6

Click the hyperlink in the **Name** field.

Result: The system navigates to the link-related information page in a new browser window.

7

Click the hyperlink in the **TE Link Name** field.

Result: The system navigates to TE Links page in a new browser window.

You can also perform the following operations:

- Create and delete a Shared Risk Group from the Link Maintenance Window.
- Create a Server Shared Risk Group from the Link Maintenance Window
- Create and remove a Physical Connection from the Link Maintenance Window.
- Implement/Deimplement a Physical Connection from the Link Maintenance Window
- Configure the Service State of a Physical Connection from the Link Maintenance Window.

End of steps

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10.26 Perform switched connection sync in Control Planes tab

Purpose

Use this task to perform the synchronization of the switched connections in the **Control Planes** tab. With this operation, the system synchronizes the switched connection link with the system.

Task

Complete the following steps to perform the UNI link with the system.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Nodes

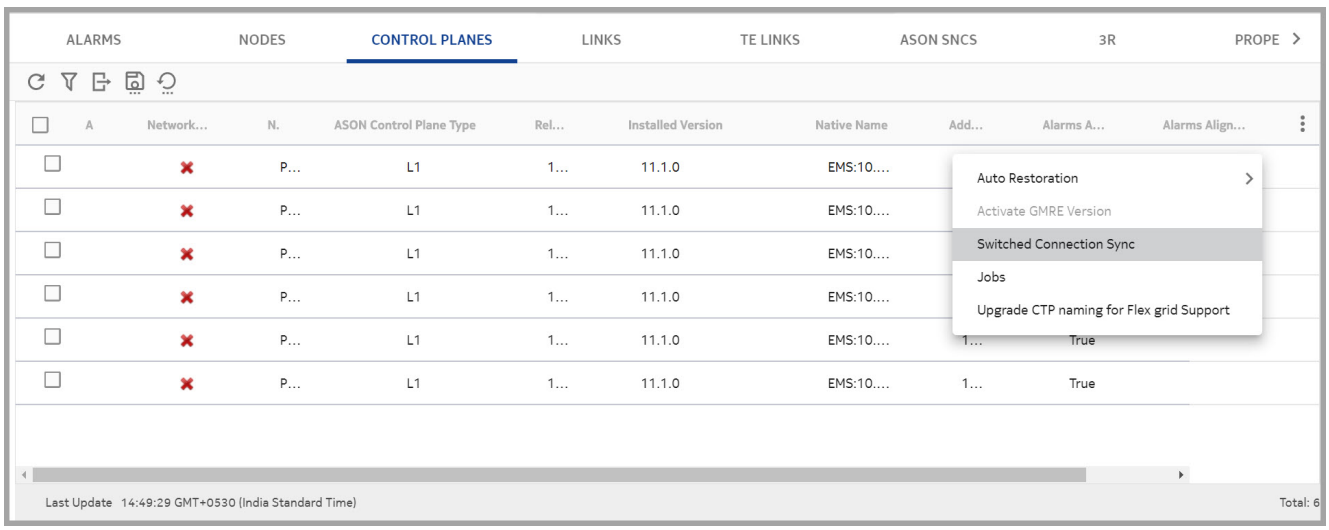
OPERATE > ASON > NPAs > 360° View > CONTROL PLANES (tab).

Result: The system displays a list of nodes.

2

Click the **More** icon on a selected node and click **Switched Connection Sync** from the menu options.

Figure 10-41 Perform Switched Connection Sync



Result: The system synchronizes the UNI link with the GMRE.

For example, if the user deletes a UNI from the system or new UNI is added that is not there in the database, then the **Switched Connection Sync** operation synchronizes the selected switched connection with the database.

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3

To view the list of switched connections that has got synchronized, go to **OPERATE > Infrastructure Connections** or **OPERATE > SNC** pages.

End of steps

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10.27 Set the ASON administrative state of links

Purpose

Use this task to set the ASON Administrative State of links. Ensure that the NPAs are created.

You can change the ASON administrative state of the links that are assigned to an NPA or color profile from the **Used In** and **Matched By**.

The **COLOR PROFILE** data table has **More** icon for **Used In** and **Matched By**. These tabs have a subtab for ASON Links. The **ASON Links** subtab and **LINKS** tab, which is displayed for ASON NPAs, provide the same actions and functions for links.

See 10.9 “View the list of NPAs” (p. 1447).

Task

Complete the following steps to set the ASON Administrative State of the links.

1

From the NFM-T GUI, follow one of these navigation paths

OPERATE > ASON > NPAs 360° View > LINKS (tab)

Result: The system displays the list of links.

2

Select a link and perform the following options:

- Click the **More** icon and select **Administrative State** from the pop up menu

3

Set one of the following options as per your need for the configuration

- **set to Unlocked**
- **set to Shutting Down**
- **set to Soft Shutting Down**
- **set to Locked**
- **Synchronize**

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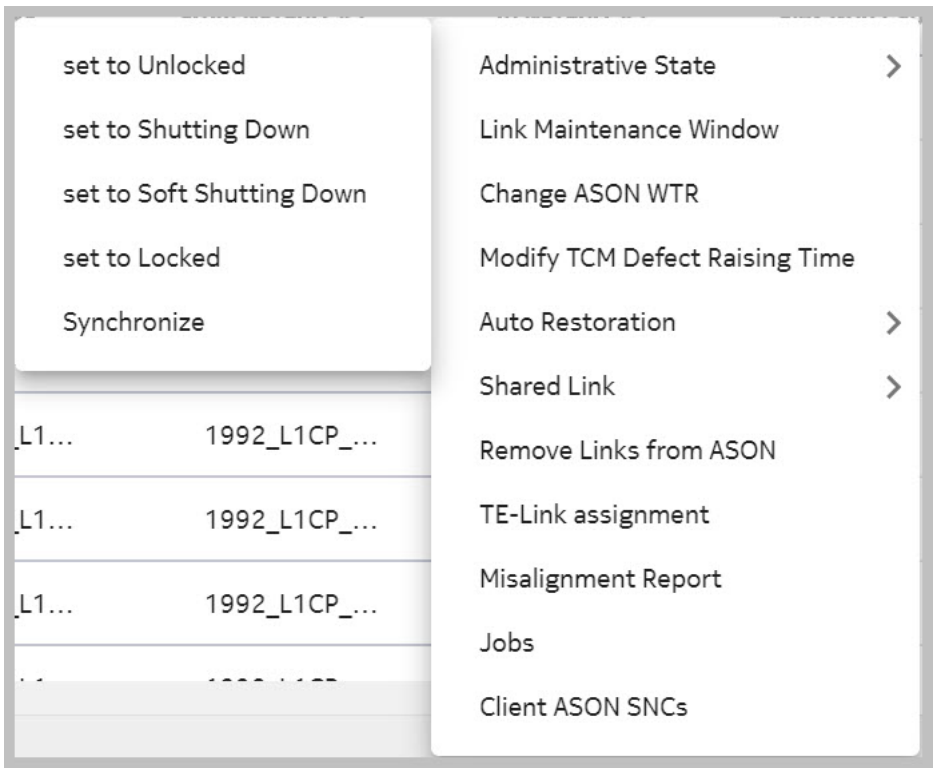
Figure 10-42 Set the ASON Administrative State: Administrative State icon



4

If the **ASON Administrative State** selected is one of the following; **set to Unlock**, **set to Shutting Down**, **set to Soft Shutting Down**, or **Synchronize**; the system performs the requested operation and outputs a success message at the bottom left of the window.

Result: The **ASON Administrative State** column on the NPA data table is updated.

Note: When **ASON Administrative State** is **set to Shutting Down**, traffic flows in GMRE only. Once all the traffic is moved, GMRE link is set to **Locked** state. Perform a manual link synchronization, to view the **Locked** state in NFM-T.

5

If the **ASON Administrative State** selected is **Set to Locked**, the system displays a warning message:

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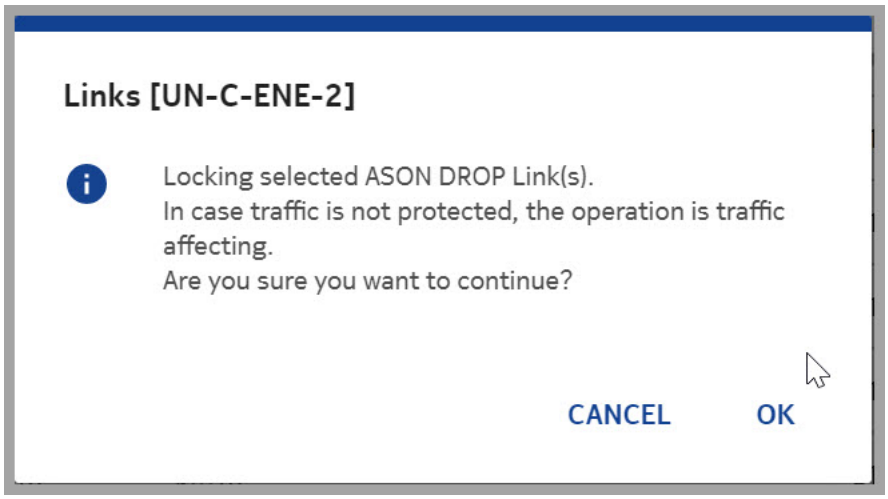

6

Click **OK**.

Result: The system performs the Lock operation and outputs a success message at the bottom left of the window

7

To view the status of the operation, navigate to **ADMINISTER > Jobs** page.

Result: The **Jobs** page displays a single job for the multiple operations that is performed on the links.

Right-click a job and select **Run History** to view the details of the job.

8

Select the job and click the **Details** tab in the lower panel

Result: The **Details** tab displays the **Job Type** and the **Runs Executed** which specifies the number operations performed on that particular link.

9

Select the scheduled job and click the **Job Inventory** tab in the lower panel.

Result: The **Job Inventory** tab displays all the instances of the operations that is triggered on a particular link. The **Description** column displays **Success** or **Failure** status for a particular operation.

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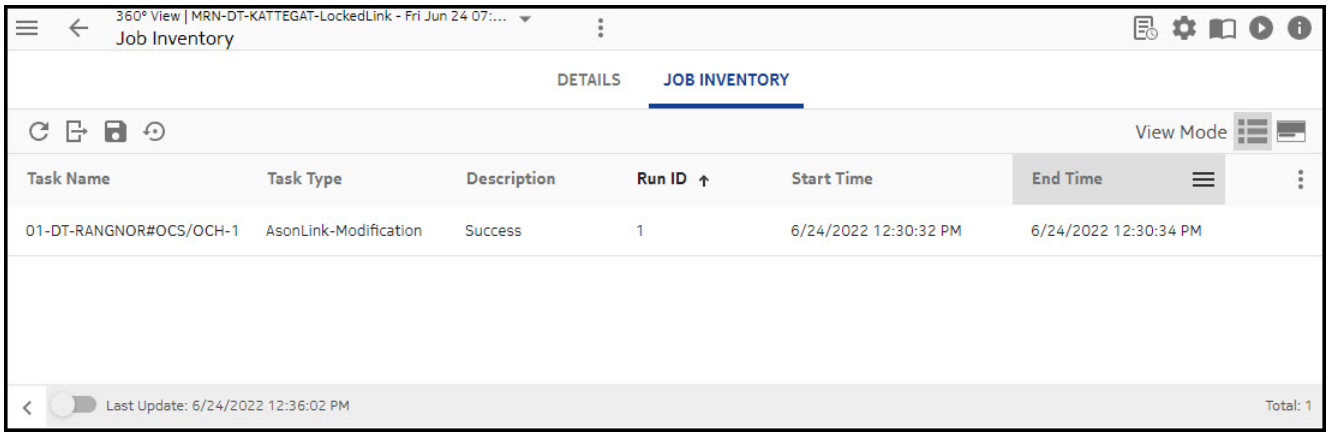
Figure 10-43 Jobs page for ASON Links operations



END OF STEPS

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10.28 UNI management support for EPL service

Introduction

This feature describes the requirements for management support of IETF UNI endpoints for EPL services. The new endpoint type (UNI-C) allows IP-optical integration whereby paths in the optical domain are set up through direct signalling from the IP router endpoints (UNI-C). The optical network endpoints interfacing with the UNI-C are denoted UNI-N and provide the access points for EPL service. This feature is based on signalling and requires GMPLS-enabled network, either MRN or L1 Control Plane network. The EPL services are supported only on the UNI-N endpoints (10GE, 100GE) on the network.

When the user triggers the creation of switch connection from the router, GMRE internally creates the private tunnel LSPs on the PSS NE. The private tunnels is internally managed by the GMRE. The private tunnels are discovered by the NMS either via notification or the Control Plane switched connection sync. ODU trail representing the private tunnel DSR representing the switched connection. Private tunnel is also viewed in ASON SNC.

NMS creates two types of private tunnel connections:

- ODU trail representing the private tunnel
- DSR representing the switched connection

The user can also view the private tunnels in the **ASON SNC** tab.

The user cannot perform modifications of ASON SNC attributes and deletion of the private tunnel from NMS.

The following operations can be performed on the private tunnels in NMS:

- retrieves the SNC
- retrieves all routes
- changes the nominal route
- sets the SNC test Mode
- retrieves SNCP switch states
- changes the SNCP state

The Ethernet services transports over ODUk/OCh layers in Optical domains with the requested protection and restoration types and routing constraints. This feature is applicable for WDM (PSS-32/16) and the OTs, as well as the OCS (PSS-64/36) and the I/Os.

UNI management support for EPL service

The NFM-T provides users with the possibility to discover an EPL service from NE and manage this type of service in all the configurations. The EPL service is managed as nominal route and stored in the NFM-T Data Base. Modification of the EPL service such as restoration, protection and more, are managed automatically.

A new UNI port type has to be managed to support the EPL service. The new endpoint type (UNI-C) allows IP-optical integration whereby paths in the optical domain can be setup via direct signalling

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from the IP router endpoints (UNI-C). The optical network endpoints interfacing with the UNI-C are denoted UNI-N and provide the access points for EPL service.

This feature is based on signalling and requires GMPLS-enabled network, either MRN or L1 CP network.

The EPL service supports different E2E protections:

- Unprotected
- Shared meshed restoration
- Full rerouting
- SNCP protected 1+1
- SNCP protected 1:1 or 1:N.

The E2E protection are controlled by UNI-C and are mostly transparent for UNI-N (Optical device UNI-Network).

Shared Mesh Restoration and SNCP 1+1 are not supported by UNI-C.

The UNI-C can change the type of segment protection therefore the NFM-T takes care of discovering and managing the change of configurations supported by UNI-N nodes.

EPL services are supported only on the GE UNI-N endpoints at 10 GbE and 100 GbE on the network.

Discovery of the connection in the network

The feature describes about the auto-discovery of GMPLS control plane network configuration and state.

This feature describes about the discovery of GMRE auto-created UNI-IETF connections and state for only switched connection sync and private tunnels and DSR.

The auto-discovery is enabled via existing north-bound interfaces of the NE such as SNMP, TL1 and CORBA.

The connection takes place via routers and the notification is issued by the GMRE.

The full configuration sync requires that all the GMRE entities already configured in the network are synced to NFM-T. This enables the NFM-T to discover the initial GMRE network configuration as well as periodically validate and align the full network. Event notifications may be triggered due to network configuration or state changes.

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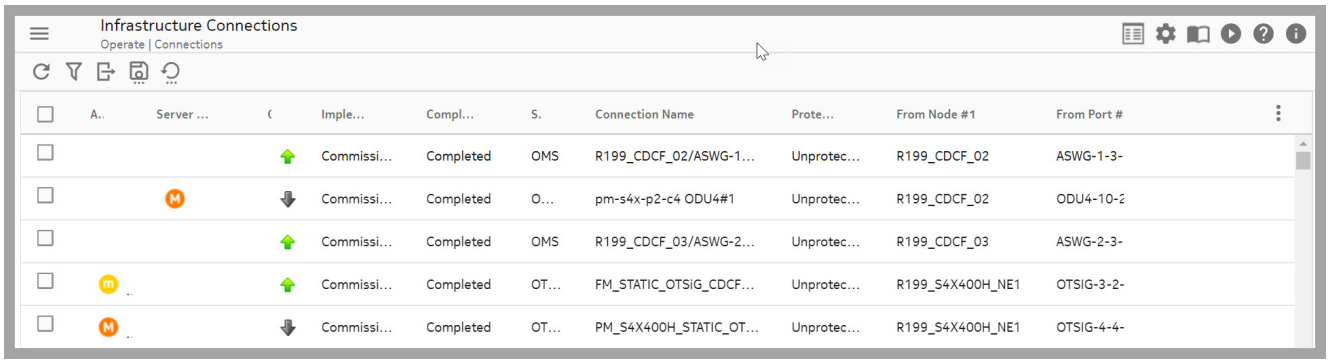
Figure 10-44 Discovered Connection in OTN



UNI-C configuration

GMRE supports UNI interfaces with RSVP-TE and LMP. UNI links supported are Ethernet only supporting EPL services over ODU over lambda.

The IP Router connects to the Client ports of the OT packs of PHN (260SCX2, 130SCX10, 130SNX10) in the Control Plane. The required physical connections from OT packs Line port towards network side is configured and added as UNI-N connections in the NPA.

IP router initiates a ASON routed Infrastructure connection and service to GMRE directly using these ports and the Physical Links in GMRE as the server. Such ASON SNCs are discovered from GMRE through synchronization and notification.

GMRE supports setup of Ethernet LSPs (switched connections) by UNI-C node via signalling. Network tunnels (FA-TERM, FA-UNTERM) must be set up separately. The private tunnels are routed via pre-configured tunnels as required. GMRE sets the first established route for the LSP as the nominal route. EPL services are supported only on 10GE and 100GE ports. This feature is not supported for 40 GE ports or service.

Table 10-5 100GE Ports Supported

Card Type	Shelf Type
260SCX2 (130G mode)	PSS-16/32
130SCA1	PSS-16/32
112SCA1	PSS-16/32
112SNA1	PSS-16/32

Table 10-6 10GE Ports Supported

Card Type	Shelf Type
11STAR1	PSS-16/32

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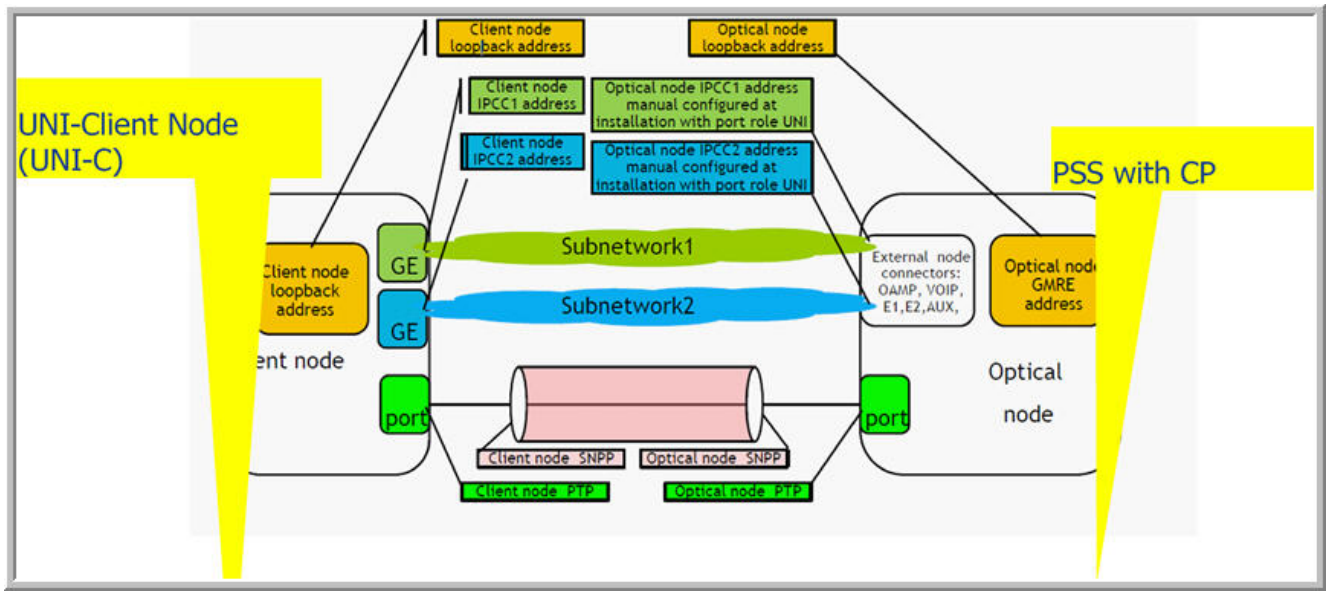
Table 10-6 10GE Ports Supported (continued)

Card Type	Shelf Type
11STAR1A	PSS-16/32
11QPA4	PSS-16/32
11QPEN4	PSS-16/32
Muxponder Card Types (10G clients)	
112SCX10	PSS-16/32
112SNX10	PSS-16/32
130SCX10	PSS-16/32
130SNX10	PSS-16/32

Figure 10-45 UNI-C Configuration



ENE and UNI-C configuration

The user has to configure ENE, as well as UNI link between UNI-C and UNI-N.

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Table 10-7 Supported protection / restoration combinations

End to end protection/restoration types	Unprotected	SBR	GR	SNCP	PRC
Unprotected	YES	YES	YES	YES	YES
1:1 / 1:N	YES	YES	YES	YES	NO
Full Rerouting	Full Rerouting	NO	Full Rerouting	NO	NO

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10.29 Upgrade CTP naming for Flexgrid support

Purpose

Use this task to update the Connection Termination Point (CTP) naming to the new naming for Flexgrid support.

When GMRE installed version is upgraded to R9.1, the CTP Naming is automatically upgraded to new FlexGrid format.

This operation is not mandatory and is triggered only in case of trail creation issues after upgrade.

If the Tomcat server does not receive this notification because of some problem, the user can perform **Upgrade CTP Naming for Flexgrid Support** in the Control Plane tab of NPA or Nodes.

Task

Complete the following steps to upgrade CTP Naming for Flexgrid Support.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > ASON > NPAs > 360° View > CONTROL PLANES (tab).

Result: The system displays the list of control plane for that particular NPA.

2

Click the **More** icon on selected control plane and select the option **Upgrade CTP Naming for Flexgrid Support** from the pop up menu.

Result: The system displays a confirmation message.

3

Click **OK**.

Result: The system receives a notification that the migration is complete.

END OF STEPS

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10.30 Activate GMRE for Control Plane NE

When to use

Use this operation to set the Active Network Version of GMRE to be same as the Installed Version on the GMRE.

The option to activate the GMRE would be available if the Active Network Version of the selected GMRE (Control Plane) is different from the installed version.

Related information

GMRE supports two types of versions, **Installed Version** and **Active Network Version**. The Installed Version is the GMRE software version installed on the Network Element. The Active Network Version is the version currently activated on the GMRE. For example, the user can upgrade GMRE to a version *x.y* (Installed Version) but, GMRE can still be running with version *a.b* (Active Network Version). When the Installed Version is upgraded, the user must manually set the Active Network Version to the Installed Version for the GMRE.

This feature is supported for all control plane NEs:

- L0 Control Plane NEs
- L1 Control Plane NEs

Task

Complete the following steps to activate network version of GMRE for Control Plane enabled NE.

1

From the NFM-T GUI, follow one of these navigation paths:

- **OPERATE > Nodes > 360° View > CONTROL PLANES** tab
- **OPERATE > ASON > NPAs > 360° View > CONTROL PLANES** tab

Result: The system displays the appropriate data table as per the selection.

2

For **CONTROL PLANES** tab on **Node** page, on the selected Control Plane click the **More** ⋮ icon and select **Activate GMRE Version**.

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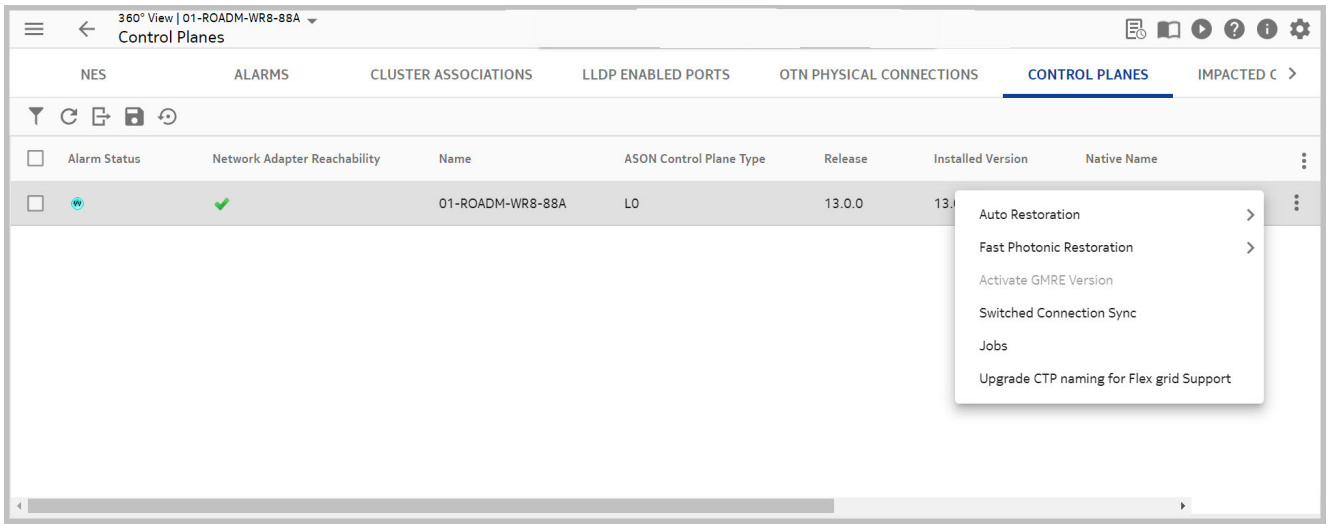

For the **CONTROL PLANE** tab under **ASON NPAs** 360° View, on the selected Control Plane click the **More** ⋮ icon and select **Activate GMRE Version** from the pop up menu.

The Activate GMRE Version menu is enabled or disabled in the following scenarios:

- This menu is enabled only if the **Active Network Version** of the selected GMRE (Control Plane) is different from the **Installed Version**.
- This menu is enabled on multi-select only if the **Installed Version** of the selected GMRE is less than R10.1.
- This menu is disabled on multi-select, if the selected GMRE has **Installed Version** greater than or equal to R10.1.

If the **Installed Version** is greater than or equal to R10.1 and the user clicks the **Activate GMRE Version** menu, the command is sent to one GMRE. The GMRE then internally sends the command to all its neighbor nodes. So, all the GMRE in the domain of the selected GMRE on which the **Activate Version** is executed, gets updated with the **Installed Version**. The **Active Version** of all the GMRE in the same domain (that are updated internally by GMRE) is updated in NFM-T GUI (**Release** column) via notification.

If the **Installed Version** is less than R10.1, the **Activate Version** operation must be executed individually on all the nodes. (Subsequently, multi-select is provided only for **Installed Version** less than R10.1).

If an NPA has GMREs belonging to different domains and the **Installed Version** is greater than or equal to R10.1, then the user has to perform **Activate Version** separately selecting one GMRE belonging to each domain.

Result: The system outputs a series of messages on the bottom right of the window.

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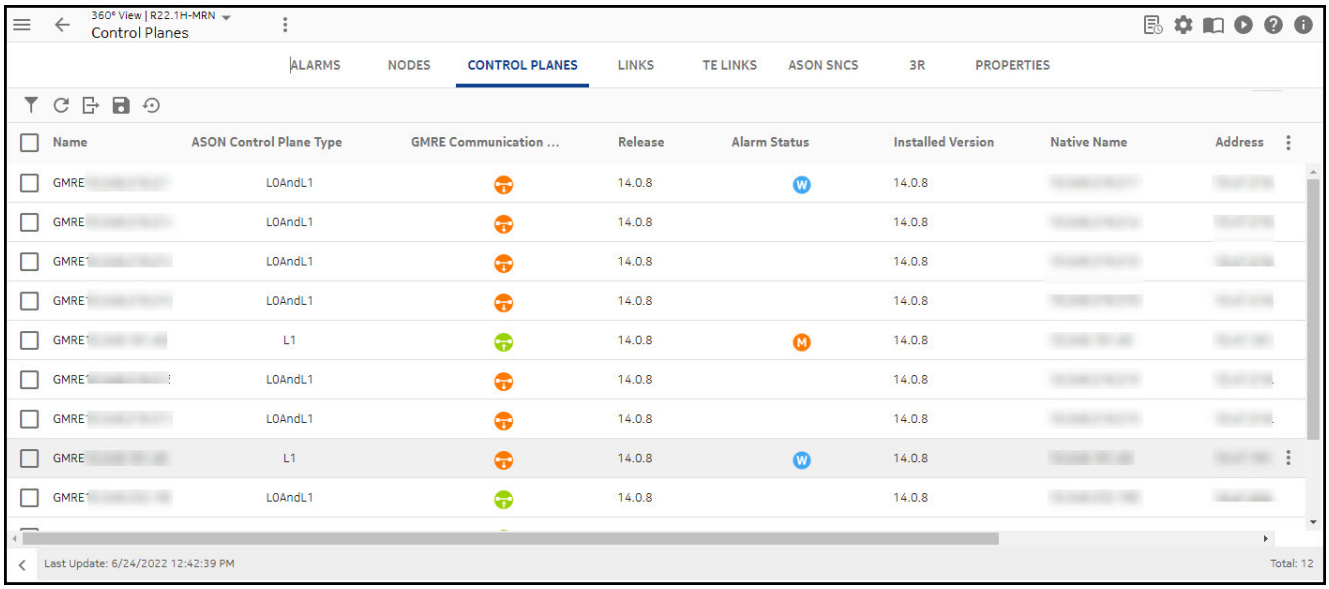
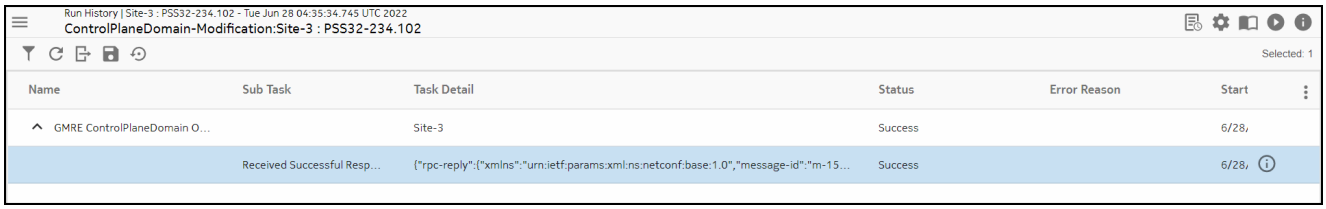


3

To view the details of the performed operation, navigate to **ADMINISTER > Jobs > Run History**.

Result: The success message is displayed.

Figure 10-46 Activate GMRE Version: Run History window



End of steps

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10.31 View NE cluster configurations in ASON SNC and ASON NPA pages

When to use

Use this task to view NE Cluster configurations in ASON SNC and ASON NPA pages.

Related information

For more information on cluster NEs, cluster NE management, and cluster association, see the following topics in this document:

- "Compound node scenarios" (p. 181)
- "Multi-NE Clusters" (p. 183)
- 10.7 "Cluster configuration for Control Plane " (p. 1440)

Before you begin

Important! From 1830 PSS NEs R11.0 and onwards, Cluster configuration is supported for L0 GMPLS and from 1830 PSS NEs R11.1 onwards for MRN. Cluster configuration is supported for 1830 PSS-8, 1830 PSS-16, 1830 PSS-16II, 1830 PSS-32, 1830 PSS-8x and 1830 PSS-12x for L0 GMPLS and 1830 PSS-24x for MRN. See 10.7 "Cluster configuration for Control Plane " (p. 1440) for information on cluster configuration in control plane.

The creation and association of cluster configuration in Control plane is similar to Managed plane and following is the detailed steps:

1. Ensure to provision the NE names and IP addresses and create the cluster link physical connection before adding NEs to form a multi-NE cluster association.

   Refer to the Multi Cluster NEs (PHN) in the NFM-T NE Management Guide, Multi Cluster NEs (OCS) in the NFM-T NE Management Guide tasks for detailed steps.
2. Add cluster associations, refer to the Add a new Cluster Association task for steps.
3. The cluster link is configured from the EQM window. See "Task: View the configured cluster links from EQM" (p. 1517) task for steps.
4. The routes and links created during the cluster configuration in control plane can be viewed in the corresponding **OPERATE > ASON > SNCs > More ⋮ icon > Routes** and **OPERATE > ASON > NPAs > 360° View > LINKS (tab)** windows. See "Task: View the cluster configuration in ASON SNC and ASON NPA pages" (p. 1518) task for steps.
5. Then refer to the Manage Associations task in the NFM-T NE Management Guide to see how to add new cluster to an existing nodes, delete and view cluster configurations in Managed plane and follow similar steps for Control plane.

Task: View the configured cluster links from EQM

Complete the following steps to view the configured cluster links from EQM window:

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1

From the NFM-T GUI, select the following navigation path:

OPERATE > Equipment Manager

Result: The system displays the Equipment Manager window in its default state and instructs you to do the following: *Please select a node to view details.*

2

Select the L1 slot of the cluster compound node from the navigation tree.

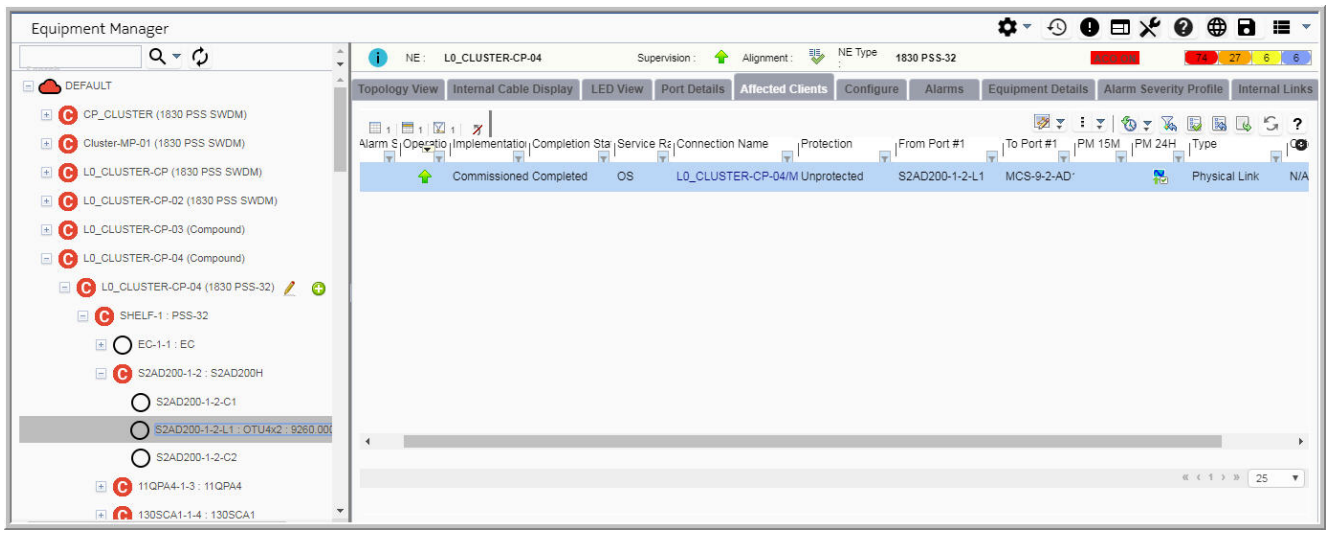
Result: The system displays the information of the object selected on the right pane.

3

Select the **Affected Clients** tab for the respective **Connection Name** to view the details.

Result: The system displays the complete details of the connection with the cluster configuration.

Figure 10-47 Affected Clients tab - NE Cluster configuration in Control Plane



End of steps

Task: View the cluster configuration in ASON SNC and ASON NPA pages

Complete the following steps to view the cluster configuration in ASON SNC and ASON NPA pages:

1

From the NFM-T GUI, select both the following navigation paths:

OPERATE > ASON > SNCs > More ⋮ icon > Routes

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OPERATE > ASON > NPAs > 360° View > LINKS (tab)

Result: The system displays a data table that lists all the routes and links.

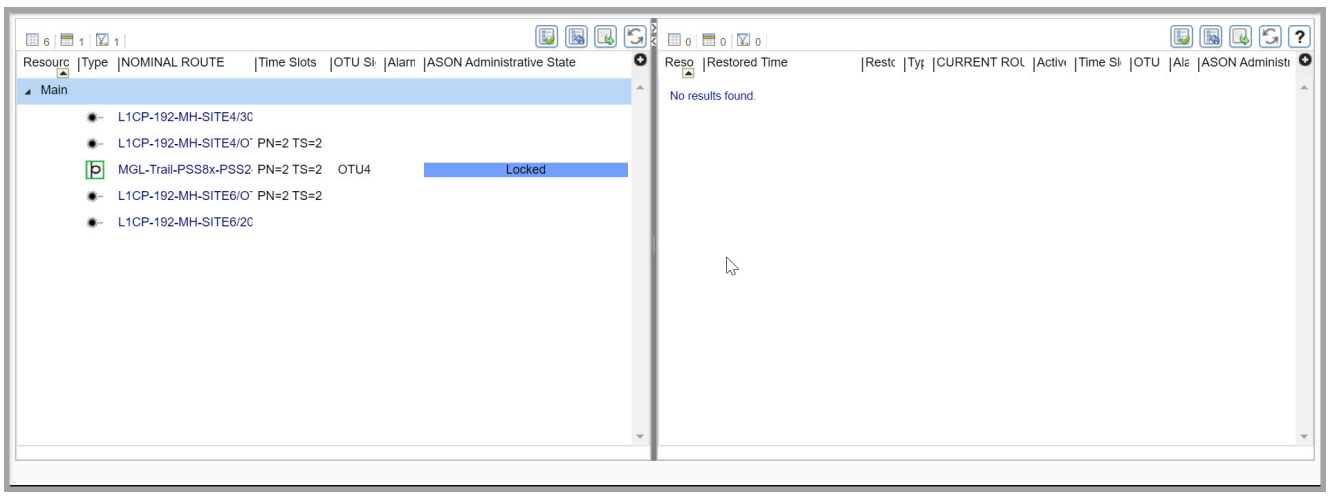
2

Refer to Step 3 to view the **Routes** in the **ASON > SNCs > More** ⋮ **icon > Routes** page and Step 4 to view the **LINKS** in the **ASON > NPA > 360° View > LINKS** page.

3

Select **OPERATE > ASON > SNCs > More** ⋮ **icon > Routes** page, to view the starting and the ending points of the route and the drop link represents the GMRE boundary.

Result: The **Routes** page displays the Nominal Route and the Current Route details.



4

Select **OPERATE > ASON > NPAs > 360° View > LINKS** tab, to view the links created by the cluster configuration.

5

The Cluster links can be filtered using the **Physical Connection Type** as **Inter Cluster** along with the **Link Type** as **drop** value on the Physical links created for the cluster configuration.

Result: The system displays the connections with the category as **Physical links**.

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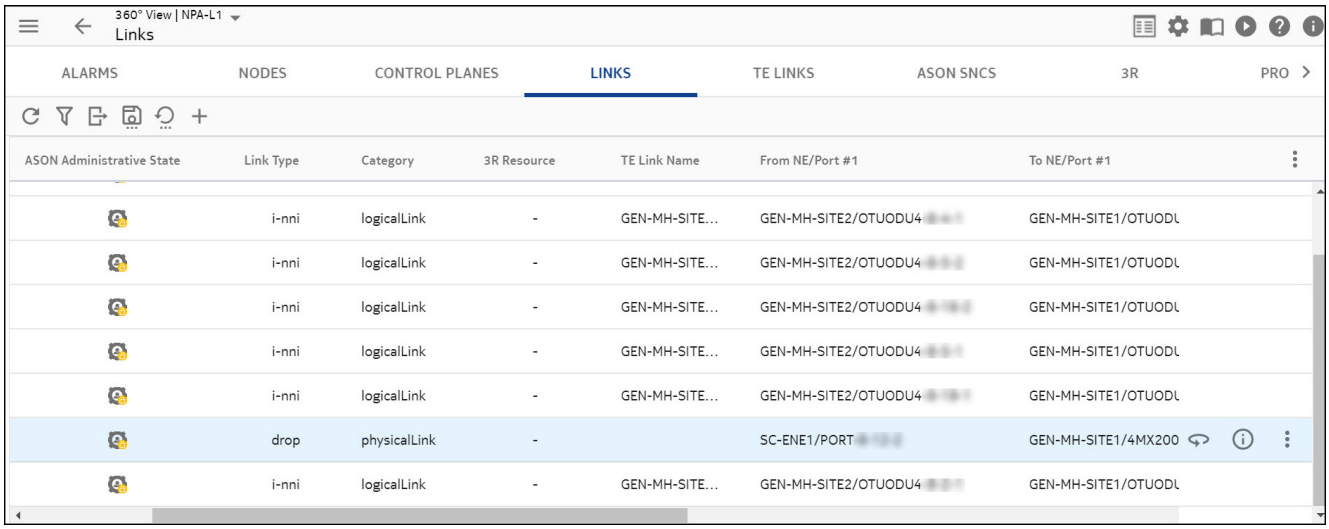

End of steps

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Operate ASON SNC

10.32 ASON SNC

Description

Subnetwork Connection: A transport entity that transfers information across a subnetwork. It is formed by the flexible association of ports on the boundary of the subnetwork.

An SNC, which is a Subnetwork Connection, is a WDM ODU0, ODU1, or ODU4 layer that connects user-selected primary and spare endpoints. An SNC is further defined by its connection shape, its support of Tandem Connection Monitoring (TCM), and its sets of Control Plane restoration parameters and color parameters

Route switch

Switching current to nominal in L1 domain is not allowed when the system needs to overlap nominal route of two SNCs that are part of the same end-to-end connection. So if the end to end trail in the connection has two ASON Trails, the user needs to perform SNC disjointness on both the trails after the end to end trail is created.

See for further details.10.42 “Manage SNC constraints” (p. 1554)

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10.33 View the ASON SNCs

Purpose

Use this task to view the list of SNCs in the data table.

Task

Complete the following steps to view the details of the ASON SNCs.

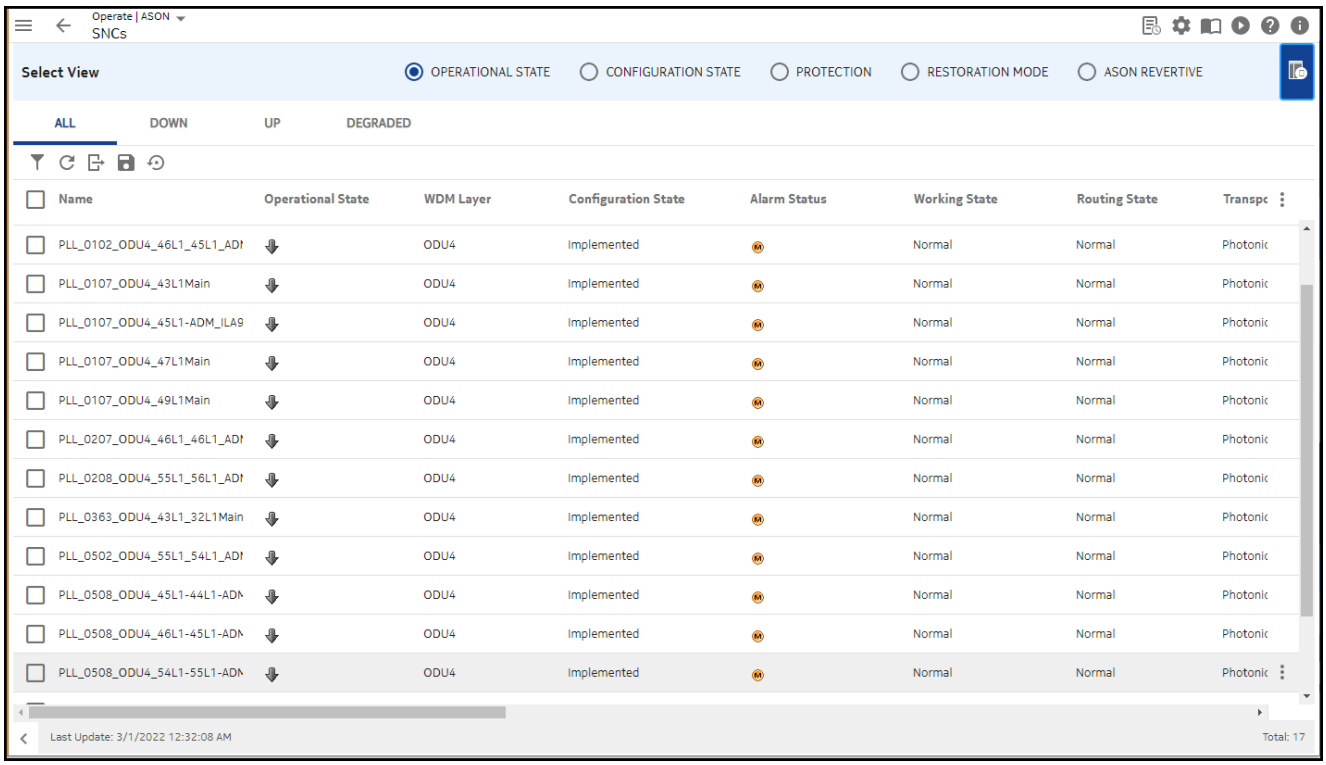
1

From the NFM-T GUI, follow this navigation path:

OPERATE > ASON > SNCs.

Result: The system displays the list of SNCs in a data table.

Figure 10-48 List of ASON SNCs



Note: The user belonging to a partitioned domain can only view the SNCs where one of the node is in the same domain. The user can perform an operation if both the nodes are in the same domain.

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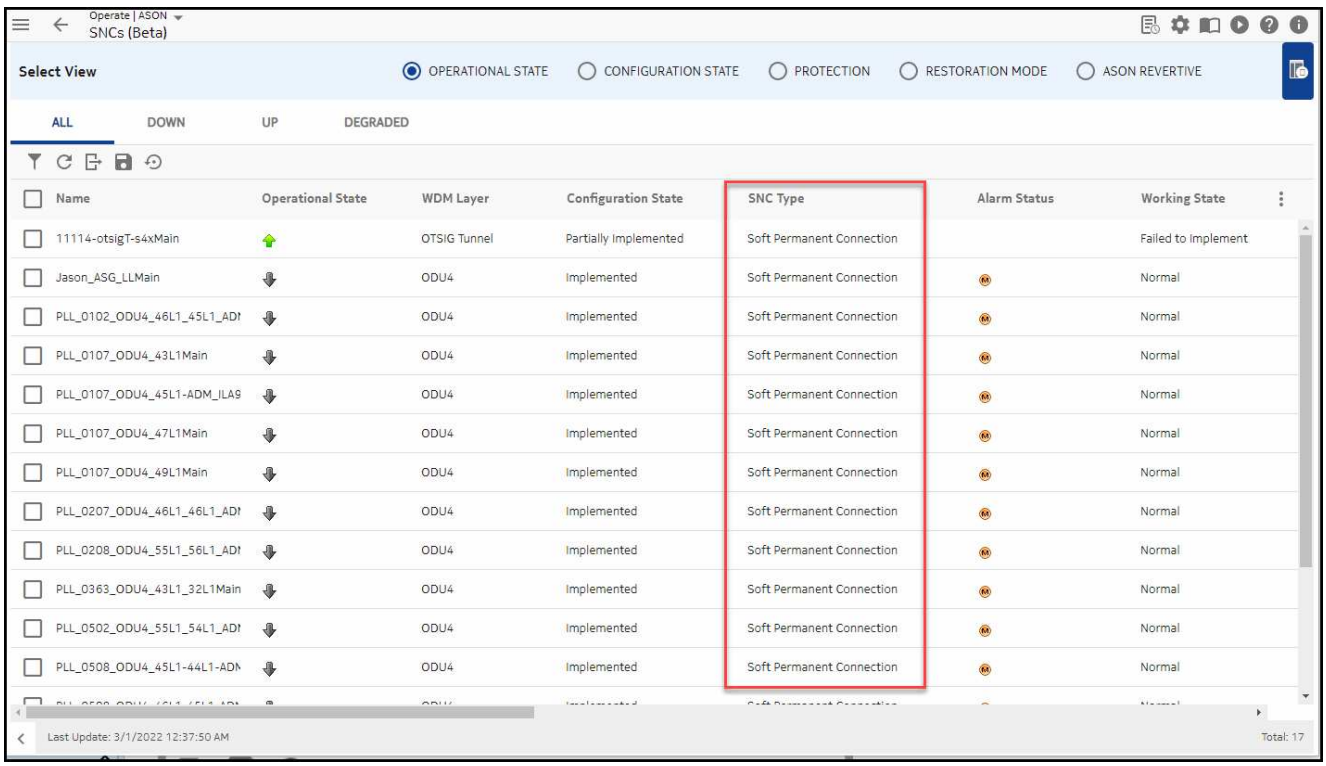
2

Click the **MANAGE COLUMNS** ( ) icon in the **Select View** area to add or remove columns or views from the page. Click **Apply** to apply the changes, close the window, and return to the **OPERATE > ASON > SNCs** page.

