected tunnels routing needs to be executed on both Working LSP and Protection LSP. Calling this command on a “Hole” will open the Next Hop dialog, which lists all possible MPLS-TP links to reach the next-hop node.
Automatic Routing	Starts the Automatic Routing based on the cheapest route from Initiator to Terminator. Once routing is completed the path is added to the graphical diagram. For protected tunnels routing needs to be executed on both Working LSP and Protection LSP. Note: If a “Tunnel” template is used: Starts the Automatic Routing based on the template’s configured automatic routing parameters. Please refer to Advanced Routing for parameters’ details.
Advanced Routing	Calls the Automatic Routing Parameters dialog. For protected tunnels routing needs to be executed on both Working LSP and Protection LSP. The dialog’s “Route” button creates a complete LSP automatically based on the configured routing parameters. Once routing is completed the path is added to the graphical diagram.

Delete LSP Element	Removes the LSP elements from the Path; only possible in Edit mode. This command is called from the context menu of the selected LSP element(s) of the Working LSP or the Protection LSP. It is possible to remove - a link, - an NE (node) and a link, - a number of consecutive links from the path. If more than one link is selected, then the nodes between two links are also removed. The removed LSP element(s) are then replaced by a “hole”. Only one “hole” is allowed on the path. When an LSP element is removed from the path, the corresponding link and node resources are automatically released. A hole can be closed again by applying Manual Routing , Automatic Routing or Advanced Routing while in Edit mode.
Edit	Allows modifying the currently opened tunnel.
Save	Saves the tunnel in the database.
Deploy	Deploys the planned (saved) tunnel to the nodes.
Delete	Deletes the currently opened tunnel.
Cancel	Closes the dialog without creating the tunnel.

Help

? Help	Calls the help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Tunnel](#),
[Select Initiator/Terminator NE](#),
[Service Profile](#) (depends on license option),
[Manual Routing](#),
[Automatic Routing](#),
[Advanced Routing](#),
[Working and Protection Label Switched Paths \(LSPs\)](#),
[BFD \(Bidirectional Forwarding Detection\)](#),
[Path Protection](#),
[Encryption](#),
[Attached Pseudo Wires](#),
[Tunnel Details](#).

8.6.1 Select Initiator/Terminator NE

Purpose

This window allows you to select the A End NE or Z End NE from the ENP Domain's member NEs.

Dialog image

Select Initiator or Terminator NE

Name	Global ID	Node ID	Description	NE ID	Addressing	NE Operati...	
NE_192.16...	1	1			1 IP: 192.168...	Manageable	▲
NE_192.16...	1	2			2 IP: 192.168...	Manageable	
NE_192.16...	1	3			3 IP: 192.168...	Manageable	

Entries: Total 3 Filtered 3 Selected 0

✓ OK

Apply

✕ Cancel

Mandatory entries

Select one of the listed NEs.

Optional entries

Not applicable.

Informational content

Name	Configured NE name.
Global ID Node ID	The pair of Global ID and Node ID should be unique.
NE ID	The NE ID automatically set by the FOXMAN-UN system.
Addressing	IP address of the node.
Support QoS	A mark in the checkbox indicates that the NE supports QoS. An empty checkbox indicates that the NE doesn't support QoS.
NE Operational State	The status of the node as defined by the core.
NE Type	Shows the NE type, e.g. FOX615, FOX612, or FOX611.

Controls (buttons, menu items, etc.)

OK	Applies the selected A/Z End NE and closes the dialog.
Apply	Applies the selected A/Z End NE without closing the dialog.
Cancel	Closes the dialog without applying the modifications.

Help

? Help	Calls the help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Create Tunnel](#).

Available BW [kbit/s]	Bandwidth attribute used for the LSP path computation. Available BW = Link BW - Reserved BW Note: All the proposed links' "Available BW" can satisfy the path's bandwidth requirement provided the link bandwidth is not set to a value above its physical capabilities.
Used by other path	Indicates that the link is already used by the working/protecting path.
Last	Indicates that the proposed link is the last hop to complete the path.
Total BW [kbit/s]	Link bandwidth computed from physical port characteristics of the selected MPLS-TP endpoint ports, e.g. CESM1 port-1.
Reserved BW [kbit/s]	Total allocated bandwidth of all configured (saved in the database) but not yet deployed Tunnels using this link.
Cost	The configured link cost.

Controls (buttons, menu items, etc.)

Next Hop	Lists all possible links to reach the next-hop node. To prevent loops, the links leading to nodes already used in the path are not listed. When the Next-Hop is selected, - the corresponding NE and MPLS-TP Link are added to the path session, - the tunnel's configured BW is added to the selected MPLS-TP link's reserved BW, - new possible next hops are shown.
Step Back	Deletes the last hop and displays the previous hop(s).
Finish	Creates the last hop and closes the dialog.
Close	Closes the dialog without creating the hop.

Help

? Help	Calls the help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Create Tunnel](#).

8.6.3 Automatic Routing

Purpose

Automatic Routing automatically creates a complete LSP based on the cheapest route. This means the routing engine takes into account the administrative cost of the link, which is set via section management or via [NE](#). The selected path between Initiator and Terminator, therefore has the lowest overall link cost in the network.

If **Service Profile** is used, the automatic routing engine completes the path based on the service profile's configured Automatic Routing Parameters. Please refer to **Advanced Routing** section for details.

i

Please note:

If distinct links and distinct HW (MPLS-TP interfaces on distinct Core Unit HW) are available, protected tunnels are routed over distinct HW, provided the section cost of the respective links is appropriate.

8.6.4

Advanced Routing

Purpose

Advanced Routing creates a complete LSP automatically based on the configured values of the Automatic Routing Parameters.

If a **Service Profile** is used, the advanced routing engine will override the service profile's configured Automatic Routing Parameters in completing the LSP, provided the service profile allows the variation of the parameter(s).

i

Please note:

The Advanced routing engine, however, will not change the tunnel service profile's configuration.

Dialog image

Routing Parameters

☐ Maximum Hops

☐ Maximum Cost

0

0

Routing Order

Cheapest

Included NEs

NE_80
NE_83

Excluded NEs

NE_82

⬆ ⬇ ⬆

Select NEs

Select NEs

Excluded Links

Select Links

Select Distinct Tunnels

☒ Filter Tunnels with current Endpoints

? Help

Route

Clear

✓ OK

✕ Close

Select NEs (Choose Included NEs / Choose Excluded NEs)

Included ...	Name	Global ID	Node ID	Description	NE ID	Address
☒	NE_80	1	1	Node 80 -...	1	IP: 192.1...
☒	NE_83	1	3	Node 83 -...	3	IP: 192.1...

Entries: Total 2 Filtered 2 Selected 0 Included NEs 2

Select Links (Choose Excluded Links)

Excluded ...	Name	A End NE	A End TP	Z End NE	Z End TP	Link BW [..
☒	80-82	NE_80	NE_80 - C...	NE_82	NE_82 - C...	1,000,000
☒	82-83	NE_82	NE_82 - C...	NE_83	NE_83 - C...	1,000,000
☒	80-83	NE_80	NE_80 - C...	NE_83	NE_83 - C...	1,000,000

Entries: Total 3 Filtered 3 Selected 0 Excluded Links 3

Select Distinct Tunnels

Name	Tunnel Id	Description	Initiato...	Termin...	Total BW ...	In Use B...
VPLS_153...	3::1::1::3		NE_80	NE_83	10,000	10,0
VPLS_153...	6::1::1::3		NE_80	NE_83	10,010	10,0
VPWS_15...	10::1::1::...		NE_80	NE_83	10,010	10,0
tunnel_1...	15::1::1::...		NE_80	NE_83	100,010	

Entries: Total 15 Filtered 4 Selected 1

Mandatory entries

Not applicable.

Optional entries

All entries are optional

Informational content

Included NEs	The routing engine always starts with the Initiator NE and ends with the Terminator NE. The “Included NEs” box is the “ordered” allowlist of nodes between the Initiator and Terminator NE. These are the MPLS-TP nodes that will be taken into account during path calculation of the routing engine. The order of the listing of nodes can be changed (via the up and down arrows). The routing engine searches a path from the Initiator to the first node in the list, then to the next and so forth. It applies the concept of Explicit Route Order (ERO) based on RFC 3209. Note: The Maximum Hop and Maximum Cost options are disabled.
Excluded NEs	Exclude nodes. List of MPLS-TP nodes to be excluded during the path calculation. Note: All nodes from the blocklist are removed from the network graph. Also, links which contain the node(s) present in the blocklist will be removed from the graph. Therefore the nodes and links in the blocklist will not be considered during the automatic path calculation.

Controls (buttons, menu items, etc.)

Maximum Hops	The maximum allowed number of hops in the path
Routing Order	Defines the mode of operation of the routing algorithm. With each routing order different constraints are attached. The following options are available: - BW_Optimized: Takes into account the current bandwidth utilization of link (Available bandwidth). Calculated path uses the less utilized links (in terms of bandwidth). (Cost and Number hops are not taken into account). - Cheapest: Takes into account the administrative cost of the link. Calculated path has the lowest overall cost in the network. (Current bandwidth utilization and number of hops are not taken into account). - Shortest: Takes into account the number of hops on the path. Calculated path has the lowest number of hops in the network. (Current bandwidth utilization and link cost are not take into account). Note: Despite routing order mode, if a link will utilize more than 100% of the available bandwidth then the link will be pruned from the graph. Available BW = Link BW - Reserved BW.
Maximum Cost	The allowed maximum cost of the total path (sum of the MPLS-TP links costs).
Select NEs: Included NEs	Calls the Choose Included NEs dialog, which allows you to select the NEs to be taken into account during the automatic path calculation.
Select NEs: Excluded NEs	Calls the Choose Excluded NEs dialog, which allows you to select the NEs to be excluded during the automatic path calculation.
Excluded Links	Shows a list of links (identified by their Link Names) that are excluded from routing. The list can be modified via the “ Select Links ” and “ Select Distinct Tunnels ” command buttons.

Select Links	Calls the “Choose Excluded Links” dialog to select links that shall be excluded from routing.
Select Distinct Tunnels	Calls the “Select Distinct Tunnels” dialog to select distinct tunnels that shall be excluded from routing.
Filter Tunnels with current Endpoints	If marked, only tunnels matching the current tunnel endpoints are shown in the “Select Distinct Tunnels” dialog.
? Help	Calls the help viewer and opens this page.
Route	Performs automatic routing of the path with the defined parameters.
	Note: If the list of excluded links is too stringent routing will fail with an error message similar to “Automatic Routing failed. Causing exception: Path calculation failed (Resources unavailable)” being displayed.
Clear	Clears all the currently selected parameters without closing the dialog.
OK	Closes the dialog with setting the Routing Parameters, but without performing the routing.
Close	Closes the dialog without setting the Automatic Routing Parameters.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Automatic Routing](#).

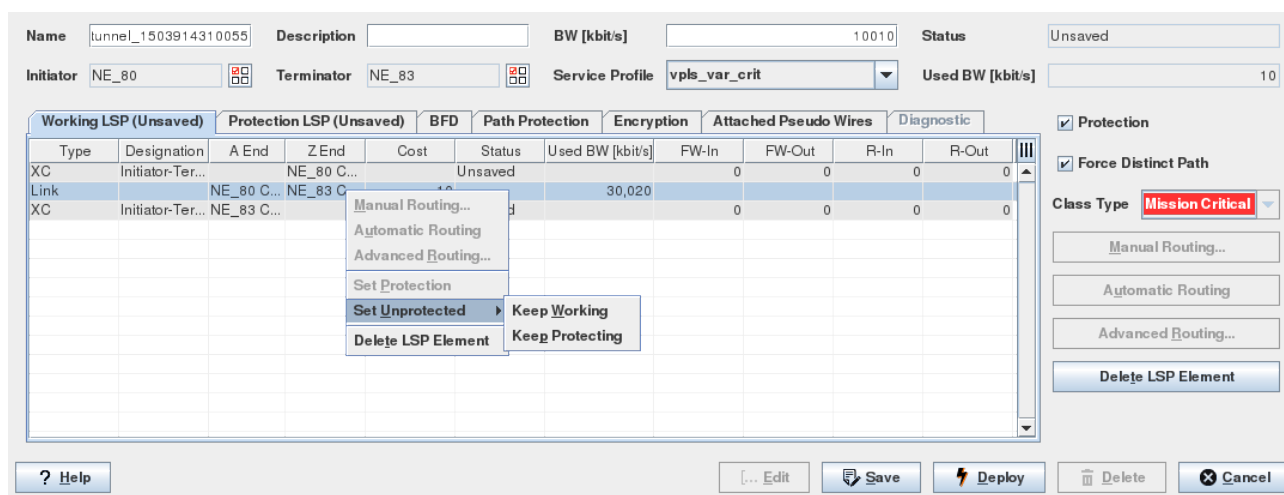
8.6.5 Working and Protection Label Switched Paths (LSPs)

Purpose

When the routing is completed, the Working LSP and Protection LSP tabs display the Working and Protection Paths respectively.

The tabs allow to delete LSP element, enable/disable working or protection LSP.

Dialog image



[illegible]

Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Working LSP/ Protection LSP

Type/Designation	Shows a list of the path elements. A path element can be a: - Hole: represents an incomplete path section. - XC (Cross Connection). There are two types of XC designations: Initiator (ingress) – Terminator (egress) NE: pushes/pops the node label. Transit (Switching) NEs: switch the node label and send the packet to the path. - Link: MPLS-TP link connecting Initiator -Transit-Terminator routers. These MPLS-TP links carry the MPLS-TP packets from a node to the next. An MPLS-TP link joins two MPLS-TP ports.
A End	The A End NE's MPLS-TP port.
Z End	The Z End NE's MPLS-TP port.
Cost	The MPLS-TP link cost.
Status	Shows the deployment status of the Tunnel.
Used BW [kbit/s]	The total allocated bandwidth of all configured (saved in the database) and deployed Tunnels using the link.
FW-In	Incoming LSP Label (Forward direction: Initiator to Terminator). Note: The LSP labels are assigned when the tunnel is saved.
FW-Out	Outgoing LSP Label (Forward direction: Initiator to Terminator).
R-In	Incoming LSP Label (Reversed direction: Terminator to Initiator).
R-Out	Outgoing LSP Label (Reversed direction: Terminator to Initiator).

Controls (buttons, menu items, etc.)

Context Menu

Manual Routing	Starts the Manual Routing by calling the Next-Hop dialog. This allows the user to route the LSP manually. Calling this command on a Hole will open the Next Hop dialog, which lists all possible MPLS-TP links to reach the next-hop node.
Automatic Routing	Starts the Automatic Routing based on the predefined Automatic Routing Parameters.
Advanced Routing	Calls the Automatic Routing Parameters dialog.
Set Protection	Ticks the Protection checkbox and activates the Protection LSP tab, Path Protection tab, and BFD sessions. Only available when the Service Profile is allowing this setting.
Set Unprotected	Unprotects the path (LSP). Only available when the Service Profile is allowing this setting. Choose between “Keep Working” and “Keep Protecting” path. The chosen path is used as the working path (without protection).
Delete LSP Element	Removes the LSP elements from the Path. It is possible to remove - a link, - an NE and a link, - a number of consecutive links from the path. If more than one link is selected the nodes between two links are also removed. The removed LSP element(s) are then replaced by a “Hole”. Only one “Hole” is allowed on the path.

Help

? Help	Calls the help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

MPLS-TP Introduction,
Service Provisioning and Deployment via ENP GUI,
Create Tunnel,
Service Profile (depends on license option).

8.6.6 BFD (Bidirectional Forwarding Detection)

Purpose

Bidirectional Forwarding Detection (BFD) is a network protocol used to detect faults between two MEP endpoints connected by a link. The BFD establishes a session between these endpoints over a particular tunnel / link by exchanging control packets.

Both MEPs exchange BFD control packets at a regular interval. The local MEP sends Continuity Check (CC) packets at a defined “CC Interval” and the remote MEP monitors the arrival of the CC packets and detects loss of Continuity (LOC) if the packets fail to appear over a certain time period.

If the link or path is protected, separate BFD sessions (BFD CC Supervision) are automatically established in the working and protection LSP to monitor both links.

When BFD is activated 1 bandwidth of 10 kbit/s is allocated to the packets exchanged for this purpose.

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Please note:

For background information, please refer to sections [OAM and BFD](#) and [Protection Mechanism](#).

Dialog image

Working LSP (Unsaved)Protection LSP (Unsaved)BFDPath ProtectionEncryptionAttached Pse

Initiator

☒ BFD Session

Working LSP BFD CC Supervision

Discriminator0

CC Interval [ms]100

Protection LSP BFD CC Supervision

Discriminator0

CC Interval [ms]100

Terminator

☒ BFD Session

Working LSP BFD CC Supervision

Discriminator0

CC Interval [ms]100

Protection LSP BFD CC Supervision

Discriminator0

CC Interval [ms]100

Mandatory entries

CC Interval

Optional entries

Not applicable.

Informational content

To achieve sub-50 ms path protection switch-over time, the default value of 3.3 ms CC interval is recommended.

Controls (buttons, menu items, etc.)

BFD Session	Enables/Disables the BFD session in the local and remote MEP (A End NE and Z End NE). If the Path is protected, a working LSP and protection LSP BFD sessions are automatically established. Note: When “BFD Session” is enabled, a bandwidth of 10 kbit/s is automatically added to the “In Use BW [kbit/s]” of the related tunnel. This specific bandwidth also adds per tunnel to the “Reserved BW [kbit/s]” of each Link.
CC Interval [ms]	Defines the transmit interval the local MEP sends the CC packets. The value can be between 3.3 ms and 1000 ms

Help

? Help	Calls the help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

MPLS-TP Introduction,
Service Provisioning and Deployment via ENP GUI,
Create Tunnel.

8.6.7 Path Protection

Purpose

Allows you to define the notification frequency of the path state as well as the restoration actions once the working path is repaired or restored. The protection mode defines whether or not the traffic is switched back from protection path to the working path. There are two modes of operation:

- Revertive mode
The traffic is automatically switched from the protection path to the working path after the expiration of the Wait-to-Restore (WTR) timer.
- Non Revertive mode
The traffic is not automatically restored to the working path, even if the working path is repaired. Thus, administration form of intervention, i. e “Manual Switch” via **FOXCST** is needed to invoke restoration action.

This mode is employed if the administrator wants to gain assurances about the integrity of the path before switching path or if it is acceptable to continue operation without the (protection) path being protected.

In addition this dialog also allows you to trigger manual switch-over commands on deployed tunnels and display the path protection status on deployed tunnels.

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Please note:

For background information, please refer to sections **OAM and BFD** and **Protection Mechanism**, and to Tunnel Details - **Path Protection**.

Dialog image

Path Protection

	Initiator	Terminator
Protection Mode	Revertive	Revertive
WTR Time [s]	300	300
State Change Tx Interval [ms]	20.0	20.0
Steady State Tx Interval [s]	5	5

Path Protection Status

Protection Status			
Request Sent	No Request	No Request	Active LSP Working
Request Related Path			Switch Over
User Data Traffic	Working	Working	Command Clear
Request Received	No Request	No Request	Clear Lockout Protection Forced Switch Manual Switch
Request Related Path			
User Data Traffic	Working	Working	
			Execute

Mandatory entries

Protection Mode

Optional entries

WTR Time

State Change Tx Interval

Informational content**Protection Status**

Active LSP	Shows which LSP is used for transmitting user data (Working or protection).
Request Sent	Shows which switch-over command is sent from Initiator and Terminator nodes.
Request Related Path	If the request sent is related to the working or protection path this is shown here (e.g. interruption of working path).
User Data Traffic	Information sent to other node: Shows which path is carrying user data.
Request Received	Shows which switch-over command is received from Initiator and Terminator nodes.
Request Related Path	If the request received is related to the working or protection path this is shown here (e.g. interruption of working path).
User Data Traffic	Information received from other node: Shows which path is carrying user data.

Controls (buttons, menu items, etc.)

Protection Mode: Revertive	When the signal fail condition is no longer active and after the expiry of the wait-to-restore (WTR) timer, the user traffic is switched back from the protection LSP to the working LSP.
Protection Mode Non Revertive	The user traffic remains on the protection LSP even if the signal fail condition is no longer active.
WTR Time [s]	Wait-To-Restore time for the revertive protection mode in the range: - 0 to 720 s (default 300 s). The user traffic is switched from protection to working LSP only after the expiration of the wait-to-restore timer. While the WTR time is running, a "Maintenance Function Active" alarm is raised on the involved nodes.
State Change Tx Interval [ms]	The time interval to send three protection state coordination (PSC) protocol packets when there is a state change, e.g. a defect. The possible values are: - 3.3 ms, - 10.0 ms, - 20.0 ms.
Steady State Tx Interval [s]	The time interval to send the protection state coordination (PSC) protocol packets when there is no state change.

Switch Over (Protection Status on deployed tunnels with protection enabled)

Command	Select the manual switch-over command that shall be executed when clicking the Execute command button. The following commands are available: - Clear; Upon clicking on "Execute" an active protection switching command is cleared. - Lockout Protection; Upon clicking on "Execute" the protection LSP is locked out from the protection process. - Forced Switch; Upon clicking on "Execute" a forced switch-over from the currently active LSP to the protecting LSP is done. Note: A forced switch-over to the protecting path causes the protecting path to be active whenever it is fault free. Upon a fault on the active protecting path, a switch back to the working path is done. When the fault on the protecting path is cleared, traffic is switched to the protecting path again as long as the forced switch request is active. - Manual Switch; Upon clicking on "Execute" a manual switch-over from the currently active LSP to the protecting LSP is done. Note: A manual switch-over to the protecting path causes the protecting path to be active if it is fault free. Upon a fault on the active protecting path, a switch back to the working path is done, and the manual switch request is cleared automatically.
Execute	Command button to execute the protection switching command selected from the list of four available commands (Clear; Lockout Protection, Forced Switch, Manual Switch).
Help	
? Help	Calls the help viewer and opens this page.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Create Tunnel](#).

8.6.8 Encryption**Purpose**

Set the parameters for tunnel encryption (applicable only for encrypted tunnels):

- Select the Working Encryption Profile,
- Select the Protection Encryption Profile,
- Create Encryption or Delete Encryption.



Please note:

As a prerequisite to configuring and operating tunnel encryption you need to install and set up:

- at least one encryption unit (SENC1 series) per node,
- a centralized key management system (DIRAC),
- a physical connection between core unit front port and encryption unit front port for each link (physical link or VLAN subinterface) that shall carry encrypted tunnels.



Please note:

For an encrypted tunnel, single segments may be unencrypted, either because there is no encryption unit available in the nodes for a specific segment, or because the operator has chosen not to enable encryption on that segment.

→ In such a case, no warning or alarm is issued, and the operator must make sure all segments are configured as per the operator’s requirements.

Dialog image

Tunnel – Encryption

Name tunnel_pb2

Description

BW[kbit/s] 0

Status Unsaved

Initiator Node1

Terminator Node3

Service Profile

Used BW[kbit/s] 0

Working Path

Node1

→ 3004
← 3005

CESM3 <11> port-1

Node2

→ 3004
← 3005

CESM3 <11> port-2

Node3

→ 3004
← 3005

Protecting Path

Node1

→ 3006
← 3007

CESM3 <11> port-2

Node4

→ 3006
← 3007

CESM3 <11> port-2

Node3

→ 3006
← 3007

Path Protection Encryption Attached Pseudo Wires Diagnostics

Working LSP (Unsaved)

Protection LSP (Unsaved)

BFD

Working LSP

Protection LSP

Port	Direction	Fwd Label	Rev Label	Required Profile	Required S
Node1 CESM3 <11> port-2	Egress	3006	3007	[4] Encrypted with OAM	1
Node4 CESM3 <11> port-1	Ingress	3006	3007	[4] Encrypted with OAM	1
Node4 CESM3 <11> port-2	Egress	3006	3007	[4] Encrypted with OAM	2
Node3 CESM3 <11> port-2	Ingress	3006	3007	[4] Encrypted with OAM	2

Profile [4] Encrypted with OAM

Create End-To-End Encryption

Create Hop-By-Hop Encryption

Create Segment(s) Encryption

Delete Encryption

? Help

... Edit

Save

Deploy

Delete

Cancel

Mandatory entries

Not applicable.

Optional entries

Encryption Profile

Informational content

LSP Graphical View	The LSP graph shows nodes and LSPs with encryption related information such as labels (Label In, Label Out). Encrypted LSPs are colored in gold: - Nodes with end-to-end encrypted LSPs are also colored in gold. - When hop-by-hop encryption is applied, only the segments are colored, but not the nodes.  For deployed tunnels with encryption, lock symbols are shown on each port of encrypted LSPs. In encryption (transmit) direction a closed padlock symbol is shown to indicate the encryption process at this port.  In receive direction an open padlock symbol is shown to indicate the decryption process at this port.  If for any reason a Crypto Engine (CE) or Crypto Configuration (CC) is missing the respective entries are colored red, and the label in the LSP graph is marked with a warning symbol.
Port	Shows the NE name, unit name, slot, and port ID of the tunnel end point port.
Encryptable	Shows whether the LSP can be encrypted or not, depending on the provided infrastructure. If no encryption unit is available the checkbox will be empty; if an encryption unit is available the checkbox will be marked.
Direction	Egress: this is the egress port as per the tunnel configuration. Ingress: this is the ingress port as per the tunnel configuration.
Fwd Label	Shows the forward label.
Rev Label	Shows the reverse label.
Required Profile	Shows the required profile for tunnel encryption. This is as selected in Profile .
Required Segment Id	While creating the tunnel, this shows the ID of the segment to which the encryption is to be applied. When displaying the tunnel details of an existing tunnel, this shows the segment ID for each of the segments.
CE Profile	While creating the tunnel, this field is empty. When displaying the tunnel details of an existing tunnel, this shows the Crypto Engine (CE) profile applied to the tunnel. If a CE Profile had been configured and deployed but is missing, e.g. because it has been deleted manually, the status "Missing" is shown.
CE Segment Id	While creating the tunnel, this field is empty. When displaying the tunnel details of an existing tunnel, this shows the Crypto Engine (CE) Segment ID for each of the segments. If a CE Profile had been configured and deployed but the CE Segment ID is missing, e.g. because the CE Profile has been deleted manually, the status "Missing" is shown.

Controls (buttons, menu items, etc.)

Profile	Select the tunnel encryption profile (applicable to working and protection LSP in case of Protection): - None: No profile applied; this is the default, - [1] Discard: Discard all traffic, - [3] Encrypted & Authenticated without OAM: Encrypt and authenticate all traffic; do not use OAM, - [5] Encrypted & Authenticated with OAM: Encrypt and authenticate all traffic; use OAM.
Applicable to Working LSP and Protection LSP separately:	
Create End-To-End Encryption	Create end-to-end encryption for the current tunnel. For tunnels over one physical link this is identical to creating hop-by-hop encryption.
Create Hop-By-Hop Encryption	Create hop-by-hop encryption for the current tunnel. In general, this creates separate encryption segments for each hop (link). For tunnels over one physical link this is identical to creating end-to-end encryption.
Create Segment(s) Encryption	Create encryption on a segment basis, i.e. each segment is encrypted separately.
Delete Encryption	Delete the encryption configuration from the current tunnel.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Service Profile](#) (depends on license option),
[Create Tunnel](#).

8.6.9 Attached Pseudo Wires**Purpose**

Displays all the Pseudo Wires attached to a tunnel.

Allows you to open the VPWS and VPLS dialogs in details view mode.

Dialog image

Tunnel – Attached Pseudo Wires

[illegible]

Mandatory entries

Not applicable.

Optional entries

Details Service

Informational content

Name	The specified Name of the Service.
Description	The specified Description of the Service.
Initiator	The ingress Label Edge Router (LER).
Terminator	The egress LER.
Service	The specified Service name.
Tunnel	The specified tunnel name.
BW [kbit/s]	The allocated Service bandwidth.
Class Type	The assigned Class Type.
Dual-Home Group	The assigned Dual-Home Group.
Dual-Home Role	The assigned Dual-Home Role.
Status	The Pseudo Wire status: - Deploying/Removing: Display the Progress bar Indicating the current progress of deploying or deleting the selected Service(s). - Deployed Valid: The Service (both Pseudo Wire endpoints) is deployed to the MPLS-TP nodes. - Deployed Invalid: One side of the Pseudo Wire is missing or was not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes.
Tunnel Status	The deployment status of the tunnel. For possible states see “Status” above.
Admin State	The administrative state of the PW.

Operation	During deployment, the transient operation state of the PW.

Controls (buttons, menu items, etc.)

Service Context Menu

Details VPWS/VPLS	 Calls the VPWS/VPLS dialog in view mode. From the Details view, the possible actions are: - Edit (applicable only to VPLS): Calls the Create Service Wizard. - Deploy: Deploys the Service to the nodes. - Delete: Deletes the Service. - Close: Closes the dialog. For details refer to the VPWS Details section.
Details Service...	Open a dialog to show details of the service allocated to the PW.
Show Status Reason...	Opens a window with additional information on the most probable reason for an unaligned or invalid status if applicable to the selected item.
Admin State	- Up: Sets the administrative state of the Pseudo Wires used for this service to “up”. - Down: Sets the administrative state of the Pseudo Wires used for this service to “down”.

Table Sorting and Filtering/Export and Printing

Please refer to **Table Sorter** section for details.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Create Tunnel](#),
[Create Service](#).

8.7 Create Tunnel Mesh

Purpose

The “Create Tunnel Mesh” wizard allows you to create a tunnel mesh that spans over several NEs / links. The tunnels mesh is based on one specific service profile and uses one specific Class Type.

The wizard includes the following steps.

Step 1: Select NEs

- Name
- Service Profile
- Class Type
- Select NEs from table of selectable NEs

Step 2: Define Tunnels

Select Tunnels to be used for the mesh.

Option “Search Matching Tunnels” is on by default.

Existing tunnels can be selected; missing tunnels can be created and routed manually or automatically. The “Mode” column shows whether a tunnel is selected or not.

Details of a selected tunnel can be shown (“Details Tunnel...”).

“Automatic Routing” creates the mesh automatically

Step 3: Create Tunnel(s) Manually (only if required)

Create tunnels manually that are not yet existing.

Step 4: Summary

Summary is shown, click “Save” to save the tunnels.

Dialog image

Create Tunnel Mesh (Wizard)

Steps
1. Select NEs
2. Define Tunnels
3. Create Tunnel(s) Manually
4. Summary

Summary
Service Profile VPLS-210422
Class Type Prio

NEs
NE_80
NE_81
NE_82
NE_83

Select NEs

Name {Terminato}Service Profile VPLS-210422Class Type Prio

Selected NEs

NE	Name ^1	Global ID	Node ID	Description	NE ID	IP Address	
☐	NE_56	100	3		68 /172.31.8...		
☐	NE_57	100	1		70 /172.31.8...		
☐	NE_58	100	4		71 /172.31.8...		
☐	NE_59	100	2		69 /172.31.8...		
☒	NE_80	1	1	Node 80 - MPLS-TP	1 /192.168...		
☒	NE_81	1	4	Node 81 - MPLS-TP	24 /192.168...		
☒	NE_82	1	2	Node 82 - MPLS-TP	2 /192.168...		
☒	NE_83	1	3	Node 83 - MPLS-TP	3 /192.168...		

? Help

< BackNext >SaveCancel

8.8 VPLS Details

Purpose

The VPLS Details dialog displays all the information related to the VPLS in a tree structure, including the involved NEs, VPWS ports, Pseudo Wires, tunnels, and PE Dual Home groups. It provides a “VPLS Service - Details” tab and a “VPLS Service - Graph” tab.

Details

The “Details” tab provides the following types of information for the VPLS as described in detail further below:

- General VPLS information,
- a table of member NEs,
- a table of used Pseudo Wires.

Graph

The “Graph” tab provides a graphical presentation of the physical and/or the logical view on the service.

Depending on the dialog window size you can select the physical graph, the logical graph, or a split view with both the physical and the logical graph (for a selected PW in the physical graph) shown.

The **physical graph** of the VPLS shows involved

- NEs,
- PWs,
- broadcast domains (via polygons),
- LSP links (optional), and
- physical sections (optional).

It also indicates the different layers (service, Pseudo Wire, tunnel, link, section) with colors. For each NE, both a physical symbol and a logical symbol are shown.

Each broadcast domain of a VPLS is emphasized with a polygon connecting the logical icon of the involved NEs. Different polygons have different color shading.

The **logical graph** of the VPLS shows the logical layers of a selected Pseudo Wire used to provide the service. It uses the same colors for showing the different layers (service, Pseudo Wire, tunnel, link) as the physical graph does.

Working and protecting LSPs (tunnels) are shown as solid lines and patterns (working tunnel) and dotted line and patterns (protecting tunnel), respectively.

VPLS Graph Symbols

The following icons or patterns are used in the physical graph:

Icon or Pattern	Description
	Physical NE symbol with NE name and number of VPLS ports on NE.
	Logical NE type "PE Dual Home".
	Logical NE type "Mesh".
	Logical NE type "Spoke".
	Logical NE type "Node with VPWS ports".
	Pseudo Wire, binding "Spoke".
	Pseudo Wire, binding "Mesh", or "Show Pseudo Wire Bindings" disabled.
	Pseudo Wire, "Working".
	Pseudo Wire, "Protecting".
	Pseudo Wire (selected).
	Link / section (selected).
	Link / VLAN sub-interface (selected).
	Layers of a section (default) with PW, tunnel LSP link.

Icon or Pattern	Description
	Layers of a section ('show all layers' enabled) with service, PW, tunnel, LSP, LSP link, link.

View Options:

Several view options can be enabled or disabled in the graph via the view icon :

Paths:

- Working Path,
- Protection Path,

View Settings:

- Show All Layers,
- Show Alarms,

Physical Graph:

- Show Sections,
- Show All Pseudo Wires,

Note that by default, Pseudo Wires of polygons, i.e. Pseudo Wires of broadcast domains (meshed parts of the VPLS) are not shown.

- To view these PWs temporarily, click into the polygon (colored polygon with corners on involved NEs). To hide PWs of polygons, click outside the polygon.
- To persistently view PWs of polygons, enable the option "Show all Pseudo Wires".
- To persistently hide PWs of polygons, disable the option "Show all Pseudo Wires".
- Show Pseudo Wire Bindings,

Labels:

- Show TE labels,
- Show Shared Resource Count,
- Show NE IDs.

Legend:

In the View Options - Legend, the colors used in the diagram are assigned to the layers. A click on the specific color icon will highlight or fade out the layer, respectively. The following layers are available for highlighting or fading out:

- Layers:
 - Service,
 - Pseudo Wire,
 - Tunnel,
 - LSP,
 - LSP Link,
 - Link,
- Physical:
 - Section.

Issues

A list of possible issues can be opened/closed via the info icon . It includes information related to shared resources, status, holes, alarms.

Edit Mode

The graph can be edited which allows a user to rearrange the NEs (nodes) to match their specific requirements in the physical graph.

The icon for starting the edit mode is . The icon is colored dark blue while the edit mode is active. To go back to view mode, select “Stop Editing Mode”.

Further options of the graphical view:

- Zoom in / zoom out;
- Open in a separate window;
- Refresh;
- Reset layout - resets the physical graph to the default view.

Dialog image

VPLS Service - Details

The VPLS service details dialog may look as follows (sample):

VPLS_7

Name	Description	Status
VPLS_7		Deployed Valid

VPN OUI 000001.000000007 **Service Profile** VPLS-var-PCP-crit

Nes

Name	SVI VLAN	VLAN Name	Role	Primary Node	Secondary Node	Service Profile	Status	Conflict
-NE_80	888	VLAN-888 (VLAN_...)	Hub			VPLS-var-PCP-crit	Deployed Valid	☐
-NE_82	888	VLAN-888 (VLAN_...)	Hub			VPLS-var-PCP-crit	Deployed Valid	☐
-NE_83	888	VLAN-888 (VLAN_...)	Hub			VPLS-var-PCP-crit	Deployed Valid	☐
-NE_81	888	VLAN-888 (VLAN_...)	Hub			VPLS-var-PCP-crit	Deployed Valid	☐

Entries: Total 4 Filtered 4 Selected 0

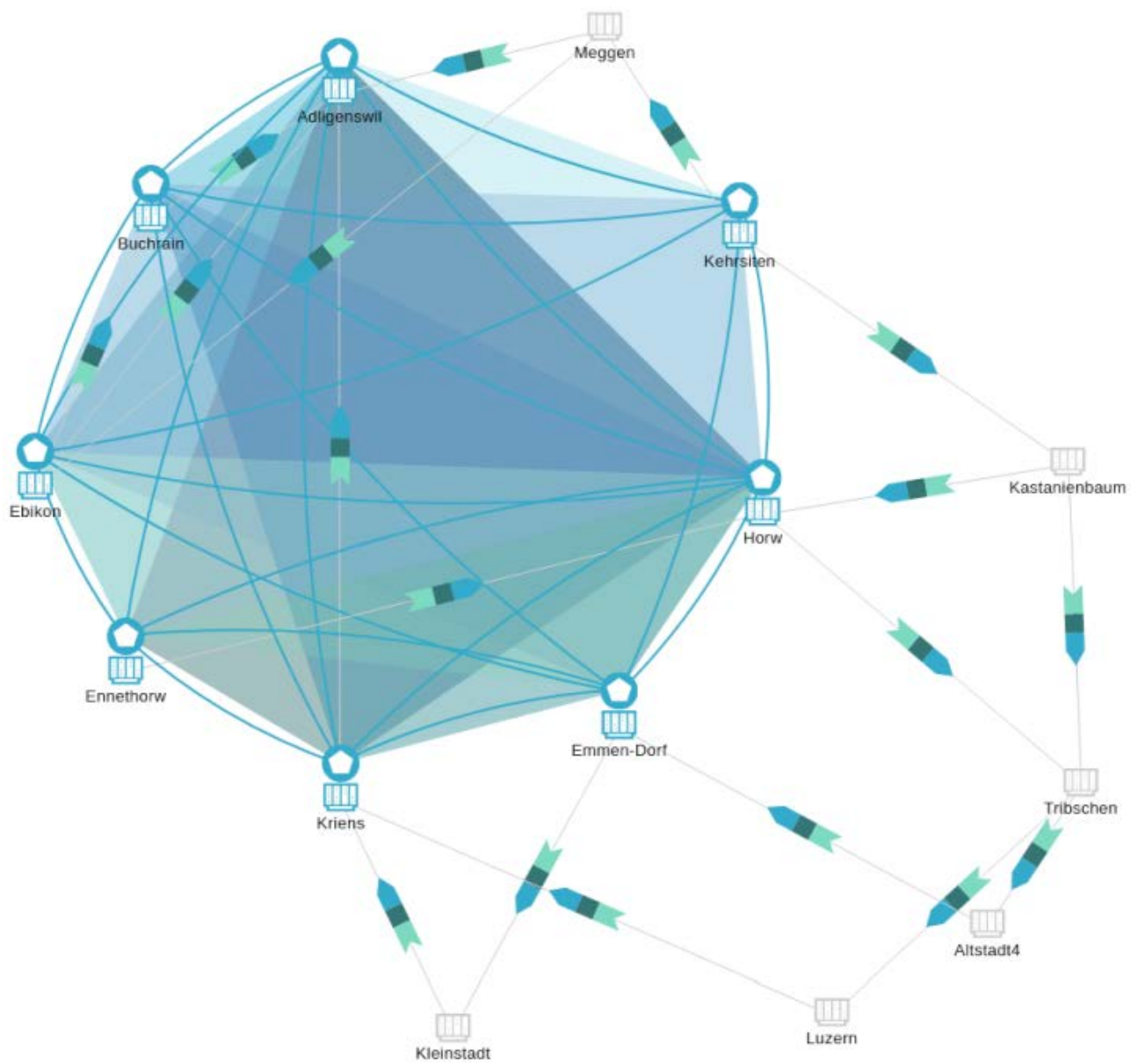
Pseudo Wires

Name	Description	Initiator	Terminator	Tunnel	BW [kbit/s]	Class-Type	Dual-Home Group	Dual-Home Role	Status	Tunnel Status	Admin St...	Operation
VPLS_7_p...		NE_80	NE_81	VPLS_15758...	10,000	Mission C...			Deployed Valid	Deployed Valid	Up	
VPLS_7_p...		NE_80	NE_83	VPLS_15758...	10,000	Mission C...			Deployed Valid	Deployed Valid	Up	
VPLS_7_p...		NE_80	NE_82	VPLS_15758...	10,000	Mission C...			Deployed Valid	Deployed Valid	Up	
VPLS_7_p...		NE_82	NE_81	VPLS_15758...	10,000	Mission C...			Deployed Valid	Deployed Valid	Up	
VPLS_7_p...		NE_82	NE_83	VPLS_15758...	10,000	Mission C...			Deployed Valid	Deployed Valid	Up	
VPLS_7_p...		NE_83	NE_81	VPLS_15758...	10,000	Mission C...			Deployed Valid	Deployed Valid	Up	

Entries: Total 6 Filtered 6 Selected 0

VPLS Service - Graph

The VPLS service physical graph may look as follows (sample):



Informational content

Name	The specified Name of the VPLS.
Description	The specified Description of the VPLS.

Status	The VPLS status: - Deploying/Removing: Display the Progress bar Indicating the current progress of deploying or deleting the selected VPLS. - Deployed Valid: The VPLS is deployed to the MPLS-TP nodes. - Deployed Invalid: One end point of the VPLS is missing or was not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The VPLS, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes. Note: If for any reason a service is invalid an “i” icon indicates additional information. You can display details on the probable cause by double-clicking on the Status field. The “i” icon only appears when the service status is invalid or unaligned.
VPN OUI	A unique VPN id calculated by ENP, common for all member nodes of a VPLS instance.
Service Profile	The name of the Service Profile used for creating the VPLS.

NEs

Name	The specified Name of the NE. The NE can be expanded or collapsed to show or hide the units and ports used for the VPLS service on the NE.
SVI VLAN / VLAN Name	The selected VLAN ID and the VLAN name of the incoming Ethernet frames of the node.
Role	The selected Pseudo Wire binding of the node: Hub or Spoke.
Primary Node	Applicable to Spoke NE. Displays the (primary) Hub node to which the spoke NE is connected.
Secondary Node	Applicable to Spoke NE in case of PE Dual Homing. Displays the secondary Hub node to which the spoke NE is connected.
Service Profile	The name of the Service Profile used for creating the VPLS.
Status	The deployment status of the service on the NE.
Conflict	A mark in the checkbox is set if there is a conflict occurring on the VPLS on this NE instance. Possible conflicts are inappropriate QoS settings or an inappropriate port VLAN mode.

NEs – NE instance

Name	The specified Name of the NE. The NE can be expanded or collapsed to show or hide the units and ports used for the VPLS service on the NE.
SVI VLAN / VLAN Name	The selected VLAN ID of the incoming Ethernet frames of the node.
Status	The deployment status of the service on the NE.
Binding	The selected Pseudo Wire binding of the node: Mesh or Spoke.
Attached To NE	Applicable to Spoke NE. Displays the Mesh node the spoke NE is connected to.
Service Profile	The name of the Service Profile used to create the VPLS.

Status	The service status: - Deployed Valid: The Service is deployed to the MPLS-TP nodes. A deployed Service can be deleted. It can neither be modified nor set back to saved. - Deployed Invalid: One component of the service is not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The service is saved in the database but not yet deployed in the MPLS-TP nodes. - Saved Incomplete: One side of the service is not correctly deployed. It is saved in the FOXMAN-UN database.
Conflict	A mark in the checkbox is set if there is a conflict occurring on a port on this NE instance. Possible conflicts are inappropriate QoS settings or an inappropriate port VLAN mode.

NEs – NE instance – Ports

Reference	Displays the unit name, and <slot> <port>.
Type	Displays the port mode of the port (CVP)
VLAN Mode	Displays the VLAN mode of the port as set via the FOXCST GUI.
PVID	Displays the Port VLAN ID of the port as set via the FOXCST GUI.
Service Profile	The name of the Service Profile used to create the VPLS.
Status	The deployment status of the service on the port.
Conflict	A mark in the checkbox is set if there is a conflict occurring on this port instance. Possible conflicts are inappropriate QoS settings or an inappropriate port VLAN mode.

NEs – NE instance – port instance

Shows properties of the selected port, including Rate Limiting parameters.

VPWS Ports

Port	Displays the Ethernet unit <slot>/<port>
Status	The deployment status of the service on the NE.
Attached to NE	The name of the NE to which the port is attached.
Pseudo Wire	The name of the Pseudo Wire used for the VPWS port.
Tunnel	The name of the tunnel used for the VPWS port.

Pseudo Wires

Name	The specified Name of the Pseudo Wire.
Description	The specified Description of the Pseudo Wire.
Initiator	The name of the initiator NE.
Terminator	The name of the terminator NE.
Tunnel	The name of the tunnel used for the PW.
BW [kbit/s]	The allocated Pseudo Wire bandwidth.
Class Type	The allocated Class Type.
Dual-Home Group	The name of the Dual-Home group to which the PW belongs.
Dual-Home Role	The role of the PW in a Dual-Home configuration.

Status	The Pseudo Wire status: - Deployed Valid: The Service, and Pseudo Wire are deployed to the MPLS-TP nodes. A deployed Service can be deleted. It can neither be modified nor set back to saved. - Deployed Invalid: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes. - Saved Incomplete: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database.
Tunnel Status	The Tunnel deployment status.
Admin State	The PW Admin State; can be "Up" or "Down".
Operational State	The PW operational state; can be "Up" or "Down".
Dual Home Operational State	The PE Dual Home services operational state; can be "Up" or "Down".
Operation	Indicates operational states and transitions.

Pseudo Wire and Tunnel Details

Pseudo Wire

Name	The specified Name of the Pseudo Wire.
Description	The specified Description of the Pseudo Wire.
Status	The Pseudo Wire status: - Deployed Valid: The Service, and Pseudo Wire are deployed to the MPLS-TP nodes. A deployed Service can be deleted. It cannot be modified and set to saved Service. - Deployed Invalid: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes. - Saved Incomplete: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database.
BW [kbit/s]	The allocated Pseudo Wire bandwidth.
Class Type	The allocated Class Type.
Tunnel	The name of the tunnel used for the PW.

Attachment Circuits, Initiator/Terminator

AC	The selected NE.

Status	The Pseudo Wire status: - Deployed Valid: The Service, and Pseudo Wire are deployed to the MPLS-TP nodes. A deployed Service can be deleted. It can neither be modified nor set back to saved. - Deployed Invalid: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes. - Saved Incomplete: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database.
Type	The defined Service Type.
AC VLAN/PW VLAN	- AC VLAN: The SVI VLAN ID which is mapped to the local VLAN ID. - PW VLAN: The Pseudo Wire VLAN ID.
In Label	The incoming Pseudo Wire label.
Out Label	The outgoing Pseudo Wire label.
Binding	(Mesh or Spoke) This is usually empty for a VPWS due to the point-to-point characteristics of a VPWS.

Selected Tunnel

Name	The specified Name of the tunnel.
Description	The specified Description of the tunnel.
BW [kbit/s]	The allocated tunnel bandwidth.
Status	Indicates the Status of the tunnel: - Deployed Valid: The path is complete. The tunnel and LSP(s) are saved in the FOX-MAN-UN database and are deployed to the nodes. A deployed tunnel can be deleted. It cannot be modified nor set back to saved. - Deployed Invalid: The tunnel is incomplete, i.e. there is a hole in the path. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The path is complete. The tunnel and LSP(s) are saved in the FOX-MAN-UN database. A saved tunnel can be modified, deployed and deleted. - Saved Incomplete: The tunnel is incomplete, i.e. there is a hole in the path. It is saved in the FOXMAN-UN database.
Initiator	The name of the initiator NE.
Terminator	The name of the terminator NE.
Service Profile	The name of the service profile applied when creating the tunnel. This name is empty if no service profile has been used.
Used BW [kbit/s]	The total allocated bandwidth of all configured (saved in the database) and deployed services using this tunnel.
Working / Protection LSP	For details, please refer to section Working and Protection Label Switched Paths (LSPs)
BFD / Path Protection	For details, please refer to sections BFD (Bidirectional Forwarding Detection) and Path Protection

Encryption	Shows details on the Encryption parameters for Initiator and Terminator side of the tunnel: - Working Encryption Settings: Status, Profile, - Protection Encryption Settings: Status, Profile.
Attached Pseudo Wire	For details, please refer to section Attached Pseudo Wires
Diagnostic	Provides OAM commands such as LSP ping, trace route, and delay measurements. For details refer to Diagnostic .
Class Type	The allocated Class Type.

Optional entries

Not applicable.

Mandatory entries

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
Edit	Switches to edit mode, calls the Modify Service wizard. Note: The Modify Service wizard provides the same steps and parameters as the Create VPLS dialog.
Deploy	Deploys the Service to the MPLS-TP nodes (not available for deployed, aligned services with status "Deployed Valid").
Align	Aligns the Service such that any misalignment between the ENP database configuration and the Service present in the network is corrected.
Delete	Deletes the Service.
Close	Closes the dialog.

Related dialogs / windows

[VPLS](#),
[Create Tunnel](#),
[Create Service](#),
[Create VPLS](#).

8.9 Modify VPLS

Purpose

Allows you to add or remove VPLS NEs from a saved or deployed VPLS instance.

Allows you to add ports to an existing VPLS.

Allows you to align a VPLS with VLANs added to VPLS ports.

Please refer to [Create VPLS](#) section for more details.

Purpose: Align VPLS with added ports

Allows you to add ports on specific nodes to a saved or deployed VPLS instance. This is applicable when one or several ports have been added to a VPLS VLAN on a specific NE via the

FOXCST GUI. After having added ports to the VPLS VLAN, the VPLS status will appear “Unaligned”.

To add ports to a saved or deployed VPLS instance:

Prerequisites - Required ports have been added to the VPLS VLAN via the **FOXCST** GUI. The port Status on the respective NE (node) of the VPLS therefore appears with a status “Unaligned – Added” in the ENP.

Proceed as follows:

1. In the ENP main window, VPLS tab, select the required, unaligned VPLS instance.
2. Select “Modify VPLS...”.
3. Proceed to step 3 in the GUI dialog “Define VPLS NEs”.
4. Expand the required (modified) NE.
 - The added port(s) appear in the list of ports, with Status = “Unsaved”.
5. Verify if the added port(s) are as required.
 - If not, go back to the **FOXCST** GUI to correct the port characteristics, otherwise proceed with the next step.
6. Click “Next >” to continue VPLS modification.
7. Click “Next >”, then “Finish” to conclude and Save the changes. Confirm pop-up message.
 - The modified VPLS appears with Status = “Saved OK”.
 - The added port(s) appear with Status = “Saved OK”.
8. Deploy the modified VPLS to apply the changes to the node(s).
 - The modified VPLS appears with Status = “Deployed Valid”.
 - The added port(s) appear with Status = “Deployed Valid”.

Result: You have successfully added VPLS ports to an existing VPLS.

End of instruction

Purpose: Align VPLS with added VLANs

Allows you to add VLANs on specific ports to a deployed VPLS instance. This is applicable when one or several VLANs have been added to a VPLS port on a specific NE via the **FOXCST** GUI. After having added one or several VLANs to the VPLS port(s), the VPLS status appears “Unaligned”.

To align a VPLS that is unaligned due to a VLAN added to one of the VPLS ports:

Prerequisites - A new VLAN (ID) has been added to one of the VPLS ports on one or several nodes via the **FOXCST** GUI. The VPLS therefore appears with a status “Unaligned” in the ENP.

Proceed as follows:

1. In the ENP main window, VPLS tab, select the required, unaligned VPLS instance.
2. Select “Modify VPLS...”.
3. Proceed to step 3 in the GUI dialog “Define VPLS NEs”.
4. A pop-up message appears, informing that the “Alignment SniPort succeeded”.
5. Click “OK” to confirm this alignment.
6. Click “Next >”, then “Next >” to proceed.
7. Click “Next >”, then “Finish” to conclude and Save the changes. Confirm pop-up message.
 - The modified VPLS appears with Status = “Saved OK”.

8. Deploy the modified VPLS to apply the changes to the node(s).
- The modified VPLS appears with Status = “Deployed Valid”.

The modified port(s) appear with Status = “Deployed Valid”.

Result: You have successfully aligned new VLAN(s) on VPLS ports of an existing VPLS.

End of instruction

8.10 VPWS Details

Purpose

The VPWS dialog in view mode displays the VPWS, the Pseudo Wire, and the selected tunnel in one view.

It provides a “VPWS Service - Details” tab and a “VPWS Service - Graph” tab.

Details

The “Details” tab provides the following types of information for the VPWS as described in detail further below:

- General,
- Attachment Circuits,
- Quality of Service
- Rate Limiting.

Graph

The “Graph” tab provides a graphical presentation of the physical and/or the logical view on the service.

Depending on the dialog window size you can select the physical graph, the logical graph, or a split view with both the physical and the logical graph shown.

The physical graph of the VPWS shows involved initiator, transit, and terminator NEs (nodes), service access points, and links. It also indicates the different layers (service, Pseudo Wire, tunnel, link) with colors.

The logical graph of the VPWS shows the logical layers used to provide the service. It uses the same colors for showing the different layers (service, Pseudo Wire, tunnel, link) as the physical graph does.

Working and protecting LSPs (tunnels) are shown as solid lines and patterns (working tunnel) and dotted line and patterns (protecting tunnel), respectively.

VPWS Graph Symbols

The following icons or patterns are used in the graph:

Icon or Pattern	Description
	NE symbol with NE name.
	NE with attachment circuit (AC), NE name and AC unit, slot, and port.
	Link, section (selected).
	Link, VLAN sub-interface (selected).

Icon or Pattern	Description
	Layers of a section (default) with PW, tunnel LSP link.
	Layers of a section ('show all layers' enabled) with service, PW, tunnel, LSP, LSP link, link.

View Options:

Several view options can be enabled or disabled in the graph via the view icon :

Paths:

- Working Path,
- Protection Path,

View Settings:

- Show All Layers,
- Show Alarms,

Labels:

- Show TE labels,
- Show Shared Resource Count,
- Show NE IDs.

Legend:

In the View Options - Legend, the colors used in the diagram are assigned to the layers. A click on the specific color icon will highlight or fade out the layer, respectively. The following layers are available for highlighting or fading out:

- Layers:
 - Service,
 - Pseudo Wire,
 - Tunnel,
 - LSP,
 - LSP Link,
 - Link,
- Physical:
 - Section.

Issues

A list of possible issues can be opened/closed via the info icon . It includes information related to shared resources, status, holes, alarms.

Edit Mode

The graph can be edited which allows the user to rearrange the NEs (nodes) in the physical graph.

The icon for starting the edit mode is . The icon is colored dark blue while the edit mode is active. To go back to view mode, select "Stop Editing Mode".

Further options of the graphical view:

- Zoom in / zoom out;
- Open in a separate window;
- Refresh;

- Reset layout - resets the physical graph to the default view.

Dialog image

VPWS Service - Details

Wire2

Wire2

Name

Wire2

Description

Status

Deployed Valid

Admin State

Up

Operational State

Up

Refresh

BW [kbit/s]

10000

Dual-Home Group

Dual-Home Role

PW Control Word

Disabled

Link Loss Forwarding

On

Service Profile

VPWS-var-prio

Class Type

Prio

Tunnel

Wire2_tunnel_NE_80_NE_83

Attachment Circuits

	Initiator	Terminator
AC	NE_80 ETOP1 <8> port-7	NE_83 ETOP1 <8> port-6
Status	Deployed Valid	Deployed Valid
Name	Wire2	Wire2
Description		
BW [kbit/s]	10000	10000
Admin State	Up	Up
Operational State	Up	Up
Type	AC Port Based, No Change	AC Port Based, No Change
AC VLAN		
PW VLAN		
In Label	500004	500004
Out Label	500004	500004
Binding		
Dual-Home Group		
Dual-Home Role		
PW Control Word	Disabled	Disabled
SNI Port Status	Deployed Valid	Deployed Valid

Quality of Service

	Configuration	Network	Configuration	Network
CoS Type	PCP	PCP	PCP	PCP
Default Priority	0	0	0	0
Scheduling Profile	1	1	1	1
CoS Overwrite	-	-	-	-
Overwrite Priority	-	-	-	-

Rate Limiting

Rate Limiting Enabled	☒	☒	☒	☒
Committed Information Rate [kbits/s]	10000	10000	10000	10000
Committed Burst Size [Bytes]	4096	4096	4096	4096
Excess Information Rate [kbits/s]	10000	10000	10000	10000
Excess Burst Size [Bytes]	4096	4096	4096	4096

Help

Edit

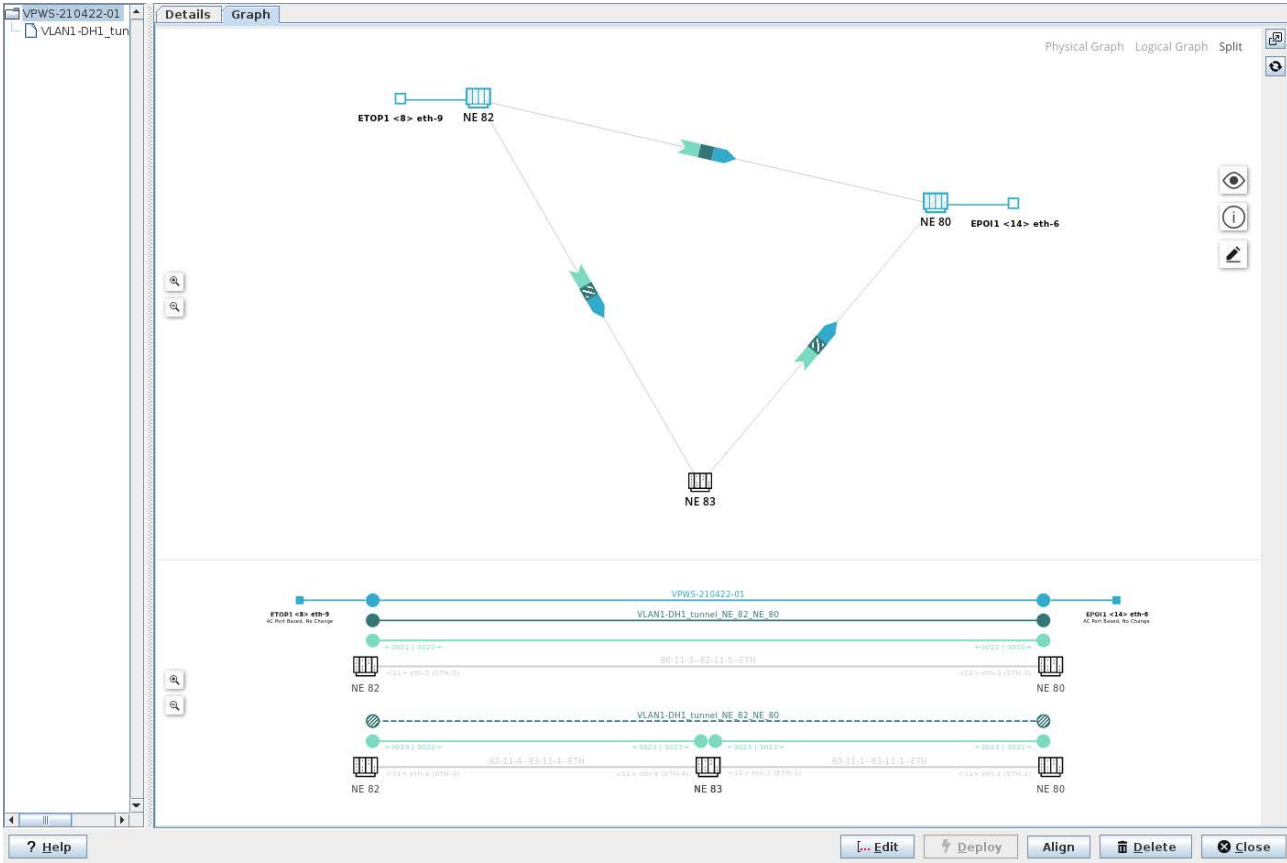
Deploy

Align

Delete

Close

VPWS Service - Graph



Informational content - Details tab

Name	The specified Name of the Service.
Description	The specified Description of the Service.
Status	The Pseudo Wire status: - Deployed Valid: The Service, and Pseudo Wire are deployed to the MPLS-TP nodes. A deployed Service can be deleted. It can neither be modified nor set back to saved. - Deployed Invalid: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes. - Saved Incomplete: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database.
Admin State	The admin state can be set to “Up” or “Down”. When opening the dialog, the current admin state is shown.
Operational State	The current VPWS operational state; when up, the field background is colored green. When down, the field background is colored orange.
BW [kbit/s]	The allocated Pseudo Wire bandwidth.
Dual-Home Group	The name of the Dual-Home group to which the PW belongs.
Dual-Home Role	The role of the PW in a Dual-Home configuration.
PW Control Word	Indicates whether the PseudoWire Control Word is enabled or disabled.

Service Profile	The allocated Service Profile.
Class Type	The allocated Class Type.
Tunnel	The allocated tunnel name.

Attachment Circuits, Initiator/Terminator

AC	The Initiator/Terminator Attachment Circuit. The expression consists of NE name, unit name, slot number, and port number.
Status	The Pseudo Wire status: - Deployed Valid: The Service, and Pseudo Wire are deployed to the MPLS-TP nodes. A deployed Service can be deleted. It can neither be modified nor set back to saved. - Deployed Invalid: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes. - Saved Incomplete: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database.
Name	The specified Name of the Service.
Description	The specified Description of the Service.
BW [kbit/s]	The allocated Pseudo Wire bandwidth.
Admin State	Shows the AC admin state ("Up" or "Down").
Operational State	The current VPWS operational state at the Initiator and Terminator ends; when up, the field background is colored green. When down, the field background is colored orange.
Type	The defined Initiator/Terminator Type.
AC VLAN/PW VLAN	The defined Attachment Circuit/Pseudo Wire VLAN.
In Label	The incoming Pseudo Wire label.
Out Label	The outgoing Pseudo Wire label.
Binding	(Mesh or Spoke) This is usually empty for a VPWS due to the point-to-point characteristics of a VPWS.
Dual-Home Group	The name of the Dual-Home group to which the PW belongs.
Dual-Home Role	The role of the PW in a Dual-Home configuration.
PW Control Word	Indicates whether the PseudoWire Control Word is enabled or disabled.
SNI Port Status	The deployment status of the SNI port on Initiator/Terminator.

Quality of Service, Initiator (Configuration, Network)/Terminator (Configuration, Network)

If there is a misalignment between the network/node(s) and the configuration in the ENP database, the misaligned settings are marked and can be aligned via the "Align" command button.

CoS Type	The Class of Service Type configured on Initiator/Terminator side.
Default Priority	The Default Priority configured on Initiator/Terminator side.
Scheduling Profile	The Scheduling Profile applied on Initiator/Terminator side.
CoS Overwrite	The CoS overwrite mode: - Overwrite, - Maintain, as defined during service creation.

Overwrite Priority	The overwrite priority for the service as defined during service creation.

Rate Limiting, Initiator (Configuration, Network)/Terminator (Configuration, Network)

If there is a misalignment between the network/node(s) and the configuration in the ENP database, the misaligned settings are marked and can be aligned via the “Align” command button.

Rate Limiting Enabled	Indicates whether Rate Limiting is enabled or not.
Committed Information Rate [kbits/s]	Shows the configured Committed Information Rate (CIR) in kbit/s.
Committed Burst Size [Bytes]	Shows the configured Committed Burst Size (CBS) in Bytes.
Excess Information Rate [kbits/s]	Shows the configured Excess Information Rate (EIR) in kbit/s.
Excess Burst Size [Bytes]	Shows the configured Excess Burst Size (EBS) in Bytes.

Tunnel Details

See [Tunnel Details](#) section.

Optional entries

Not applicable.

Mandatory entries

Not applicable.

Controls (buttons, menu items, etc.)

Edit	Switches to edit mode, calls the Modify Service wizard.
	Note: The Modify Service wizard provides the same steps and parameters as the Create VPWS dialog.
Deploy	Deploys the Service to the MPLS-TP nodes (not available for deployed, aligned services with status “Deployed Valid”).
Align	Aligns the Service such that any misalignment between the ENP database configuration and the Service present in the network is corrected.
Delete	Deletes the Service.
Close	Closes the dialog without applying the changes.
? Help	Calls the help viewer and opens this page.

Related dialogs / windows

[VPWS](#),
[Create Tunnel](#),
[Create Service](#).

8.11 Pseudo Wire Details

Purpose

The Pseudo Wire Details dialog (Details tab) displays all the information related to the selected Pseudo Wire including its admin state, the PW member NEs, the ports, Attachment Circuits, and the selected Tunnels in one view.

The PW admin state can be modified in both the “View” and the “Edit” mode.

An “Edit” command button allows you to edit some of the PW parameters:

- Name,
- Description,
- Tunnel (select a different available tunnel for the PW).

An edited PW needs to be saved and deployed to be effective in the network.

Details

The “Details” tab provides the following types of information for the Pseudo Wire as described in detail further below:

- General,
- Attachment Circuits,
- Quality of Service
- Rate Limiting.

Graph

The Pseudo Wire “Graph” tab provides a graphical presentation of the physical and/or the logical view on the PW.

Depending on the dialog window size you can select the physical graph, the logical graph, or a split view with both the physical and the logical graph shown.

The physical graph of the PW shows involved initiator, transit, and terminator NEs (nodes), service access points, and links. It also indicates the different layers (service, Pseudo Wire, tunnel, link) with colors.

The logical graph of the PW shows the logical layers used to provide the service. It uses the same colors for showing the different layers (service, Pseudo Wire, tunnel, link) as the physical graph does.

Working and protecting paths are shown as solid lines and patterns (working tunnel) and dotted line and patterns (protecting tunnel), respectively.

Several view options can be enabled or disabled:

PATHS:

- Working Path,
- Protection Path,
- Sub Protecting Path,

VIEW SETTINGS:

- Show Fixed TEs,
- Show SNCs as Cloud,
- Show Indistinct Sections,

LABELS:

- Show TE labels,
- Show Shared Resource Count,
- Show NE IDs.

A list of possible issues (related to: shared resources; status; holes) can be opened/closed.
 The graph can be edited which allows the user to rearrange the NEs (nodes) in the physical graph.

Further options of the graphical view:

- Zoom in / zoom out;
- Open in a separate window;
- Refresh;
- Reset layout - resets the physical graph to the default view.

Dialog image

Pseudo Wire (VPLS)

Name

VPLS_2_pw_NE_82_NE_83

Description

Status

Deployed Valid

Admin State

Up

BW [kbit/s]

10000

Dual-Home Group

Dual-Home Role

PW Control Word

Enabled

Class Type

Default

Tunnel

VPLS_2_tunnel_NE_82_NE_83

Attachment Circuits

	Initiator	Terminator
AC	NE_82	NE_83
Status	Deployed Valid	Deployed Valid
Admin State	Up	Up
Type	AC VLAN Based, No Change	AC VLAN Based, No Change
AC VLAN	122	122
PW VLAN	122	122
In Label	500003	500003
Out Label	500003	500003
Binding	Mesh	Mesh
Dual-Home Group		
Dual-Home Role		
PW Control Word	Enabled	Enabled

? Help

... Edit

Save

⚡ Deploy

✕ Cancel

Pseudo Wire (VPWS)

Name	VPWS_7		
Description			
Status	Deployed Valid		
Admin State	Up		
BW [kbit/s]	10000		
Dual-Home Group			
Dual-Home Role			
PW Control Word	Enabled		
Class Type	Special		
Tunnel	VPWS_7_tunnel_NE_82_NE_80		

Attachment Circuits

	Initiator	Terminator
AC	NE_83 ETOP1 <8> port-9	NE_80 ETOP1 <14> port-9
Status	Deployed Valid	Deployed Valid
Admin State	Up	Up
Type	AC Port Based, No Change	AC Port Based, No Change
AC VLAN		
PW VLAN		
In Label	500024	500024
Out Label	500024	500024
Binding		
Dual-Home Group		
Dual-Home Role		
PW Control Word	Enabled	Enabled
SNI Port Status	Deployed Valid	Deployed Valid

Quality of Service

	Configuration	Network	Configuration	Network
CoS Type	Interface	Interface	Interface	Interface
Default Priority	0	0	0	0
Scheduling Profile	1	1	1	1
CoS Overwrite	-	-	-	-
Overwrite Priority	-	-	-	-

Rate Limiting

Rate Limiting Enabled	☒	☒	☒	☒
Committed Information Rate [kbits/s]	10000	10000	10000	10000
Committed Burst Size [Bytes]	4096	4096	4096	4096
Excess Information Rate [kbits/s]	1	1	1	1
Excess Burst Size [Bytes]	1	1	1	1

? Help

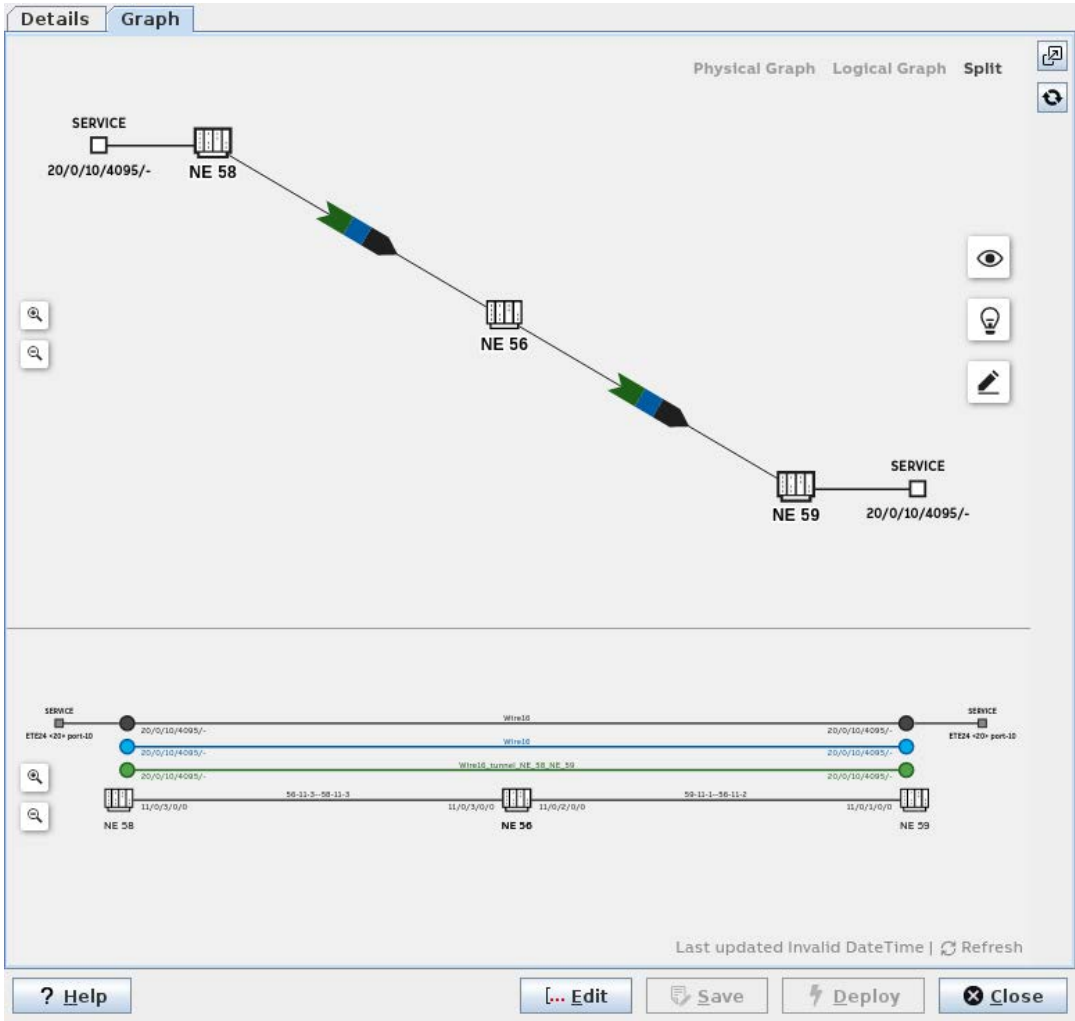
[... Edit]

Save

Deploy

Cancel

Pseudo Wire Graph



Select Tunnel

Name	Description	Initiator	Ter
VPLS_1505833726212_tunnel_NE_83_NE_80		NE_83	NE_8
VPLS_1503663064418_tunnel_NE_83_NE_80		NE_83	NE_8

Entries: Total 2 Filtered 2 Selected 1

OK Apply Cancel

Informational content

Name	The specified Name of the Pseudo Wire
Description	The specified Description of the Pseudo Wire

Status	The Pseudo Wire status: - Deployed Valid: The Service, and Pseudo Wire are deployed to the MPLS-TP nodes. A deployed Service can be deleted. It can neither be modified nor set back to saved. - Deployed Invalid: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes. - Saved Incomplete: One side of the Pseudo Wire is not correctly deployed. It is saved in the FOXMAN-UN database.
Admin State	The administrative state of the Pseudo Wire. It can be set to “up” or “down”, also via ENP main menu or context menu in the Pseudo Wire tab.
Operational State	The current PW operational state; when up, the field background is colored green. When down, the field background is colored orange.
BW [kbit/s]	The allocated Pseudo Wire bandwidth.
Dual-Home Group	Shows the Dual-Home group name.
Dual-Home Role	Shows the Dual-Home role.
PW Control Word	Indicates whether the PseudoWire Control Word is enabled or disabled.
Class Type	The specified Class Type of the tunnel.
Tunnel	The specified Name of the tunnel.

Attachment Circuits (Initiator, Terminator)

AC	The selected NE and port
Status	The AC status: - Deployed Valid: The item is deployed to the MPLS-TP nodes. - Deployed Invalid: One side of the item is not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The item is saved in the database but not yet deployed in the MPLS-TP nodes. - Saved Incomplete: One side of the item is not correctly deployed. It is saved in the FOXMAN-UN database.
Admin State	The administrative state of the Pseudo Wire. It can be set to “up” or “down” via ENP menu or context menu.
Operational State	The current PW operational state at the Initiator and Terminator ends; when up, the field background is colored green. When down, the field background is colored orange.
Type	The defined AC type.
AC VLAN	The defined VLAN for the Attachment Circuit.
PW VLAN	The defined VLAN for the Pseudo Wire.
In Label	The defined In Label for the AC.
Out Label	The defined Out Label for the AC.
Binding	The defined Pseudo Wire binding of the node: Mesh or Spoke. This field is empty when undefined, e.g. if the PW status is “Invalid”.
Dual-Home Group	Shows the Dual-Home group name.

Dual-Home Role	Shows the Dual-Home role.
PW Control Word	Indicates whether the PseudoWire Control Word is enabled or disabled.
SNI Port Status	Shows the Service-Network Interface (SNI) port deployment status.

**Quality of Service (only if configured for the PW)
Initiator (Configuration, Network)/Terminator (Configuration, Network)**

CoS Type	The Class of Service Type configured on Initiator/Terminator side.
Default Priority	The Default Priority configured on Initiator/Terminator side.
Scheduling Profile	The Scheduling Profile applied on Initiator/Terminator side.
CoS Overwrite	The CoS overwrite mode: - Overwrite, - Maintain, as defined during service creation.
Overwrite Priority	The overwrite priority for the service as defined during service creation.

**Rate Limiting (only if configured for the PW)
Initiator (Configuration, Network)/Terminator (Configuration, Network)**

Rate Limiting Enabled	Indicates whether Rate Limiting is enabled or disabled for this PW.
Committed Information Rate [kbit/s]	Shows the CIR in kbit/s for this PW.
Committed Burst Size [Bytes]	Shows the CBS in bytes for this PW.
Excess Information Rate [kbit/s]	Shows the EIR in kbit/s for this PW.
Excess Burst Size [Bytes]	Shows the EBS in bytes for this PW.

Mandatory entries

Not applicable.

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
Edit	Changes the dialog to Edit mode. In the Edit mode the tunnel associated with the PW can be selected. To select a different tunnel, open the “Select Tunnel” dialog by clicking on the  icon. In the Edit mode the “Deploy” button is active.
Save	Save changes (only available when in Edit mode).
Deploy	Deploys the changes made to the PW. Only applicable when the Pseudo Wire has been modified, i.e. when in Edit mode.
Close	Closes the dialog (only available when in View mode).
Cancel	Closes the dialog without applying changes (only when in Edit mode).

Related dialogs / windows

[VPLS Details](#),
[VPWS Details](#).

8.12 Tunnel Details

Purpose

The Tunnel Details dialog displays all the information related to the tunnel including the working LSP, protecting LSP (if available), member NEs, BFD details, attached PWs, and a Diagnostic tab in one view.

In the upper part of the dialog the tunnel graph is shown.

For any node (NE) shown in the tunnel graph you can use the context menu to:

- open the “NE Details” dialog;
- open the node (NE) configuration; select “Configuration - <user class>”. Depending on the user class you will have a specific permission level on the node.

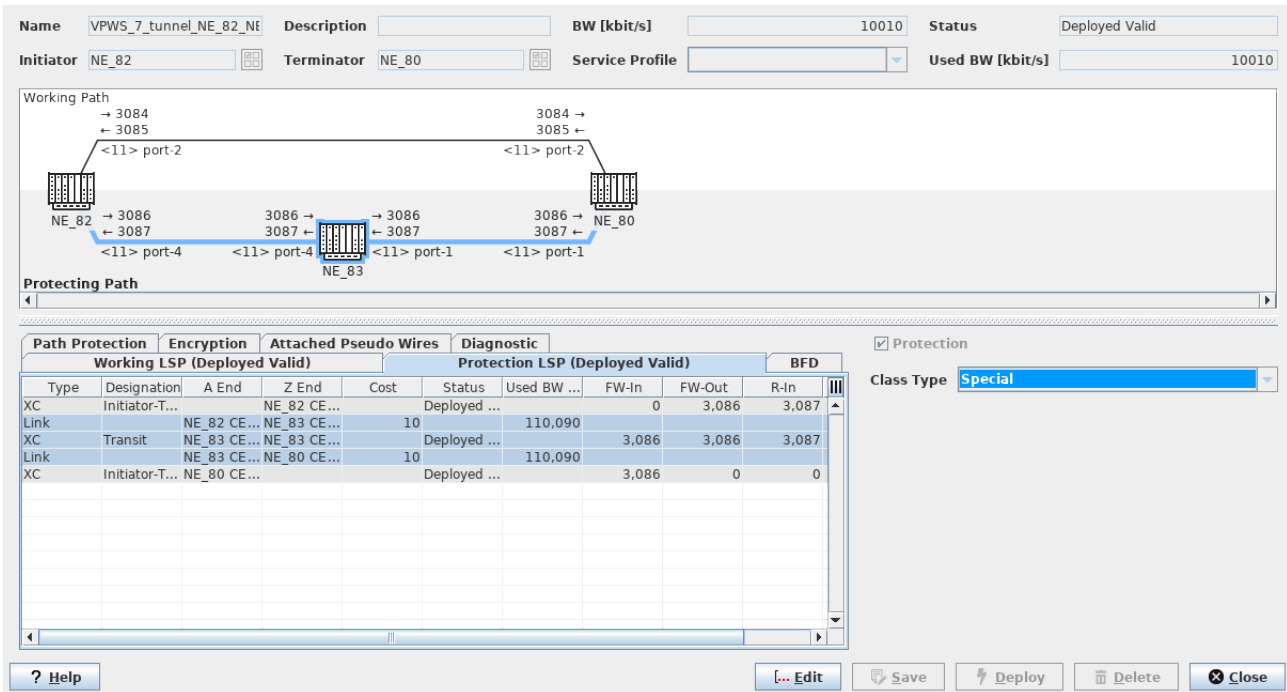
For any LSP segment shown in the tunnel graph you can use the context menu to:

- open the “Link Details (dialog window)” dialog;
- open the A End NE configuration;
- open the Z End NE configuration.

Any commands are applicable to deployed tunnels only.

Dialog image

Tunnel – Working LSP or Protection LSP



Mandatory entries

Not applicable.

The contents of this dialog are very similar to the “Create Tunnel” dialog. For more details refer to [Create Tunnel](#) and to the status information available under [Path Protection](#) and [Diagnostic](#).

Via the context menu you can call details of a selected item in the tunnel graph, e.g.

- on any node, open the NE Details dialog, or open the NE configuration.
- on any LSP or LSP segment, the Link Details dialog.

Selected items both in the table and in the graph are colored light blue.

Controls (buttons, menu items, etc.)

? Help	Calls the help viewer and opens this page.
Edit	Changes the dialog to Edit mode. In the Edit mode the tunnel Name, Description, and BW [kbit/s] (tunnel bandwidth) can be modified. See Modify Tunnel...
Deploy	Deploys the changes made to the Tunnel.
Cancel	When in edit mode, closes the dialog without applying changes.
Close	When in view mode, closes the dialog.

Related dialogs / windows

[Create Tunnel](#),
[Modify Tunnel...](#),
[Working and Protection Label Switched Paths \(LSPs\)](#),
[BFD \(Bidirectional Forwarding Detection\)](#),
[Path Protection](#),
[Attached Pseudo Wires](#),
[Encryption](#),
[Diagnostic](#).

8.12.1 Path Protection

Purpose

Displays path protection configuration and status information and provides protection switching command options.

The switch-over commands are only applicable to deployed valid LSPs.

Upon opening the “Path Protection” tab, the status is read from the network, and the currently active path is colored in gold.

Dialog image

Tunnel – Path Protection

Name

VPWS_7_tunnel_NE_82_NE_80

Description

BW [kbit/s]

10010

Status

Deployed Valid

Initiator

NE_82

Terminator

NE_80

Service Profile

Used BW [kbit/s]

10010

Working Path

→ 3084

← 3085

<11> port-2

→ 3084

← 3085

→ 3086

← 3087

<11> port-4

→ 3086

← 3087

→ 3086

← 3087

<11> port-1

→ 3086

← 3087

→ 3084

← 3085

<11> port-2

→ 3084

← 3085

NE_82

NE_83

NE_80

Protecting Path

Path Protection

Encryption

Attached Pseudo Wires

Diagnostic

Working LSP (Deployed Valid)

Protection LSP (Deployed Valid)

BFD

Protection Mode

Revertive

Revertive

WTR Time [s]

300

300

State Change Tx Interval [ms]

20

20

Steady State Tx Interval [s]

5

5

Protection Status

Request Sent

No Request

No Request

Request Related Path

User Data Traffic

Working

Working

Request Received

No Request

No Request

Request Related Path

User Data Traffic

Working

Working

Active LSP

Working

Switch Over

Command

Manual Switch

Execute

Class Type

Special

Help

Edit

Save

Deploy

Delete

Close

Mandatory entries

Not applicable.

Optional entries

Switch-over command parameters are optional (defaults can be used if appropriate).

Informational content

For more information on path protection command options refer to **Path Protection** in the “Create Tunnel” section.

8.12.2 Diagnostic

Purpose

Provides OAM commands such as LSP ping, trace route, and delay measurements.
The commands are applicable to deployed valid LSPs.

Dialog image

Tunnel – Diagnostic

Name1339_tunnel_NE_82_NDescriptionBW [kbit/s]10010StatusDeployed Vali

InitiatorNE_82TerminatorNE_80Service ProfileUsed BW [kbit/s]10010

Working Path

Protecting Path

Path ProtectionEncryptionAttached Pseudo WiresDiagnostic

Working LSP (Deployed Valid)Protection LSP (Deployed Valid)BFD

CommandTrace RouteLSPWorkingNENE_82Execute

Timeout [ms]5000EXP Value0Abort

Packet CountInterval [ms]TTL

Result

Index	Global ID	Node ID	Egress IF	Ingress IF	Outgoing Label	Round Trip [ms]	Return Code
1	1	1				6 Success (3)	

Class TypeMission Critical

? Help

... EditSaveDeployDeleteClose

Mandatory entries

Not applicable.

Optional entries

Command parameters are optional (defaults can be used if appropriate).

Informational content

Name	The specified Name of the Service
Initiator	The ingress Label Edge Router (LER)
Terminator	The egress LER
Description	The specified Description of the Service
BW [kbit/s]	The allocated Service bandwidth.
Used BW [kbit/s]	The allocated Service bandwidth.

Status	The Pseudo Wire status: - Deploying/Removing: Display the Progress bar Indicating the current progress of deploying or deleting the selected Service(s). - Deployed Valid: The Service (both Pseudo Wire endpoints) is deployed to the MPLS-TP nodes. - Deployed Invalid: One side of the Pseudo Wire is missing or was not correctly deployed. It is saved in the FOXMAN-UN database and is deployed to the nodes. - Saved OK: The Service, Pseudo Wire are saved in the database but not yet deployed in the MPLS-TP nodes.

Controls (buttons, menu items, etc.)

OAM Commands

Command	Select one of the three OAM commands. - Ping: Ping the NE (the maintenance entity group end point MEP) at the end of the LSP. The resulting replies and round trip times are stored and displayed in the Result table. - Trace Route: Determine the route of a packet to the LSP end point. Each answering node returns information, which is stored and displayed in the Result table. - Delay Measurement: Measure the delay through the LSP. The measurement results are stored and displayed in the Result table. An overview and a detailed view is available. The measurement resolution is 1 ns (nanosecond). Some of the following parameters will show specific ranges depending on the command selected.
LSP	Select one of the two LSPs - Working, - Protecting.
NE	Select the NE from which the command shall be executed. This can either be the Initiator or the Terminator.
Timeout [ms]	Set the timeout as follows: - for the Ping command: 200 to 10000 ms (default is 5000 ms); - for the Trace Route command: 200 to 10000 ms (default is 5000 ms). This is the timeout for response to a traceroute package; - the Delay Measurement command: 1 to 2000 s for (default is 5 s); if no message from the opposite side is received within this time the session will be canceled. The value entered shall be greater than "Interval".
EXP Value	Set the EXP value for the packets in the range 0 to 7. Default is 0.
Packet Count	Set the number of packets as follows: - for the Ping command: Set the number of ping packets to be sent in the range 1 to 1024 (default is 5). - for the Delay Measurement command: Set the number of measurements to be executed on the LSP in the range 1 to 300 (default is 5). Not applicable to the Trace Route command.

Interval	Set the interval as follows: - for the Ping command: Set the packet interval in the range 100 to 10000 ms (default is 1000 ms). - for the Delay Measurement command: Set the interval between delay measurements in seconds in the range 1 to 600 (default is 1 s). Not applicable to the Trace Route command.
TTL	Set the Time To Live in the range 1 to 255. Not applicable to Trace Route and Delay Measurement commands.
Verify Reverse	This option is not used currently.
Execute	Execute the command.
Abort	Abort the executed command.
Result	Provides a result table listing the result of the executed command.

In case of Ping the Result table includes one row with the latest results.

In case of Trace Route the Result table includes all responding intermediate or end points.

In case of Delay Measurement the Result table provides two tabs:

- Overview, with a summary view of the measurement results:
 - Duration:
the total duration of the measurement.
 - Result Count:
the number of recorded results during the measurement.
 - Send [ns]:
the min, max, and average of the packet delay in send direction seen from the selected NE.
 - Receive [ns]:
the min, max, and average of the packet delay in receive direction seen from the selected NE.
 - Two Way [ns]:
the min, max, and average sum of the packet delay in send and receive direction seen from the selected NE.
 - Round Trip [ns]:
the min, max, and average of the packet round trip time, including the processing delay in the remote NE(s).
 - Remote [ns]:
the min, max, and average of the packet processing delay in the remote NE(s).
- Details, with the relative time and the above parameters listed for each packet sent for delay measurement.

Table Sorting and Filtering/Export and Printing

Please refer to [Table Sorter](#) section for details.

Related dialogs / windows

[MPLS-TP Introduction](#),
[Service Provisioning and Deployment via ENP GUI](#),
[Create Tunnel](#),
[Create Service](#).

9 Service Supervision and Reporting

This part contains the help information for the FOXMAN-UN Service Supervision and Reporting. It includes the following topics:

- [Introduction](#),
- [Service Supervision](#),
- [Service Editor](#),
- [Customer Manager](#),
- [SLA Manager](#),
- [Components Selector](#),
- [Service Alarms](#),
- [Service Reporting](#),
- [Report Manager](#).

9.1 Introduction

Service Supervision provides Service Level Management by monitoring services and presents service operational state and fault state. In addition, it generates reports for services that present availability over time. Any managed object which is capable of generating alarms can be monitored.

End-to-End Service Definition

The following services or “circuits” in the FOX61x can be monitored and their status reports can be generated:

- **MPLS-TP Services** and service components (System Services - see notes 1 and 2 below):
 - VPLS services,
 - VPWS services,
 - Pseudo Wires,
 - Tunnels,
 - Links.
- **Legacy Services** and service components (Advanced Services - see note 3 below):
 - Ethernet over PDH data services,
 - E&M voice services,
 - X.21,
 - RS232,
 - E1,
 - Ethernet over SDH (EoS) data services (including EoS of FOX51x).

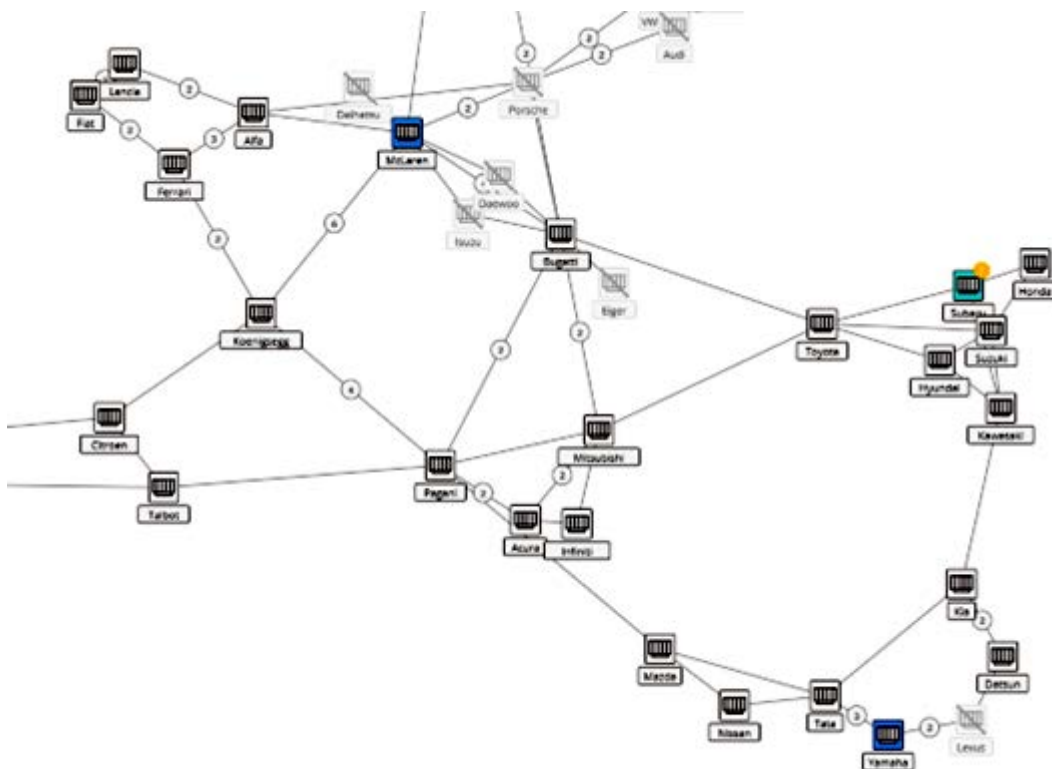


Please note:

- MPLS-TP services (managed in ENP) are enabled in Service Supervision via the context menu of a selected service by choosing “Supervision - Enable”, upon which they appear as System Services in Service Supervision.
- For more details regarding MPLS-TP services also refer to the FOX61x User Manual “MPLS-TP”.
- For more details regarding TDM services also refer to the FOX61x User Manual “TDM Services and Cross Connections”.

9.1.1 MPLS-TP Services

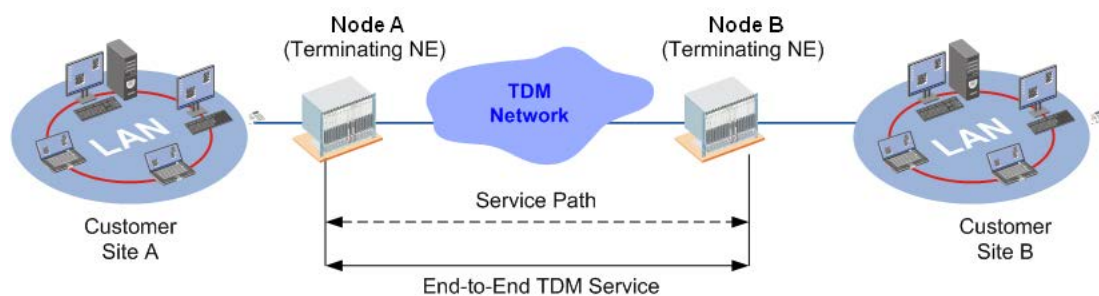
Service supervision for MPLS-TP services covers end-to-end supervision of all elements of a service. A service can be a Virtual Private Wire Service (VPWS) or a Virtual Private LAN Service (VPLS).



In the ENP and its related applications in the WebUI, especially the MPLS-TP Map, service supervision can be enabled on any service instance. When enabled, the service and its components are added to the “System Services” tab of the Service Supervision dialog.

9.1.2 Legacy Services

The sample EoS network diagram below illustrates the boundary of the FOXMAN-UN's end-to-end service monitoring and an overview of the Service Path.



- **Service**
A service is a collection of Service Paths, where a Service Path provides one complete “channel” of the intended service. A service must have at least one path.
- **Path**
A Service Path or transport route defines one complete channel of the service. It is a combination of Service Components.
- **Service Components**
A Service Component, which represents a physical or logical element in the network, can be:
 - Port,

- Circuit,

The Networking Package (NP) must be enabled for Circuits to be part of a service. If NP is disabled, the operator can use only the Ports, Sections and Service Points for creating a Service Path.

- Section,

- Service Point (SP),

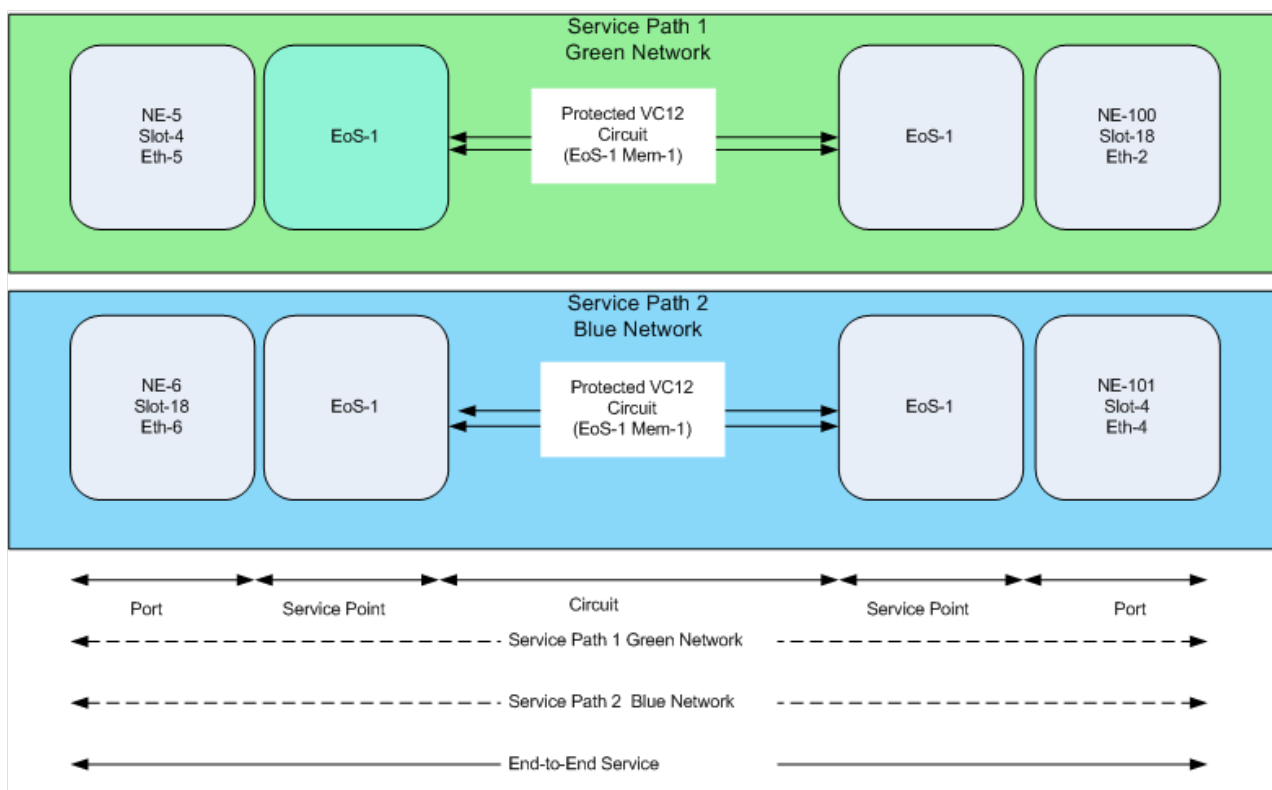
A FOXMAN-UN object, where key service control and configuration resides. For example, an EOS service SP represents the point where EOS is enabled/disabled and where EOS specific alarms would be addressed.

Other supported Service Point types are as follows: X21, RS232 (V24/V28), E&M, and E1.

- Tunnel,

MPLS-TP tunnels used for VPLS or VPWS. To select tunnels as service components an MPLS-TP network is required with at least a tunnel configured.

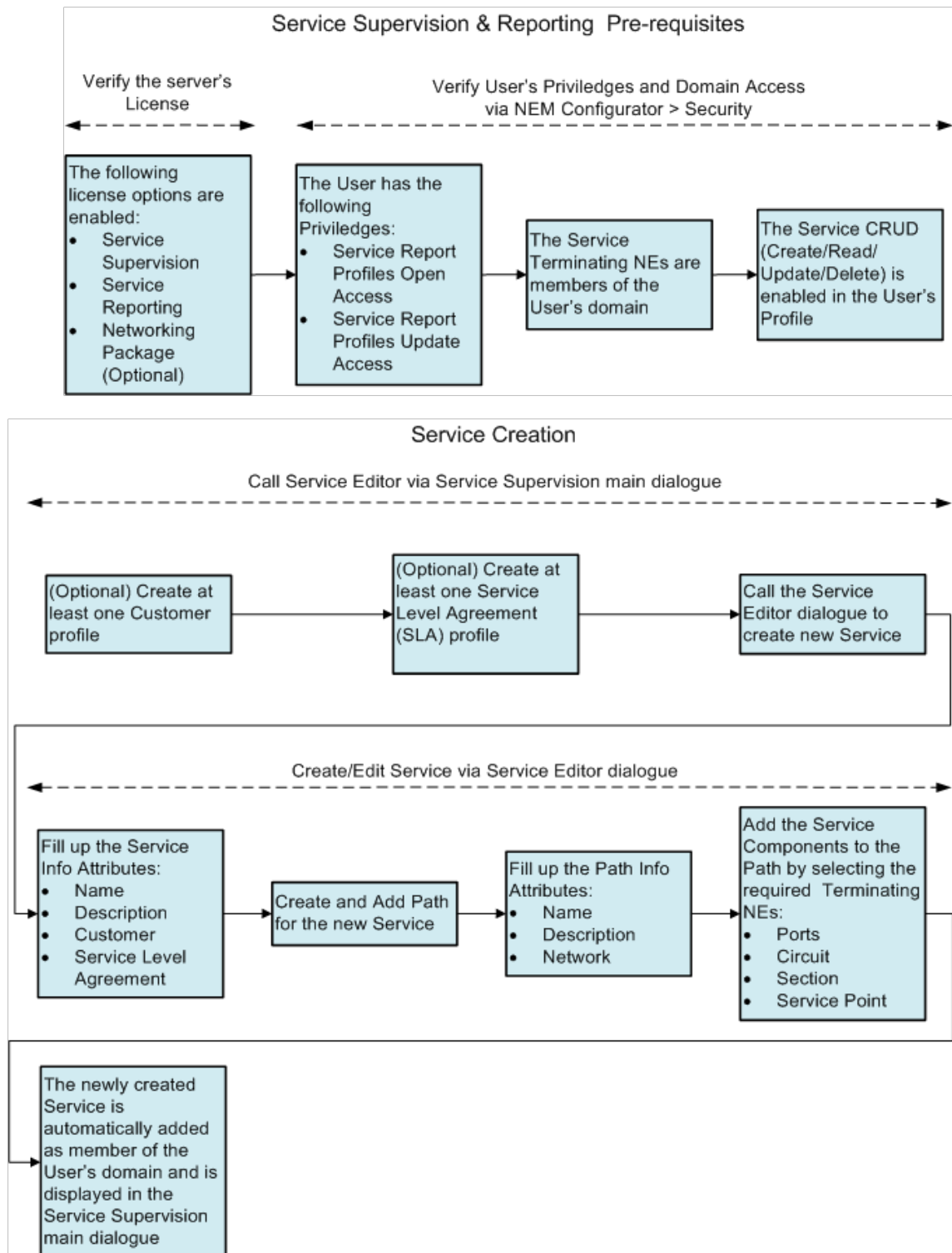
The diagram below illustrates a single end-to-end service with two different Paths (or transport routes).

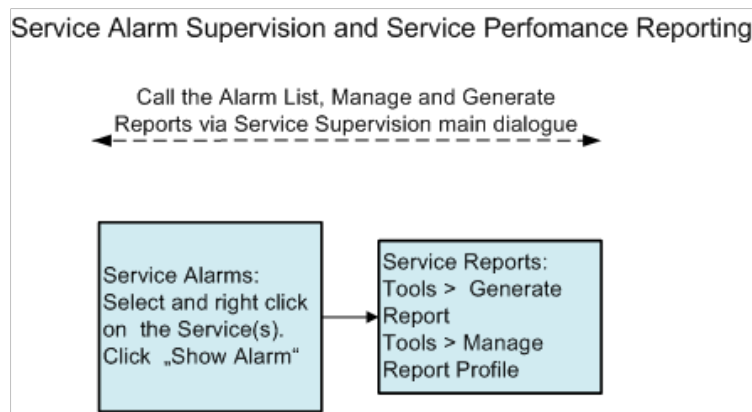


FOXMAN-UN must maintain and present the operational state and fault state of all services defined by the operator.