See 26.7 "Manage data columns" (p. 2213) for a detailed description and usage of the Manage Columns window.

To identify whether the ASON SNC is of private tunnel type, select SNC Type from the list of columns in the Manage Columns window. SNC Type is hidden by default. The user must select it to view the SNC Type attribute.

Figure 10-49 SNC Type in ASON SNC



3

Select an SNC and click the **Properties** icon.

Result: The system displays the properties of the selected SNC.

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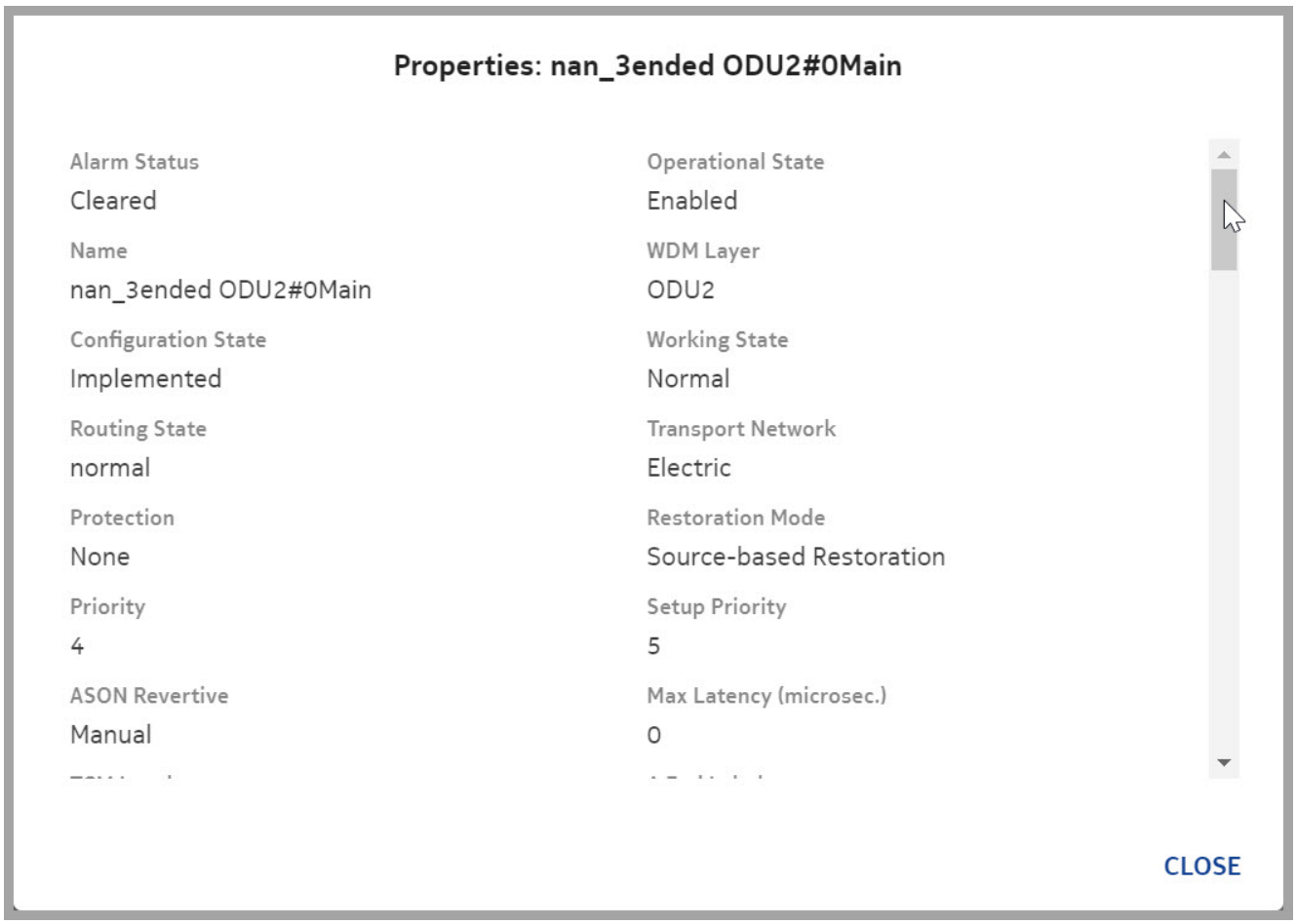
Figure 10-50 Properties of ASON SNCs



4

To sort the data in the column in ascending or descending order, click the column name to sort.

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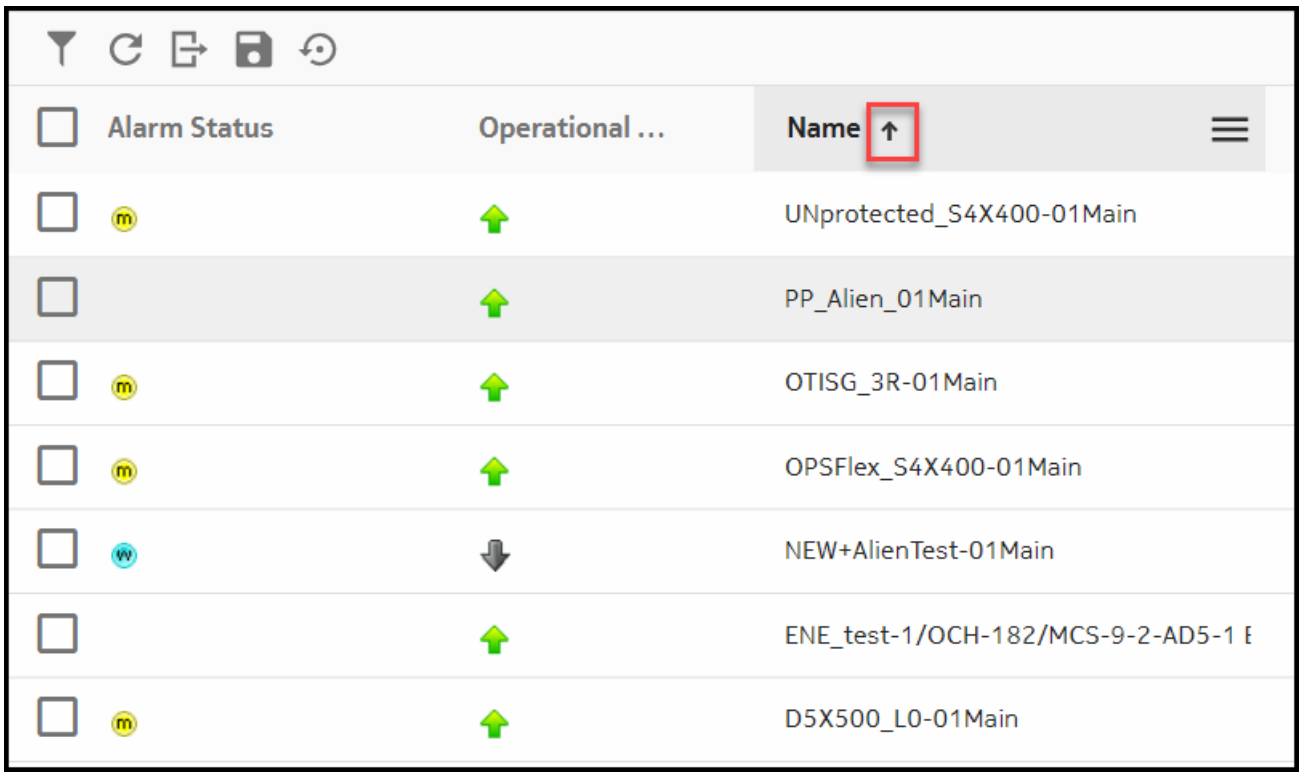
Figure 10-51 ASON SNC sorting



5

Select an SNC and click the **More** icon.

Result: The system displays a list of operations that can be performed on the SNC.

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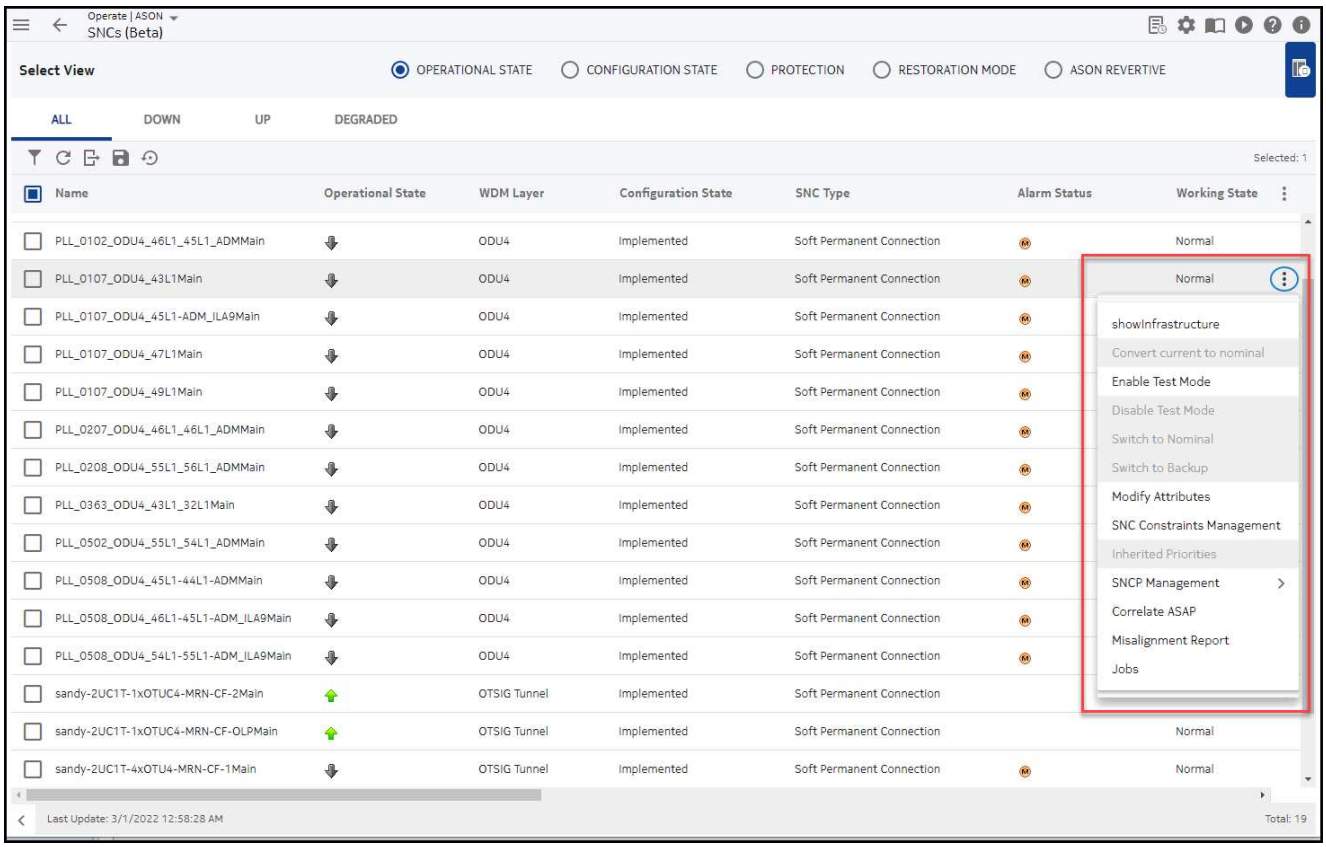
Figure 10-52 SNC Operations



6

Refer to the following procedures for the SNC operations, under **More** icon:

- To view the misalignment report for a given SNC, see 10.38 “View a misalignment report for an SNC” (p. 1544)
- To enable or disable test mode, see 10.40 “Enable/Disable the test mode for an SNC” (p. 1550).
- To modify the SNC attributes, see 10.43 “ Modify the attributes of an SNC” (p. 1557).
- To manage SNCP attributes, see 10.41 “Manage SNCP in ASON SNC” (p. 1553).
- To manage SNC constraints, see 10.42 “Manage SNC constraints” (p. 1554).
- To correlate ASAP in ASON SNC, see 10.39 “Correlate an ASAP with SNC” (p. 1546).
- To view the inherited priorities, see 10.37 “View the inherited priorities of an SNC” (p. 1542).
- To switch SNC routes, see 10.44 “Switch SNC routes” (p. 1560).

END OF STEPS

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10.34 ASON SNC table columns

ASON SNC table parameters

Table 10-8 ASON SNC table description

Columns	Descriptions
Access Control Domain	The **Access Control Domain** column displays the specific domain to which the node must be assigned to. By default it is set to unknown.
A End Client Slot Number **A2 End Client Slot Number** **Z2 End Slot Number** **Z End Client Slot Number**	For I connection shapes, the **A End Client Slot Number** and **Z End Client Slot Number** columns display the client slot numbers of the originating (A) and terminating (Z) ends of the ASON SNC. For X and Y connection shapes, the **A2 End Client Slot Number** column displays the end client slot numbers of the originating (A2) end of the ASON SNC.
A End Label **Z End Label**	The **A End Label** and **Z End Label** columns display the labels for the originating (A) and terminating (Z) ends of the ASON SNC
A End Port Id **A2 End Port Id** **Z End Port Id** **Z2 End Port Id**	For I connection shapes, the **A End Port Id** and **Z End Port Id** columns display the identifiers for the originating (A) and terminating (Z) end ports of the ASON SNC. For X and Y connection shapes, the **A2 End Port Id** and **Z2 End Port Id** columns display the identifiers for the originating (A2) and terminating (Z2) end ports of the ASON SNC
A End TS **A2 End TS** **Z End TS** **Z2 End TS**	For I connection shapes, the **A End TS** and **Z End TS** columns display the time slot names of the originating (A) and terminating (Z) ends of the ASON SNC. For X and Y connection shapes, the **A2 End TS** and **Z2 End TS** columns display the time slot names of the originating (A2) and terminating (Z2) ends of the ASON SNC.
A End TS Granularity **A2 End TS Granularity** **Z End TS Granularity** **Z2 End TS Granularity**	For I connection shapes, the **A End TS Granularity** and **Z End TS Granularity** columns display the time slot granularity of the originating (A) and terminating (Z) ends of the ASON SNC to be ODU0, ODU1, or -, which is not applicable or unknown. For X and Y connection shapes, the **A2 End TS Granularity** and **Z2 End TS Granularity** columns display the time slot granularity of the originating (A2) and terminating (Z2) ends of the ASON SNC to be ODU0, ODU1, or -, which is not applicable or unknown.
Alarm Status	The **Alarm Status** displays the status of alarm that has occurred The **Alarm Synthesis** column displays whether the node/NE is alarmed and the severity of the alarm. The Alarm Synthesis is: **Minor**, **Critical**, **Major**, or **Cleared**.
ASAP Name	The **ASAP Name** displays the name of the Alarm Severity Assignment Profile to be **default ASAP** or the actual name of the ASAP.
ASON Protection	The **ASON Protection** column displays the ASON protection for the SNC, None is displayed if no protection is configured.
Backup Route Pre-Configured	Specifies the backup route that has been defined by the user. The allowed values are **True** and **False**. By default the value is **False**. If the backup route is configured, the value is **True** and the user can clear the backup route.
ASON Revertive	The **ASON Revertive** column displays the required setup priority of the ASON SNC.
A Spare End Label **Z Spare End Label**	The **A Spare End Label** and **Z Spare End Label** columns display the labels for the originating (A) and terminating (Z) spare ends of the ASON SNC.

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Table 10-8 ASON SNC table description (continued)

Columns	Descriptions
A WDM Frequency **Z WDM Frequency**	The **A WDM Frequency** and **Z WDM Frequency** columns display the frequency for the originating (A) and terminating (Z) ends of the ASON SNC.
Backup State	The **Backup State** column displays the backup state of the selected SNC to be **normal** or **unavailable**.
Client Dependency	The **Client Dependency** column displays if the SNC is client dependent, in this case the value is True, otherwise False. Client dependent means that, if you create that data in one client is limited to that client only and it is not accessible in other clients
Configuration State	The **Configuration State** column displays the current state of the ASON SNC.
Configured Soft Revertive SNCP Mode	The value is set at creation or modification by the user.
Configured Soft Revertive SNCP Timeout	This value is set at creation or modification by the user if the Soft Revertive SNCP Mode is MainNominal or AnyNominal.
Disjoint State	**Disjoint State** parameter indicates if an SNC is involved in a disjoint relationship with other ASON SNCs or TE Links. The disjoint states represent the following meaning: • **No Disjoint** - No diversity • **SNC Diversity** - with SNC • **TeLink Diversity** - with TELink • **TeLink&SNC Diversity** - SNC and TE link diversity **Note:** When SNC is disjointed from another SNC with a different head node, the disjointness is translated to TE Links to GMRE. To manage SNC constraints, see 10.42 “Manage SNC constraints” (p. 1554)
End To End OTN Trail Id	The **End To End OTN Trail ID** column displays the end-to-end trail identifier that is associated with the selected SNC.
End To End OTN Trail Label	The **End To End OTN Trail Label** column displays the end-to-end trail label that is associated with the selected SNC.
Exclude Any Color ID	The **Exclude Any Color Id** column displays any color ID (identifier) that is excluded.
Exclude Any Color Bits	The **Exclude Any Color Bits** column displays the color bits that are excluded.
Exclude Any Color Name	The **Exclude Any Color Name** column displays any color name that is excluded.
GMRE SNC Label	The **GMRE SNC Label** column displays the GMPLS Routing Engine (GMRE) subnetwork connection label that is associated with the selected ASON SNC.
Reversion Control Group	Specifies the Reversion Control Group that is associated to the SNC
ID	The **ID** column displays the Network Protection Architecture identifier for the selected object.
Include Any Color Bits	The **Include Any Color Bits** column displays any color bits that are included.
Include Any Color Id	The **Include Any Color Id** column displays any color Id that is included.
Include Any Color Name	The **Include Any Color Name** column displays any color name that is included.

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Table 10-8 ASON SNC table description (continued)

Columns	Descriptions
Max Latency	The **Max Latency (microsec.)** column displays the maximum latency in microseconds that is associated with the selected ASON SNC. The range of values is from 0 to 10000000. While migrating to NFM-T R22.6, if the **Max Latency** value is greater than 10000000 microseconds, then it is set to 10000000 microseconds automatically in NFM-T. Otherwise the same value is retained. However, the actual value is applicable for GMRE on the NE.
MRN Tunnel Type	For a TE Link, the **MRN Tunnel Type** column displays **Not Applicable** or the type of Multi-Region Network (MRN) tunnel that is associated with the TE Link. For an SNC, the **MRN Tunnel Type** column displays **Not Applicable**, **Terminated**, or **Unterminated**.
Diversity Mode	The **Diversity Mode** specifies the diversity mode set for a selected ASON SNC. This new optional parameter allows forcing of the LSP provisioned diversity constraint to be soft or hard in terms of SRGs/TELink diversity. Four types of Diversity modes are supported from **SNC Constraints Management** window: • **SRG Diverse** • **Link Diverse** • **Most Disjoint** • **Full Overlap Allowed** For more information, see 10.42 "Manage SNC constraints" (p. 1554).
Name	The **Name** column displays the name that is identified with the ASON subnetwork connection.
Native Name	The **Native Name** column displays the name of the node and the IP address of the selected node in the Control Plane. **Example:** EMS:10.243.222.10
Node Id	The **Node Id** column displays the alphanumeric string that is identified with the node.
NPA Id	The **NPA ID** column displays the identifier of the Network Protection Architecture for the selected object.
NPA Name	The **NPA Name** column displays the name of the NPA
Operational State	The **Operational State** column displays whether the connection is up (in service) or down (out-of-service). Information is displayed in icon format. This icon is an up (green) or down (black) arrow.
Preferred Restoration Mode	The **Preferred Restoration Mode** column displays whether the restoration mode that is preferred is **Guaranteed Restoration**, **No Restoration**, or **Source-based Restoration**
Priority	The **Priority** column displays the priority that is associated with the ASON SNC.
Protection	For ASON SNCs, the **Protection** column displays whether the protection method for the subnetwork connection is **D&C SNCP**, **In Rings**, **None**, or **SNCP**.
Protection Group	The **Protection Group** column displays the protection group that is associated with the ASON SNC.
Required Priority	The **Required Priority** column displays the required priority of the ASON SNC.
Required Reversion Mode	The **Required Reversion Mode** column displays the reversion mode to be **Automatic**, **Manual**, **Soft Automatic**, or **-**, which is unknown or not applicable.
Required Setup Priority	The **Required Setup Priority** column displays the required setup priority of the ASON SNC.

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Table 10-8 ASON SNC table description (continued)

Columns	Descriptions
Restoration Mode	Displays the Restoration methods: **No Restoration**, **Sourced-based Restoration** (the default), or **Guaranteed Restoration**. With **No Restoration**, traffic is lost if a failure occurs With **Source-based Restoration**, the Control Plane protects the traffic if a failure occurs by calculating a new route With **Guaranteed Restoration**, the restoration path is pre-calculated and it improves the restoration time respect to SBR type
Reversion Blocked State	The **Reversion Blocked State** column displays the reversion blocked state to be **blocked** or **not blocked**.
Reversion State	The **Reversion State** column displays the reversion state to be **not ready to revert** or **ready to revert**.
Reversion Control Group	The **Reversion Control Group** column displays the name of the Reversion control group.
Routing State	The **Routing State** column displays the routing state of the ASON SNC to be **normal** or **rerouted**.
Setup Priority	The **Setup Priority** column displays the setup priority of the ASON SNC.
Snc ID	The **SNC Id** column displays the identifier of the ASON subnetwork connection (SNC).
SNCP Command Status	The **SNCP Command Status** column displays the last SNCP command status performed on a given ASON SNC. The supported values are: • **Forced SNCP** • **Manual SNCP** • **No SNCP Command** • **Unknown**
SNC Type	Helps to identify whether the ASON SNC is of private tunnel type. **SNC Type** column heading remains hidden. The user must select to view the **SNC Type** attribute.
Subnetwork Connection Shape	The **Subnetwork Connection Shape** column displays the shape of the ASON SNC to be **I Shape**, **X Shape**, or **Y Shape**.
	The **TCM Level** determines the Tandem Connection Monitoring level. The values are no TCM (the default), Level 1, Level 2, Level 3, Level 4, Level 5, or Level 6.
Test Mode	The **Test Mode** column displays whether the testing mode for the selected object is **Active**, **Inactive**, or **Unknown**.
Time Slot Granularity	The **Time Slot Granularity** column displays the granularity to be **ODU0**, **ODU1**, or **-**, which is unknown or not applicable.
Transport Network	Displays the type of transport network, whether **Electric** or**Photonic** The photonic layer of OTN is provided through Wavelength Division Multiplexing (WDM) NEs The electrical layer of OTN is provided through both WDM and Optical Cross-connect System (OCS) NEs or only through a network of OCS NEs that carry either the same data rate level as the photonic layer or a lower data rate level that is multiplexed and transported through the photonic layer.
Used Soft Revertive SNCP Mode	This value is the last synchronized value from the GMRE application.

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Table 10-8 ASON SNC table description (continued)

Columns	Descriptions
Used Soft Revertive SNCP Timeout	This value is the last synchronized value from the GMRE application.
Wait For Server Restoration	The **Wait For Server Restoration** column displays whether this feature is operational or not. Supported values are **No** (default), **Yes** or **N/A**.
WDM Layer	The **WDM layer** column displays the WDM layer rate of the ASON SNC to be **DS**, **Not Defined**, **OCH**, **ODU...** (various rates), **OMS**, **OTU**, or **Physical**.
Working State	The **Working State** column displays whether the working state of the selected ASON SNC is **Normal**, **Failed to Reroute**, **Failed to Implement**, **Failed to Deimplement**.

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10.35 More operations on ASON SNC

ASON SNC More option

Table 10-9 ASON SNC More option description

Menu	Second Level Menu	Description
Infrastructure		Opens the Infrastructure page in a new window. For more information see *OTN guide*.
Convert current to nominal		From SNC list the user can get the current route and once the failure is repaired, the user can switch back to nominal, see "ASON Concepts" (p. 364) and 10.44 "Switch SNC routes" (p. 1560)
Enable Test Mode		Allows to enable the Test Mode for an SNC. That deals with modifying the **Working State** of the attributes of the SNC. See 10.40 "Enable/ Disable the test mode for an SNC" (p. 1550)
Disable Test Mode		Allows to disable the Test Mode for an SNC. That deals with modifying the **Working State** of the attributes of the SNC. See 10.40 "Enable/ Disable the test mode for an SNC" (p. 1550)
Switch to Nominal		Allows to switch routes (to nominal) for an SN, see 10.44 "Switch SNC routes" (p. 1560)
Switch to Backup		Allows to switch routes (to backup) for an SNC, see 10.44 "Switch SNC routes" (p. 1560)
Modify Attributes		Allows to modify the attributes for an SNC, see 10.43 " Modify the attributes of an SNC" (p. 1557)
SNC Constraints Management		Allows to manage SNC restoration constraints, see10.42 "Manage SNC constraints" (p. 1554)
Add Preconfigured Backup/Delete Preconfigured Backup		Add and delete preconfigured backup route See 10.45 "Set a preconfigured Backup Route in ASON SNC" (p. 1563).
Inherited Priorities		The inherited priorities of an SNC are illustrated as two sliding scales (one for Inherited Holding Priority, the other one for Inherited Setup Priority) that both range from 1, which is the highest, to 5, which is the lowest, see 10.37 "View the inherited priorities of an SNC" (p. 1542)
SNCP Management	**Synchronize Switch Position** **Force main** **Force spare** **Manual main** **Manual spare** **Release**	Allows to Manage SNCP in ASON SNC. Supported management options are listed in **Second Level Menu** columns. See 10.41 "Manage SNCP in ASON SNC" (p. 1553)
Correlate ASAP		Shows how to correlate an SNC with an ASAP, see 10.39 "Correlate an ASAP with SNC" (p. 1546)
Misalignment Report		Lists the misaligned objects for the selected SNC, see 10.38 "View a misalignment report for an SNC" (p. 1544)

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Table 10-9 ASON SNC More option description (continued)

Menu	Second Level Menu	Description
Jobs		Open a new window which displays main data and status of SNC jobs.
Routes		The Nominal Route and the Current Route for the SNC are displayed in Routes page
Create Reversion Group		Creates the Reversion Control Group by associating two ASON SNCs. This option is enabled for multi-select of the ASON SNCs. Only twpo ASON SNCs can be selected at a time.

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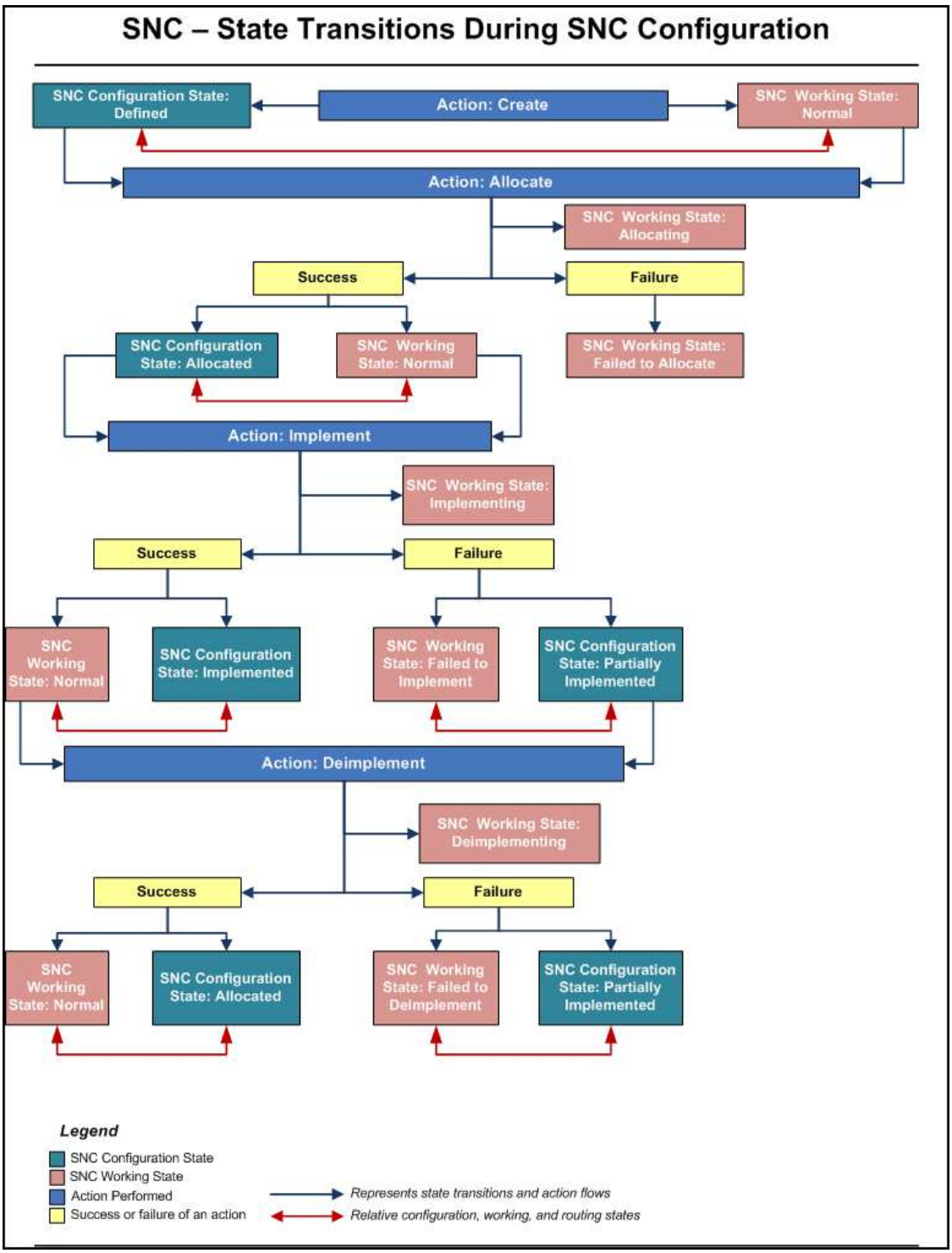
10.36 ASON SNC state transition diagrams

ASON SNC state transition - SNC configuration



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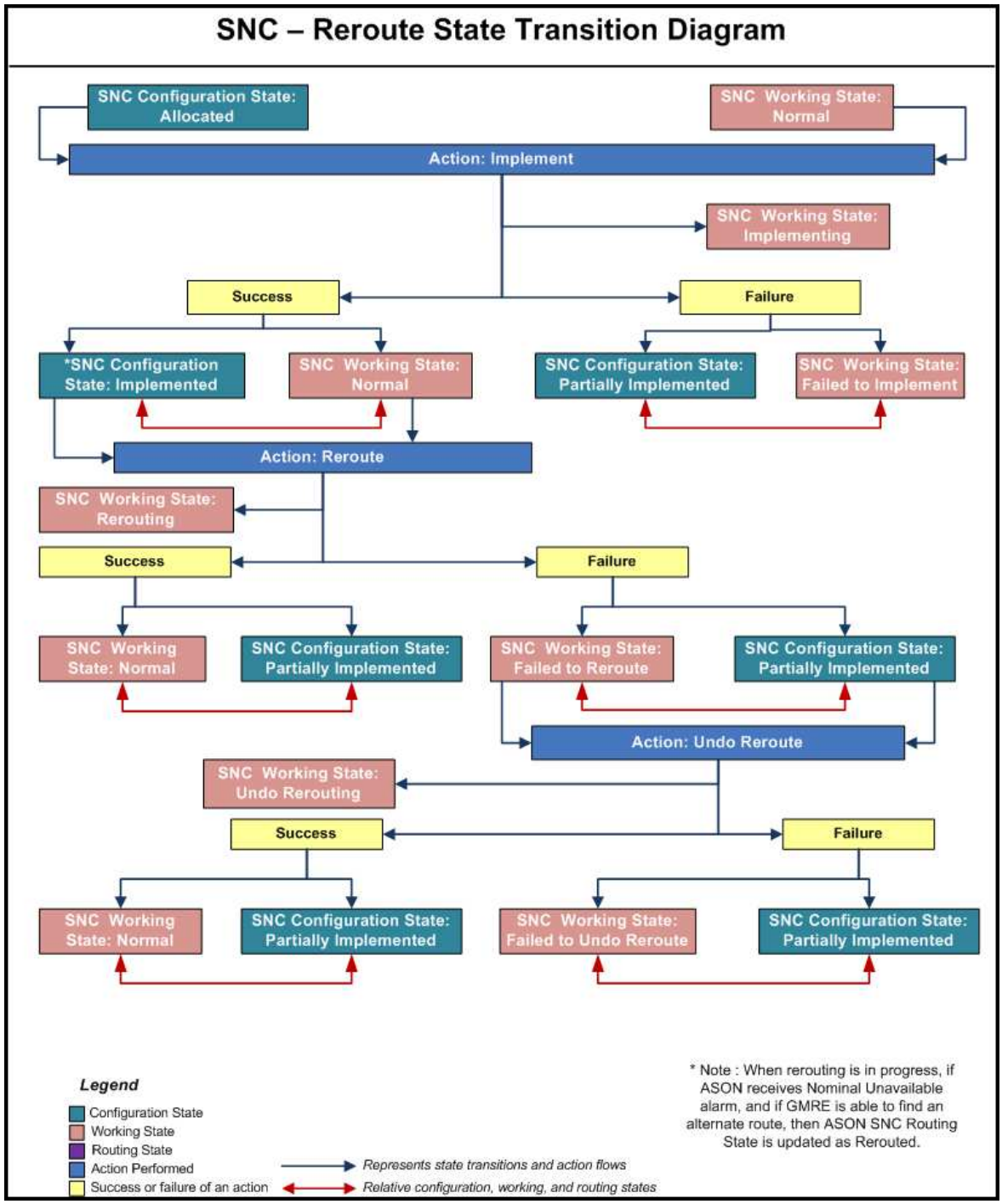
ASON SNC state transition - Reroute

Figure 10-53 ASON SNC State Transition - Reroute



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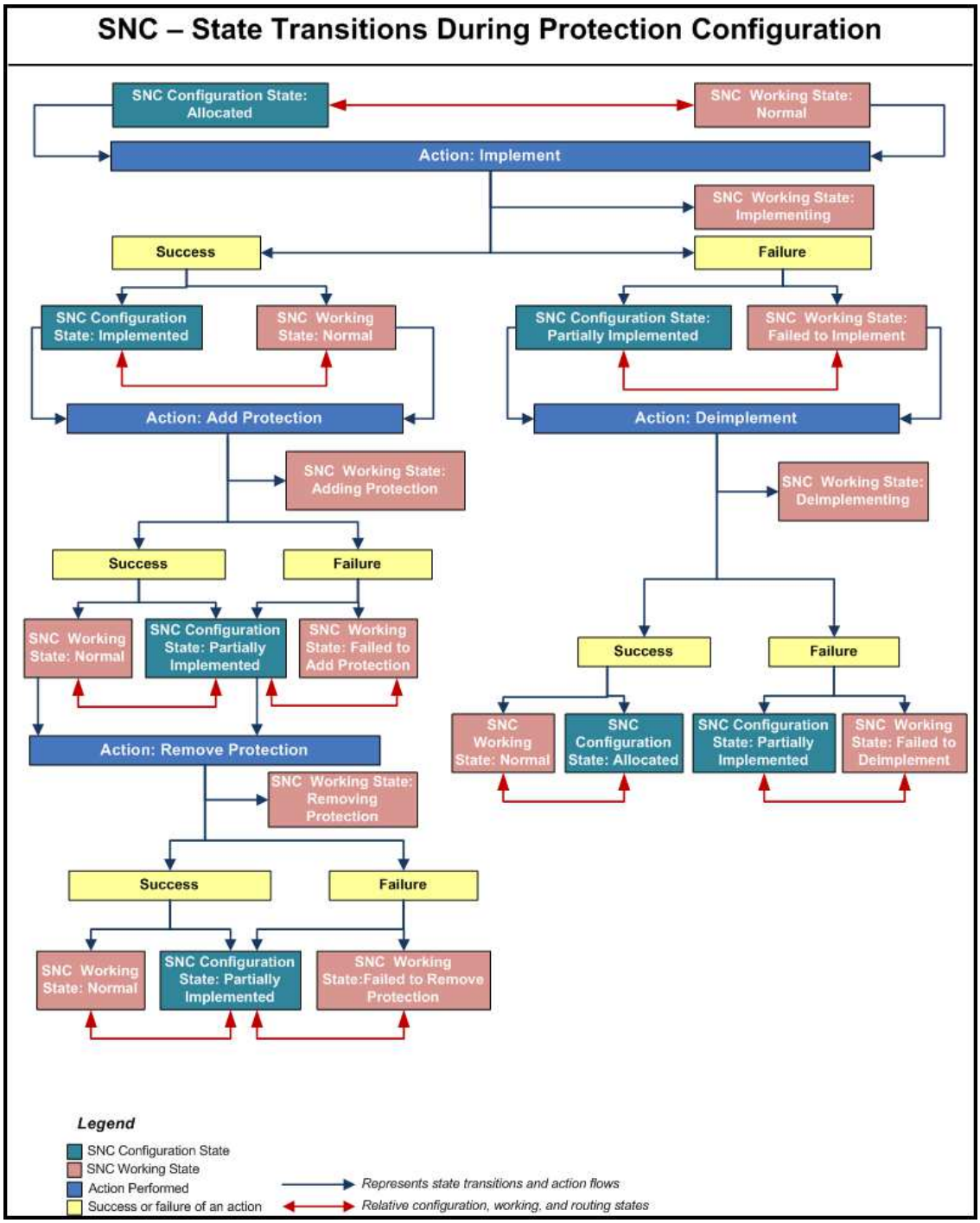
ASON SNC state transition - Protection

Figure 10-54 ASON SNC State Transition - Protection



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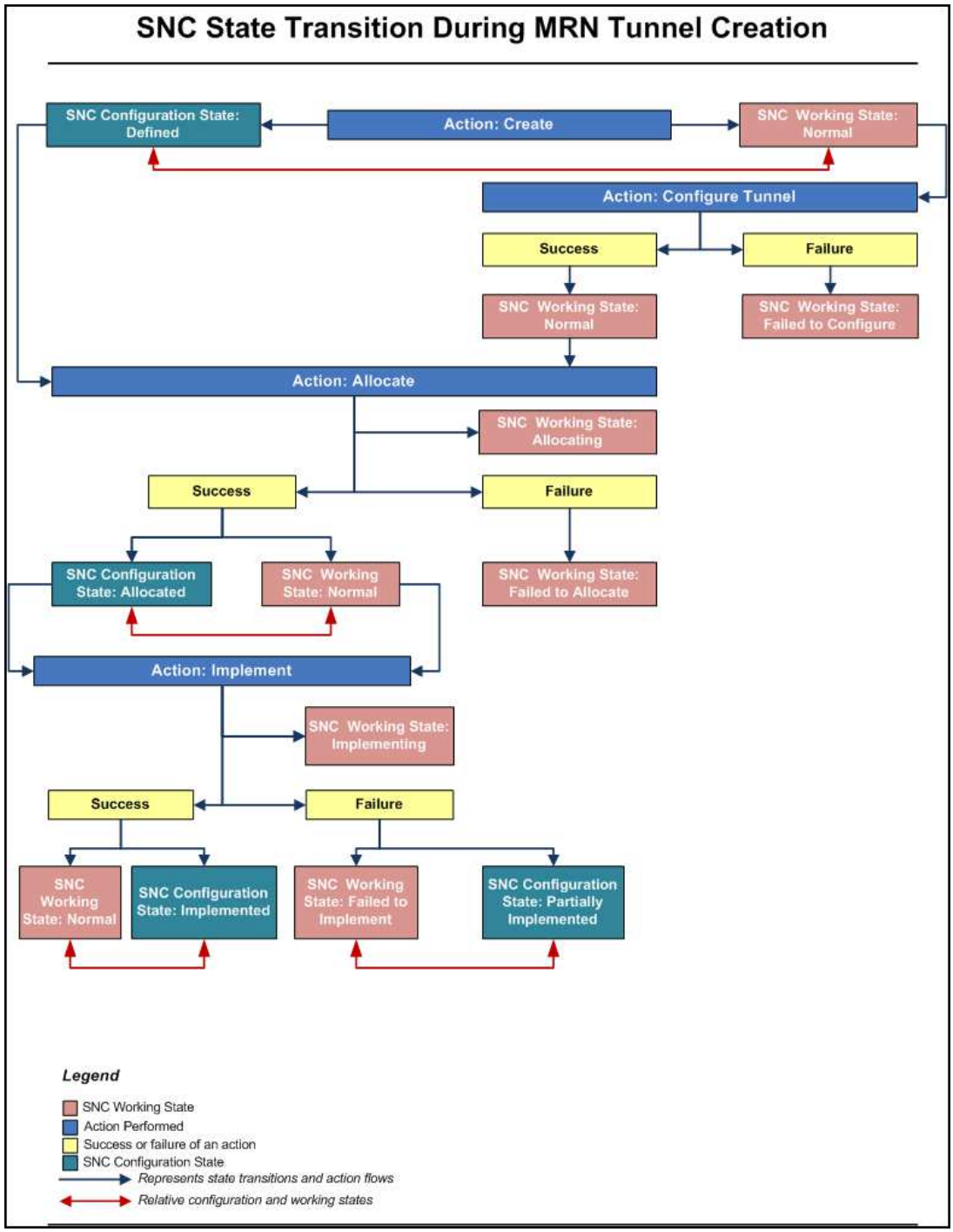
ASON SNC state transition - MRN Tunnel creation

Figure 10-55 ASON SNC State Transition - MRN Tunnel Creation



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10.37 View the inherited priorities of an SNC

Purpose

Use this task to view the inherited priorities of an SNC.

Ensure that the SNCs are available in the data table.

The inherited priorities of an SNC are illustrated as two sliding scales that range from 1, which is the highest, to 5, which is the lowest.

- Inherited Holding Priority
- Inherited Setup Priority

This task provides all navigation methods to access the ASON SNC data table from the **OPERATE >** navigation path. Depending on the ASON SNC, all ASON SNC data tables that are displayed with the **ASON SNCs** tabbed topic provide the same actions and functions.

Task

Complete the following steps to view the inherited priorities of an SNC.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs

OPERATE > ASON > NPAs > 360° View > ASON SNCs (tab)

2

On the selected SNC, click the **More** ⋮ icon and select **Inherited Priorities** from pop up menu.

Result: The system displays the **Inherited Priorities** window. This is a read only window.

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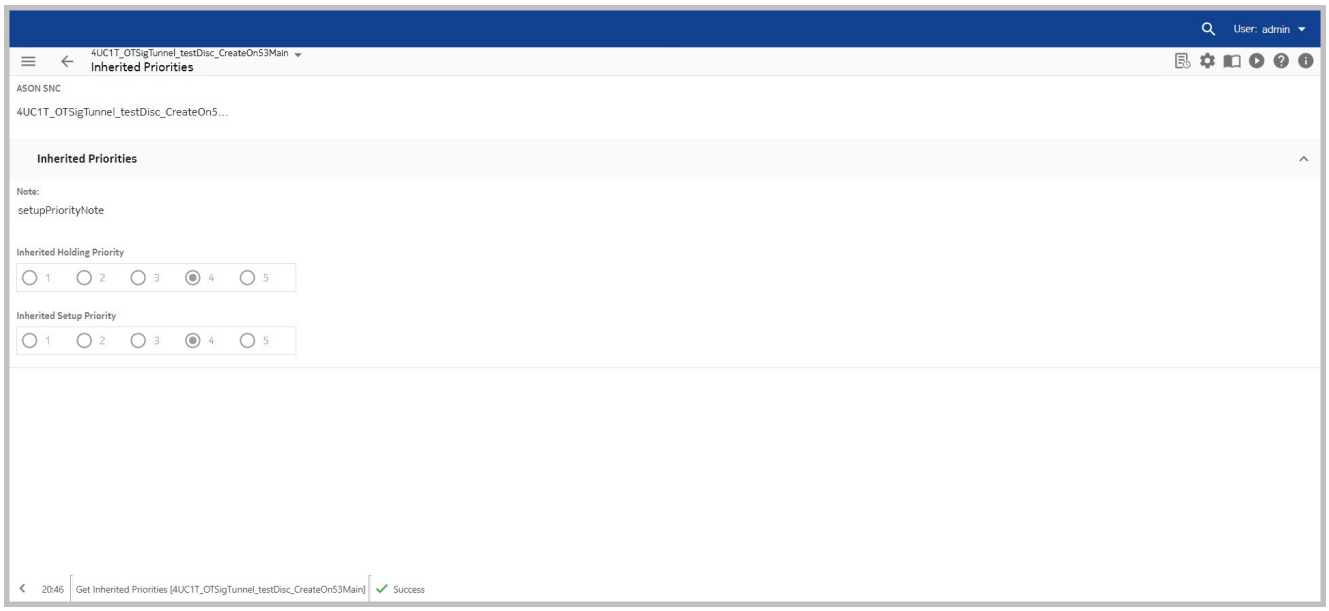
Figure 10-56 Inherited Priorities window



END OF STEPS

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10.38 View a misalignment report for an SNC

Purpose

Use this task to view the misalignment report for an SNC.

Task

Complete the following task to view the misalignment report for an SNC.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs.

OPERATE > ASON > NPAs > 360° View > ASON SNCs (tab).