Service Creation and Reporting Process Overview

- The Service Components Port and Service Point are restricted by Role Based Access Control (RBAC), where the NE must be in the users Domain.
- The Service Components Section and Circuit are restricted by DAC, where either end-point TTP must belong to an NE in the users Domain.
- The Service Point data for nodes will only be available with the addition of the following line in /opt/nem/etc/np.conf:
ifpoint_data_koap_support enable





9.2 Service Supervision

Purpose

The Service Supervision main window displays details of all the configured services that have service supervision enabled with their corresponding paths and components.

The tab “System Services” lists services that were added to Service Supervision from services created in the MPLS-TP or NP application GUI (see [Networking Package > Main Window](#) and [Ethernet Networking Package > ENP Main Window](#)).

The tab “Advanced Services” lists services manually created by the user via the “Create” command/icon.

From the main window you can call the relevant dialogs such as:

- Alarm list of the service(s),
- Create/edit/delete services,
- Synchronize services,
- Manage Customer,
- Manage SLA,
- Manage Report Profile,
- Generate Report.

If at least one of the managed Network Elements is in maintenance mode a yellow labeled notice is added in the upper right area of the dialog window. Also see [NE Maintenance Mode](#).



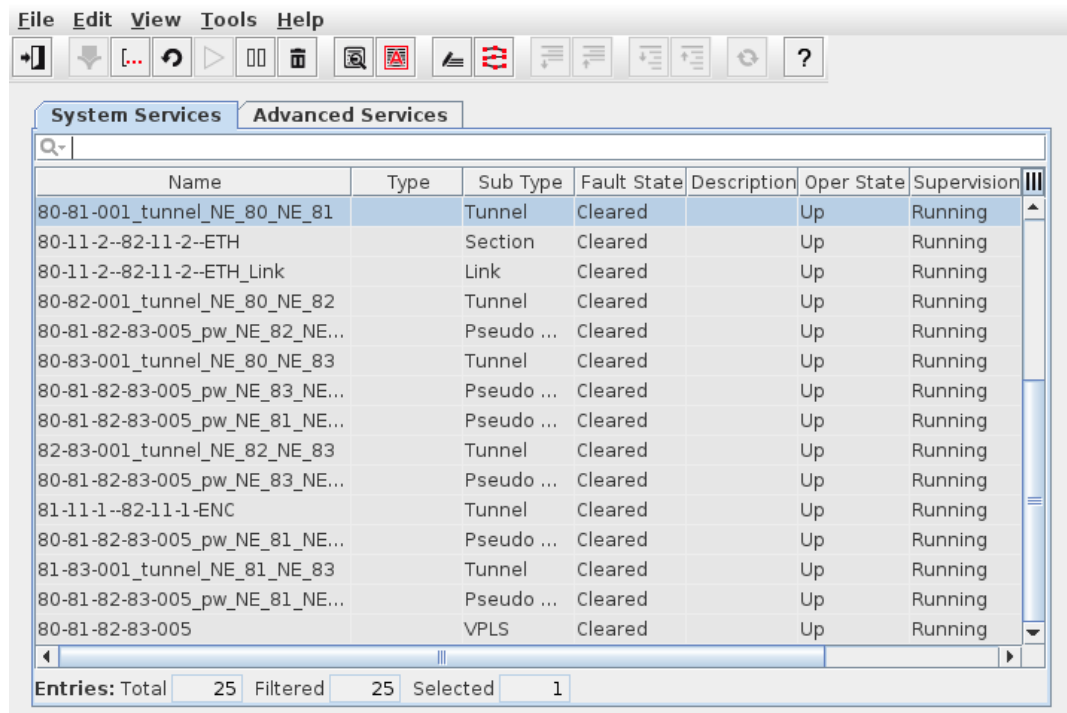
Please note:

When exceeding the maximum number of services licensed for supervision of “System Services” or for “Advanced Services”, a non-clearable alarm is raised.

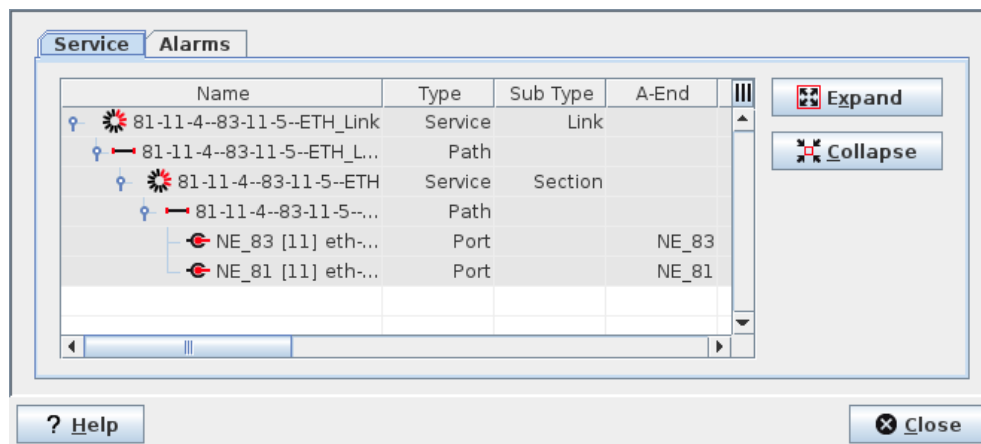
- To check the licensed number of advanced services or system services, view the [License Information](#) in the [NEM Remote Admin Tool](#).
- The alarm can only be acknowledged and cleared by either reducing the number of supervised services, or by purchasing and applying a new license covering an appropriate number of services.

Dialog image

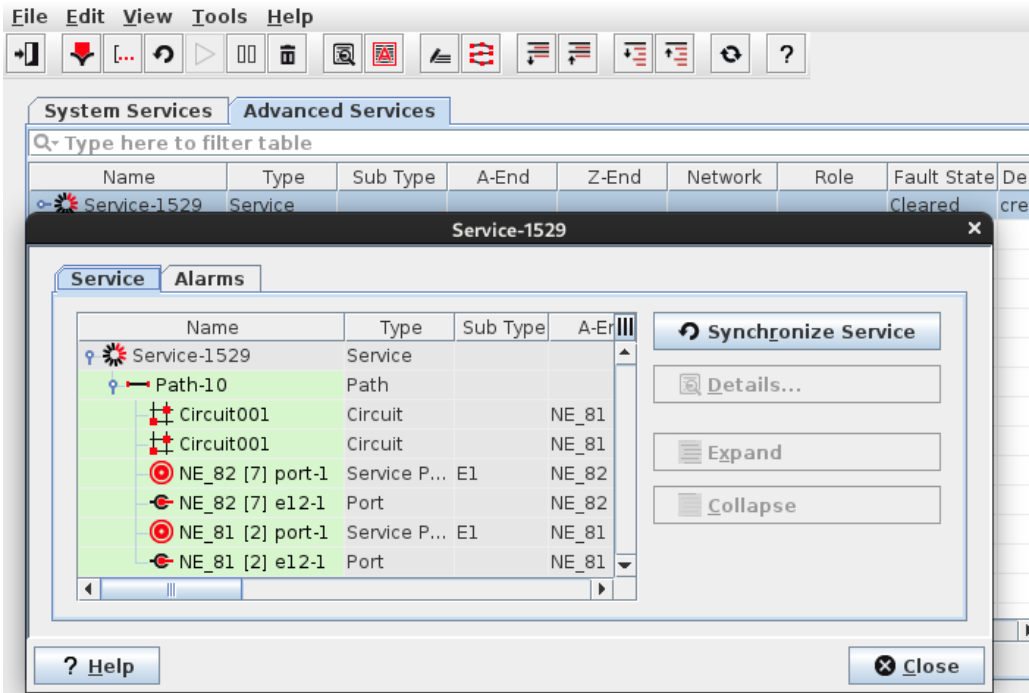
Service Supervision - System Services



Service Supervision - System Services - Details



Service Supervision - Advanced Services



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

Displays all the configured services. Providing service details as follows (note that some of the parameters are only available in the Details view):

Name	Service path(s) and service components. Components with an active alarm are colored according to the alarm severity.
Type, Sub Type	Type of the service supervision component (see Components) or path (see Service Editor).
A-End and Z-End	A-End and Z-End of the service component.
Network	red, green, blue or yellow (as selected during service creation).
Role	The Type or Sub Type role if defined.
Fault State	Current fault state of the service component (Cleared, Warning, Minor, Major, Critical).
Description	Information on when a service or path has been created or added, or from which service point it has been generated. Applicable to services or paths.
Admin State	Administrative state of the type or sub type (Up, Down, Unknown). Admin state also applies to the protection service component where applicable.
Operational State	Operational state of the service component (Up, Down, Unknown).
Prot. Fault State	Current fault state of the protection service component (where applicable).
Prot. Oper State	Current operational state of the protection service component (where applicable).
Supervision	Status of the supervision (usually running or paused).

Customer	Configured customer of the service component (as selected during service creation).
Service Level Agreement	Configured service level agreement of the service component (as selected during service creation).

A notice appears when NEs are in maintenance mode. The notice with yellow background appears in the upper right area of the main window. To check which NEs are in maintenance mode, please see more details in [NE Maintenance Mode](#).

Controls (buttons, menu items, etc.)

File menu

Exit		Closes the current dialog window.

Edit menu / icon bar

Create...		Calls the Service Editor dialog to create a new service and opens the Service Info Attributes dialog.
Edit...		Calls the Service Editor dialog for a selected service.
Synchronize Service		Re-synchronizes the selected service.
Supervision ► Resume		Resume paused supervision for the selected service. The status shown in the “Supervision” column will go back to “Running”.
Supervision ► Pause		Pause supervision for the selected service. The status shown in the “Supervision” column will go to “Paused”. The entry is colored cyan.
Delete		Deletes the selected service element entry and all its lower level members.
Manage Customer...		Calls the Customer Manager dialog to create a new customer entry.
Manage SLA...		Calls the SLA Manager dialog to create a new SLA profile.
Manage NE Maintenance Mode ...		Calls the NE Maintenance Mode dialog to enable or disable maintenance per NE.

View menu / icon bar

Details...		Opens a details view of the service and, where applicable, its alarms.
Alarm List...		Calls the Alarm List dialog listing the currently selected “Service Type” alarms, e.g. Total Service Loss. Only applicable to entries where active alarms are present.

Show Tree Table	☒	When enabled, loads service details and shows Advanced Services as a tree structure in the main table.
	☐	When disabled, only shows the top level for each service in Advanced Services.

Tools menu / icon bar

Generate Report...		Calls the Service Reporting dialog.
Manage Report Profile...		Calls the Report Manager dialog to create new Report profile.

Additional options in icon bar

Details... - Expand (next level)		In the details view, shows the members of the selected service in the table. The next lower level of the selected item is expanded.
Details... - Collapse (last level)		In the details view, hides the members of the selected service in the table. The lowest level of the selected items is collapsed.
Details... - Expand (all levels)		In the details view, shows the members of the selected service in the table. All lower levels of the selected item are expanded simultaneously.
Details... - Collapse (all levels)		In the details view, hides the members of the selected service in the table. All lower levels of the selected items are collapsed simultaneously.
Reload		Reloads all System Services and Advanced Services.

Service/Path/Service Components menu; Context menu

Details...		Opens a detailed view of the selected service.
Alarm List...		Calls the Alarm List dialog listing the alarms for the currently selected item in the table. This is only available for a selected component with an active alarm.
Edit		Calls the Service Editor dialog for a selected service.
Synchronize Service		Re-synchronizes the selected service.
Supervision ► Resume		Resume paused supervision for the selected service. The status shown in the "Supervision" column will go back to "Running".
Supervision ► Pause		Pause supervision for the selected service. The status shown in the "Supervision" column will go to "Paused". The status entry is colored cyan.
Delete		Deletes the selected service element entry and all its lower level members.

Expand		Shows the members of the selected item in the table. All lower levels of the selected item are expanded simultaneously.
Collapse		Hides the members of the selected item in the table. All lower levels of the selected items are collapsed simultaneously.
Help		
? Help		Calls the FOXMAN-UN help viewer and opens this page.

Table Sorting and Filtering

Please refer to [Table Sorter](#) section for details.

Related dialogs/windows

[Service Editor](#),
[Create VPLS](#),
[Create VPWS](#),
[Customer Manager](#),
[SLA Manager](#),
[NE Maintenance Mode](#),
[Components Selector](#),
[Service Alarms](#),
[Service Reporting](#),
[Report Manager](#),
[Alarm List](#).

9.3 Service Editor

Purpose

The Service Editor dialog is launched from the Service Supervision main dialog to create or edit services. It looks similar to the main dialog, with the following differences:

- Displays only the details of the current service being created or edited
- Does not show the status and alarms
- Allows deleting the current service
- Allows adding or removing Service Path(s), Service Component(s)
- Allows editing the existing Path and service attributes of the current service.
- When opened from the “Edit” menu or context menu entry “Show Details...” of a section in the section manager, only the specific section is shown with the respective service attributes. The view can be expanded or collapsed.

Dialog image

Service Editor

Name	Type	Sub Type	A-End
VPWS_151998498...	service		
Path for NEID-1	path		
NE_80 [14] e...	port		NE_80
NE_80 [211] SP...	servic...		NE_80
Path for NEID-3	path		
NE_83 [8] et...	port		NE_83
NE_83 [211] SP...	servic...		NE_83

+ Add Path...

+ Add Components...

[... Edit...

- Remove

Expand

Shrink

? Help

OK

Apply

Cancel

Service Info Attributes

Name	1478171340385
Description	Thu Nov 03 12:09:00 CET 2016
Customer	
Service Level Agreement	Premium Customer

OK

Cancel

Path Info Attributes

Name	1478171543221
Description	Thu Nov 03 12:12:23 CET 2016
Network	green

OK

Cancel

Mandatory entries

A service should have at least one path and one component in order to be created.

Optional entries

The Service and Path Info attributes entries.

Informational content

Displays details of the current service being created or edited.

Controls (buttons, menu items, etc.)**Service Editor menu, Service/Path context menu**

Add Path...		Add a path to the selected service. Calls the Path Info Attributes dialog.
Add Components...		Add a component to the selected item. Calls the Components Selector dialog.
Edit		Edit the selected element. If the selected element is: - a service: Calls the Service Info Attributes dialog; - a path: Calls the Path Info Attributes dialog.
Remove		Deletes the selected element and all its lower level members.
Expand		Shows the members of the selected element. All lower levels of the selected item are expanded simultaneously. A collapsed element can also be expanded by double-clicking the entry in the list.
Shrink		Hides the members of the selected element. All lower levels of the selected items are collapsed simultaneously. An expanded element can also be collapsed by double-clicking the entry in the list.
? Help		Calls the help viewer and opens this page.
OK		Saves the changes and exits the dialog.
Apply		Saves the changes without exiting the dialog.
Cancel		Exits the dialog without saving the changes.

Table Sorting and Filtering

Please refer to **Table Sorter** section for details.

Service Info Attributes

Name	Enter a name for the service.
Description	Enter a description of the service. Default: The current date and time of service creation.
Customer	(Optional) Select one of the existing customers from the drop-down menu. Note: To create new Customer, go to Customer Manager dialog
Service Level Agreement	(Optional) Select one of the existing SLAs from the drop-down menu. Note: To create new SLA, go to SLA Manager dialog.
OK	Creates the service.
Cancel	Exits the dialog without creating the service.

Path Info Attributes

Name	Enter name of the service path
Description	Enter a description of the service path.

Network	Selects the Network it is part of. - red - green - blue - yellow Note: The network is an attribute that allows coloring and filtering paths and components according to their physical implementation.
OK	Creates the Path
Cancel	Exits the dialog without creating the Path

Related dialogs/windows

Service Supervision [Service Supervision](#),
[Customer Manager](#),
[SLA Manager](#),
[NE Maintenance Mode](#),
[Components Selector](#).

9.4 Customer Manager

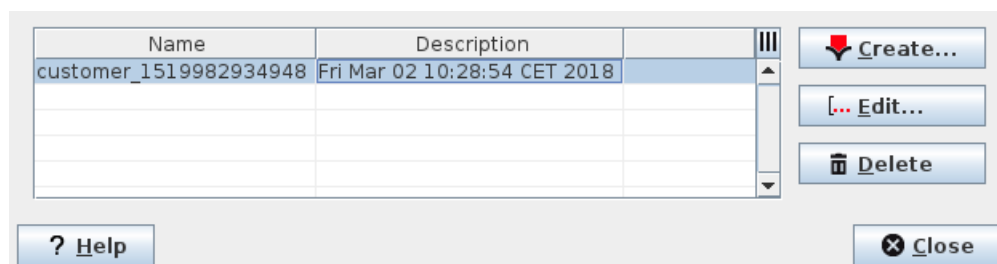
Purpose

Displays the name and description of all the managed customers.

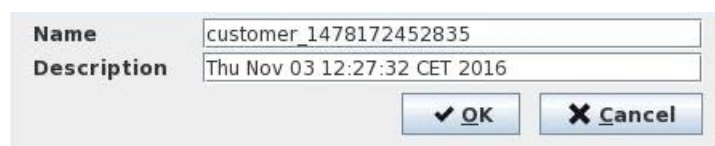
Allows adding new managed customers, deleting or editing the existing customer profiles.

Dialog image

Customer Manager



Customer Editor



Mandatory entries

Not applicable.

Optional entries

Customer Editor entries.

Informational content

List all the managed customers.

Controls (buttons, menu items, etc.)

Customer Manager

Create...		Calls the Customer Editor dialog to create a new customer.
Edit...		Calls the Customer Editor to edit Name and/or Description of currently selected customer.
Delete		Deletes the selected customer entry.
? Help		Calls the help viewer and opens this page.
Close		Closes the dialog.

Table Sorting and Filtering

Please refer to **Table Sorter** section for details.

Customer Editor

Name	Enter a name of the customer
Description	Enter a description of the customer. Default: The current date and time of service creation.
OK	Creates the new customer and exits the dialog.
Cancel	Exits the dialog without creating the customer.

Related dialogs/windows

Service Supervision **Service Supervision**,
Service Editor.

9.5 SLA Manager

Purpose

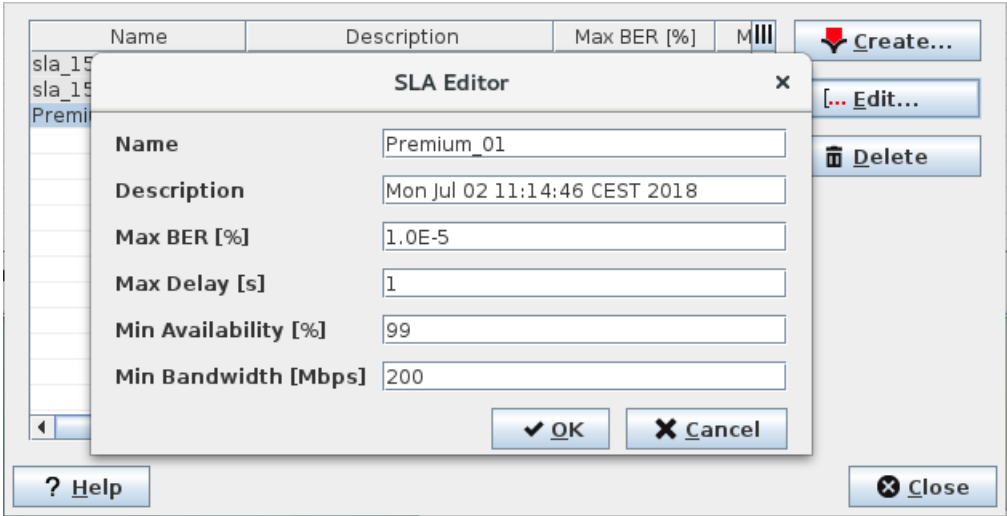
The Service Level Agreement (SLA) contains the service reliability/performance metrics that can be negotiated between the service provider and a customer to guarantee levels of quality for traffic transiting the network.

The current implementation monitors only the actual Service Availability and compares it against the Service Availability threshold set in the SLA. If this threshold is crossed, an SLA violation is reported in the **Service Reporting** dialog.

The future implementation will likewise monitor the other service performance metrics such as latency, BW, BER. Their observed values will be compared against the service level thresholds set in the SLA.

Dialog image

SLA Manager, SLA Editor



Mandatory entries

Valid values for the SLA metrics:

- max. BER
- max delay
- min availability
- min bandwidth



Please note:
Currently only the min. availability metric is evaluated by the system. You can retain the default values of the other SLA metrics.

Optional entries

Name, Description

Informational content

Displays the configured performance metrics for each SLA.

Controls (buttons, menu items, etc.)

SLA Manager

Create...		Calls the SLA Editor dialog to create new SLA.
Edit...		Calls the SLA Editor dialog to edit values of the currently selected SLA.
Delete		Deletes the selected SLA(s).
? Help		Calls the help viewer and opens this page.
Close		Closes the dialog.

Table Sorting and Filtering

Please refer to [Table Sorter](#) section for details.

SLA Editor

Name	Enter a name for the SLA. Maximum length is 100 characters.
Description	Enter a description for the SLA. Maximum length is 1000 characters.
Max BER [%]	Maximum allowed Bit Error Rate (BER) in percent, e.g. enter 10 for a Max. BER of 10%.
Max Delay [s]	Maximum allowed service end-to-end transit delay or packet delivery delays in seconds.
Min Availability [%]	Minimum allowed service availability in percent, e.g. enter 99 for 99% Availability. Note: Operational availability is defined as the percentage of time a service is available to end users.
Min Bandwidth [Mbps]	Minimum allowed lowest transmission rate in Megabits/second for a service. This is the BW that is always guaranteed by the service provider. Any BW utilization that is below the set threshold is considered degraded service of the network.
OK	Creates the SLA and exits the dialog.
Cancel	Exits the dialog without creating the SLA.

Related dialogs/windows

Service Supervision [Service Supervision](#),
[Service Editor](#),
[Service Reporting](#).

9.6 NE Maintenance Mode

Purpose

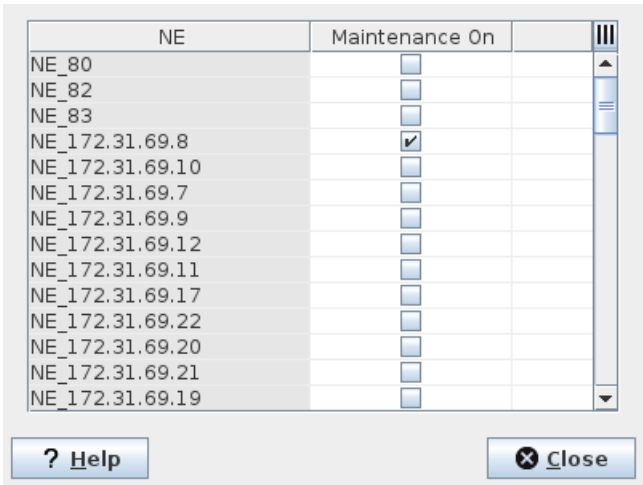
Allows you to put selected NEs to maintenance mode and prevent them from reporting service alarms while doing maintenance. Whenever at least one NE is in maintenance mode a notice “NE(s) are in Maintenance Mode” appears in the upper right area of the Service Supervision [Service Supervision](#).

The NE Maintenance Mode is called from the Service Supervision [Service Supervision](#) via the “Edit – Manage NE Maintenance Mode...” menu entry.

To check which NEs are in maintenance mode, click on the “Maintenance On” column header to change the table sorting until the NEs with maintenance mode “On” are listed on top. Alternatively you can set a filter to show NEs with maintenance on only.

Dialog image

NE Maintenance Mode



Mandatory entries

Not applicable.

Optional entries

Select NE(s) for which the maintenance mode shall be activated.

Informational content

NE	Name of the NE.
Controls (buttons, menu items, etc.)	
Maintenance On	A mark in the checkbox sets the selected NE to maintenance mode.
? Help	Calls the help viewer and opens this page.
Close	Closes the dialog.

Table Sorting and Filtering

Please refer to [Table Sorter](#) section for details.

Related dialogs/windows

Service Supervision [Service Supervision](#),
[Service Editor](#).

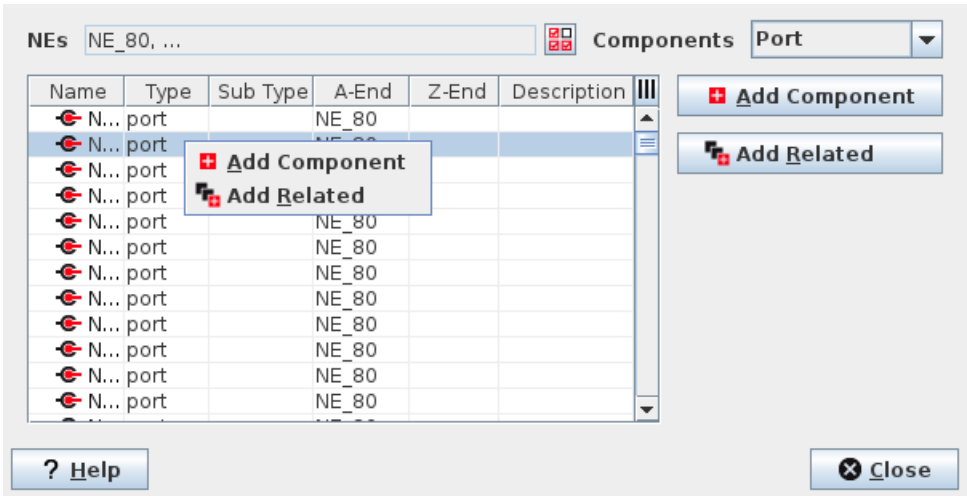
9.7 Components Selector

Purpose

Allows adding service components to the service path. It likewise allows automatically finding all of its related components and adding them to the service path.
The Components Selector is called from the [Service Editor](#) via the [Add Components...](#) button.

Dialog image

Components Selector



Mandatory entries

Select terminating NEs and Service Component(s)

Optional entries

Not applicable.

Informational content

Name	The specified name of the component. This name is usually composed of NE name, slot no. (including physical and logical slots), and AP (Access Point). Note: When setting labels on ports in the FOXCAST GUI make sure to verify the label is set on the appropriate AP. As an example, the label that appears in the AP part of the Name for SFP-based ports of a CESM1 core unit is the one set on the “unit-x/port-y/mau” AP of the SFP-based port, while for electrical Ethernet ports of a CESM1 core unit this is the label set on the “unit-x/port-y” AP.
Type	The type is determined by the selection made in the “ Components ” selector.
Sub Type	Depends on the selection made in the “ Components ” selector. For components “ Service Point ” the Sub Type is used to unambiguously identify the available components.
A-End Z-End	Identifies the A-End and / or Z-End NEs of the listed component. For valid circuits, sections, and tunnels both A-End and Z-End NEs are shown.
Description	Shows the description of the component (where available).

Controls (buttons, menu items, etc.)

Add Component		Add the selected component to the service path. Note: After having selected the required service component(s) in the Component Selector dialog list, you need to add them via either “Add Component” or “Add Related” in order to make them appear in the Service Supervision Service Supervision .
Add Related		Add the selected component and all its related components to the service path. Also see the note for “Add Component” above.
? Help		Calls the help viewer and opens this page.
Close		Closes the dialog.

Components Filter

NEs		Calls the Select NEs dialog, where you can select one or several NEs available.
Components		Select one of the applicable Components from the drop-down menu. The listed objects are filtered, and only items that are applicable for the current component layer are shown: - Port Table displays all the available ports of the selected NEs. This may include NE internal ports, local management ports, synchronization ports, etc. - Circuit Table displays all the circuits terminating in any of the selected NEs. - Section Table displays all the sections terminating in any of the selected NEs. - Service Point Table displays all the service points (e.g. for EoS, VPLS, VPWS, E1 services, etc.) of the selected NEs. - Tunnel Table displays all MPLS-TP tunnels available on the selected NEs. - Service Table displays all services available on the selected NEs. - Alarm Table displays all alarms available on the selected NEs. - MO Table displays all Managed Objects available on the selected NEs.

Component Context menu

Add single component		Add the selected component to the service path.
Find and Add related components		Add the selected component and all its related components to the path.

Table Sorting and Filtering

Please refer to **Table Sorter** section for details.

Related dialogs/windows

Service Editor.

9.8 Service Alarms

Purpose

The key piece of functionality in the Service Supervision is identifying which services are impacted by traffic affecting equipment alarms. This feature is useful when troubleshooting a service problem.

The Alarm List dialog filters the alarms based on the selected element(s), e.g. list only the service alarm of the selected service(s) or list all the alarms of the service(s), service path(s) and service components.



Please note:

Important points about service alarms:

- Only one service alarm is active per service.
- If a service alarm changes severity, the active alarm is cleared and a new alarm is raised.
- Only traffic affecting equipment alarms are monitored for service alarms.
- Only Major and Critical Alarms are monitored for the service alarms.

Service Alarm Severity

- The mapping of equipment alarms to service fault state is configurable via `/opt/nem/etc/singlePathServiceAlarmMapping.cfg` and `/opt/nem/etc/multiPathServiceAlarmMapping.cfg`
- A default configuration is pre-installed, the values are shown below:

```
$ vi singlePathServiceAlarmMapping.cfg

AlarmStatus=Cleared
MinPercentRoutesPrimaryAvailable=100
MinPercentRoutesProtectingAvailable=100
AlarmStatus=Cleared
MinPercentRoutesPrimaryAvailable=100
MinPercentRoutesProtectingAvailable=NA

AlarmStatus=Minor
MinPercentRoutesPrimaryAvailable=100
MinPercentRoutesProtectingAvailable=0

AlarmStatus=Major
MinPercentRoutesPrimaryAvailable=0
MinPercentRoutesProtectingAvailable=100

AlarmStatus=Critical
MinPercentRoutesPrimaryAvailable=0
MinPercentRoutesProtectingAvailable=0
AlarmStatus=Critical
MinPercentRoutesPrimaryAvailable=0
MinPercentRoutesProtectingAvailable=NA

$ vi multiPathServiceAlarmMapping.cfg

AlarmStatus=Cleared
MinPercentRoutesPrimaryAvailable=100
MinPercentRoutesProtectingAvailable=100
```


AlarmStatus=Cleared
MinPercentRoutesPrimaryAvailable=100
MinPercentRoutesProtectingAvailable=NA

AlarmStatus=Warning
MinPercentRoutesPrimaryAvailable=100
MinPercentRoutesProtectingAvailable=50

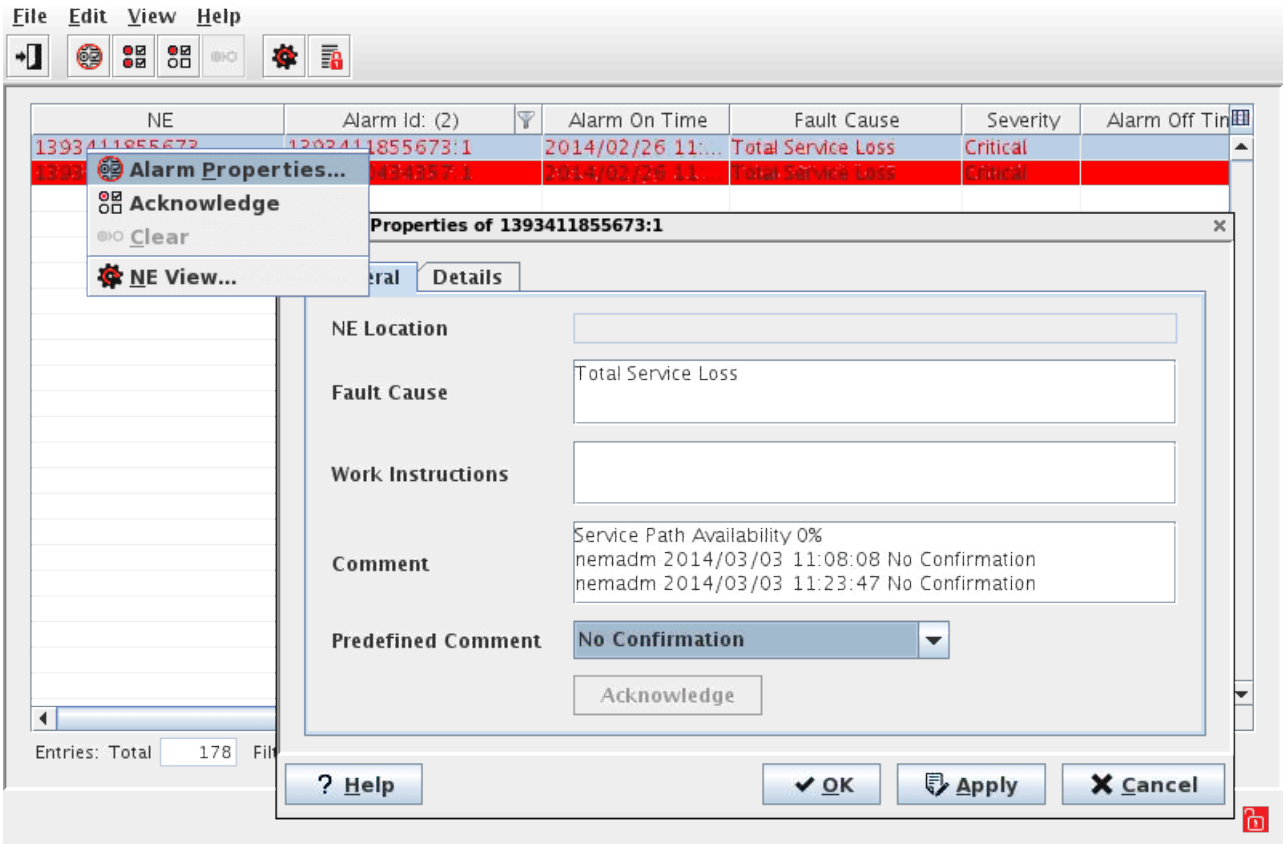
AlarmStatus=Minor
MinPercentRoutesPrimaryAvailable=100
MinPercentRoutesProtectingAvailable=0
AlarmStatus=Minor
MinPercentRoutesPrimaryAvailable=50
MinPercentRoutesProtectingAvailable=50
AlarmStatus=Minor
MinPercentRoutesPrimaryAvailable=0
MinPercentRoutesProtectingAvailable=100

AlarmStatus=Major
MinPercentRoutesPrimaryAvailable=50
MinPercentRoutesProtectingAvailable=0
AlarmStatus=Major
MinPercentRoutesPrimaryAvailable=50
MinPercentRoutesProtectingAvailable=NA

AlarmStatus=Critical
MinPercentRoutesPrimaryAvailable=0
MinPercentRoutesProtectingAvailable=0
AlarmStatus=Critical
MinPercentRoutesPrimaryAvailable=0
MinPercentRoutesProtectingAvailable=NA

Dialog image

Alarm List



Mandatory entries

Not applicable.

Optional entries

Not applicable.

Informational content

The list shows the service alarm(s) of the currently selected service(s).

Controls (buttons, menu items, etc.)

Please refer to the [Alarm List](#) section for details.

Related dialogs/windows

Service Supervision [Service Supervision](#),
[Alarm List](#).

9.9 Service Reporting

Purpose

The Service Reporting dialog is called from the Service Supervision **Service Supervision** via the menu selection “Tools – Generate Report...”.

Service Reporting displays the service end-to-end performance monitoring information as listed below:

- Service outage events
Displays the service outage or unavailability events and their durations.
- Service outage daily statistics
Displays the service unavailability instances count and time intervals for the 24h period.
- Service monthly availability
Displays the calculated service end-to-end Availability per month. It likewise detects threshold violations against the Availability QoS metric set in the SLA.

Service Availability percentage and Service Outage

The service availability required for reports are based on service outage events and their durations.

As per ITU-T G.826, the availability is calculated as follows:

$$\text{Availability} = ((\text{Measured Time} - \text{UAS}) / \text{Measured Time}) * 100$$

where:

- Measured Time = Reporting time span in seconds, (note: 24 hr = 86,400 s)
- UAS (Unavailable Seconds) = outage or service unavailability in seconds

The table below provides an overview of the correlation of the Availability percentage and outage durations.

Table 12: Availability and Downtime

Availability	Downtime (Outage) per year	Downtime (Outage) per month
99.9999%	32s	2.67s
99.999%	5min 15s	26.25s
99.99%	52min 36s	4min 23s
99.9%	8h 46min	43min 50s
99%	3days 15h 40min	7h 18 min

Dialog image

Report Viewer

Report Query Criteria

Report Type: **Service Events** | Reported Services: | From: **3, 2016** | To: **3, 2016** | **Load**

Service N...	Event Star...	Event Star...	Event End ...	Event End ...	Event Dur...	Event Des...	Customer	SLA
14781713...	03/11/2016	12:24:03	03/11/2016	12:24:03	0	Service Cr...	customer_...	Premium C...

Select Services

Service Name	ID	Customer	SLA
VPLS_1519985463542- VPLS Servi...	80	customer_15...	sla_151998...
1530521637741	81	customer_15...	sla_151998...
SRVC_ETH_001	82	customer_15...	Premium_01
1519983084194	77	customer_15...	sla_151998...
All MPLS-TP Tunnels	78	customer_15...	sla_151998...
VPWS_1519984987669- VPWS Se...	79	customer_15...	sla_151998...

Entries: Total 6 Filtered 6 Selected 2

OK

Apply

Cancel

Mandatory entries

Select the Report Type and Time interval from the Report Query Criteria.

Optional entries

Not applicable.

Informational content

Displays detailed information for the service outages instances and durations as well as monthly availability.

Controls (buttons, menu items, etc.)

Exit		Closes the current dialog window.
Load		Load Report according to criteria.
Export		Export content of this table. Reports can be saved in the server directory as csv or.xml file.
Print		Print content of this table

Report Query Criteria

Report Type	
Service Events	Lists the Service Events within the specified reporting period. - Service Name - Event Start/End Date - Event Start/End Time - Event Duration - Event Description

Daily Failure Count 1	List the Service Outage daily statistics within the specified reporting day. - Circuit Name (Service Name) - Report Day - Outage count - Shortage Outage - Longest Outage - Total Outage - Average Outage - Total Online Time Note: Outage measurements in seconds
Daily Failure Count 2	List the Service Outage daily statistics within the specified reporting day. - Link Name (Service Name) - Report Day - Outage Start/End Time - Outage counts for the following outage durations:<10s 10s to 60s 1min to 10 min >10min - Number of Failure - Outage Time
Monthly Availability	List the service monthly availability within the specified reporting period. - % available for each month - YTD (Year-to-Date) % available. Average availability from the beginning of the year through current reporting period. - SLA applied - SLA Violations
Reported Services	
Select Services	 Calls the Select Services dialog, which list all the available services. A specific service or services can be selected to be included in the Report.
Date Range	
From/To	Defines the time interval or reporting period.

Select Services

Service Name	The name of the service specified in the Service Editor .
ID	The service ID.
Customer	The customer name specified in the Customer Manager .
SLA	The SLA name specified in the SLA Manager .
Select All	Selects all listed services for the report.
Deselect All	Deselects all listed services for the report.
OK	Applies the selected services and closes the dialog.
Apply	Applies the selected services without closing the dialog.
Cancel	Cancels the service selection and closes the dialog.

Related dialogs/windows

Service Supervision **Service Supervision**,
Service Editor,
Customer Manager,
SLA Manager.

9.10 Report Manager

Purpose

The Report Manager dialog is called from the Service Supervision **Service Supervision** via the menu selection “Tools – Manage Report Profile...”.

Allows the creation of Service Report Profile to:

- Schedule report creations
- Send generated reports to an email or save in a local directory.

Dialog image

Report Manager

Name	Description
serviceReportProfile_1521707029743	Thu Mar 22 09:23:49 CET 2018
serviceReportProfile_1521707135530	Thu Mar 22 09:25:35 CET 2018
serviceReportProfile_1521707179361	Thu Mar 22 09:26:19 CET 2018
serviceReportProfile_1521707273400	Thu Mar 22 09:27:53 CET 2018

Create...

Edit...

Delete

Help

Close

Report Profile Editor

Name

serviceReportProfile_1521707029743

Description

Thu Mar 22 09:23:49 CET 2018

Destination

Destination File

service_reports_profile_1

CSV

Destination Directory

.

Destination Email

Content

Report Type

Service Events

Reporting Period

1

Day(s)

Reported Services

Schedule

Execution Periodicity

Once

Execution Moment

Jul 2, 2018

09:23

OK

Cancel

Informational content

List the Reports Profile showing the report type (Service, Daily Statistics Count 1, etc.), the Schedule of the report generation and the Destination of the generated report(s).

Controls (buttons, menu items, etc.)**Report Manager**

Create...		Calls Report Profile Editor to create new Profile.
Edit...		Calls the Report Profile Editor dialog to edit values of the currently selected Profile.
Delete		Deletes the selected Profile(s).
? Help		Calls the help viewer and opens this page.
Close		Closes the dialog.

Table Sorting and Filtering

Please refer to **Table Sorter** section for details.

Report Profile Editor

Name	Enter a name for the Report Profile.
Description	Enter a description for the Report Profile.
Destination File	Specify a file name and file type (csv or pdf).
Destination Directory	Specify a local directory where to save the generated report(s).
Destination Email	Specify the email address(es) where to send the generated report(s).
Report Type	Select the content of the report(s) to be generated: - Service Events, - Daily Failure Count 1, - Daily Failure Count 2, - Monthly Availability.
Reporting Period	The time period covered by the report, e.g. the Monthly Availability data for 3 months.
Reported Services	Select the service(s) to be included in the Report.
Execution Periodicity/Execution Moment	Define the report schedule: - "Once", or date and time of execution: - Daily/Time of execution, - Weekly/Day of execution, - Monthly/Day of the month of execution.
OK	Creates the Report Profile and exits the dialog.
Cancel	Exits the dialog without creating the Report Profile.

Related dialogs/windows

Service Supervision **Service Supervision**.

10 Ethernet Security

This part contains the help information for the FOXMAN-UN Ethernet Security Manager. It includes the following topics:

- [Introduction](#),
- [Ethernet Security Manager](#),
- [Crypto Engines](#),
- [Segments](#),
- [Crypto Configurations](#),
- [Mappings](#),
- [Create Mapping](#),
- [Functional Unit View](#).

10.1 Introduction

The Ethernet Security Manager is used to configure and manage Crypto Engines, Crypto Termination Points, Crypto Configurations, and Mappings. These items are available only with the use of specific equipment for MPLS-TP Encrypted tunnels in FOX61x MPLS-TP networks, including a DIRAC server. For DIRAC installation and operating instructions refer to the DIRAC user documentation.

10.2 Ethernet Security Manager

Purpose

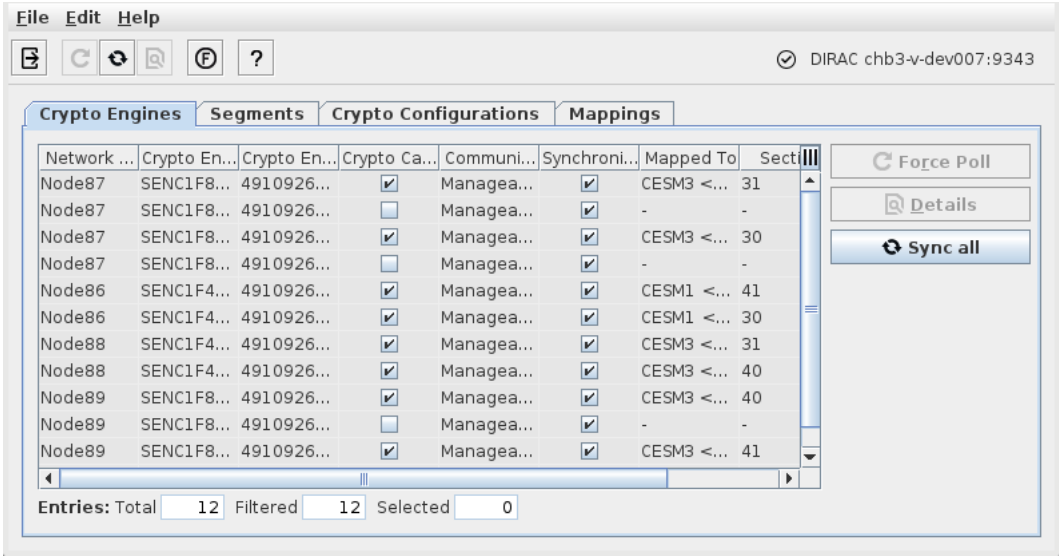
The Ethernet Security Manager dialog supports you in setting up and monitoring the infrastructure for encrypted MPLS-TP tunnels. It is called from the [NEM Desktop](#) via the menu selection “Application – Ethernet Security Manager...”. The dialog provides four different tabs.

10.2.1 Crypto Engines

Purpose

Lists the crypto engines with related information managed by the DIRAC server. For a specific crypto engine, provides detailed information via the “Details” dialog on a selected crypto engine.

Dialog Image



Informational content

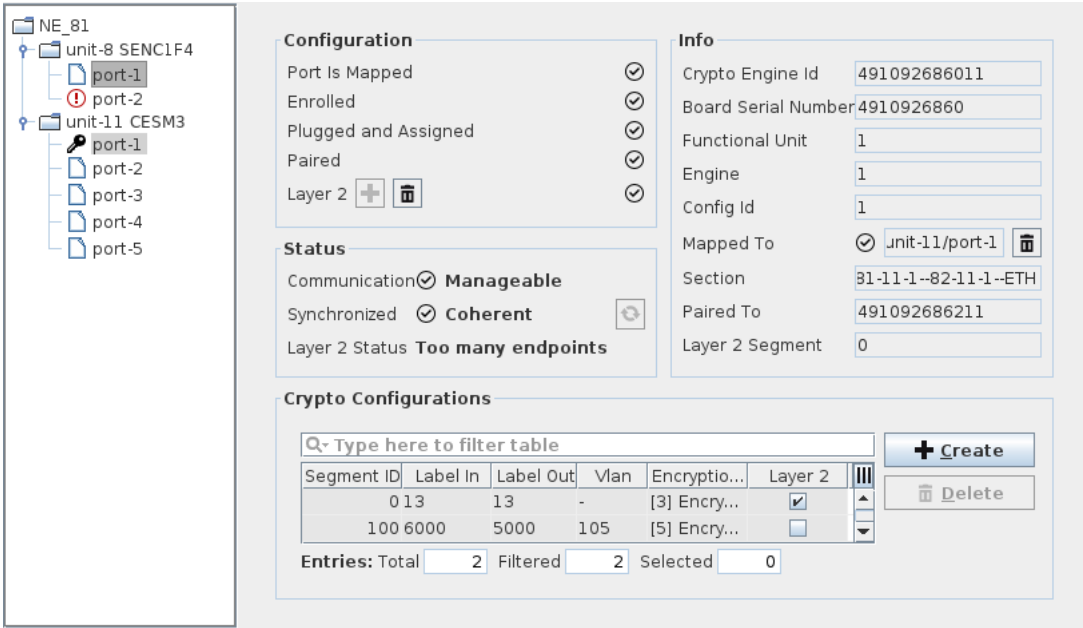
DIRAC status	The DIRAC communication status is shown in the upper right corner of the dialog window. When a DIRAC server is installed on the same machine as FOXMAN-UN, and if it is up and running, and communication is up with valid certificates, the status is indicated with - “DIRAC localhost:9343” - or - “DIRAC <server_name>:9343” and an OK symbol. If the connection to the DIRAC server has failed the status is indicated with “No connection DIRAC <server_name>:9343” and a red exclamation mark symbol. In this case the server administrator needs to make sure the DIRAC server is up and running, and the certificates for secure communication are exchanged and valid between the FOXMAN-UN and the DIRAC server.
Contents of the “Crypto Engines” tab:	
Network Element	The Network Element Name where the Encryption Unit and the Crypto Engine are located.
Crypto Engine Unit	Encryption Unit HW type, <slot within the subrack>, and port.
Crypto Engine ID	The unique identifier of the Crypto Engine, composed of the card serial number and the identifier of the Crypto Engine on the Encryption Unit (1 for Crypto Engine A; 2 for Crypto Engine B).
Crypto Capable	If the checkbox is marked the Crypto Engine is capable of providing encryption. An unmarked checkbox indicates that the physical and/or logical setup is not suitable for providing encryption.
Communication Status	The communication status of the Crypto Engine with the DIRAC. - Manageable: Communication between DIRAC and SENC1 series encryption unit is established. - READY Port ready for enrollment. - Not in Dirac: Port currently not configured in DIRAC. - Not Manageable: Communication between DIRAC and SENC1 series encryption unit is not established.

Synchronized	If the checkbox is marked the Crypto Engine is synchronized.
Mapped To	The core unit name, subrack slot and physical port to which the Crypto Engine is mapped.
Section	The ID of the section
Layer 2	When marked, indicates that encryption for the SyncE and PTP L2 protocols is configured for that Crypto Engine.

Controls (buttons, menu items, etc.)

Exit		Closes the Ethernet Security Manager dialog.
Force Poll		Force a polling of the crypto configuration data for the selected Crypto Engine(s).
Sync All		Reload the basic Crypto Engines information from DIRAC and update the list.
Details...		Calls the Details window to display Crypto Engine details.
Configuration (<user class>)		When selected from the context menu of an NE, opens the NE configuration in the FOXCST GUI with the chosen user class.
Functional Unit View		Opens the Functional Unit View .
Show Mapping		When selected from the context menu of an NE, opens the Map-pings tab.
Show Layer 2		Shows L2 protocols encryption status.
Enable Layer 2		Enable encryption of the SyncE and PTP L2 protocols for that Crypto Engine.
Disable Layer 2		Disable encryption of the SyncE and PTP L2 protocols for that Crypto Engine.
? Help		Calls the help viewer and opens this page.

Dialog Image (Crypto Engine Details)



Informational content

Configuration	Provides configuration details, such as: - Port mapping (Port is Mapped), - Enrollment status (Enrolled), - Assignment status (Plugged and Assigned), - Pairing Status (Paired), - Layer 2 setting active (Layer 2), with the option to add Layer 2 encryption for the SyncE and PTP protocols, or to delete Layer 2 encryption.
Status	Provides status information, such as: - Communication status (Communication), - Synchronization status (Synchronized); can be updated by clicking the sync button, - Layer 2 Status (OK if layer 2 SyncE and PTP encryption is active).
Info	Provides more information on the crypto engine, such as: - Crypto Engine Id: the ID of the Crypto Engine composed of the board serial number and the Crypto Engine index; - Board Serial Number: the serial number of the HW; - Functional Unit: the ID of the FU on the board; - Engine: the ID of the Crypto Engine on the FU; - Config Id; - Mapped To: the status and address of the mapped core unit port, with the option to delete the mapping; - Section: name of the section configured on the encryption port of the Crypto Engine; - Paired To: Crypto Engine Id of the Crypto Engine on the remote end; - Layer 2 Segment: ID of the layer 2 segment.

Crypto Configurations	List of existing Crypto Configurations, with the option to create or delete a Crypto Configuration. Provides the following information (in columns): - Segment ID, - Label In, - Label Out, - VLAN, - Encryption Profile, - Layer 2.