2

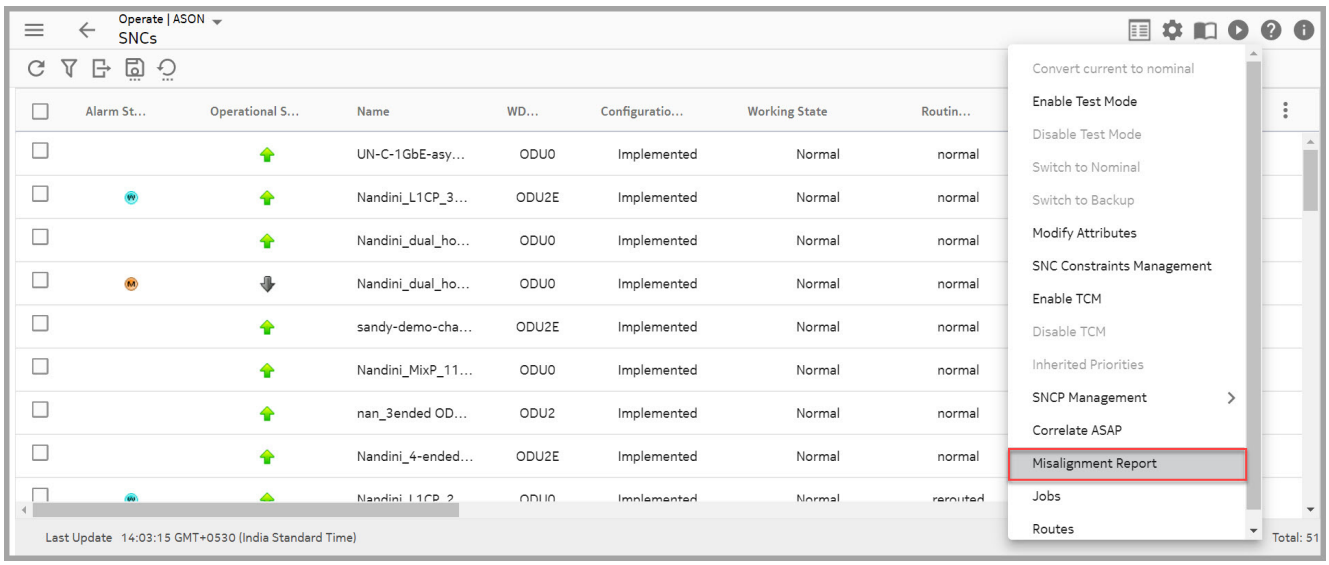
Click the **Manage Columns** ( ) icon in the **Select View** area to add or remove columns or views from the page. Click **Apply** to close the window and return to the page you were working on.

See 26.7 "Manage data columns" (p. 2213) for a detailed description and usage of the Manage Columns window.

3

On the selected SNC, click the **More** icon and select **Misalignment Report**.

Figure 10-57 Misalignment Report in ASON SNC



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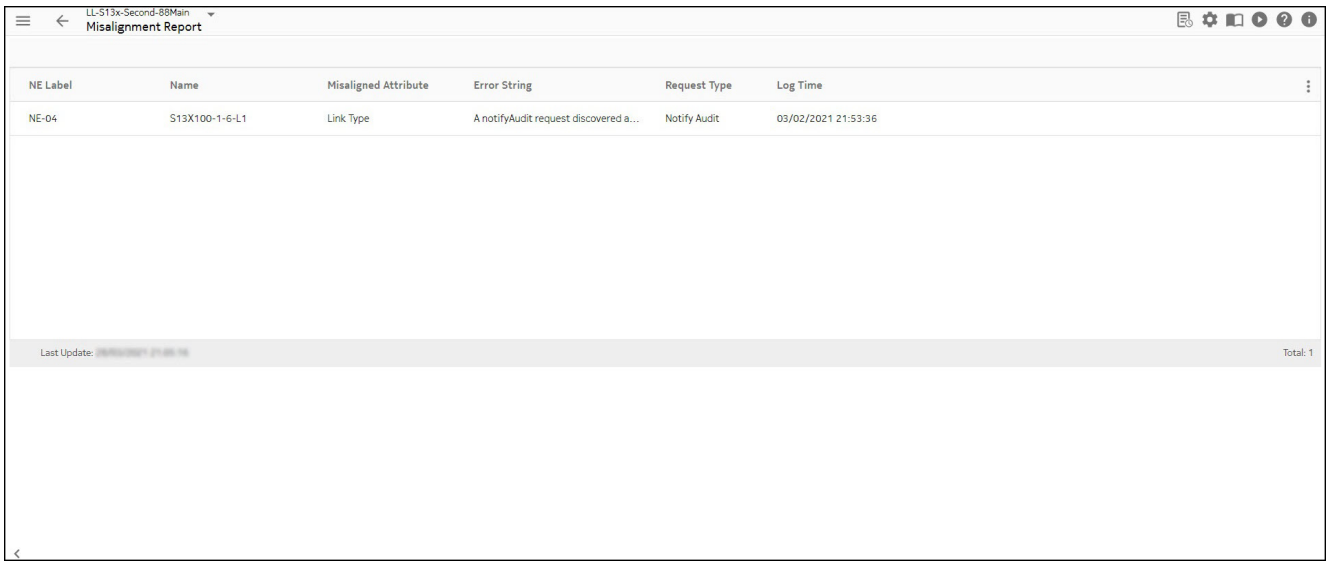
Result: The system displays the **Misalignment Report** window.

Note: The misalignment report displays data only for objects involving ASON SNC links for Control Plane connections.

Figure 10-58 Misalignment Report window



4

To view the additional attributes, click the **Attribute** icon.

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10.39 Correlate an ASAP with SNC

When to use

Use this task to correlate an SNC with an ASAP.

Ensure that the SNCs are listed in the data table.

Task

Complete the following steps to correlate an SNC with an Alarm Severity Assignment Profile (ASAP).

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs

OPERATE > ASON > NPAs > 360° View > ASON SNCs (tab)

2

Click the **Manage Columns** ( ) icon in the **Select View** area to add or remove columns or views from the page. Click **Apply & Save** to save the changes and close the window.

See 26.7 "Manage data columns" (p. 2213) for a detailed description and usage of the Manage Columns window.

3

On the selected SNC, click the **More** icon and select **Correlate ASAP** option.

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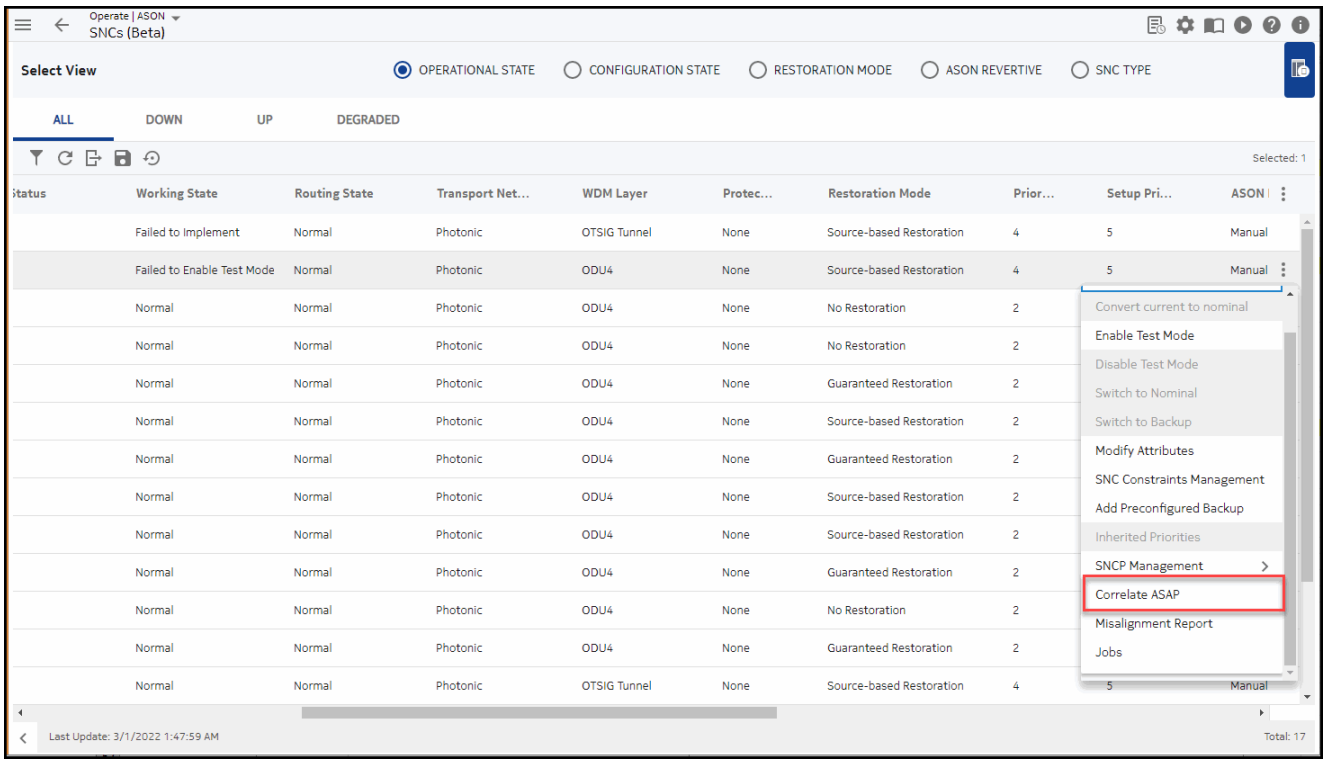
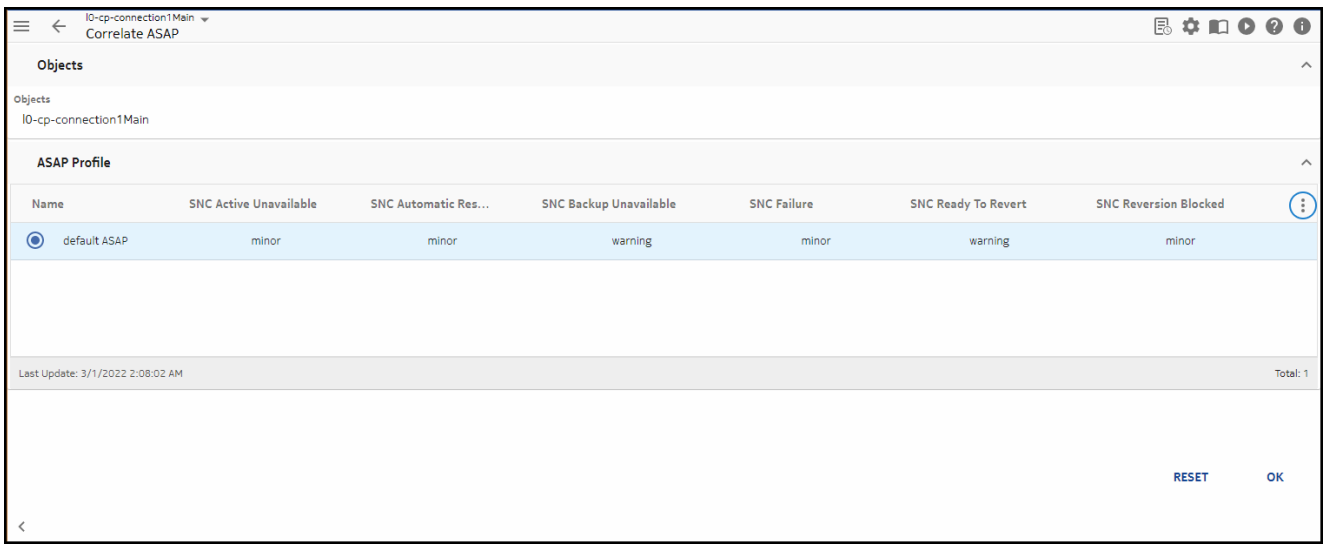
Figure 10-59 Correlate ASAP option in ASON



Result: The system displays the **Correlate ASAP** window.

Figure 10-60 Correlate ASAP window in SNC



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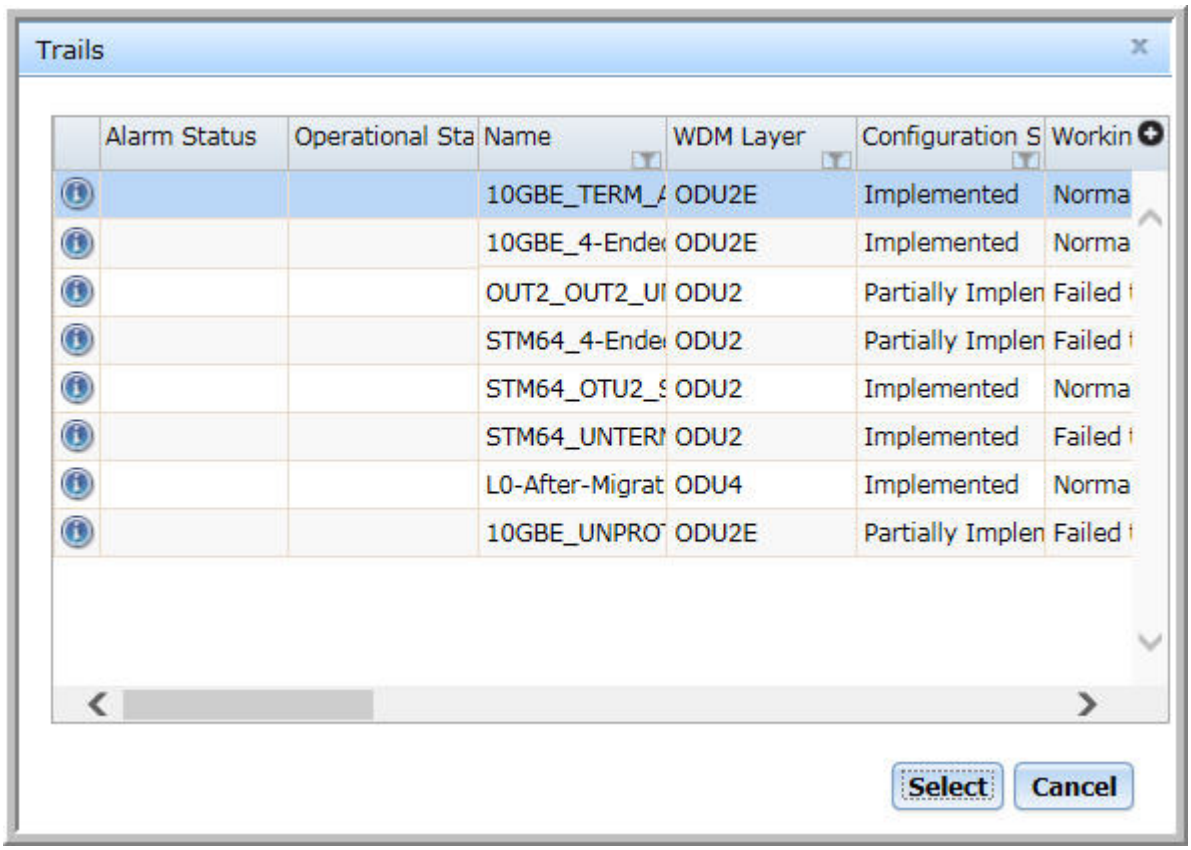
4

To select and populate the entity in the **Objects** panel, click the **Search** icon.

Result: The system displays the **Trails** window.

Figure 10-61 Trails window



5

To select the alarm profiles and populate in the **ASAP Profile** panel, click the **Search** icon.

Result: The system displays **Alarm Profiles** window.

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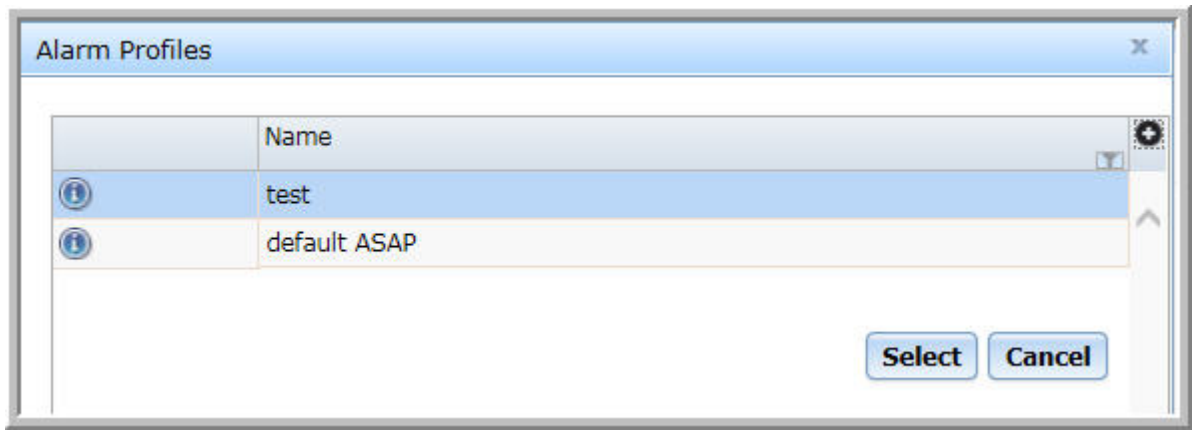
Figure 10-62 Alarm Profiles window



6

Click **Deploy**.

Result: The selected ASAP and SNC are now correlated.

END OF STEPS

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10.40 Enable/Disable the test mode for an SNC

When to use

Use this task to enable or disable the test mode for an SNC.

Related information

The enabling or disabling of the test mode for an SNC deals with modifying the **Working State** of the attributes of the SNC. Only an SNC that has the **Working State** of Normal can have the test mode enabled. Only an SNC that has the **Working State** of **Failed to Modify SNC Attributes** can have the test mode disabled.

Depending on the success or the failure of the test mode, the system changes the **Working State** from **Normal** to **Modifying SNC Attributes** or **Failed to Modify SNC Attributes**; or, conversely, the system changes the **Working State** from **Failed to Modify SNC Attributes** to **Normal**.

Before you begin

Ensure that the SNCs are available in the data table.

Task: Enable Test Mode

Complete the following steps to enable the Test Mode for an SNC.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs

OPERATE > ASON > NPAs > 360° View > ASON SNCs (tab)

2

Click the **Manage Columns** ( ) icon in the **Select View** area to add or remove columns or views from the page. Click **Apply** to close the window and return to the main page.

See 26.7 “Manage data columns” (p. 2213) for a detailed description and usage of the Manage Columns window.

3

On the selected SNC, click the **More** icon and select **Enable Test Mode**.

Result: Depending on the success or failure of the test mode, the system changes the status of the **Test Mode** attribute.

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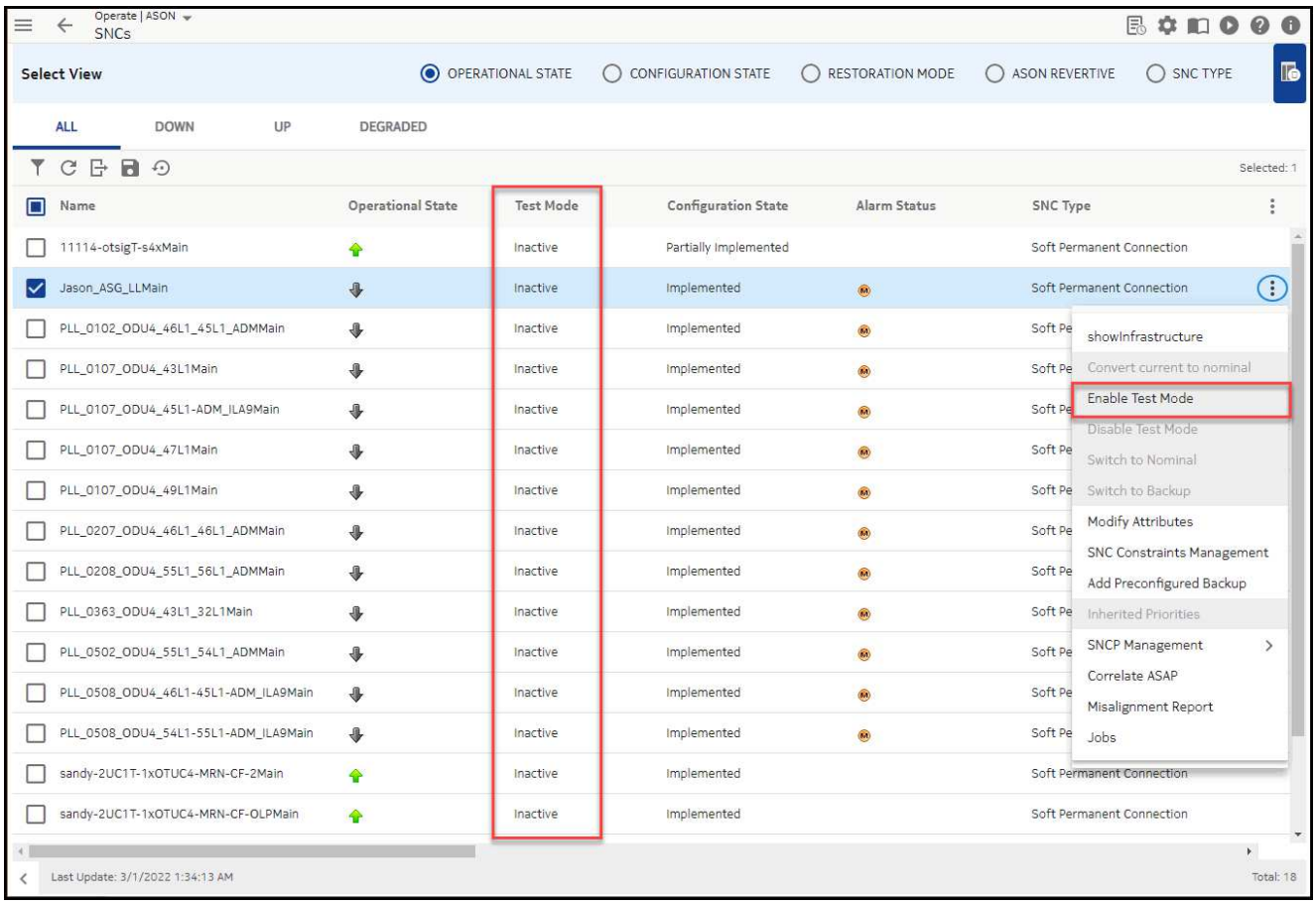
Figure 10-63 SNC Test Modes



END OF STEPS

Task: Disable Test Mode

Complete the following steps to disable the Test Mode for an SNC.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs

OPERATE > ASON > NPAs > 360° View > ASON SNCs (tab)

2

On the selected SNC click the **More** icon and select **Disable Test Mode**.

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Result: The system changes the **Test Mode**.

End of steps

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10.41 Manage SNCP in ASON SNC

Purpose

Use this task to Manage SNCP in ASON SNC.

Ensure that the ASON SNCs are available in the data table.

To identify the SNCP command status for each SNC that is listed in the SNC data table, click the plus sign that is located in the upper right corner of the data table and check the SNCP command status column.

Task

Complete the following steps to manage SNCP in ASON SNC.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs.

OPERATE > ASON > NPAs > 360° View > ASON SNCs.

Result: The system displays the list of SNCs in the data table.

2

On the selected SNC to which you want to manage SNCP, depending on the current state of the SNC, click the **More** icon and follow one of these paths:

- **SNCP Management > Synchronize Switch Position**
- **SNCP Management> Force main**
- **SNCP Management> Force spare**
- **SNCP Management> Manual main**
- **SNCP Management> Manual spare**
- **SNCP Management> Release**

Result: The system displays a success or failure message at the bottom of the window and changes the SNCP command status in the SNC data table to reflect your request.

Note: The SNCP page will be shown as menu option to launch in the NFM-T GUI.

END OF STEPS

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10.42 Manage SNC constraints

When to use

Use this task to manage SNC constraints.

Ensure that the SNCs are available in the data table.

Task

Complete the following steps to manage SNC constraints.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs.

OPERATE > ASON > NPAs > 360° View > ASON SNCs.

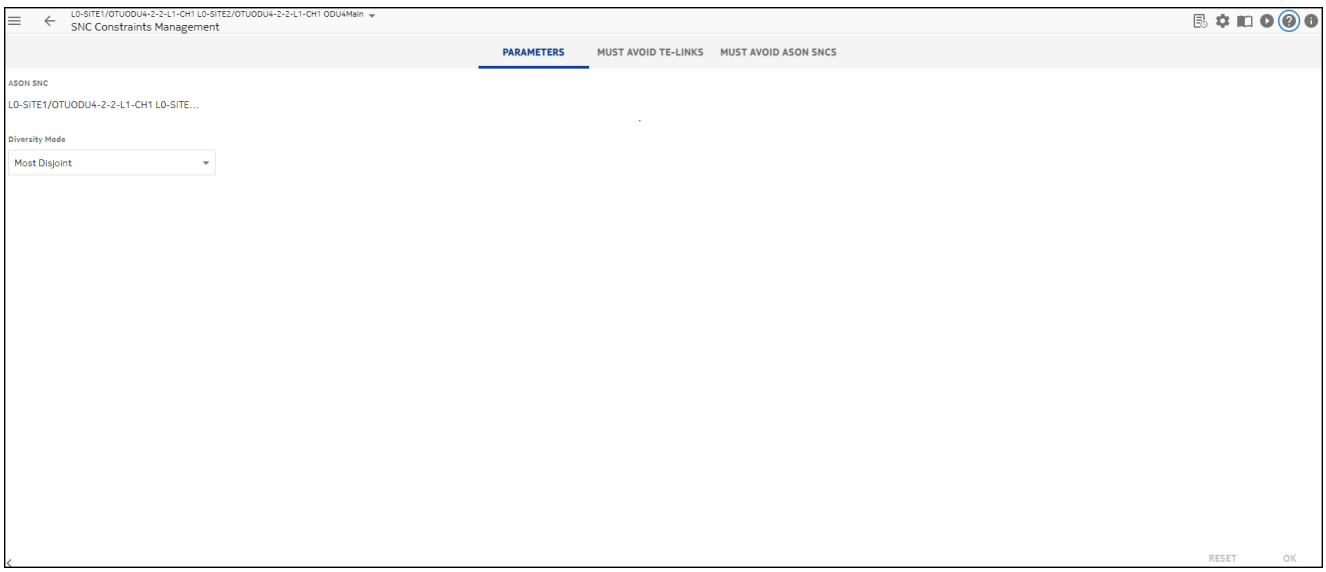
Result: The system displays the list of SNCs in the data table.

2

On the selected SNC, click the **More** icon and select **SNC Constraints Management** option.

Result: The system displays the **SNC Constraints Management** window.

Figure 10-64 SNC Constraints Management window



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3

In the **PARAMETERS** tab, select the appropriate value for **Diversity Mode** field from the drop-down list.

For protected connections traversing ASON networks using two different SNCs (one for working and another for protection) retain the current or backup route diverse to prevent single failure to affect both working and protection. Adding the Diversity Mode allows the forcing of the LSP provisioned diversity constraint to be soft or hard in terms of SRGs or TE Link diversity, that is, allow or do not allow SRG or TE Link overlap.

By default, the **Diversity Mode** is set to **Most Disjoint**.

The following modes are supported:

Parameter	Description
Strict SRG Diverse	Strict SRG Diverse is a restrictive mode. GMRE sets up the new LSP route only if it is SRG Diverse from the configured LSP or TE Link diversity constraint. If this is not possible, the new LSP route setup fails with alarm **`Reroute not possible`**. GMRE uses a route if the SRGs are diverse to the provided diversity constraints.
Strict Link Diverse	GMRE sets up the new LSP route only if it is Link Diverse from the configured LSP/TE Link diversity constraint. SRG diversity violation is allowed and **`SRG violation`** alarm is raised on the Implemented LSP. GMRE uses a route if the SRGs are diverse to the provided diversity constraints and allows SRG violations in the new route.
Most Disjoint	This is the default diversity mode to grant backward compatibility with the soft mode supported in the previous releases. GMRE tries to set up a full Link and SRG diverse route with respect to the LSP/TE Link configured constraints. Else, **`SRG violation`** or **`Link diversity violation`** alarm is raised on the Implemented LSP. GMRE uses a route if the links are diverse to the provided diversity constraints and allows link violations as long as at least one link is diverse.
Full Overlap Allowed	GMRE tries to set up a full Link and SRG diverse route with respect to the LSP/TE Link configured constraints. If the route is not established, **`SRG violation`** or **`Link diversity violation`** alarm is raised on the Implemented LSP in case of full overlap. This diversity mode allows 100 percent overlap.

Note: For 1830 PSS R11.0 and lower versions, GMPLS Control Plane supports the **Most Disjoint** diversity mode, which applies to LSP services that are specified with TE Link diversity.

4

In the **MUST AVOID TE-LINKS** tab, select the TE Links from the table.

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Result: The selected TE Links that are to be avoided are excluded from the connection creation.

5

In the **Must avoid ASON SNC's** tab, select the subnetwork connections from the table.

Result: The selected ASON SNCs that are to be avoided are excluded from the connection creation.

6

Click **OK**.

Result: The system displays a success message at the bottom of the window.

The connections are deployed with the set diversity mode and selected TE Links and ASON SNCs are excluded.

If the user changes the default to a value that is not compatible with the GMRE version, the NFM-T sets the value back to the value supported by GMRE, that is **Most Disjoint**. The selected Diversity mode is propagated to GMRE current LSP route. The nominal LSP route still retains the **Most Disjoint** default value at creation. As a consequence of that in the **SNC Constraint Management** window, if the user has selected the disjoint from another SNC and set the **Diversity Mode** as **Full Overlap Allowed**, a **Current to Nominal** operation would fail.

End of steps

Behavior when an ASON SNC is filled in ASON SNC box

In case the ASON SNC does not have the same head node of the primary SNC, the system is able to translate the SNC route in a TE Link list and configure them into TE Link diversity on GMRE. The NFM-T stores the SNC diversity information as restoration constraint in NFM-T Database and exports it in JSON files.

LSP Diversity Reset

Scenario

The *LSP diversity* parameter in GMRE, that is equivalent to *Must avoid* SNC's parameter in NFM-T, is reset in GMRE after the operation Convert current to nominal on the SNC.

Resolution

Follow the steps to re-apply the LSP diversity.

1. Navigate as**: OPERATE > ASON > SNCs** once the Convert current to nominal operation is terminated successfully.
2. Click the **More** icon on the SNC, on which the Convert current to nominal operation was done, and select **SNC Constraints Management** option.
3. On the **SNC Constraints Management** window, cross verify the correct LSP diversity is listed in **MUST AVOID ASON SNCS** tab. The LSP diversity is retained in NFM-T after the convert current to nominal operation.
4. Click **OK** to update the LSP diversity in GMRE for this SNC.

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10.43 Modify the attributes of an SNC

When to use

Use this task to modify the attributes of SNC.

Ensure that the SNCs are listed in the data table.

Task

Complete the following steps to modify the attributes of the SNC.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs

OPERATE > ASON > NPAs > 360° View > ASON SNCs (tab)

Result: The system displays the list of SNCs in a data table.

2

On the selected NE, click the **More** icon and select **Modify Attributes**.

Result: The system displays the **Modify Attributes** window for the selected SNC.

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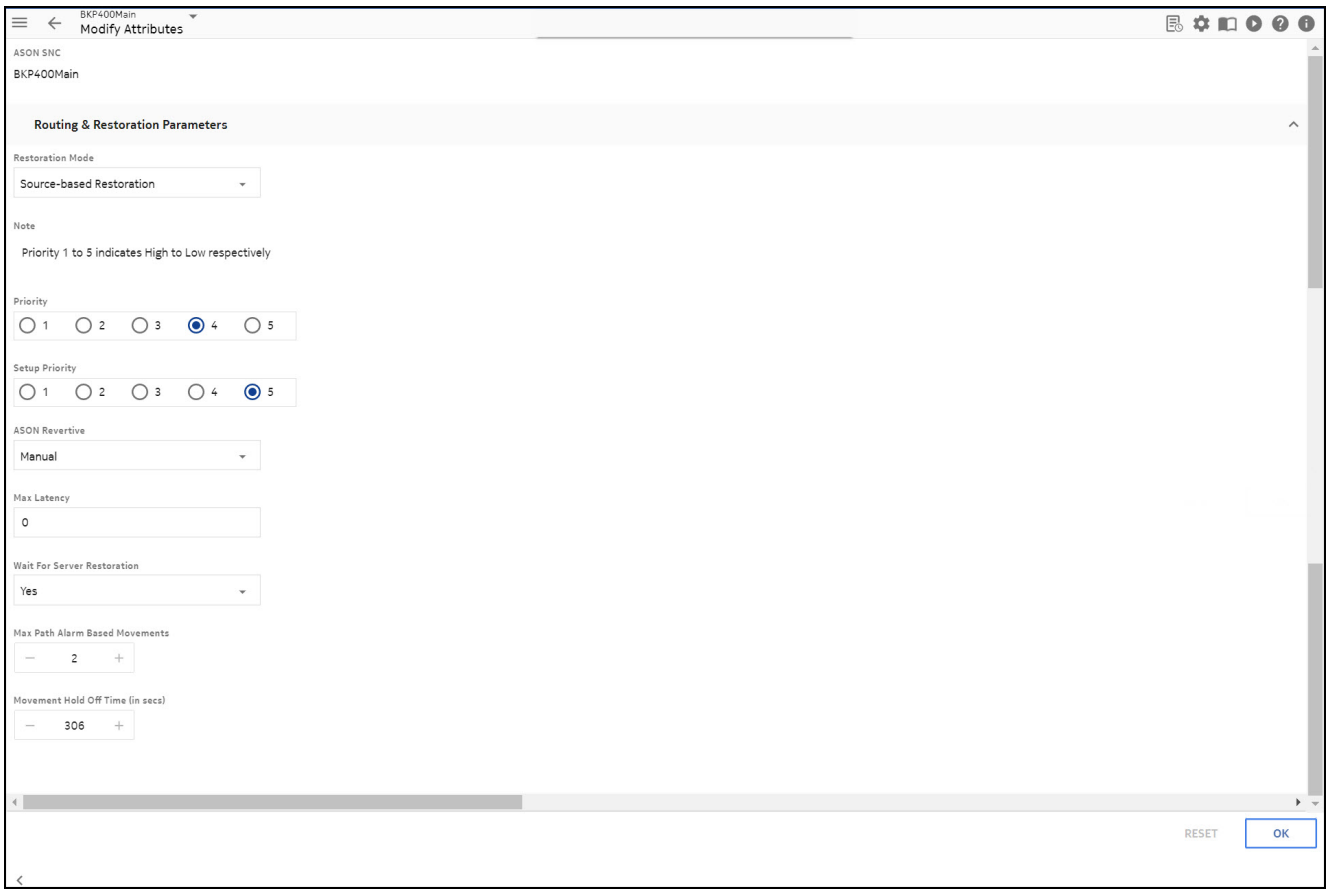
Figure 10-65 Modify Attributes Window



3

In the **Routing & Restoration Parameters** panel, configure the following parameters:

- In the **Restoration Mode** field, select one of the following options:
  - **No Restoration**: the traffic is lost if a failure occurs.
  - **Source-Based Restoration**: the Control Plane protects the traffic if a failure occurs by calculating a new route.
  - **Guaranteed Restoration**: protection and restoration are used together to optimize recovery time and to maximize service quality. The Control Plane calculates a restored route as an alternative to the nominal route (main).
- In the **Priority** field, select the appropriate numbered priority with 1 being high and 5 being low.
- In the **Setup Priority** field, select the appropriate numbered priority with 1 being high and 5 being low.
- In the **ASON Revertive** field, select *Manual* or *Automatic*.

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- In the **Max Latency** field, enter the number of microseconds from 0 to 10000000.
  While migrating to NFM-T R22.6, if the **Max Latency** value is greater than 10000000 microseconds, then it is set to 10000000 microseconds automatically in NFM-T. Otherwise the same value is retained. However, the actual value is applicable for GMRE on the NE.
- In the **Wait For Server Restoration** field, select *True* or *False*.
- In the **Max Path Alarm Based Movements** field, set the value between 0 and 5.
- in the **Movement Hold Off Time (in secs)** field, set the hold-off time between 30 seconds and 1h (3600 seconds).

4

Click **OK**.

Result: The system makes the parameter changes for the selected SNC.

End of steps

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10.44 Switch SNC routes

When to use

Use this task to switch routes for an SNC.

Ensure that the SNCs are listed in the data table.

Task

Complete the following steps to switch the route to Nominal.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > ASON > SNCs

OPERATE > ASON > NPAs > 360° View > ASON SNCs (tab)

Result: The system displays the list of SNCs in the data table.

2

To switch the route to Nominal on the selected SNC, click the **More** icon and select the option to switch the route and select **Switch to Nominal**.

Note: Switch To Nominal option is enabled when the **Reversion Blocked - Path Alarm Movement** alarm is detected in ASON SNC. **Reversion Blocked - Path Alarm Movement** alarm is raised when the OTU Path alarm is present and GMRE has successfully performed the first movement. GMRE blocks the automatic reversion and GMRE is not aware when the issue is solved to raise the **Ready to Revert** alarm. Therefore, the user has to trigger the reversion manually.

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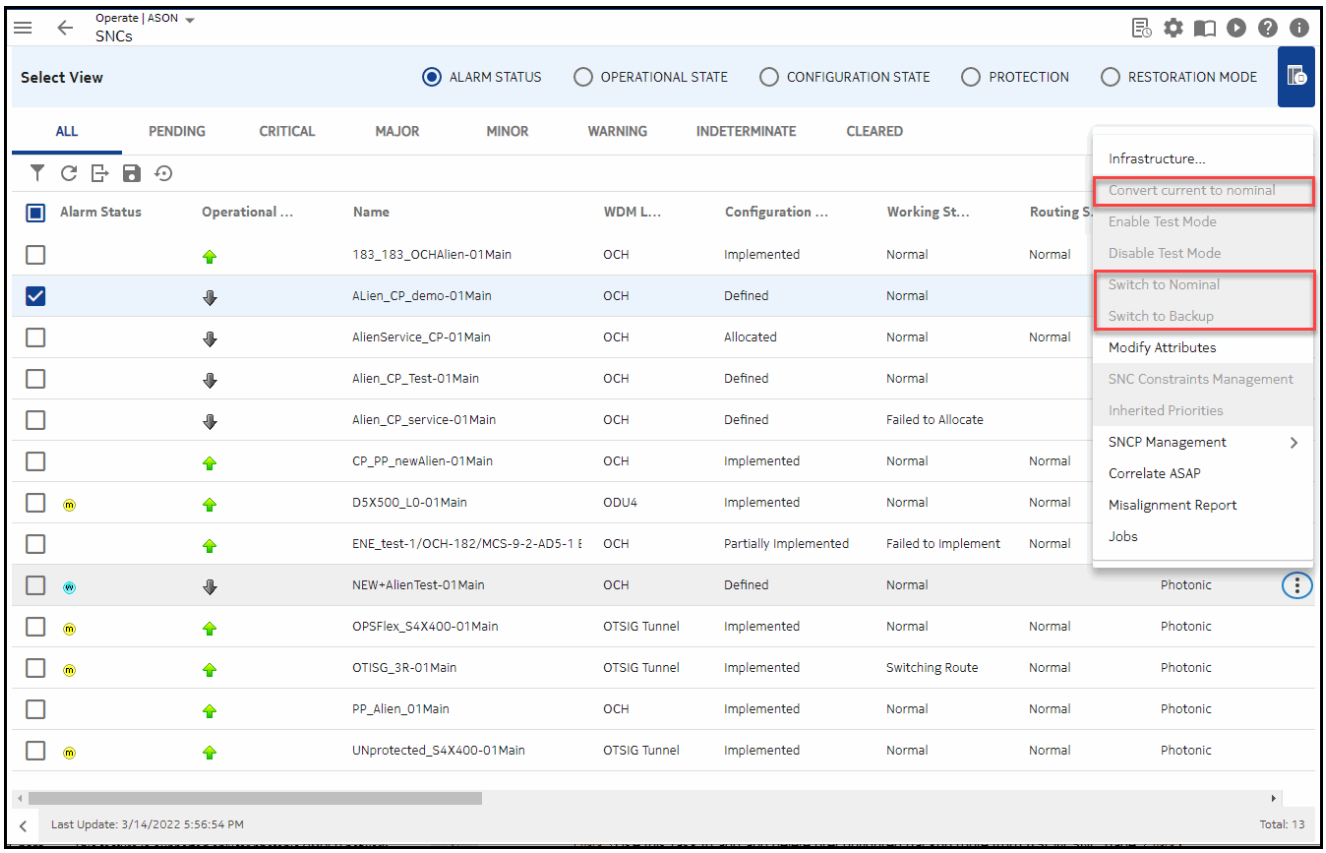
Figure 10-66 Switch Routes - SNC



3

To convert the route, click the **More** icon on the required SNC to convert the route and select **Convert current to nominal**.

4

To switch the route to backup, click the **More** icon on the required SNC to switch the route of backup and select **Switch to Backup**.

5

When you switch to any of the three states, the system displays the message stating that the operation could be traffic impacting.

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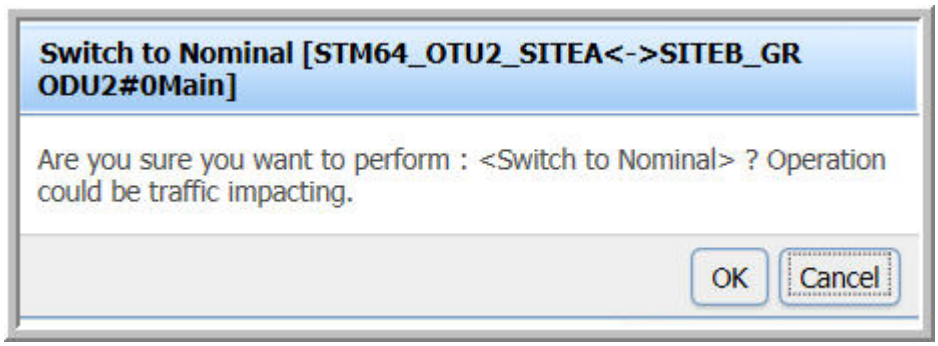

6

Click **OK**

Result: The system displays a success or failure message.

END OF STEPS

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10.45 Set a preconfigured Backup Route in ASON SNC

When to use

Use this task to add and delete preconfigured backup route from ASON SNC page.

The user can configure and provision a preconfigured backup route to be used by GMRE at the first nominal route failure, triggering restoration to GMRE.

The GMRE tries the preconfigured route as first backup (GR scenario) or current route (SBR scenario). If the route functions, the GMRE uses the route. If the route does not function, GMRE calculates its own backup/current route and uses it. GMRE keeps the preconfigured backup route parameters configured by the NFM-T and returns them at backup route retrieval.

Note: This feature is supported only for photonic GMPLS network.

Before you begin

The user must check the end points from the **End Points** tab of ASON SNC so that the user can select the whole route that starts from the A node and ends in the Z node specified in the **End Points** tab. Else, the following error message is displayed during deployment of the constraint: **`TE Link node sequence is not correct`**.

Task: Add a preconfigured backup route

Complete the following steps to add a preconfigured backup route:

1

From the NFM-T GUI, follow this navigation path:

OPERATE > ASON NPAs > 360° View > ASON SNCs (tab).

Result: The system displays the ASON SNCs in a data table.

2

On the selected SNC, click the **More** icon and select **Add Preconfigured Backup** from the drop-down list.

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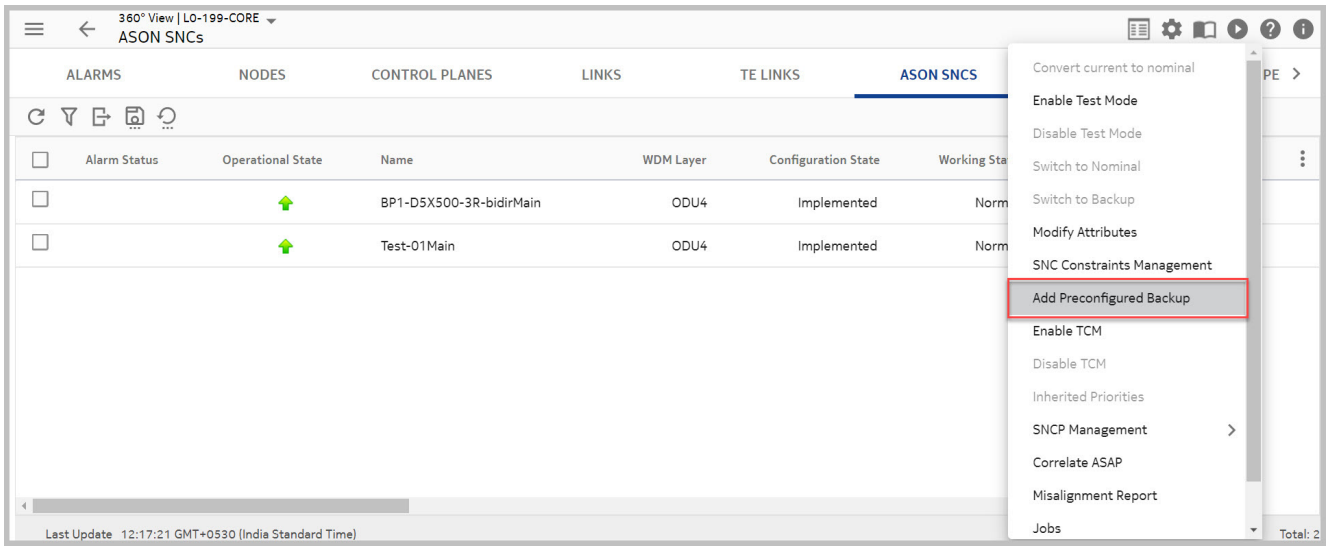
Figure 10-67 Add Preconfigured Backup Route



Result: The **Backup Constraint List** window is displayed to add ASON Link and 3R Constraint types.

3

To add ASON Links as Constraint, select **ASON Link Constraint** from the drop-down. When the user selects **ASON Link Constraint**, the following fields are enabled:

1. In the **SNC Label** field, the name of the SNC is populated automatically.
2. In the **Constraint Type** field, select **ASON Link Constraint**.
3. In the **Current Node** field, enter a node to select the route. The user must select the route that is specified in the **End Points** tab of ASON SNC, for example, A node can be Node 1. The selected node can be A node or Z node.

   The list of ASON links that starts from Node 1 or ends on Node 1 are displayed.
4. In the **Next Node** field, select the respective nodes as mentioned in the **TE Links Name** column of the **ASON Links** panel.

   The **ASON Links** panel is populated based on the selection of the nodes. For description on the table column parameters, see 10.34 “ASON SNC table columns” (p. 1527).
5. Click **Add to Restoration Path** button to add the ASON links to the **Selected Restoration Route** panel.

   The user can add multiple ASON links to the **Selected Restoration Route** panel.

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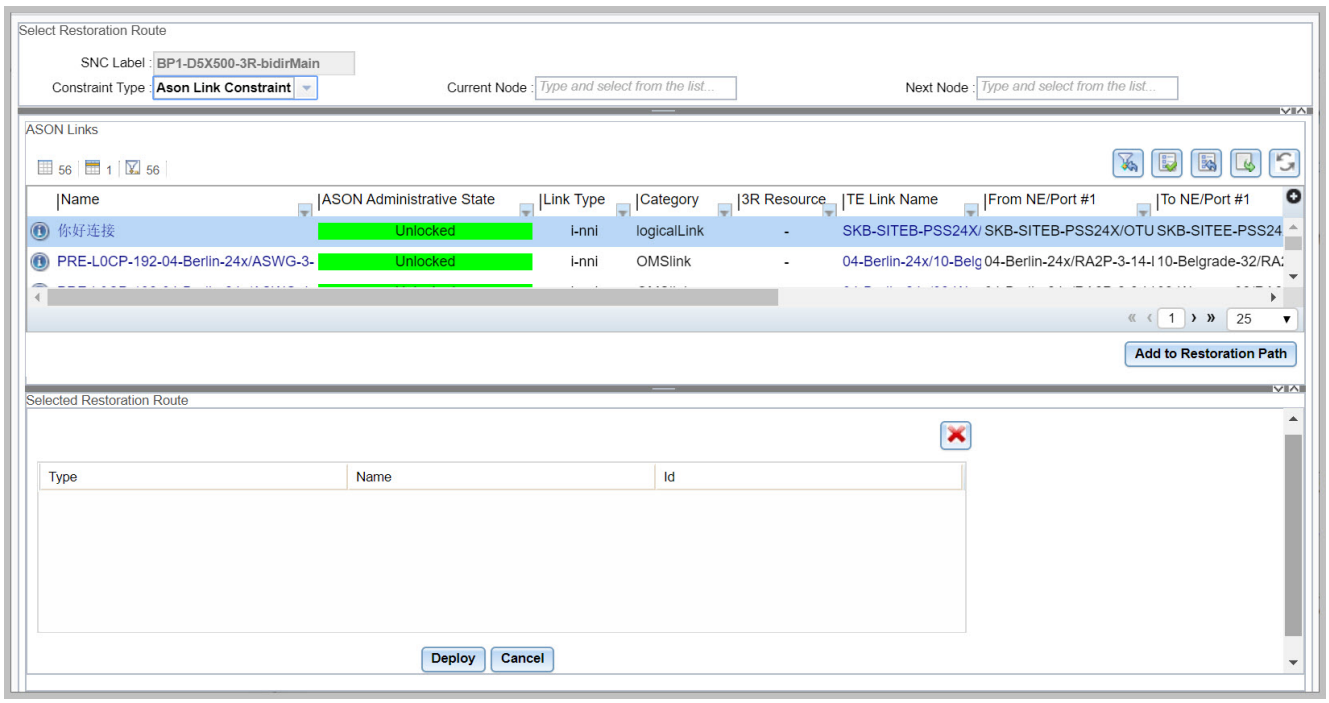
Figure 10-68 Add Restoration Route window: ASONLink Constraint



If there are any 3Rs, the user can add the 3R after the ASON Links as per the route specified in the end.

4

To add a **3R Constraint**, select **3R Constraint** in the **Constraint Type** field. Configure the following parameters:

1. In the **SNC Label** field, the name of the SNC is populated automatically.
2. In the **Constraint Type** field, select **3R Constraint**.
3. In the **Node** field, enter a node name and select the respective node based on the end point sequence in the **End Points** tab of ASON SNC.

   The **3R Port List** panel is populated based on the selection of the nodes with the list of 3Rs for the node.
4. Click **Add to Restoration Path** to add the 3R to the **Selected Restoration Route**.

   The user can add multiple 3Rs to the **Selected Restoration Route** panel.

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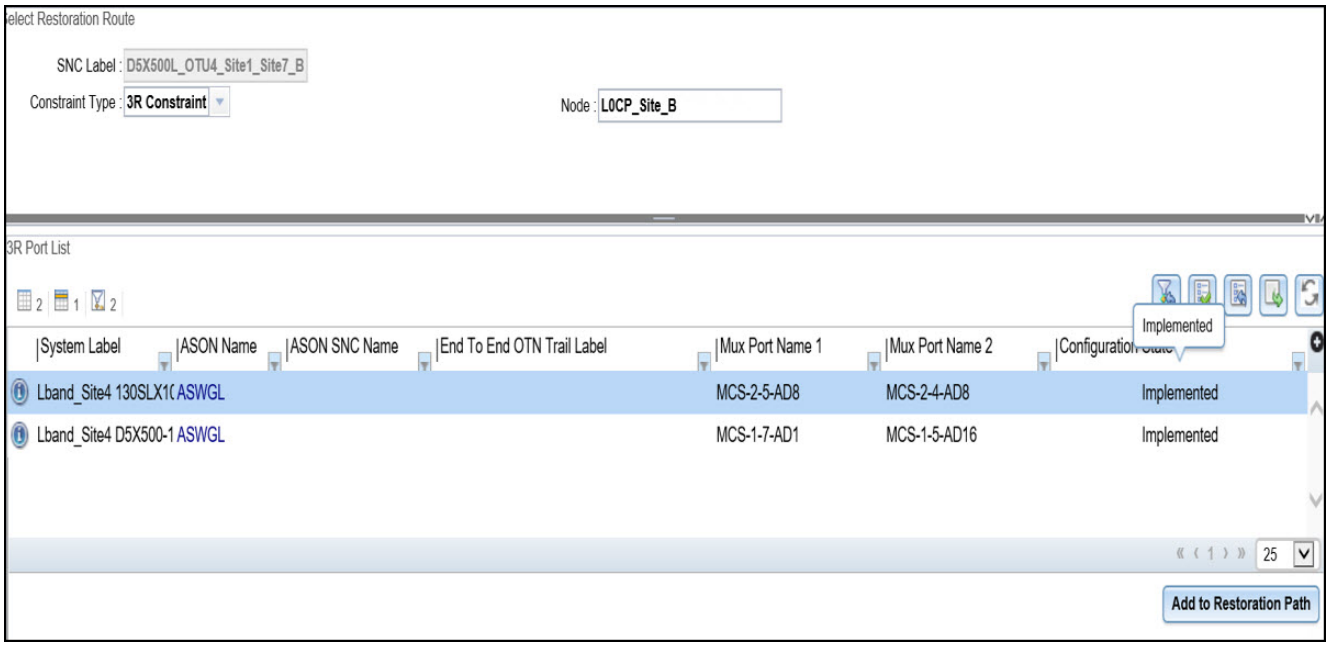
Figure 10-69 3R as Constraint



5

Click the **Delete** icon to delete the restoration path or to rearrange the restoration path as per the sequence.

6

Click **Deploy**.

When the user clicks **Deploy**, the button remains disabled until the user adds another constraint. Click **Cancel** to close the window.

Result: On completion, the following success message is displayed: **`Backup Route Configuration is successful.`**

If the **ASON Links Constraints** and **3R Constraints** are not in the TE Link sequence, an error message is displayed.

When the backup route configuration is successful, the **Add Preconfigured Backup** in the **More** icon of the **ASON SNC** page toggles to **Delete Preconfigured Backup**.

Note: When the user performs an **Add Preconfigured Backup**, the value in the **Backup Route Configured** column in the ASON SNC 360° page changes to **True** from **False**.

7

To view the backup route that is added, navigate to the **Backup Route** tab of ASON SNC page.

For Backup Route, see 25.10 “Backup Route” (p. 2076).

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Note: If the deployment operation is performed consecutively, GMRE overrides with the new path.

END OF STEPS

Task: Delete a preconfigured backup route

Complete the following steps to delete a preconfigured backup route.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > ASON > SNCs.

Result: The system displays the ASON SNCs in a data table.

2

On the selected SNC, click the **More** icon and select **Delete Preconfigured Backup** from the drop-down list.

Result: The Preconfigured Backup Route is deleted.

Note: When the user performs a **Delete Preconfigured Backup** operation, the value in the **Backup Route Configured** column in the ASON SNC 360° page changes to **False** from **True**.

END OF STEPS

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ASON synchronization

10.46 Overview

Purpose

This section provides the steps to perform ASON synchronization for Control Plane connections.

ASON Discovery synchronizes the ASON NPA (TE Links) and ASON SNCs, respectively, from Control Plane enabled Network Elements managed by NFM-T.

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10.47 Introduction

ASON NPA and ASON SNC synchronization

ASON NPA synchronization retrieves the TE Links from all the GMRE nodes supervised in the NFM-T, and assigns the links to the NPA.

ASON SNC synchronization retrieves the ASON SNCs from all the GMRE nodes supervised in NFM-T, and creates the same in NFM-T.

Note: NFM-T supports ASON synchronization from NFM-T R19.9 and above; and NE and GMRE R10.1 onwards.

ASON synchronization is only supported in greenfield network.

The NFM-T supports ASON discovery for L0 and L1 connections. The ASON synchronization addresses the complete synchronization and inventory in NFM-T of all the networking resources of a given Control Plane domain that is already established and working.
ASON synchronization supports the following:

- Service/connection discovery (terminated or unterminated) in either L0 or L1 domain.
- Service/connection discovery in mixed Plain domains (based on either L1 or L0 GMPLS domain) where the fragments in Managed Plane and Control Plane connections are joined in a single inventory.
- Electrical SNCP (Protected/PRC) services.
- OPSA Protected (Protected/PRC) trails.
- OPSB/Y-cable protected services, that is the Mixed Plane scenario.

the following configurations are not supported for takeover, discovery and delete from NFM-T:

- Discovery of C+L ASON Links and corresponding ASON connections over these links
- MRN tunnels
- Mixed plane configurations for L0 and L1
- L0/L1 Overlay (24x)

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10.48 Perform ASON NPA synchronization

When to use

Use this task to perform global synchronization of ASON NPAs.

Before you begin

For L1 and L0 GMRE, ensure to perform the following operations in the hierarchical order prior to performing NPA synchronization:

- **Network Scan**: Go to **DEPLOY > New Nodes**. Select the node and perform **Network Scan**.
- Go to **OPERATE > Nodes** page or **OPERATE > NEs** page and perform the following:
  - **Full Synchronization**
  - **Discover External Physical Connections**

    For physical connections with at least one end as 1830 PHN NEs, perform **Discover External Physical Connections**. For 1830 PSS OCS to 1830 PSS OCS physical connections, manually create OPS/OTS Physical Connections from **OPERATE > Physical Connections** page.
  - **Path Synchronization**: This is applicable only for L1 GMRE.

Task

Complete the following steps to perform a global synchronization of ASON NPAs.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Synchronize ASON NPAs.

Result: The following confirmation message is displayed:

`Do you want to trigger NPA sync? Please check Job for details`.

2

To continue with ASON NPA synchronization, click **OK**.

Click **Cancel** to cancel the operation.

Result: A new NPA is created with the name **`DISCOVERED_NPA_<timestamp>`**. The system outputs a series of messages on the bottom right of the window, indicating success or failure of the operation.

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Figure 10-70 Discovered NPAs

All the TE Links from all the GMRE enabled NEs managed in the system are synchronized and assigned to the newly created NPA. See Step 5.

3

To see the status of the ASON NPA synchronization, navigate to **ADMINISTER > Jobs**.

4

To view the details of the ASON NPA synchronization, select the job and click the **Run History** icon in the **Jobs** page.

Result: The details of ASON NPA Synchronization status is displayed. Scroll down the **Run History** window, expand and view the completion summary of the ASON NPA synchronization, which includes the number of links deleted and number of links discovered. The Run History also displays the Skipped entities.

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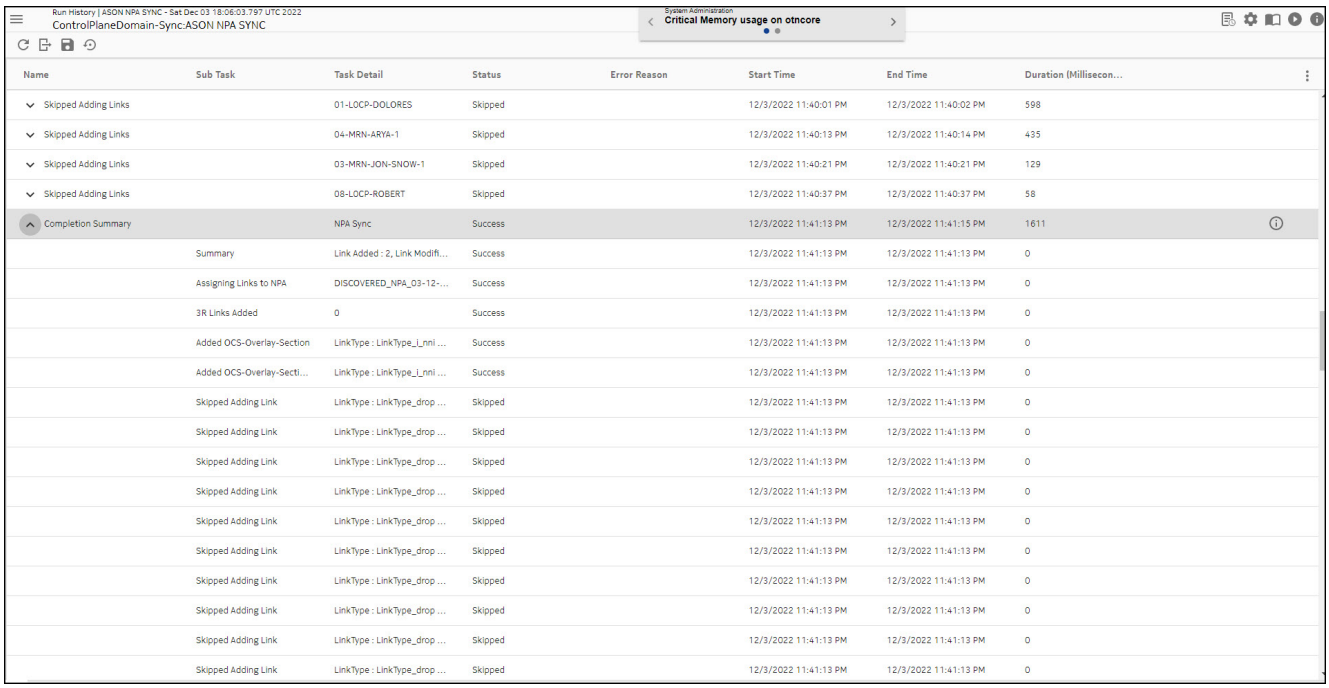
Figure 10-71 ASON NPA Synchronization: Run History window



Name	Sub Task	Task Detail	Status	Error Reason	Start Time	End Time	Duration (Millisecon...
Skipped Adding Links		01-LOCP-DOLORES	Skipped		12/3/2022 11:40:01 PM	12/3/2022 11:40:02 PM	598
Skipped Adding Links		04-MRN-ARYA-1	Skipped		12/3/2022 11:40:13 PM	12/3/2022 11:40:14 PM	435
Skipped Adding Links		03-MRN-JON-SNOW-1	Skipped		12/3/2022 11:40:21 PM	12/3/2022 11:40:21 PM	129
Skipped Adding Links		08-LOCP-ROBERT	Skipped		12/3/2022 11:40:37 PM	12/3/2022 11:40:37 PM	58
Completion Summary		NPA Sync	Success		12/3/2022 11:41:13 PM	12/3/2022 11:41:15 PM	1611
	Summary	Link Added : 2, Link Modifi...	Success		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Assigning Links to NPA	DISCOVERED_NPA_03-12-...	Success		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	3R Links Added	0	Success		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Added OCS-Overlay-Section	LinkType : LinkType_i_nni ...	Success		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Added OCS-Overlay-Secti...	LinkType : LinkType_i_nni ...	Success		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0
	Skipped Adding Link	LinkType : LinkType_drop ...	Skipped		12/3/2022 11:41:13 PM	12/3/2022 11:41:13 PM	0

If an entity is not available or if there is any problem in the system, then the discovery of such entities are skipped and the discovery still completes. To understand and rectify the problem with the skipped entity, click the **Additional Attributes** icon. The additional attributes icon mentions the reason for the skip of the entity during the discovery and action that must be performed.

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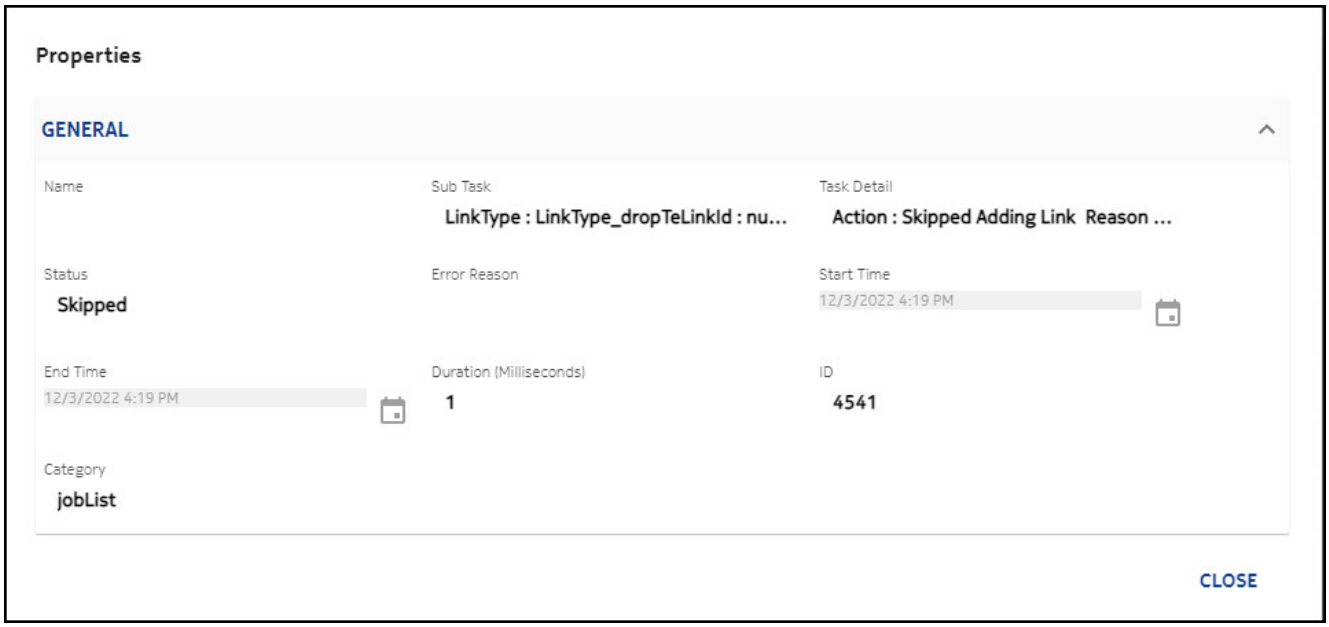
Figure 10-72 Skipped List: ASON NPA Synchronization



5

To view the links that are assigned to NPA, select the NPA, click the **360° View** icon and select the **Links** tab.

Result: The links that are assigned to NPA are displayed.

6

To view the NPA to which the physical connection is associated, navigate to **OPERATE > Physical Connections** page. Scroll to the right to view the **NPA Name** column.

Result: The **NPA Name** column displays a name if the NPA is associated to an OTS or OPS physical link. Otherwise the **NPA Name** column remains blank.

END OF STEPS

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10.49 Perform an ASON SNC synchronization

When to use

Use this task to perform a global synchronization of ASON SNC.

Before you begin

For L0 GMRE, ensure to perform the following prior to performing SNC synchronization:

- **ASON NPA Synchronization**: Go to **OPERATE** and perform **Synchronize ASON NPAs**.

Note: To discover the connection between the D5X500 and 20P200 cards, ensure to perform the following steps for Control Plane connections:

1. **OPERATE > Nodes > Discover External Physical links**
2. **OPERATE > Nodes > Synchronize > Equipment**
3. **OPERATE > Nodes > Synchronize > Port**
4. **OPERATE > Nodes > Synchronize > Internal Links**
5. **OPERATE > Nodes > Synchronize > Cross Connections**
6. **OPERATE > Synchronize ASON SNCs**
7. **OPERATE > Nodes > Synchronize > Paths**

These steps can be performed if the services having ODUk cross-connects are not discovered on top of Control Plane L0 SNCs.

Task

Complete the following steps to perform a synchronization of ASON SNCs.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Synchronize ASON SNCs

Result: The following confirmation message is displayed:

`Do you want to trigger SNC sync? Please check Job for details`.

2

To continue with ASON SNC synchronization, click **OK**

Click **Cancel** to cancel the operation.

Result: The system synchronizes the Control Plane connections.

3

To see the status of the ASON SNC synchronization, navigate to **OPERATE > Jobs**.

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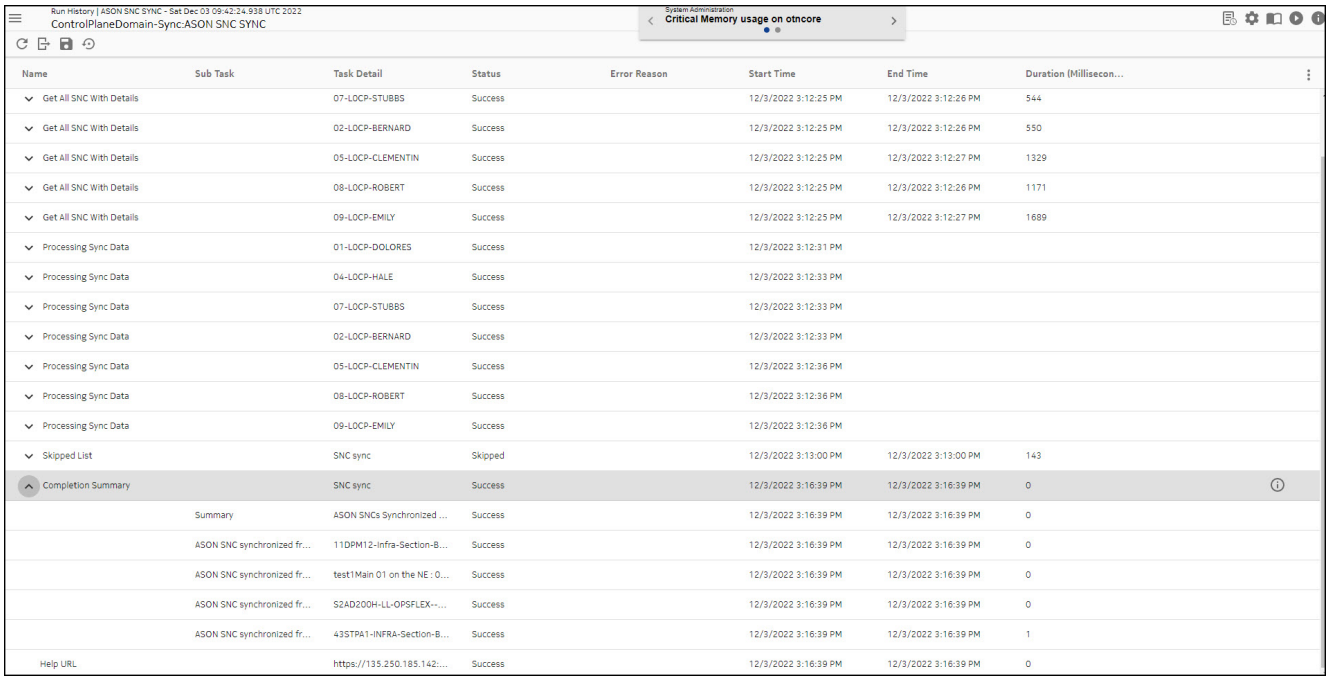
4

To view the details of the ASON SNC synchronization, select the job and click the **Run History** icon in the **Jobs** page.

Result: The details of ASON SNC synchronization status is displayed. Scroll down the **Run History** window, expand and view the completion summary of the ASON SNC Synchronization, which includes the number of links deleted and number of links discovered.

Figure 10-73 ASON SNC Synchronization: Run History window



Name	Sub Task	Task Detail	Status	Error Reason	Start Time	End Time	Duration (Millisecon...
Get All SNC With Details		07-L0CP-STUBBS	Success		12/3/2022 3:12:25 PM	12/3/2022 3:12:26 PM	544
Get All SNC With Details		02-L0CP-BERNARD	Success		12/3/2022 3:12:25 PM	12/3/2022 3:12:26 PM	550
Get All SNC With Details		05-L0CP-CLEMENTIN	Success		12/3/2022 3:12:25 PM	12/3/2022 3:12:27 PM	1329
Get All SNC With Details		08-L0CP-ROBERT	Success		12/3/2022 3:12:25 PM	12/3/2022 3:12:26 PM	1171
Get All SNC With Details		09-L0CP-EMILY	Success		12/3/2022 3:12:25 PM	12/3/2022 3:12:27 PM	1689
Processing Sync Data		01-L0CP-DOLORES	Success		12/3/2022 3:12:31 PM		
Processing Sync Data		04-L0CP-HALE	Success		12/3/2022 3:12:33 PM		
Processing Sync Data		07-L0CP-STUBBS	Success		12/3/2022 3:12:33 PM		
Processing Sync Data		02-L0CP-BERNARD	Success		12/3/2022 3:12:33 PM		
Processing Sync Data		05-L0CP-CLEMENTIN	Success		12/3/2022 3:12:36 PM		
Processing Sync Data		08-L0CP-ROBERT	Success		12/3/2022 3:12:36 PM		
Processing Sync Data		09-L0CP-EMILY	Success		12/3/2022 3:12:36 PM		
Skipped List		SNC sync	Skipped		12/3/2022 3:13:00 PM	12/3/2022 3:13:00 PM	143
Completion Summary		SNC sync	Success		12/3/2022 3:16:39 PM	12/3/2022 3:16:39 PM	0
	Summary	ASON SNCs Synchronized ...	Success		12/3/2022 3:16:39 PM	12/3/2022 3:16:39 PM	0
	ASON SNC synchronized fr...	11DPM12-Infra-Section-B...	Success		12/3/2022 3:16:39 PM	12/3/2022 3:16:39 PM	0
	ASON SNC synchronized fr...	test1Main 01 on the NE : 0...	Success		12/3/2022 3:16:39 PM	12/3/2022 3:16:39 PM	0
	ASON SNC synchronized fr...	S2AD200H-LL-OPSFLEX--...	Success		12/3/2022 3:16:39 PM	12/3/2022 3:16:39 PM	0
	ASON SNC synchronized fr...	43STPA1-INFRA-Section-B...	Success		12/3/2022 3:16:39 PM	12/3/2022 3:16:39 PM	1
Help URL		https://135.250.185.142:...	Success		12/3/2022 3:16:39 PM	12/3/2022 3:16:39 PM	0

5

To view the Control Plane connections and tunnels that are discovered, navigate to **OPERATE > ASON SNCs** .

Result: The list of SNCs are displayed.

6

Select the discovered connection. Click the **More** ⋮ icon and select the **Routes** from the list of options.

Result: The **Current Route** and **Nominal Route** are displayed.

7

Navigate to **OPERATE > Infrastructure Connections**.

Result: The discovered connections are displayed.

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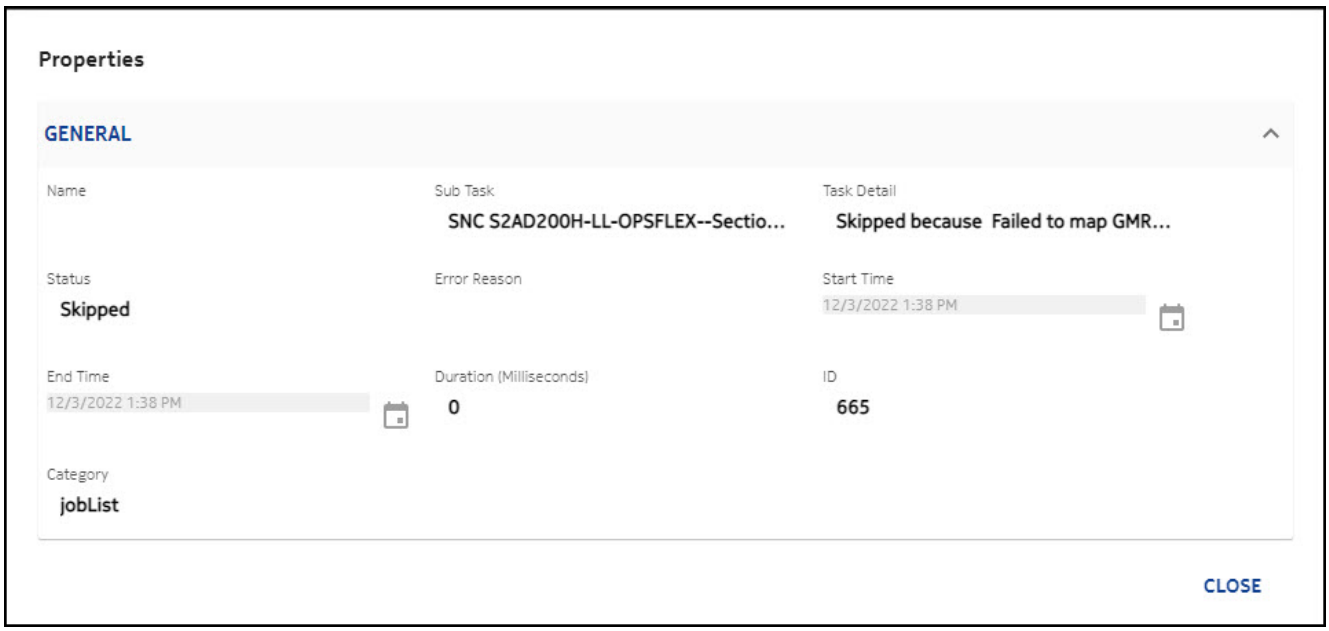
Click the **360° View** icon and select **CLIENTS** tab to view the service on the connection created.

Skipped List displays the entities that are not available or there is any problem in the system. The discovery of such entities are skipped and the discovery still completes. To understand and rectify the problem with the skipped entity, click the **Additional Attributes** icon. The additional attributes icon mentions the reason for the skip of the entity during the discovery and action that has to be performed.

Figure 10-74 Skipped List for ASON SNC Synchronization



End of steps

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Manage Reversion Control Group

10.50 Overview

Purpose

This section explains the ability to create Reversion Control Groups for deployed ASON SNCs . The selected ASON SNCs are included in the Reverse Control Group.

Contents

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10.52 Create Reversion Control Group	1579
10.53 View and remove the Reversion Control Group	1584
10.54 Reversion Control Group table columns	1587
10.55 Manage and schedule the jobs for Reversion Control Group	1588

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10.51 Reversion Control Group

Introduction

The Reversion Control Group helps to maintain the automatic switch of IP traffic upon reversion of Control Plane optics services to the Nominal Route from the Backup Route. This feature is applicable for a scenario where two or more diverse path optics LSPs are carrying primary and secondary paths of the IP/MPLS tunnel.

This is based on the SDN policy providing the control switch for the reversion of Nominal Route and Backup Routes of two GMPLS optics services or ASON SNCs in a group.

This feature provides an option to group two LO Control Plane services in a group, so that it does not have a down path at a given point of time. This helps to avoid the traffic hit by control switch for the reversion of Nominal and Backup routes of two GMPLS optics services in a group.

This feature is supported only on L0 Control Plane connections. Each group can contain only two L0 Control Plane services or ASON SNCs.

This section covers the following work flows for Reversion Control Group

- Create a Reversion Control Group. See 10.52 “Create Reversion Control Group” (p. 1579).
- View the Reversion Control Group: See 10.53 “View and remove the Reversion Control Group” (p. 1584).
- Manage the jobs for Reversion Control Group. See 10.55 “Manage and schedule the jobs for Reversion Control Group” (p. 1588)

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10.52 Create Reversion Control Group

When to use

Use this task to create a Reversion Control Group.

Related Information

- 10.53 “View and remove the Reversion Control Group” (p. 1584)
- 10.55 “Manage and schedule the jobs for Reversion Control Group” (p. 1588)

Before you begin

Ensure the following:

- the **Configuration State** is set to **Implemented**
- the **Transport Network** is **Photonic**
- the **ASON Revertive** is set to **Manual**

Task

1

From the NFM-T GUI, follow this navigation path:

OPERATE > ASON > SNCs

Result: The system displays the list of ASON SNCs.

2

Click the **Manage Columns** ( ) icon in the **Select View** area to add or remove columns or views from the page. Click **Apply** to close the window and return to the main page.

See 26.7 “Manage data columns” (p. 2213) for a detailed description and usage of the Manage Columns window.

3

In the data table, filter the **Transport Network** column and select **Photonic** and filter the **Reversion Mode** column and select **Manual**.

Select two SNCs which has fulfilled the prerequisites mentioned in Before you begin “Before you begin” (p. 1579) and click the **More** icon in the upper right corner of the window. Select **Create Reversion Group** from the list of options.

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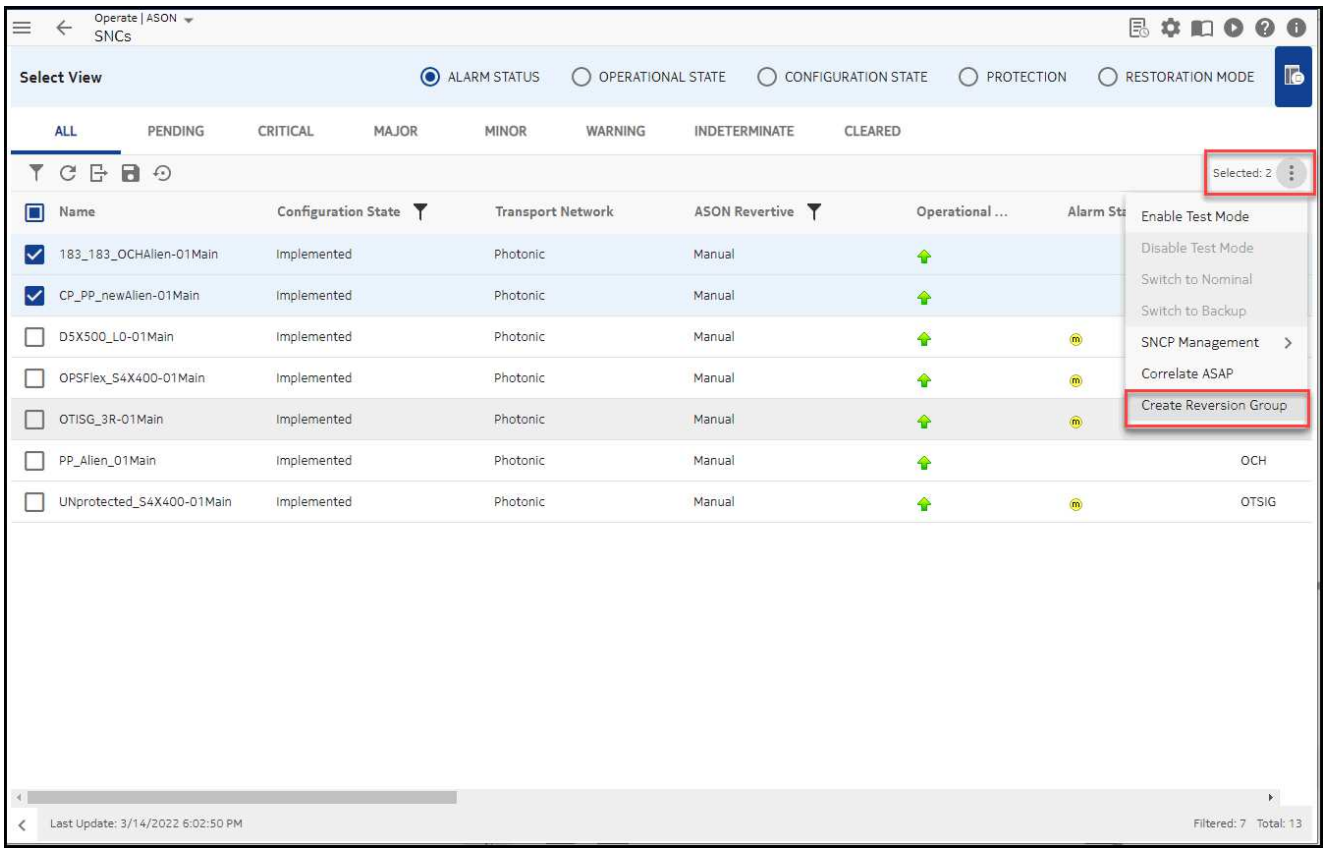
Figure 10-75 Create Reversion Group



Note:

- Only two ASON SNCs are grouped together into a **Reversion Control Group**.
- Ensure that the selected ASON SNCs are not assigned to any group.
- If the selected ASON SNC is already a part of a group, the system displays a message indicating the user that the SNCs selected are part of a particular group.

Result: The **Reversion Control Group** window is displayed in a new tab.

4

In the **Group Name** field, enter a name to identify the group and click **OK**. To reset or modify the group name, select **RESET**.

The **Group Name** field supports up to 100 characters.

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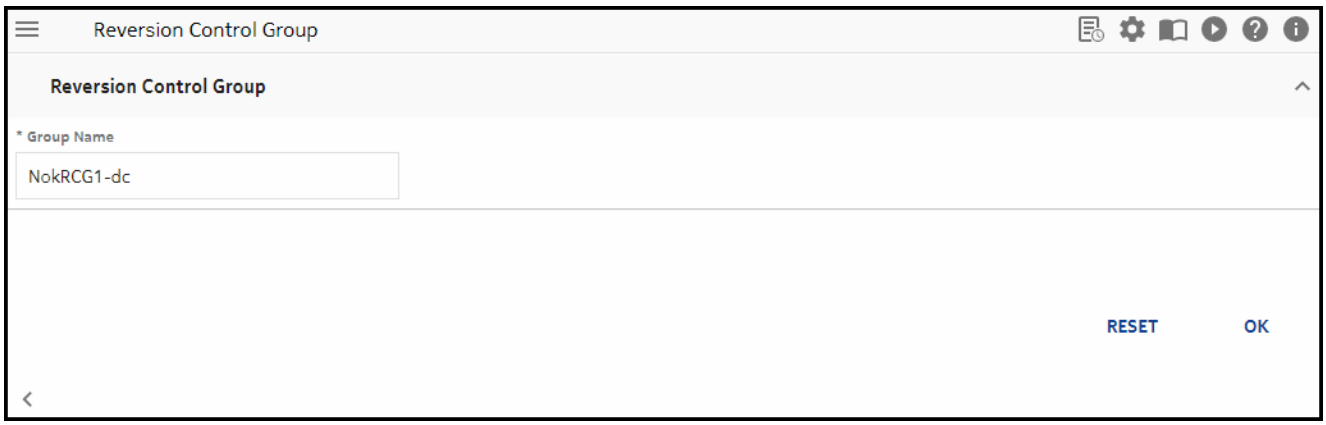
Figure 10-76 Create Reversion Control Group



Result: The success message is displayed at the bottom of the window.

Note: The user can change the **Revertive Mode** from **Manual** to **Automatic** after creating the Reversion Control Group and the same Reversion Control Group will be considered for the next audit.

5

To view the added group names, navigate to one of the following locations:

OPERATE > ASON SNCs

OPERATE > Infrastructure Connections

The added group names and its details are also displayed in the **OPERATE > Reverse Control Group**. See 10.53 "View and remove the Reversion Control Group" (p. 1584)

Result: The **Reversion Control Group** column is populated and the existing selected ASON SNCs are assigned to the **Reversion Control Group**.

To view the **Reversion Control Group** column in the **Infrastructure Connections** page, click the **More** icon in the upper right corner of the window, select **Manage Columns** and enable **Reversion Control Group** check box.

With the creation of **Reversion Control Group**, the internal audit is triggered.

If the group is created for the first time, a new scheduler job is created along with the creation job in the **ADMINISTER > Jobs** page. To view the job scheduled for **Reversion Control Group**, see 10.55 "Manage and schedule the jobs for Reversion Control Group" (p. 1588).

Note: When the user creates the SNC for the first time and associates to **Reversion Control Group**, NFM-T takes this nominal route as original route and stores it in the database. In case the user modifies the nominal route after SNC creation and then

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associate it with **Reversion Control Group**; the latest nominal route does not get updated as original nominal route is available in the database.
If the user wants to modify the nominal route, perform one of the following

- Create the SNC and associate it to an **Reversion Control Group** before performing the Modify Route operation.
- Select and create the ASON SNC and choose the nominal route as required.

END OF STEPS

Additional information on specific use cases

When a **Reversion Control Group** is created for the first time, a corresponding scheduling job is created in the **ADMINISTER > Jobs** page. The status of the audit that is triggered as part of **Reversion Control Group** is also displayed in the **Jobs** page. The default time interval for triggering an audit is six minutes. After every six minutes, a new audit job is triggered, which fetches all the groups and the two ASON SNCs involved.

During the audit run, the two ASON SNCs (*SNC A* and *SNC B*) that are associated with the group adheres to one of the following conditions and the system checks these conditions internally.

Table 10-10 Specific Scenarios of Reversion Control Group

If				Then
	Re-routed	**Ready to Revert Alarm**	**Operational State**	
Use Case 1A				Perform **Switch to Nominal** on SNC A and then perform **Switch to Nominal** on SNC B.
SNC A:	**YES**	**YES**	**UP**	
SNC B	**YES**	**YES**	**UP**	
Use Case 1B				Perform **Switch to Nominal** on SNC A
SNC A	**YES**	**YES**	**UP**	
SNC B	**YES**	**NO**	**UP**	
Use Case 1C				Perform **Switch to Nominal** on SNC A
SNC A	**YES**	**YES**	**UP**	
SNC B	**NO**	**NO**	**UP**	
Use case 2				Perform **Convert Current to Nominal** on SNC A if the following conditions are fulfilled: • Current route is not the Nominal route of any other SNCs in the network. • Diversity of Nominal Routes for SNCs within RCG group will be maintained after **Convert Current to Nominal** operation If the mentioned conditions are not fulfilled, the **Convert Current to Nominal** operation is not applicable.
SNCA	**YES**	**YES**	**UP**	
SNC B	**NO**	**NO**	**DOWN**	

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Table 10-10 Specific Scenarios of Reversion Control Group (continued)

If				Then
Use Case 3				Ensure to check the following before proceeding with the actions on any of the SNC: • Original Nominal is not equal to the Current Nominal of the SNC • Original Nominal Route (links Frequencies, 3Rs) must not be used in the Nominal Route or Current Route of any SNCs in the network. Current Route of the same LSP should not be using the resources of the older Nominal Routes. • Diversity of Nominal routes is maintained after reverting to original nominal. If any of the conditions mentioned are not fulfilled, the user cannot perform any action on that SNC. If all the mentioned conditions are fulfilled, perform **Modify Route** to modify the Nominal Route of the SNC back to original nominal.
SNCA	**NO**	**NO**	**UP**	
SNC B	**NO**	**NO**	**UP**	
Use Case 4A				The user need not perform any action OR no action can be performed.
SNCA	**NO**	**NO**	**DOWN**	
SNC B	**NO**	**NO**	**DOWN**	
Use Case 4B				The user need not perform any action OR no action can be performed.
SNCA	**YES**	**NO**	**DOWN**	
SNC B	**YES**	**NO**	**DOWN**	

The following error messages in the **Run History** of the **Jobs** page are applicable based on the use cases

If	Then
`Original and current nominal route for <SNC1> and <SNC2>are same, so skipping route modify for <group_create>`	See Table 10-10, “Specific Scenarios of Reversion Control Group” (p. 1582)
If none of the use cases are satisfied during the audit run	See Table 10-10, “Specific Scenarios of Reversion Control Group” (p. 1582)
If the *Operational State*, *Configuration State*, *Working State*, and *Routing State* of the selected SNC State is not correct,	Navigate to **OPERATE > SNCs** page and check the *Operational State*, *Configuration State*, *Working State* and *Routing State* of the selected SNC.

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10.53 View and remove the Reversion Control Group

When to use

The Reversion Control Group option displays all the groups that are available in that particular server.

Related information

- 10.52 “Create Reversion Control Group” (p. 1579)
- 10.55 “Manage and schedule the jobs for Reversion Control Group” (p. 1588)

Task

Complete the following steps to view the created Reversion Control Group:

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Reversion Control Group

Result: The **Reversion Control Group** page is displayed.

To view the details in the **Reversion Control Group**, see Step 2.

To remove the **Reversion Control Group**, see Step 4 to Step 5.

2

To view the details of the associated ASON SNCs, select the created group.

Result: The **Details** pane is displayed on the right side of the window with the details of the two associated ASON SNCs. See Table 10-12, “Details panel of Reversion Control Group ” (p. 1587).

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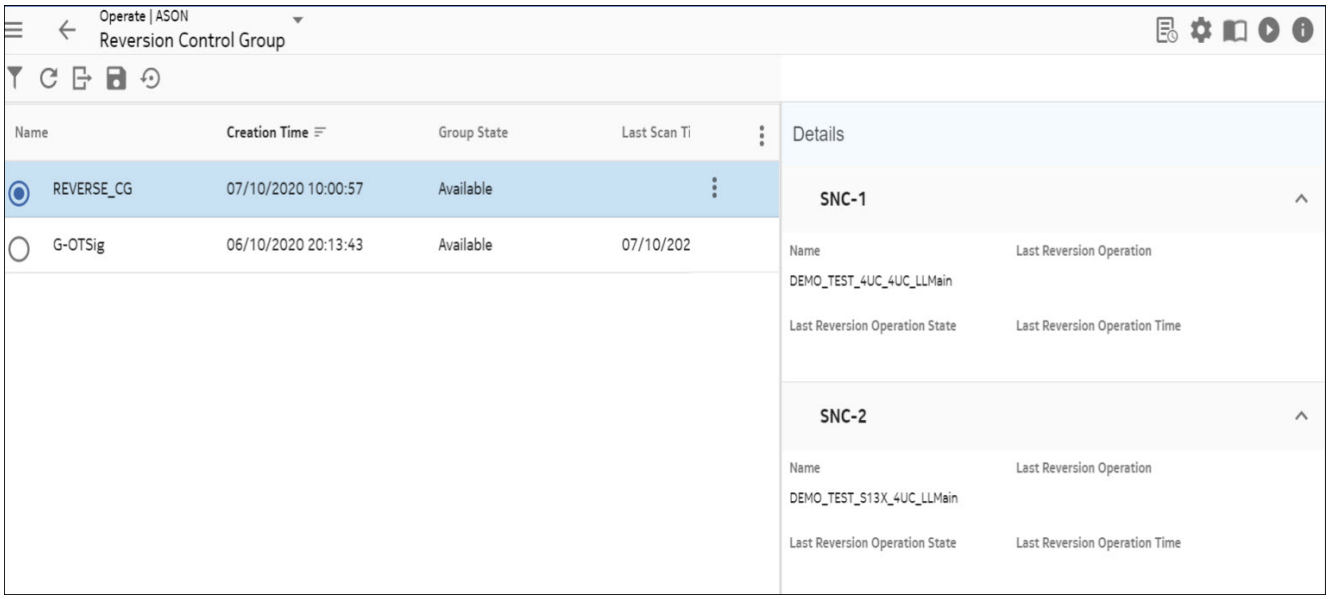
Figure 10-77 Reversion Control Group



3

To view the description of the table column, see 10.54 "Reversion Control Group table columns" (p. 1587).

4

Optional: To remove the **Reversion Control Group**, select the group, click the **More** icon, and select **Remove**.

Result: A confirmation box is displayed.

The **Remove** option is enabled when the **Group State** is in **Available** state. The **Remove** option remains disabled if the **Group State** column displays **Audit In progress** state.

Note: If the user tries to delete ASON SNC that is part of the **Reversion Control Group** from the **Infrastructure Connections** page, then the system displays the following message:

```
Connection <Connection_Name> is part of Reversion Control Group
-<Reversion_Control_Group_Name>. You may delete the group from
Reversion Control Group page, before proceeding with connection
deletion.
```

5

Click **YES** to continue.

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Result: The group is removed from the **Reversion Control Group** page.

End of steps

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10.54 Reversion Control Group table columns

Reversion Control Group table description

This section provides the description of the table columns of Reversion Control Group and description of the parameters of the associated ASON SNCs in the Details pane.

To view the description of the data table column parameters, see "Reversion Control Group table columns" (p. 1587).

To view the parameters of the Details pane, see Table 10-12, "Details panel of Reversion Control Group " (p. 1587).

Reversion Control Group table columns

Table 10-11 Reversion Control Group Table Columns

Parameter	Description
Name	Specifies the name for the Reversion Control Group.
Creation Time	Specifies the time at which the Reversion Control Group is created.
Group State	**Available**: Specifies the groups that are available for audit **Audit In Progress**: Specifies the audit is in progress for the groups.
Last Scan Time	Specifies the date and time when the last scan was performed
Last Operation	Specifies the last operations that is performed as part of the audit
ID	Specifies the ID

Table 10-12 Details panel of Reversion Control Group

Parameter	Description
Name	Specifies the name of the associated ASON SNC
Last Reversion Operation	Specifies the operation that is performed on one of the associated ASON SNC that is part of the group on trigger of the audit The operations are: • Modify Connection • Switch to Nominal • Convert current to nominal
Last Reversion Operation State	Specifies the state of the Reversion Control Group operation. The states can be either Success, In Progress, or Failure.
Last Reversion Operation Time	Specifies the time at which the Reversion Control Group operation is performed.

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10.55 Manage and schedule the jobs for Reversion Control Group

When to use

Use this task to manage and schedule the jobs for Reversion Control Group.

Note: The Reversion Control Job is created the first time a Reversion Control Group is created. Once the job is created, it will always be in *Scheduled* or *In Progress* state (when the audit triggers) always. The job will not be in *Completed* or *Aborted* state.