Related dialogs/windows

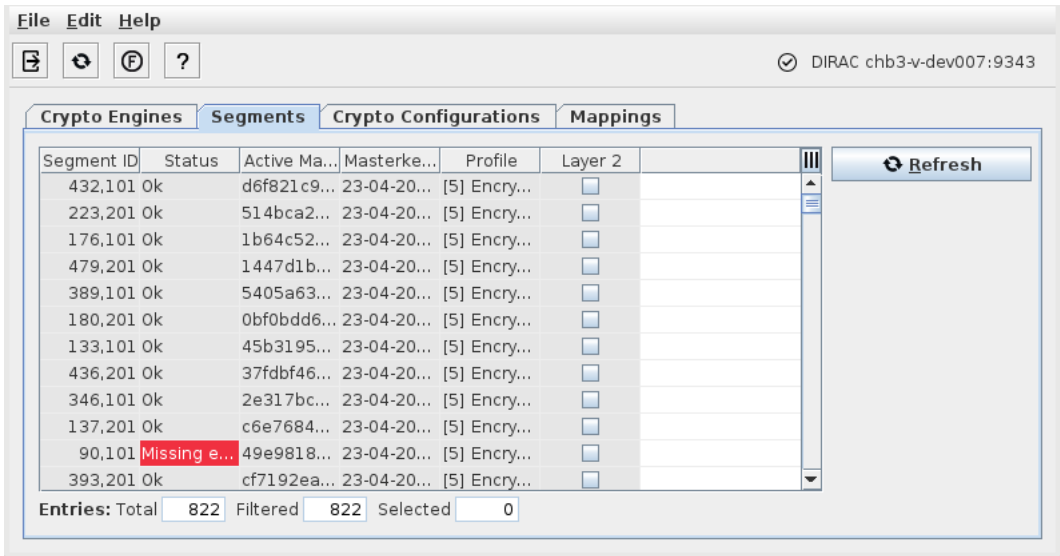
Segments,
Crypto Configurations,
Mappings,
Create Mapping,
Functional Unit View.

10.2.2 Segments

Purpose

Lists the encryption segments and some related information managed by the DIRAC server.

Dialog Image



Informational content

Segment ID	The ID of the current segment. The ID is composed of a counter for the segments per NE and a number derived from the Crypto Engine.

Status	The segment status. The status can be as follows: - OK; - Missing endpoint; → Needs configuration of a missing segment end point. - Too many endpoints; → Needs re-configuration of ambiguous segment end points. - Mismatching active master key; → Usually a master key refresh solves this. - Mismatching crypto profile; → Check configuration of the segment or tunnel. - Outdated master key; → Perform a master key refresh. - Unknown master key creation time; → Perform a master key refresh. - Wrong segment initialization; may happen after upgrade. → Perform a master key refresh.
Active Masterkey	A hash of the currently active master key.
Masterkey Activation Time	The activation time of the current master key for the segment. The default format is yyyy-MM-dd hh:mm:ss.
Profile	The encryption Profile applied to the segment.
Layer 2	When marked, indicates that this is the segment that defines the SyncE and PTP L2 protocols encryption behavior.
AEnd	Identifier for the A-End of the segment, composed of NE name, unit name and slot, port number.
ZEnd	Identifier for the Z-End of the segment, composed of NE name, unit name and slot, port number.

Controls (buttons, menu items, etc.)

Exit		Closes the Ethernet Security Manager dialog.
Refresh		Refresh the contents of the window.
Functional Unit View		Opens the Functional Unit View .
? Help		Calls the help viewer and opens this page.
Context Menu Options on selected segment(s):		
Refresh Masterkey	Refreshes the master key for the selected segment(s).	
Show Crypto Configurations	Opens the Crypto Configurations tab.	

Related dialogs/windows

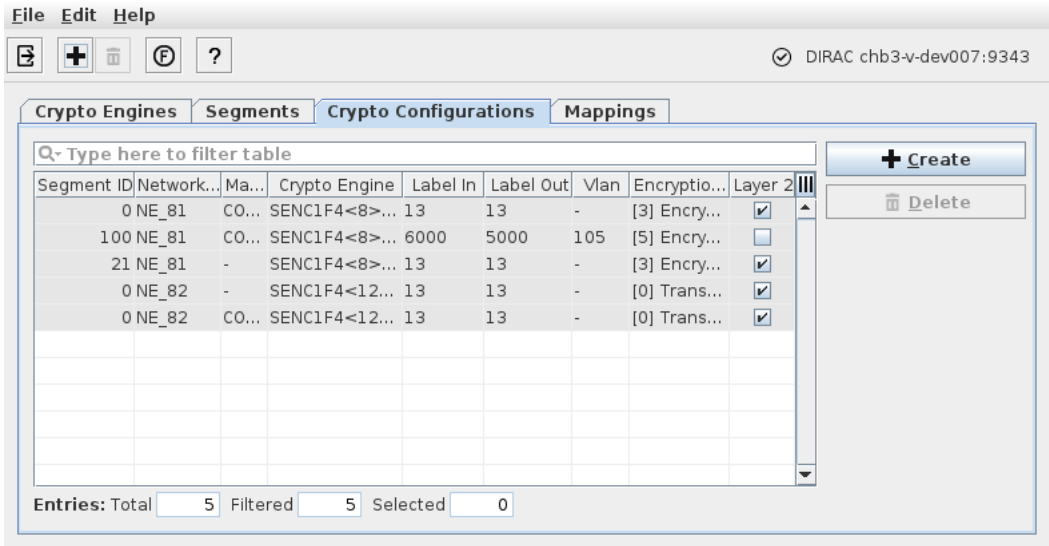
[Crypto Engines](#),
[Crypto Configurations](#),
[Mappings](#),
[Create Mapping](#),
[Functional Unit View](#).

10.2.3 **Crypto Configurations**

Purpose

Lists managed Crypto Configurations (encryption configurations). Allows you to create new Crypto Configurations, and to delete a selected Crypto Configuration. Provides details of a selected Crypto Configuration.

Dialog Image



Informational content

Segment ID	The ID of the encrypted segment in the network.
Network Element	The Network Element Name where the Encryption Unit and the Crypto Engine are located.
Mapped To	The unit and physical port to which the Crypto Engine is mapped.
Crypto Engine	The unique identifier (unit, slot, port) of the Crypto Engine.
Label In	The In Label of the segment.
Label Out	The Out label of the segment.
VLAN	The VLAN ID. Applicable only if a VLAN is defined.
Encryption Profile	The configured Encryption Profile.
Layer 2	When marked, indicates that this is the crypto configuration that defines the SyncE and PTP L2 protocols encryption behavior.

Controls (buttons, menu items, etc.)

Exit		Closes the Ethernet Security Manager dialog.

Create...		Creates a new Crypto Configuration. For this purpose you need to: - select an existing Crypto Engine, - enter a Segment ID, - enter a Label In, - enter a Label Out, - enter a VLAN ID (if applicable), and - select an Encryption Profile. The following Encryption Profiles are available: - [1] Discard: Discard all traffic, - [3] Encrypted & Authenticated without OAM: Encrypt and authenticate all traffic; do not use OAM, - [5] Encrypted & Authenticated with OAM: Encrypt and authenticate all traffic; use OAM.
Delete		Delete a selected Crypto Configuration.
Details...		Calls the Details window to show details of a selected Crypto Configuration.
Functional Unit View		Opens the Functional Unit View .
? Help		Calls the help viewer and opens this page.

Related dialogs/windows

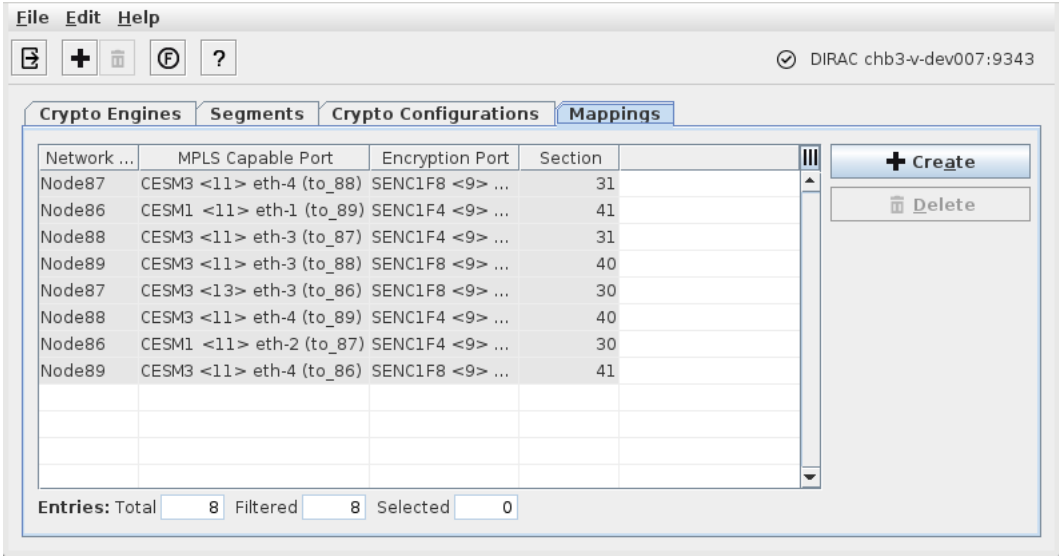
Crypto Engines,
 Segments,
 Mappings,
 Create Mapping,
 Functional Unit View.

10.2.4 Mappings

Purpose

Display, create, and delete mappings of core unit (Central Unit) front ports and Encryption Unit front ports on specific NEs. For each of the links, the mapped core unit (Central Unit) front port and encryption unit front port need to be physically connected.

Dialog Image



Informational content

Network Element	The Network Element Name where the Encryption Unit and the Crypto Engine are located.
MPLS-TP Capable Port	The unit name, slot, and MPLS-TP port ID on the core unit that is mapped to an encryption unit port.
Encryption Port	The unit name, slot, and MPLS-TP port ID on the encryption unit that is mapped to a core unit port.
Section	The section name as shown in the Section Management dialog.

Controls (buttons, menu items, etc.)

Exit		Closes the Ethernet Security Manager dialog.
Create mapping		Opens a dialog to create a new mapping (Create Mapping) between a core unit front port and an encryption unit front port.
Delete		Delete a selected Mapping.
Functional Unit View		Opens the Functional Unit View .
? Help		Calls the help viewer and opens this page.

Related dialogs/windows

[Crypto Engines](#),
[Segments](#),
[Crypto Configurations](#),
[Create Mapping](#).

10.2.5 Create Mapping

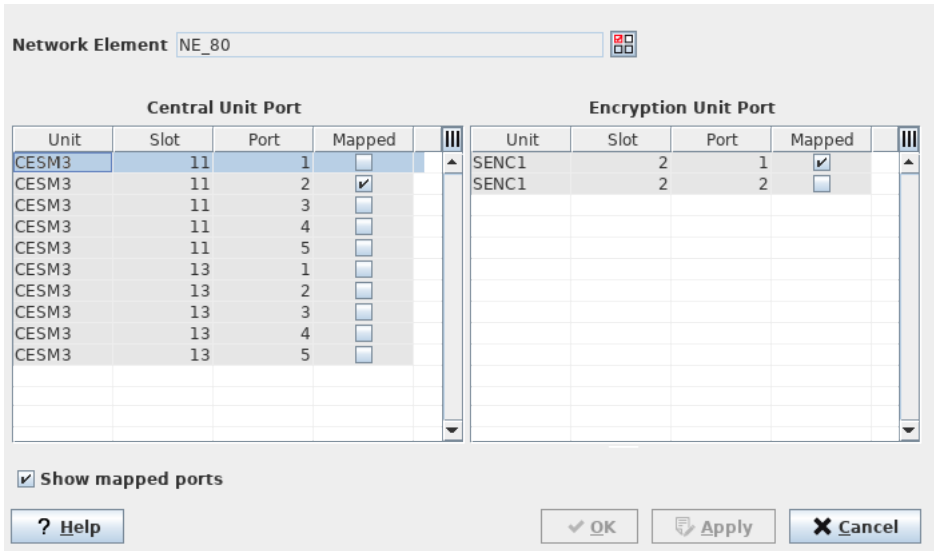
Purpose

Supports you in defining mappings between ports of the core unit (“Central Unit”) and ports of the encryption unit for a specific Network Element. The dialog is called from the **Ethernet Security Manager - Mappings** tab via the “Create” button.

A mapping defines the local physical connection of a link between the front port on the core unit and the front port on the encryption unit for links that shall transport encrypted tunnels.

The link segment (mapping) between a front port of a core unit and a front port on the encryption unit should always be a local physical connection of the same Network Element. The link segment between the encrypted front port of the local encryption unit and the encrypted front port of the remote encryption unit usually bridges the distance between two nodes with encrypted MPLS-TP tunnels.

Dialog Image



Informational content

Network Element	The selected Network Element Name.
Unit	The unit name.
Slot	The slot where a core unit (Central Unit) or an Encryption Unit is installed.
Port	The port used for the mapping between Encryption Unit and core unit (Central Unit).
Mapped	A marked box indicates that the item is already mapped and cannot be re-used. This box is read-only.

Controls (buttons, menu items, etc.)

Network Element		Select Network Element on which the mapping shall be created. This button calls the “Select NE” dialog to select one NE at a time.
Show mapped ports	☒ ☐	An empty box prevents the mapped ports from being displayed. A marked box includes the ports that are already mapped and enables the “Mapped” column.
? Help		Calls the help viewer and opens this page.
OK		Creates the Mapping and exits the dialog.

Apply	Applies the Mapping without exiting the dialog.
Cancel	Closes the dialog without creating the Service.

Related dialogs/windows

Crypto Engines,
Segments,
Crypto Configurations,
Mappings.

10.2.6 Functional Unit View

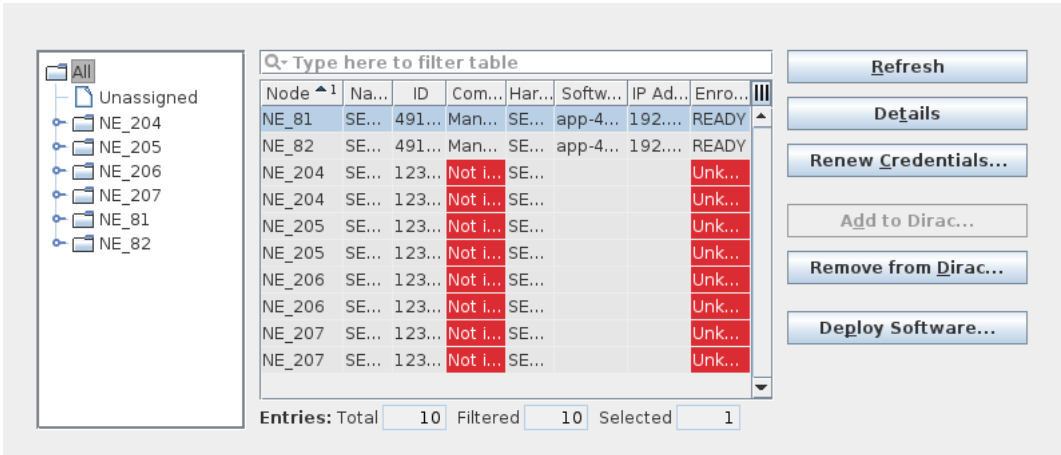
Purpose

Displays details of port components of the crypto configuration on the current NE. The required port item can be selected from a tree structure in the left hand side of the dialog window. The tree includes the NE, its core units and encryption units, and the ports that are part of or eligible for the crypto configuration.

A Functional Unit provides a total of four (eight) Encryption Unit front ports, two (four) towards the core unit (unencrypted), and two (four) towards the network (encrypted, marked with locked padlock symbol on the unit front).

Dialog Image

Functional Unit View (Overview - All)



Informational content

- The information displayed on the right hand side depends on the object selected in the tree:
- When “All” is selected, all detected FUs (encryption units) are listed; when a node is selected, the FUs (encryption units) installed in the respective node are listed. In both cases the following Functional Unit (FU) information is listed on the right hand side:
 - Node:
Name of the node;
 - Name:
Identification of the FU via unit name and slot, and FU index;
 - ID:
FU ID, composed of HW serial number and FU index;

- Communication Status:
"Manageable" or "Not in Dirac";
- Hardware:
HW name;
- Software:
Installed software name_version;
- IP Address:
IP address of the FU registered in DIRAC;
- Enrollment Status.

Commands

The following command buttons are available when at least one node in the table is selected:

- Refresh:
Refreshes the table contents.
- Details:
Open the details view for a selected table entry.
- Renew Credentials...:
Opens a dialog to authorize DIRAC public keys for the selected Functional Unit(s) authentication. This will require to enter the Maintainer and Administrator passwords.
This can be used after a software upgrade on the FU from pre-r17a SW versions instead of removing the FU from DIRAC and re-adding it to DIRAC. It can also be used in case of a unit reset and/or loss of connectivity.
After entering the correct Maintainer and Administrator passwords, processing of credentials renewal is started. This may take some time until completion. When completed successfully, a confirmation "Credentials set correctly" is issued. This must be acknowledged by clicking the "OK" button.
- Add to Dirac...:
Opens a dialog to add a FU to DIRAC.
- Remove from Dirac...:
Opens a confirmation dialog to remove the selected FU entry from DIRAC.
- Deploy Software...:
Opens a dialog to deploy a FU software to selected FUs if software is available in the respective software installation folder (/opt/dirac/addon/ESW).
If the FU has not yet been added to DIRAC or its communication status is "Not in Dirac", the Maintainer password is required to install FU software via the command "Deploy Software".
If the FU communication status is "Manageable", the Maintainer password is not required.
If no software is available, an error messages pops up that needs to be acknowledged.

For the FU detail view, i.e. with an FU selected in the tree, refer to the next dialog image.

Dialog Image

Functional Unit View (FU details) and “Crypto Engines” tab

SENC1F4<8> FU1

Status

ID49109268601

Card Serial Number4910926860

Index1

Neld24

Slot8

HardwareSENC1F4

Softwareapp-416_r17a06

IP Address 192.168.3.11

Dirac

Network Element

CommunicationManagea

EnrollmentREADY

Ping Status

Remove from Dirac...

Align IP

Crypto Engines

Software Management

Network ...	Crypto En...	Crypto En...	Crypto Ca...	Synchroni...	M...	Section	
NE_81	SENC1F4...	4910926...			C...	81-11-1--82-11-1-...	
NE_81	SENC1F4...	4910926...			-	-	

Entries: Total 2 Filtered 2 Selected 0

Software Management (FU details), “Software Management” tab

Crypto Engines

Software Management

Running Software: app-416_r17a06

Disk Usage: 76 out of 471MB (84% free disk space)

Software packages in Device

Name	Version	Size(MB)	Creation Date	
app-416_r17a06.tar	R17A06	50	30-09-2024 09:11:12	

Entries: Total 1 Filtered 1 Selected 1

Load...

Delete...

Activate...

Informational content

When a specific encryption FU of a node is selected, the FU’s details are listed on the right hand side of the Functional Unit View as follows.

- FU Properties:
 - ID: the ID of the FU composed of the card serial number and the Crypto Engine index;
 - Card Serial Number: the serial number of the card HW;
 - Index: the FU index on the card HW;
 - NEId: the ID of the NE in the NEM Configurator;
 - Slot: the slot of the card within the NE subrack;
 - Hardware: the name of the card HW;
 - Software: the name of the installed SW, including a version identifier;
 - IP Address: the IP address of the FU. To configure the IP address of the FU open the configuration of the unit in the **FOXCST**.
- Status:
 - Dirac Status;
 - Network Element Status;
 - Communication (Manageable or Not Manageable);
 - Enrollment Status (Unknown, READY, NOT READY).

- **Crypto Engines tab:** table listing the Crypto Engines available on the same card HW for a selected FU:
 - Network Element name;
 - Crypto Engine Unit: Encryption unit name and slot;
 - Crypto Engine ID: composed of the card serial number and the Crypto Engine index;
 - Crypto Capable: True, False;
 - Communication: Manageable or Not Manageable;
 - Synchronized: True, False;
 - Mapped To: core unit name and slot;
 - Section: Name of the “core unit to FU” section in the section manager.
- **Software Management tab:** To allow software management by DIRAC for FU software of release R16B or later, you need to enter the maintainer and administrator passwords for the SENC1 series FUs.

Once the correct passwords are entered, the “Software Management” tab provides information on the FU selected in the FU tree on the left-hand side of the dialog window:

- Running Software: shows the name and version of the running SW;
- Disk Usage: shows the used and total disk space, and the percentage of free disk space;
- Table with software packages information, such as name, version, size (MB), and creation date of the software on the FU;
- Command buttons to load, delete, and activate software on the FU.

In addition to the informational content, the following controls are available; some of the commands are dependent on the current Enrollment status:

Controls (buttons, menu items, etc.)

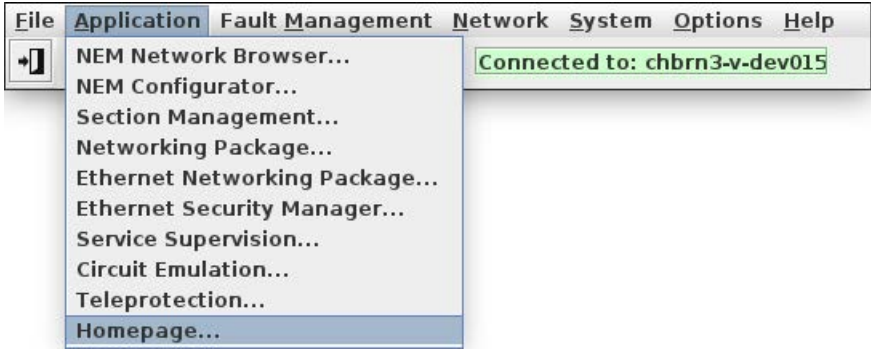
Ping Status	Send a ping request to the FU to update the communication status.
Install Software	Install software on the FU.
Enroll and Add to Dirac	Enroll the FU and add it to the DIRAC database.
Add to Dirac	Add an enrolled FU to the DIRAC database.
Remove from Dirac...	Remove the FU from the DIRAC database.
Align IP	Align the IP address of the FU. Not available if the FU enrollment status is unknown or if its IP address is already aligned.

11 Homepage (Web UI)



Please note:
 For more information on the general Web UI features, refer to the WebUI user manual [1MRC000084]. Some of the applications in the FOXMAN-UN GUI are still legacy application dialogs whereas others have been migrated to the Web UI.

The “Homepage” application is a browser based application (Web UI) providing the home for all application UIs. The Web UI homepage (“Homepage”) is opened from the **NEM Desktop** Application menu by selecting “Application – Homepage...”:

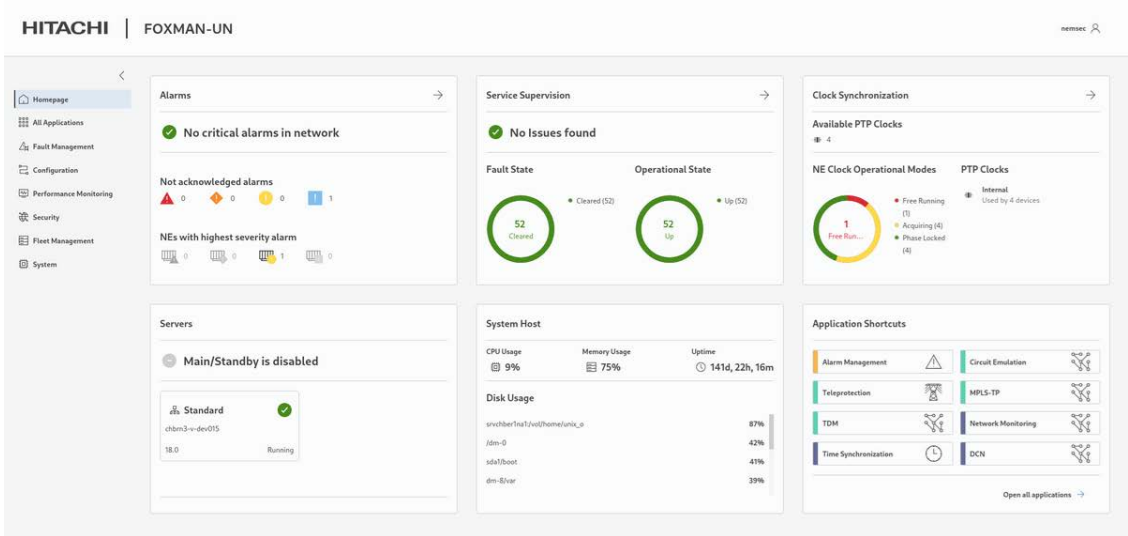


In the current release, the default view of the Web UI homepage looks as shown below. The icon



Homepage

provides the following overview - note that depending on screen size and your network setup the widgets may be arranged differently:



In the upper right corner of the Web UI the “logged-in user” icon provides some user settings:

- nemadmin

Current
 User Settings
- User Preferences
 - Manage Maps (Map Manager)
 - Manage Tags

When the icon



All Applications

is selected in the entity browser (left panel) of services and applications, application widgets are shown, grouped into categories as follows; each of the groups can be selected separately:

**Fault Management:**

- [Service Supervision](#)
- [Alarm Management](#) with map views (Alarms, Section, NE) and the legacy applications:
 - [Alarm Summary](#)
 - [Alarm List](#)
 - [Alarm History](#)
 - [Alarm Customisation](#)

**Configuration:**

- [Circuit Emulation](#)
- [Teleprotection](#)
- [MPLS-TP](#); also see legacy applications [Ethernet Networking Package](#), [NEM Network Browser Main Window](#) and [Create Map](#)
- [TDM](#); also see legacy application [Networking Package](#)
- [Spanning Tree](#), see [Spanning Tree Map](#)
- [Element Management](#) with map views (NE, Section) and the legacy applications
 - [NEM Network Browser](#)
 - [NEM Configurator](#)
 - [Section Management](#)

**Performance Monitoring:**

- [Network Monitoring](#) with
 - [Metrics Database](#)
 - [PM Client](#), see [Performance Management](#)
- [Time Synchronization](#) map views (NE, Section) and the legacy application:
 - [Synchronization Map](#)
- [DCN](#)

**Security:**

- [Credential Distribution](#)
- [DIRAC & FU Credential Management](#)
- [Ethernet Security Manager](#), see [Ethernet Security](#)
- [User and Role Management](#)

**Fleet Management:**

- [Inventory](#), also see legacy applications [Inventory Report \(legacy dialog\)](#) and [Request Inventory Report \(legacy dialog\)](#)
- [Profiles & CPS Tasks \(legacy dialog\)](#)
- [ESW Network Overview](#)
- [ESW Distribution Task](#), see [Distribution Wizard](#)
- [ESW Task Management](#)
- [ESW Job Management](#)

**System:**

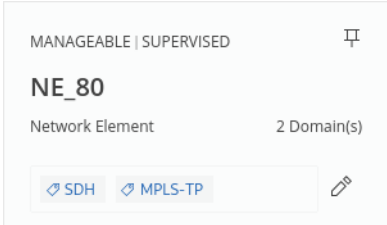
- [System Event List](#)
- [Remote Executor](#)

Applications can be opened from the homepage by clicking on the respective application widget.



Please note:

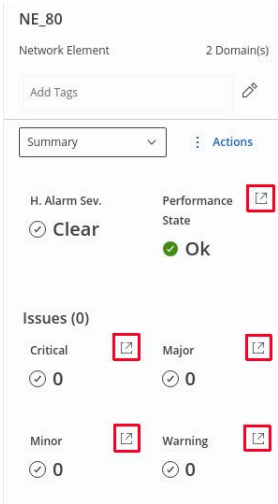
For any selected item in an application (“app”), except system events, alarms, and tasks, one or several tags can be added. Adding tags can ease the individual assignment of objects to a specific subject. The tags are added in the “Add Tag” field of the details panel on the right hand side of the Web UI dialogs. Example for an NE with two tags added; the tags are colored blue:



Please note:

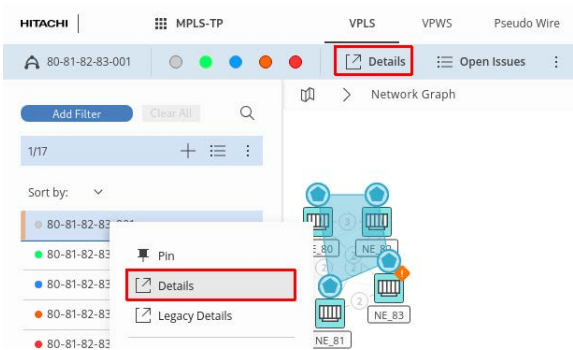
For any item with a link icon: , a page with further information or further details of the item is opened when clicking on the link icon.

Such link icons can be found in many places of the Web UI, e.g., in the right panel of a selected NE of the MPLS-TP Map (marked in red here):



Please note:

For any element selected in the entity browser (left panel) or in the map, detailed information can be obtained either in the right panel or via the Details link in the ribbon or in the context menu (marked red):



11.1 User Settings

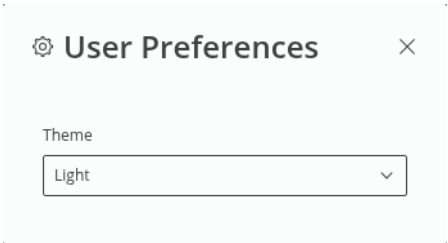
This dialog includes the following features:

- User Preferences,

- **Manage Maps (Map Manager),**
- **Manage Tags.**

The options available under these features depend, as usual, on the user’s permissions assigned via RBAC.

11.1.1 User Preferences



In the user preferences you can select the theme of the Web UI. Select from the themes

- Light,
- Dark,
- Default.

The default theme will take over the theme applied in the current user settings of the OS. All Web UI windows will be changed to the selected theme.

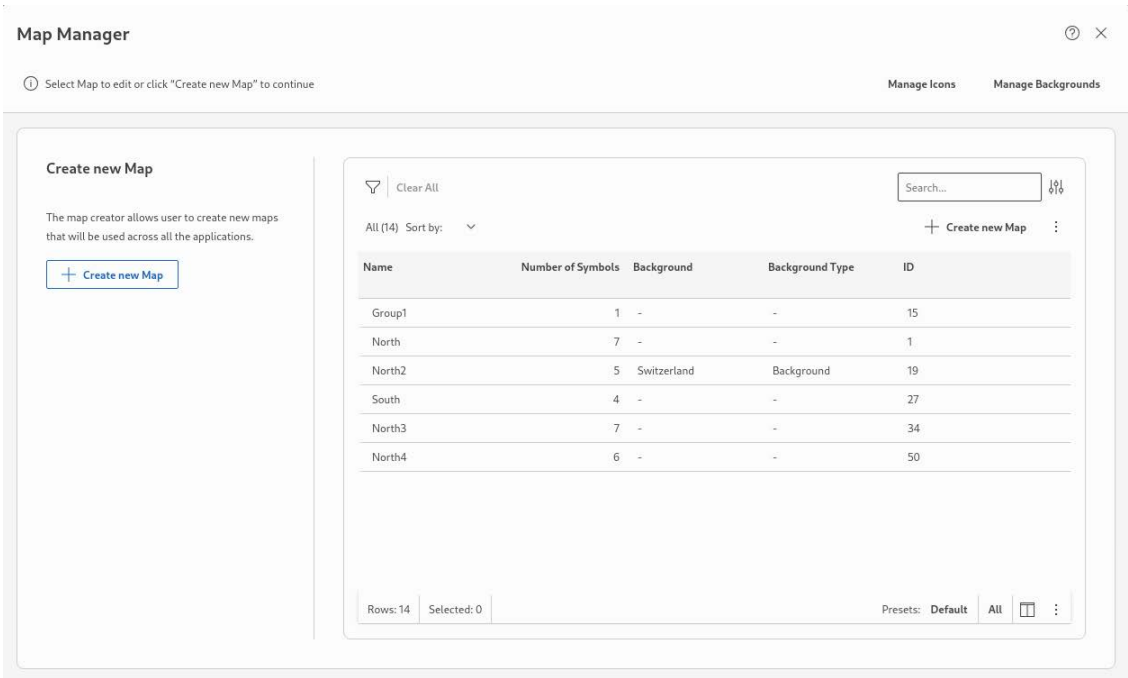
Click on the close (X) icon in the upper right corner of the User Preferences modal to close the user preferences dialog.

11.1.2 Manage Maps (Map Manager)

The Map Manager is called

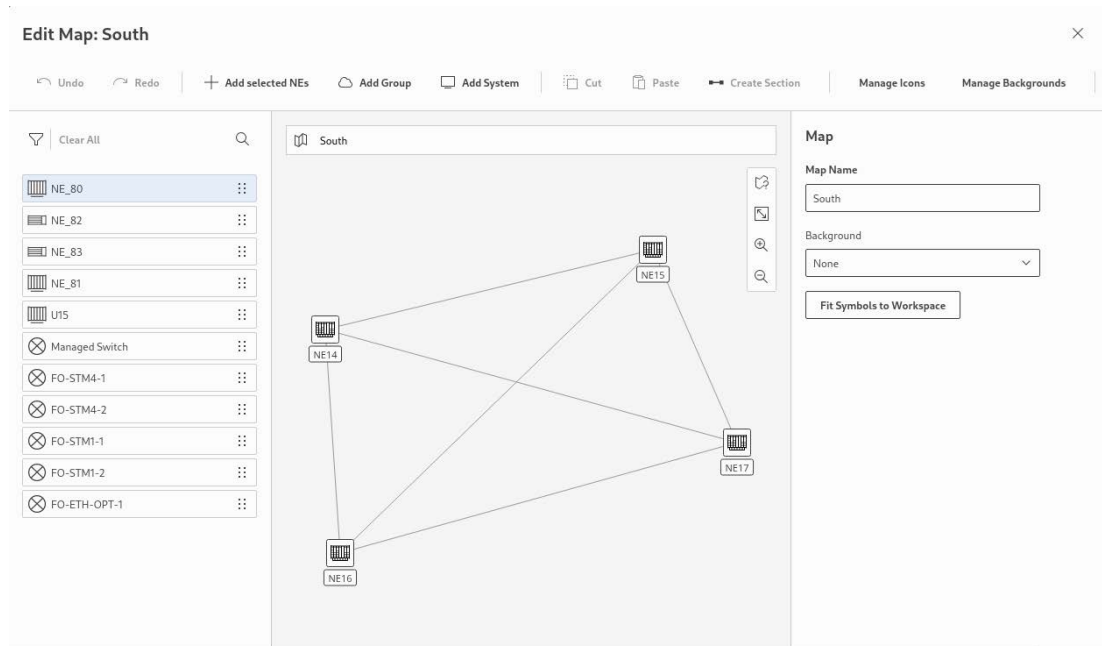
- from the user settings menu by clicking on “Manage Maps” or
- from any map by clicking on the map icon (🗺️) in the upper left corner of the map.

The map manager allows you to select an existing map to edit to create a new map. It also includes functions to manage icons and backgrounds used on the maps.



In the Map Manager you can

- click on “+ Create new Map” to start the map creator;
The map creator provides the same features as the “**Edit selected Map**” command described just below.
- select an existing map from the list of maps to edit it;
an existing map selected from the list activates the ribbon commands:
 - Duplicate Map
This opens a pop-up name field to edit the proposed name, which is by default the original name with “(Copy)” appended. By clicking on “Duplicate”, the new map is created and added to the list.
 - Edit selected Map



This opens the selected map in a map editor. For newly created maps, you should provide a map name and select a background (optional). You can add selected NEs, create sections, add groups, cut or paste elements, undo or redo actions, manage icons, manage backgrounds, edit the map name, and select a different background.

- Existing elements on the map can be moved after selecting the element on the map using the pointing device, then dragging it to the required place on the map. An element selected on the map can be deleted from the map. It will then be added to the list of available elements again.
- New elements can be added to the map by selecting the element from the NE, System, or Group list on the left-hand side, then dragging it to the required place on the map. When added to the map, the element will be removed from the list.
- Sections can be created while creating a new map, or using the section manager. To create a section, select two NEs on the map while keeping the CTRL key pressed, then click the “Create Section” command from the commands bar. This will open the Create Section dialog.

Create Section

Define Section Details

Name*

Enter Text...

Cost*

0

☐ Distinct

Define Endpoints

A End NE

NE14

Z End NE

NE17

A End TP Select Port from the table below

Unit Name

Slot

Label

CESM1

13

eth-5

ELET1

20

eth-11

CEP11

17

e12-8

ELET1

20

eth-20

TEPI2

3

cmd-2

TEPI2

3

vin-3

SAMO2

4

stm-3

SENC1F8

8

eth-2

Z End TP Select Port from the table below

Unit Name

Slot

Label

CESM3

13

eth-3

CESM3

13

eth-5

CESM3

13

ESO-2

TEGO1

16

iec61850-1

TEGO1

16

iec61850-2

TEGO1

16

iec61850-3

TEGO1

16

IRIG-B-6

Discard

Create and Close

Create and define next

In the Create Section dialog, enter a name and the cost for the section, require the section to be distinct, and select the A End TP and Z End TP, i.e., the termination points on both ends of the new section. To restrict the choice of TPs, use the filter () or the search option. When done, either create the section and close the dialog or create the section and continue with creating the next section.

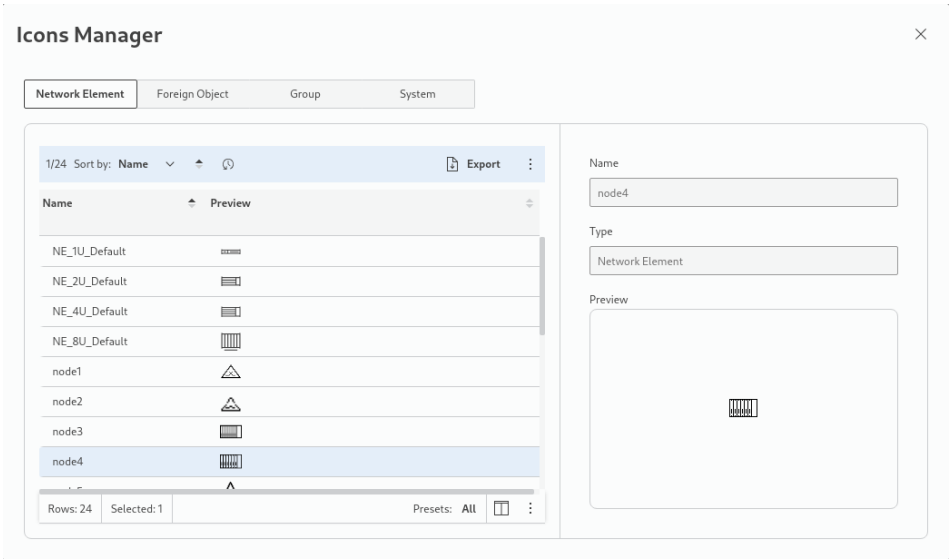
- Groups are added by clicking “Add Group”, which will add an automatically named group symbol to the map. The group, when selected, can be renamed, its icon can be changed, or the group can be deleted.
To edit a group, select the group symbol on the map and click “Open Group” in the right panel. Once the group has been edited, return to editing the map by clicking on the map name in the breadcrumb path of the map address bar.

If NE symbols are outside of the workspace, the button “Fit Symbols to Workspace” helps you arrange them on the visible workspace.

Icons

Icons can be added or removed via the “Manage Icons” button, which opens the Icons Manager. Filter presets are available for

- Network Element,
- Foreign Object,
- Group,
- System.



The Icons Manager allows you to import, export or delete icons, and to export the table data to a file. When selected, table data is exported to a CSV file with a choice of the following options:

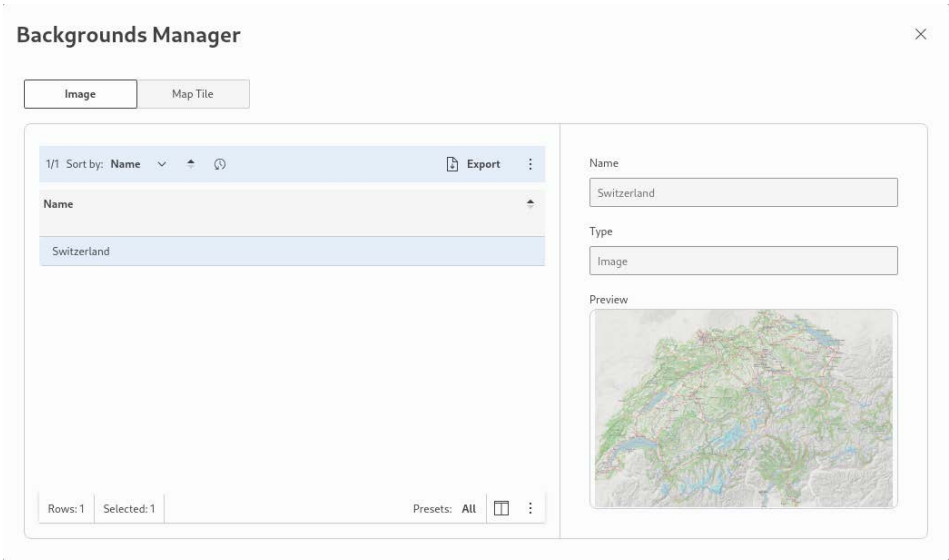
- Column separator: , or ;
- Line separator: CRLF or LF
- Include header: enabled or disabled.

When selecting to export the file, a file browser opens with a proposed folder and file-name, which can be changed as required. After successful export, the dialog is closed.

Once done with managing icons, click on the close (×) icon in the upper right corner of the Icons Manager modal to close the dialog.

Backgrounds

Backgrounds can be added or deleted via the “Manage Backgrounds” button, which opens the Backgrounds Manager.



The Backgrounds Manager allows you to import and preview images that can be used as map backgrounds. It also provides a feature to manage map tiles by adding URLs to a web server providing access to map tiles. While adding a Map Tile, a server URL that is entered can be verified by clicking on “Test” next to the address field. If the URL is valid,

a preview of the map is shown in the Map Preview window. Note that online access to the server is required to use the tiles.

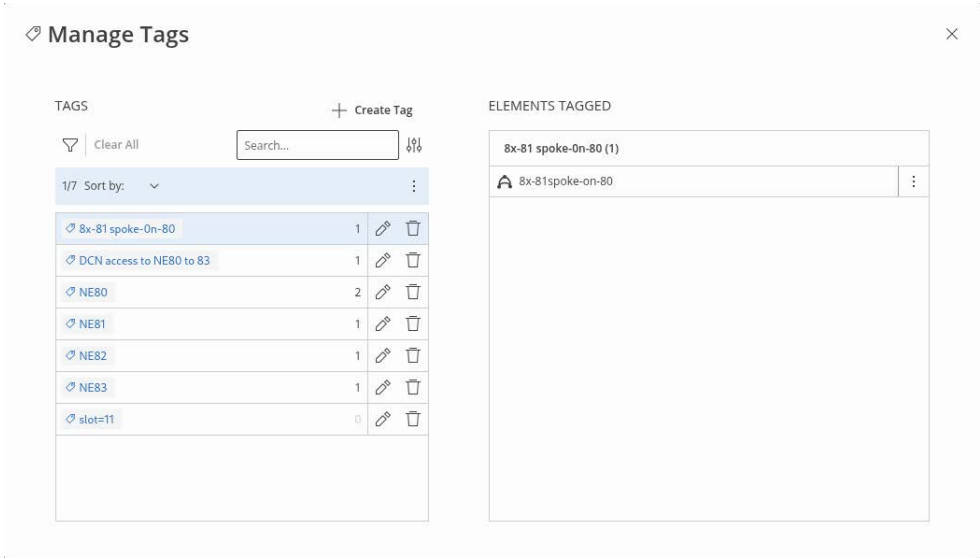
Once done with managing backgrounds, click on the close (✕) icon in the upper right corner of the Backgrounds Manager modal to close the dialog.

– Delete Map

This opens a pop-up dialog to confirm the deletion. Click “Delete” to execute the command. This will remove the map from the list.

Once done with managing maps, click on the close (✕) icon in the upper right corner of the Map Manager modal to close the dialog.

11.1.3 Manage Tags



The “Manage Tags” option allows you to

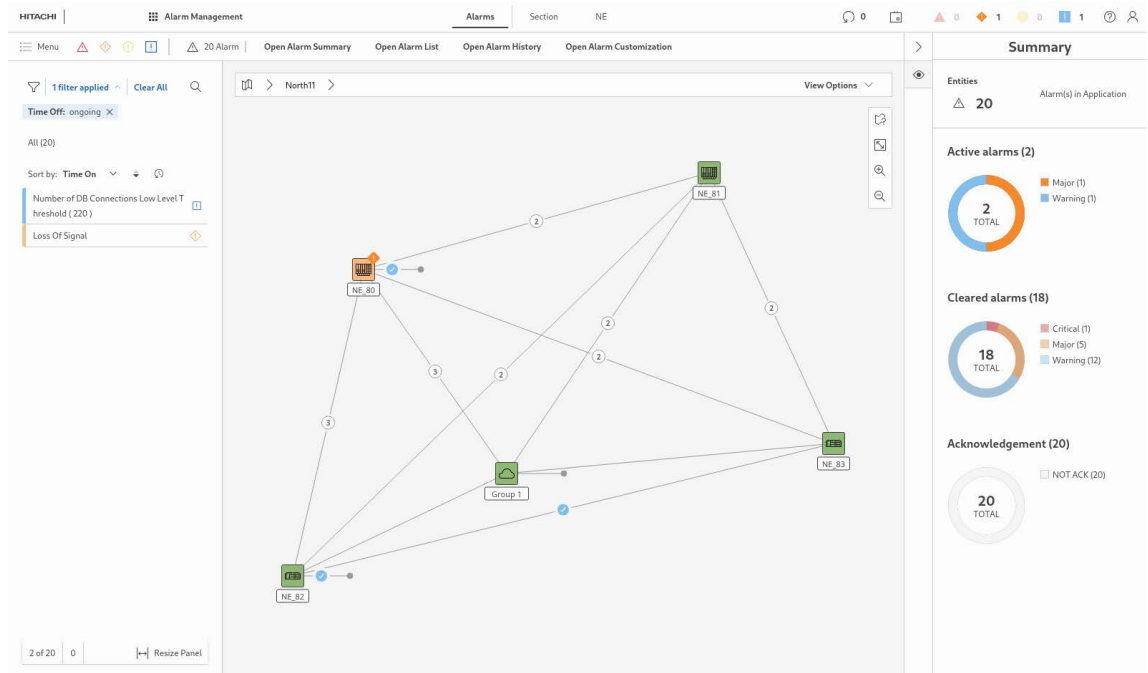
- create tags,
- search for existing tags, and
- set a filter on the tags list.

If you select a tag from the tags list, the elements having the tag assigned are listed in the right-hand side table. For each tagged element listed in the right-hand side table, you can

- untag the element,
- open details page of the element.

If you click on “+ Create Tag” to create a new tag, a modal is opened where you can enter a tag name and click on “Create” to create the tag. If the tag already exists, the modal is closed, an error message is issued, and no new tag is created. If the tag is new, it will be created and added to the tags list with no (0) elements assigned.

11.2 Alarm Management



The alarm management includes an overview within the Web UI providing a map with the following views (tabs):

- **Alarms,**
- **Section,**
- **NE.**

Independent of the selected tab, the ribbon provides the following tools for monitoring alarms via a link for opening the (legacy) dialog:

- **Alarm Summary** (via “Open Alarm Summary”),
- **Alarm List** (via “Open Alarm List”),
- **Alarm History** (via “Open Alarm History”),
- **Alarm Customisation** (via “Open Alarm Customization”).

The following tabs are provided:

Alarms

The entity browser (left panel) lists alarms. The right panel shows a summary of all alarms in the network. When selecting an active alarm of an NE from the entity browser, the NE is highlighted on the map where the alarm is located. In the right panel, alarm details are provided for the selected alarm with

- Basic Information (including all relevant alarm details),
- Acknowledgment,
- Additional Information,

and the ribbon can be used to call the alarm’s details page, acknowledge the alarm, or pin the alarm in the right panel icon bar.

Section

This tab provides a list of physical and logical sections with filter options and a search utility. The right panel provides a summary of all entities (sections). When selecting one or several sections from the entity browser, the sections are highlighted on the map. In the right panel, details are provided for the selected section(s) with

- Summary,
- Configuration,
- Health Monitors
- Supervision,
- Issues,
- Related

for one selected section, and

- Summary,
- Supervision,
- Issues

for several selected sections.

NE

This tab provides a list of NEs with filter options and a search utility. The right panel provides a summary of all entities (NEs). For a selected NE, its icon is highlighted on the map. Detailed information is available as follows:

- Summary,
- Configuration (General, Basic Configuration, CEM & Teleprotection),
 - MPLS-TP (essential information on supported features and resource usage),
 - CE (Circuit Emulation) & TP (Teleprotection), where applicable,
 - DCN (General, Interfaces, OSPF, Diagnostic),
 - Synchronization (PETS, PTP),
- Diagnostic,
 - TDM,
- Health Monitors (General, Details, NE Metrics),
- Issues (number of issues with severity critical, major, minor, warning),
- Related (Used By, Using - with all relevant details of parent and child relations).

11.3 Circuit Emulation

This section contains the basic information for the FOXMAN-UN Circuit Emulation application. It includes the following topics:

- [Introduction](#),
- [Circuit Service](#),
- [Circuit Emulation Service](#),
- [VPWS](#) (Virtual Private Wire Services),
- [Section](#),
- [NE](#) (Network Elements).

11.3.1 Introduction

For details of this feature refer to the specific CEM user manual [1KHW029177] included in the FOXMAN-UN technical documentation package. The information below is a short overview on the use of the Circuit Emulation user interface (UI).

All of the tabs in the Circuit Emulation UI provide a details panel that can be expanded or collapsed, and which shows more information on a selected entry or entries of the current table when expanded.

Services created with the service creation wizard in the “[Circuit Emulation Service](#)” tab are shown in the map after deployment to the network.

11.3.2 Circuit Service

The Circuit Service tab provides

- a list of circuits used for end-to-end services between two physical ports,
- filter options,
- a search utility, and
- a “+ Create” command button that starts a wizard for creating a new circuit service.

A circuit has a cross connection from the physical port on each of the two end points of the service.

To create a new Circuit service, make sure to have a suitable **Circuit Emulation Service** available. Once this is fulfilled, click on “+ Create” to start the Create Circuit wizard. It will guide you through the following 4 steps

- **Step 1: General,**
- **Step 2: Endpoints,**
- **Step 3: Circuit Emulation Service,**
- **Step 4: Summary,**

depicted with an example:

Step 1: General

The screenshot displays the 'Create Circuit: CS002' wizard in the 'General' step. On the left, a form contains the following fields:

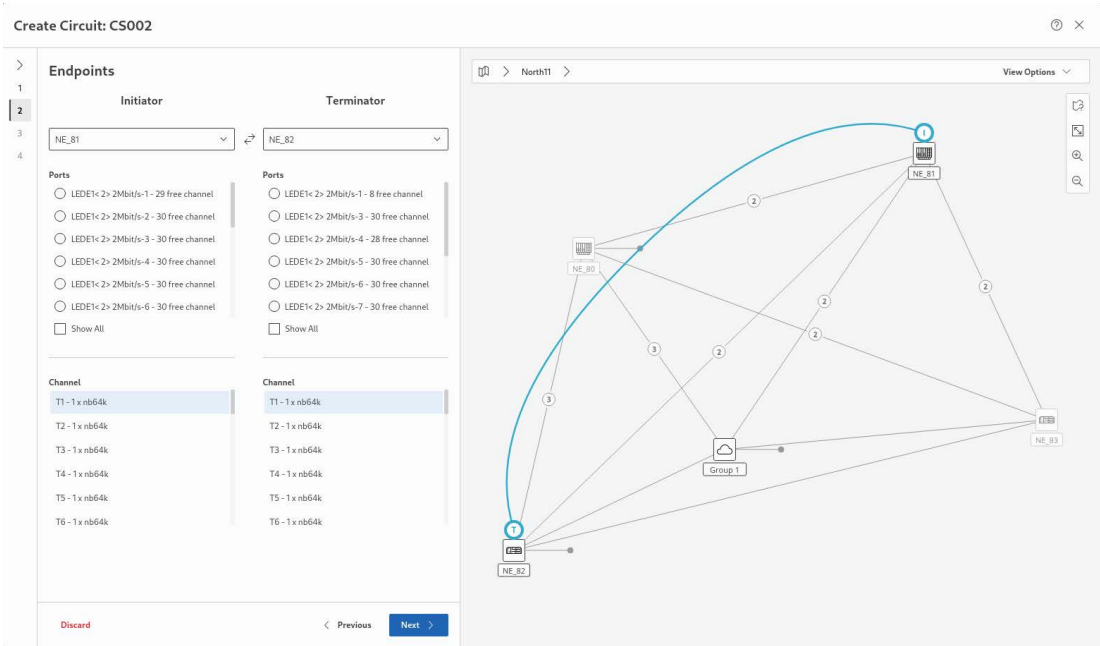
- Name***: A text input field containing 'CS002'.
- Layer Rate**: A dropdown menu with 'P0_nc' selected.