Related Information

See the following sections::

- 10.53 “View and remove the Reversion Control Group” (p. 1584)
- 10.52 “Create Reversion Control Group” (p. 1579)

Task

Complete the following steps to view the jobs for Reversion Control Group:

1

From the NFM-T GUI, follow the navigation path:

ADMINISTER > Jobs.

Result: The jobs page is displayed.

2

Filter the **Job Type** column with the name **Reversion Control Group -Schedule**.

The **Job State** column displays **Scheduled** for the scheduled jobs. Each server hosts only one scheduler job irrespective of the number of groups that are created.

Result: All the Create Reversion Control Group operations results in a single scheduled job.

Right click on the job to view the list of operations that are supported:

- Select the job and select **Reschedule** to reschedule the job to a convenient time. See Step 18
- Select the job and select **Pause** to pause the Scheduler and resume later. The system displays a confirmation message to continue the operation.
- Select the job and click **Run History** to view the details. See Step 3 to Step 7.
- Select the job and click **Resume** to re-enable the Scheduler. This operation starts from the same place where the rescheduled job was stopped.

Note:

- The user cannot delete a *Scheduled* job. The **Delete** options remains disabled during *Scheduled* jobs.
- When the user performs the **Pause** operation, the **Resume** option will not appear

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automatically in the list of right click options, as the Jobs window is not getting updated. Similarly if the user performs the **Resume** operation, the **Pause** operation will not appear automatically. The user must refresh or reopen the **Jobs** page to view the updated right click menu options.

3

Right click the job, select **Run History**.

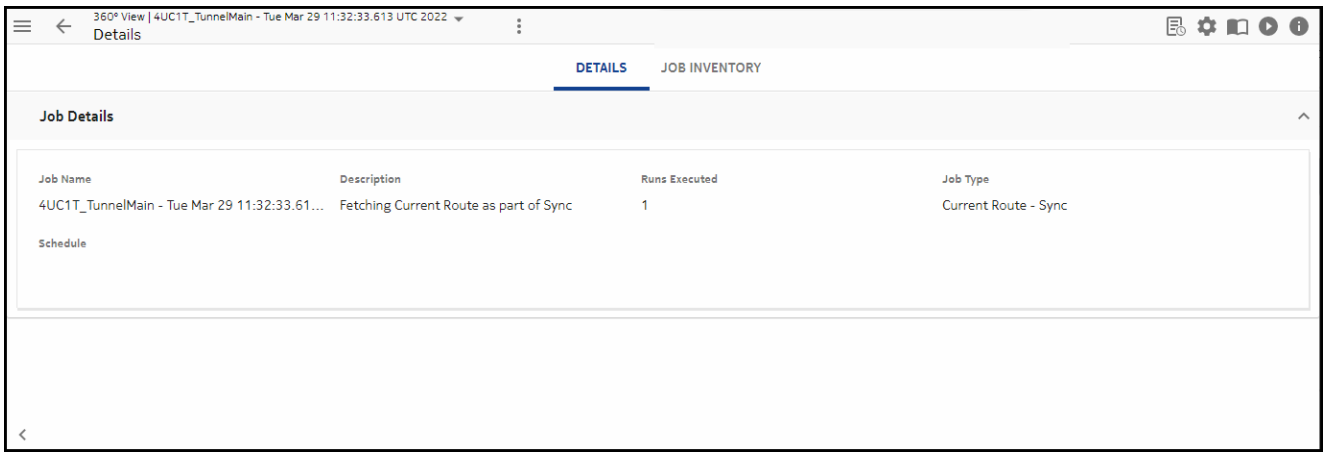
Result: The **Run History** of the latest job is displayed.

4

Select the scheduled job and click the **Details** tab in the lower panel.

Result: The **Details** tab displays the **Job Type** and the **Runs Executed** which specifies the number of times the audit is executed at that time. The time in the **Schedule** filed displays the server time.

Figure 10-78 Details tab of job for Reversion Control Group



5

Select the scheduled job and click the **Job Inventory** tab in the lower panel.

Result: The **Job Inventory** tab displays all the instances of the audit that is triggered for the scheduled **Reversion Control Group** job. By default, the audit is triggered after every six minutes, which scans the groups, fetches the ASON SNCs, and checks the prerequisites.

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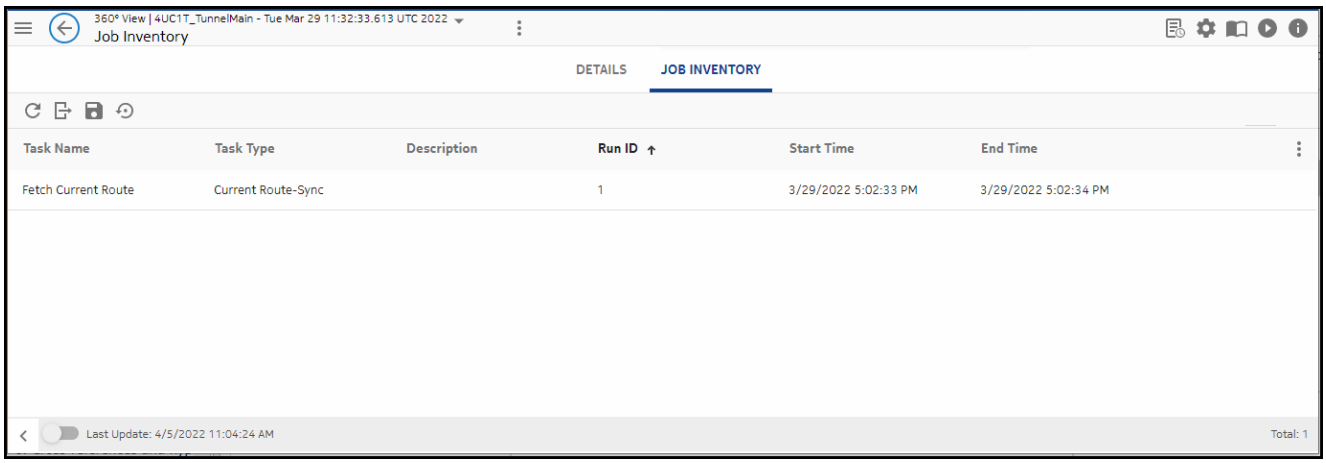
Figure 10-79 Job Inventory tab for Reversion Control Group

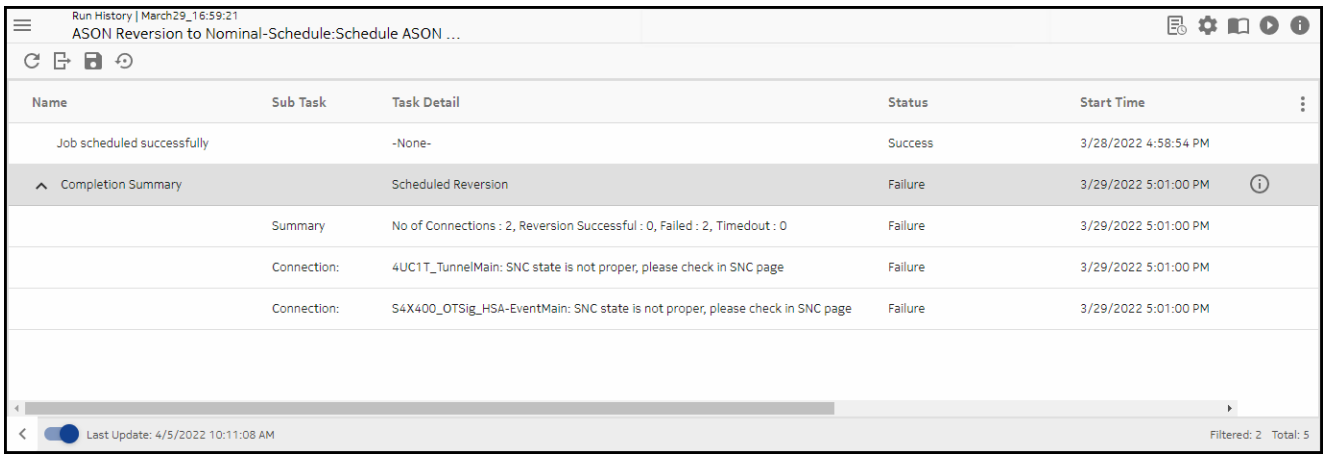


6

Select any instance of the job in the **Job Inventory** tab and click **Run History**.

Result: The **Run History Details** is displayed with the status of the job for that particular audit instance.

Every audit instance of the job has a separate **Run History**.



7

To reschedule the job, right click the scheduled job and select **Reschedule** to schedule the audit as per the convenient time. By default the audit recurs every six minutes. The audit can be scheduled by provisioning the scheduled date (month/day/year) and time (hour:minutes AM/PM),

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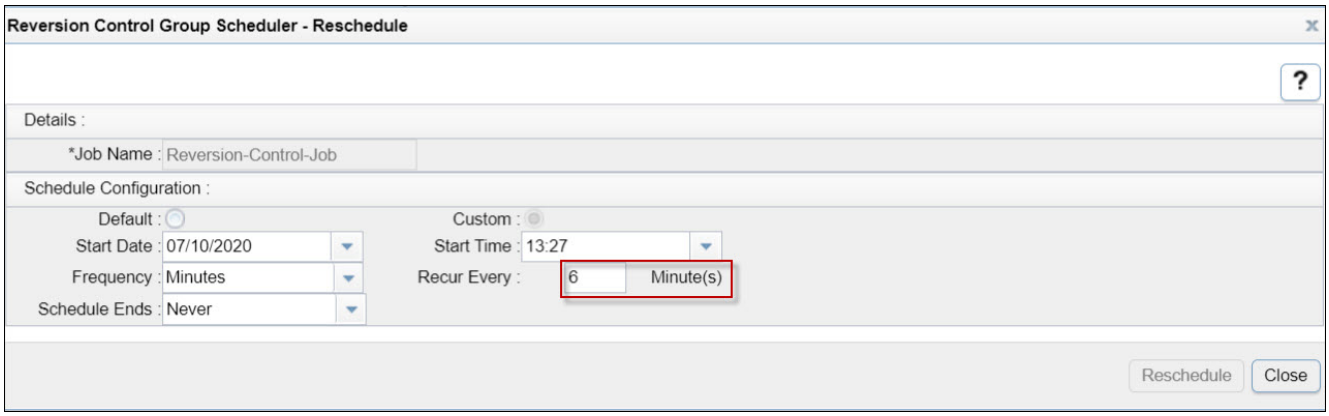
Result: The **Scheduler** window is displayed.



8

In the **Job Name** field, a name for the job is auto-populated based on the job.

9

In the **Schedule Configuration** pane, the **Default** option is enabled by default. The **Custom** option remains disabled.

10

If the **Frequency** is set to **Minutes**

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar when the audit is to begin.
- In the **Start Time** field, click the drop-down menu and select a time when the audit is to begin.

11

If you selected the **Frequency** to be **Minutes**, go to Step 10.

If you selected the **Frequency** to be **Hour & Minute**, go to Step 12.

If you selected the **Frequency** to be **Daily**, go to Step 13.

If you selected the **Frequency** to be **Weekly**, go to Step 14.

If you selected the **Frequency** to be **Monthly**, go to Step 15.

If you selected the **Frequency** to be **Quarterly**, go to Step 16.

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12

If the **Frequency** field is **Hour & Minute**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar when the audit must begin.
- In the **Start Time** field, click the drop-down menu and select the time when the audit must begin.
- In the **Recur Every** field, enter the value as six minutes or more for the audit must occur.

  If the minimum interval between the audits is more than six minutes, an error message is displayed.
- Go to Step 17.

13

If the **Frequency** field, is **Daily**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar when the audit must begin.
- In the **Start Time** field, click the drop-down menu and select the time when the audit must begin.
- In the **Recur Every** field, enter the number of days when the audit must occur.
- Go to Step 17.

14

If the **Frequency** field is **Weekly**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar when the audit must begin.
- In the **Start Time** field, click the drop-down menu and select a the time when the audit must begin.
- In the **Recur Every** field, enter the number of weeks and check the days when the audit must occur.
- Go to Step 17.

15

If the **Frequency** field is **Monthly**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar when the audit must begin.
- In the **Start Time** field, click the drop-down menu and select a the time when the audit must begin.
- In the **Recur Every** field, the number of months when the audit must occur.
- Go to Step 17.

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If the **Frequency** field is **Quarterly**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar when the audit must begin.
- In the **Start Time** field, click the drop-down menu and select a the time when the audit must begin.
- In the **Recur Every** field, enter a number that equals the number of quarters when the audit must occur.
- Go to Step 17.

17

In the **Schedule Ends** field, select **Never**, which is the default option.

18

Click **Reschedule**.

Result: A success message is displayed. **`Successfully rescheduled Reversion Control Job`**. The audit is rescheduled as per the specified schedule.

Note: The inventory (task and the related task information) in the Jobs page will get deleted from the NFM-T database after the set retention period. The default time interval for the data to remain in the database in seven days.
To purge the jobs to a user selected value, navigate to the location: **`/nokia/NMA/ESM/*release*/tools/esm_job_purge.oms`**.
Edit the value of **`REVERSIONGROUPPURGEAGE`** to purge the record to a different value from the current set value.

END OF STEPS

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Part IV: Commissioning and Maintenance

Overview

Purpose

This part of the document describes the tasks involved in commissioning and maintenance of the systems constituting the network.

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11 CPB Application

11.1 Overview

Purpose

This chapter provides an introduction to the Commissioning and Power Balance (CPB) application. It provides how commissioning files from EPT are used in CPB. It describes the configurations and stages supported on CPB and also the pre-commissioning requirements.

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Network Planning

11.2 NFM-T CPB overview

CPB introduction

The NFM-T Commissioning and Power Balance (CPB) application provides users with provisioning, commissioning, power balancing, loss report generation, and validation functions. The validation function lists all the inventory mismatches before starting other operations, which saves time as configuration errors are discovered in advance.

The commissioning file used in the NFM-T CPB application contains all the systems for the network in a single commissioning file, which makes it more convenient to handle large networks. The NFM-T CPB application commissions any number of systems and NEs in parallel, which reduces the total commissioning time. Multiple users can simultaneously operate on their own systems and check the status of other systems, which improves the user experience in large networks. However, system validation cannot be performed simultaneously by multiple users. System validation must be performed on one system at a time.

Note: CPB does not support “+” and “,” characters in commissioning file name.

Supported NEs

The Engineering and Planning Tool (EPT) is used to design a network that comprises of the following 1830 PSS photonic network elements:

- 1830 PSS-4
- 1830 PSS-8
- 1830 PSS-16
- 1830 PSS-16II
- 1830 PSS-32
- 1830 PSI-2T
- 1830 PSI-M

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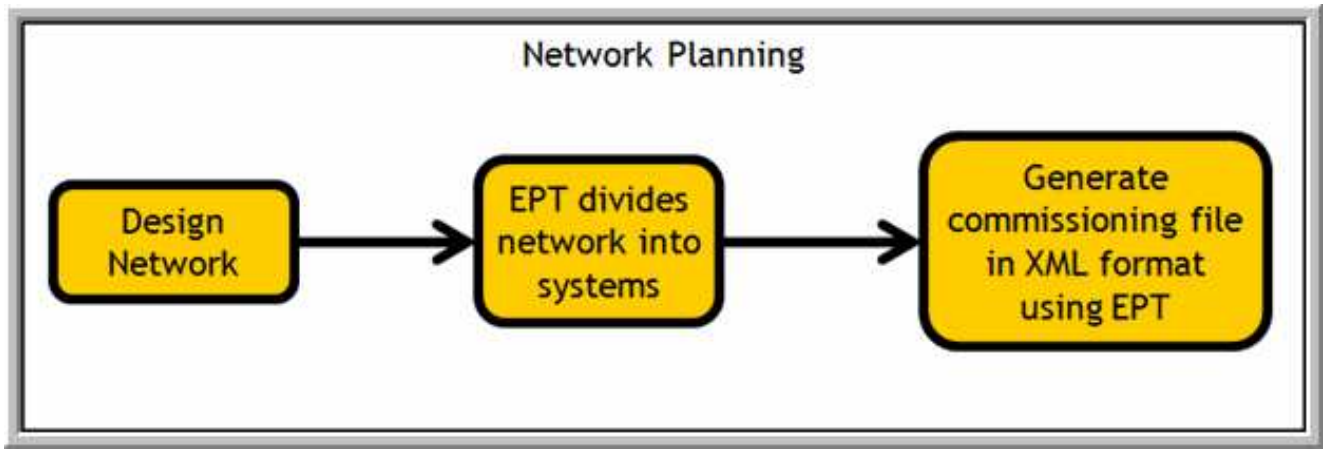
11.3 Network planning using EPT

EPT and CPB

Figure 11-1 Network Planning Using EPT



The EPT can generate a commissioning file in XML format for all the systems that form the network. A system within a network consists of one or more network elements and a network can consist of one or more systems. A single commissioning file can contain the design for all the systems that constitute the network or a segment of the network. See *1830 PSS Engineering and Planning Tool User Guide* for more information on generating the commissioning file.

The commissioning file generated using the EPT is the input for the NFM-T CPB application. A commissioning file is the network design representing the initial network plan or an incremental change to an existing network plan.

From R20.7 onwards, the NFM-T CPB and 1830 EPT supports backward compatibility for up to 2 digit off-releases for N, N-1, and N-2 NE releases. But backward compatibility is not supported for GMPLS design. For example, for a GMPLS disabled 1830 EPT R13.0 design, you will be able to choose the releases of the NE for commissioning. But for a GMPLS enabled 1830 EPT design R13.0, only the latest release of the NE, which is R13.0 for all 1830 PSS, 1830 PSS-4 and 1830 PSI-L NEs is available or listed for commissioning. For 1830 PSI-2T 4.0.x and 1830 PSI-M R5.0.x, the NE release field is not editable when GMPLS is enabled.

From R20.11 onwards, CPB is compatible with EPT release R13.0.4. NFM-T CPB supports legacy releases of NE and NFM-T for up to three-digit which means number of off-releases supported are a maximum of three for NE and NFM-T.

For example: CPB supports

- NE releases such as
  N R13.0.4
  N-1 R13.0.x
  N-2 R12.0.5

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- NFM-T releases such as
  N R20.11.x
  N-1 R20.7.x
  N-2 R19.9.x

From NFM-T R21.4 onwards, backward compatibility is supported for N-4 releases for NE and NFM-T.

From NFM-T R21.12 onwards, backward compatibility is supported for Managed Plane and N-4 releases for NE and NFM-T.

From NFM-T R22.6 onwards, backward compatibility is supported for Managed Plane and N-4 releases for NE and NFM-T.

Table 11-1 NE releases supported

NTM-T /CPB Release	NFM-T Backward releases supported	1830 EPT Release	Supported NEs	Supported NE releases	
R22.6	R22.6	R14.0.8	1830 PSS (Includes 1830 PSS-4)	N	R14.0.x (x>=8)
	R21.12			N-1	R14.0.x (x<8)
	R21.4			N-2	R13.1.x
	R20.11			N-3	R13.0.x (x>=4)
	R19.9.x			N-4	R12.0.x
R21.12	R21.12	R14.0	1830 PSS (Includes 1830 PSS-4)	N	R14.0
	R21.4			N-1	R13.1
	R20.11			N-2	R13.0.x (where x >=4)
	R20.7			N-3	R13.0.x (where x < 4)
	R19.9			N-4	R12.0.x

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Table 11-1 NE releases supported (continued)

NTM-T /CPB Release	NFM-T Backward releases supported	1830 EPT Release	Supported NEs	Supported NE releases	
R21.4	-	R13.1	1830 PSS (includes 1830 PSS-4)	N	R13.1 Only Managed Plane is supported
				N-1	R13.0.x
				N-2	13.0
				N-3	R12.0.x
				N-4	11.1.x
			1830 PSI-M	N	R5.1
				N-1	R5.0.4
				N-2	R5.0.x
				N-3	R4.0.x
				N-4	R3.2
R20.11	-	R13.0.4	1830 PSS (includes 1830 PSS-4)	N	R13.0.4
				N-1	R13.0.x
				N-2	R12.0.5
			1830 PSI-M	N	R5.0.4
				N-1	R5.0.x
				N-2	R4.0.x

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Table 11-1 NE releases supported (continued)

NTM-T /CPB Release	NFM-T Backward releases supported	1830 EPT Release	Supported NEs	Supported NE releases	
R20.7	-	R13.0	1830 PSS (includes 1830 PSS-4) and 1830 PSI-L	N	R13.0
				N-1	R12.0
				N-2	R11.1
			1830 PSI-2T	N	R4.0
				N-1	R4.0
				N-2	R2.0
			1830 PSI-M	N	R5.0
				N-1	R4.0
				N-2	R3.2

After the commissioning and power balancing the systems loaded into the NFM-T using the CPB application, perform various network operations using NFM-T. The latest network data is contained in a *Network Data File*, which you can generate and upload into the EPT using NFM-T GUI. See *Operate - Tools - Network Data Files* in the *OTN Guide* for more information about generating the network data files.

The 1830 PSS-24X is an OTN shelf which does not need a commissioning file, when configured as a stand-alone shelf. However, a commissioning file is required if the 1830 PSS-24X shelf is configured on a SWDM NE such as 1830 PSS-32 NE.

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11.4 OTS fiber characteristics configuration using CPB

Automatic configuration of OTS fiber characteristics

OTS fiber characteristics are configured automatically using CPB, with the manual configuration of fiber length and fiber type as described in the procedure 7.37 "Modify the fiber characteristics of an OTN physical connection " (p. 877).

The EPT file contains the fiber length and fiber type values for the OTS connections and these are imported for all the OTS connections being commissioned. The OTS fiber characteristics of fiber type and fiber length are included in a properly designed EPT design that has a valid commissioning file, after running CPB in the NFM-T.

The following constraints are applicable when CPB is used to enter the fiber type and fiber length automatically:

- Once the CPB has provisioned the fiber length and type in the OTS Fiber Characteristics, subsequent CPB provisioning with an updated commissioning file which specifies a different fiber type and fiber length for any OTS will not change the current, existing fiber length and fiber type that was initially created using CPB in NFM-T.
- Any changes to the existing fiber type and fiber length must be done manually using the procedure 7.37 "Modify the fiber characteristics of an OTN physical connection " (p. 877).
- Any changes to power parameters that need to be reset by an updated commissioning file can now be done using CPB.

Workflow to set fiber characteristics using valid commissioning file

1

Perform the provisioning of a system using a valid commissioning file generated for a valid EPT design.

On successful completion of the provisioning, the following values are set for each of the OTS specified in the EPT design:

- Fiber Type - The values can be SSMF, MetroCore, ELEAF, TWRS, TWC, TW+, LS, or DSF.
- Fiber Length - The value of the fiber length rounded to the nearest km.

2

Perform the following action to verify if the fiber length and fiber type are configured as per the values in the commissioning file after the provisioning is complete:

- From the list of physical connections in the **OPERATE > Physical Connections** page, hover the mouse over a specific OTS and select the associated **More** ⋮ icon. Select **Modify Fiber Characteristics** from the context menu. The **Modify OTS Fiber Characteristics** window is displayed with the updated **Fiber Length** and **Fiber Type** parameter values.

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Modification of fiber characteristics after initial configuration using CPB

Note: After the fiber type and fiber length parameters are provisioned by CPB, these can ONLY be changed manually by the user by following the procedure 7.37 "Modify the fiber characteristics of an OTN physical connection " (p. 877).

A subsequent provisioning with CPB using a new commissioning file with a different fiber type and fiber length will NOT change the values that were set by the initial provisioning with CPB using the initial or original commissioning file, unless the following tasks are performed:

- All OTS links that were previously provisioned for the system containing the existing fiber type and lengths are removed from NFM-T.
- All NEs that were previously specified in the original commissioning file are deleted from the NFM-T Node List.
- All NE DB for all of the NEs specified in the initial commissioning file are cleared or deleted from the NEs.

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11.5 Configurations and stages supported on CPB

System and configurations

A *system* is a set of amplifiers, wavelength routers, filters, and the optical connections between them. One commissioning file can design a network with one or more systems.

The types of configuration supported by the NFM-T CPB application includes, but is not limited to, the following:

- FOADM based on Interleaver (ITL)/Static Filter (SFD), and amplifiers
- ROADM based on ITL/SFDs, Wavelength Routers (WR), and amplifiers
- TOADM based on ITL/SFDs, Colourless Wavelength Routers (CWR), Wavelength Routers (WR), and amplifiers
- CDC-F topology
- iROADM configuration
- GMRE-enabled network

NFM-T R17.3 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R17.3 onwards:

- iROADM9 and S13X100R cards support
- AAR2x-8A - modified amplifier array
- FlexGrid support phase 2 with WR8-88AF based ROADM
- FlexGrid support phase 2 with C-F
- FlexGrid support phase 2 with CDC-F
- FC-1200 client support on 12P120
- GEN2 100G cost reduction with new hardware variants for 130SCX10, 130SNX10, and 130SCA1 cards
- D5X500 functional variant AB
- Two new modulations for D5X500 - BPSK and 16QAM-550G
- OTU1 client on 11DPM8
- 11OCEC card support with equivalent features as 103SCEC card

NFM-T R17.6 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R17.6 onwards:

- 1830 PSS R9.2 support
- 1830 PSS-8x R9.2 support
- 1x100G Uplink for 1830 PSS-8x
- 20x10G Uplink/Client Card for 1830 PSS-8x
- 20x10G/sub-10G Multirate Card for 1830 PSS-8x
- 1830 PSS-36/64 R9.2 support for 11OCUP

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- 1830 PSS-36/64 R9.2 update to include STM1e/1GbE/STM4 bi-directional SFP support on 24ANMB
- Additional ROADM Network configurations (iROADMF/V) with PSS R9.0
- 1830 PSS-36/64 OPSB client protection
- OPSA with MVAC scenario on back plane
- 20P200 hardware protection on ADM configuration
- WTOCM(A) swap with WTOCM-F, and SR8-88A swap with WR8-88AF
- Replacing 4QPA8 with 4DPA4 card in level 3 scenarios.

NFM-T R17.9 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R17.9 onwards:

- RA2P-96 supporting 96 channel configurations
- OTDRWB card in combination with AWBING, AWBEGR, and AWBILA and legacy optical amplifier cards
- PSI-2T NE and D5X500L card support
- Provisioning of S13X100E/R with regen mode, cascaded trails on client ports from 10G OTS, and OPSB on client ports
- GMRE configuration support for DSF fiber
- Commissioning of C+L ROADM for L and C band

NFM-T R18.3 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R18.3 onwards:

- Provisioning and commissioning of the following cards are supported - PTPIOC, 1CE100, 130SLX10, 130SLA1, 11QPA4B, D5X500Q/L, SFDC8, 12CE120, 12CE121, AA2DONWB, OSCTAPR, SFDC8, and iROADM9R
- Cascading configuration of 130SLX10 with 11DPM12 through OTU2
- AddDrop/Regen mode for configurations with 130SLX10 and 130SLA1 cards
- OPSFlex optical protection switch for coherent optimized ROADM
- Amplified multi span DWDM single fiber transmission
- D5X500Q and D5X500 with QSFP28 clients in GMRE enabled CDCF configuration
- Provisioning of D5X500/Q/L cards supporting different modulation formats on line ports

NFM-T R18.7 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R18.7 onwards:

- Provisioning and Commissioning for Release 11.0, 1830 PSS NEs (PSS-32/16/16II/8/4)
- NFM-T supports backward compatibility for all older releases of NEs, but not for CPB. NFM-T 18.7 CPB only supports Provisioning and Commissioning for 11.0 NEs (with the Commissioning file generated from 11.0 EPT). Backward compatibility for older releases of NEs with older releases of EPT commissioning files are being tested on a request to request basis.

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- PSS photonic configurations using new cards - ASWG-L, OPSB5, S2AD200H, 8P20, and iROADM20
- New shelf PSI-M
- Low Power IROADM9R without OSC
- WR8-88 configurations based on ROADM, FOADM using cards IROADMV or IROADM9R containing OLP with auto power management
- Multi-port OPSB protection for OTs - 130SCX10, 130SNX10, 260SCX2, D5X500/Q/L, S13X100E/R, 20P200, and S2AD200H
- Packet based cards - 1CE100/12CE120/121, with S13X100
- OPSA protected services with 1UD200 card
- CDC-F configuration using D5X500 card with diverse MCS in control plane
- Y-cable protection for a pair of 12P120 cards

NFM-T R19.2 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R19.2 onwards:

- Provisioning and Commissioning for R11.1, 1830 PSS NEs (PSS-32/16/16II/8/4) operation
- NFM-T supports backward compatibility for all older releases of NEs, but not for CPB. NFM-T 19.2 CPB only supports Provisioning and Commissioning for R11.1 NEs (with the Commissioning file generated from 11.1 EPT). Backward compatibility for older releases of NEs with older releases of EPT commissioning files are being tested on a request to request basis.
- OLP with CDC-F configuration using unidirectional amplifiers
- OPSFLEX for Optical Protection Switch for Coherent Optimized ROADM configuration with GMPLS
- DWDM T-SFP+ without integrated WTE configuration
- Node Scalability for Single-Site/Multi-Node with Power-Automated Drop Node configuration
- iPREAMP support of preamp for working in CDC-F 2.0 and other iROADM configurations
- Filterless DGE in non-GMPLS configuration
- configuration with DCM placed between AA2DONWB and SFD
- MCS16x15 for CDC-F configuration
- 1830-LX for extension of ULH with CDC configuration
- Single Fiber support with iROADM9R-LP configuration
- CDC-F configuration with and without GMPLS, added iROADM9R configuration
- C+L module support on AC variant PSS-16II shelves
- OPSB5 Client Protection for S2AD200H cards
- 3R configuration for S2AD200H cards for Managed Plane and Control Plane configurations
- PSS-12x and uplink cards for PSS-8x and PSS-12x
- C+L with GMRE network

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NFM-T R19.9 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R19.9 onwards:

- Provisioning and Commissioning for Release 12.0 1830 PSS NEs (PSS-32/16/16II/8/4) operation
- NFM-T supports backward compatibility for all older releases of NEs, but not for CPB. NFM-T R19.9 CPB only supports Provisioning and Commissioning for R12.0 NEs (with the Commissioning file generated from 12.0 EPT). Backward compatibility for older releases of NEs with older releases of EPT commissioning files are being tested on a request to request basis.
- L0 CP support for PSI-M
- support homogeneous bucket of 250 GHz wide bands for Flex
- IRDM32L (GMPLS and Non-GMPLS)
- new APN for extended temperature range for OSC SFP
- early introduction of ADD4/PSE-3S in EPT R12.0 (S4X400H)
- early iIntroduction of ADD4/PSE-3S in R12.0 (S4X400H in MP Cluster and CP)
- 1830 LX ROADM passthrough (MP and CP)
- DA2C4E module on PSI-M (MP and CP)
- Loss report/PowerAdj for mixed C+L/C/L network
- S2AD200R Reach Optimized 100G/200G transponder (MP only)
- early introduction of DFC12 and DFC12E (MP Cluster)

NFM-T R20.7 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R20.7 onwards:

- Provisioning and Commissioning for 1830 PSS NEs Release 13.0 (1830 PSS-32, 1830 PSS-16, 1830 PSS-16II, 1830 PSS-8, and 1830 PSS-4) operation
- NFM-T CPB R20.7 and 1830 EPT R13.0 supports backward compatibility for up to N, N-1, and N-2 NE releases using EPT commissioning files. But backward compatibility is not supported for GMPLS design.
- RA5PB is supported for non-GMPLS configurations only with the exception of IR32L non-GMPLS which is not supported.
- OMDCL is supported in non-GMPLS (managed plane) only configurations. L-band is currently not supported in OMDCL configurations.
- ASG LD is supported in ILAs for non-GMPLS and GMPLS configurations.
- ASGLP LD is supported in ILAs for non-GMPLS configurations only.
- Support of new shelf type PSI-8L under 1830 PSI-L in both non-GMPLS and GMPLS configurations.
- ASE Power adjustment and generation of ASE Loss reports from the NFM-T CPB UI is discontinued.
- EPT design with High ASE Noise OT segregations for non-GMPLS and GMPLS configurations.

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- EPT design of 87.5GHz BW support on S4X400H and DFC12/DFC12E over CDC-F (1.0 and 2.0), C+L, and WR8-88AF, iROADM9R, CD-F, and C-F for non-GMPLS and GMPLS configurations.
- PTPIOC with more amplifiers.
- S4X400H 3R with OTSig for non-GMPLS and GMPLS configurations
- Support of packet based card - 1CE100Q to replace the 1CE100 card in the same configurations supported by the 1CE100 card.
- IRDM32 managed plane (non-GMPLS) and IRDM32 control plane (GMPLS) configurations are supported.

NFM-T R20.11 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R20.11 onwards:

- Provisioning and Commissioning for 1830 PSS NEs Release 13.0.4 (1830 PSS-32, 1830 PSS-16, 1830 PSS-16II, 1830 PSS-8, and 1830 PSS-4) operation.
- NFM-T CPB R20.11 and 1830 EPT R13.0.4 supports backward compatibility for up to three digit off-releases for NE releases such as N, N-1, and N-2 using EPT commissioning files. But backward compatibility is not supported for GMPLS design.
- Supports selected Nodes and Add Drop Blocks (User Selectable options) to be stored in CPB Logs Export.
- Support of DFM6 and DFM6E cards in non-GMPLS configurations.
- Support of new power filter 8DC30T2 in both non-GMPLS and GMPLS configurations.
- Support of provisioning of new port level power attribute ExtraInputLoss (TX LBO).
- Support of increase in add target OT powers for CDC-F Add Drop block.
- Support of interworking scenarios of S4X400 with 20P200 LO Mapping Flexible Muxponder with GMPLS configuration for shelf types 1830 PSS16-II and 1830 PSS-8.
- Support of Multi-port OPSB card with S4X400H in GMPLS configuration.
- Support of OPSFLEX- Optical Protection Switch for Coherent Optimized ROADM with S4X400H in GMPLS configuration.
- Support of S4X400 in 3R Configuration for GMPLS configuration for shelf type 1830 PSS 32.
- ASG LD is supported in ILAs for non-GMPLS and GMPLS configurations for shelf type PSI-8L.
- ASGLP LD is supported in ILAs for non-GMPLS configurations for shelf type PSI-8L.
- PTPIOC support with IRDM32 C-L configuration in GMPLS configurations.

NFM-T R21.4 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R21.4 onwards:

- Provisioning and Commissioning for 1830 PSS NEs Release 13.1 (1830 PSS-32, 1830 PSS-16, 1830 PSS-16II, 1830 PSS-8, and 1830 PSS-4) and 1830 PSI-M R5.1 operation.
- CPB R21.4 and 1830 EPT R13.1 supports backward compatibility for up to four digit off-releases for NE releases such as N, N-1, N-2, N-3, and N-4 in NFM-T R21.4 using EPT commissioning files. Backward compatibility is not supported for GMPLS design.

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- Support for S4X400L 4x100G Flexible Muxponder and 20P200+S4X400L with and without GMPLS.
- Support for 1830 PSS-24x - 4 carrier PSE-Vc Uplink card - 4UC1T
- Support for "Hybrid" Line protection for IROADM cards (OMSP for Power adjustment support) for non-GMPLS design.
- Support for ASC4 and MXN824 cards for Managed Plane.
- Support for ASE LLoad-C & IRDM32
- Support for S5AD400H - 4x100G/1x400G and 4:1 MUXPONDER with and without GMPLS design.
- Support for IR9 with and without GMPLS design and IR9LP without GMPLS.
- Support for C-F architecture with iRDM20/32/32L with and without GMPLS design.
- Support for 100G / 200G Trail/Tunnel Management with regeneration between new OTSiG/old OTU4 model based OT/Uplinks for 8UC1T/S2AD200/2UX200 cards in both Managed Plane and Control Plane.

NFM-T R21.12 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R21.12 onwards:

- Provisioning and Commissioning for 1830 PSS NEs Release 14.0 (1830 PSS-32, 1830 PSS-16, 1830 PSS-16II, 1830 PSS-8, and 1830 PSS-4).
- CPB R21.12 and 1830 EPT R14.0 supports backward compatibility for up to four digit off-releases for NE releases such as N, N-1, N-2, N-3, and N-4 in NFM-T R21.12 using EPT 14.0 commissioning files. Backward compatibility is supported for Managed Plane and not supported for GMPLS design.
- Support for 112.5 and 125 GHz XC bandwidth on IRDM20/32/32L/iROADM9R/WR20-TF for Managed Plane and Control Plane.
- Support for SFM6 on 1830 PSI-M for C-band and both Managed Plane and Control Plane.
- Support for S6AD600H for C-band and both Managed Plane and Control Plane.
- Support for OPSUM Protection for C-band Single Carrier and both Managed Plane and Control Plane.
- Support for 16P200 for C-band and Managed Plane.
- Support for DD2M4 for Managed Plane.
- Support for direct connect to the MXN ASC4 for Managed Plane.
- Support for MXN824 AD blocks for Control Plane.
- MVACF support for iROADM9R, CDC-F, and C-F configurations for Managed Plane.

NFM-T R22.6 cards and configurations support

NFM-T supports the following additional cards and architectures using CPB from R22.6 onwards:

- Provisioning and Commissioning for 1830 PSS NEs Release 14.0.8 (1830 PSS-32, 1830 PSS-16, 1830 PSS-16II, 1830 PSS-8, and 1830 PSS-4).
- CPB R22.6 and 1830 EPT R14.0.8 supports backward compatibility for up to four digit off-

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releases for NE releases such as N, N-1, N-2, N-3, and N-4 in NFM-T R22.6 using EPT 14.0.8 commissioning files. Backward compatibility is supported for Managed Plane and not for GMPLS design.

- Support for Virtual OT for Alien Wavelength Restoration on both Managed Plane and Control Plane.
- Support for MSH8A card for Heterogeneous C band CDC-F node configuration WR20-TFM and IRDM32 for both Managed Plane and Control Plane.
- Support for 1830 PSS-16II shelf with new fan type 16FAN2C.
- Support for QSFP56-DD pluggable module on S6AD600H and SFM6 cards for both Managed Plane and Control Plane.
- Support for QSFP28 FR pluggable module on S6AD600H, S5AD400H, and S4X400H cards for both Managed Plane and Control Plane.
- Support for OPSB with S6AD600H and SFM6 cards for both Managed Plane and Control Plane.
- Support for ASG amplifier in ILA configuration for Control Plane.
- Support for C2ACOA and C2ACOD pluggable modules for DA2C4 and DA2C4E 1830 PSI-M cards.
- Support for 3GSDIE pluggable modules for 8P20 card.
- Support for egress Smoothing power parameter as a Port Power parameter on various IROADM Wavelength Router packs.
- Support for user selectable Add Drop blocks for MLFSB configurations in **Select Add/Drop Blocks Panel** on the CPB Provisioning UI.

Pre-commissioning requirements

Before performing any commissioning task, ensure the following:

- All required NEs for commissioning are successfully managed in the NFM-T.
- The node names in the NFM-T are the same as the node names defined in the commissioning file.

Stages of commissioning and power balance

The NFM-T CPB application performs the following for commissioning a network:

- Load a commissioning file
- Validate a system
- Provision a system
- Initiate channel power adjustment
- Generate system loss report

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12 System Administration for CPB Application

12.1 Overview

Purpose

This chapter provides us information on the CPB processes using the System Administration tool.

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12.1 Overview	1613
12.2 System Administration functionality for CPB application	1614
12.3 Start or stop mnc-cpb container	1615

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12.2 System Administration functionality for CPB application

System Control access

The user can monitor the system resources and performance using the **System Control** option available from the following navigation:

ADMINISTER > System Administration > Dashboard > System Control

See the *NFM-T Administration Guide* for more information on the System Administration functionality.

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12.3 Start or stop mnc-cpb container

When to use

Use this task to start or stop the mnc-cpb container and its processes from the **System Administration** window. See the *NFM-T Administration Guide* for more information on the System Administration functionality.

Related Information

The **Dashboard** folder contains the list of other dashboards such as **System**, **System Advanced**, and **System Control**. The **System Control** Dashboard lists all the NFM-T components that are listed as docker containers along with the process in an accordian format. Each container can be expanded to view the associated processes in it.

Steps

Complete the following steps to start or stop the mnc-cpb container/process:

1

From the NFM-T GUI application window, follow this path:

ADMINISTER > System Administration

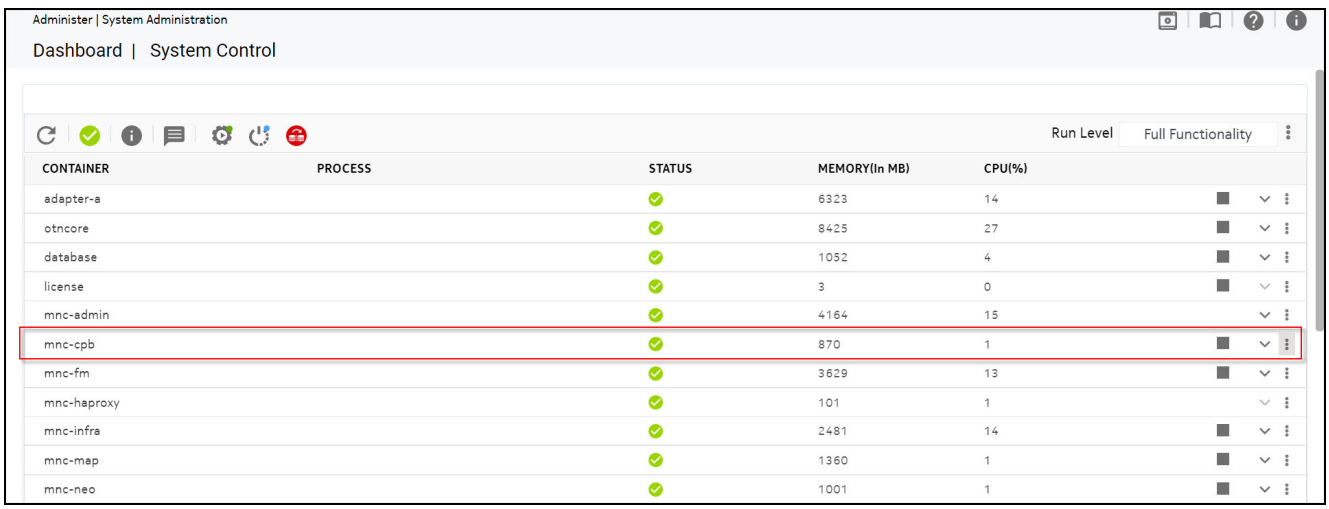
Result: The System Administration Dashboard is displayed.

2

Click the **Dashboard | System** folder name displayed at the top left corner of the Dashboard window to navigate to other Dashboards. Select **System Control** from the drop-down list.

Result: The System Control Dashboard is displayed.

Figure 12-1 Container/Process Control Dashboard window



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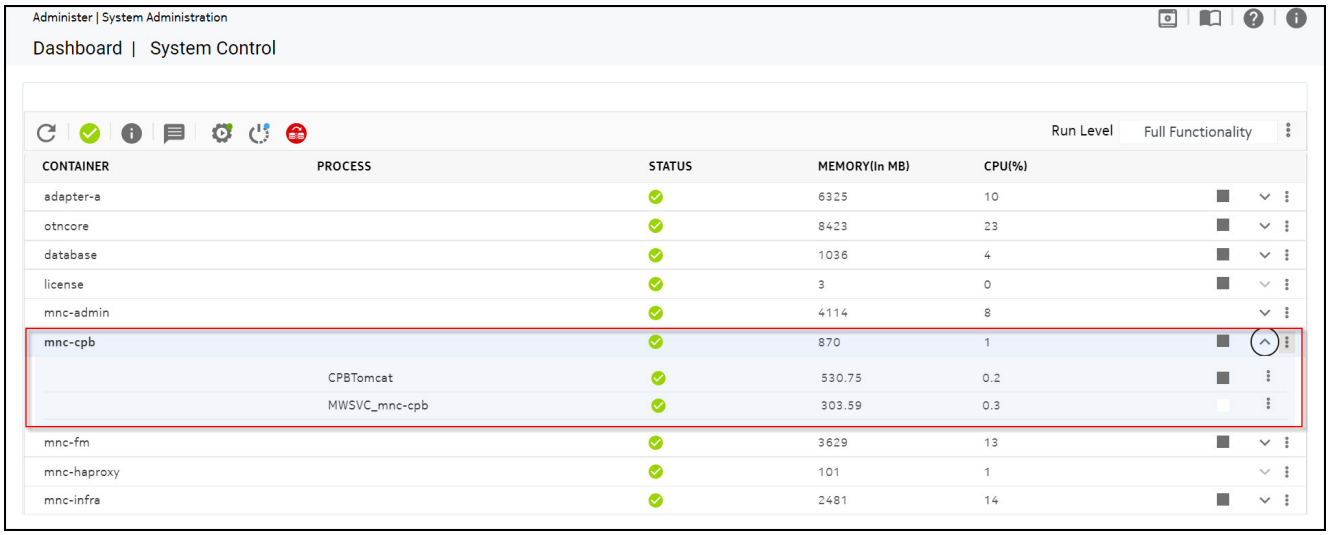
3

Click the expandable arrow, **Show Processes** at the end of **mnc-cpb** container panel, to view all the associated processes in the container.

Figure 12-2 mnc-cpb container



4

Click the **STOP** icon to stop the container.

Result: A confirmation message `Do you want to stop the container 'mnc-cpb'?` is displayed.

5

Click **OK** to confirm the action.

Result: An in-line message **'mnc-cpb' Container stop request submitted successfully** is displayed.

The status icon of the container changes to red when it is stopped or down. The status icon changes to green when it is started or up. Even if one process in a container is down, then the container status reflects as yellow.

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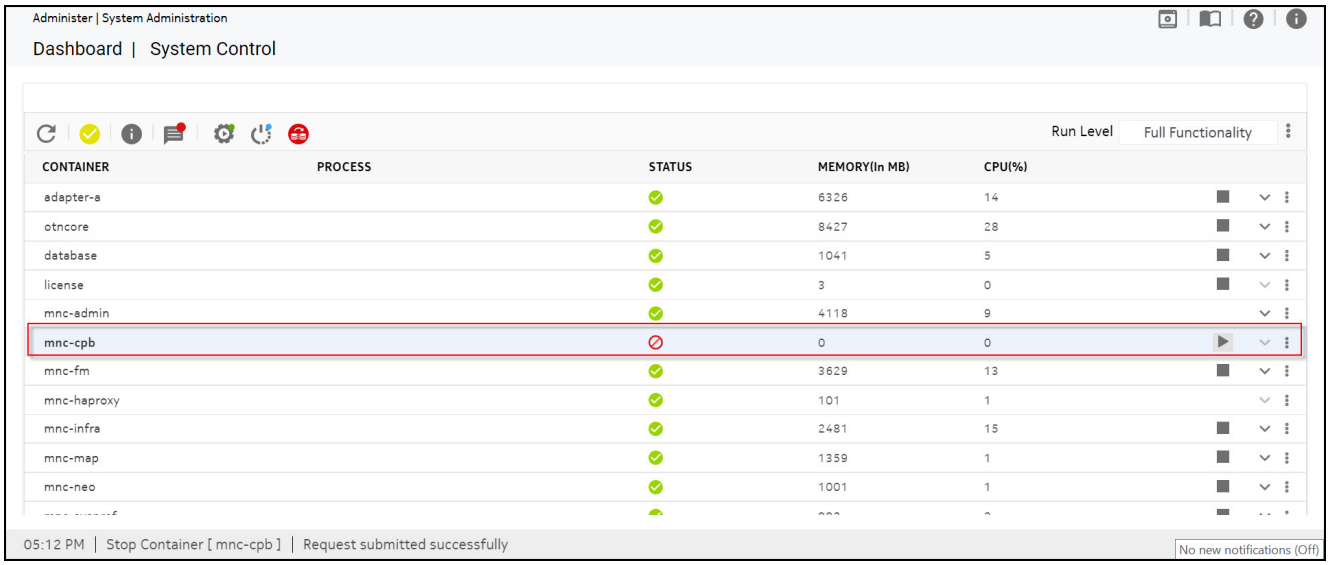
Figure 12-3 mnc-cpb container down



6

Click the **START** icon to start the container.

Result: An in-line message **'mnc-cpb' Container start request submitted successfully** is displayed.

7

Click the **More** icon and select **Info** button to view the properties of the mnc-cpb container or individual processes.

Result: The **Properties: mnc-cpb** window is displayed.

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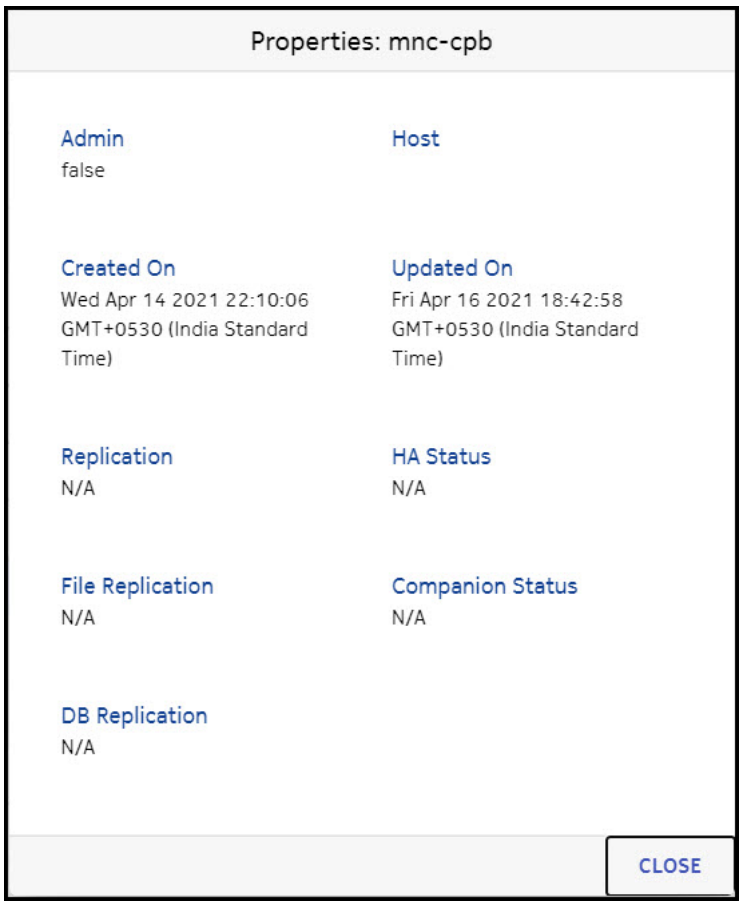
Figure 12-4 Properties window



8

Click the **More** icon and select **Logs**, at the individual process level, to view the logs.

Result: A **Process <Name> Logs** window is displayed at the individual process level.

9

Click the **More** icon at the **mnc-cpb** container level and then select **Start Processes** or **Stop Processes** to start/stop the individual processes.

Result: A respective confirmation message `Do you want to perform 'Start' all processes ?` or `Do you want to perform 'Stop' all processes ?` is displayed based on the action.

10

Click **OK**.

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Result: All the processes inside the **mnc-cpb** container starts/stops based on the action.

11

Select **CPBTomcat** process inside the **mnc-cpb** container and then click the **Stop Process** icon to stop the individual process.

Result: A confirmation message `Do you want to stop the process 'XXX'?` is displayed.

12

Click **OK** to confirm the action or **Cancel** to cancel the action.

Result: An in-line message **'XXX' Process stop request submitted successfully** is displayed and the process is stopped.

The status icon of the process changes to red when it is stopped or down. The status icon changes to green when it is started or up.

13

Click the **Start Process** icon to start the process.

Result: An in-line message **'XXX' Process start request submitted successfully** is displayed.

14

Click **OK** to confirm the action or **Cancel** to cancel the action.

Result: The process is started.

15

Click the **More** ⋮ icon at the individual process level and then select **Info** to view the properties of the individual process.

Result: The **Properties: <PROCESS>** window is displayed.

16

When the process is started, there is an option to restart the process. Click the **More** ⋮ icon at the individual process level and then select **Restart** to restart the individual process.

Result: A confirmation message `Do you want to restart the process 'XXX'?` is displayed.

17

Click **OK** to confirm the action.

Result: An in-line message **'XXX' Process restart request submitted successfully** is displayed and the process is restarted.

End of steps

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13 System Operations and Validation

13.1 Overview

Purpose

Validation definition

System validation is performed after a commissioning file has been loaded in the NFM-T CPB application. During the validation process, the NFM-T CPB application verifies whether the NEs match the design in the commissioning file. If they do not match, the NFM-T CPB application either stops the validation by giving an appropriate error, or the validation succeeds with appropriate warnings. The physical installation problems must be corrected and then the validation must be restarted.

This chapter describes how to launch CPB and load commissioning files, and how to perform system validation.

Contents

13.1 Overview	1621
CPB operations and system validation	1622
13.2 Launch CPB from NFM-T GUI and load commissioning file	1622
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13.4 View system operation status and cancel an operation	1628
13.5 Validate the system	1631

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CPB operations and system validation

13.2 Launch CPB from NFM-T GUI and load commissioning file

When to use

Use this procedure to launch the NFM-T CPB application from the NFM-T GUI.

Related information

See *1830 PSS Engineering and Planning Tool User Guide* for more information on network design.

See *Access the Equipment Manager and View Equipment Details* procedure in the *NFM-T OTN Guide* to access the *NFM-T OTN Equipment Manager*.

Before you begin

Ensure to obtain the commissioning file to be loaded from the EPT and save it on your PC.

Task: Launch CPB

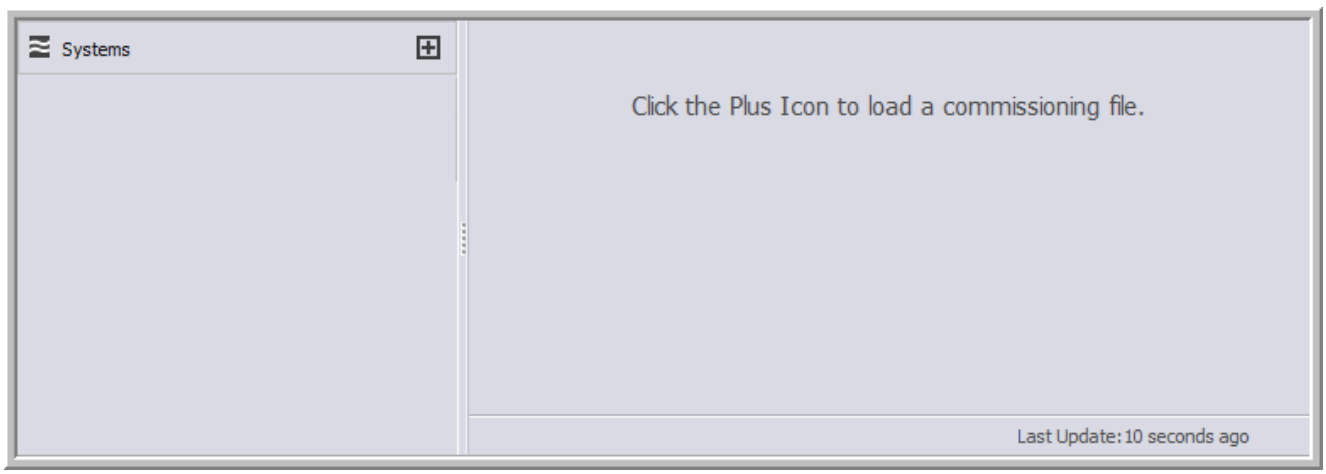
1

From the NFM-T GUI, follow this navigation path:

Operate > Commission and Power Balance

Result: The NFM-T CPB application opens in a new tab of the browser.

Figure 13-1 Main Window



END OF STEPS

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Task: Load commissioning file

1

Click the **Plus** ⊞ icon on the **Systems** panel.

Result: The **Load Commissioning File** window opens.

Figure 13-2 Load Commissioning File

2

Click **Browse** and select the commissioning file to be loaded from your PC.

3

Click **Load File**.

Result: The commissioning file is loaded and the systems that constitute the network plan is displayed below the **Systems** panel.

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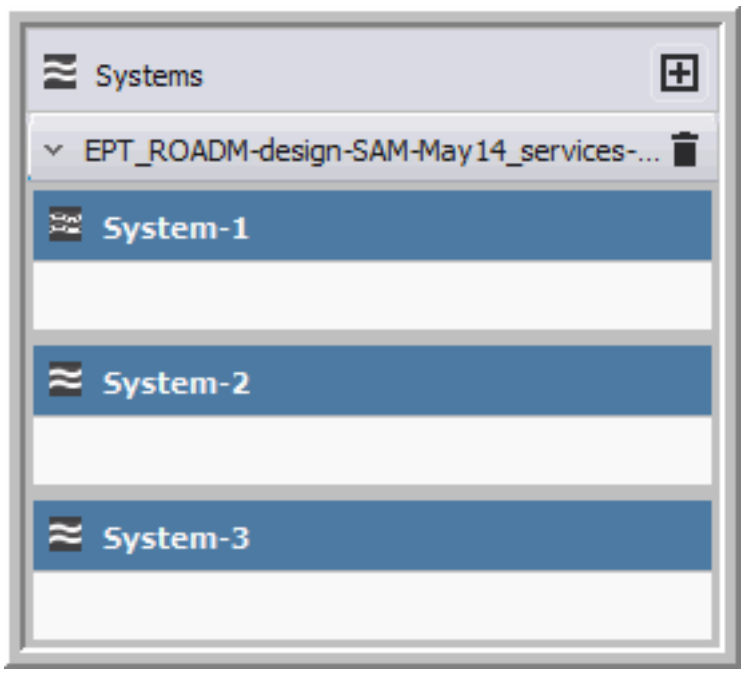
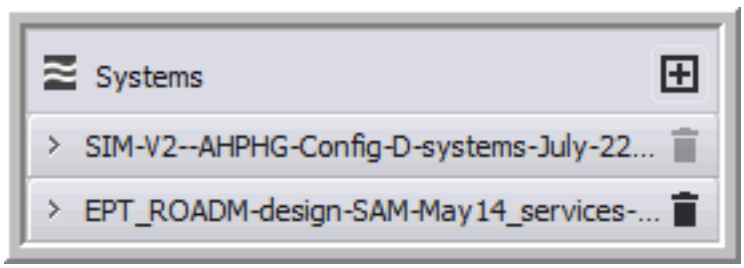
Figure 13-3 Commissioning File Loaded



You can load more than one commissioning file in the NFM-T CPB application. Click the commissioning file tabs below the **Systems** panel to expand and collapse the systems of a particular commissioning panel.

Figure 13-4 Multiple Commissioning File - Collapsed View



END OF STEPS

Task: Delete a commissioning file

1

Click the **Recycle Bin** icon on the commissioning file panel.

Result: The **Remove Commissioning File** confirmation dialog box opens.

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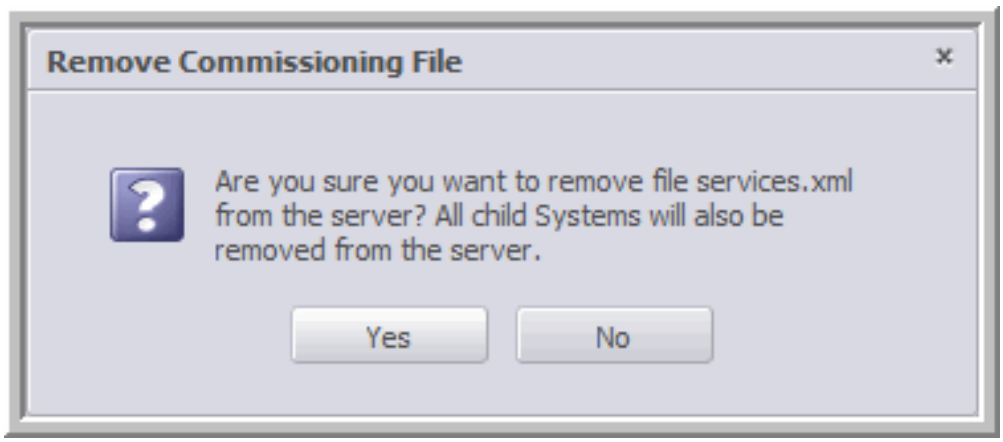
Figure 13-5 Remove Commissioning File



2

Click **Yes**.

Result: The commissioning file and the related systems are deleted from the server.

Note: You cannot delete a commissioning file if any task is in progress for any system defined within the file.

END OF STEPS

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13.3 View system operations

When to use

Use this procedure to view the operations that can be performed on a system.

Related information

After a system is loaded using a configuration file, the following operations are listed for a system:

System operation icon	Description
	System validation icon
	System provisioning icon
	Channel power adjustment icon
	Generate loss report icon

Before you begin

After uploading the commissioning file, the systems configured in the commissioning file are listed. However, to view the operations that can be performed on a system, you must click a system and highlight it first. Also note that when an operation is in progress, all icons for other operations are disabled until the operation in progress is completed.

Task

1

Click a **System** in the list of systems below the commissioning file panel.

Result: The system is highlighted.

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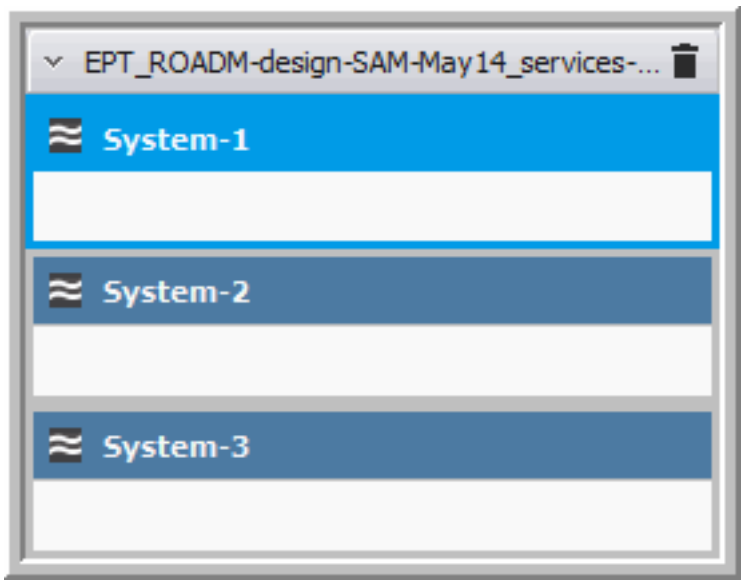
Figure 13-6 Highlighted System



2

Mouse over the **System Operations** icon in the highlighted system.

Result: A list of operations that can be performed in a system is displayed.

Figure 13-7 System Operations

End of steps

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13.4 View system operation status and cancel an operation

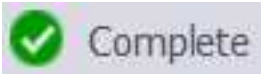
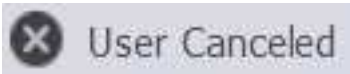
When to use

Use this procedure to view the status of the operation performed on a system or to cancel an operation in progress.

Related information

While performing any of the system operations, the status bar in the lower panel of the NFM-T CPB application displays the status of the operation.

Table 13-1 System Operation Status

Status	Description
	Operation is in progress.
	Operation is completed successfully.
	Operation has failed with an error.
	Operation is cancelled.

Before you begin

Ensure that an operation is initiated to view the status of the operation. You can cancel all the operations, except system validation and generation of loss report.

Task: View status

1

Perform the following:

- Validate a system - See 13.5 “Validate the system” (p. 1631).
- Provision a system - See 14.2 “Provision a system” (p. 1634).
- Perform channel power adjustment - See 14.3 “Channel power adjustment” (p. 1649).
- Generate system loss report - See 14.4 “Generate system loss report” (p. 1653).

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2

View the status bar in the lower panel of the application.

Result: The status is displayed as described in Table 13-1, “System Operation Status” (p. 1628).

END OF STEPS

Task: Cancel an operation

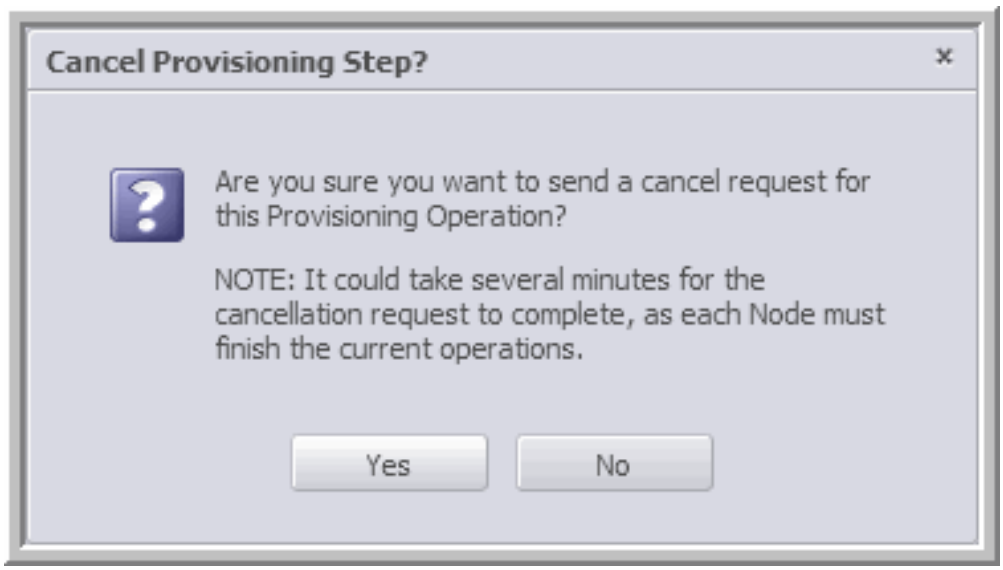
1

Click the **Cancel** button in the top right corner of the application, when one of the following operations is in progress:

- System provisioning
- Channel power adjustment

Result: The **Cancel Provisioning Step** window opens.

Figure 13-8 Cancel Operation - Cancel Provisioning Example



2

Click **Yes** to cancel the operation.

Result: If a node is in between an operation for example, provisioning a card during the system provisioning step, and the **Cancel** button is clicked, then the node completes the current operation, and then only the system provisioning is cancelled.

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The status bar displays **User Cancelled** status after the operation is completed.

End of steps

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13.5 Validate the system

When to use

Use this procedure to perform system validation.

Related information

System validation must be performed to ensure that the commissioning file loaded has the same plan as the nodes in the field. After system validation, the mismatched information is reported which can be used to fix the errors.

System validation involves querying the NFM-T database and comparing the following, as currently provisioned, against those specified in the commissioning file:

- Shelves
- Card slots
- Port pluggable module type
- Internal topologies
- External topologies

Before you begin

Ensure to upload the commissioning file. See 13.2 “Launch CPB from NFM-T GUI and load commissioning file” (p. 1622).

Task

1

Perform 13.3 “View system operations” (p. 1626) to view the system operations.

2

Click the **System Validation** icon.

Result: The status bar in the bottom panel of the NFM-T CPB application window displays the status of the operation. See 13.4 “View system operation status and cancel an operation” (p. 1628).

Note: You cannot cancel a system validation.

The system validation results are displayed for the nodes and the system, including the number of mismatches and number of warnings.

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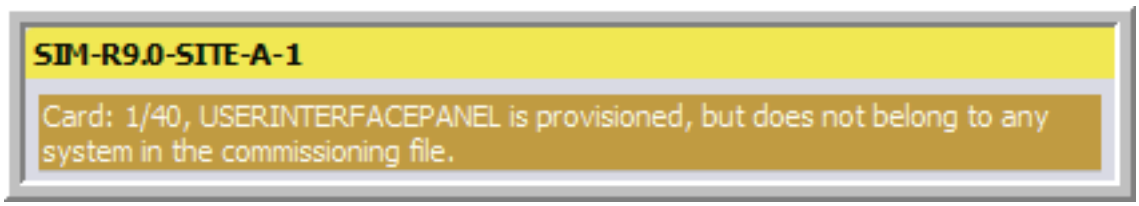
Figure 13-9 System Validation Result

3

Click the system or nodes in case of errors or warnings.

Result: The details of the errors or warnings are displayed.

Figure 13-10 System Validation Warning



A warning is reported in the system or node level validation summary for information that is not included in the commissioning file. For example, in Figure 13-10, “System Validation Warning” (p. 1632), the commissioning file does not explicitly mention the user interface panel. The next commissioning steps can be performed even if warnings are included in the commissioning file.

An error indicates differences between the commissioning file and the real device. Validation mismatch errors in shelves and cards must be corrected before further commissioning can proceed.

End of steps

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14 Provision and Commission Systems

14.1 Overview

Purpose

This chapter provides information on provisioning a system, performing channel power adjustment, and generating loss reports.

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System provisioning

14.2 Provision a system

When to use

Use this procedure to provision a system as configured in the commissioning file after system validation is completed.

Related information

System provisioning includes setting-up the nodes in a network as configured in the commissioning file.

The following steps are involved in provisioning a system:

- **Query Inventory** - involves collecting information from the uploaded commissioning file.
- **Provision Inventory** - involves provisioning of the shelves and cards in all the nodes as per the design in the commissioning file.
- **Provision External Topology** - involves configuration of external optical links.
- **Provision Internal Topology** - involves configuration of internal optical links.
- **Provision SEAM Topology** - involves configuration of SEAM tag on the connections between THRU ports of a WR or CWR card between two different systems.
- **Provision Power Attributes** - involves configuration of the power attributes such as power gain and nominal loss.

Before you begin

Ensure to complete the system validation and fix errors encountered during validation process.

Task

1

Perform 13.3 “View system operations” (p. 1626) to view the system operations.

2

Click the **System Provisioning** icon.

Result: The sequence of tasks to be performed for system provisioning is displayed.

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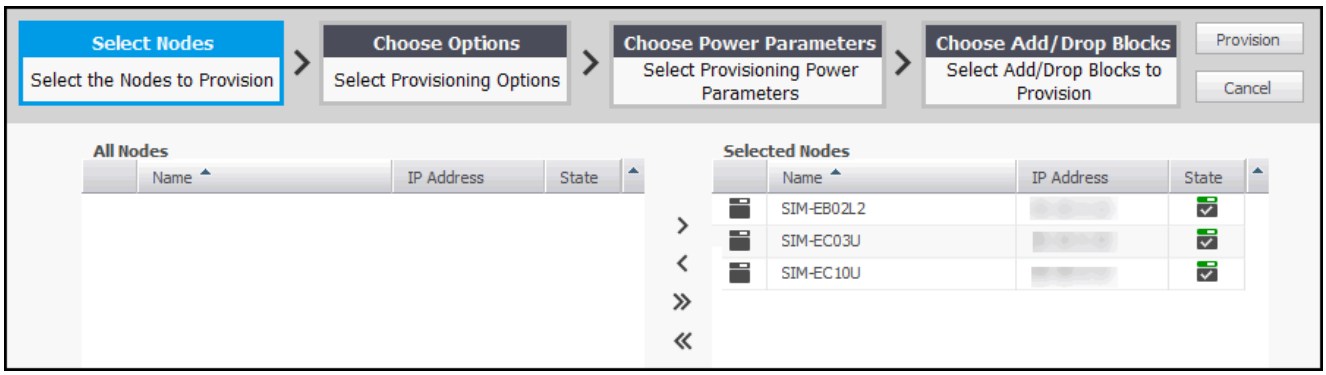
Figure 14-1 System Provisioning Steps



3

Perform one of the following to select the nodes to be provisioned in the **Select Nodes** step:

- Select a node and drag it to or from the **All Nodes** and **Selected Nodes** lists to deselect or select a node to be commissioned.
- Select one or more nodes and click the select or deselect icons to move the selected nodes to or from the **All Nodes** and **Selected Nodes** lists.

>	Select icon
<	Deselect icon

- Click the select all or deselect all icons to move all the nodes to or from the **All Nodes** and **Selected Nodes** lists.

»	Select all icon
«	Deselect all icon

By default, all the nodes in the network are selected to be provisioned.

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The nodes are in one of the following states:

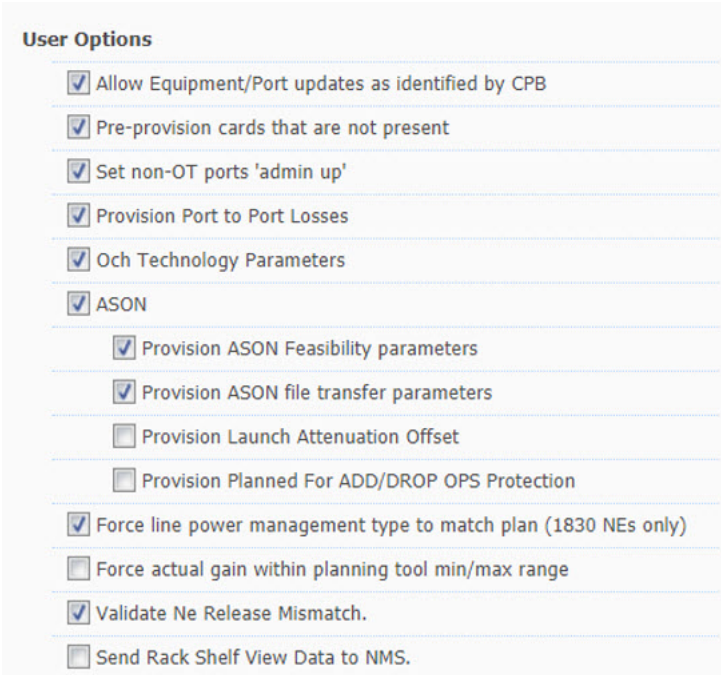
Icon	Description
	Managed and Reachable - Indicates that NFM-T is managing the node and has active communication with the node.
	Not Managed - Indicates that NFM-T is not managing the node.
	Not Reachable - Indicates that NFM-T is not having active communication with the node.

4

Click **Choose Options** and configure the parameters in the **User Options** list in one of the following ways:

- Click **Select All**.
- Click **Clear All** and select parameters as required.
- Click **Select Defaults** to select the default parameters only.

Figure 14-2 Provisioning User Options



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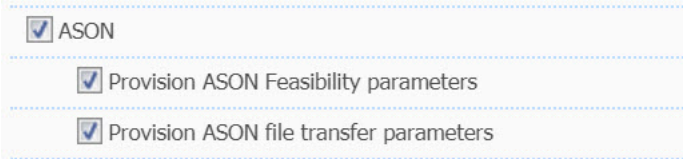
By default, all the options are selected, except **Force actual gain within planning tool min/max range**.

Important! While configuring the provisioning options for a new version of a GMRE node, click **Clear All**, and then select **ASON**, **Provision ASON Feasibility parameters**, and **Provision ASON file transfer parameters** check boxes only.

Figure 14-3 Provisioning User Options - Upgraded GMRE node

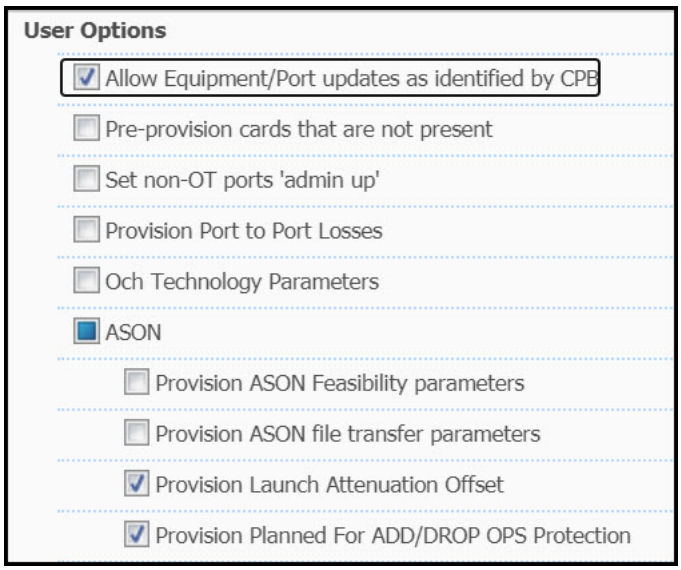


By default, only the option **Allow Equipment/Port updates as identified by CPB** should be selected when using the following options under **ASON**:

- **Provision Launch Attenuation Offset**
- **Provision Planned for ADD/DROP OPS Protection**

Note: These two parameters **Provision Launch Attenuation Offset** and **Provision Planned for ADD/DROP OPS Protection** are not selected by default. These parameters are used if a non-GMRE network is converted into a GMRE network or OPS protection on OTs EPT design has to be commissioned by CPB.

Figure 14-4 Provisioning User Options - ASON parameters



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The various **User Options** listed includes the following:

- **Allow Equipment/Port updates as identified by CPB** - This option allows CPB to make changes on the system being provisioned. If you do not want to make any changes on the NE configuration, deselect this option.

  When this option is deselected, all other options in this section except the ASON options are ignored.
- **Pre-provision cards that are not present** - This option allows CPB to pre-provision a card on an empty card slot as per the configuration file. Disabling pre-provisioning of cards may cause provisioning failures if the system is not provisioned according to the configuration file.
- **Set non-OT ports 'admin up'** - This option allows CPB to set the administrative state for all ports to UP.
- **Provision Port to Port Losses** - This option allows CPB to provision gain/loss parameters for ports on the optical path.
- **Och Technology Parameters** - This option allows CPB to set the OCH technology parameters.
- **ASON** - This option allows CPB to enable or disable the following parameters:
  - **Provision ASON Feasibility parameters** - This option allows CPB to provision the ASON feasibility parameters for the NE. This is mainly used for GMRE path computation.
  - **Provision ASON file transfer parameters** - This option allows CPB to set the ASON file transfer parameters for GMRE nodes. The CPB application parses the optical impairment lookup tables and stores a new XML file in the default FTP directory, where the node can retrieve it.
  - **Provision Launch Attenuation Offset** - This option allows CPB to set the attenuation values for a GMPLS enabled and GMPLS disabled designs.

    For GMPLS enabled designs, the launch attenuation value is set to 0 dB to enable faster restoration.

    For GMPLS disabled designs, the launch attenuation value is set to 2 dB.
  - **Provision Planned for ADD/DROP OPS Protection** - This option is supported only on GMPLS enabled designs. This option is available on GMPLS enabled designs consisting of IROADMF, IROADMV, IROADM9R, IROADM9R-LP, IRDM20, IRDM32 configurations, and not supported on IROADM9M configuration.
- **Force line power management type to match plan (1830 NEs only)** - This option allows CPB to set the power management type of an amplifier port to match the commissioning file. This may result in the pack to be out of service while the parameter is changed.
- **Force actual gain within planning tool min/max range** - This option allows the CPB tool to override the actual gain value in the commissioning file with a value that lies in the range of the minimum and maximum gain. This option is deselected by default, and you need not change it.
- **Validate Ne Release Mismatch** - This option allows the CPB to continue with the provisioning of the network while validating the mismatch in the NE releases during provisioning. The CPB tool displays a warning message, if NE releases are different from the planned values. From R20.7 onwards, the NFM-T CPB R20.7 and 1830 EPT R13.0 supports backward compatibility for up to N, N-1, and N-2 NE releases. The CPB tool will check the

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NE release before using the Commissioning File for provisioning. Refer the table Table 11-1, “NE releases supported ” (p. 1600) to know the NE releases supported. If there is a mismatch in the NE release, then a warning message is displayed in the CPB Log file and the provisioning of the network cannot be continued.

```
Network Element:   Site1-1_LBO

  1.   [10/14/20 17:26:12 PM]  Start provisioning inventory for Network Element: Site1-1_LBO
  2.   [10/14/20 17:26:12 PM]  ...Validating Ne Release mismatch...
  3.   [10/14/20 17:26:12 PM]  Node version does not match EPT version!
  4.   [10/14/20 17:26:12 PM]  Commissioning file created for Network Release: 13.0
  5.   [10/14/20 17:26:12 PM]  This node software version: 13.0.4
  6.   [10/14/20 17:26:12 PM]  Cannot Continue Provisioning with Ne Release mismatch

Network Element:   Site2-1_LBO

  1.   [10/14/20 17:26:12 PM]  Start provisioning inventory for Network Element: Site2-1_LBO
  2.   [10/14/20 17:26:12 PM]  ...Validating Ne Release mismatch...
  3.   [10/14/20 17:26:12 PM]  Node version does not match EPT version!
  4.   [10/14/20 17:26:12 PM]  Commissioning file created for Network Release: 13.0
  5.   [10/14/20 17:26:12 PM]  This node software version: 13.0.4
  6.   [10/14/20 17:26:12 PM]  Cannot Continue Provisioning with Ne Release mismatch
```

- **Send Rack Shelf View Data to NMS** - This option allows the user to transfer the rack shelf view data for a particular commissioning file to NMS and later on to NE.

Important! CPB creates NE feasibility files and CPB log files that are replicated on HA systems. However, if an HA switchover occurs before these files have been replicated, these will not be available on the new active server. Feasibility files can be recovered by re-executing the CPB provisioning operation that creates the feasibility file on the newly active server. The CPB log files that were not previously replicated would not be recoverable, but the associated provisioning operation could be run again.

This situation can occur only when the HA is configured with the Automatic switchover. In case of Manual switchover, the data must be previously aligned by the operator prior to performing the switching.

5

Click **Choose Power Parameters**, scroll down the list and configure the parameters in the **Power Options** list in one of the following ways:

- Click **Select All** to select all parameters.
- Click **Clear All** and select parameters as required.
- Click **Select Defaults** to select the default parameters only.

By default all options are selected except **WT Decoder Usage Type**. You may not change the default options. The **Power Options** include the following:

- **WT Decoder Usage Type** - If wavelength tracker information is required for a system, ensure to select the **WT Decoder Usage Type** check box. If the **WT Decoder Usage Type** check

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box is deselected and subsequent CPB operations are completed, then no wavelength tracker information is displayed in the NE WebUI or the NFM-T GUI, when required.

- **Gain Adjust Sched Base** - This option allows CPB to set base period past the hour for scheduled gain adjustments.
- **Gain Adjust Timer Period** - This option allows CPB to set the time period between gain adjustments.
- **Gain Adjust Timer Length** - This option allows CPB to set the length of the time allocated for scheduled gain adjustments.
- **Gain Adjust Auto Enabled** - This option allows to enable or disable automatic gain adjustment.
- **Ingress SRS Tilt Post Fraction** - This option allows CPB to modify the fraction of ingress span SRS tilt post-compensated.
- **Egress SRS Tilt Pre Fraction** - This option allows CPB to modify the fraction of egress span SRS tilt pre-compensated.
- **Egress SRS Tilt Calc Output Loss** - This option allows CPB to override the allowed loss on calculated SRS tilt.
- **SRS Tilt Adjust Auto Enabled** - This option allows CPB to enable or disable automatic SRS tilt adjustment.
- **LH Launch Attenutation** - This option allows CPB to set long haul service launch attenuation offset on the NE to facilitate commissioning and in-service adjustments.
- **IROADM** - allows CPB to enable or disable or confgure the following IROADM parameters:
  - **Max Channels** - configures maximum channels per degree.
  - **Add Minimum PPC** - adds minimum per-channel power.
  - **Express Minimum PPC** - expresses minimum per-channel power.
  - **Egress OA Ripple** - configures the egress ripple on the optical amplifier.
  - **Fiber Type Out** - configures the expected fiber type of the card.
  - **Fiber Length Out** - configures the total length of the fiber inside the card, to the closest kilometer.
  - **Nominal Span Loss Out** - configures the nominal span loss.
  - **Target PPC Out** - configures the target per-channel power.
  - **Ingress OA Target PPC Adjust** - configures the per-channel power adjustment on the ingress optical amplifier.

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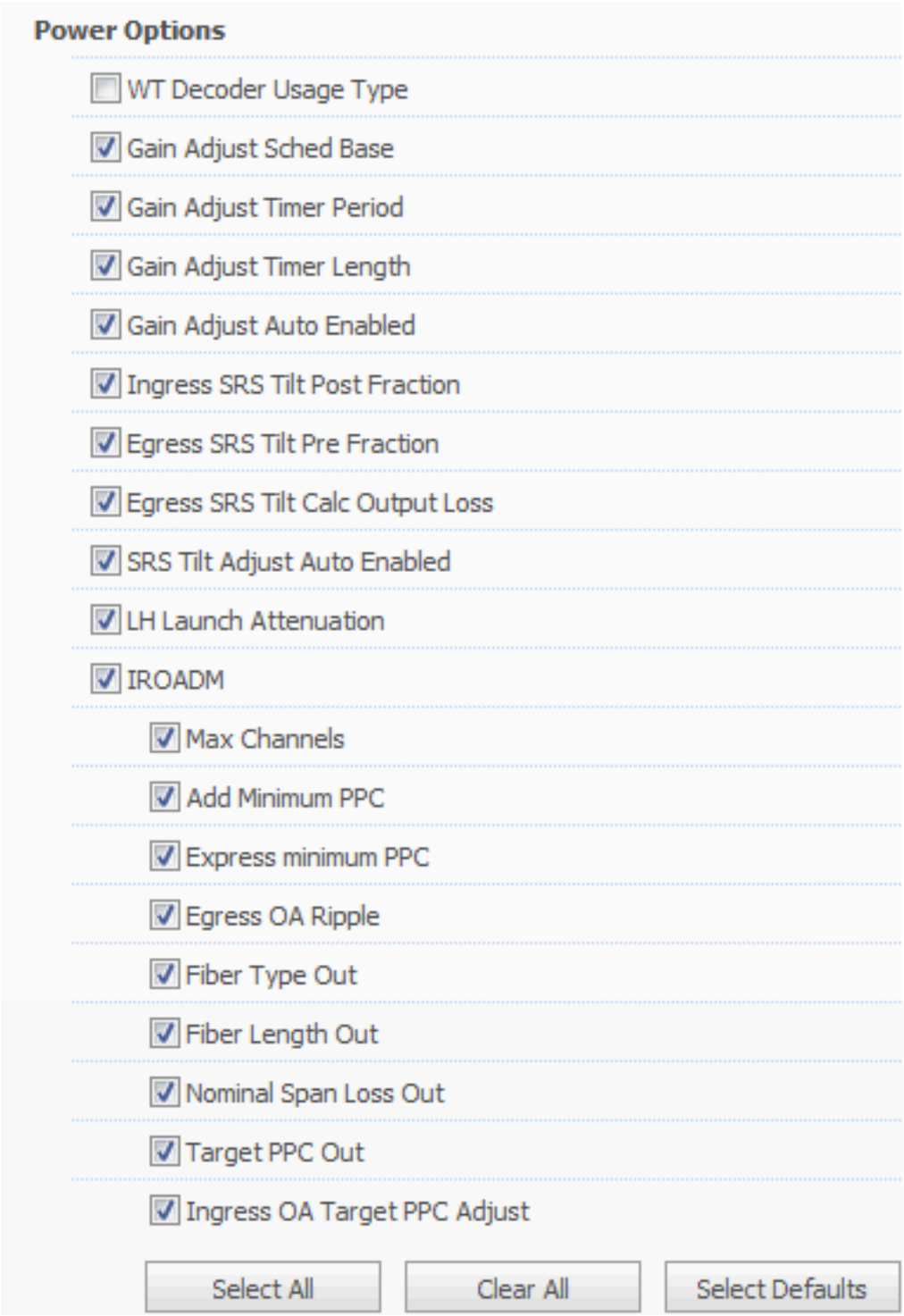
Figure 14-5 Power Options Configuration



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Note:

1. There are additional power options which are not listed in the NFM-T CPB application, as they are not optional, and are provisioned irrespective of the selection of the optional parameters listed in the application.
2. After provisioning an NE, if the line power management type is set to Manual and then re-provisioned without choosing to set the line power management type to match the commissioning file (by default, it is set to Auto in commissioning file), the following errors are expected:

   ```
   ERROR: Failed to provision power attribute: rippleAllowance
   ERROR: Failed to provision power attribute: gainSetOffset
   ERROR: Failed to provision power attribute: srsTiltPreFraction
   ERROR: Failed to provision power attribute: srsTiltCalcACoeff
   ERROR: Failed to provision power attribute:
   srsTiltCalcMultiplier
   ERROR: Failed to provision power attribute:
   srsTiltCalcOutputLoss
   ERROR: Failed to provision power attribute: fiberSpanTiltPreComp

   ERROR: Failed to provision power attribute: srsTiltPostFraction
   ```

   The errors listed are for the card level power attributes.

Important! While configuring the provisioning options for a new version of a GMRE node, click **Clear All**.

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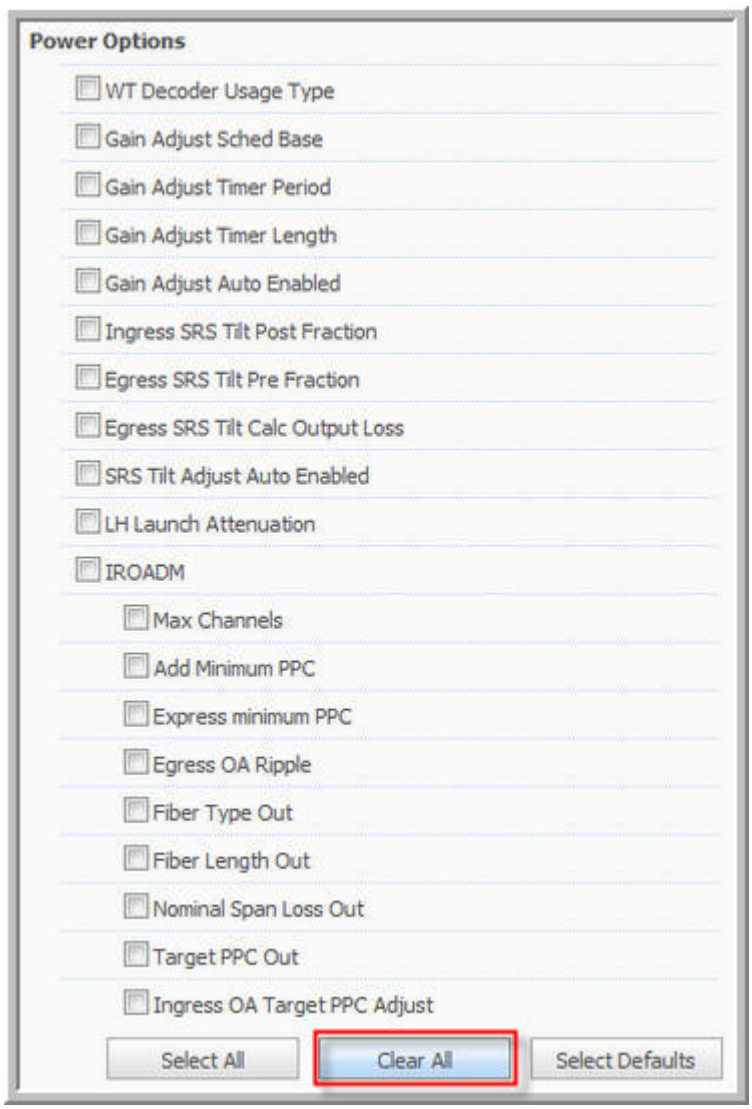
Figure 14-6 Power Options Configurations - Upgraded GMRE node



Additional Information Port level power attributes are provisioned automatically without any user inputs if the required cards are as part of the NE setup and if the values are added in the commissioning file. The port level power attributes are provisioned during the provisioning operation and the attribute values are displayed in the CPB log file. For example - ExtraInputLoss 5.1 is a port level power attribute which is provisioned and displayed in the CPB log file.

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```
210. [10/14/20 17:53:17 PM]  **** Provisioned: targetOutputPower = 1.94
211. [10/14/20 17:53:17 PM]  Port = 1/7/SIG
212. [10/14/20 17:53:17 PM]  Planned power Attributes: ampMaxGain = 24.44, ampMinGain = 24.44, ampNominalGain = 24.44, gainFlatOffset = 0.0, targetOutputPower = 4.9
213. [10/14/20 17:53:18 PM]  **** Provisioned: ampMinGain = 24.44
214. [10/14/20 17:53:18 PM]  **** Provisioned: ampMaxGain = 24.44
215. [10/14/20 17:53:18 PM]  Skipping provisioning of (ampPortPowerGain) since the user option is unselected (Force actual gain within planning tool min/max range)
216. [10/14/20 17:53:18 PM]  **** Provisioned: gainFlatOffset = 0.0
217. [10/14/20 17:53:18 PM]  **** Provisioned: targetOutputPower = 4.94
218. [10/14/20 17:53:18 PM]  Port = 1/12/CLS1
219. [10/14/20 17:53:18 PM]  Planned power Attributes: extraInputLoss = 5.1, roadmDropTargetPower = -12.0,
220. [10/14/20 17:53:18 PM]  **** Provisioned: roadmDropTargetPower = -12.0
221. [10/14/20 17:53:18 PM]  **** Provisioned: extraInputLoss = 5.1
222. [10/14/20 17:53:18 PM]  Port = 1/12/CLS2
223. [10/14/20 17:53:18 PM]  Planned power Attributes: roadmDropTargetPower = -12.0,
224. [10/14/20 17:53:18 PM]  **** Provisioned: roadmDropTargetPower = -12.0
225. [10/14/20 17:53:18 PM]  Port = 1/12/CLS3
226. [10/14/20 17:53:18 PM]  Planned power Attributes: roadmDropTargetPower = -12.0,
227. [10/14/20 17:53:19 PM]  **** Provisioned: roadmDropTargetPower = -12.0
228. [10/14/20 17:53:19 PM]  Port = 1/12/CLS4
229. [10/14/20 17:53:19 PM]  Planned power Attributes: roadmDropTargetPower = -12.0,
230. [10/14/20 17:53:19 PM]  **** Provisioned: roadmDropTargetPower = -12.0
231. [10/14/20 17:53:19 PM]  Port = 1/12/CLS5
232. [10/14/20 17:53:19 PM]  Planned power Attributes: roadmDropTargetPower = -12.0,
233. [10/14/20 17:53:19 PM]  **** Provisioned: roadmDropTargetPower = -12.0
234. [10/14/20 17:53:19 PM]  Port = 1/12/CLS6
235. [10/14/20 17:53:19 PM]  Planned power Attributes: roadmDropTargetPower = -12.0,
236. [10/14/20 17:53:19 PM]  **** Provisioned: roadmDropTargetPower = -12.0
```

New Planned power Attributes such as expressTargetPower, expressChannelTargetPower, and ConfigDropExpressTargetPower are included in the commissioning file to support IRDM20, IRDM32, IRDM32L, iROADM9R, and WR20-TF cards.