At the bottom of the form are two buttons: 'Discard' (in red) and 'Next >' (in blue). To the right of the form is a network diagram titled 'North1'. The diagram shows a complex network topology with nodes labeled NE_80, NE_81, NE_82, NE_83, and Group 1. Connections between these nodes are marked with numbers 1, 2, and 3. A 'View Options' dropdown is located in the top right corner of the diagram area.

Enter a name and select a service rate (P0_nc or P12).

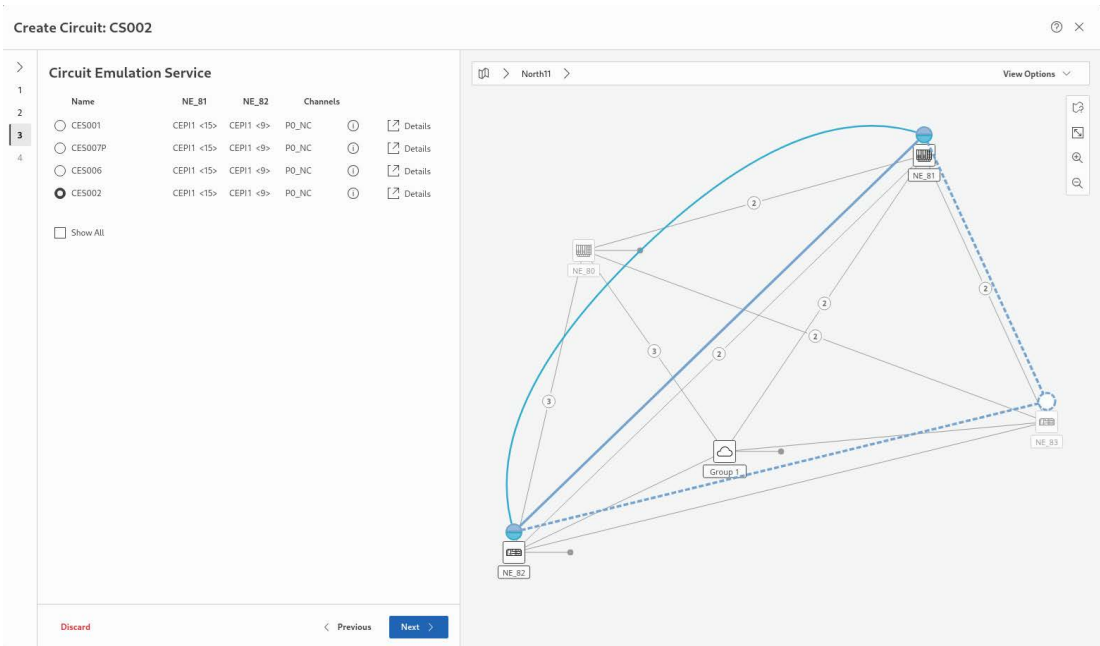
Click “Next >” to proceed to step 2 Endpoints.

Step 2: Endpoints

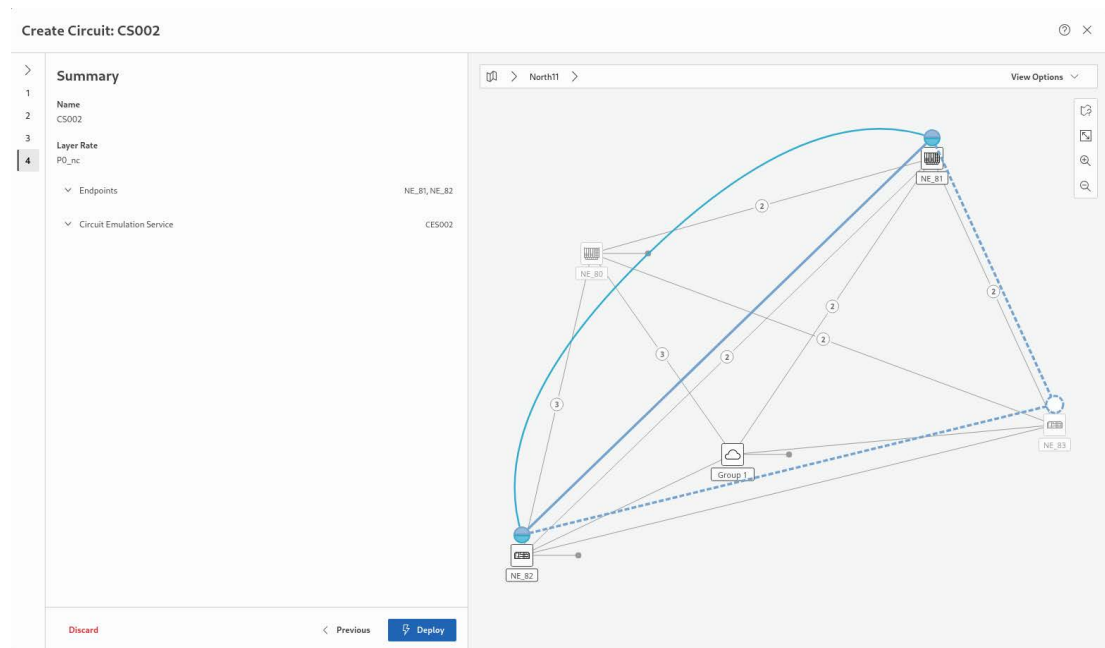


Make sure to remember the layer rate in step 1, the termination mode, and the CAS setting. These settings may be essential for the selection in step 3. Click “Next >” to proceed to step 3 Circuit Emulation Service.

Step 3: Circuit Emulation Service



If, during Circuit Service creation, step 3, there is no suitable **Circuit Emulation Service** available, the service cannot be created. By showing all existing **Circuit Emulation Services** available, including the unsuitable ones, and clicking on the (i) icon for the respective entry, the reason for its unsuitability is shown in the “Reason” entry. Possible reasons for unsuitability may include inappropriate bandwidth (number of timeslots), termination mode or CAS mode. Click “Next >” to proceed to step 4 Summary.

Step 4: Summary

Verify the details listed under “Summary”. If correct, deploy the circuit service by clicking “Deploy”. Wait until deployment is successfully concluded.

Click “Finish” to close the wizard.

A circuit service selected in the entity browser list is shown on the map. Its detail information is shown in the right panel. All details are available on the details page of the service. The details page for a selected circuit service can be opened via the “Details” command ion the ribbon.

11.3.3 Circuit Emulation Service

This tab in the Circuit Emulation UI provides a list in the entity browser of

- existing Circuit Emulation services,
- filter options,
- a search utility, and
- a “+ Create” command button that starts a wizard for creating a new Circuit Emulation Service (CES).

To create a new CES, click on “+ Create” to start the Create CES wizard. It will guide you through the following 8 steps:

- **Step 1: General,**
- **Step 2: Endpoints,**
- **Step 3: Addressing,**
- **Step 4: Quality of Service,**
- **Step 5: Timing,**
- **Step 6: Transport,**
- **Step 7: Tunnel,**
- **Step 8: Summary,**

depicted with an example:

Step 1: General

Create CES: CES004

General

1 Name*
2 CES004
3
4 Description
5
6 Protection Mode
7 1:1
8

Discard Next >

View Options

South

NE14, NE15, NE16, NE17

Enter a name (mandatory) and description, and select a protection mode (None or 1:1).
Click “Next >” to proceed to step 2 Endpoints.

Step 2: Endpoints

Create CES: CES004

Endpoints

1 Initiator Terminator
2 NE14 NE15
3
4
5 Structure Awareness
6 ☒ Aware ☐ Agnostic
7 Pseudowire Protocol
8 UDP RTP
9
10 CE Units
11 NE14 NE15
12 ☒ CEP11 <17> ☐ CEP11 <1>
13 ☒ CEP11 <17> ☐ CEP11 <1>
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100

Discard Previous Next >

View Options

South

NE14, NE15, NE16, NE17

Select the initiator and terminator NEs and the required Structure Awareness (Aware, Agnostic). If that will not result in suitable NEs and units, open the required NE configurations using the FOXCAST (user class: Manager) and set the CES Mode in the Circuit Emulation units configuration to either “Structure Aware” or “Structure Agnostic”, as required.

Select the Pseudowire Protocol from the for options

- MEF8
- MEF8 RTP
- UDP
- UDP RTP (default)

From the list of proposed units select the appropriate unit on each end (Initiator, Terminator) or accept the proposed ones.

Click “Next >” to proceed to step 3 Addressing.

Step 3: Addressing

Verify the L2 and L3 addressing details listed in this step. If not OK, correct the required options. Note that manual correction is only successful if carefully evaluated. The available parameters depend, among others, on the structure awareness selected in step 3.

Click “Next >” to proceed to step 4 Quality of Service.

Step 4: Quality of Service

Accept the proposed settings or do the required changes. Note that manual changes require a thorough understanding of the consequences on service quality for each of the parameters.

Also make sure to select the P12 container from the list of drop down p12 terminations if required.

Click “Next >” to proceed to step 5 Timing.

Step 5: Timing

Select a Clock Recovery Mode (Synchronous, Adaptive 1, Adaptive 2, Adaptive 3), and the required Filter (Filter 1, Filter 2, Filter 3, Filter 4).

Click “Next >” to proceed to step 6 Transport.

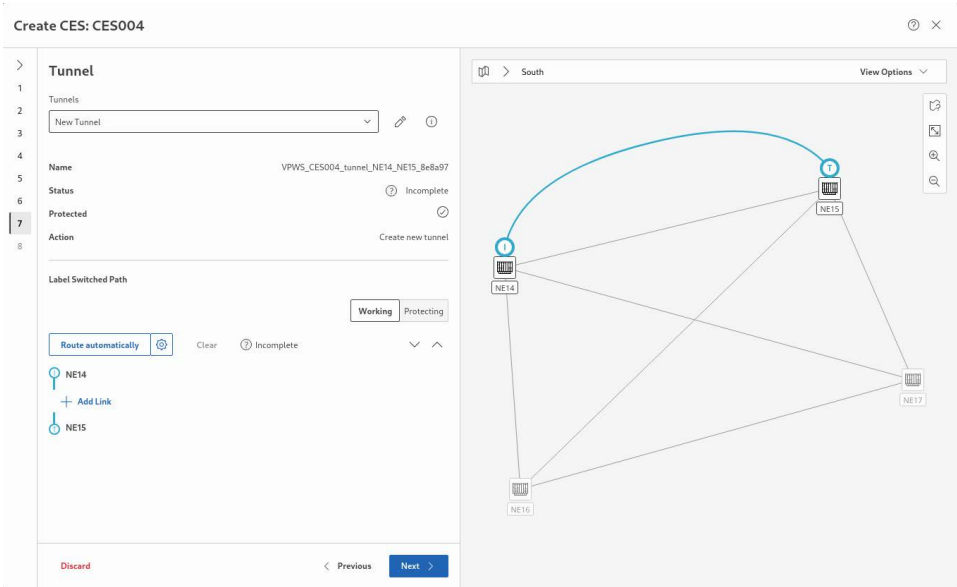
Step 6: Transport

Select a Service Profile. If more information is required, click on “Advanced” to view details of available service profiles and to search for or filter specific service profiles. You can show all service profiles, including the ones not appropriate for the CES creation with an indication of their issues when selected from the list.

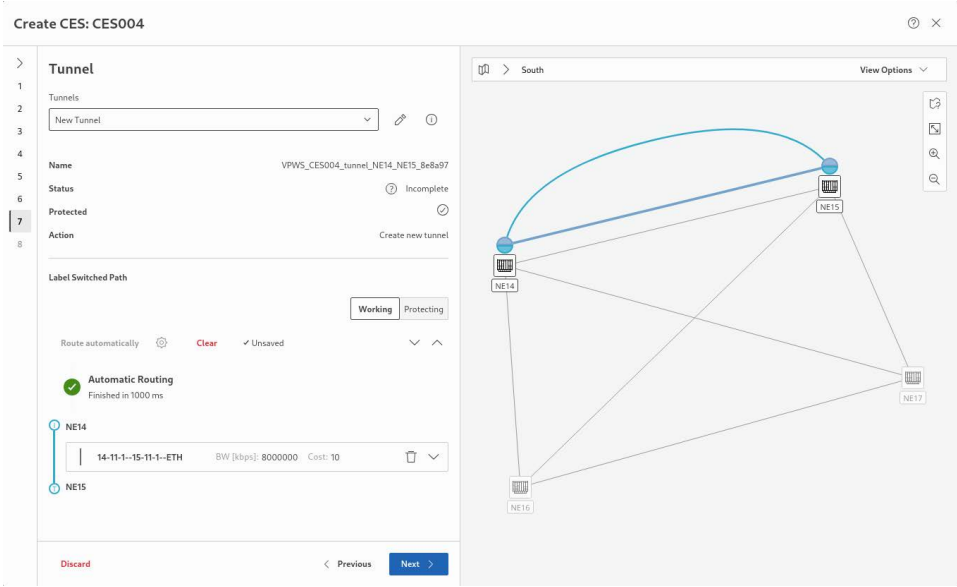
Once an appropriate service profile is selected, verify VPWS general information and Attachment Circuit (AC) port information. Edit their details if required.

Click “Next >” to proceed to step 7 Tunnel.

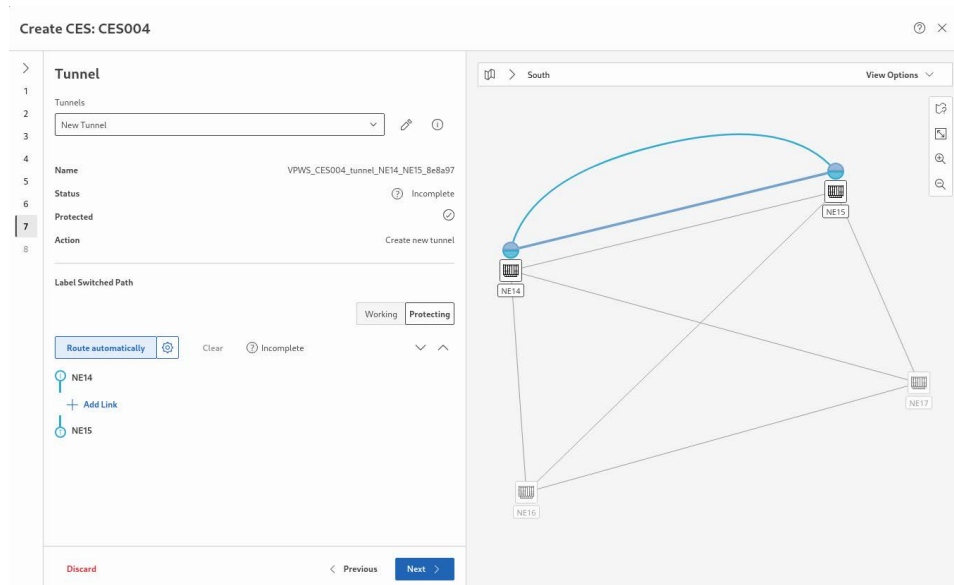
Step 7: Tunnel



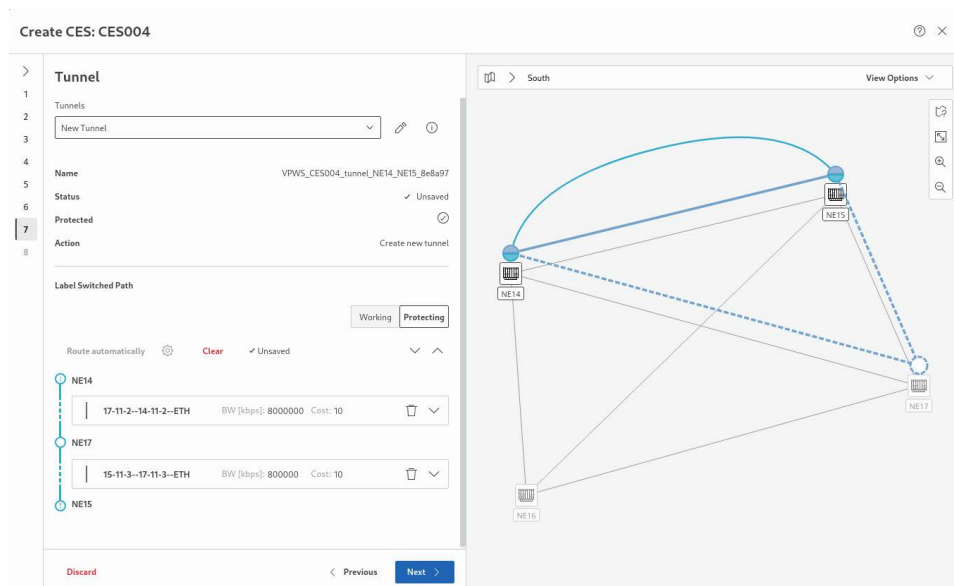
If no suitable tunnel is proposed, create a new tunnel. If a suitable tunnel is deployed already, it will be selected by default. It can be modified by clicking on the edit icon (✎) if required. Once a suitable tunnel is available, click “Route automatically” under Label Switched Path for the Working LSP. This will automatically route the Working LSP:



For services with protected LSPs, select the Protecting LSP:

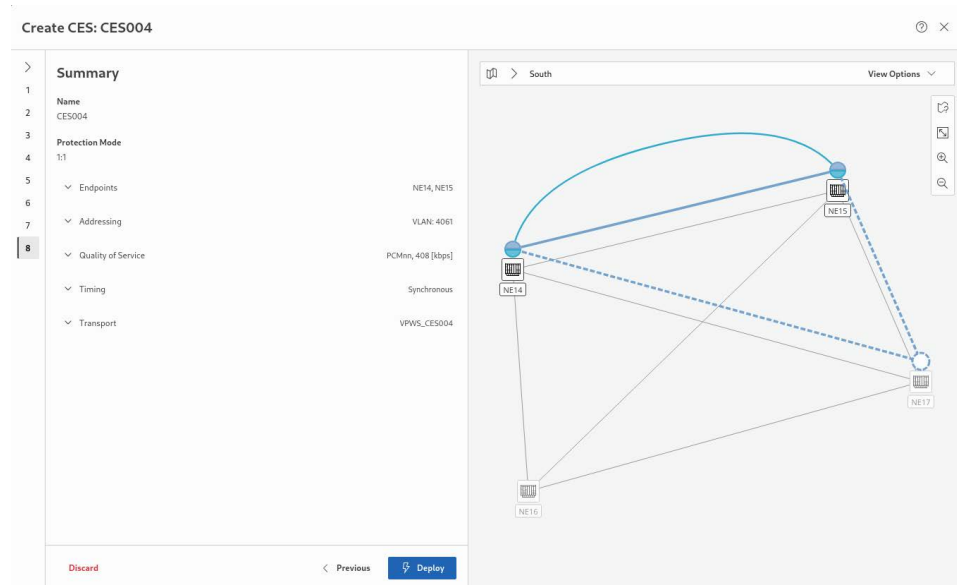


and click “Route automatically” again. This will automatically route the Protecting LSP:



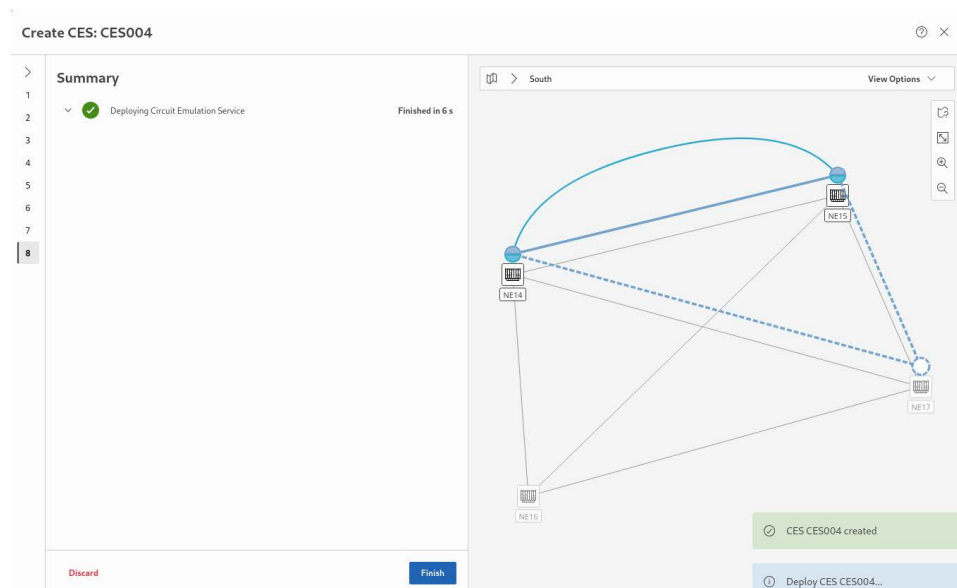
When all required LSPs are routed, click “Next >” to proceed to step 8 Summary.

Step 8: Summary



This summarizes the service settings. Use the expand and collapse arrows the view more or less details.

When done, click on “Deploy” to deploy the service to the network. Progress will take some time, depending on the available bandwidth and the number of involved NEs. A confirmation is issued once the service deployment is terminated.



Click “Finish” to close the service creation wizard and return to the Circuit Emulation app.

A deployed Circuit Emulation Service can be used as resource while creating a **Circuit Service**, with the appropriate parameters and settings selected during creation.

VPWS

This tab in the Circuit Emulation UI provides a list in the entity browser of existing Virtual Private Wire Services, filter options, and a search utility. The listed VPWS are used for services created in the “**Circuit Emulation Service**” tab.

Section

This tab in the Circuit Emulation UI provides a list in the entity browser of physical and logical sections with Circuit Emulation relevant information, filter options, and a search utility. It also allows you to create a new section.

NE

This tab in the Circuit Emulation UI provides a list in the entity browser of managed NEs with Circuit Emulation relevant information, filter options, and a search utility.

11.4 Teleprotection

This section contains the basic information for the FOXMAN-UN Teleprotection application. It includes the following topics:

- [Introduction](#),
- [Circuit Service](#),
- [Teleprotection Service](#),
- [VPWS](#) (Virtual Private Wire Services),
- [Section](#),
- [NE](#) (Network Elements).

Introduction

The information below is a short overview on the use of the Circuit Emulation user interface (UI).

All of the tabs in the Circuit Emulation UI provide a details panel that can be expanded or collapsed, and which shows more information on a selected entry or entries of the current table when expanded.

Services created with the service creation wizard in the “[Teleprotection Service](#)” tab are shown in the map after deployment to the network.

11.4.1 Circuit Service

This tab in the Teleprotection UI provides a list of circuits used for end-to-end services between two physical ports, filter options, a search utility, and a “+ Create” command button that starts a wizard for creating a new circuit service.

The creation of circuits with teleprotection services is only supported for specific teleprotection units.

The wizard is essentially the same as for Circuit Services using a Circuit Emulation Service (see also the [Circuit Service](#) wizard for CES) and provides 4 basic steps,

- step 1 “General” to:
 - define Name and Layer Rate;
- step 2 “Endpoints” to:
 - define Initiator and Terminator NEs,
 - define appropriate ports on both Initiator and Terminator NEs,
 - define Channels for the circuit;
- step 3 “Teleprotection Service” to:
 - select an appropriate teleprotection service from a list of existing teleprotection services;
- step 4 “Summary” to:
 - show details of the circuit service to be created and deploy the service to the network.

A circuit has a cross connection from the physical port on each of the two end points of the service. For creation, it requires an existing, suitable [Teleprotection Service](#). If, during Circuit Service creation, step 3, there is no suitable [Teleprotection Service](#) available, the service cannot be

created. By showing all existing **Teleprotection Services** available, including the unsuitable ones, and clicking on the (i) icon for the respective entry, the reason for its unsuitability is shown in the “Reason” entry.

A circuit selected in the list is shown on the map.

11.4.2 Teleprotection Service

This tab in the Teleprotection UI provides a list of existing teleprotection services, filter options, a search utility, and a “+ Create” command button that starts a wizard for creating a new teleprotection service.

The Teleprotection service wizard guides you through service creation in 7 main steps as shown in the following sample. In step 1 “General” you need to provide basic service identification including

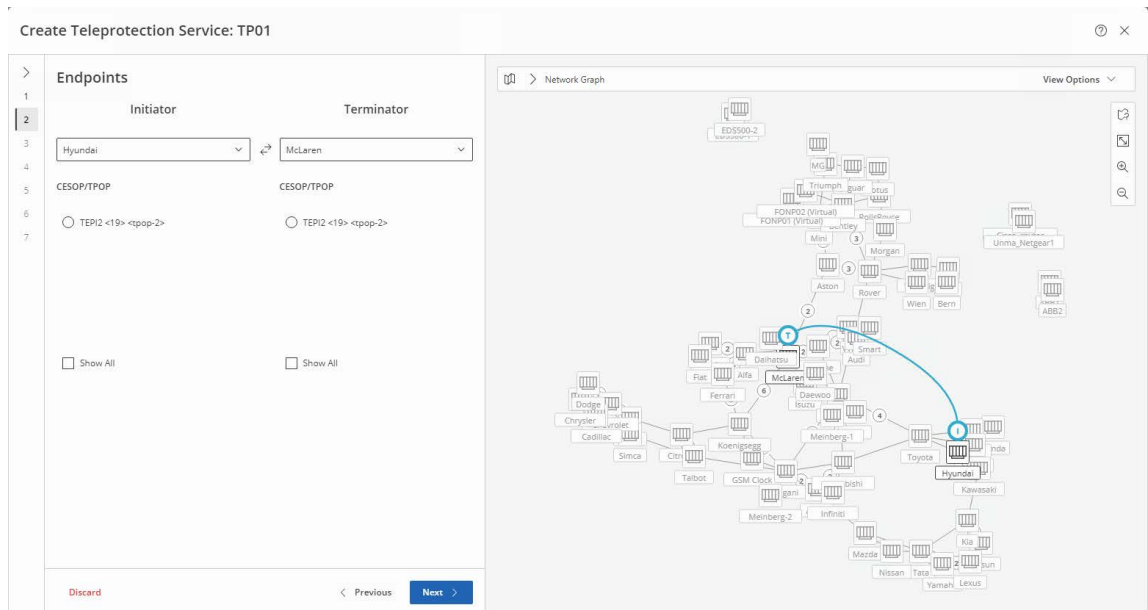
- Name
- Description (optional)
- Teleprotection Type (Differential; Distance; GOOSE/SV)
- Protection Mode (None; 1:1; Hitless)

The screenshot shows the 'Create Teleprotection Service' wizard in its first step, 'General'. The left panel contains the following fields:

- Name:** A text input field.
- Description:** A text input field.
- Teleprotection Type:** A dropdown menu with 'Differential' selected.
- Protection Mode:** A dropdown menu with 'Hitless' selected.

At the bottom of the form are a 'Discard' button and a 'Next >' button. The right panel displays a 'Network Graph' with a hierarchical tree structure of electrical components, including various busbars, breakers, and transformers, connected by lines representing the network topology.

Teleprotection Type and related Protection Modes have some dependencies and will also restrict their applicability to certain NEs and units in operation on these NEs. Also see step 2. Click “Next >” to proceed to step 2 “Endpoints”.



Select an Initiator NE and a Terminator NE. If no suitable NEs are available due to their provisioning with appropriate units supporting the chosen teleprotection type and/or protection mode, you can click on “Show All” at the bottom of the selection list to include NEs that would provide teleprotection service features, but do not support the required combination of teleprotection type and protection mode. Initiator and Terminator NE and the service connection are marked on the map.

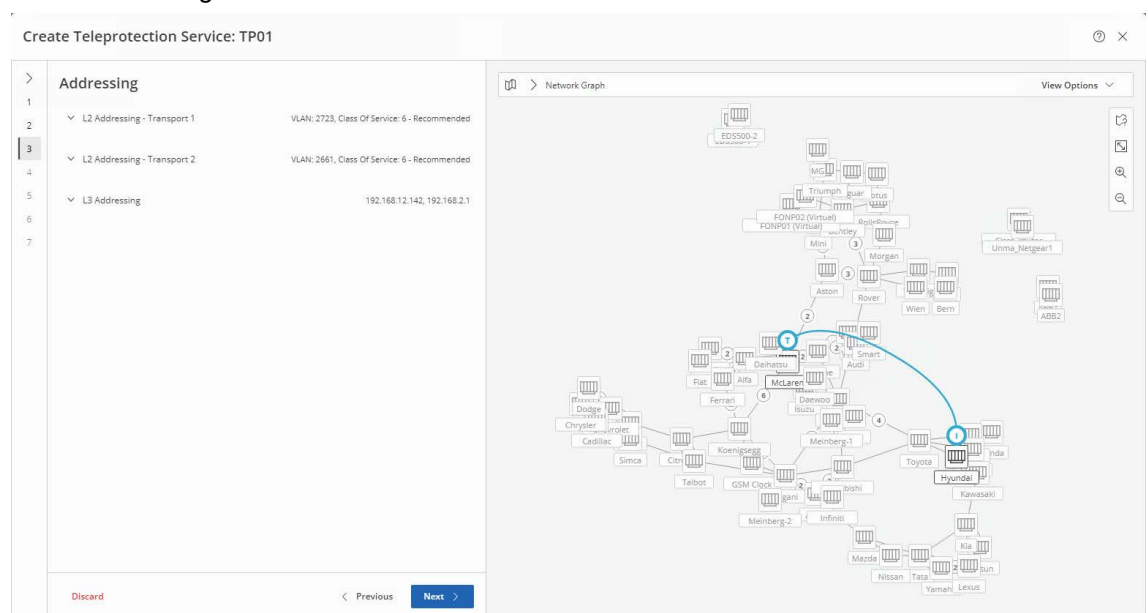
If suitable NEs are selected, select the unit ports you want to use for the service. Use the “Show All” option for each NE to include units/ports that provide support for teleprotection services but are not available for selection, e.g., because they are already carrying such a service.

Once unit ports are selected, a proposed port configuration is added for both NEs with their pre-selected termination modes. If required, you can select a different termination mode from the drop-down list.

Click “Next >” to proceed to step 3 “Addressing”.

Step 3 proposes preselected settings for

- L2 addressing, transport 1;
- L2 addressing, transport 2;
- L3 addressing.



You can expand each of the characteristics to view the details and modify them if required. Note that some of the settings (e.g., L3 source IP addresses), if modified, need further actions to ensure a working service.

Click “Next >” to proceed to step 4 “Quality of Service & Timing”.

Depending on the service type, select the required settings for

- Guard Interval
- Measurement Interval
- Max Allowed Delay
- Excessive Packet Loss Error Threshold

Create Teleprotection Service: TP01

Quality of Service & Timing

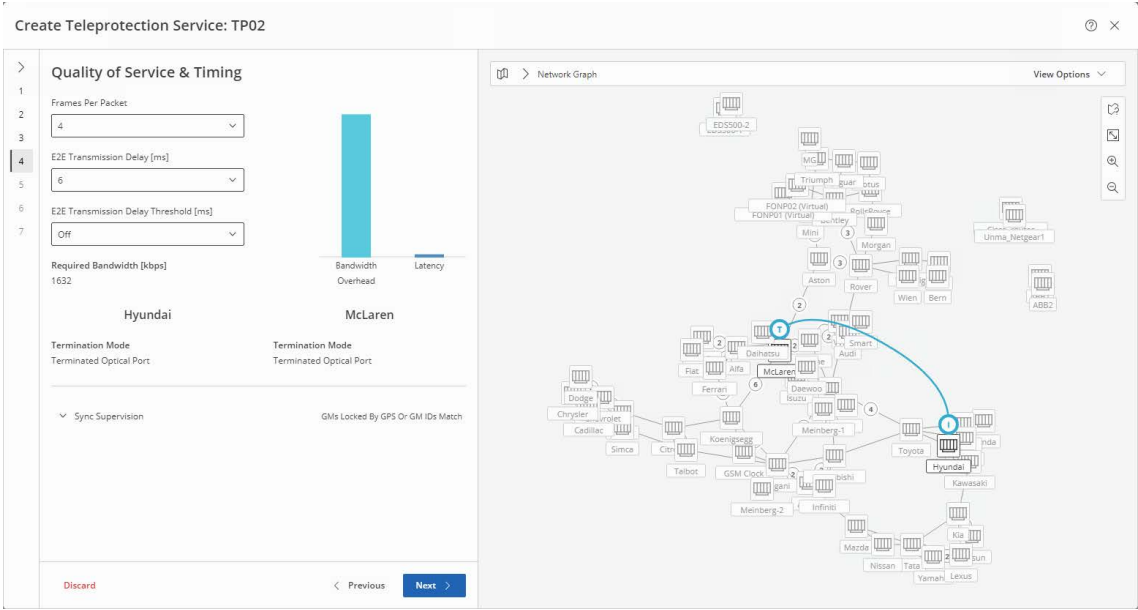
- Guard Interval [ms]
5
- Measurement Interval
20
- Max Allowed Delay [ms]
10
- Excessive Packet Loss Error Threshold
1.0 %

Required Bandwidth [kbps]
288

Discard Previous Next

Network Graph

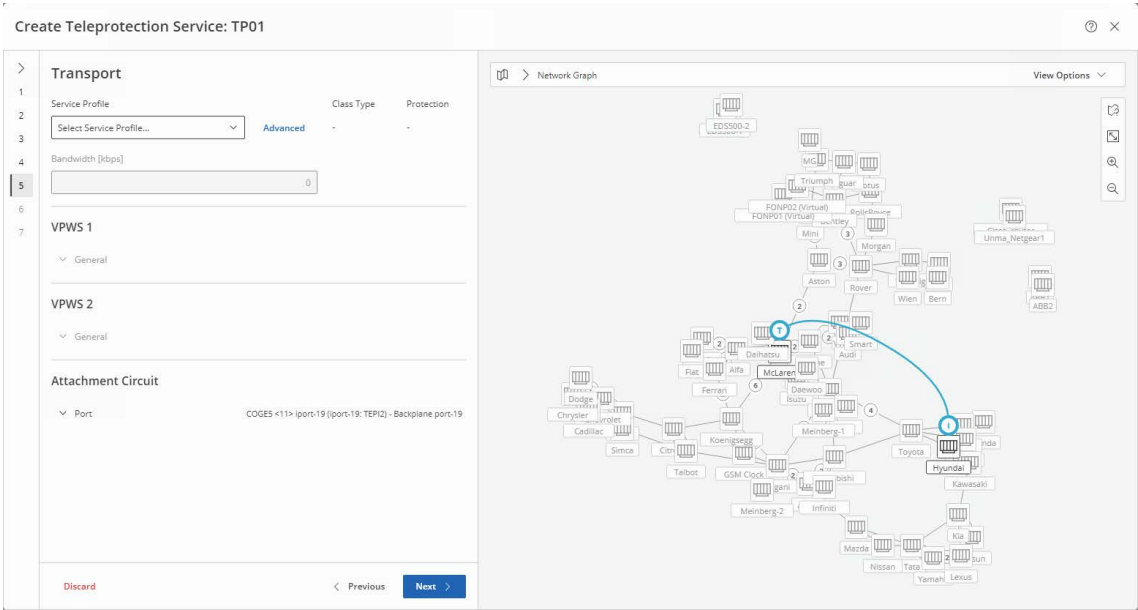
- Frames Per Packet
- E2E Transmission Delay
- E2E Transmission Delay Threshold
- Sync Supervision:
 - GMs Locked by GPS
 - GMs Locked by GPS Or GM IDs Match
 - GMs Locked by GPS And GM IDs Match
 - GM IDs Match
 - None (Sync Supervision Disabled)



or accept the proposed QoS and timing settings. The required bandwidth is automatically calculated and displayed.

Click “Next >” to proceed to step 5 “Transport”.

Select the appropriate service profile from the list of available service profiles. Click “Show All” to include service profiles in the list that are unsuitable for the selected service characteristics.



Once a suitable service profile is selected, the Class Type color, protection support, bandwidth, appropriate VPWS 1 and VPWS 2 and the AC (attachment circuit) are proposed if available.

The bandwidth can be modified if required.

The attachment circuit (AC) ports can be edited if required. Their port type is shown when expanding the port name using the expand arrow. Port changes need to be deployed and will take effect immediately, i.e. before service deployment.

Create Teleprotection Service: TP01

Transport

1 Service Profile: VPWS_Teleprotection Class Type: Advanced Protection: No

2

3

4 Bandwidth (kbps): 288

5

6

7

VPWS 1

General: VPWS_TP01_1

VPWS 2

General: VPWS_TP01_2

Attachment Circuit

Port: COGES <1> (port-19 (port-19: TEPI2) - Backplane port-19)

Discard Previous Next

Network Graph

View Options

If none are available they need to be created before proceeding.

Click “Next >” to proceed to step 6 “Tunnel”.

If appropriate tunnels already exist, their names are proposed as “Tunnel 1” and “Tunnel 2”. The tunnels also appear on the map.

In case of disabling the “Force Distinct Path” option, only one tunnel is proposed.

If no appropriate tunnels exist, a new tunnel must be created for each path before proceeding. New tunnels can be routed manually or automatically.

If a selected tunnel needs to be modified before applying it for the service, click on the pen icon right to the tunnel name and make the necessary changes. The “info” icon right to the tunnel name shows detailed information about the selected tunnel.

If protection shall be applied, make sure to define a tunnel for both Working and Protecting path.

Create Teleprotection Service: TP01

Tunnel

1 ☒ Force Distinct Path

2

3

4 **Tunnel 1**

5 Tunnel_001_TP_W1_UP_Hyundai_McLaren ✓ ⓘ

6

7 **Tunnel 2**

Tunnel_001_TP_W2_UP_Hyundai_McLaren ✓ ⓘ

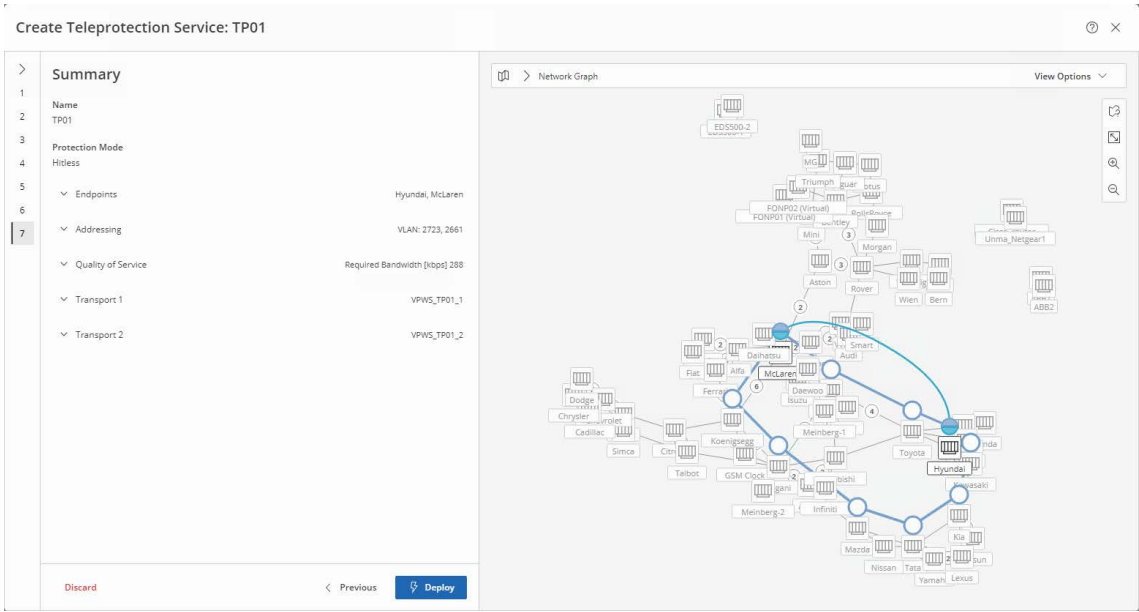
Discard Previous Next

Network Graph

View Options

Click “Next >” to proceed to step 7 “Summary”.

The summary will show the main service characteristics specified in the different steps. Details can be shown by expanding the individual step sections



Click “Deploy” to deploy the service to the network.
Once deployed successfully, click “Finish” to close the wizard.

VPWS

This tab in the Teleprotection UI provides a list of existing Virtual Private Wire Services, filter options, and a search utility. The listed VPWS are used for services created in the “Teleprotection Service” tab.

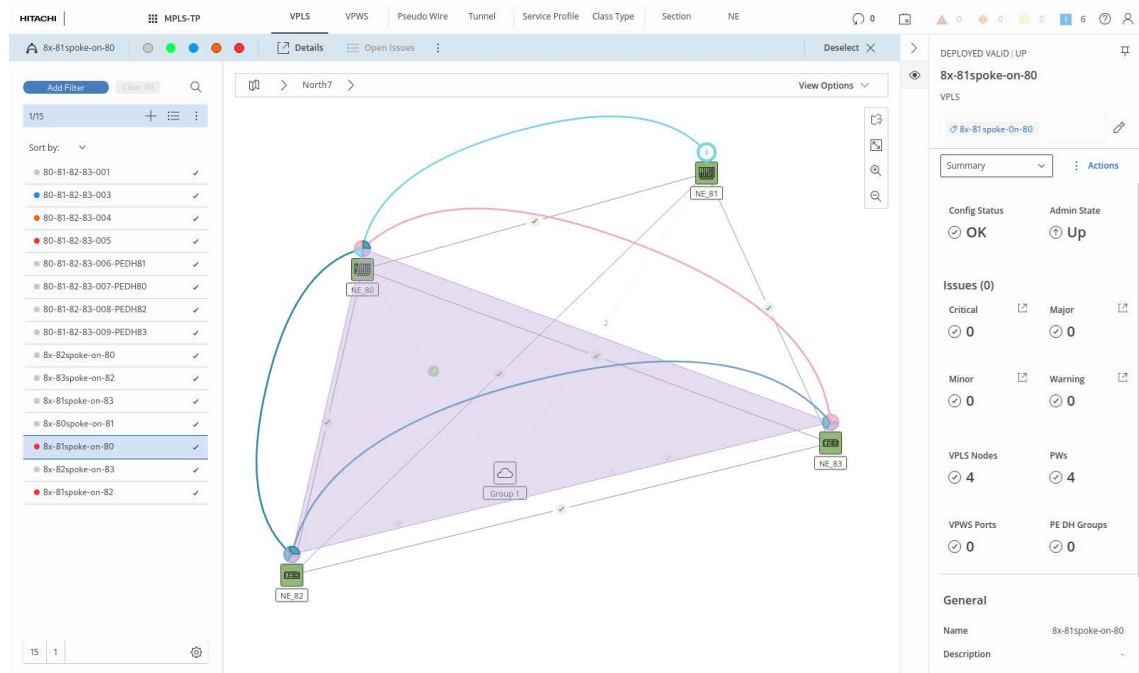
Section

This tab in the Teleprotection UI provides a list of physical and logical sections with Teleprotection relevant information, filter options, and a search utility.

NE

This tab in the Teleprotection UI provides a list of managed NEs with Teleprotection relevant information, filter options, and a search utility.

11.5 MPLS-TP



The MPLS-TP app is part of the “Configuration” group of applications.

The MPLS-TP map shows your complete MPLS-TP network with its structural components, including

- VPLS (also see legacy dialog **VPLS**),
- VPWS (also see legacy dialog **VPWS**),
- Pseudo Wire (also see legacy dialog **Pseudo Wire**),
- Tunnel (also see legacy dialog **Tunnel**),
- Service Profile (also see legacy dialog **Service Profile**),
- Class Type (also see legacy dialog **Class Type**),
- Section (also see legacy dialogs **Link**, **Section Management**, and **Create Section**),
- NE (also see legacy dialog **NE**),

each of which is accessible via its own tab in the common header on top of the window.

It allows you to select individual components from the entity browser (left panel) or from the map and display any kind of information on the selected component.

It also allows you to create services using the built-in service creation wizard.

- **Create VPLS**,
- **Create VPWS**,
- **Create Tunnel**,
- **Modify Tunnel (special procedure)**,
- **Create Service Profile**.

For the creation of Class Types, Sections, Links, and NEs refer to the legacy dialogs.

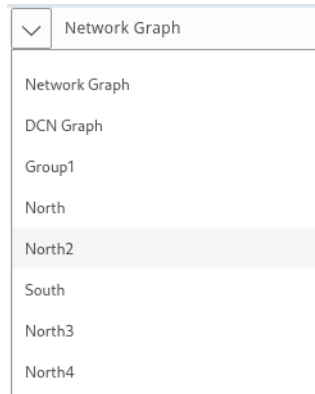
In the MPLS-TP map you can also

- select the overall network graph or a specific network graph,

**Please note:**

For arranging NEs on the map, use the **NEM Network Browser**. Any edit action (adding, deleting, rearranging NEs) done on the **NEM Network Browser** map(s) will be reflected on the MPLS-TP Map.

→ To see a specific map on the MPLS-TP Map application, select the respective map instead of the overall network graph, as shown in the following sample:



- Show Context:
 - enable or disable showing alarms (“Alarms”),
 - enable or disable health monitoring (“Health Monitors”),
 - enable or disable showing encryption (“Encryption”)
- activate the View Modes
 - Entity View,
 - Service View,
 - Transport View,
 - Connections View,
 - Physical View,
- Interaction Options:
 - enable or disable to fit the view to the selected object (“Fit View to Selection”),

or return to the application overview (All apps) or to the Homepage via clicking on the 9-dots “all apps” icon.

11.5.1 Create VPLS

The “Create VPLS” wizard is started with the “+ Create” button from the ribbon of the **VPLS** tab in the MPLS-TP Map.

The “Modify VPLS” wizard is started for a selected VPLS with the “Modify VPLS” button from the action menu of the selected VPLS.

**Please note:**

A VPLS can be modified using the command “Modify VPLS”. This command will open the “Modify VPLS: <VPLS Name>” wizard, which provides the same steps as the “**Create VPLS**” wizard, but with some restrictions regarding modification of settings, i.e., not all parameters can be modified.

The wizard leads you through 6 basic steps of creating a new VPLS in your MPLS-TP network. The steps below show the creation of a sample VPLS,

- **Step 1: General**
 - for creating an E-Tree VPLS, see **Create E-Tree over VPLS**,
 - for creating a standard VPLS, continue here,
- **Step 2: Endpoints**,
- **Step 3: Rate Limiter**,

- **Step 4: Pseudo Wires,**
- **Step 5: Tunnels,**
- **Step 6: Summary.**

Step 1: General

Create VPLS: VPLS_Sample

General

1 Name*
2 VPLS_Sample
3
4 Description
5
6 EVC ID
e7dbd5ef-237e-42ea-b146-b6c8f1d02f68

Topology
H-VPLS

Service Profile*
VPLS_DH_20240610

☒ PE Dual-Home / PW CW 2x Enabled ⓘ
☒ QoS / Rate Limiting Rate Limiting Enabled ⓘ

Discard Next >

North5 View Options

Diagram showing network topology with nodes NE_83, NE_82, NE_80, and NE_81 connected by lines with step numbers (1, 2, 3, 4).

This step requires at least a unique name for the new VPLS and an appropriate service profile before proceeding to the next step.

The service profile is used to define the “PE Dual-Home / PW CW” and “QoS / Rate Limiting” settings. The description is optional; the EVC ID is generated automatically.

Under “**Topology**”, select either of the two options, as required:

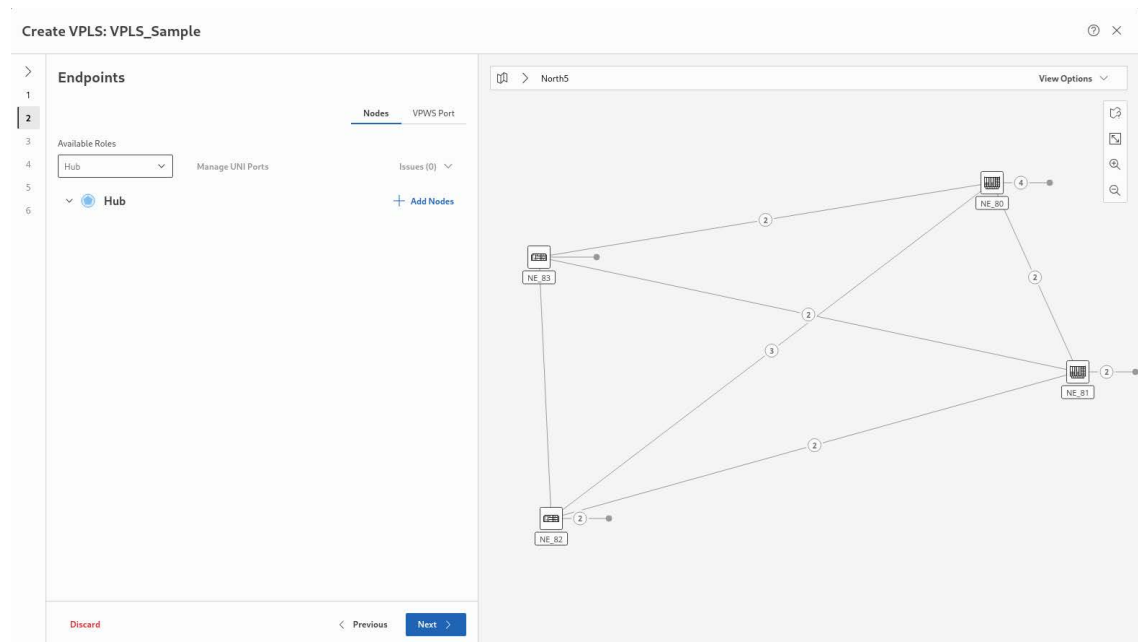
- H-VPLS,
- E-Tree over VPLS.

This description continues for the option “H-VPLS”. For the option “E-Tree over VPLS” refer to [11.5.2 "Create E-Tree over VPLS"](#).

The map on the right hand side shows the progress through all steps.

Click “Next >” to proceed to step 2 for H-VPLS creation.

Step 2: Endpoints



This step requires network nodes as endpoints. The “Nodes” selector (top right in the settings area of this step) is active by default. By default, only the “Hub” role is enabled under “Available Roles”. Other roles can be enabled at any time. For selecting the appropriate nodes, click on the “+ Add Nodes” button.

This will provide

- a field to enter the service VLAN ID,
- a list of selectable nodes, and
- a dropdown field to select from available node roles.

The available node roles depend on the service profile chosen in step 1.