```
ETP_Site1-1
[8/11/2021, 3:37:56 PM] Planned power Attributes: ampMaxGain = 22.5, ampMinGain = 16.5, ampNominalGain = 22.5, deltaMaxGain = 2.0, deviationOut = 0.6486667, outputVoa = 0.0, spliceMargin = 0.0, targetOutputPower = 3.18, tiltTarget = 0.0,
[8/11/2021, 3:37:57 PM] **** Provisioned: deltaMaxGain = 0.0
[8/11/2021, 3:38:00 PM] **** Provisioned: ampMinGain = 16.5
[8/11/2021, 3:38:00 PM] **** Provisioned: ampMaxGain = 22.5
[8/11/2021, 3:38:01 PM] **** Provisioned: outputVoa = 0.0
[8/11/2021, 3:38:02 PM] **** Provisioned: tiltTarget = 0.0
[8/11/2021, 3:38:03 PM] **** Provisioned: deltaMaxGain = 2.0
[8/11/2021, 3:38:03 PM] **** Provisioned: spliceMargin = 0.0
[8/11/2021, 3:38:05 PM] **** Provisioned: targetOutputPower = 3.18
[8/11/2021, 3:38:05 PM] **** Provisioned: deviationOut = 0.6486667
[8/11/2021, 3:38:05 PM] Port = 1/3/LINEOUT
[8/11/2021, 3:38:05 PM] Planned power Attributes: ampMaxGain = 23.62, ampMinGain = 23.62, ampNominalGain = 23.62, deltaMaxGain = 0.0, deviationOut = 0.6486667, fiberSpanTilt = 0.8, gainAdjAutoEnabled = true, gainAdjSchedBase = 0.0, gainAdjTimerLength = 28.0,
gainAdjTimerPeriod = 600.0, launchAtten = 2.0, outputVoa = 0.5, srsTiltAutoEnabled = true, targetOutputPower = 2.68, tiltTarget = -0.8,
[8/11/2021, 3:38:06 PM] **** Provisioned: deltaMaxGain = 0.0
[8/11/2021, 3:38:10 PM] **** Provisioned: ampMinGain = 23.62
[8/11/2021, 3:38:11 PM] **** Provisioned: ampMaxGain = 23.62
[8/11/2021, 3:38:12 PM] **** Provisioned: outputVoa = 0.5
[8/11/2021, 3:38:12 PM] **** Provisioned: tiltTarget = -0.8
[8/11/2021, 3:38:13 PM] **** Provisioned: deltaMaxGain = 0.0
[8/11/2021, 3:38:13 PM] **** Provisioned: srsTiltAutoEnabled = true
[8/11/2021, 3:38:14 PM] **** Provisioned: gainAdjSchedBase = 0.0
[8/11/2021, 3:38:14 PM] **** Provisioned: launchAtten = 2.0
[8/11/2021, 3:38:15 PM] **** Provisioned: targetOutputPower = 2.68
[8/11/2021, 3:38:16 PM] **** Provisioned: gainAdjAutoEnabled = true
[8/11/2021, 3:38:16 PM] **** Provisioned: gainAdjTimerLength = 28.0
[8/11/2021, 3:38:17 PM] **** Provisioned: gainAdjTimerPeriod = 600.0
[8/11/2021, 3:38:17 PM] **** Provisioned: deviationOut = 0.6486667
[8/11/2021, 3:38:18 PM] **** Provisioned: fiberSpanTilt = 0.8
[8/11/2021, 3:38:18 PM] Port = 1/4/ADT1
[8/11/2021, 3:38:18 PM] Planned power Attributes: expressTargetPower = -19.0,
[8/11/2021, 3:38:18 PM] **** Provisioned: expressTargetPower = -19.0
[8/11/2021, 3:38:18 PM] Port = 1/10/LINEIN
[8/11/2021, 3:38:18 PM] Planned power Attributes: deviationIn = 0.0,
[8/11/2021, 3:38:19 PM] **** Provisioned: deviationIn = 0.0
[8/11/2021, 3:38:19 PM] Port = 1/10/LINEOUT
[8/11/2021, 3:38:19 PM] Planned power Attributes: ampMaxGain = 22.5, ampMinGain = 16.5, ampNominalGain = 22.5, deltaMaxGain = 2.0, deviationOut = 0.6486667, outputVoa = 0.0, spliceMargin = 0.0, targetOutputPower = 3.18, tiltTarget = 0.0,
[8/11/2021, 3:38:20 PM] **** Provisioned: deltaMaxGain = 0.0
```

6

Click **Choose Add/Drop Blocks** and perform one of the following to select the Add/Drop blocks to be provisioned

- Select an Add/Drop block and drag it to or from the **Available Add/Drop Blocks** and **Selected Add/Drop Blocks** lists to deselect or select a block to be commissioned.
- Select one or more Add/Drop blocks and click the select or deselect icons to move the selected blocks to or from the **Available Add/Drop Blocks** and **Selected Add/Drop Blocks** lists.

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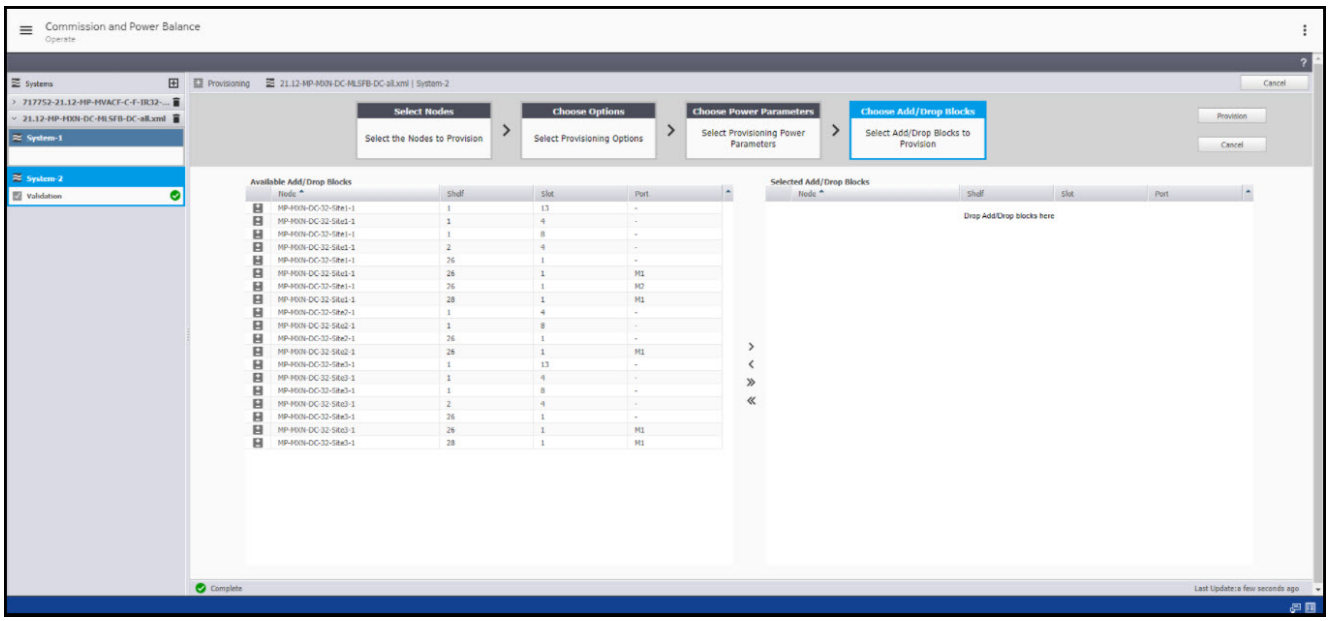
>	Select icon
<	Deselect icon

- Click the select all or deselect all icons to move all the blocks to or from the **Available Add/Drop Blocks** and **Selected Add/Drop Blocks** lists.

»	Select all icon
«	Deselect all icon

By default, all the Add/Drop blocks are not selected.

Figure 14-7 Add/Drop Blocks Multiple Selection Example



Additional Information A new user selectable Add/Drop block attribute, **addPowerMode**, with values high or low is configured in the commissioning file at each MCS (card level) to improve

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the optical performance. In OTs using a CDC-F add amplifier array (AAR), the attribute**addPowerMode=high/low** is set to `-16dBm or -19dBm` as the input power in the AAR.

If the target power cannot be reached in a particular NE, then the actual power is automatically readjusted to a lower value in the AAR.

The **addPowerMode=high** is allowed only if the target -16 dBm is reachable. Therefore:

- A MCS with **addPowerMode=high** should allow high output power OTs (low power OTs or OPS protected trails are not allowed).

  For example - When the default (low) is selected, then the **addPowerMode** value is set to low for all the MCSes, and the calculations are done assuming -19 dBm as the target. Low output power OTs are not allowed when the Add/Drop block has a value **addPowerMode=high**.
- Nodes with Sigout larger than the threshold can have Add/Drop block set to high.

  For example - When the chosen target is -16 dBm, the **addPowerMode=high** is assumed in all the Add/Drop blocks belonging to the nodes with SigOut larger than the threshold. All the Add/Drop blocks at the nodes with SigOut lower than the threshold is set to low.

Note: When there is an upgrade from previous release, ensure to set the **addPowerMode** to low.

Along with Shelf, Slot, a new attribute/column **Port** is included in the commissioning file to provide the Port level details. Port level details are available for Add/Drop Blocks. When there are multiple Add/Drop blocks in a card, the Port level information helps user to determine which port is applicable for provisioning. The Port level information is available for few Add/Drop blocks. A **hyphen (-)** is displayed at the port level for a non-supported Add/Drop block.

Currently, CPB displays both port level and card level information for users to select during provisioning of Add/Drop Block. The user should not select card level information, if the intent is only to provision the port. For example, in the figure Figure 14-7, “Add/Drop Blocks Multiple Selection Example” (p. 1645), if user selects Add/Drop Block on port 26/1, CPB might provision up to six Add/Drop Blocks as mentioned in the commissioning file. If user wants to provision 26/1/M1, then the user must select only 26/1/M1 and not 26/1.

7

Click **Provision** in the panel listing the steps.

Result: The status bar in the bottom panel of the NFM-T CPB application window displays the status of the operation. See 13.4 “View system operation status and cancel an operation” (p. 1628).

During the provisioning process, the status of each step involved in the system provisioning is displayed for the nodes and the system.

The status is one of the following:

- **Pending**
- **In Progress**
- **Completed**

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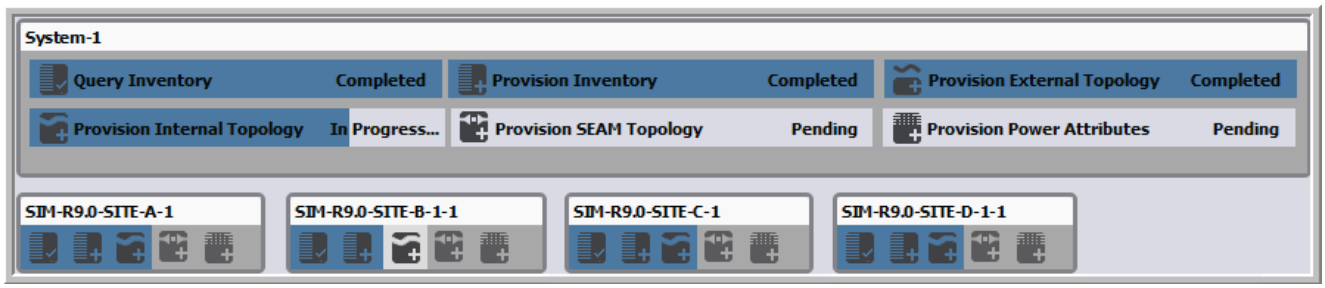
The status of a system for a particular step is the overall status of the corresponding step for the nodes constituting the system. For example, in Figure 14-8, “Example of System Provisioning In Progress Status” (p. 1646), status of the step **Provision Internal Topology** for a system continues to be **In Progress** until provisioning of the internal topology is completed for the second node in the system.

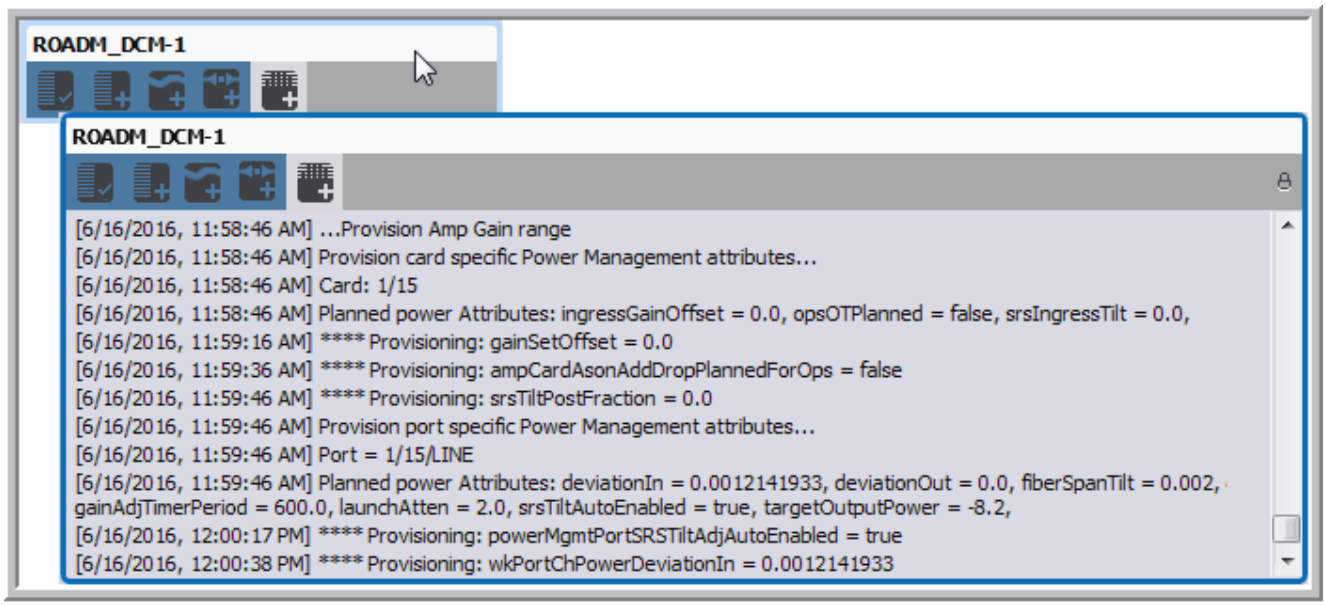
Figure 14-8 Example of System Provisioning In Progress Status



8

Click the system or the node panel to view the summary of the provisioning.

Figure 14-9 Example of Provisioning Summary for Node



Note: The NE phase logs are synchronized with NFM-T system phase logs and failure errors that occur during any phase of the provisioning operation are reported. Errors are displayed when the provisioning operation fails.

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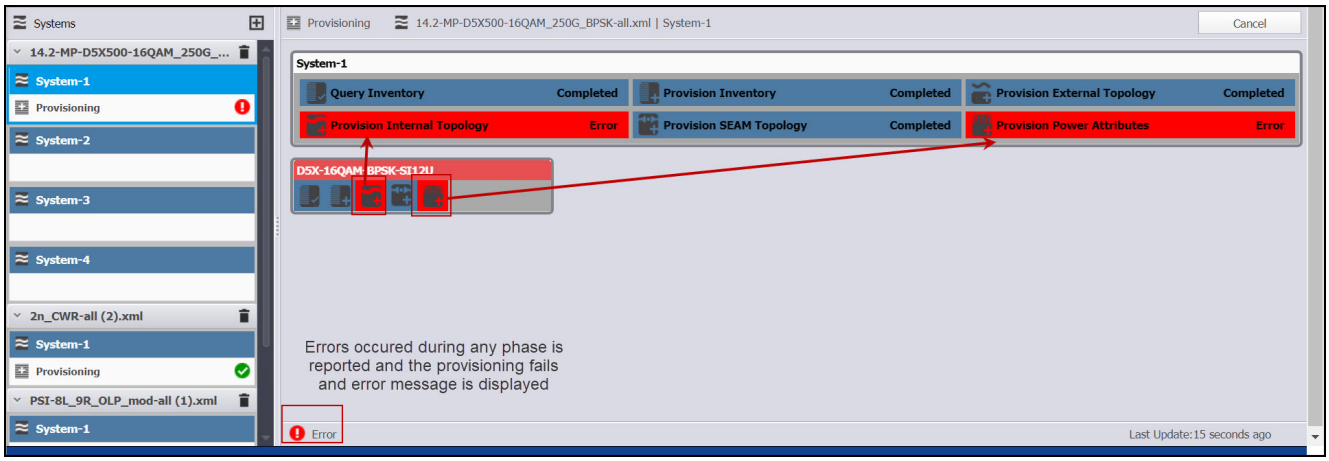
Figure 14-10 Example - Provisioning failure errors



END OF STEPS

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Power adjustment and loss report

14.3 Channel power adjustment

When to use

Use this procedure to perform channel power adjustment.

Related information

Channel Power Adjustment can be used to perform in-service power adjustments. While performing this task, the channel power levels are adjusted to attempt to reach target levels, using a wavelength service created through all nodes defined in the commissioning file.

The channel power adjustment consists of the following steps:

- **Verifying Inventory** - includes verification of the provisioned system against the information in the commissioning file.
- **Performing In Service Power Adjust** - includes performing in-service power adjustments that includes ingress and egress adjust/accept process, performing adjustment on a span, and so on.
- **Setting NE Commissioned** - includes setting the commissioning flag on the system and nodes to *commissioned*.
- **Display In-Service Power Adjust Result Summary** - includes displaying the results of the channel power adjustment in the system and direction summaries.

Before you begin

Ensure to perform the following before performing in-service (channel) power adjustment on a system for every NE defined in the commissioning file for that system:

1. Perform port synchronization for every NE in the system. Navigate **OPERATE > Nodes** from the menu option. Right click every NE listed and select **Synchronize > Ports**.
2. Set the external topology for every NE in the system. Navigate to **OPERATE > Nodes** from the menu option. Right click every NE listed and select **Discover External Physical Links**.
3. There could be services between systems for which you are performing the channel power adjustment. So, ensure to successfully complete the provisioning for all the systems loaded by the commissioning file before performing channel power adjustment on a system loaded by the same commissioning file.

Task

1

Perform 13.3 “View system operations” (p. 1626) to view the system operations.

2

Click the **Channel Power Adjustment** icon.

Result: The **Start Channel Power Adjustment?** dialog box opens.

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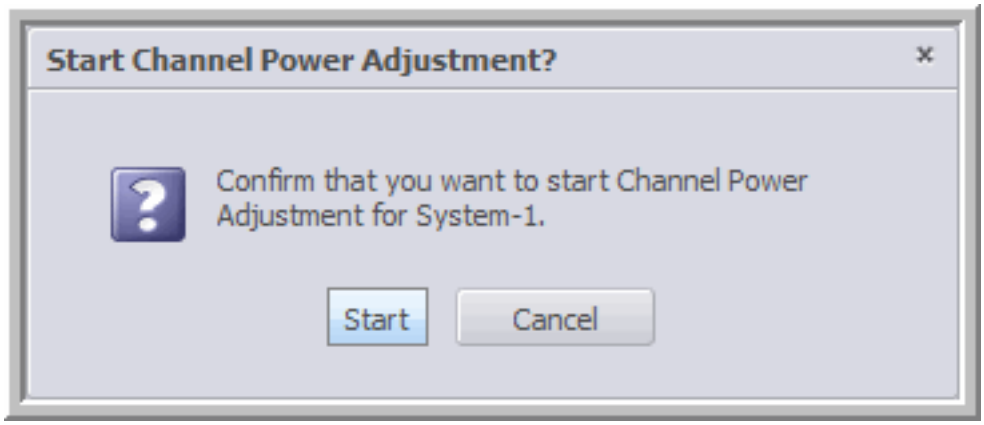
Figure 14-11 Start Channel Power Adjustment



3

Perform one of the following actions:

- Click **Start** to begin the channel power adjustment.
- Click **Cancel** to quit the channel power adjustment.

  Result: The status bar in the bottom panel of the NFM-T CPB application window displays the status of the operation. See 13.4 "View system operation status and cancel an operation" (p. 1628).

The summary of the channel power adjustment is displayed for the system and for each of the directions in the network.

4

Scroll down the summary at the system and direction levels to check the latest status of the channel power adjustment operation.

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Figure 14-12 Example for Channel Power Adjustment System Summary

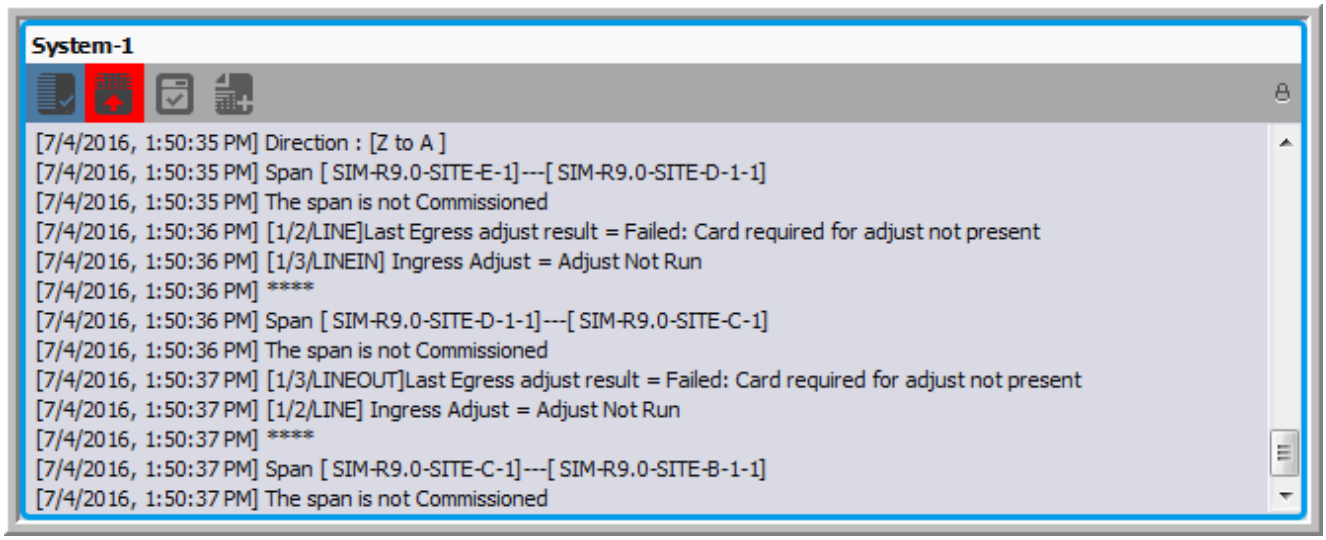
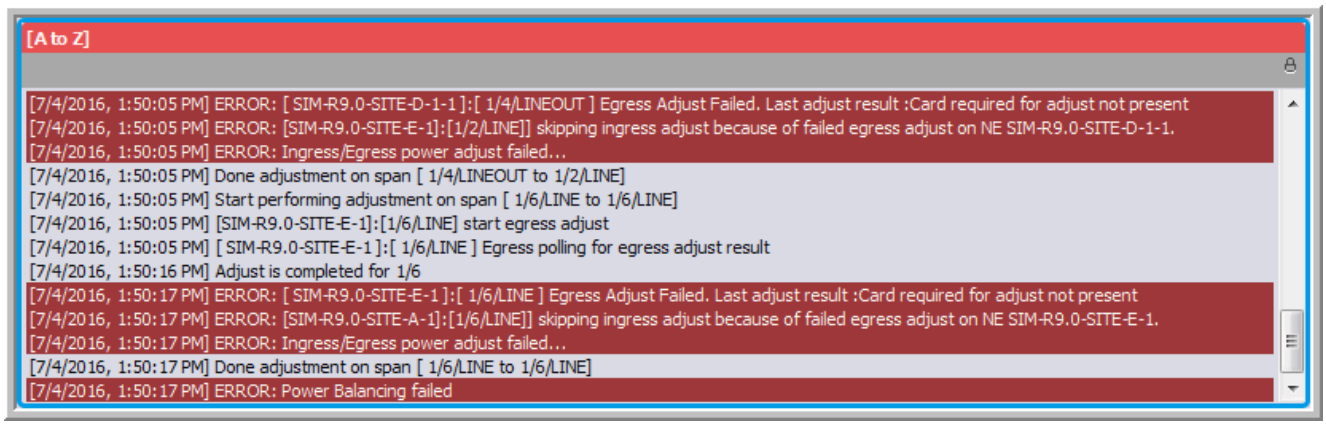


Figure 14-13 Example for Channel Power Adjustment [AtoZ] Summary



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The Channel Power Adjustment Report where the auto power balance for an OMSP design is shown.

Figure 14-14 Example of the Channel Power Adjustment Report for an OMSP Design

Result:

The status bar in the bottom of the NFM-T CPB application window displays the status of the operation:

- In Progress... - indicates that the operation is in progress.
- Complete - indicates that the operation is completed successfully.
- Error - indicates that the operation has failed with some error.

End of steps

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14.4 Generate system loss report

When to use

Use this procedure to generate system loss report.

Related information

When you choose to generate loss report for a system, the NFM-T CPB application finds the system light path and queries all the NEs on the path for power values which consumes some amount of time. The loss report is displayed only when the process of finding the light path and querying the NEs is complete. In the meantime, if you select a different system, and then select the previous system again, the same loss report appears. You must select the system loss report generation again to recalculate the light path and query the power values of the NEs to generate the latest loss report.

The CPB application can generate a loss report for a system and each of the Add/Drop blocks in the system in both A to Z and Z to A directions.

The following types of loss reports are supported:

- **Power Balance Loss Report**
- **On-demand Loss Report**

Before you begin

Ensure to complete the provisioning, commissioning, and power adjustment to get proper loss reports in all spans of the network.

Task

1

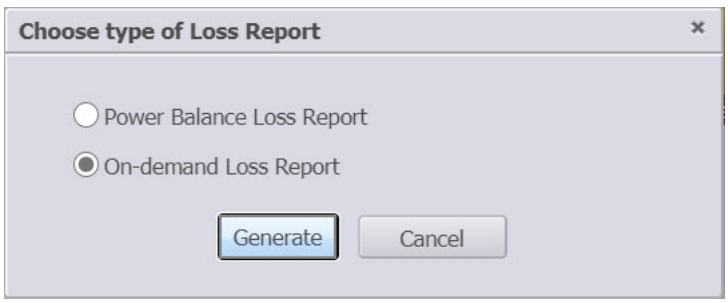
Perform 13.3 “View system operations” (p. 1626) to view the system operations.

2

Click the **Loss Report** icon.

Result: The **Choose type of Loss Report** window opens.

Figure 14-15 Loss Report Types



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3

Select any one of the types of loss report and click **Generate**.

Result: Waiting for Loss Reports results is displayed.

After the loss report generation is completed, the report is displayed for each direction and each of the Add/Drop blocks in the system.

Figure 14-16 Example for Power Balance Loss Report

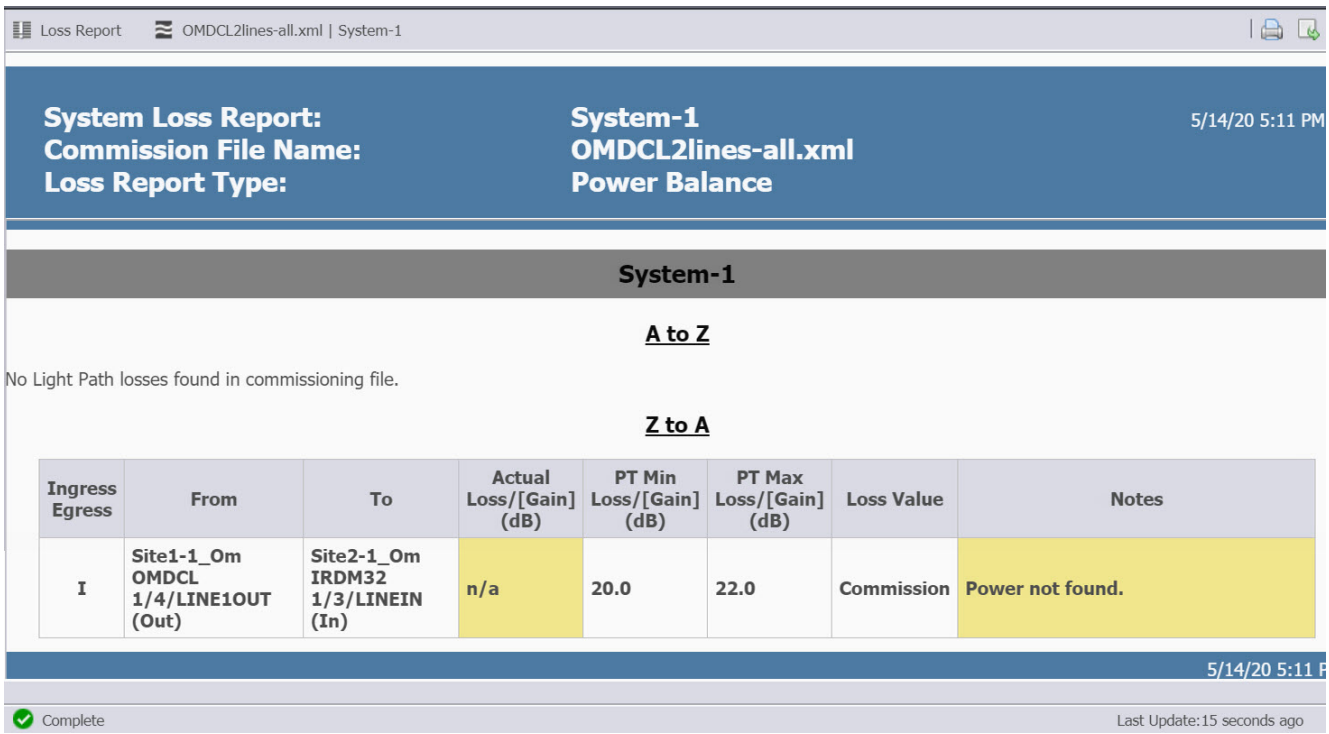

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Figure 14-17 Example for On-demand Loss Report

Loss Report | PSI-8L_9R_OLP_mod-all (1).xml | System-1

System Loss Report: System-1
Commission File Name: PSI-8L_9R_OLP_mod-all (1).xml
Loss Report Type: On Demand

10/16/20 12:41 AM

System-1

A to Z

Ingress Egress	From	To	Actual Loss/[Gain] (dB)	PT Min Loss/[Gain] (dB)	PT Max Loss/[Gain] (dB)	Loss Value	Notes
E	CA-ROADM2 WR20-TF 8/14/ADT1 (In)	CA-ROADM2 WR20-TF 8/14/SIG (Out)	n/a	3.3	9.7	Most recent	Warning: unable to read loss/gain value.
E	CA-ROADM2 WR20-TF 8/14/SIG (Out)	CA-ROADM2 AM2125B 8/13/LINEIN (In)	n/a	0.0	0.5	Most recent	Warning: unable to read loss/gain value.
E	CA-ROADM2 AM2125B 8/13/LINEIN (In)	CA-ROADM2 AM2125B 8/13/LINEOUT (Out)	[15.0]	[22.0]	[22.0]		Row shows EDFA gain.Integrated EVOA = 0.0 dB
I	**CA-ROADM2 AM2125B 8/13/LINEOUT (Out)**	**PL9R2-1 AM2125A 1/2/LINEIN (In)**	**n/a**	**15.0**	**17.0**	**Commission**	**Power not found.**
I	PL9R2-1 AM2125A 1/2/LINEIN (In)	PL9R2-1 AM2125A 1/2/LINEOUT (Out)	[15.0]	[15.0]	[17.0]		Row shows EDFA gain.Integrated EVOA = 0.0 dB
I	PL9R2-1 AM2125A 1/2/LINEOUT (Out)	PL9R2-1 WR20-TF 1/4/SIG (In)	n/a	0.0	0.5	Most recent	Warning: unable to read loss/gain value.
I	PL9R2-1 WR20-TF 1/4/SIG (In)	PL9R2-1 WR20-TF 1/4/ADT1 (Out)	n/a	3.3	9.7	Most recent	Warning: unable to read loss/gain value.

Z to A

Ingress Egress	From	To	Actual Loss/[Gain] (dB)	PT Min Loss/[Gain] (dB)	PT Max Loss/[Gain] (dB)	Loss Value	Notes
E	PL9R2-1 WR20-TF 1/4/ADT1 (In)	PL9R2-1 WR20-TF 1/4/SIG (Out)	n/a	3.3	9.7	Most recent	Warning: unable to read loss/gain value.
E	PL9R2-1 WR20-TF 1/4/SIG (Out)	PL9R2-1 AM2125A 1/3/LINEIN (In)	n/a	0.0	0.5	Most recent	Warning: unable to read loss/gain value.
E	PL9R2-1 AM2125A 1/3/LINEIN (In)	PL9R2-1 AM2125A 1/3/LINEOUT (Out)	[15.0]	[22.0]	[22.0]		Row shows EDFA gain.Integrated EVOA = 0.0 dB
I	**PL9R2-1 AM2125A 1/3/LINEOUT (Out)**	**CA-ROADM2 AM2125B 8/12/LINEIN (In)**	**n/a**	**15.0**	**17.0**	**Commission**	**Power not found.**
I	CA-ROADM2 AM2125B 8/12/LINEIN (In)	CA-ROADM2 AM2125B 8/12/LINEOUT (Out)	[15.0]	[15.0]	[17.0]		Row shows EDFA gain.Integrated EVOA = 0.0 dB
I	CA-ROADM2 AM2125B 8/12/LINEOUT (Out)	CA-ROADM2 WR20-TF 8/14/SIG (In)	n/a	0.0	0.5	Most recent	Warning: unable to read loss/gain value.
I	CA-ROADM2 WR20-TF 8/14/SIG (In)	CA-ROADM2 WR20-TF 8/14/ADT1 (Out)	n/a	3.3	9.7	Most recent	Warning: unable to read loss/gain value.

10/16/20 12:41 AM

Complete | Last Update:10 seconds ago

4

Click the **Loss Report Print Preview** icon.

Result: The print preview for the system loss of the selected system is displayed.

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Figure 14-18 System Loss Report Print Preview Title Bar

5

Perform one of the following actions:

- Click **Print** to start printing the report.
- Click the close icon next to the **Print** button to close the preview.

6

Click the **Loss Report Export to CSV** icon.

View or save the CSV file to an appropriate location in the system. The system displays the prompt to view or save the depending on the browser used.

Result: The CSV file displays the loss report values such as loss report type, loss report date, actual loss, maximum, and minimum loss.

The reports are displayed in A to Z and Z to A directions. In case of an L-band configuration, the reports are additionally displayed for the A to Z (L-band) and Z to A (L-band) directions.

END OF STEPS

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14.5 View and export CPB log files

When to use

Log files are generated in the Commissioning and Power Balance (CPB) application while performing operations such as provisioning a system, performing channel power adjustment, and generation of loss reports.

All loss reports generated by the users are saved along with other logged CPB operations. The default retention period of these logs is 30 days, subsequently NFM-T deletes the associated logs automatically.

Use this procedure to view and export the log files from the CPB application.

Task

1

From the NFM-T GUI, follow this navigation path:

ADMINISTER > CPB Log Files

Result: The **CPB Log Files** window opens with a table listing all the log files.

2

Click the **More** icon on the top right corner of the table header and click **Manage Columns** to select or deselect the columns to view. By default, all the columns are selected.

Result:

The following columns are displayed for each CPB log entry displayed on the CPB log files screen:

Attributes	Description
Additional Info	Indicates more information of the selected log file.
File Date	Indicates the timestamp when the log file was created.
File Type	Indicates the type of log file generated. The log file indicates the type of operation that was performed. For example, Provisioning, and Loss Report.
Commissioning File Name	Indicates the name of the commissioning file for the selected log file. The log file indicates the operation that was performed.
System Name	Indicates the name of the system for the selected log file. The log file indicates the operation that was performed.

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Attributes	Description
Status	Indicates whether the operation had failed or passed.

3

Select a log file from the list, click the **More** icon at the end of the row, and select **Display Log**.

Result: The log details opens in a new tab of the browser.

The details displayed for the selected log files include the following:

- **CPB Operation** - Displays the name of the operation of the selected file. For example, Provisioning, Validation, and so on.
- **Commissioning File** - Displays the name of the commissioning file applicable to the selected log file.
- **System Name** - Displays the name of the system for which the log was generated.
- **Status** - Displays the status of the operation represented by the selected log file.
- Details of the operations depicting the status of the sub-operations included for the log file are also displayed. The sub-operations depend on the type of operation.

  User options selected during the provisioning operation are exported to CPB Logs file. They are:
  - Nodes/Network Elements
  - Options (Provisioning/User)
  - Power Options

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− Add/Drop Block

```
CPB Operation:                                                    Provisioning
Commissioning file:                                               2n_CWR-all (2).xml
System Name:                                                      System-1
Status:                                                           Completed
Network Element

  1.   Site1-1_LBO
  2.   Site2-1_LBO

User Options

  1.  True       Allow Equipment/Port updates as identified by CPB
  2.  True       Pre-Provision cards that are not present
  3.  True       Set non-OT ports 'admin up'
  4.  True       Provision Port to Port Losses
  5.  True       OCH Technology Parameters
  6.  True       Provision ASON Feasibility parameters
  7.  True       Provision ASON File transfer parameters
  8.  False      Provision Launch Attenuation Offset
  9.  False      Provision Planned For ADD/DROP OPS Protection
  10.  True       Force line power management type to match plan (1830 NEs only)
  11.  False      Force actual gain within planning tool min/max range
  12.  False      Validate Ne Release Mismatch

Power Options

  1.  False      WT Decode Usage Type
  2.  True       Gain Adjust Sched Base
  3.  True       Gain Adjust Timer Period
  4.  True       Gain Adjust Timer Length
  5.  True       Gain Adjust Auto Enabled
  6.  True       Ingress SRS Tilt Post Fraction
  7.  True       Egress SRS Tilt Pre Fraction
  8.  True       Egress SRS Tilt Calc Output Loss
  9.  True       SRS Tilt Auto Enabled
  10.  True       LH Launch Attenuation
  11.  True       Max Channels
System

  1.   [10/14/20 17:52:18 PM]  Query and Validate Inventory...
  2.   [10/14/20 17:52:20 PM]  Provisioning Inventory
  3.   [10/14/20 17:52:36 PM]  ...Send ASON FTP File to NMS...
  4.   [10/14/20 17:52:36 PM]  ASON File transfer not done as Optical Impairment lookup tables doesn't exist in the commissioning file
  5.   [10/14/20 17:52:36 PM]  ...Send Rack Shelf View FTP File to NMS...
  6.   [10/14/20 17:52:36 PM]  File transfer not done as Rack Shelf Infodoesn't exist in the commissioning file
  7.   [10/14/20 17:52:36 PM]  ....Send Commissioning File to NMS....
  8.   [10/14/20 17:52:36 PM]  Provision External Topology
  9.   [10/14/20 17:52:36 PM]    External topology already exists for Site1-1_LBO:1/3/LINEOUT --> Site2-1_LBO:1/2/LINEIN
  10.  [10/14/20 17:52:36 PM]    External topology already exists for Site2-1_LBO:1/3/LINEOUT --> Site1-1_LBO:1/2/LINEIN
  11.  [10/14/20 17:52:37 PM]  ...Update Admin UP of NON OT Cards and Ports (that belong to external topologies).
  12.  [10/14/20 17:52:37 PM]  Provision Cluster Topology
  13.  [10/14/20 17:52:37 PM]  No Cluster Topological Links for Selected System.
  14.  [10/14/20 17:52:37 PM]  Provision Internal Topology (except SEAM)
  15.  [10/14/20 17:52:38 PM]  Provision SEAM Topology
  16.  [10/14/20 17:52:38 PM]  Provision Power Attributes
  17.  [10/14/20 17:53:33 PM]  Provisioning System Completed