Upon clicking “Apply”, the end points appear under the selected node role, in this sample under “Hub”:

Available Roles

Hub

Manage UNI Ports

Issues (0)

Hub (3)

+ Add Nodes

Name	SVI VLAN	SNI Ports		
NE_80	612	4 Ports	1	
NE_82	612	1 Ports	1	
NE_83	612	1 Ports	1	

The “hub” part of the service is now also shown on the right-hand side map.
To add nodes with other roles, click again on “+ Add Nodes”. In this sample, a fourth node is added as “PE Dual Home” node:

Endpoints

Available Roles

Hub, PE Dual-Home

Hub (3)

NE_80

NE_82

NE_83

PE Dual-Home

+ Add Nodes

VLAN ID

612

Clear All

NE_81

NE14

NE15

NE16

NE17

Apply

Cancel

When applied, the node is added under its role (in this sample under “PD Dual Home”) and requires more settings; in this case a “Primary Node” and a “Secondary Node”:

PE Dual-Home (1)

+ Add Nodes

Name	SVI VLAN	SNI Ports	Connection	
NE_81	612	1 Ports	Define	1

NE_81

Primary Node

Select

Secondary Node

Select

Apply

Cancel

Discard

Next

In case of selecting the node role to be “Spoke”, its “Primary Node” needs to be selected and applied.

When applied, the final endpoints settings are listed and also shown on the map:

The node role, VLAN ID and VLAN name can be modified at any time before proceeding via the three-dots action menu for the defined nodes.

More information on the node(s) is provided either via the “information” icon ⓘ or by expanding/collapsing the field via the down/up arrows ^ v for the node or for the node role.

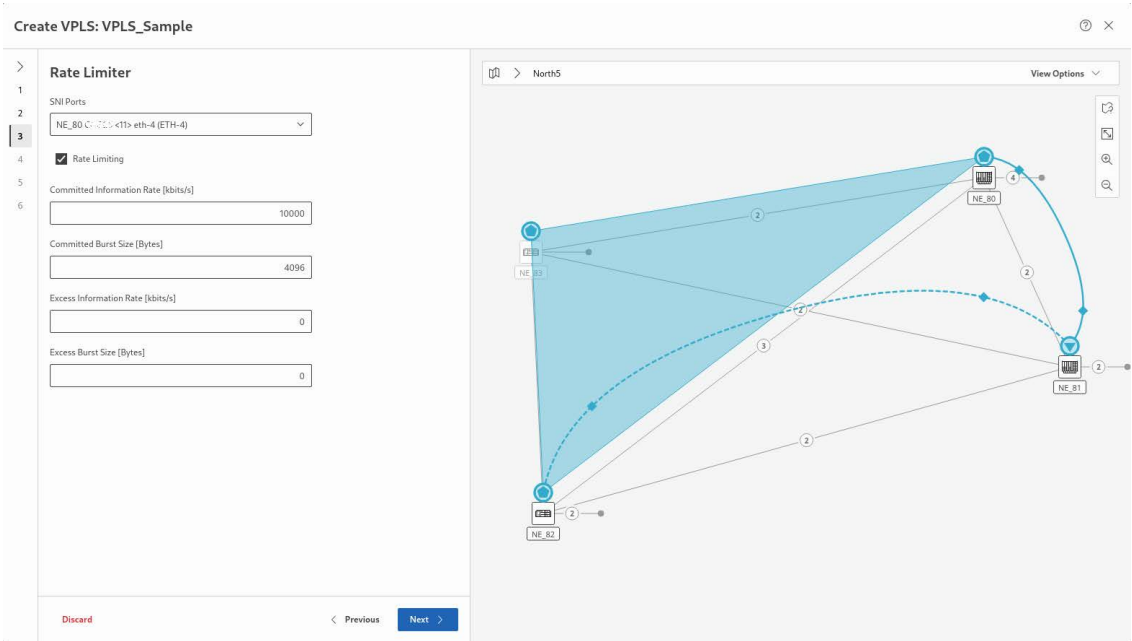
To add VPWS ports, click on the “VPWS Port” selector, then click on the “+ Add VPWS Port” button. Select or edit the parameters

- NE,
- VPWS Type,
- AC VLAN (optional),
- PW VLAN (optional),
- Port (the port can be edited if required),
- Attached To,

then click “Apply” to add the port. Repeat the step to add more ports if required.

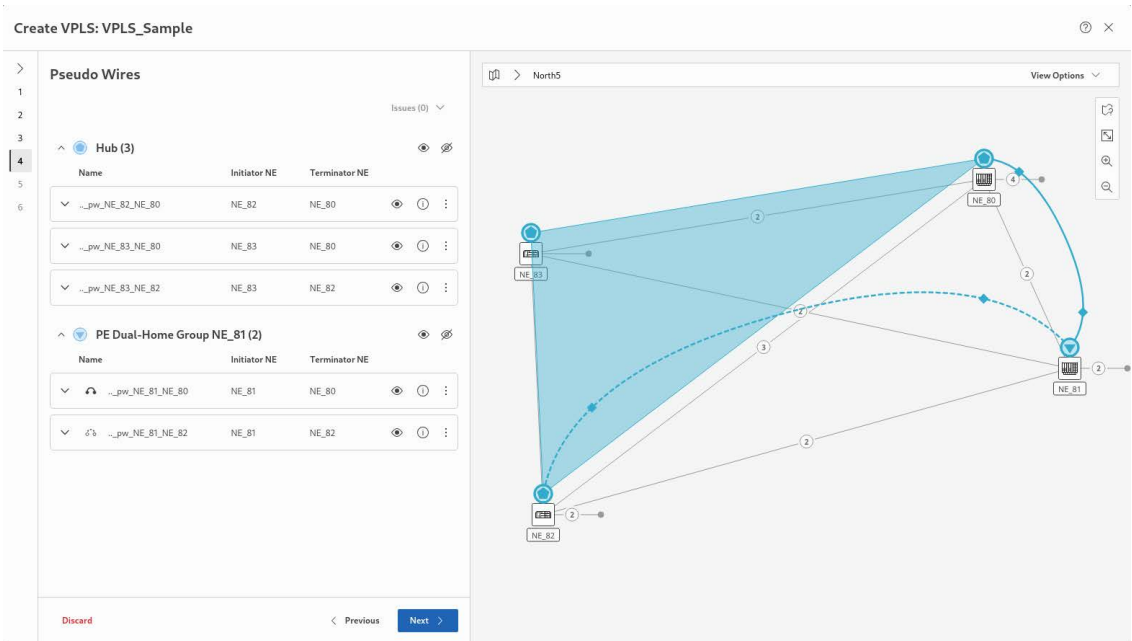
Click “Next >” to proceed to step 3.

Step 3: Rate Limiter



In this step, rate limiter settings are required. You can accept the settings given by the service profile or select individual settings per selected SNI port. Depending on the selected service profile, some of the settings are fixed and cannot be changed here. Click “Next >” to proceed to step 4.

Step 4: Pseudo Wires



This steps shows the selected Pseudo Wires grouped by node role. You can show or hide a Pseudo Wire on the map by clicking on the show or hide icons  . Properties of a specific Pseudo Wire can be modified via the three-dot action menu entry “Modify Pseudo Wire”. More information on the Pseudo Wires is provided via the “information” icons . Click “Next >” to proceed to step 5.

Step 5: Tunnels

This step proposes tunnels to be assigned for the service. If no suitable tunnels exist, tunnels can be created. The button “Route All Tunnels Automatically” executes an automatic routing for all incomplete tunnels of the service. You can show or hide assigned tunnels on the map by clicking on the show or hide icons .

More information on a specific tunnel and additional settings, such as

- Protection options,
- Deployment status,
- Initiator and terminator NEs,
- Selected section / link,

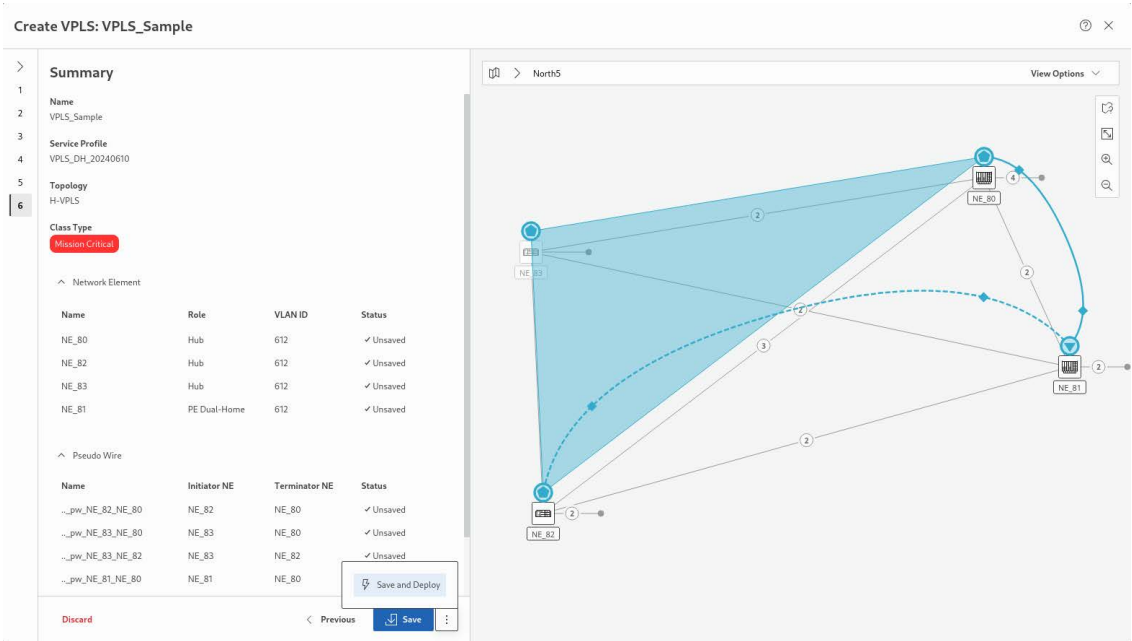
is obtained by expanding/collapsing the tunnel field via the down/up arrows . When expanding a tunnel field, its visibility is automatically set to “show”. The expanded tunnel fields provide all tools to finally select appropriate tunnels for the new service, and to route the tunnel manually.

For protected tunnels, make sure both working and protecting tunnels are routed.

Once all tunnels show an OK mark in the Status column the step is completed.

Click “Next >” to proceed to step 6.

Step 6: Summary



This step shows a summary of the relevant settings related to General, Network Element, and Pseudo Wire properties. The respective fields can be expanded/collapsed via the down/up arrows .

Once the service settings are verified, either

- click the “Save” button to execute a save action for the service and its components or
- click the three-dots menu button right to it and execute “Save and Deploy” to save and deploy the new service and its components to the network.

In both cases, progress and status are shown.

Click “Finish” to close the wizard and return to the MPLS-TP Map view.

11.5.2 Create E-Tree over VPLS

For more detailed information and samples of supported E-Tree creation scenarios, also refer to the application note “E-Tree Application Scenarios” [1MRC000134] included in the FOXMAN-UN documentation package.

The “Create VPLS” wizard is started with the “+ Create” button from the ribbon of the **VPLS** tab in the MPLS-TP Map.

Step 1: General

Create E-Tree: VPLS-ETree-250408-1437

General

1 Name*
VPLS-ETree-250408-1437

2 Description

3 EVC ID
2780b953-9f5-4723-af62-1e87e735d9d3

4 Topology
E-Tree over VPLS

5 Service Profile*
VPLS_DH_20240610

6 PE Dual-Home / PW CW 2x Enabled ⓘ

GoS / Rate Limiting Rate Limiting Enabled ⓘ

Discard Next >

Map Graph NorthS View Options

Mandatory fields are:

- Name

Mandatory selections are:

- Topology = E-Tree over VPLS
- Service Profile, requires a service profile suitable for creation of an E-Tree.

This description continues for the option “E-Tree over VPLS”. For the option “H-VPLS” refer to [11.5.1 "Create VPLS"](#).

The map on the right hand side shows the progress through all steps. In the map header, left of the map selector drop-down menu, click either the “Map” or the “Graph” button to switch between map view and specific E-Tree graph view.

Click “Next >” to proceed to step 2 for E-Tree creation.

Step 2: Endpoints

Create E-Tree: VPLS-ETree-250408-1437

Endpoints

1 Available Roles
Root, Leaf Manage UNI Ports

2 + Add Nodes

3 + Add Nodes

4 Discard < Previous Next >

Map Graph NorthS View Options

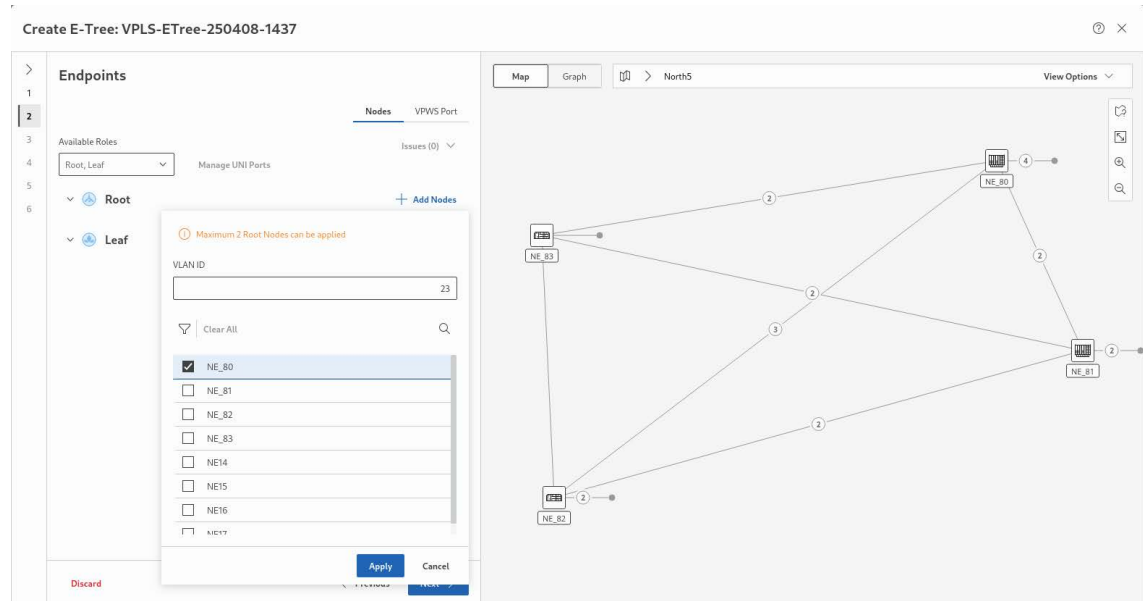
This step requires network nodes as endpoints. The “Nodes” selector tab (top right in the settings area of this step) is active by default. Under “Available Roles”, Root and Leaf are enabled by default. For selecting the appropriate Root node(s), click on the “+ Add Nodes” button.

The “Add Nodes” pop-up dialog will provide

- a field to enter the service VLAN ID,
- a list of selectable nodes.

The available node roles depend on the service profile chosen in step 1.

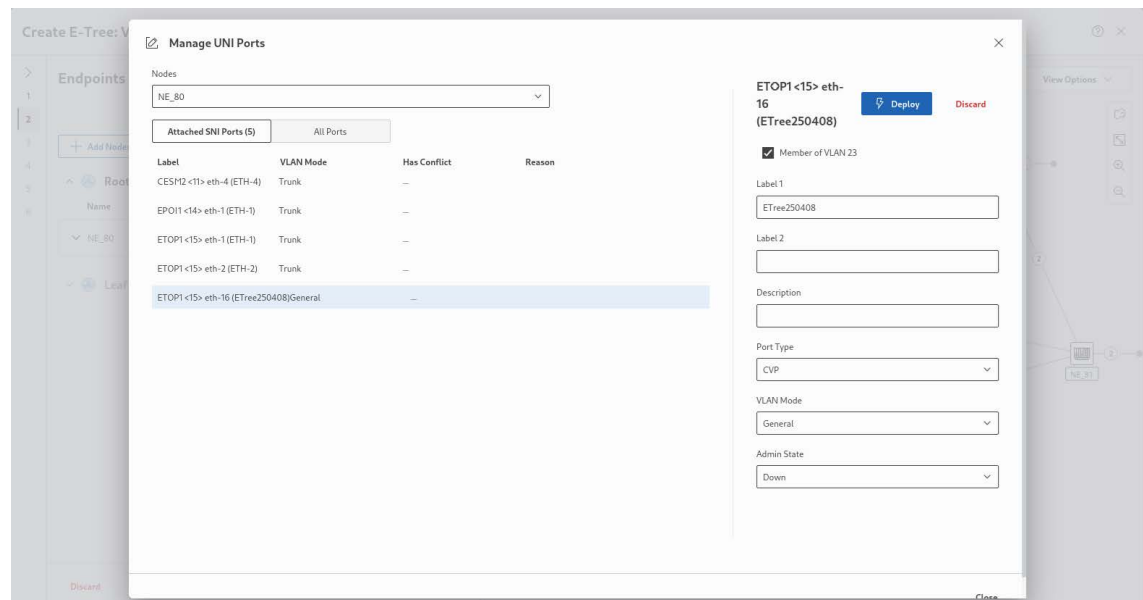
Select the “Root” node:



- enter the VLAN ID,
- enable the required E-Tree root node(s). In this example, node “NE_80” is selected as root node,
- Click “Apply”.

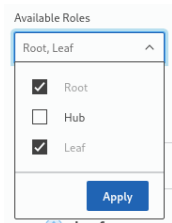
The selected root node(s) will be listed under the “Root” node category.

To manage UNI ports for the root node(s), click on the “Manage UNI Ports” tab. This will open the list of attached SNI ports of the selected node and reconfigure them as appropriate.



Deploy required port configuration changes to the node by clicking on “Deploy” in the header area of the port settings in the details panel of the selected port. When done, click on “Close” in the bottom right corner of the “Manage UNI Ports” dialog.

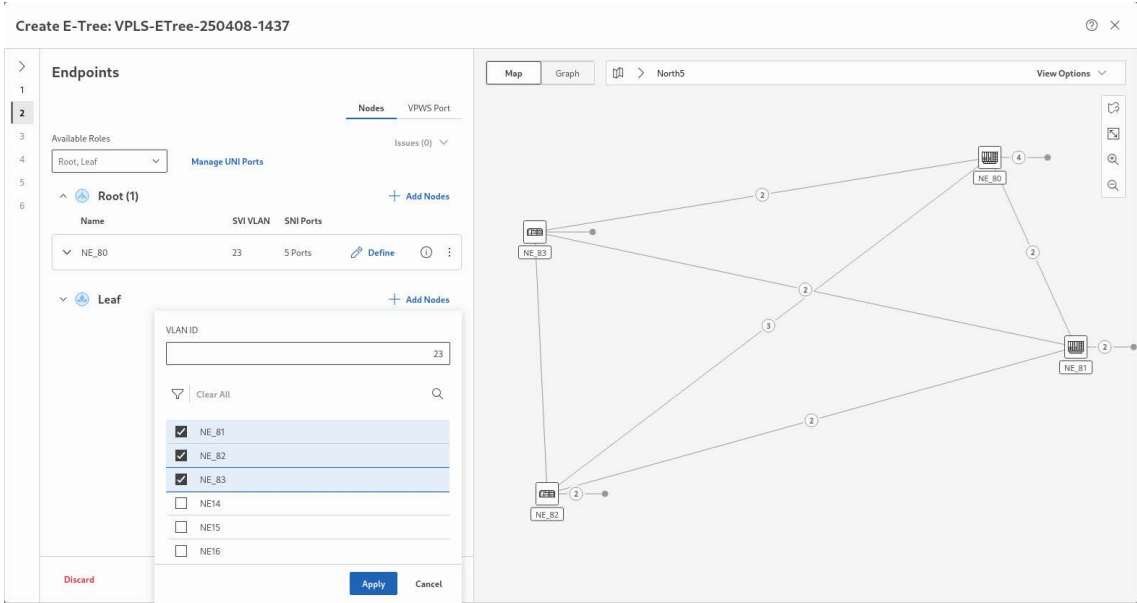
When done with adding Root nodes and managing UNI ports, continue with adding Leaf nodes. If you also need Hub nodes, enable the “Hub” category under “Available Roles”:



and click “Apply”.

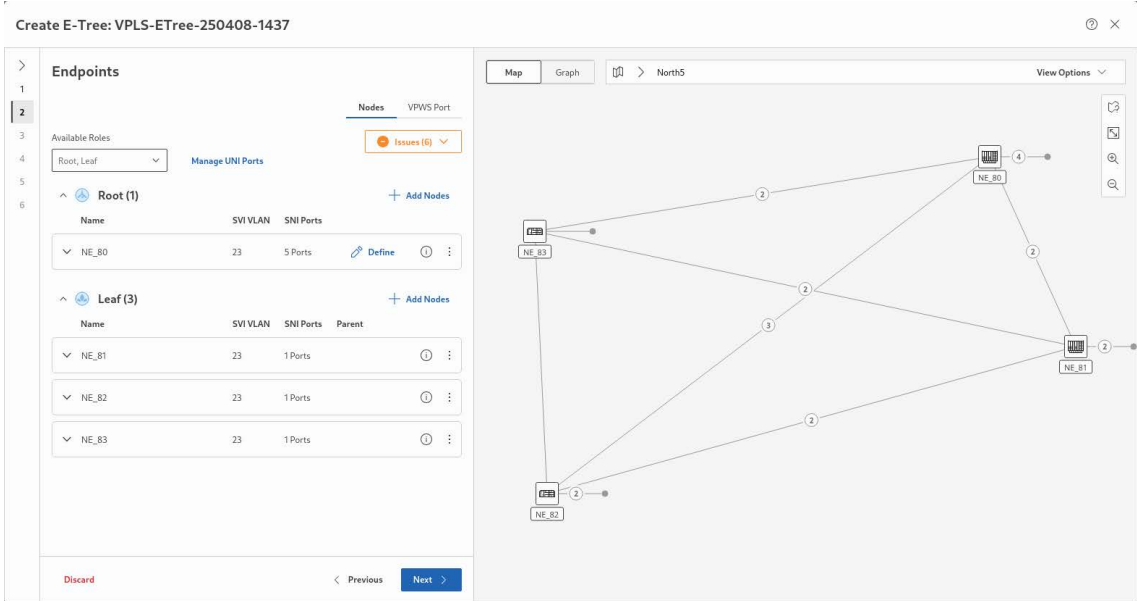
For the Leaf and Hub nodes, proceed in a similar way as for the Root nodes, as required, to build the wanted E-Tree.

In this example, three Leaf nodes, NE_81, NE_82, NE_83, are added to the E-Tree in addition to the already selected Root node:



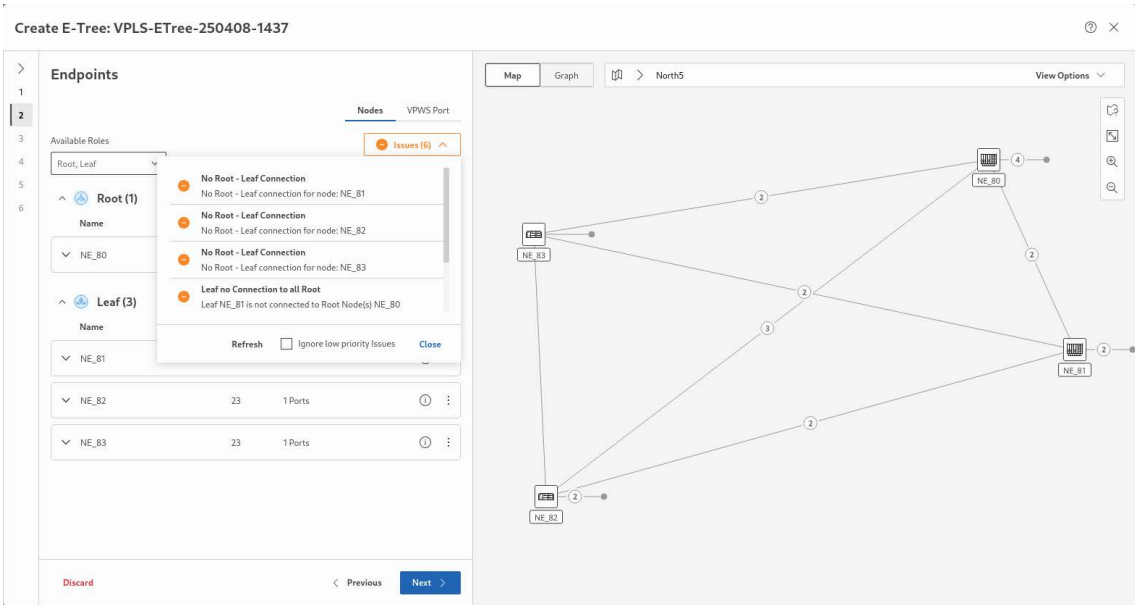
When done with adding Leaf and/or Hub nodes and managing UNI ports, apply the changes for the Leaf and/or Hub nodes by clicking “Apply” at the bottom of the selection dialog.

This will provide the overview on the selected nodes:

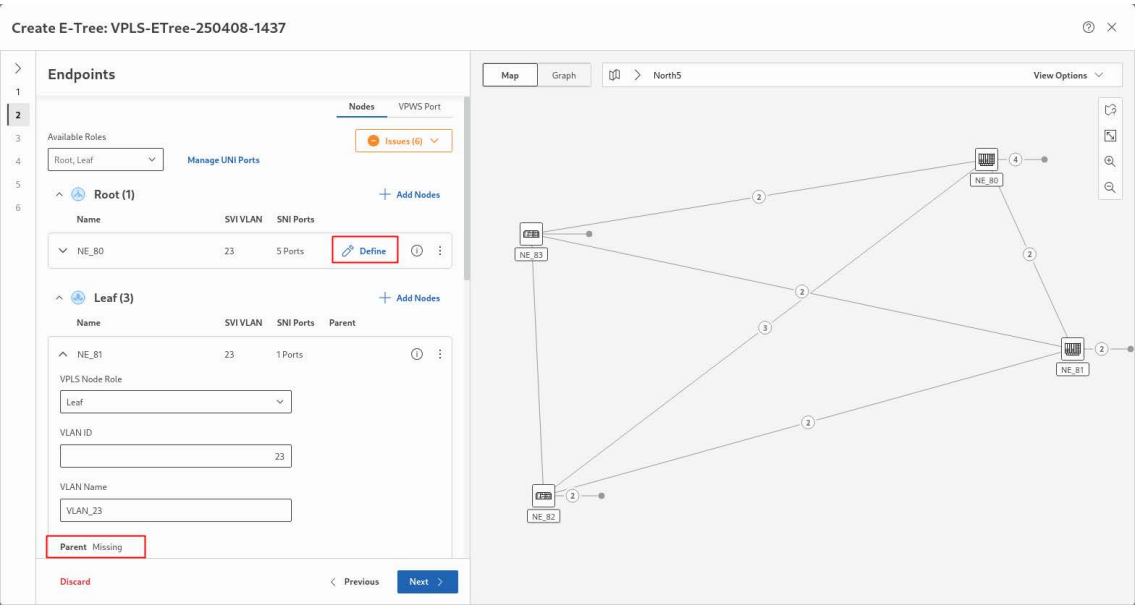


As the relations (connections) between root and leaf nodes are not yet defined, the Issues drop-down box will be marked as shown in the sample above, indicating the number of issues found. In the example it shows Issues (6).

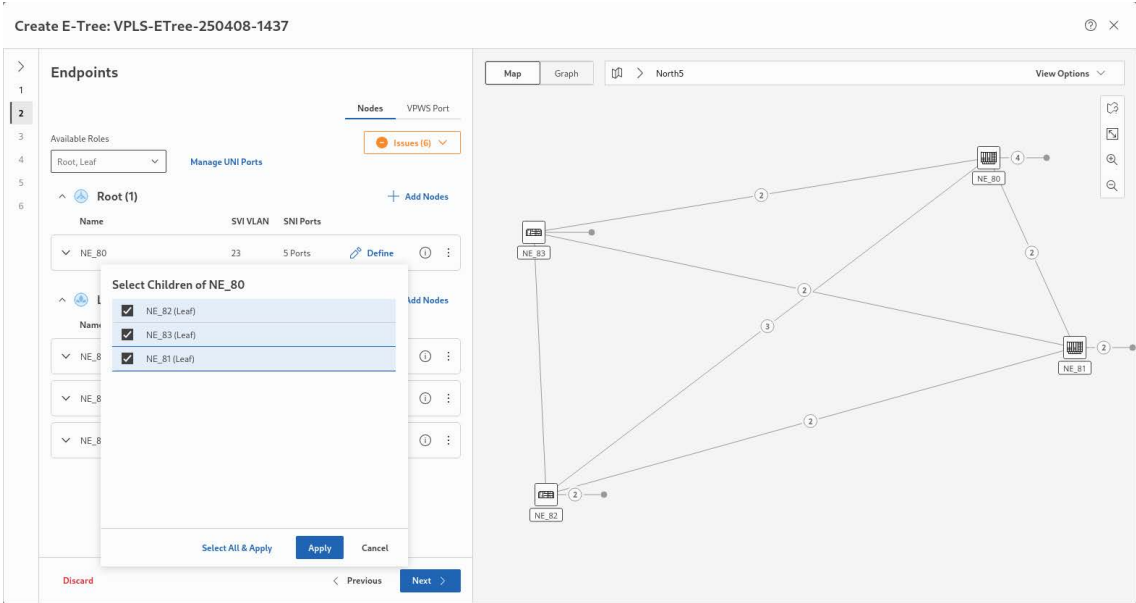
Expand the drop-down box to view the details as shown in the next sample screenshot:



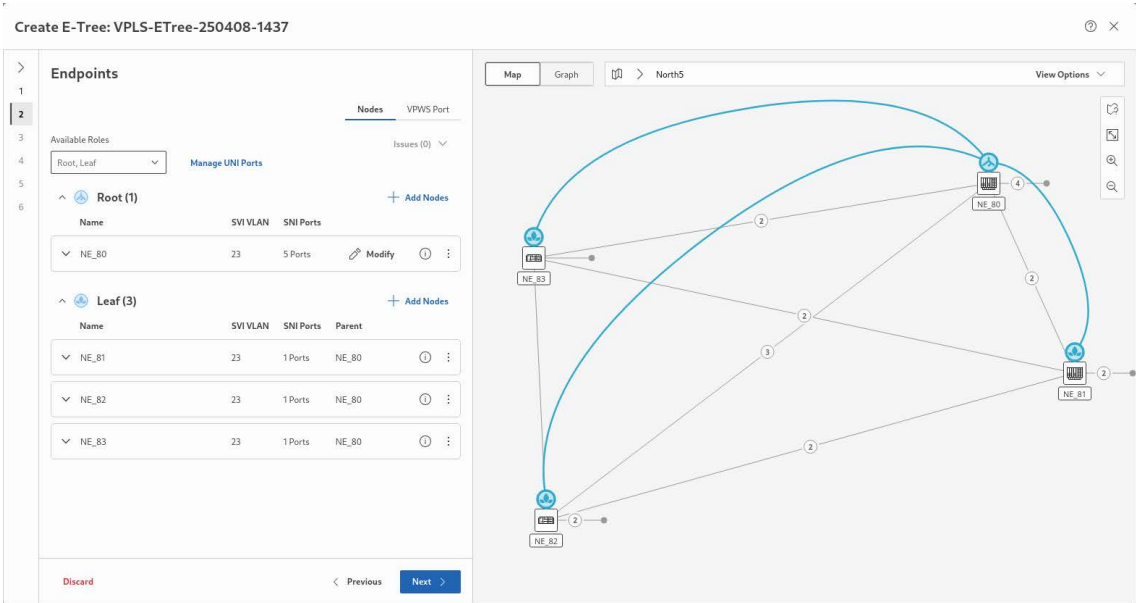
In this example, there are no root-leaf connections yet. Therefore, open the individual nodes' fields by clicking on the expand arrow left of the node name as shown below for the node "NE_81". This node doesn't have a parent NE as it is not connected to the "Root" node, see "Parent Missing" marked red:



To correct this, click on the "Define" command, marked red, of the "Root" node (in this example: NE_80) and select the three leaf nodes for their "Leaf" role:



When done, apply the role selection by clicking on the “Apply” button. This will return you to the node list with the root-leaf connections shown on the map:



Click “Next >” to proceed to step 3.

Step 3: Rate Limiter

Create E-Tree: VPLS-ETree-250408-1437

1

2

3

4

5

6

Rate Limiter

SNI Ports

NE_80 CESI2<11> eth-4 (ETH-4)

☒ Rate Limiting

Committed Information Rate [kbits/s]

10000

Committed Burst Size [Bytes]

4096

Excess Information Rate [kbits/s]

0

Excess Burst Size [Bytes]

0

Discard

< Previous

Next >

Map

Graph

North5

View Options

In this step, rate limiter settings are required. You can accept the settings given by the service profile or select individual settings per selected SNI port. Depending on the selected service profile, some of the settings are fixed and cannot be changed here.

Click “Next >” to proceed to step 4.

Step 4: Pseudo Wires

Create E-Tree: VPLS-ETree-250408-1437

1

2

3

4

5

6

Pseudo Wires

Issues (0/0)

^ Pseudo Wire (3)

Name	Initiator NE	Terminator NE				
...pw_NE_81_NE_80	NE_81	NE_80				
...pw_NE_82_NE_80	NE_82	NE_80				
...pw_NE_83_NE_80	NE_83	NE_80				

Discard

< Previous

Next >

Map

Graph

North5

View Options

This step lists existing Pseudo Wires (PWs) chosen for the service. If no suitable PWs are available, they need to be created. You can show or hide a Pseudo Wire on the map by clicking on the show or hide icons .

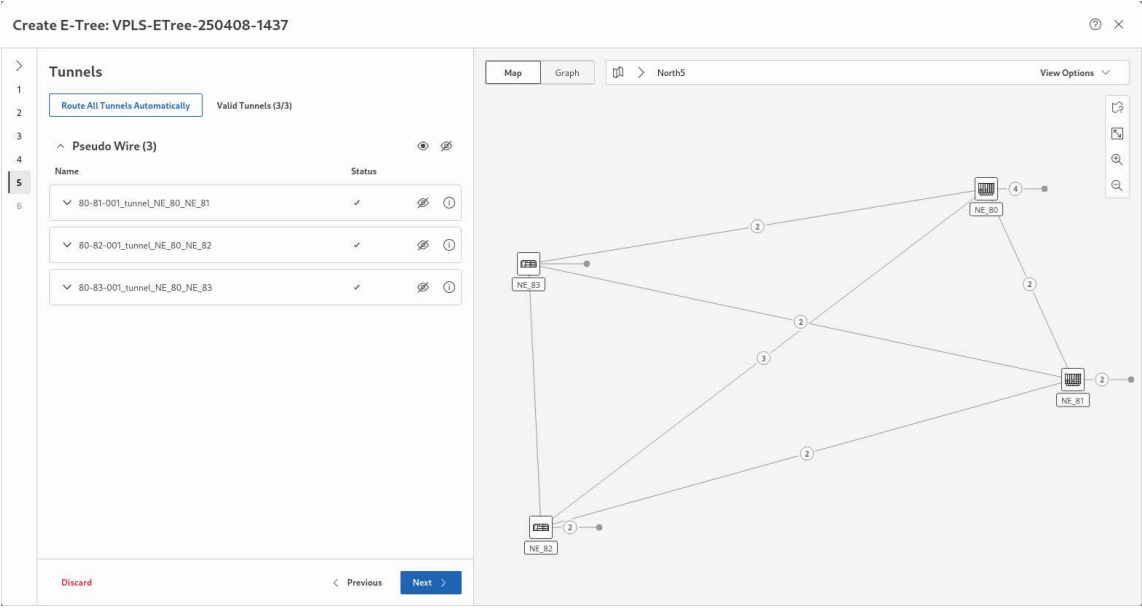
More information on the PWs is provided via the “information” icons .

Issues with existing PWs are indicated in the “Issues” drop-down box which can be expanded to view details.

The three-dot menu provides commands to modify or delete PWs.

Click “Next >” to proceed to step 5.

Step 5: Tunnels



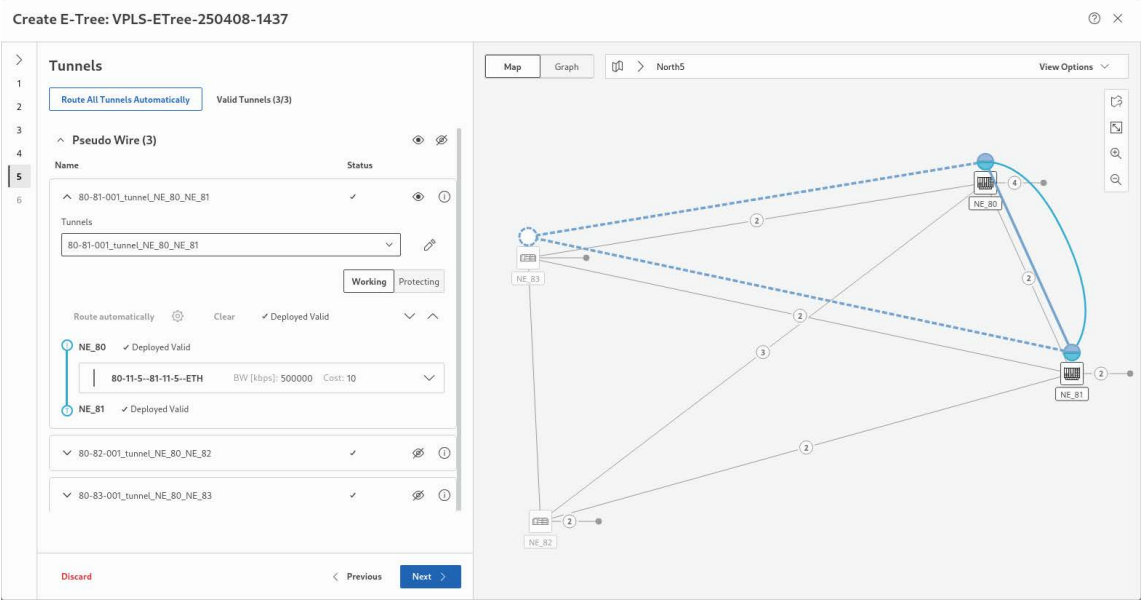
This step proposes tunnels to be assigned for the service. If no suitable tunnels exist, tunnels can be created. The button “Route All Tunnels Automatically” executes an automatic routing for all incomplete tunnels of the service. You can show or hide assigned tunnels on the map by clicking on the show or hide icons  .

More information on a specific tunnel and additional settings, such as

- Protection options,
- Deployment status,
- Initiator and terminator NEs,
- Selected section / link,

is obtained by expanding/collapsing the tunnel field via the down/up arrows  . When expanding a tunnel field, its visibility is automatically set to “show”. The expanded tunnel fields provide all tools to finally select appropriate tunnels for the new service, and to route the tunnel manually.

For protected tunnels, make sure both working and protecting tunnels are routed. With only one of several involved tunnels shown, the map looks like shown below:



With all tunnels shown involved in this example, the map looks as below:

Create E-Tree: VPLS-ETree-250408-1437

Tunnels

Route All Tunnels Automatically Valid Tunnels (3/3)

^ Pseudo Wire (3)

Name	Status
80-81-001_tunnel_NE_80_NE_81	✓
80-82-001_tunnel_NE_80_NE_82	✓
80-83-001_tunnel_NE_80_NE_83	✓

Tunnels

80-83-001_tunnel_NE_80_NE_83

Working Protecting

Route automatically Clear ✓ Deployed Valid

NE_80 ✓ Deployed Valid

80-11-1--83-11-1-ETH BW (kbps): 500000 Cost: 10

NE_83 ✓ Deployed Valid

Discard Previous Next >

Map Graph NorthS View Options

Once all tunnels show a OK mark in the Status column the step is completed.

Click “Next >” to proceed to step 6.

Step 6: Summary

Create E-Tree: VPLS-ETree-250408-1437

Summary

General VPLS-ETree-250408-1437

Network Element

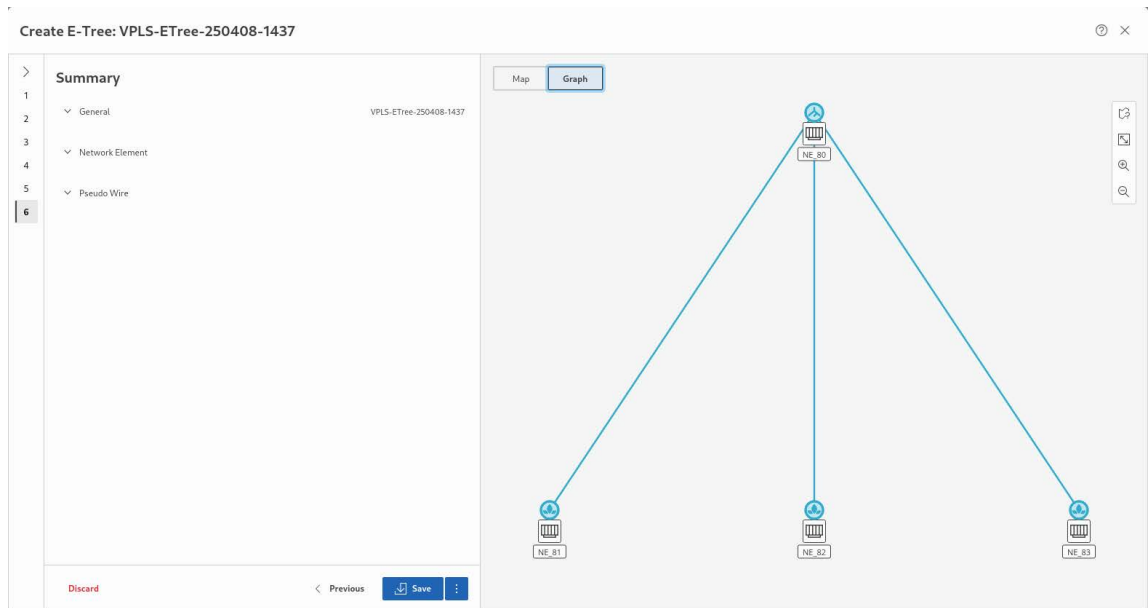
Pseudo Wire

Discard Previous Save

Map Graph NorthS View Options

This step shows a summary of the relevant settings related to General, Network Element, and Pseudo Wire properties. The respective fields can be expanded/collapsed via the down/up arrows ^ v .

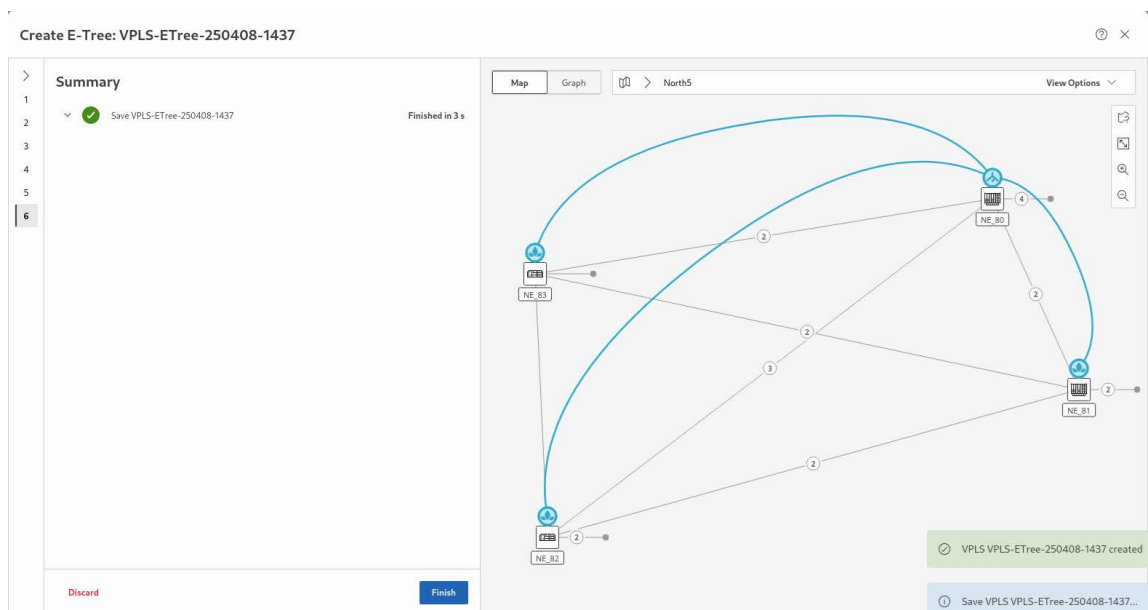
When activating the “Graph” view instead of the “Map” view the service will be shown in a specific E-Tree graph:



Once the service settings are verified, either

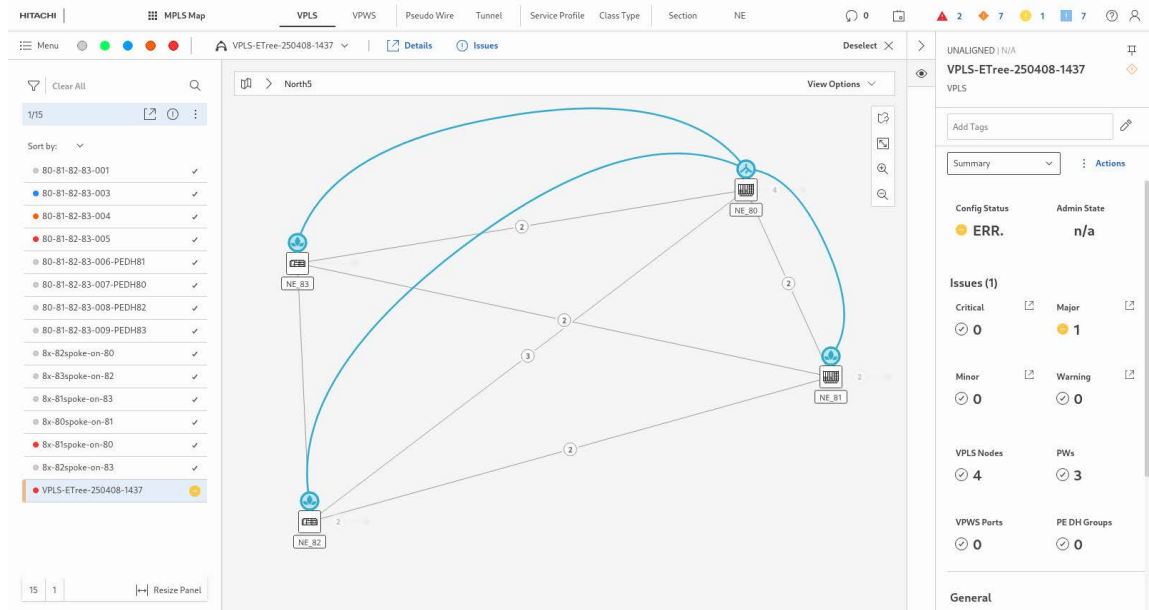
- click the “Save” button to execute a save action for the service and its components or
- click the three-dots menu button right to it and execute “Save and Deploy” to save and deploy the new service and its components to the network.

In both cases, progress and status are shown.



Click “Finish” to close the wizard and return to the MPLS-TP Map view.

The new service will now be shown in the map:



11.5.3 Create VPWS

The “Create VPWS” wizard is started with the “+ Create” button from the ribbon of the **VPWS** tab in the MPLS-TP Map.

The “Modify VPWS” wizard is started for a selected VPWS with the “Modify VPWS” command from the action menu of the selected VPWS.



Please note:

A VPWS can be modified using the command “Modify VPWS”. This command will open the “Modify VPWS: <VPWS Name>” wizard, which provides the same steps as the “**Create VPWS**” wizard, but with some restrictions regarding modification of settings, i.e., not all parameters can be modified.

The wizard leads you through 6 basic steps of creating a new VPWS in your MPLS-TP network. The steps below show the creation of a sample VPWS,

- **Step 1: General,**
- **Step 2: Attachment Circuit,**
- **Step 3: Pseudo Wire,**
- **Step 4: Tunnel,**
- **Step 5: Summary.**

Step 1: General

Create VPWS

1

2

3

4

5

General

Name*
VPWS_Sample

Description

EVC ID
407d2688-cf97-4739-ab81-25fe732f0e10

Service Profile
Select

☐ PW Control Word

QoS / Rate Limiting

Rate Limiting Disabled

Discard

Next >

North5

This step requires at least a unique name for the new VPWS and an appropriate service profile before proceeding to the next step.

The service profile is used to define the “PW Control Word” and “QoS / Rate Limiting” settings. The description is optional; the EVC ID is generated automatically.

If the selected service profile permits, PW Control Word can be enabled or disabled, and QoS / rate limiting properties can be configured after expanding the “QoS / Rate Limiting” field.

The map on the right hand side shows the progress through all steps.

Click “Next >” to proceed to step 2.

Step 2: Attachment Circuit

Create VPWS: VPWS_Sample

1

2

3

4

5

Attachment Circuit

Initiator

Terminator

NE
Select

NE
Select

VPWS Type
AC VLAN Based, No Change

VPWS Type
AC VLAN Based, No Change

AC VLAN
1

AC VLAN
1

Port
Select

Port
Select

☐ Rate Limiting Disabled

☐ Rate Limiting Disabled

Discard

< Previous

Next >

North5

This step defines the AC properties on the Initiator and Terminator ends of the service. For each end, you need to select

- NE,
- VPWS Type,
- AC VLAN (optional, also depends on VPWS type),
- PW VLAN (optional, depends on VPWS type),
- Port.

A port can be edited to make it better suitable for the service if required by clicking on the “Edit Port” button. This will allow you to set “Label 1”, “Label 2”, “Description”, “Port Type”, and “Admin State” of the port. Such a change needs to be deployed before continuing.

If the selected service profile permits and rate limiting is enabled, rate limiting properties can be configured after setting the above properties and after expanding the “Rate Limiting” field. Rate limiting can also be disabled here if the service profile permits.

Click “Next >” to proceed to step 3.

Step 3: Pseudo Wire

Create VPWS: VPWS_Sample

Pseudo Wire

- Bandwidth (kbps): 10000
- ☐ Link Loss Forwarding
- Labels Min / Max: 500000 / 1048575

Discard < Previous Next >

North5

This step has no mandatory fields. Depending on the selected service profile it may allow you to modify the bandwidth and the “Min Label” and “Max Label” values. Link Loss Forwarding (LLF) can be enabled or disabled if the involved units support the feature.

Click “Next >” to proceed to step 4.

Step 4: Tunnel

The screenshot shows the 'Create VPWS: VPWS_Sample' web interface. On the left, a sidebar lists steps 1 through 5, with step 4 'Tunnel' selected. The main configuration area for 'Tunnel-33' includes fields for Name, Status (Deployed Valid), Protected, and Label Switched Path. The 'Label Switched Path' section has buttons for 'Working' and 'Protecting', and a 'Route automatically' button. Below this, a list of tunnels is shown, including '81-11-4-83-11-5-ETH' with a bandwidth of 500000 kbps and a cost of 10. On the right, a network diagram shows a topology with nodes NE_81, NE_82, NE_83, and NE_80, connected by various links and tunnels.

This step proposes a tunnel to be assigned for the service. If no suitable tunnels exist, the proposed tunnel can be modified, or a new tunnel can be created.

To modify a tunnel, click on the pen icon right to the tunnel selection field. This will open a new modal window where you can edit tunnel parameters (editability depends on the selected VPWS service profile) such as

- Name,
- Description,
- Class Type,
- Bandwidth,
- Protected (true, false),
- Force Distinct Path (true, false),
- Service Profile,
- BFD Session (true, false),
- Working CC Interval / Protection CC Interval,
- Revertive Mode,
- WTR Time,
- State Change Tx Interval.

To apply the tunnel modifications, click “Apply”.

Under “Label Switched Path”, the button “Route automatically” executes an automatic routing individually for the working and the protecting LSPs, respectively. Auto Routing Parameters can be set via the gear icon of the command button. While routing, status of working and protecting LSPs and missing elements are indicated in-line. After routing, the new tunnel name is listed with its auto-assigned name.

The proposed tunnel (working and protecting LSPs) is shown on the map. For protected tunnels, make sure both working and protecting tunnels are routed by selecting the respective field “Working” or “Protecting” and applying required settings.

More information on the tunnel and additional settings, such as

- Protection options (working and protecting LSPs),
- Deployment status,
- Initiator and terminator NEs,

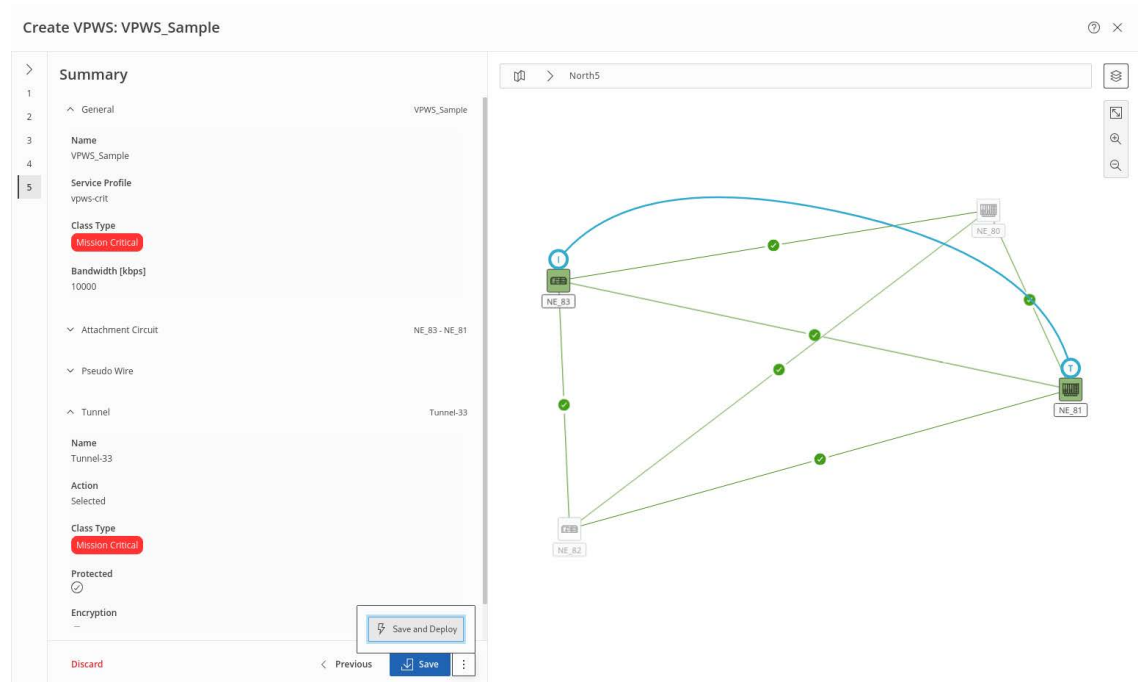
- Selected section / link,

is obtained by expanding/collapsing the Label Switched Path field via the down/up arrows  . The expanded LSP fields provide all tools to finally select an appropriate tunnel for the new service.

Once the tunnel shows a green OK mark in the Status field the step is completed.

Click “Next >” to proceed to step 5.

Step 5: Summary



This step shows a summary of the relevant settings related to General, Attachment Circuit, Pseudo Wire, and Tunnel (LSP) properties. The respective fields can be expanded/collapsed via the down/up arrows  .

Once the service settings are verified, either

- click the “Save” button to execute a save action for the service and its components or
- click the three-dots menu button right to it and execute “Save and Deploy” to save and deploy the new service and its components to the network.

In both cases, the progress and status are shown.

Click “Finish” to close the wizard and return to the MPLS-TP Map view.

11.5.4 Create Tunnel

The “Create Tunnel” wizard is started with the “+ Create” button from the ribbon of the **Tunnel** tab in the MPLS-TP Map.

The “Modify Tunnel” wizard is started for a selected tunnel with the “Modify Tunnel” command from the action menu of the selected tunnel.



Please note:

A tunnel can be modified using the command “Modify Tunnel”. This command will open the “Modify Tunnel: <Tunnel Name>” wizard, which provides the same steps as the “**Create Tunnel**” wizard, but with some restrictions regarding modification of settings, i.e., not all parameters can be modified.

When you re-route a deployed tunnel while removing two consecutive LSP elements, a special procedure is required, see **Modify Tunnel (special procedure)**.

The wizard leads you through 6 basic steps of creating a new tunnel in your MPLS-TP network. The steps below show the creation of a sample tunnel,

- **Step 1: General,**
- **Step 2: Endpoint,**
- **Step 3: OAM,**
- **Step 4: Label Switched Path,**
- **Step 5: Encryption,**
- **Step 6: Summary.**

Step 1: General

The screenshot shows the 'Create Tunnel: Tunnel_Sample' wizard in the 'General' step. The form is divided into two main sections: a configuration panel on the left and a network graph on the right.

Configuration Panel (Left):

- Name:** Tunnel_Sample
- Description:** (empty field)
- Service Profile:** VPWS230614Msc (selected)
- Class Type:** Mission Critical (selected)
- Bandwidth [kbps]:** 10000
- Protected:** ☒
- Force Distinct Path:** ☒
- Labels:** 3000 / 1048575 (range)

Network Graph (Right):

The network graph shows four nodes: NE_81, NE_82, NE_83, and NE_80. NE_81 and NE_82 are connected to NE_80 and NE_83. NE_80 and NE_83 are connected to each other. The graph is labeled 'Network Graph'.

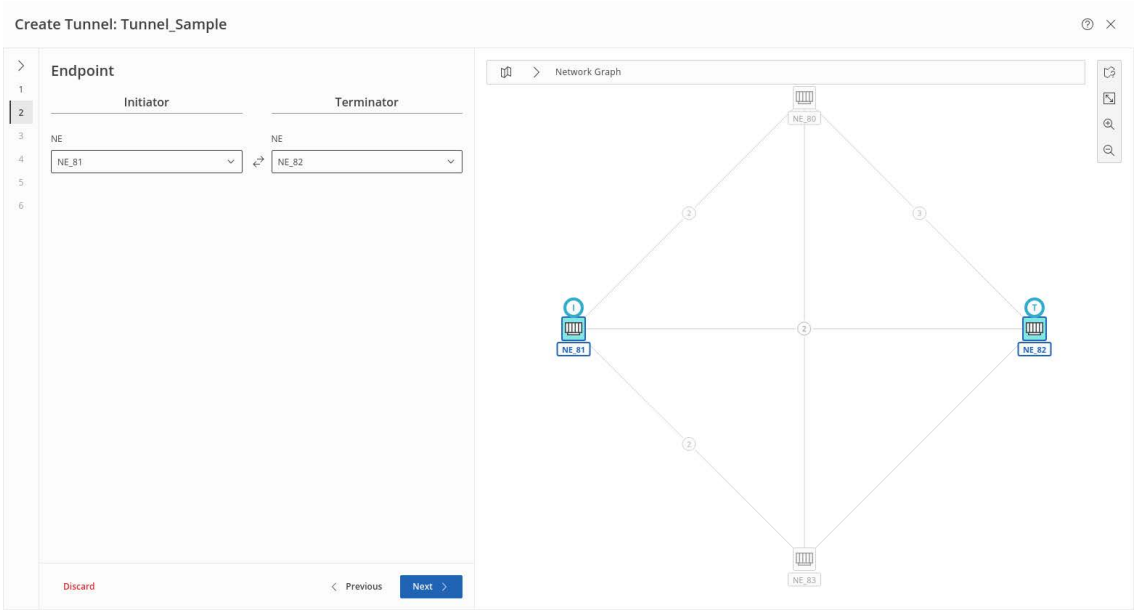
This step requires at least a unique name for the new tunnel, and selection of either an appropriate service profile or Class Type is strongly recommended before proceeding to the next step. Modification of some of the settings won't be possible once the tunnel is saved.

If a service profile is selected, most of the parameters are given by the service profile.

If no service profile is selected, Min Label and Max Label can be selected manually; default range is 3000 ... 1048575.

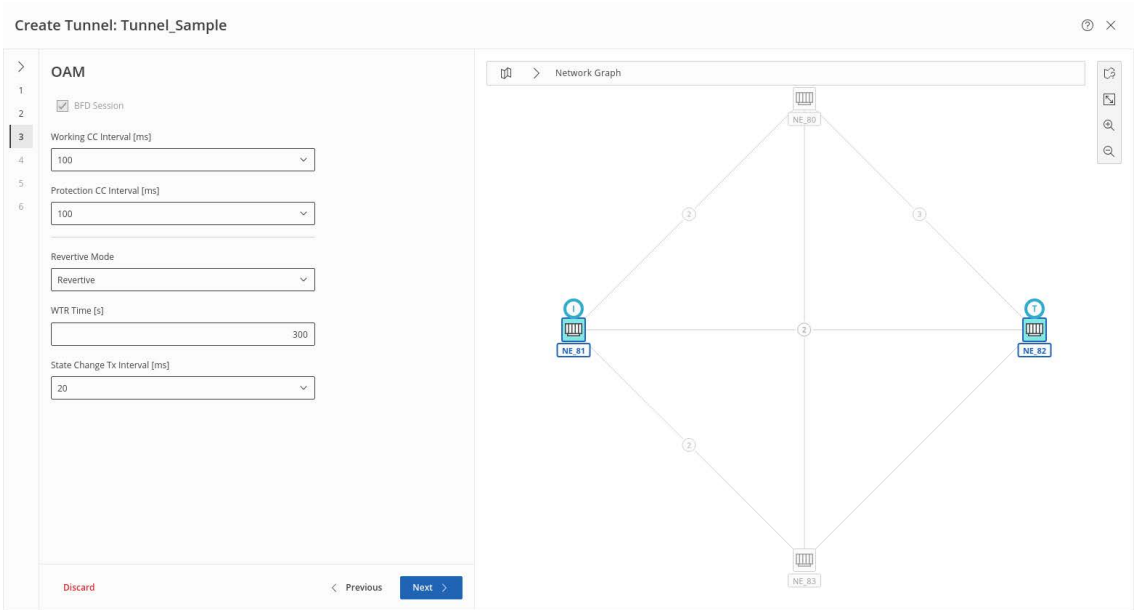
Click "Next >" to proceed to step 2.

Step 2: Endpoint

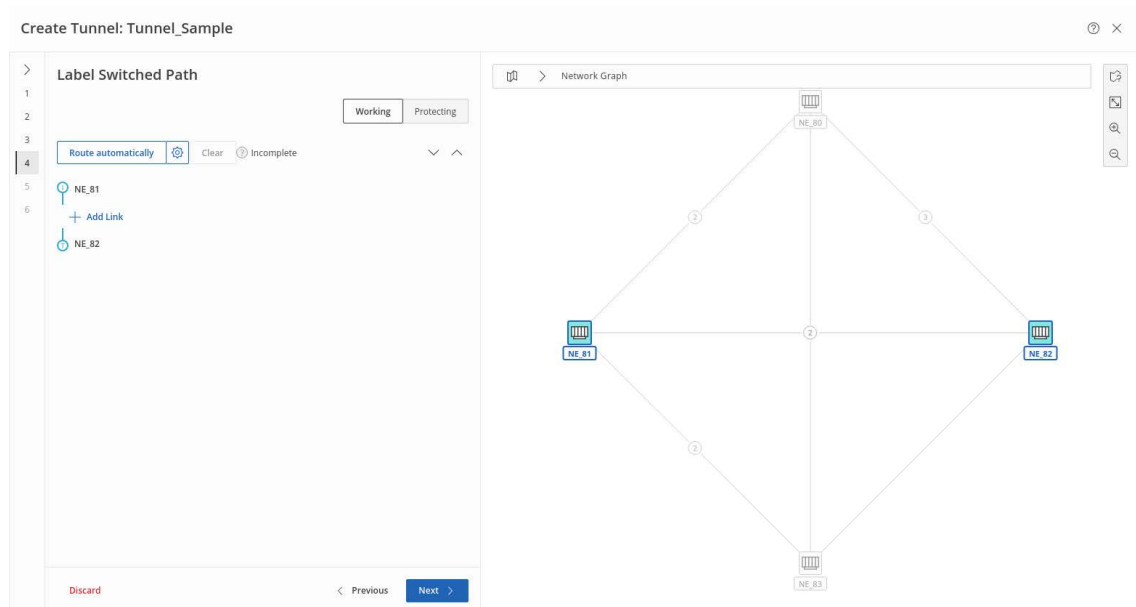


This step requires selection of the two tunnel endpoints (Initiator, Terminator): the NE for each of the endpoints is selected from a list of available NEs.
Click “Next >” to proceed to step 3.

Step 3: OAM



This step lets you defined OAM settings. If you have selected a service profile in step 1, it determines some or all settings.
If no service profile is selected and protection is disabled, you can enable BFD session and set the related parameter Working CC Interval; if protection is enabled, you can additionally set the parameters Protection CC Interval, Revertive Mode, WTR Time, and State Change Tx Interval individually.
Click “Next >” to proceed to step 4.

Step 4: Label Switched Path

This step shows the tunnel endpoints and lets you route the LSP(s) automatically if the prerequisites are given for automatic routing; usually a valid service profile is the right prerequisite.

Otherwise you may add at least one link (or at least two links for working and protecting LSPs) manually.

The gear wheel icon is used for setting auto routing parameters, such as:

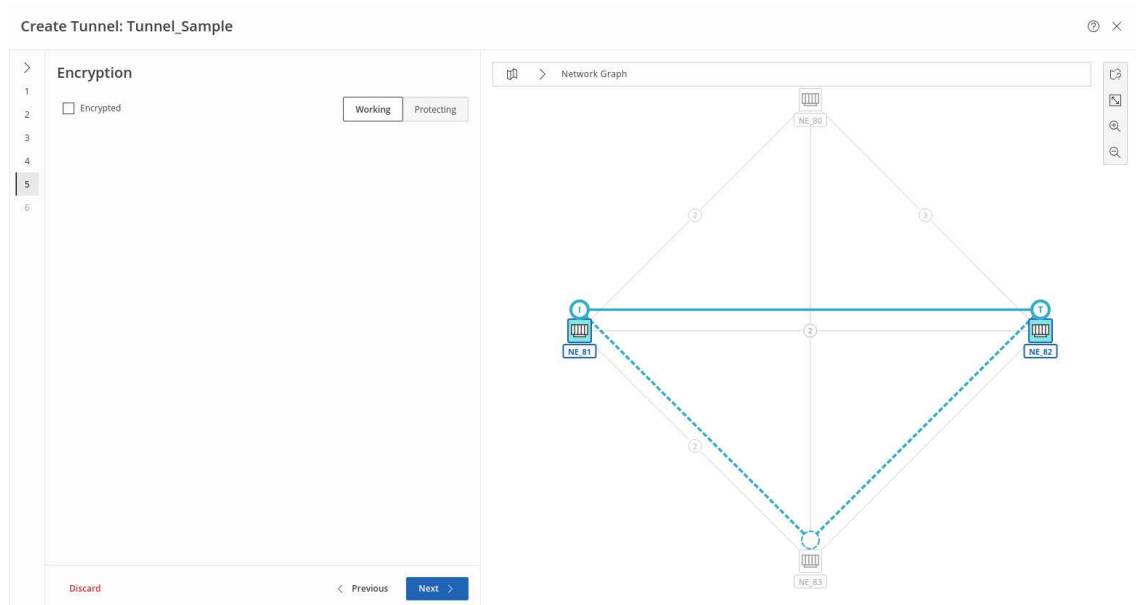
- Routing Order (BW Optimized, Cheapest (default), Shortest),
- Max Hops,
- Max Cost,
- Excluded NEs,
- Included NEs,
- Excluded Links.

The auto routing parameters are applicable separately to working and protecting LSPs.

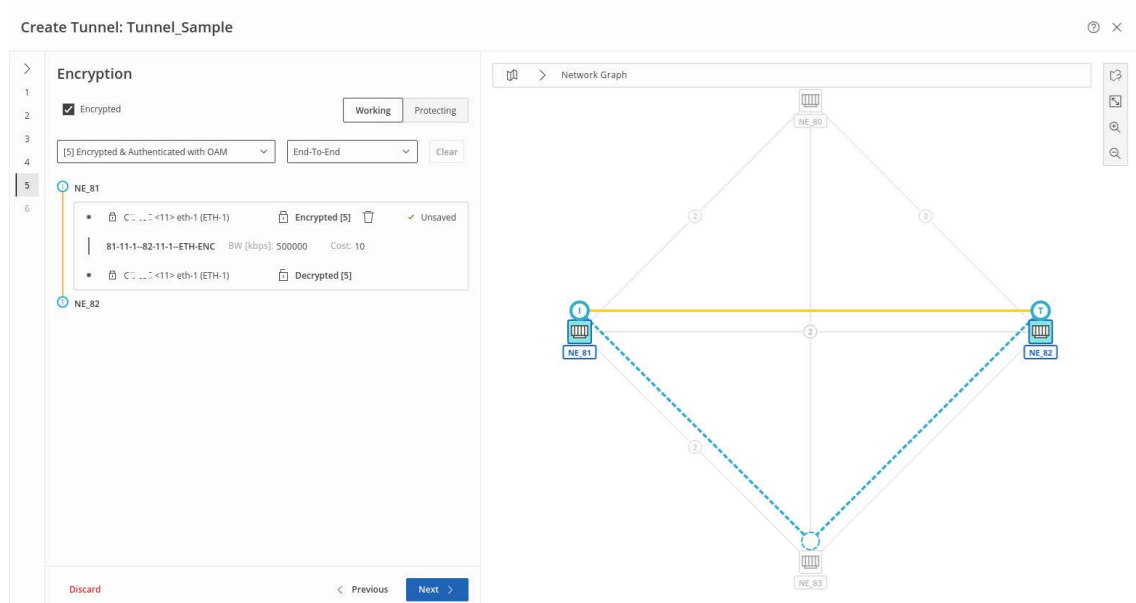
Once routing is completed, the LSP segments are listed.

Click “Next >” to proceed to step 5.

Step 5: Encryption



This step lets you enable encryption if you use encryption units and have set up the links accordingly. With protected LSPs, you can enable encryption individually for working and protecting LSPs as far as available on the respective links.

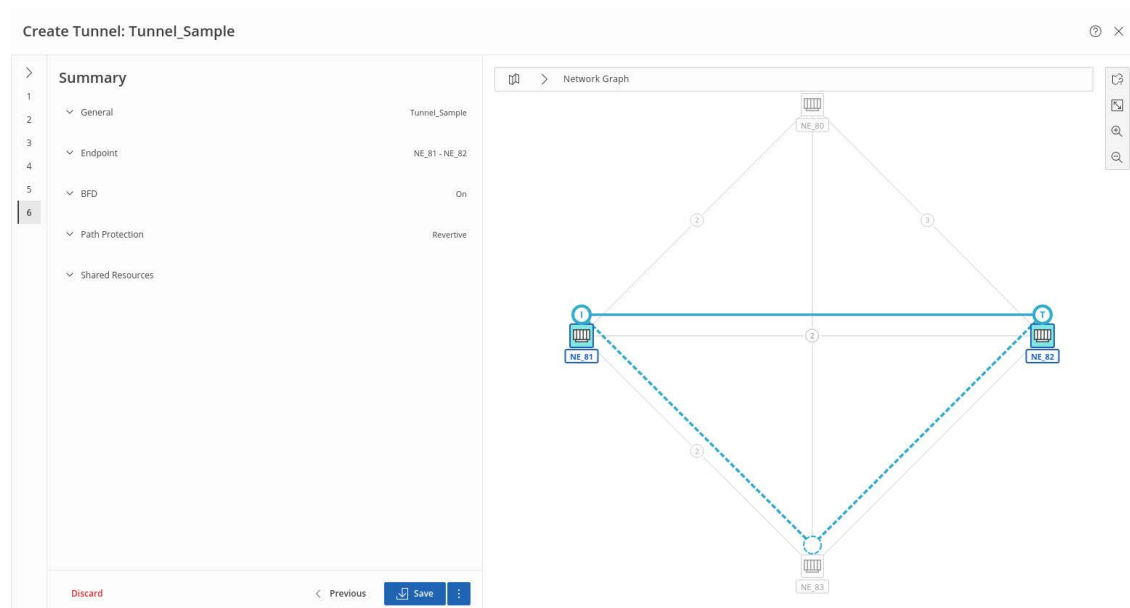


Encrypted links are indicated with a lock symbol in front of the initiating and terminating unit ports. The color of the tunnel between the A and Z end NEs is set to gold. Note that an encrypted tunnel in the MPLS-TP map, "Tunnel" tab, will also be shown colored in gold if the view option to show the context "encryption" is enabled.

Where encryption is supported, e.g., only on working tunnel of a working and protecting pair, it will be saved and deployed to the network accordingly, i.e., when proceeding to the next step, the encryption settings are only taken over where supported by the network.

Click "Next >" to proceed to step 6.

Step 6: Summary



This step shows a summary of the relevant settings related to General, Endpoint, BFD, Path Protection, and Shared Resources.

The respective fields can be expanded/collapsed via the down/up arrows .

Once the tunnel settings are verified, either

- click the “Save” button to execute a save action for the tunnel and its components or
- click the three-dots menu button right to it and execute “Save and Deploy” to save and deploy the new tunnel and its components to the network.

In both cases, progress and status are shown.

Click “Finish” to close the wizard and return to the MPLS-TP Map view.

11.5.5 Modify Tunnel (special procedure)

When you re-route a deployed tunnel while removing two consecutive LSP elements, a special procedure is required.

Proceed as follows:

1. Select the tunnel and click on “Modify tunnel”. Go to wizard step 4 “Label Switched Path”.
2. Delete the two LSP elements (links), save and deploy the tunnel.
3. Select the tunnel again and click on “Modify tunnel”. Go to wizard step 4 “Label Switched Path”.
4. Delete again the second LSP element (link), then re-route the tunnel.
5. Save and deploy the re-routed tunnel.

11.5.6 Create Service Profile

The “Create Service Profile” wizard is started with the “+ Create” button from the ribbon of the **Service Profile** tab in the MPLS-TP Map.

An existing service profile cannot be modified, but only deleted, or a new service profile can be created using an existing one as template (Ribbon command “Create Base On” for a selected service profile). The wizard for the “Create Base On” command is the same as for the “+ Create” command, but parameters are taken over from the template service profile and can be modified.

The wizard leads you through 6 basic steps of creating a new service profile for your MPLS-TP network.

The steps below show the creation of a sample tunnel,

- **Step 1: General,**
- **Step 2: Bandwidth / Rate Limiting,**
- **Step 3: Quality of Service,**
- **Step 4: Tunnel,**
- **Step 5: Routing,**
- **Step 6: Summary.**



Please note:

For many of the parameters, a parameter change option is available that can be set to “fixed” or to “variable”. When set to fixed, the respective parameter will remain fixed when the service profile is applied to a service during service creation. When set to variable, the respective parameter can be modified during service creation with that service profile applied.

Step 1: General

This step requires at least a unique name for the new tunnel, and selection of an appropriate service type is strongly recommended before proceeding to the next step. The service type determines the applicability of the service profile to services and the availability for selection of further options, such as PE Dual-Home and PW Control Word.

- For service type VPWS, PE Dual Home is always disabled.
- For service type VPLS, if PE Dual Home is enabled, the PW Control Word is always enabled, and BFD Session will always be enabled in step 4.

Whether or not an NE is Dual-Home capable can be checked in the NE details. For checking its capability, select an NE on the map, then click on “Details” in the ribbon. In the NE details select the “MPLS” tab and verify there is an “OK” mark for “PE Dual Home Capable”.

Service Category provides the options (General, Transparent Clock without CW, Transparent Clock with CW; default is: General).

It is possible to create new service categories.

Click “Next >” to proceed to step 2.

Step 2: Bandwidth / Rate Limiting

Create Service Profile

Bandwidth / Rate Limiting

Class Type

Prio

1

2

3

4

5

6

Bandwidth [kbps]

10000

Fixed

Rate Limiting

Fixed

Rate Limiting Type

1 Rate - 2 Color

Committed Information Rate [kbits/s]

10000

Fixed

Committed Burst Size [Bytes]

4096

Fixed

Excess Information Rate [kbits/s]

0

Fixed

Excess Burst Size [Bytes]

0

Fixed

Cancel

Previous

Next

This step is used to select the Class Type (see [Class Type](#) and [HQoS Configuration Manager](#)), and define bandwidth and rate limiting parameters. If rate limiting is enabled, selection of an appropriate rate limiting type is strongly recommended. Alternatively, the default settings can be used.

Click “Next >” to proceed to step 3.

Step 3: Quality of Service

Create Service Profile

Quality of Service

Trust Mode

Untrusted

1

2

3

4

5

6

CoS Type

Interface

Fixed

Default Priority

0

Fixed

CoS Overwrite

Overwrite

Fixed

For VLAN Based services the CoS Type and Default Priority are ignored

Overwrite Priority

0

Fixed

Scheduling Profile

1

Fixed

Cancel

Previous

Next

This step sets QoS parameters such as

- Trust Mode (Untrusted, Trust Layer 2, Trust Layer 3),
- CoS Type (Interface, PCP, DSCP),
- Default Priority (0 ... 7),

- CoS Overwrite (Maintain, Overwrite) - if set to overwrite, the CoS Type and Default Priority are ignored for VLAN based service,
- Overwrite Priority (0 ... 7),
- Scheduling Profile (1 ... 5).

Click “Next >” to proceed to step 4.

Step 4: Tunnel

Create Service Profile

Tunnel

1 > ☒ Protected Fixed

2 ☒ Force Distinct Path Fixed

3

4 ☒ BFD Session Fixed

5 PE Dual Home and Tunnel Protection requires BFD

6

CC Interval [ms]
100 Fixed

Revertive Mode
Revertive Fixed

WTR Time [s]
300 Fixed

State Change Tx Interval [ms]
20 Fixed

Cancel < Previous Next >

This step sets the tunnel related parameters, such as

- Protected (enabled, disabled),
- Force Distinct Path (enabled, disabled),
- BFD Session (enabled, disabled) - if PE Dual Home is enabled (step 1) or if “Protected” is enabled, BFD Session is always enabled.
- CC Interval (range: 3.3 ... 1000 in 8 steps),
- Revertive Mode (Revertive, Nonrevertive),
- WTR Time [s] (range: 5 ... 720),
- State Change Tx Interval [ms] (range: 3.3, 10, 20),
- Min Label (default: 3000),
- Max Label (default: 1048575).

Depending on the settings in previous steps, some of the parameters cannot be set.

Click “Next >” to proceed to step 5.

Step 5: Routing

Create Service Profile

Routing

1

2

3

4

5

6

Routing Order

Cheapest

Fixed

Max Hops

0

Fixed

Max Cost

0

Fixed

Cancel

Previous

Next

This step sets the routing parameters:

- Routing Order (BW Optimized, Cheapest, Shortest; default is: Cheapest),
- Max Hops (enabled, disabled; default is: disabled). If enabled, the number of hops can be set (range: 0 ... 32767),
- Max Cost (enabled, disabled; default is: disabled). If enabled, the number of hops can be set (range: 0 ... 32767).

Click “Next >” to proceed to step 6.

Step 6: Summary

Create Service Profile

Summary

1

2

3

4

5

6

General

ServiceProfile_Sample

Name

ServiceProfile_Sample

Service Type

VPLS

Service Category

General

Class Type

Pho

Protected

☒

Bandwidth [kbps]

10000

Quality of Service

CoS Type

Interface

CoS Overwrite

Overwrite

Scheduling Profile

1

Cancel

Previous

Finish

This step provides a summary of the service profile settings.

Click “Finish” to save the service profile, close the wizard, and return to the MPLS-TP Map view.

The newly created service profile is added to the list of available service profiles.

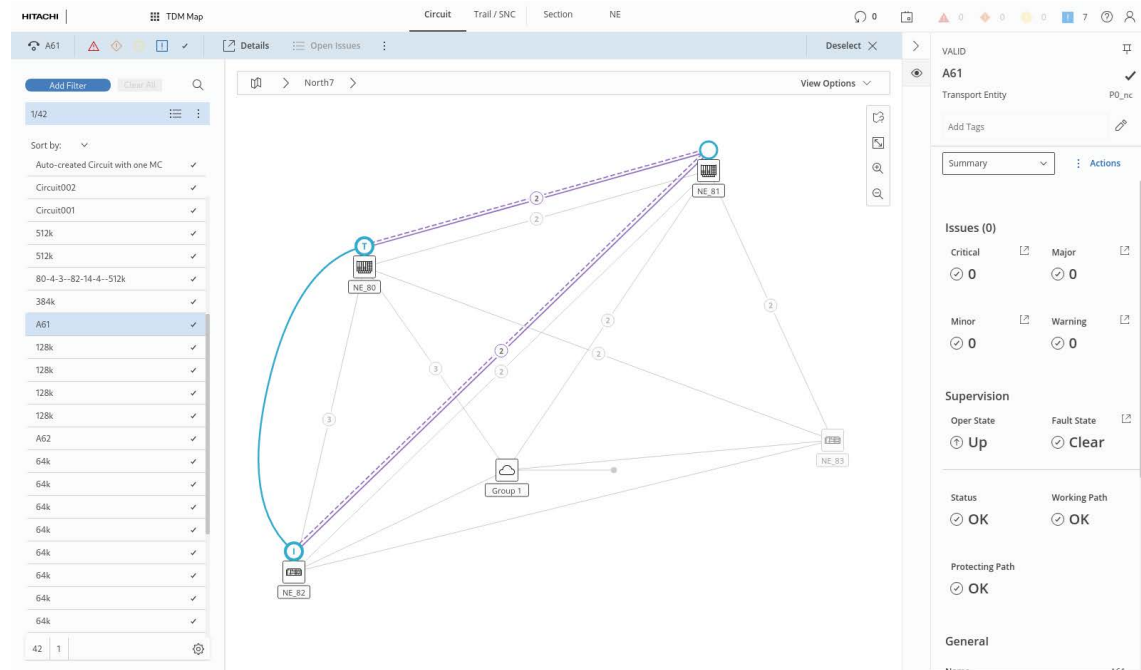


Please note:

After creation, any selected service profile(s) can be exported (i.e., saved to disk) via the action menu command “Export”. The command is called via the three-dot menu in the ribbon upon selecting one or several service profiles from the list.

The ribbon also provides the “Import” command to import service profiles saved earlier.

11.6 TDM



The TDM application provides access to the legacy NP functionality with a network map view, primarily the graphical presentation of the tabs

- **Circuit**,
- **Trail / SNC**,
- **Section**, and
- **NE** of types FOX61x, FOX51x, FO.

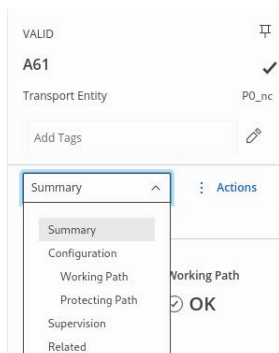
related elements that are part of the NP domain, each of which having its own tab.

For any of the elements selected in the entity browser (left panel) or in the map it provides a details view with information on (as far as applicable):

- basics,
- endpoints,
- service supervision,
- health monitors,
- diagnostic issues,
- used Transport Entity (TE),
- used NEs (with additional extended information on each involved NE),
- used units (with additional extended information on each involved unit),
- used ports (with additional extended information on each involved port).

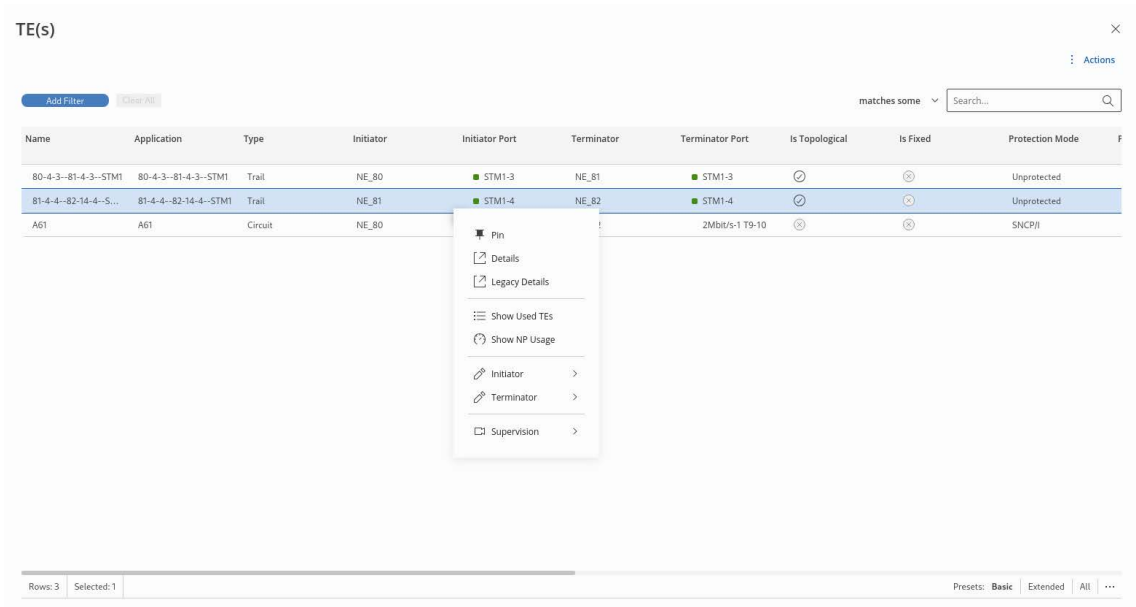
Circuit

For a selected **Circuit**, the right panel provides the following details options in the right panel, selectable from the drop-down field:



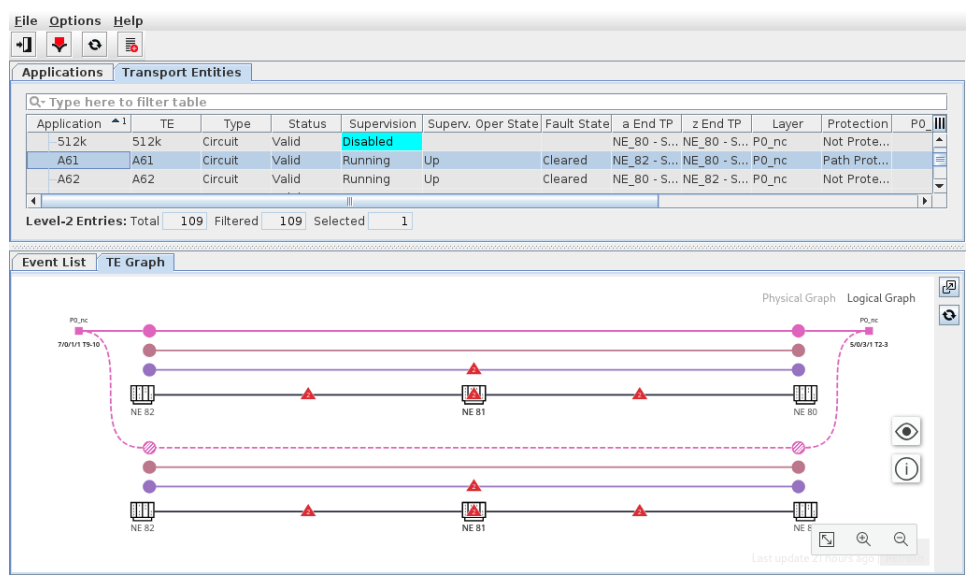
- **Summary with**
 - overall Status, and Working Path, Protecting Path status,
 - General circuit information, such as Name, Application, TE ID, Layer Rate, Cost, etc.
- **Configuration**
Provides general information on the circuit configuration and on its initiator and terminator. For protected circuits, the following options are available:
 - **Working Path**
Provides general information on the working path and on involved NEs, sections, and connections, such as status, number of involved NEs, sections, and connections.
 - When expanding “Network Elements”, apart from additional information on the NEs and their used layer rates, the details of TE(s) can be listed via the link icon [🔗](#).
 - When expanding “Sections”, the name, initiator, terminator, status, number of TEs, and layer rates are shown for each of the involved sections.
 - When expanding “Connections”, the initiator NE, terminator NE, status, number of TEs, and the layer rates are shown, and an indication on the presence of Working TEs, Protecting TEs, and Topological TEs (via “OK” or “not applicable” icons). The details of involved TE(s) can be listed via the link icon [🔗](#), see more details below.
 - **Protecting Path**
Similar information is available as for the working path described above.
- **Supervision** (Supervision, Alarms, Actions) where applicable,
- **Related** (Used By, Using: Network Element, Unit, Port).

Details on involved TE(s) can be listed via the TE(s) link icon [🔗](#). This opens a modal page with more information on the involved TE(s), being topological or non-topological TEs as shown in the following sample with the context menu opened on a topological TE:



From the context menu on a TE, apart from an additional “Details” page and some more options,

- “Legacy Details” calls the legacy application details for the parent NP Application (also see [Application \(View/Create/Edit\)](#)) with the TE Graph available as shown in the following sample, visualizing the involved logical elements (when Logical Graph is selected):



- “Show Used TEs” calls the TEs details page of the parent NP application with details on used TEs for working and protecting path (where applicable);
- “Show NP Usage” calls the legacy dialog “NP Usage” (for topological TEs).

There are some options that depend on whether the TE is topological or non-topological.

Trail / SNC

For a selected **Trail / SNC**, its graph is shown on the map either as a trail or SNC between two or more NEs, or as an SNC within one single NE.

Trails are shown on the map either

- as curved line between two NEs (e.g. for physical layer such as STMx PMS), or
- as a combination of straight and curved lines, indicating the physical and logical connections, respectively (e.g. for logical layer rates such as P12, VC12, VC4, STMx MS, STMx RS).

For a selected Trail, detailed information is available in the right panel. The details include the options (where applicable):

- Summary (Supervision, General),
- Configuration (General, Initiator, Terminator),
 - Working Path (General, Network Elements, Sections, Connections),
 - Protecting Path (General, Network Elements, Sections, Connections),
- Supervision (Supervision, Alarms, Actions),
- Related (Used By, Using: Transport Entity, Network Element, Unit, Port).

SNCs are shown on the map either

- as a circle icon on an NE with the number of endpoints (usually 2) for intra-NE SNCs (e.g. for VC12 SNC between two units on an NE), or
- as a combination of straight and curved lines (indicating the physical and logical connections, respectively) between two or more NEs (e.g. for logical layer rates such as P0_nc) with initiator and terminator endpoints indicated in the summary (right panel).

For a selected SNC, detailed information is available in the right panel. The details include the options (where applicable):

- Summary (Supervision, General),
- Configuration (General, Initiator, Terminator),
 - Working Path (General, Network Elements, Sections, Connections),
 - Protecting Path (General, Network Elements, Sections, Connections),
- Supervision (Supervision, Alarms, Actions),
- Related (Used By, Using: Transport Entity, Network Element, Unit, Port).

Section

For a selected **Section**, its graph is highlighted on the map as a straight line between two NEs. Detailed information is available as follows:

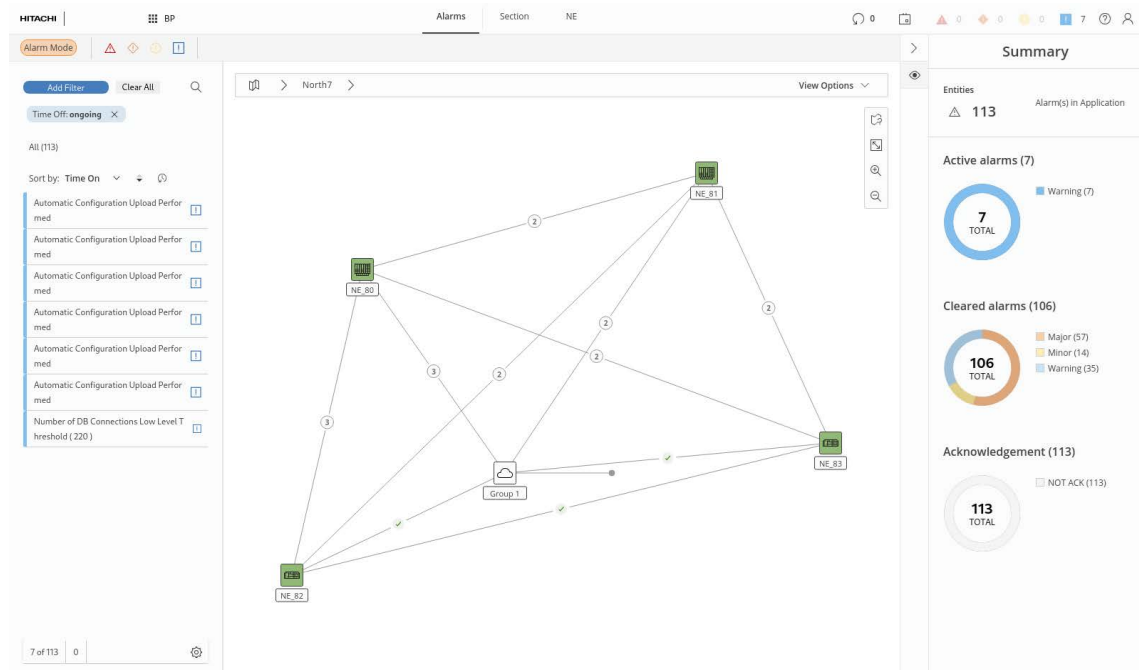
- Summary,
- Configuration (General, Initiator, Terminator, Basic Configuration, Section),
 - MPLS-TP (General, Initiator, Terminator, Utilization, if applicable),
- Health Monitors (General, Details, NE Metrics),
 - Statistics (Initiator Port Performance, Terminator Port Performance),
- Supervision (Supervision, Alarms, Actions),
- Issues (number of issues with severity critical, major, minor, warning),
- Related (Used By, Using - with all relevant details of parent and child relations).

NE

For a selected **NE**, its icon is highlighted on the map as an NE symbol. Detailed information is available as follows:

- Summary,
- Configuration (General, Basic Configuration, CEM & Teleprotection),
 - MPLS-TP (essential information on supported features and resource usage),
 - DCN (General, Interfaces, OSPF, Diagnostic),
 - Synchronization (PETS, PTP),
- Health Monitors (General, Details, NE Metrics),
- Issues (number of issues with severity critical, major, minor, warning),
- Related (Used By, Using - with all relevant details of parent and child relations).

11.7 Element Management



The Element Management application provides a map or table view with all relevant information on physical aspects of the network via the tabs

- **NE**,
- **Section**.

The Element Management is mainly related to Basic Package features and allows a user to view information on alarms, sections, and NEs with the respective summary in the right panel. The related details can be viewed by selecting an item on the map or from the entity browser (left panel).

The physical map also provides context menu options to

- enable or disable, and pause or resume supervision of sections,
- display details on NEs and sections,
- open an NE in FOXCAST,
- force poll an NE,
- display the list of active alarms for a selected NE.

NE

When selecting an NE, apart from the summary, the following details are provided:

- Configuration (General, MPLS, DCN, Synchronization),
- Health Monitors,
- Issues,
- Related (Summary, using, Used By...).

Section

When selecting a single section, apart from the summary, the following details are provided:

- Configuration,
- Utilization,
- Section MCC,
- Supervision,

- Statistics,
- Health Monitors,
- Issues,
- Related (used by...).

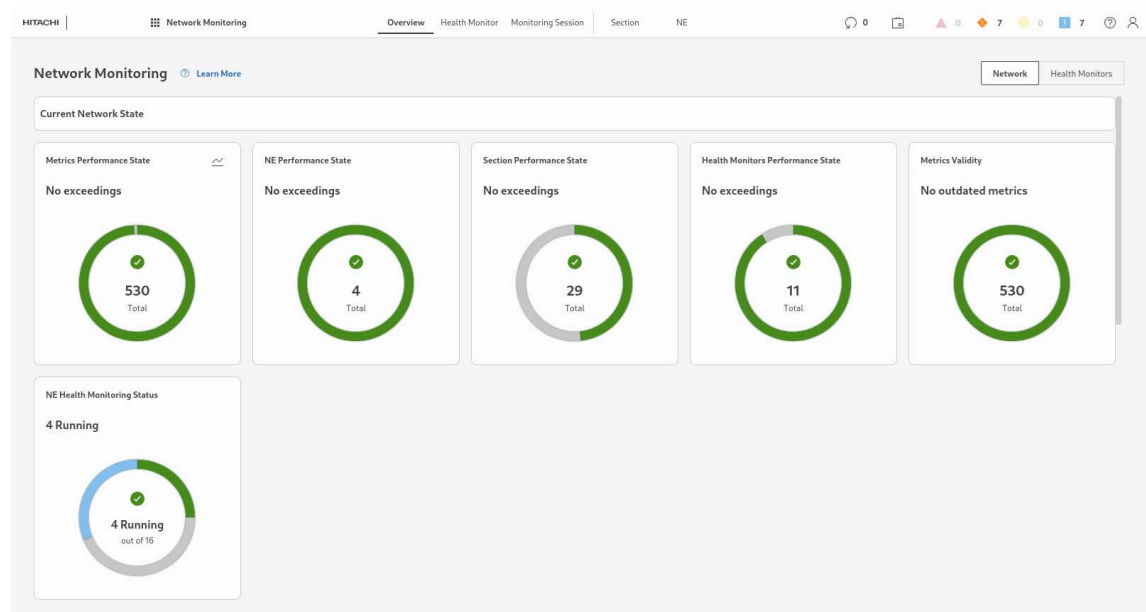
11.8 Network Monitoring

The Network Monitoring application provides a map or table view with all relevant information on the following tabs:

- **Overview**,
- **Health Monitor**,
- **Monitoring Session**,
- **Section**,
- **NE**,

related to the network health and performance. For detailed information on the Network Monitoring application, refer to the user manual “Network Monitoring - Health Monitoring Feature” [1MRC000115].

Overview



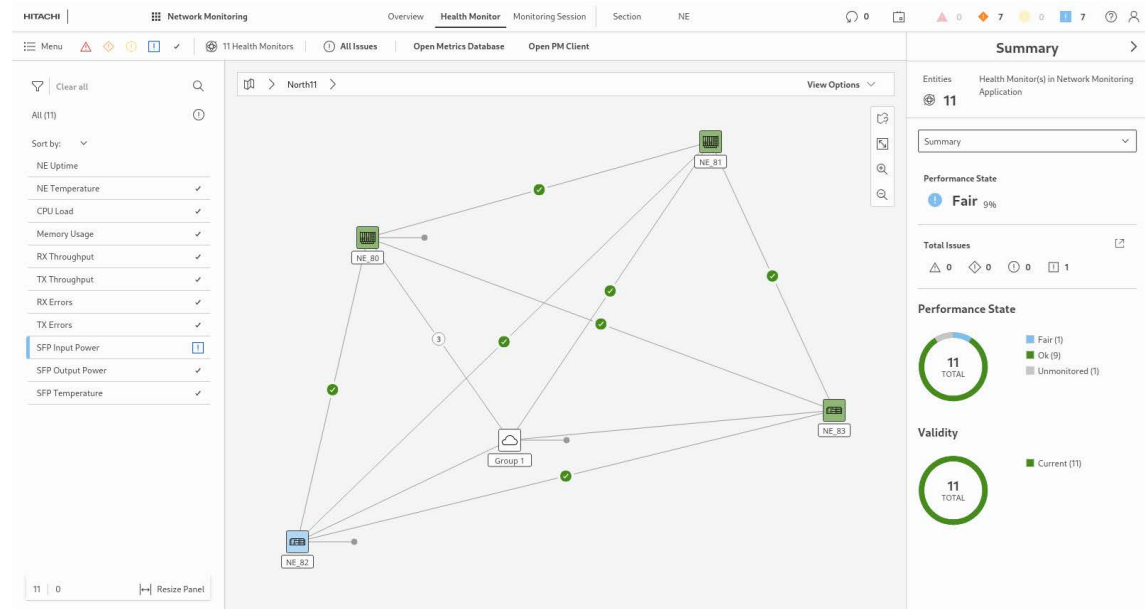
The overview tab is the dashboard for a quick overview of the network performance status and history. Overviews and diagrams, where appropriate, are shown for the selected time. The overview provides the following graphical views:

- **Network**,
An overview page with widgets providing graphical overviews on various aspects of network performance, network elements performance, and sections performance.
- **Health Monitors**, including the tabs
 - Performance State,
displaying collected performance data for all Health Monitors,
 - Values,
displaying charts for the selected time span (via Global Time Selector) for all Health Monitors,
- **Metrics Collections**,
providing a chart of the NEs health monitoring status.

Flexible options allow selection of history intervals via the “Global Time selector for all charts”, such as

- Last 24 Hours,
- Last 7 Days,
- Last 30 Days.

Health Monitor



Under the Health Monitor tab, the monitoring session collects health data from all elements of the network that provide appropriate data and presents the data on the network map and in a table in the entity browser (left panel). In the Summary (right panel) an overview on all monitored elements in the network is presented. It includes various monitored parameters, such as

- TX Errors,
- RX Errors,
- NE Uptime,
- NE Temperature,
- CPU Load,
- SFP Temperature,
- SFP Output Power,
- SFP Input Power,
- RX Throughput,
- TX Throughput,
- Memory Usage.

Upon selecting a specific monitor in the entity browser (left panel), the related health status is shown in the right panel.

Metrics

Details

When opening ‘Metrics’ from the ribbon or the context menu for a selected Health Monitor, a table with all the metrics of the given monitor is displayed in the “Details” view.

The predefined state filters

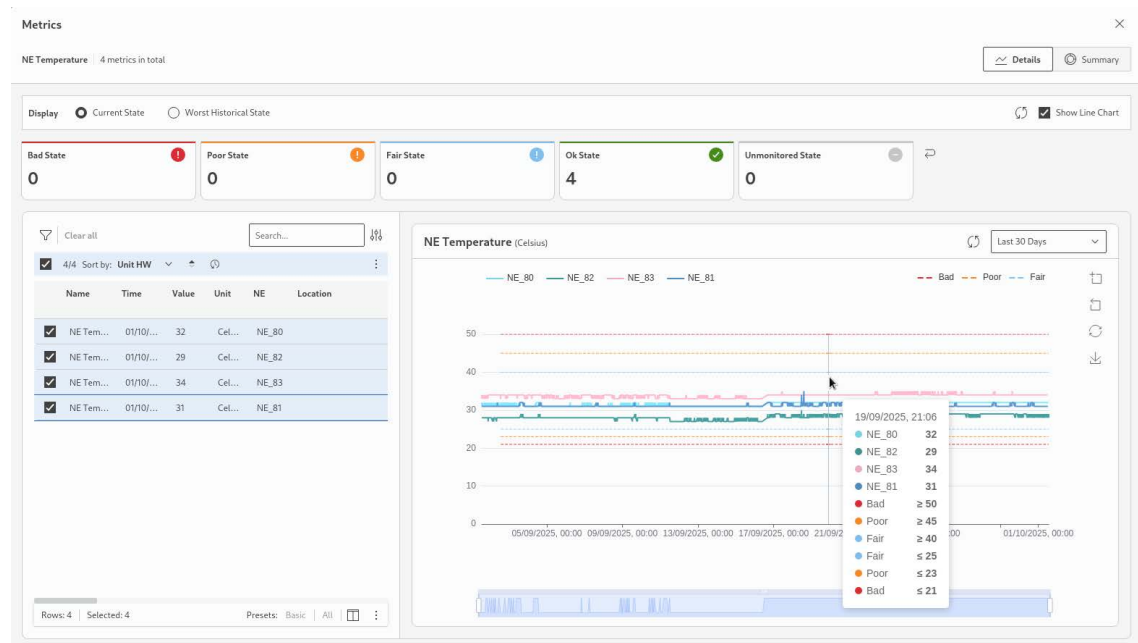
- Bad State,
- Poor State,

- Fair State,
- Ok State,
- Unmonitored State,

can be set or reset by clicking any of them.

The selectable option “Show Line Chart” activates a line chart view of a single or multiple selected metrics. The number of concurrent metrics shown in the line chart is limited.

An example for the NE temperature line chart details of four NEs is given below:



The drop-down list in the line chart title bar provides selectable default time periods. Two rulers (start date&time, end date&time) below the line chart allow you to further adjust the time span shown in the chart. You can also

- zoom into the chart by clicking on the “Zoom” icon and using the pointer device to select a span within the chart;
- go back to the previous zoom;
- reset the zoom;
- save the chart as an image file (png format);
- update the chart with the latest metrics.

When placing the pointer into the chart, details on the captured metrics samples are shown in a tooltip window.

Summary

The “Summary” view shows a summary of the selected metrics type with donut charts and a state history diagram with individually selectable filters for Bad, Poor, Fair, OK, and Unmonitored performance states.

Monitoring Session

Information on the related monitoring session, including a detailed view, is presented under the Monitoring Session tab. In the details view, among others, General information, and Threshold Configuration with defaults and overrides are available.

The Threshold Configuration page lets you

- under Defaults,
 - view default thresholds for defined metrics,
 - edit default thresholds by selecting an existing entry and clicking on “Edit”;

- under Overrides,
 - add a new threshold override for specific metrics,
 - edit an existing threshold override,
 - remove an existing threshold override.

Section

Health information on sections is presented under the Section tab with a summary or individual details for a selected section, including specific metrics, such as SFP related metrics of the two section end points where available.

NE

Health information on NEs is presented under the NE tab with a summary or individual details for a selected NE, including specific metrics, such as SFP related metrics of SFP-based ports on the NE where available.

11.9 Time Synchronization

Purpose

Shows a graphical presentation of the PTP synchronization for the managed MPLS-TP network(s).

The dialog is based on the WebUI general concept and provides the following elements (also see the [Dialog image](#)):

The ribbon (features area above the map)

- If any item on the map is selected, the ribbon is colored light blue. If nothing is selected it is colored gray.
 - The ribbon shows basic information on
 - the selected item(s),
 - on the alarms of the selected item(s),
 - the available and/or selected view modes,
 and it provides a link to a full details page for one selected item.
- On the right-hand side of the ribbon there is a “Deselect” option to cancel the selection of any item(s).

NE table (left hand side, expandable view, small/medium/large)

- Lists all managed NEs and related information depending on the table width and presets.

Map view of the network (middle area, size dependent on selected table width)

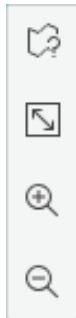
- The map is selected above the map area, clicking on the arrow right of the map symbol:



- The default map is named Network Graph; user maps are as defined by the user in the [NEM Network Browser](#) (legacy) or the [Manage Maps \(Map Manager\)](#) application.

Map legend

- The map legend and the map zoom in and zoom out icons are placed in the upper right corner of the map area with the following symbols:



The symbols are (from top to bottom):

- Map Legend,
- Fit Content To Screen,
- Zoom In,
- Zoom Out.

Details view in the details panel on the right

- The details panel can be expanded and collapsed with its right-arrow icon. It provides detailed information on the selected item(s) and the selected area with the following available options:
 - Summary,
 - Configuration,
 - Utilization,
 - DCN,
 - Synchronization,
 - Health Monitors,
 - Issues,
 - Related.
- When an NE is selected in the left-hand table, and “Synchronization” in the details panel, detailed information on the NE’s synchronization status is shown.

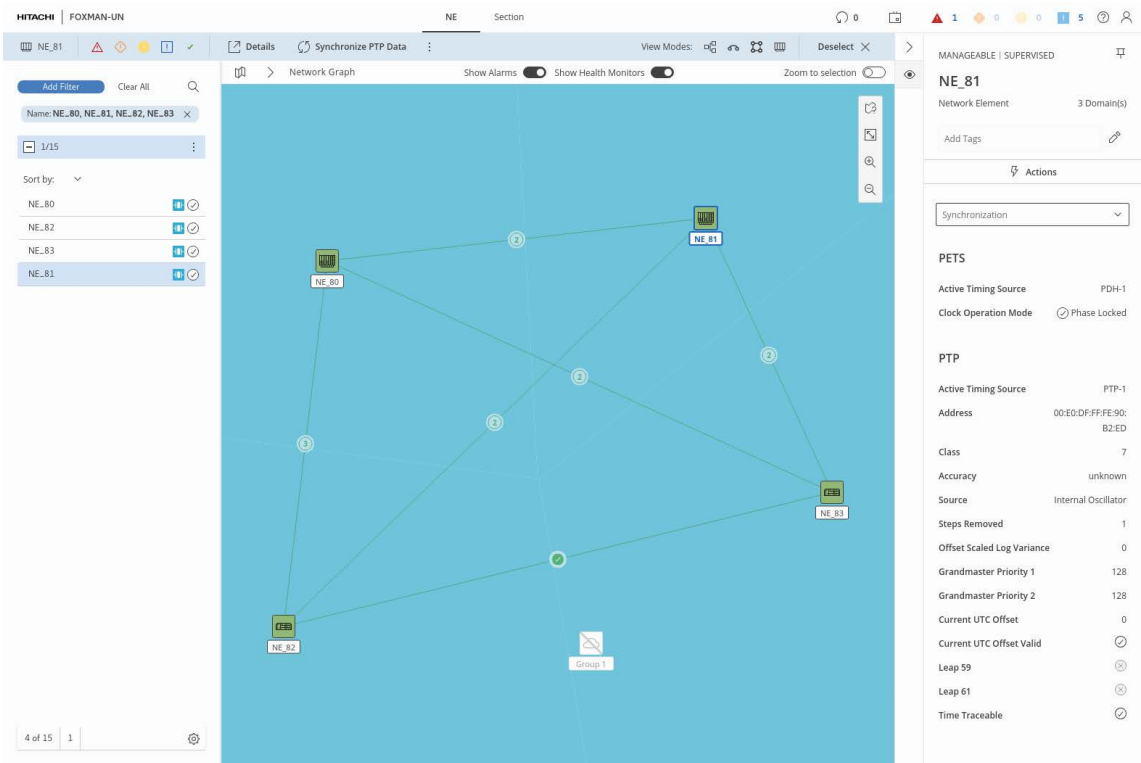
In the map, each Clock Master domain has its own background color. All NEs that are synchronized to the same PTP master are shown within the same colored Clock Master domain.

NEs that are part of the same map, but do not provide PTP functionality, are grayed out and/or marked with a crossed out symbol.

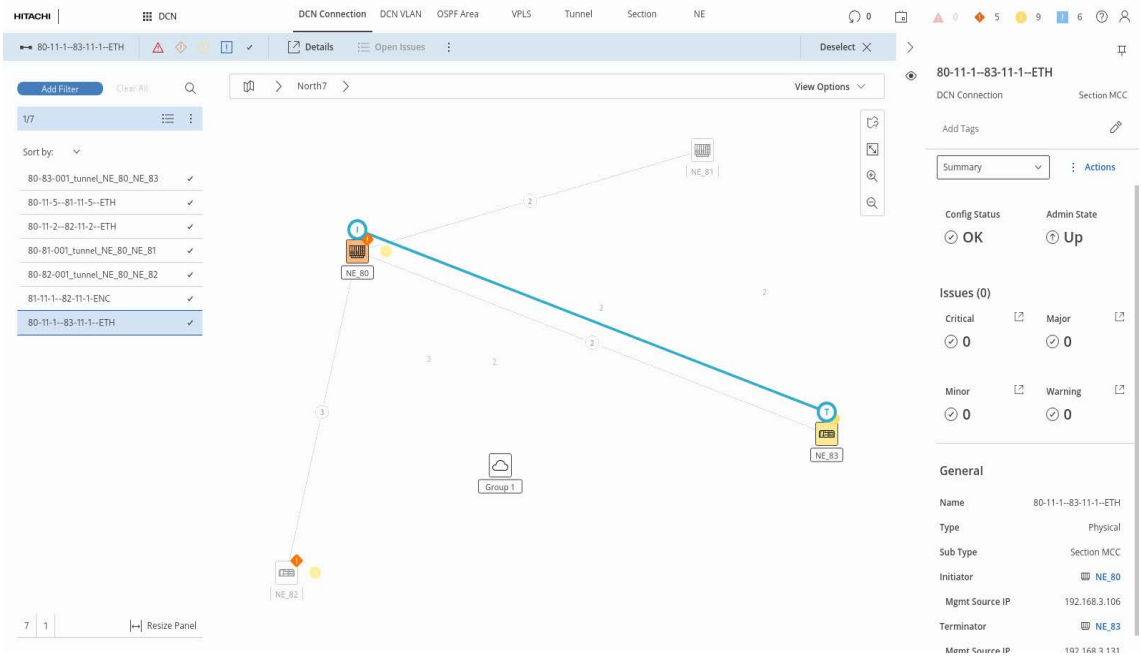
For more information on the general use of the WebUI and its elements, refer to the WebUI user manual.

Dialog image

PTP Synchronization Map



11.10 DCN



The DCN (Data Communication Network) application provides map and table views with all relevant information on the management communication network as available via the tabs

- **DCN Connection,**
- **DCN VLAN,**
- **OSPF Area,**

- VPLS,
- Tunnel,
- Section,
- NE of type FOX61x.

Any SNMP, FO, FOX51x or other NE types are not supported and will be shown as disabled.

The DCN application is mainly related to management communication features and allows a user to view information on the above topics within the right panel. The related details can be viewed by selecting an item from the entity browser (left panel). Upon selection it is also highlighted on the map.

Note that there is a default map graph that is specific to the DCN. It is named “DCN Graph” and can be selected from the map selector drop-down menu on the left-hand side of the map options bar.

Apart from the context sensitive summary, all tabs show the generic parameters for:

- Configuration,
- Supervision (only for MCC connections, VPLS, and tunnels),
- Health Monitors,
- Issues,
- Related (Using, Used By...).

DCN Connection

A configured DCN connection can be selected from the entity browser (left panel), and its Initiator and Terminator on NEs are shown in the map.

When selecting a single DCN connection, the following details are provided in the right panel:

- Summary (Status, Issues, General),
- Configuration (General, Initiator, Terminator),
- Supervision (details only for supervised entities; otherwise, supervision can be enabled here),
- Health Monitors,
- Issues,
- Related (Summary, Using, Used By).

DCN VLAN

In the DCN VLAN tab, a configured DCN VLAN can be selected from the entity browser (left panel), and all involved NEs are highlighted on the map. In the right panel, the following details on the selected DCN VLAN are provided:

- Summary (Status, Issues, General),
- Configuration (General, Initiator, Terminator),
- Health Monitors,
- Issues,
- Related (Summary, Using, Used By).

OSPF Area

In the OSPF Area tab, A configured OSPF area can be selected from the entity browser (left panel), and its coverage on NEs is shown in the map.



Please note:

Only OSPF areas that are assigned to a DCN interface are shown.

In the right panel, the following details on the selected DCN VLAN are provided:

- Summary (Status, Issues, General),

- Configuration (General, Initiator, Terminator),
- Health Monitors,
- Issues,
- Related (Summary, Using, Used By).

VPLS

In the VPLS tab, existing DCN VPLS are listed in the entity browser (left panel). New DCN VPLS can be created using the “Create VPLS” wizard from the DCN VPLS tab. After creation, it needs to be deployed individually.

When selecting a VPLS from the entity browser (left panel), detail information related to the VPLS is shown in the right panel, and the VPLS is marked in the map, provided the map includes the VPLS.

Tunnel

In the Tunnel tab, existing DCN tunnels are listed in the entity browser (left panel). New DCN tunnels can be created by clicking on “+ Create”, starting the “Create VPLS” wizard. After creation, the tunnel needs to be saved or saved & deployed individually.

When selecting a tunnel from the entity browser (left panel), detail information related to the tunnel is shown in the right panel, and the tunnel is marked in the map, provided the map includes the tunnel.

Section

In the Section tab, existing sections carrying a configured DCN are listed in the entity browser (left panel). New DCN sections can be created by clicking on “+ Create Section”, starting the “Create Section” wizard. After creation, the section is stored, and the wizard is closed (Create and Close), or you can continue creating sections (Create and define next).

When selecting a section from the entity browser (left panel), detail information related to the section is shown in the right panel, and the section is marked in the map, provided the map includes the section.

NE

Independent of the selected tab, the details provided in the right panel – when selecting an NE within the map – show the main DCN parameters of the NE, such as:

- Mgmt source IP address,
- DCN interfaces (MCC, VLAN, PPP),
- Main OSPF information (to get the OSPF neighbors, the specific button “OSPF Neighbors” in the right panel must be pressed),
- Diagnostic feature for restarting OSPF (button “OSPF Restart” in the right panel).

11.11 DIRAC & FU Credential Management

This application is related to DIRAC & SENC1 Functional Units (FU). It provides the means to manage all encryption related credentials used in the network.

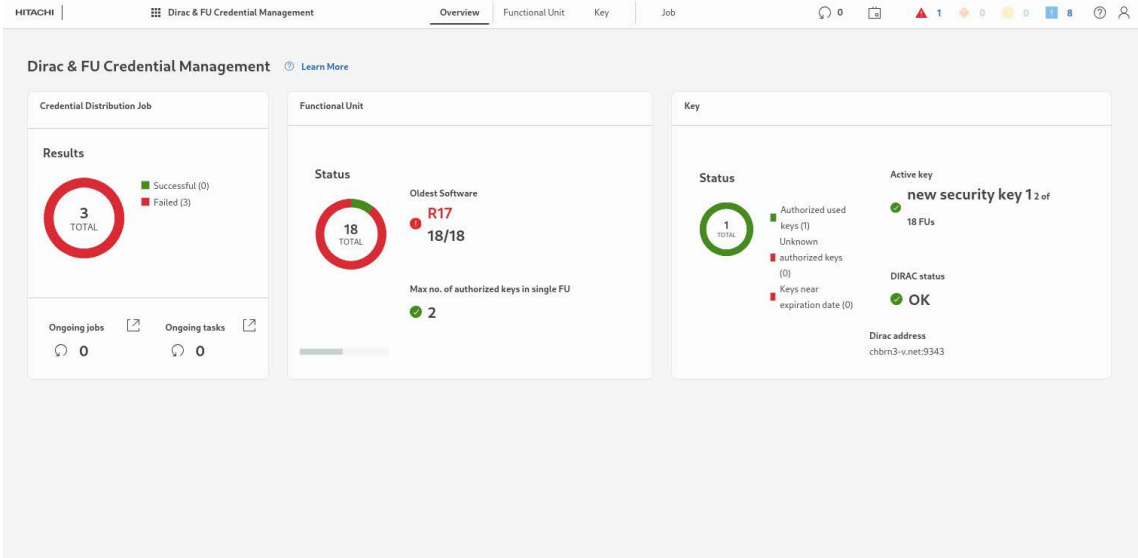
It is primarily used for management of credentials used for MPLS-TP encrypted tunnels, provided by FOX61x encryption units (SENC1-4, SENC1F4, SENC1-8, SENC1F8) in the managed network(s).

The application provides the following tabs:

- Overview, see [Overview tab](#);
- Functional Unit, see [Functional Unit tab](#);
- Key, see [Key tab](#);

- Job, see [Job tab](#).

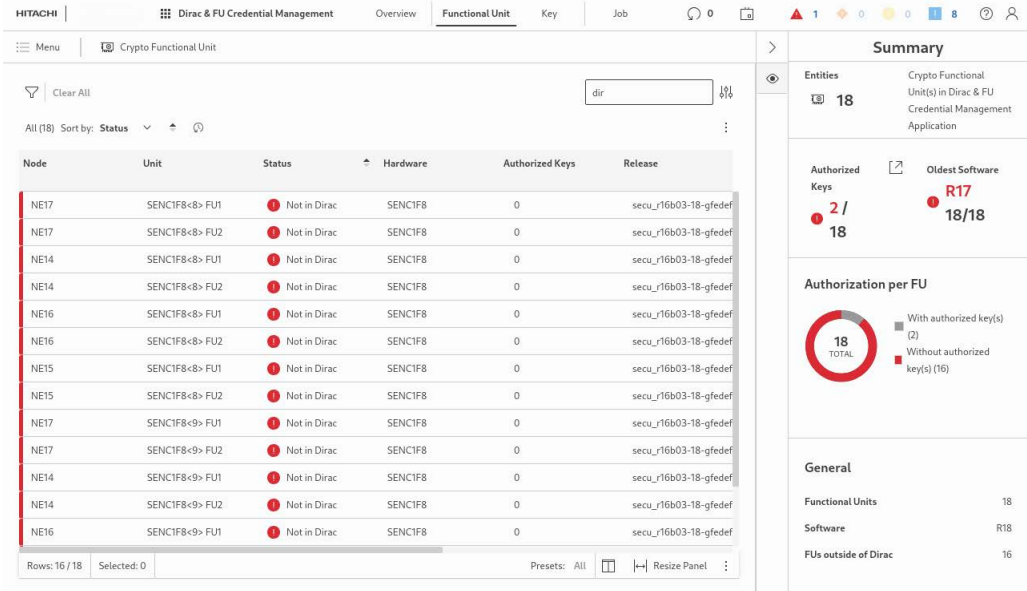
Overview tab



Provides an overview page with summary information on all elements used for DIRAC & SENC1 Functional Units (FU) credential management and their status, including

- Jobs (see [Job tab](#)),
- Functional Units (see [Functional Unit tab](#)),
- Keys (see [Key tab](#)).

Functional Unit tab



Crypto Functional Unit

The table lists all managed functional units (FU) used on encryption units (SENC1-4, SENC1F4, SENC1-8, SENC1F8) with their specific characteristics relevant to credential management, such as

- Node, Unit, Status, Hardware;
- Authorized keys - indicating the number of authorized keys on the FU,

- Release - indicating the software version running on the FU,
- GRPC expiration date,
- ID,
- IP address of the FU,
- Tags assigned to the FU.

For an FU selected in the entity table (left panel), the right panel provides some detail information, such as

- Unit address (unit name, slot, FU#),
- Node (name of the node),
- Software (software name and version),
- Hardware (name of the HW unit),
- Status (management status of the FU),
- ID,
- gRPC Expiration date,
- IP Address (of the FU).

For an FU selected in the entity table (left panel), the context menu provides the following options:

- **Manage authorized keys,**
- **Change password,**
- Renew gRPC keys,
- Force Poll,
- Check connectivity.

For multiple selected FUs, only the last two options are available.

11.11.1 Manage authorized keys

Calls the “Functional Units authorization manager”. To proceed, select a Functional Unit from the drop-down list.

This will open a list of keys with their

- Key Alias,
- Status,
- gRPC status,
- STFP status,
- SSH status,
- Expiration Date,
- Fingerprint.

With a selected key, you have the following command options available:

- Manage authorization per key - this will call the **Key authorization manager**,
- Add authorization - this will add a task for authorization of the selected key on the FU. The task will be listed in the **Job tab**.

11.11.2 Change password

This calls the wizard for creating a password change job. The wizard provides three steps:

1 Select Functional Units

Provides a list of all known FUs in the network with their Node name, Unit ID, FU ID, and status.

2 Job details

Enter a name (mandatory) and a description (optional) for the password change job.

Select the user(s) for which the password shall be changed and enter the password(s) for the selected user(s). You need to comply with the password policies listed.

3 Summary

Lists a summary of the job details provided and allows you to submit the job to execution by clicking on “Submit”.

Once the job has been submitted, you can check the execution status of the job and its result under the **Job tab**.

11.11.3 Key tab

Key Alias	Status	FUs using this key	Creation Date	Expiration Date	Fingerprint	Tags
installation_grpc_key	Not active	0	2022/07/15	2032/07/12	1433467bd8bcb8e26a...	0 tag(s)
installation_ftp_ssh_key	Not active	0	2025/03/11	2035/03/09	6025576ae2dca51b1efc...	0 tag(s)
new security key 1	Active	2	2025/04/03	2035/04/01	660d6e1c71f9ccbc6df7...	0 tag(s)

General	
Key Alias	new security key 1
Status	Active
FUs using this key	2
Creation Date	2025/04/03
Expiration Date	2035/04/01

Active interfaces

6 TOTAL

- SSH (2)
- SFTP (2)
- gRPC (2)

The table lists all keys used by functional units. It provides detailed information on the keys, such as

- Key alias,
- Status,
- FUs using the key,
- Creation date,
- Expiration date,
- Fingerprint,
- Tags assigned to the key.

The application also provides a “+ Create” button to create a new security key. The button initiates a wizard for key creation. The following information is required to be entered by the user:

- Name of the new security key.

Create New Security Key

>

1

General

Name

Discard

Save

Upon finishing the key creation by saving the new key, the key is added to the table of key aliases.

When a key is selected from the table, some detailed information is shown in the details panel. For a selected key, the table entry provides the following options from the context menu or from the ribbon:

- Delete the key - this will delete the key from the table, provided the key is inactive. Active keys cannot be deleted.
- Manage authorizations - this will open the [Key authorization manager](#).
- Activate the key - this will activate the key and display a confirmation message.

Job tab

HITACHI

Dirac & FU Credential Management

Overview

Functional Unit

Key

Job

Menu

pwd change job 001156

Details

Cancel

Retry

Deselect

Clear All

Search...

1/3 Sort by:

Details

Cancel

Retry

Name	Job Type	Status	Tasks Passed/Total	Progress	Involved NEs	Owner
Functional Unit key authoriz...	Functional Unit authorization	Failed	0 / 3	100.00 %	1	nemadm
Functional Unit key authoriz...	Functional Unit authorization	Failed	0 / 3	100.00 %	1	nemadm
pwd change job 001156	Functional Unit password change	Failed	0 / 1	100.00 %	1	nemadm

Rows: 3

Selected: 1

Presets: Basic

Extended

All

Resize Panel

pwd change job 001156

Job

Add Tags

Summary

Actions

General

Name

pwd change job 001156

Status

Failed

Tasks Passed/Total

0 / 1

Job Type

Functional Unit password change

Owner

nemadm

Start Time

2025/04/03 - 14:59:00

End Time

2025/04/03 - 14:59:00

Duration

314ms

The Job tab lists jobs executed or being in execution with their related information, such as

- Name,
- Job Type,
- Status,
- Tasks Passed/Total,
- Progress,
- Involved NEs,
- Owner,
- Start Time,
- End Time,

- Duration,
- Tags.

With no job selected from the list, the details panel shows summary information related to the

- number of job entities,
 - number of scheduled job entities,
 - number of job entities in progress,
- and two diagrams showing the ratio of
- scheduled job types and
 - processing job types
- vs. the total number of job types.

For a selected job, the details panel shows a summary of information related to the job.

Via the drop-down selection in the details panel, you can also open “Related” information on the selected job. Related information includes the NEs used by the job.

The Details page called for a selected task shows more information available about the job, its tasks and sub-tasks, and the related NE(s).

11.11.4 Key authorization manager

Key authorization manager

Key Alias: new security key 1

Authorized FUs | Non-authorized FUs

Clear All | Search...

All (2) Sort by: ▾

Unit	Node	Communication Status	gRPC	SSH	SFTP	ID	IP Address
SENCIF4<8> FU1	NE_81	Manageable	🟢	🟢	🟢	49109268601	192.168.3.11
SENCIF4<12> FU1	NE_82	Manageable	🟢	🟢	🟢	49109268621	192.168.3.12

Rows: 2 | Selected: 0 | Presets: All

The key authorization manager lists functional units for which a selected authorization key has been assigned:

- The key of interest is selected from the “Key Alias” drop-down selection field.
- Switch between the list of “Authorized FUs” or “Non-authorized FUs” by selecting the respective field.
- The table below will list the assigned FUs with their
 - Unit (physical unit identifier),
 - Node (NE name),
 - Communication Status (Manageable, Not manageable, Not in Dirac),
 - gRPC interface (status icon),
 - SSH interface (status icon),
 - SFTP interface (status icon),
 - ID (FU identifier),
 - IP Address (if configured and known).

- In the list of **Authorized FUs**, authorization can be revoked for the security key currently selected in the “Key Alias” drop-down field. This is done by selecting one ore several FUs from the list and clicking on the “**Revoke authorization**” button.
A confirmation message will pop up when this is executed.
- In the list of **Non-authorized FUs**, authorization can be activated for the security key currently selected in the “Key Alias” drop-down field. This is done by selecting one ore several FUs from the list and clicking on the “**Authorize**” button.
A confirmation message will pop up when this is executed.

11.12 User and Role Management

The user and role management includes the tools for setup and maintenance of the role-based access control within the Web UI and cover the features

- **User**,
- **Role**.

The two features are covered with two tabs of the same names. Each of the tabs presents a table listing the elements created up to now.

11.12.1 User

This tab lets you create new users in the scope of FOXMAN-UN and manage existing FOXMAN-UN users. You need appropriate permissions to do so.

HITACHI

User and Role Management

User

Role

0

1

0

0

0

8

Menu

6 User

Create

Clear All

Search...

All (6) Sort by:

Create

Name	Active	Roles	Restrictions	Tags
nemsec	✓	4 role(s)	-	0 tag(s)
dirac	✓	2 role(s)	-	0 tag(s)
nemadmin	✓	5 role(s)	-	0 tag(s)
nemuser	✓	1 role(s)	-	0 tag(s)
nmsuser	✓	1 role(s)	1 / 1	0 tag(s)

Rows: 6 Selected: 0 Presets: Basic Extended All Resize Panel

Summary

Entities 5

User(s) in User and Role Management Application

User statuses

5 TOTAL

Active (5) Inactive (0)

To create a new user, its username and password must be defined beforehand. One way to create a Linux local user is via Linux command line:

```
[user1 ~]$ sudo useradd -s /bin/bash -G nem -M nemlocaluser
[user1 ~]$ sudo passwd nemlocaluser
Changing password for user nemlocaluser.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
```

To add a user with a home directory, proceed as described in the user manual “FOXMAN-UN under Linux” [1KHW002414], section 7.5.2 “Creation via Command Line”.

Linux users including Active Directory defined users that belong to the group “nem” are available for selection in the “+ Create” dialog as shown in the following example, step 1.

Select a user’s name, enable its system roles and possible, already defined user-defined roles, and set it to active:

Create User: nmsuser

1

2

3

General

Name

nmsuser

Active

System Roles

SECADM

OPERATOR

VIEWER

ENGINEER

INSTALLER

RBACMNT

User Defined Roles

ALL

Discard

Next

Click “Next >” to proceed to step 2.

In step 2, choose whether you want to impose restrictions on the validity of the new user’s FOX-MAN-UN account; if so, enable “Include restrictions” and add the required restriction details:

Create User: nmsuser

1

2

3

Restrictions

This step enables you to restrict the selected roles to specific domains and time periods by adding domain restrictions and optionally setting expiration timestamps.

Include restrictions

ENGINEER

+ Add restriction

Domain

NMS-All

Expires

Expires on

10 Mar 2026

12:08

Discard

Previous

Next

If no restrictions shall apply, leave the option disabled.

Click “Next >” to proceed to step 3.
 This shows the summary. Expand each of the permission groups to see the related details.

Create User: nmsuser

>

1

2

3

Summary

Name

nmsuser

Active

Roles

ENGINEER

NMS-All

10/03/2026, 12:08:50

Permissions

Network Engineering

Section Management

Enabled

Network Design

Full Access

Traffic Engineering

Enabled

Map & Agent

Full Access

Ethernet Security Management

Enabled

Network Monitoring

Service Supervision

Full Access

Performance Monitoring

Enabled

Alarm Configuration

Enabled

Alarm Management

Full Access

Discard

Previous

Save

Click “Save” to conclude user creation and save the settings.

11.12.2 **Role**

This tab lets you view existing system roles, create new users roles, and manage existing user roles in the scope of FOXMAN-UN. You need appropriate permissions to do so.
 System roles are predefined by the system and cannot be altered. They are listed under the “Roles” tab and marked as “System Role” in the list of roles.
 To create a new user role, click on the “+ Create” button in the ribbon. This will open the “Create New Role” wizard, step 1:

Create New Role: Maintainer

> 1 Basic Info

2

Name
Maintainer

Description

Node Access Classes

- ☒ Information ⓘ
- ☒ Maintenance ⓘ
- ☐ Manager ⓘ
- ☐ Session Manager ⓘ

Discard Next >

Give the new role a name and a description (optional) and select the required node access classes from

- Information,
- Maintenance,
- Manager,
- Session Manager.

The (i) icon provides a tooltip with more information related to the corresponding node access class.

Click “Next >” to proceed to step 2.

In step 2, for each of the function categories (Network Engineering, Network Monitoring, System Management, Node Management) enable or disable the respective features or set the access permissions to

- No Access,
- Read Only, or
- Full Access.

Create New Role: Maintainer

1

2

Permissions

Network Engineering

Section Management

☒ Enabled

Network Design

Read Only

Traffic Engineering

☐ Disabled

Map & Agent

No Access

Ethernet Security Management

☐ Disabled

Network Monitoring

Service Supervision

Read Only

Performance Monitoring

☐ Disabled

Alarm Configuration

☐ Disabled

Alarm Management

Read Only

System Management

Role Based Access Control

No Access

Credential Management

☐ Disabled

Remote Administration

☐ Disabled

Remote Execution

☐ Disabled

Node Management

Discard

< Previous

Create

When done, click on “Create” to conclude the role definition and save the settings.

The new user role will now be listed in the Roles table:

HITACHI

User and Role Management

User

Role

Menu

Maintainer

Details

Modify

Create Based On

Deselect

>

Clear All

Search...

1/8 Sort by:

Details

Modify

Create Based On

:

Name	System Role	Network Engineering	Network Monitoring	System Management	Node Management	Node Access
VIEWER	☒	☐	☐	☐	☐	☐
OPERATOR	☒	☐	☐	☒	☐	☐
ENGINEER	☒	☒	☒	☒	☐	☐
INSTALLER	☒	☐	☐	☐	☐	☒
SECADM	☒	☐	☐	☒	☒	☐
RBACMNT	☒	☐	☐	☒	☐	☐
Maintainer	☒	☐	☒	☐	☐	☐
SUPER	☒	☒	☒	☒	☒	☒

Configuration

Actions

Permissions

20 TOTAL

Disabled + No Access (16)

Read Only (1)

Enabled + Full Access (3)

General

Name

Maintainer

Role type

User defined

Assigned to

0 user(s)

Node Access Classes

Information

Maintenance

Rows: 8

Selected: 1

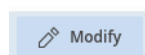
Presets: Basic

Extended

All

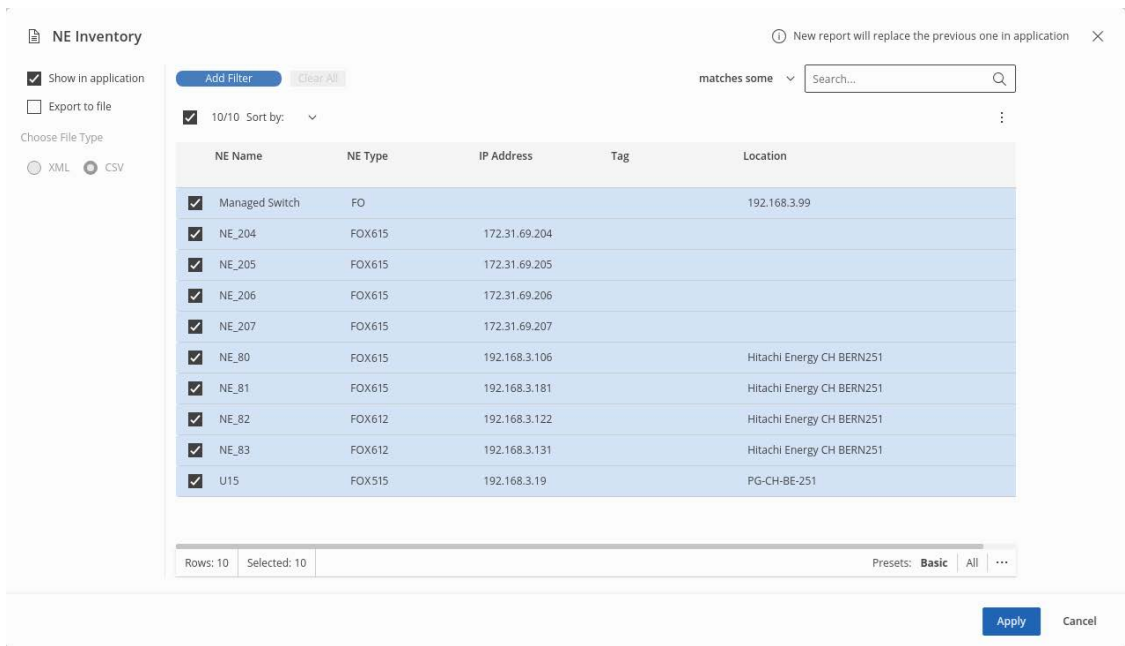
Resize Panel

To modify a user role, select it from the table and click on



in the ribbon go start and step through the user role modification wizard. To save the changes, click on the “Save” button at the end of the wizard.

11.13 Inventory



The Inventory Request application is used to generate inventory reports via inventory requests. The request options are available for the item types

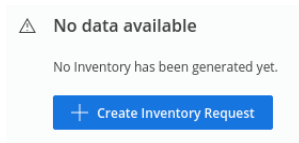
- **NE** (managed network elements),
- **Unit** (units within managed network elements),
- **Port** (ports on units), and
- **Configuration** (for legacy network elements),

which are reflected by the four tabs with the above-mentioned names. The item type “Configuration” includes the items with sub-types

- NE Inventory,
- TTP,
- Matrix Connections,
- Software,
- Timing Source,
- NE Parameters,

which are listed within their own tabs in the generated report.

Initially, when no requests have been created yet since last opening the Inventory Request application, the message “No data available” is shown:



To create an inventory request, select the appropriate tab (NE, Unit, Port, Configuration) and click on “+ Create Inventory Request”. This will open a list of NEs to select from; you can also create a filter to determine the scope of the request. Select where the report shall be generated to: as output in the application (“Show in application”), and/or exported to a file (“Export to file”), either as type CSV or XML. Once the request scope is defined, click on the “Apply” button to create the report.

Depending on your selection, the report is exported to a file and/or displayed in a table in the current application. You can customize the table as usual for the Web UI by selecting one of the presets, resize the entity browser (left panel) to large, medium, or small, and apply filters.

When closing the Inventory application, the generated inventory report table is cleared.

12 Technical Documentation

This part describes the contents of the optional technical documentation and how to access it once it is installed.

12.1 General

The FOXMAN-UN technical documentation is delivered together with the FOXMAN-UN software. It is available in HTML format with PDFs included. It must be installed as a separate package before it can be used. Make sure the documentation collection is available on your machine, and run the installation script.

For viewing the HTML-based technical documentation a web browser is required.

A PDF reader is required for viewing PDFs included in the technical documentation. It must be installed in the default directory. If it does not already exist on the workstation, it can be downloaded from the Internet.

Access to technical documentation

The documentation can be called via the start icon or from a terminal using the command:

```
docviewer
```

This opens the top navigation page of the documentation from where all documents can be accessed. If the technical documentation has not been installed yet or a PDF reader is missing in the default directory, corresponding error messages are displayed.

Documentation contents

The technical documentation contains, among others, the following information:

System Description “FOXMAN-UN”

This document provides a general description of the features and characteristics of FOXMAN-UN. It also gives an overview of the installation and administration processes and the requirements of the hardware and software platform.

User Manual “FOXMAN-UN Help”

This is the compiled version of the present document. It contains the complete information of the FOXMAN-UN help system. It includes, among others, the help for the Basic Package, the Networking Package, and the Ethernet Networking Package.

User Manual “FOXMAN-UN Networking Package”

This document provides the details for automatically or semi-automatically provisioning client connections across the complete network managed by the FOXMAN-UN system.

User Manual “FOXMAN-UN Northbound Interface” (SNMP)

This document gives an introduction to the northbound SNMP interface in FOXMAN-UN.

User Manual “FOXMAN-UN under Linux”

This document provides help with the administrative tasks and the available FOXMAN-UN software tools on the workstation.

User Manual “FOXMAN-UN under Windows”

This document provides help with the administrative tasks and the available FOXMAN-UN software tools for the Windows® installed version of the FOXMAN-UN client.

User Manual “FOXMAN-UN Installation”

This document provides installation instructions for the FOXMAN-UN and the relevant operating system.

Application Notes

Application Notes treat special or customer specific issues which are not part of the main documentation.

**Please note:**

The FOXMAN-UN Release Note, providing details on the release contents and possible limitations, is not included in the technical documentation. It can be downloaded from the Hitachi Energy Publisher (<https://publisher.hitachienergy.com>).

13 References

This section includes the following topics:

- [Agent Access Type](#),
- [Context Menus](#),
- [Crontab File Editing](#),
- [Current Alarms](#),
- [Network Element Types](#),
- [Severity](#),
- [Table Column Resizing](#),
- [Table Sorter](#).

13.1 General References

The following section contains references of a general kind.

13.1.1 Agent Access Type

Permanent	Connects to the NE either via an IP network (e.g. LAN) to the Ethernet interface on the control card/management interface of NEs or via an ECC (embedded communication channel). The interface at the FOXMAN-UN workstation is Ethernet.

13.1.2 Context Menus

Context menus in the NEM Configurator are reached by placing the cursor over an item and pressing the right hand mouse key. The item is then selected and the menu displayed. Items can be elements in the tree panel (domains, agents, filters, users, profiles) or the details panel (additionally NEs, FOs and maps).

Context menus in maps can be called in an empty space of the map or from a symbol. For a symbol the menu points enabled depend on whether the symbol has been selected (cut, delete, rename) or not (open, configuration, fault, force polling, message, activate).

Context menus in tables allow table related functions like searching, sorting, filtering, setting of column visibility, exporting, or printing. They are called from any of the table entries by placing the mouse pointer over a table entry and pressing the right hand mouse key.

13.1.3 Crontab File Editing

The crontab file contains jobs (cronjobs) that have to be executed on a regular time based schedule. FOXMAN-UN creates two such jobs at installation time:

- “logcycle” rotates the alarm and event log files every day at 23:55.
- “nettimesynch” synchronizes the time of all NEs in the network every day at 03:01.

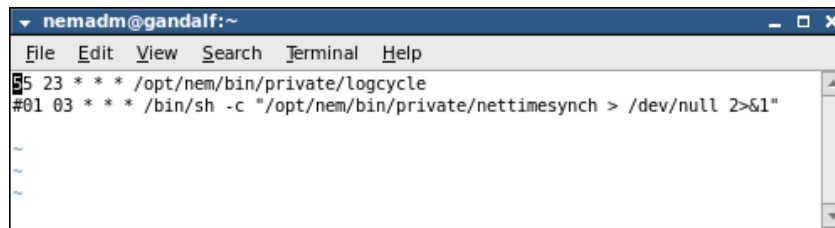
FOXMAN-UN cronjobs can be edited by executing the command “crontab -e” as an administrator. This opens an editor showing the FOXMAN-UN cronjobs:

```

nemadm@gandalf:~
File Edit View Search Terminal Help
55 23 * * * /opt/nem/bin/private/logcycle
01 03 * * * /bin/sh -c "/opt/nem/bin/private/nettimesynch > /dev/null 2>&1"

```

An existing cronjob can be stopped by simply turning it into a comment. Add a # in front of the command line as shown for the time synchronization in the screenshot below:



```
nemadm@gandalf:~
File Edit View Search Terminal Help
5 23 * * * /opt/nem/bin/private/logcycle
#01 03 * * * /bin/sh -c "/opt/nem/bin/private/nettimesynch > /dev/null 2>&1"
```

The job can be reactivated by removing the # in front of it.

The FOXMAN-UN cronjobs can be listed by executing the command

```
crontab -l
```

as an administrator.

13.1.4 Current Alarms

The Alarm List can be called for the complete managed network, for a single NE or FO, or for a single severity (including cleared but not acknowledged). The current alarms frame shows the alarms filtered accordingly.

The list is updated dynamically as new alarms are registered, unless the Freeze List button has been activated.

The list can be sorted alphabetically in ascending or descending order for each column by clicking on the column header.

A double click on any entry in the list calls the **HW View** of the corresponding NE.

The list contains the following fields:

NE	The name of the NE, given in the NEM Configurator.
Alarm Id	The format is "NE name:index". The index is incremented for each new alarm in the NE, normally providing a unique identification. The index is reset to 1 if the NE is deleted and recreated.
Alarm On Time	The date and time when FOXMAN-UN received the alarm. This can be later than the actual occurrence in the NE. The occurrence time is also recorded and can be seen in the Alarm Properties . The default date and time format is yyyy/MM/dd - HH:mm:ss. The date and time format can be set in the "\$NEM_HOME/etc/NMS.properties" file.
Alarm Off Time	The date and time when FOXMAN-UN received the alarm cleared message. Only applicable when calling the list for cleared and unacknowledged alarms from the Alarm Summary
Localization	The unit, its card slot and the layer-subunit or port identification. An asterisk preceding the localization indicates the presence of a comment which can be viewed and modified in the Alarm Properties .
Fault Cause	A text describing the type of alarm. The layer-subunit identification given in the localization columns also has to be considered. The fault cause text can be modified by the user via the Alarm Customisation
Severity	The name of the alarm Severity . In addition the background of the text line for the alarm assumes the color assigned to its severity.
Status	Shows "Outstanding" for a currently active alarm or "Cleared" for an inactive, but not yet acknowledged alarm. When a cleared alarm is acknowledged, it is moved to the Alarm List History. The history is accessible from the NEM Network Browser only.

Ack Status	The Acknowledgment Status shows whether an alarm has been observed and dealt with by a FOXMAN-UN user. It can have the values Not Ack'd (not acknowledged) or Ack'd (acknowledged). A status "Not Ack'd" causes the relevant symbol on a map and the relevant severity counter in the Alarm Summary to flash, advertising that there is a new alarm to be dealt with.
NE Location	The location of the NE, as entered as part of the NE's system configuration, where available.
Type	The type of alarm.
Work Instructions	When entered in the Alarm Customisation dialog work instructions are shown here.
Ack'd By	For acknowledged alarms the user name that acknowledged the alarm is shown here.

13.1.5 Network Element Types

The FOXMAN-UN manages the following devices:

The FOX61x systems:

FOX615	21 card slots
FOX612	8 card slots
FOX611	4 card slots
FOX610	Compact Ethernet/MPS-TP Multiplexer

The FOX51x systems

FOX515	21 card slots
FOX512	8 card slots
FOX-U	19 card slots (Obsolete)
FOX-U/E	12 card slots (Obsolete)

SNMP Devices:

Hitachi Energy devices	Hitachi Energy EDS500 series switches For a list of specific EDS500 devices see the FOXMAN-UN release note.
Other SNMP devices	For a list of supported SNMP devices see the FOXMAN-UN release note.

Other Devices:

Hitachi Energy	FOX660
Hitachi Energy	ALS

13.1.6 Severity

Each alarm in FOXMAN-UN is assigned one out of five possible severities. A severity is indicated either by its name or by its color or by both.

Critical	Red	Local NE affected. Immediate operator action is required at the local site.
Major	Orange	Local NE affected. Degradation of local transmission and/or failure of a redundant component. Operator action can be postponed.

Minor	Yellow	Remote NE affected. Alarms in the corresponding far end equipment and/or AIS received in the local NE. Immediate operator action is required at the remote site.
Warning	Blue	Status and “loop active” alarms.
Indeterminate	Light blue	Used for unmanaged and not configured NEs. Not assigned as default severity for any of the NE alarms.

An additional sixth severity exists for the purpose of inhibiting alarms. FOXMAN-UN can be configured to either ignore these alarms completely (default configuration) or to treat them as alarms with a special severity. No alarm has this severity as default.

Off	Green	Alarm severity set to Off via Alarm Customisation and FOXMAN-UN configured not to remove Off alarms.

The default severity of each alarm can be modified by the user via the [Alarm Customisation](#) on a global or NE basis or via the [HW view](#) or unit view on a per unit / subunit basis.

The severity color is used in the [Alarm List](#), the [Alarm Summary](#) and on maps.

In the Alarm List, cleared and not acknowledged alarms are shown in the color of their default severity. In the Alarm Summary, the counter for cleared alarms is shown in pink.

Symbols on maps are shown in the color for the highest severity of their currently active alarms. If there are no or only cleared alarms associated with a symbol, it is shown in green.

13.1.7 Table Column Resizing

In the “[Global Preferences - Tables](#)” dialog that is called from the NEM Desktop menu “Options - Preferences...” you can enable or disable automatic table column resizing. This setting is applied to all tables in the NEM GUI.

If you choose to disable automatic column resizing, however, you have still the option to execute the following commands from the context menu of any table header:

- “Auto Resize This Column”:
Performs automatic resizing of the column width for the selected column so that all contents within the column are visible.
- “Auto Resize All Columns”:
Performs automatic resizing of all columns of the current table so that all contents within the table columns are visible.

Any further column width modifications need to be manually done unless you go back to the “[Global Preferences - Tables](#)” dialog and enable automatic table column resizing.

In addition to the above, each table provides an individual “Options...” dialog from the  menu in the upper right corner of the table, provided the table column settings do not prevent such individual settings. The “Table Options” dialog allows you to choose among one of the following three options:

- Use global preference (currently disabled/enabled),
- Auto resize,
- Do not resize.

13.1.8 Table Filter / Search

In general tables provide a filter (search) feature that can be activated from the keyboard with CTRL-F (STRG-F) where not active per default. Where it is not active per default, you can deactivate the filter either by clicking on the close icon  or by pressing CTRL-F (STRG-F) on the keyboard. When active, the filter field is placed above the table.



A click on the search icon at the left hand side provides context dependent and general filter options that can be set as follows:

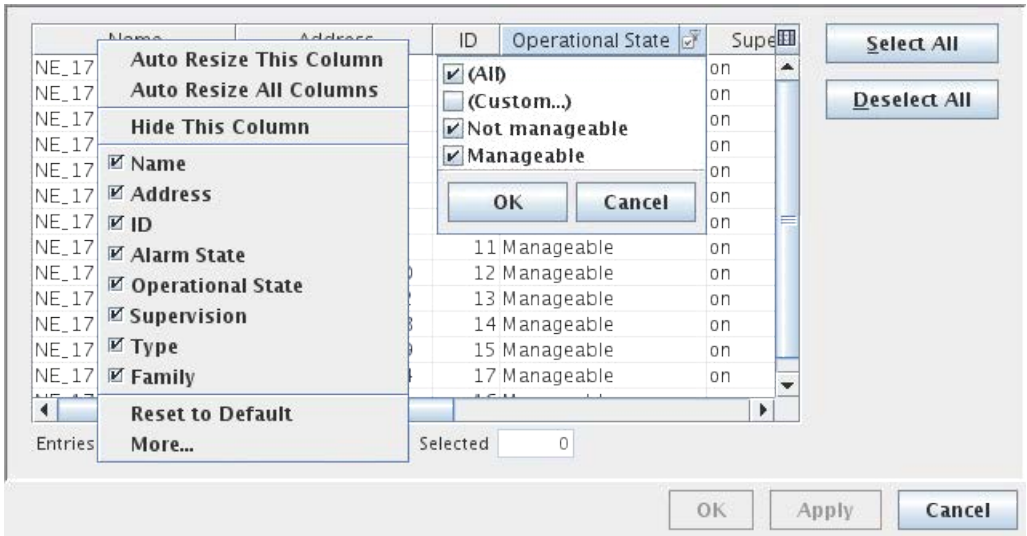
- The context dependent filter options are the table columns that can be included or excluded individually.
- The general filter options are:
 - Case sensitive or case insensitive;
 - Enable or disable the use of wildcards;
 - Enable or disable the use of regular expressions;
 - Select among “Match from start”, “Match exactly” or “Match anywhere”;
 - Enable or disable to “keep parent row if any of the children match”;
 - Enable or disable to “keep the children if any of their ancestors match”.

Any text or regular expression is allowed to be entered in the filter field, including wildcards (*). The entered expression can be deleted with the “Delete” key, the “back” key, or with a click on the “remove” symbol visible at the end of the filter field once any expression has been entered.

13.1.9 Table Sorter

FOXMAN-UN’s dialogs represent data and information in table form. FOXMAN-UN allows you to sort, filter and re-organize the table’s rows and columns to help you manage the complex data effectively. This feature is characterized by:

- clickable, resizable and draggable columns
- Numeric/alphabetic sorting
- Multi-column sorting
- filtering/searching function



The other criteria are self explanatory and hence are not explained in this section.

Controls (buttons, menu items, etc.)

Context menu in each column

Auto Resize This Column
Auto Resize All Columns
Hide This Column
Show Hidden Columns
Reset to Default

More...

Allows the user to choose the column(s) to be displayed in the table.

Alphabetic/Numeric Column Sorting

The list can be sorted alphabetically/numerically in ascending or descending order for each column by clicking on the column header.

Multi-Column Sorting

It is possible to specify multiple-column sort criteria. For example, to sort the list first by “New Severity”, then by “Unit”:

“Ctrl+click” the “New Severity” column header (1), then

“Ctrl+click” the “Unit” column header (2).

Filtering in each Column

The columns can be filtered individually. For example to filter for Operational State of the NE, follow these steps:

Place your pointer on the “Operational State” column header.

Click the filter symbol  as shown in the figure above.

Select your filter criteria. For example, “Operational State” column can be filtered as follows: All, Custom, Not Manageable, Manageable.

The Custom criteria lets you define filter conditions.

Custom Filter for Alphabetic Column

The search criteria are case sensitive.

String (*,? supported)	This is supported at any position. * is the wildcard for zero to many characters. ? is the wildcard for exactly one character.
is anything	To display all the elements.
is	To select a specific element to be displayed.
doesn't equal	To select a specific element to be hidden.
is in	To select all or specific element(s) to be displayed.
isn't in	To select all or specific element(s) to be hidden.
is empty	To hide all the elements.
is not empty	To display all the elements.
begins with	To select a specific element beginning with a certain character.
ends with	To select a specific element ending with a certain character.
contains	To select a specific element including a certain character.
doesn't contain	To select a specific element not including a certain character.

Custom Filter for Numeric Column

Number (<,>=,- supported)	To select from the list specific numeric value(s) of the element to be displayed. To specify one or more elements, the following conditions can be applied: = to specify the specific numeric value (ID, Period) of the element to be displayed, e.g. Value(s) =58 or 58 displays the element with ID number 58. > to display all the elements with the numeric value greater than the specified value, e.g.Value(s) >58 displays all the elements with ID number greater than 58. < to display all the elements with numeric value less than the specified value. - to specify a range, e.g., 10-20 will show all values from 10 to 20 including the bounds.

Export and Printing

Export...	Allows exporting/saving the table contents into a csv or xml file.
Printing...	Allows printing the table contents.

Counter: Entries

Total	Total number of table entries (unfiltered).
Filtered	Number of table entries matching the filtered criteria. Green: no entries hidden by the filter. Orange: 1 or more entries hidden by the filter. Pink: all entries hidden by the filter.
Selected	Number of highlighted table entries (Ctrl+click) to “Select” or “Deselect”.

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