Add/Drop Block

  1.   Site1-1_LBO --> 1/8
  2.   Site2-1_LBO --> 1/8
```

To save the logs in HTML format to the local system, right click on the window and use the browser's **Save As** option.

Note: The **Export to CSV file** option on the top left corner of the **CPB Log Files** page allows the user to download a list of log files. However, this option does not download the log files.

4

Select a log file from the list, click the **More** icon at the end of the row, and select **Delete**. Click **Yes** in the confirmation window that opens.

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Result: The selected log is deleted and a success message is displayed in the status bar.

End of steps

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14.6 Save a CPB log file to local PC

Save a CPB log file to local PC using Chrome, Edge and Firefox

The user can save a CPB log file to local PC through Chrome, Edge and Firefox.

Following are the steps that needs to be performed for each browser:

- From Chrome or Edge, user can do **Save As** from the displayed CPB log file, and use Save As type "Web page, Single File **`(*.mhtml)`** and ensure the saved file name has an extension **`.mhtml`**.
- From FireFox, user can do **Save Page As** from the displayed CPB log file, and use Save As type: Web Page, complete **`(.htm;.html)`** and ensure the saved file name has an extension **`.html`**.

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15 Troubleshooting CPB errors and warnings

15.1 Overview

Purpose

This chapter describes some of the common errors and warnings encountered in the CPB application.

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System validation errors and warnings

15.2 Troubleshooting system validation errors

System validation errors

System validation displays the differences between the physical hardware and the commissioning file. It aims at letting the user decide whether the physical hardware must be changed on the field, or if there is a correction needed in the commissioning file. It compares the shelves, cards, pluggables, and fiber topology in the field with the commissioning file.

A yellow colored result of the system validation is a warning to the user. Warnings do not block provisioning. A red colored result of the system validation for shelves and cards stops the provisioning from continuing and such an error must be fixed. However, provisioning continues if the validation errors are not for shelves or cards.

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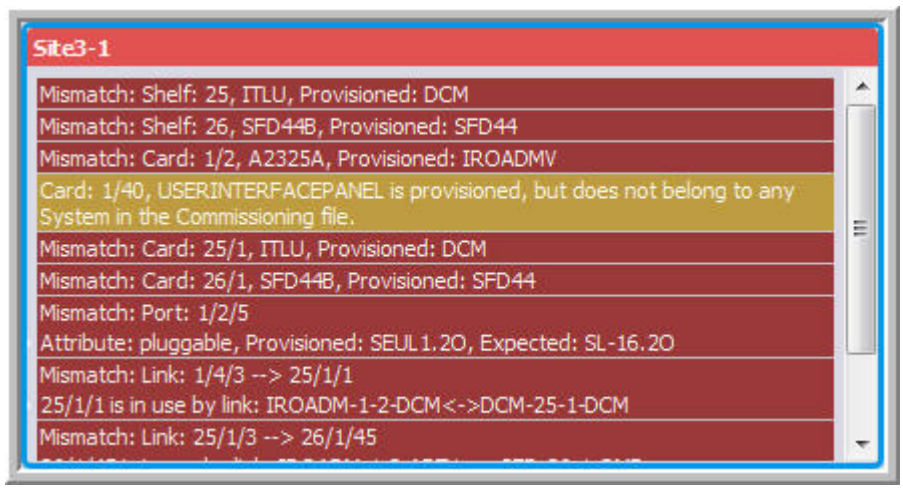
15.3 Mismatch errors and warnings in system validation phase

Mismatch errors in system validation phase

The mismatch errors are highlighted in red as shown in the following figure.

Figure 15-1 Mismatch errors in system validation



The system validation mismatch errors indicate that the card, shelf, pluggable, or link that are physically provisioned on the NE is different from the one provided in the configuration file. To fix an error, either change the physical provisioning on the NE, which may involve changing the hardware on the NE in the field, or change the EPT plan and generate a new commissioning file that matches the hardware provisioned. Validation errors for shelves and cards must be fixed before continuing with provisioning. However, provisioning can be continued with the other validation errors.

Mismatch warnings in system validation phase

It is possible for a commissioning file to contain a card in a particular slot (for example, slot 3) on a shelf which is two slots wide. So, the next slot in the configuration file does not contain a card information. However, in the hardware setup, if you have a card provisioned in this slot, the mismatch warning is generated.

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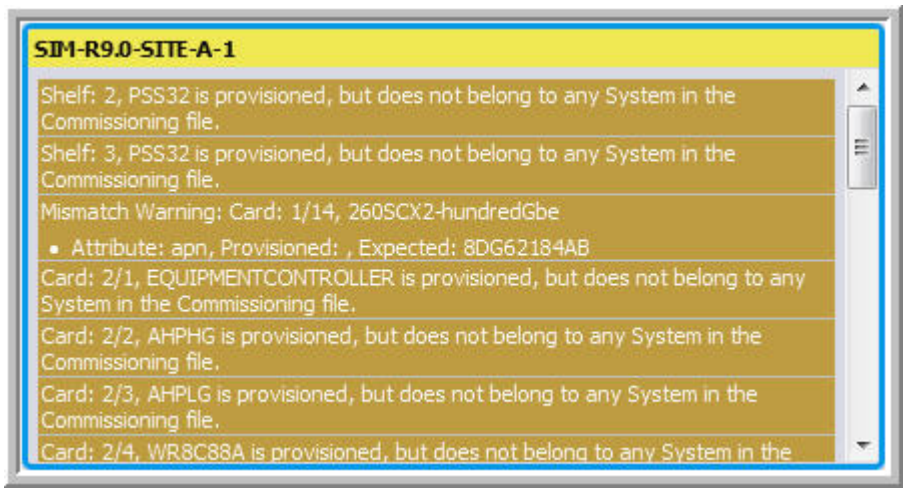
Figure 15-2 Mismatch warnings in system validation



A system validation warning does not prevent a user from starting the system provisioning.

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16 Features Provisioning

16.1 Overview

Purpose

This chapter provides the steps required to provide complex provisioning. The basic provisioning of the system is explained in the dedicated parts of this manual.

This chapter describes the new cards or packs introduced in a release or enhancements introduced in an existing card or pack.

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D5X500 circuit pack provisioning procedures

16.2 D5X500 line ports supporting different modulation

Introduction

This section details the impact that this feature has on OTN connection layer and their transmission parameter provisioning; comparing the behavior with previous NE and network management releases. Additional information about this feature is defined in D5X500 - WDM lines supporting different modulation.

The choice made for a specific parameter can influence and constrain the choice of other parameters.

Moreover, this section provides the steps required to configure the L1 and L2 line port, with different modulations.

Feature impact

This feature involved the following parameters: **Line Interface**, **Encoding Mode**, **Phase Enconding**, **Transmit Shape** and **Operational Mode**.

Line Interface

1830PSS R9.1/NFM-T R14.2 behavior:

- Both line ports have the same OTUn port type provisioning. If the port is assigned or unassigned for L1, then this provisioning is automatically applied to L2.

  Any attempt to provision the port on L2 is denied.
- To change the OTUn port type from one value to another value, both lines must first be set to *Unassigned*.

1830PSS R10.0/NFM-T R17.9 behavior:

- The **L1 != L2** feature applies only for the following port type values: **OTU4** and **OTU4x2**.
- OTUn [1…5] port type shall be provisioned independently for L1 and L2 for OTU4 and OTU4x2 line interfaces.
- To change the OTUn port type value for a specific line port, the port type must be set to *Unassigned*.
- When the OTUn port type value is changed to *Unassigned*, all server port values for that port are changed by software to *Unassigned*.

Encoding Mode (modulation format)

1830PSS R9.1/NFM-T R14.2 behavior:

- Both line ports have the same encoding provisioning. If encoding is changed for L1, then the new encoding value is automatically applied to L2.
- Any attempt to provision encoding on L2 is denied.

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- In dangling OT applications, the line port state must be down before the encoding mode to be modified.
- In non-dangling OT applications, all OCH XC must be deleted before the encoding to be modified.

1830PSS R10.0/NFM-T R17.9 behavior:

Encoding Mode can assume only the following modulation types:

- 8QAM (Line: OTU4x2, Default)
- 16QAM (Line: OTU4x2)
- QPSK (Line: OTU4, Default)
- SP-QPSK (Line: OTU4)
- **Encoding Mode** is provisioned independently for L1 and L2 and value for L1 is different than the encoding value for L2.
- In non-dangling OT applications, all OCH XC must be deleted before the encoding to be modified.

Phase Encoding

The following are the values for **Phase Encoding**:

- Absolute (default)
- Differential

1830PSS R9.1/NFM-T R14.2 behavior:

- Both line ports have the same phase encoding provisioning for all port types. If phase encoding change for L1, the new phase encoding value is automatically applied to L2. Any attempt to provision phase encoding on L2 is denied.
- In dangling OT applications, the line port state must be down before the phase encoding is modified.
- In non-dangling OT applications, all OCH XC must be deleted before the phase encoding is modified.

1830PSS R10.0/NFM-T R17.9 behavior:

- The phase encoding value must be the same for both L1 and L2, if SP-QPSK is not used. Phase encoding provisioning on the first line interface define the provisioning on the other line interface. If L1 port type is provisioned first, when L2 is provisioned, the L1 phase encoding value apply to L2. Similarly, if the L2 port type is provisioned first the L2 phase encoding value apply to L1.
- If the first line is provisioned with the following encoding mode: 8QAM, 16QAM, QPSK, BPSK, 16QAM (250G) and **Phase Encoding** is set to *Differential*, any attempt to provision the second line with encoding as SP-QPSK is denied. For example, with SP-QPSK the phase encoding value can be only *Absolute*.
- If the first line is provisioned with encoding as SP-QPSK, any attempt to provision the second line with any modulation format and **Phase Encoding** set to *Differential*, is denied. For example, with SP-QPSK the phase encoding value can be only *Absolute*.

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- If the first line port is provisioned with: **Rate**=OTU4, **Encoding**=SP-QPSK, and **Phase Encoding** =*Absolute*, the same phase encoding value (*Absolute*) is applied to the second line port:
  1. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, *Phase Encoding* value is copied from the first line port.
  2. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, any attempt to provision the *Phase Encoding* to *Differential* value, is denied.
  3. If the second line port is provisioned with Rate=OTU4x2, Encoding=8QAM or 16QAM, *Phase Encoding* value is copied from the first line port.
  4. If the second line port is provisioned with Rate=OTU4x2, Encoding=8QAM or 16QAM, any attempt to provision the *Phase Encoding* to *Differential* value, is denied.
  5. If the second line type is provisioned with Rate=OTU4, Encoding=SP-QPSK, *Phase Encoding* value is copied from the first line port.
- If the first line port is provisioned with **Rate**=OTU4, **Encoding**=QPSK, and **Phase Encoding** =*Absolute*, the same phase encoding value (*Absolute*) is applied to the second line port:
  1. If the second line port is provisioned with Rate=OTU4, Encoding=SP-QPSK, *Phase Encoding* value is copied from the first line port.
  2. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, *Phase Encoding* value is copied from the first line port.
  3. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, any attempt to provision the*Phase Encoding* to *Differential* value, is denied.
  4. If the second line port is provisioned with Rate=OTU4x2, Encoding=8QAM or16QAM,*Phase Encoding* value is copied from the first line port.
  5. If the second line port is provisioned with Rate=OTU4x2, Encoding=8QAM or 16QAM, any attempt to provision the *Phase Encoding* to *Differential* value, is denied.
- If the first line port is provisioned with **Rate**=OTU4, **Encoding**=QPSK, **Phase Encoding** =*Differential*, the same phase encoding value (*Differential*) is applied to the second line port:
  1. If the second line port is provisioned with Rate=OTU4, attempt to provision Encoding=SP-QPSK, is denied.
  2. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, Phase Encoding value is copied from the first line port.
  3. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, any attempt to provision the Phase Encoding to *Absolute* value, is denied.
  4. If the second line port is provisioned with Rate=OTU4x2, Encoding=8QAM or 16QAM, Phase Encoding value is copied from the first line port.
  5. If the second line port is provisioned with Rate=OTU4x2, Encoding=8QAM or 16QAM, any attempt to provision the Phase Encoding to *Absolute* value, is denied.
- If the first line port is provisioned with **Rate**=OTU4x2, **Encoding**=8QAM or 16QAM, **Phase Encoding** =*Absolute*, the same phase encoding value (*Absolute*) is applied to the second line port:
  1. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, Phase Encoding value is copied from the first line port.
  2. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, any attempt to provision the Phase Encoding to *Differential* value, is denied.
  3. If the second line port is provisioned with Rate=OTU4, Encoding=SP-QPSK, Phase Encoding value is copied from the first line port.

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4. If the second line port is provisioned with Rate=OTU4, Encoding=8QAM or 16QAM, Phase Encoding value is copied from the first line port.
5. If the second line port is provisioned with Rate=OTU4x2, Encoding=8QAM or 16QAM, any attempt to provision the Phase Encoding to *Differential* value, is denied

- If the first line port is provisioned with **Rate**=OTU4x2, **Encoding**=8QAM or 16QAM, **Phase Encoding**=*Differential*, the same phase encoding value (*Differential*) is applied to the second line port:
  1. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, Phase Encoding value is copied from the first line port.
  2. If the second line port is provisioned with Rate=OTU4, Encoding=QPSK, any attempt to provision the Phase Encoding to *Absolute* value, is denied
  3. If the second line port is provisioned with Rate=OTU4, any attempt to provision Encoding=SP-QPSK, is denied
  4. If the second line port is provisioned with Rate=OTU4x2, Encoding=8QAM or 16QAM, Phase Encoding value is copied from the first line port.
- Once the transmission is established on both L1 and L2, if user wants to modify the **Phase Encoding** value on either line, both lines need must to be set to *admin down*. .

  Note: Changing the Phase Encoding value on one line interface, the traffic on the other line interface is affected.

The phase encoding with line interface type and encoding mode value rules for the D5X500 pack, are resumed in the following table:

Figure 16-1 Phase encoding summarizing table

		L1 -->	OTU4x2				OTU4			
			8QAM		16QAM		QPSK		SP-QPSK	
L2 ↓			Absolute	Differential	Absolute	Differential	Absolute	Differential	Absolute	Differential
OTU4x2	8QAM	Absolute	Y	N	Y	N	Y	N	Y	N
		Differential	N	Y	N	Y	N	Y	N	N
	16QAM	Absolute	Y	N	Y	N	Y	N	Y	N
		Differential	N	Y	N	Y	N	Y	N	N
OTU4	QPSK	Absolute	Y	N	Y		Y	N	Y	N
		Differential	N	Y	N	Y	N	Y	N	N
	SP-QPSK	Absolute	Y	N	Y	N	Y	N	Y	N
		Differential	N	N	N	N	N	N	N	N

Note: Configurations marked with Y ("Yes") are the allowed setting, the one marked with N ("No") indicates an invalid setting, so configuration is not allowed by the system.

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Transmit Shape

Transmit Shape can assume the following values:

- Single Channel (Default)
- Super Channel
- Alien

1830PSS R9.1/NFM-T R14.2 behavior:

- Both line ports have the same transmit shape provisioning for all port types. If transmit shape is changed for L1, then the new transmit shape is automatically applied to L2. Any attempt to provision transmit shape on L2, is denied.
- In dangling OT applications, the line port state must be down before the transmit shape is modified.
- In non-dangling OT applications, all OCH XC must be deleted before the transmit shape is modified.

1830PSS R10.0/NFM-T R17.9 behavior:

- The value of the transmit shape is provided independently for L1 and L2; which means that the value of the transmit shape applied to L1 can be different from the value applied for L2
- In dangling OT applications, the line port state must be down before the transmit shape is modified.
- In non-dangling OT applications, all OCH XC must be deleted before the transmit shape is modified.

Operational Mode

Operational Mode can assume the following values:

- Add/Drop (Default)
- Regen

1830PSS R9.1/NFM-T R14.2 behavior:

- Both line ports have the same **Operational Mode** provisioning for all port types. If operational mode is changed for L1, the new operational mode value is automatically applied to L2. 2. Any attempt to provision operational mode on L2, is denied.

1830PSS R10.0/NFM-T R17.9 behavior:

- If the operational mode is set to *Regen*, the port type could be different on lines L1 and L2.
- For REGENRESP parameter (LaserOn, LaserOff), the provisioning follows the implementation as in R9.1. For example L1 is provisioned and L2 is auto-provisioned.

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Examples for different modulation on line port

The following are the examples for phase encoding versus line interface type, encoding mode and optical association settings. The examples provided are for 1830PSS R10.0 / NFM-T R17.9:

Example 1

- *Step 1:* User provisions L1 port type to OTU4x2 and encoding as 8QAM. For L1, the default Phase Encoding value is set to absolute, the default Transmit Shape value is set to Single Channel. All server ports are unassigned for L1.

  L2 port type is currently *Unassigned*. User can set up the ODUkxc and the server port associations for L1.
- *Step 2:* User provisions L2 port type to OTU4 and encoding as QPSK. The Phase Encoding value applied to L1 (*Absolute*) is automatically applied to L2.

  L2 server ports are set to *Unassigned* by default. The User can set up ODUkxc and the server port association for L2.

Example 2

- Step 1: User provisions the first line port (L1 in this example) type to OTU4 and the encoding to SP-QPSK. The Phase Encoding default value is set to *Absolute* (default); that is the only value allowed. All server ports are *Unassigned*. L2 port type is currently *Unassigned*. User can set up ODUkxc and the server port association for L1.
- Step 2: User provisions L2 port type to OTU4x2 and the encoding to 16QAM. Phase encoding is applied to L2. If the User attempts to set the L2 Phase Encoding value to be *Differential* on L2, it is denied.

Example 3

- Step 1: User provisions L1 to port type OTU4x2 or OTU4.
- Step 2: If user attempts to provision L2 port to port type OTU4Half or OTU4Halfx5; the setting is denied because this configuration is not supported. Existing traffic on L1 port is not affected.

Example 4

- Step 1: User provisions L1to port type OTU4Half or OTU4Halfx5. L2 is automatically set to OTU4Half or OTU4Halfx5. Any attempt to provision the second line port to a different port type value is denied.

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16.3 D5X500 line ports provisioning

Before you begin

This procedure provides the steps required to provision L1 and L2 line port of a D5X500 card with different modulations. The card slot must be configured with the D5X500 card. To configure the card slot, refer to the procedure in *Equipment Management* section of the NFM-T NE Management Guide.

Note: This feature supports only **OTU4** and **OTU4x2** signal rate.

Task

Complete the following steps to assign different modulation type to L1 and L2 line ports:

1

From the NFM-T GUI, follow this navigation path:

Operate > Equipment manager

Result: The Equipment Manager is opened in a new browser tab.

2

From the *tree list*, navigate to the required NE or use the Search box that is above the tree. Expand the tree to access the NEs and select the L1 line port to be provisioned.

3

Click the **Configure** tab to assign the **Signal Rate** to the L1 port. In the example L1 port is set to OTU4x2.

Figure 16-2 D5X500 card - L1 line port configuration

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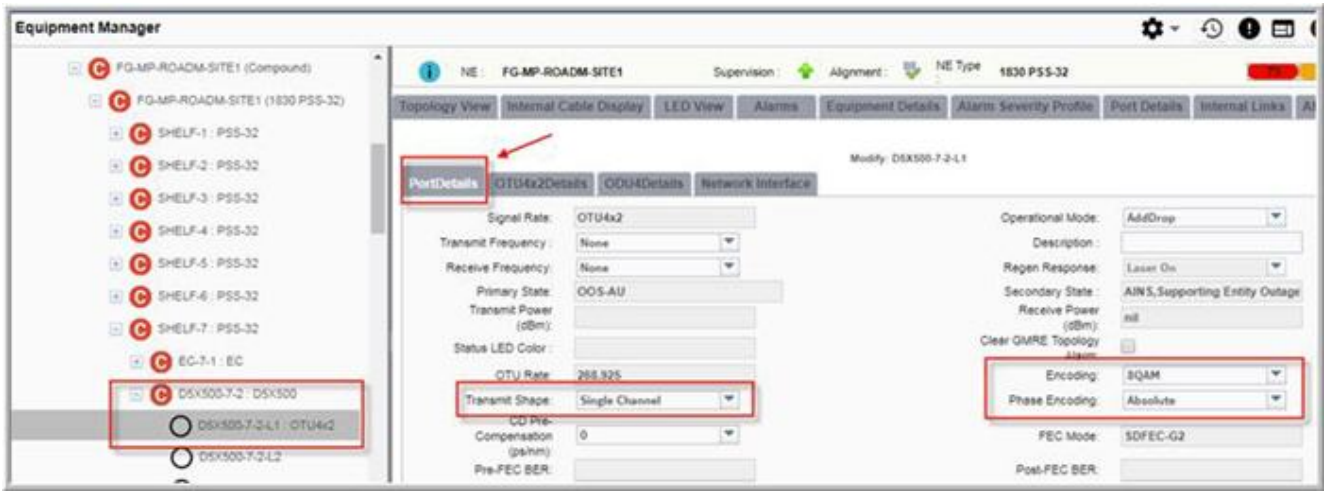
4

Click on **Port Details** subtab to modify the **Transmit Shape**, **Encoding** and **Phase Encoding** parameters.

Figure 16-3 D5X500 card - Modify L1 line port parameters



Click on **Modify** to apply the changes made.

Result: A confirmation message on card modification appears at the bottom right side of the window.

5

Click the **Configure** tab to assign the **Signal Rate** to the L2 port. In the example L2 port is set to OTU4

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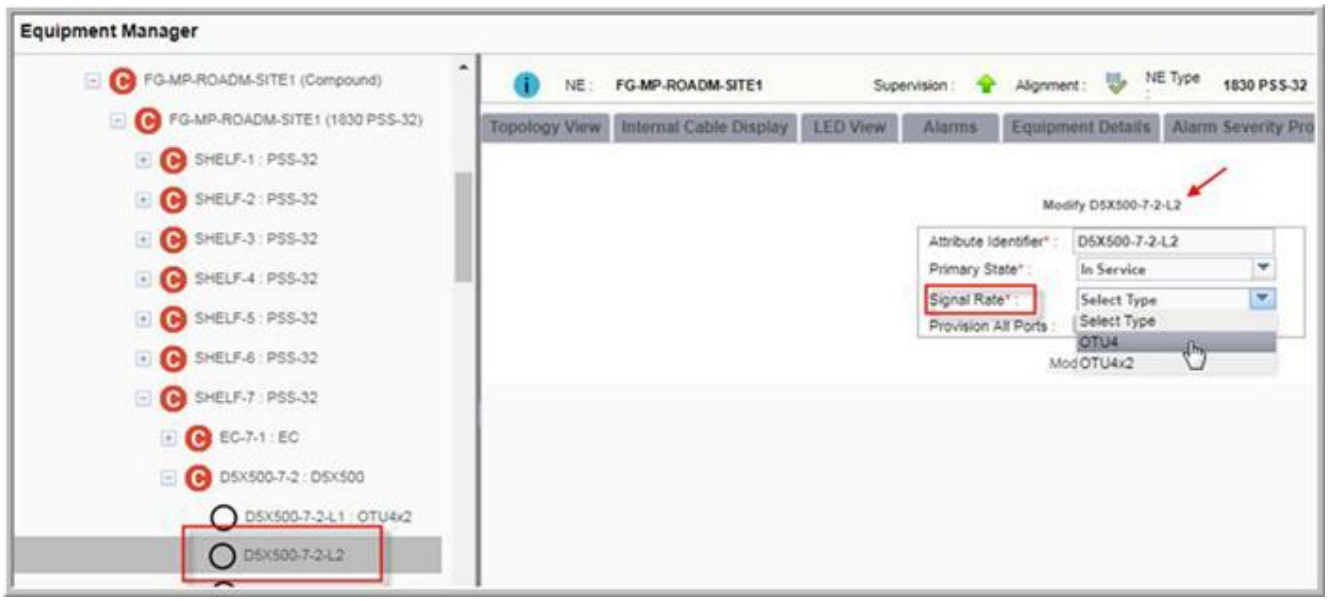
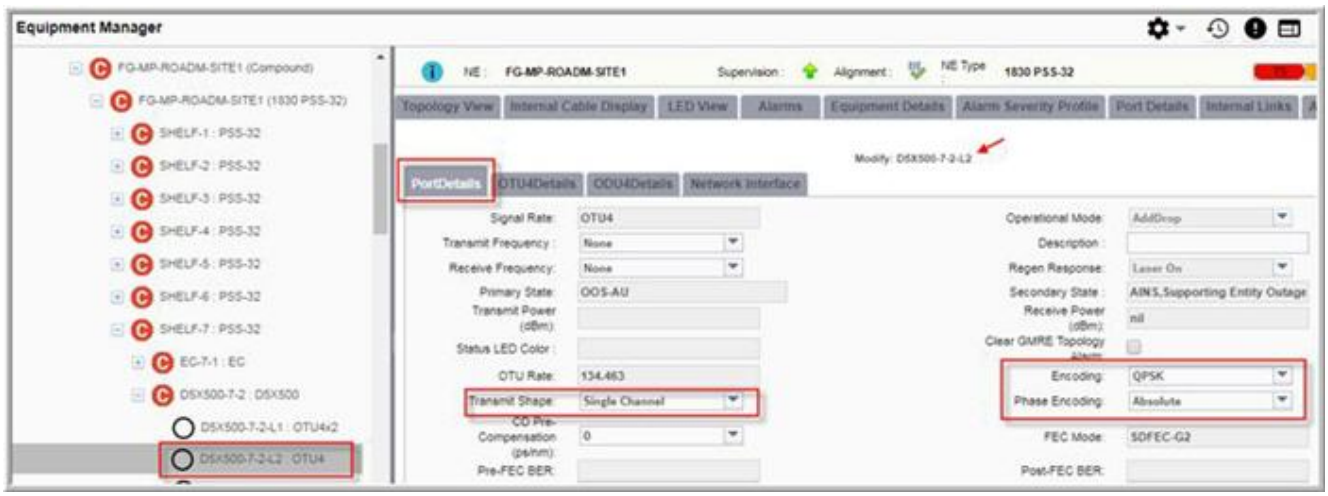
Figure 16-4 D5X500 card - L2 line port configuration



6

Click on **Port Details** subtab to modify the **Transmit Shape**, **Encoding** and **Phase Encoding** parameters.

Figure 16-5 D5X500 card - Modify L2 line port parameters



Click on **Modify** to apply the changes made.

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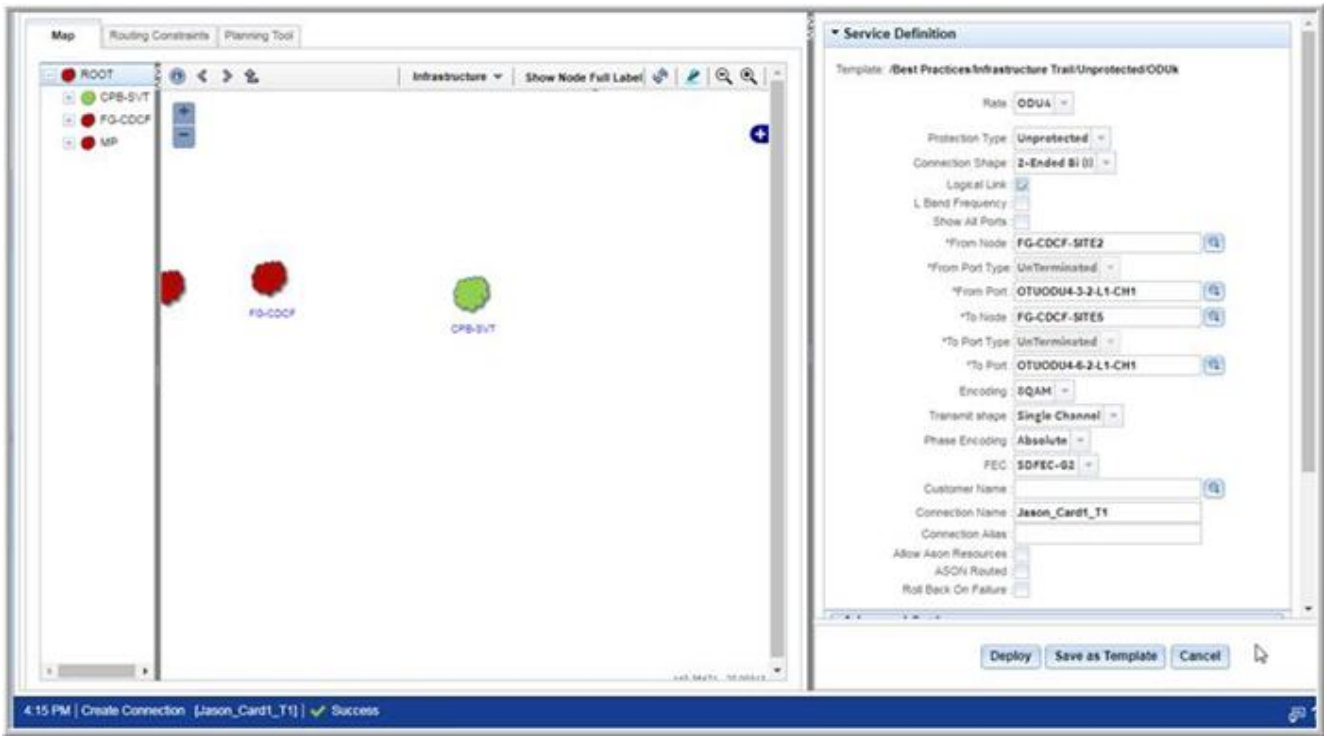
Result: A confirmation message on card modification appears at the bottom right side of the window.

7

Once the line ports have been configured, a connection between NEs are created and provisioned.

Figure 16-6 Connection provisioning



Note: The line ports L1 and L2, must be assigned with a Signal Rate before creating an internal OS link, though EQM. Whereas the connection signal rate can be assigned while the connection is provided.

End of steps

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OPSB protection provisioning

16.4 OPSB protection provisioning

Introduction

This section provides the user with necessary information to provision an OPSB protection configuration. General information on this type of protection is provided in this document, see "OPSB protection on 1830 PSS-OCS switching shelf" (p. 460).

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16.5 Provision an OPSB protection with a PSS-OCS and PSS-24x shelf

When to use

This procedure describes the steps necessary to provision an OPS link of an OPSB Ethernet and SDH client protection.

Related information

See the following topic 4.5 “OPSB and OPSB5 protection” (p. 447).

Before you begin

The OPSB card provides protection for the following client ports: nGbE (1GbE, 10GbE, 40GbE and 100GbE), SDH (STM-1, STM-4, STM-16 and STM-64) and SONET (OC-3, OC-12 OC-48 and OC-192).

The OPSB card is housed in a 1830 PSS-32 shelf, while the IOC package can be placed either in a 1830 PSSOCS or in a 1830 PSS-24x shelf.

To provision an OPSB protection, user must create an external topological links (OPS) between the A and B ports of the OPBS card on 1830PSS-32 shelf and the IOC pack on the 1830PSS OCS or 1830PSS-24x shelf. Note that the IOC pack con be placed in different shelves or different NEs.

To provision an OPSB protected end-to-end client service connection, four external topological links between OPSB and WDM / Mux_DeMUX, must be provisioned.

The following rules apply to the provisioning of the external topological links according to the IOC pack location:

1. On either A-end or Z-end, select the two IOC packs of the OCS NE from two different shelves
2. When point 1 is not applicable, on either A-end or Z-end, select the two IOC packs of the OCS NE from the same shelf
3. When point 2 is not applicable, on either A-end or Z-end, select two ports of the same rate from the same IOC pack of the OCS NE

Task

Complete the following steps create an OPS connection between the A and B ports of the OPBS and the IOC cards.

1

From the OTN WebUI, follow this navigation path:

Operate > Physical Connections

Result: The system displays a data table that lists the OTN physical connections.

2

Mouse over the icons on the top right and click the **Create** icon.

Result: The system displays the Physical Connection Creation window.

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3

In the **WDM Connection Type**, select **OPS** uplink from the drop-down.

To configure an Ethernet client signal go to Step 4

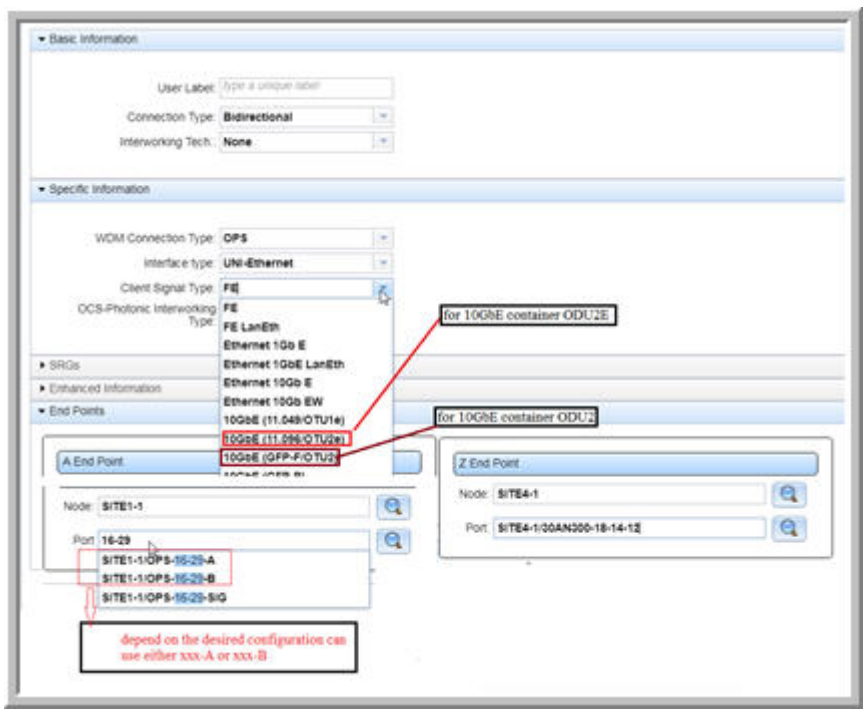
To configure an SDH or Sonet client signal go to Step 7.

4

In the Interface type field, select **UNI-Ethernet**.

5

Select the rate of client signal from **Client Signal Type**.



6

In the **Port** field of the End Points panel, the user is allowed to select either xxx-A or xxx-B port depending on the desired configuration.

7

In the Interface type field, select **UNI-SDH** or **UNI-Sonet**.

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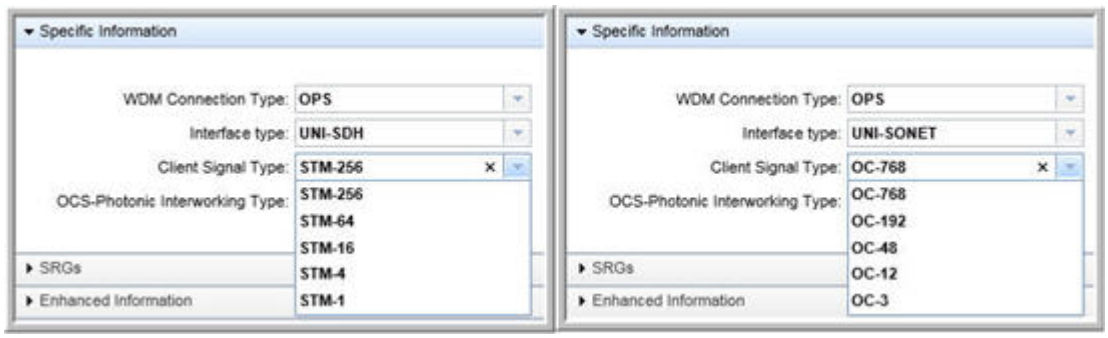


8

Select the rate of client signal from **Client Signal Type**.

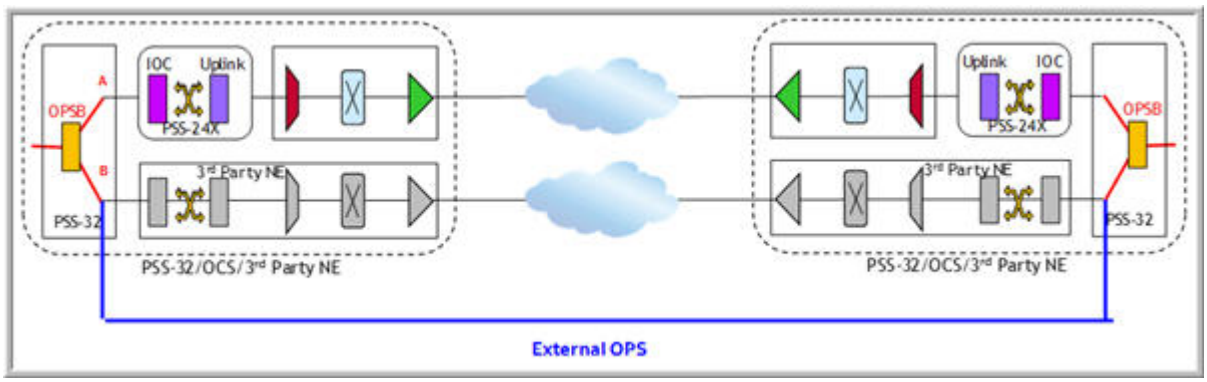
9

Click **Deploy**.

10

Note: If one OPSB port is connected to a third party NE as shown in the example, the **OPS** connection must be provisioned between the two ports.

Figure 16-7 OPSB with a third party NE



END OF STEPS

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NFM-T 22.6_FP1 Cards Support

16.6 130SLX10

Card Description

The 130SLX10 circuit pack is a 130G Single Port Tunable Coherent 10x10G MUX Transponder with SDFEC (10 clients and one line port) supporting L-band. It is an L-band variant of 130SCX10 circuit pack. It is used with the L-band only.

It supports the following main functions:

- Add/Drop 10G client services (10GbE or OTU2 clients MUX/DeMUXed to a 100G line signal)
- Uni-directional 3R regen

The 130SLX10 inherits features from 130SCX10, with *limited availability* of the following features. Be cautious when using these features:

- Setting FEC Type as AFEC on the line port.
- Setting client signal rates of OC192/STM64 and FC800
- Configuring the card on PSS-8 shelf
- Providing all types protection support for services and connections

Equipment Management

NE Support

The card is supported on PSS-8, PSS-16II, and PSS-32 from R10.1 onwards.

Shelves Support

The card is configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 16 on an 1830 PSS-32 shelf
- Card slots 3 to 9 on an 1830 PSS-16II shelf
- Card can be configured on the 1830 PSS-16 and 1830 PSS-8 shelves, however with *limited availability* of all supported features.

Port Configuration

The following port configuration behavior are known to exist:

- One fixed line port, **L1** is auto created when the pack is provisioned with signal rate of **OTU4**.
- The **Operational Mode** of the fixed line port can take the values of **Add/Drop** or **Regen**.
- **Encapsulation Mode** for the OTU4 line port is **QPSK**.
- Uni-directional Regen is supported at the line port.
- Frequency ranging between 8610.000 Hz to 9085.000 Hz is supported in steps of 0.625 Hz for both fixed grid and flex grid.

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- By default, **FEC Mode** is set to **SDFEC**. AFEC is supported, but has limited availability. Be cautious to while using FEC mode as AFEC.
- Interworking mode is not supported.
- At the line port, wavekey encoding is available with direction as OUT.
- Line ports must be configured before configuring the 10 available client ports.
- All client ports can be configured only when the line port is not in Regen mode and is In Service.
- Optional support for OPSA, OPSB, and Y-cable protection is provided. However, be cautious while using such configurations.

For more information on the ports and rates of the card, see the *1830 PSS Product Planning and Information Guide* and the *1830 PSS User Provisioning Guide*.

Connection Configuration

- L-band configuration and C+L ROADM configuration are supported. See 5.3 “C+L band ” (p. 519) for more information. The 130SLX10 can interwork with 130SLA1. However be cautious while using this interworking scenario. The 130SLX10 supports cascading configuration in the following way:

  11DPM12 (line) **<->** 130SLX10 (client) through OTU2 rate.
- Cluster configurations using 130SLX10 is not supported.
- Support for control plane is provided for this card.

Alarms and Performance Monitoring

Loopback

Both facility and terminal loopbacks are supported on the client ports C1 to C10 and line port L1. PRBS loopback and TCM are not supported.

Fault Management (FM)

The line port L1 supports the following alarms category:

- EQPT (equipment)
- OCH
- ODU4
- OTU4

The client ports C1 to C10 support the following category of alarms:

- EQPT
- 10GbE
- FC800
- OC192/STM64
- OCH
- ODU2

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- OTU2

Signal Alarm and consequent action for OTU4 signals include the following:

- LOS, LOF, LOM, OTU2-AIS
- OTU2 BDI, OTU2 TIM
- FEC- Signal Degrade, OTU2-Signal Degrade, ODU4-Signal Degrade
- ODU4-TIM, ODU4-AIS, ODU4-OCI, ODU4-LCK
- OPU4-CSF, ODU4 PTM
- LOFLOM, MISM, LOOMLFI, and ODUCSF

Signal alarm and consequent action for 100GbE clients include LOS in Rx direction, LSS, Hi-Ber, LFI, RFI in both Rx and Tx directions.

Performance Management (PM)

The following PM features are applicable to the card:

- On client ports C1 to C10, 100GbE/ETH PM, PCS, Analog PM, including per lane TX and RX power monitoring are supported. OTU4/ODU4 PM is not supported.
- On the line port L1, OTU4/ODU4, and Analog PM are supported.
- 15-min and 24-h PM is supported for all PM groups on the client and line ports.
- The analog PMs OPR, OPT and per-lane Tx are supported on all client ports. Rx power analog PM is not supported on the client ports.
- The analog PMs OPR, OPT, CD, DGD, FOFF, preFect Bits are supported on the line ports.
- Digital PMs for PCS layer and Ethernet statistics are supported on all 10GbE client ports.
- TCA profile is supported for 15-min and 24-h.

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16.7 130SLA1

Card Description

The 130SLA1 circuit pack is a 130G Single Port Tunable Coherent AnyRate Add/Drop Transponder with SDFEC (one client and one line port) supporting L-band. The 130SLA1 card is the HW variant of the 130SCA1 card for L-band network. The system supports 130SLA1 for L-band network with the same features of 130SCA1 in L0 GMPLS domains.

It supports the following main functions:

- Add/Drop 100G client services (100GbE, OTU4)
- Uni-directional 3R regen

The 130SLA1 inherits features of 130SCA1, with *limited availability* of the following features. Please be cautious for using these features::

- Setting FEC Type as AFEC on the line port
- Setting client signal rates of 100GbE
- Configuring the card on PSS-8 shelf
- Providing all types protection support for services and connections

Equipment Management

NE Support

The card is supported on PSS-16II, and PSS-32 from R10.1 onwards.

Shelves Support

The card can be configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 16 on an 1830 PSS-32 shelf
- Card slots 3 to 9 on an 1830 PSS-16II shelf

The 130SLA1 can be configured both in 100GEth and OTU4 modes.

Port Configuration

The following port configuration behavior are known to exist:

- One fixed line port, **L1** is auto created when the pack is provisioned with signal rate of **OTU4**.
- The **Operational Mode** of the fixed line port can take the values of **AddDrop** or **Regen**.
- **Encapsulation Mode** for the OTU4 line port is **QPSK**.
- Uni-directional Regen is supported at the line port.
- Frequency ranging between 8610.000 Hz to 9085.000 Hz is supported in steps of 0.625 Hz for both fixed grid and flex grid.
- By default, **FEC Mode** is set to **SDFEC**.

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AFEC is supported with the limited availability.

- Interworking mode is not supported.
- At the line port, wavekey encoding is available with direction as OUT.
- Depending on the Card Mode selected while configuring the card, the client port is auto assigned with the signal of either OTU4 or 100GbE.
- The client port can be configured only when the line port is not in **Regen** mode and is **In Service**.
- The options for OPSA, OPSB, and Y-cable protection is provided by the NE. However, these are not supported by NFM-T.

For more information on the ports and rates of the card, see the *1830 PSS Product Planning and Information Guide* and the *1830 PSS User Provisioning Guide*.

Connection Configuration

- Only L-band provisioning is supported with C+L ROADM configuration. See 5.3 "C+L band " (p. 519) for more information. 130SLA1 can interwork with 130SLX10. However be cautious while using this interworking scenario.
- Cluster configurations using 130SLA1 is not supported.
- Support for control plane is provided for this card.

Alarms and Performance Monitoring

Loopback

Both facility and terminal loopbacks are supported on the client port C1 and line port L1 at the physical level. No loopback is supported when line port is in Regen operational mode. PRBS loopback is supported on the 100GbE C1 port. TCM is not supported.

FM

The line port L1 supports the following alarms category:

- EQPT (equipment)
- OCH
- ODU4
- OTU4

The client port C1 supports the following category of alarms:

- 100GbE
- OCH
- ODU4
- OTU4

Signal Alarm and consequent action for OTU4 signals include the following:

- LOS, LOF, LOM, OTU4-AIS

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- OTU2 BDI, OTU4 TIM
- FEC- Signal Degrade, OTU4-Signal Degrade, ODU4-Signal Degrade
- ODU4-TIM, ODU4-AIS, ODU4-OCI, ODU4-LCK
- OPU4-CSF, ODU4 PTM
- LOFLOM, MISM, LOOMLFI, and ODUCSF

Signal alarm and consequent action for 100GbE clients include LOS in Rx direction, LSS, Hi-Ber, LFI, RFI in both Rx and Tx directions.

PM

The following PM features applies to the card:

- On client port C1, 100GbE/ETH PM, PCS, Analog PM, including per lane TX and RX power monitoring are supported. OTU4/ODU4 PM is not supported.
- 15-min and 24-h PM are supported for all PM groups on the client and line ports.
- The analog PMs OPR, OPT and per-lane Tx are supported on the client port. Rx power analog PM is not supported on the client port.
- Digital PMs for PCS layer and Ethernet statistics are supported on all 10GbE client ports.
- The analog PMs OPR, OPT, CD, DGD, FOFF, preFect Bits are supported on the line ports.
- TCA profile is supported for 15-min and 24-h. Lane power management is supported on the client port C1.

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16.8 iROADM9R

Card Description

iROADM9R is a circuit pack with integrated ROADM, 9-degree, Regional/Long Haul (LH)/ Ultra Long Haul (ULH). The pack is for C-band only, with WTOCM-F monitoring capabilities, OTDRRX and OTDRTX ports for supporting OTDR scans, OSC supervisory channel functions (add/drop and monitoring), and is FlexGrid capable.

Equipment Management

The iROADM9R cards can be configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 5 on an 1830 PSS-8 shelf
- Card slots 3 to 10 on an 1830 PSS-16II shelf
- Card slots 2 to 17 on an 1830 PSS-32 shelf

An iROADM9R pack can be used in:

- ROADM (up to 10 degrees – on the 10th degree, no Add/Drop channels and maybe used with other nodes to form multi-NE solutions)
- DGE (2 iROADM9R packs to form 2 degrees)
- ILA nodes, RA2P-96 and RA2P amplifier packs are supported, within the same node of iROADM9R

iROADM9R supports Layer 0 GMRE commissioning

Note: For all iROADM9R packs, LINEIN and LINEOUT ports should be connected to **Ext** in the NE WEBUI. This is to set Opposite Direction port attribute of the NE, without it all operations will fail.

If	Then
the LINEIN port is manual power managed	the Ingress adjust is not supported
the LINEIN port is auto power managed • the LINEIN port Opposite Direction Port is set • the LINEIN port Opposite Direction Port is unassigned	• the Ingress adjust is supported • the Ingress adjust is not supported
the LINEOUT port is manual power managed	the Egress adjust is not supported
the LINEOUT port is auto power managed • the LINEOUT Opposite Direction Port is set • the LINEOUT Opposite Direction Port is unassigned	• the Egress adjust is supported • the Egress adjust is not supported

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Port Configuration

The following port configuration behavior are supported:

- Physical ports - LINEIN, LINEOUT, OSC, OSCSFP, ADT[1..9], OTDRRX, OTDRTX, CUSTLAN
- Opposite Direction Port (uni RX/TX) - LINEIN, LINEOUT (Read-only, since LINEIN/LINEOUT both are on one iROADM pack)
- OSCSFP Pluggable module.

For more information on the ports and rates of the card, see the *1830 PSS Product Planning and Information Guide* and the *1830 PSS User Provisioning Guide*.

Connection Configuration

The following connection configurations are supported:

- OTS topological link management (OSNR support, OTDR, and Fiber characteristics)
- OMS trail management (C-band only, one C-band OMS trail per span)
- OTUk/OCH trail management (integrated with ODUk)

As part of Connection provisioning, the following are supported:

- Infrastructure connection provisioning and management
- Client service connection provisioning and management
- Map view
- Port Selection
- Connection list
- Routing Display
- 360-degree view
- Integrated and consistent connection provisioning
- All the scenarios for protected, with soft re-route and unprotected

Interworking with other types of node

OTS (optical span) interworking is supported with the following:

- ILA and DGE configurations
- Any of the WSS portfolio and other iROADM variants such as IROADMF/V/9M

OT packs

All existing OT packs are supported.

Interworking with LDs

Interworking with the following LDs are not supported:

1. iROADM9R with OSCT degrees

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2. iROADM9R with unamplified FOADM
3. iROADM9R with the AA2DONW(B)

Add/Drop configurations support

Add-Drop configurations supported with SFD and ITLB variants.

Note: Clip-on VWDM-DW SFD2, SFD4, SFD8 (not supported by NFM-T)
OTs: non-coherent OTs only with ITLB or 44 channels for the degree; without ITLB, only coherent OTs can be used. No further restrictions on the OT support – except that 10G with fVoA is not compatible to iROADM9R.

Supported configurations

Supported configurations are:

Cluster configuration

All cluster configurations are supported.

Note: ADT ports do not support cluster configurations.

Compound node with OCS NE

Compound node with OCS NE is supported.

Control Plane

Layer 0 GMPLS is supported.

Alarms and Performance Monitoring

Optical Intrusion Detection

Optical Intrusion Detection is supported at a pack level.

The following attributes are supported:

- Monitoring Enabled
- Span Loss (dB)
- Baseline Span Loss (dB)
- Loss Threshold (dB)
- Polling Period (seconds)
- Clear Optical Intrusion Detected Alarm

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FM

The CUSTLAN port supports PLK alarm category.

The ADT[1..9] ports support the following alarm category:

- EQPT
- OTS

The LINEIN port supports the following alarm category:

- EQPT
- OCH
- OMS
- OTS

The LINEOUT port supports the following alarm category:

- EQPT
- OCH
- OTS

The OSCSFP port supports the following alarm category:

- EQPT
- OTS

Alarms are not supported on OSC, OTDRRX, and OTDRTX ports.

PM

PM Data is reported on the following ports:

- OSCSFP
- LINEIN
- LINEIN-freq
- LINE-OUT
- LINEOUT-freq

iROADM9R supports PM on the following:

- OCH mainly for wavelength tracker
- OTS for optical power
- OSC for digital and optical PM
- LINEIN/LINEOUT – OSC OPT and OPR

Example Interworking scenarios supported

Following are examples of the supported interworking scenarios:

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Figure 16-8 iROADM9R with 260SCX2 – 100GbE Client, L0 CP

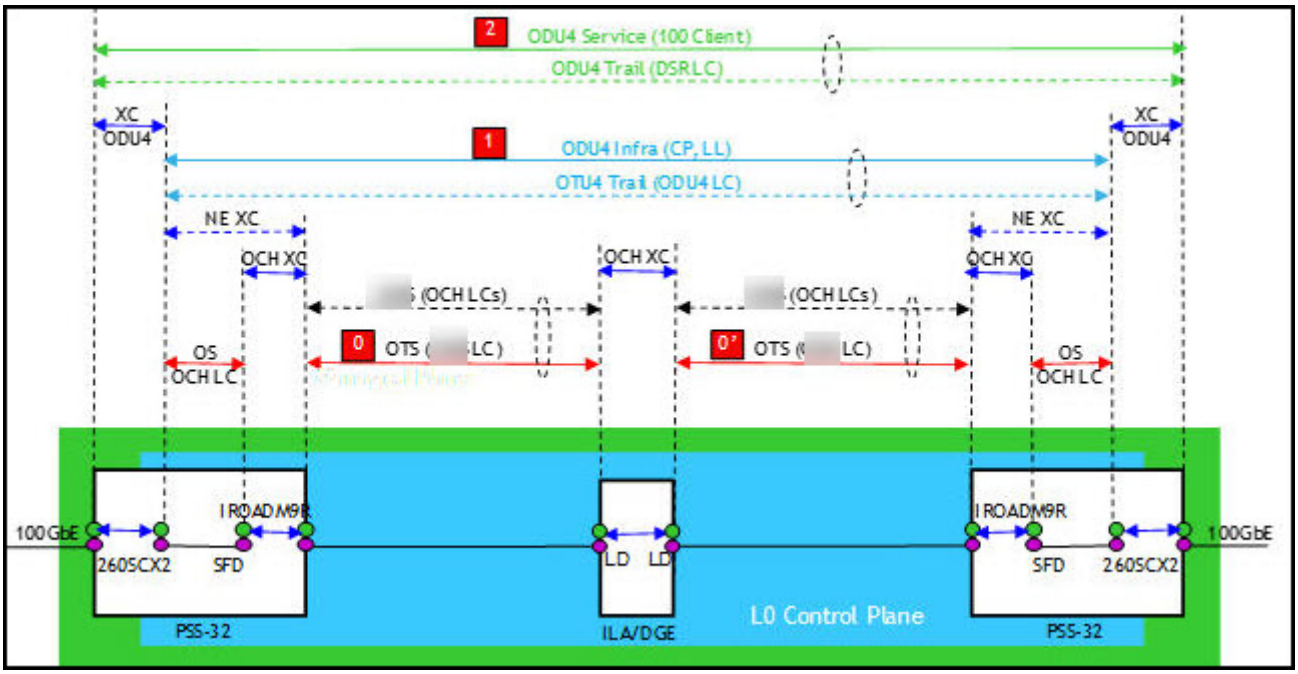

Figure 16-9 iROADM9R with 11QPA4 – 10GbE Client, MP (WR8-88A/F)

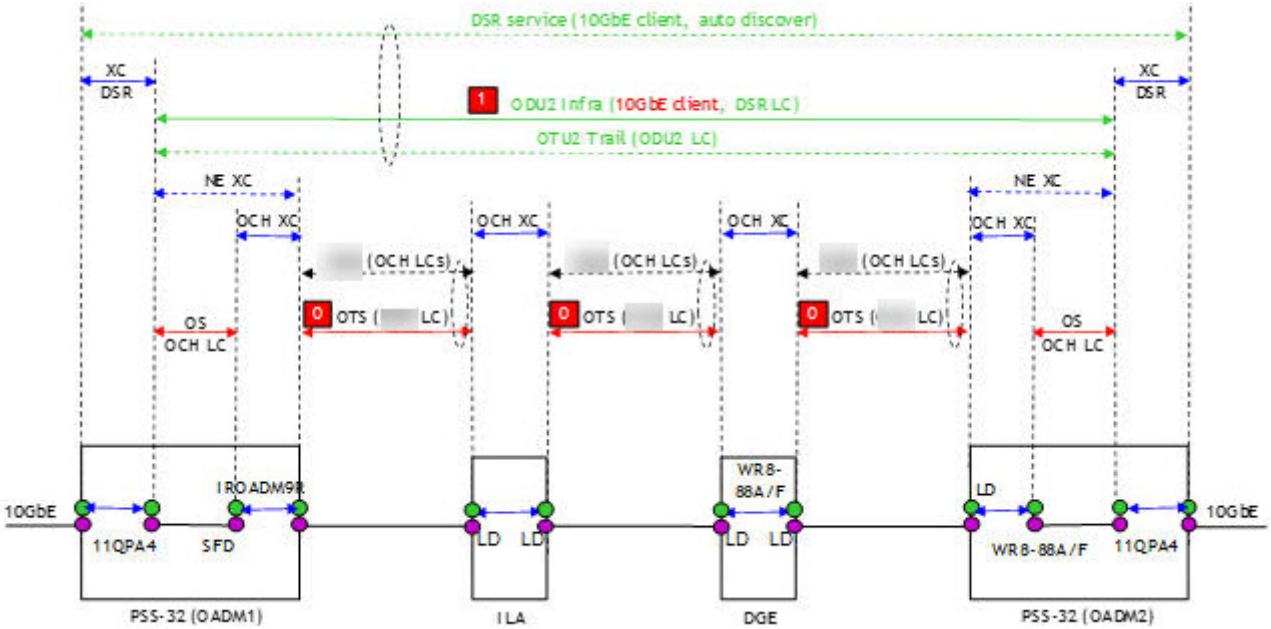

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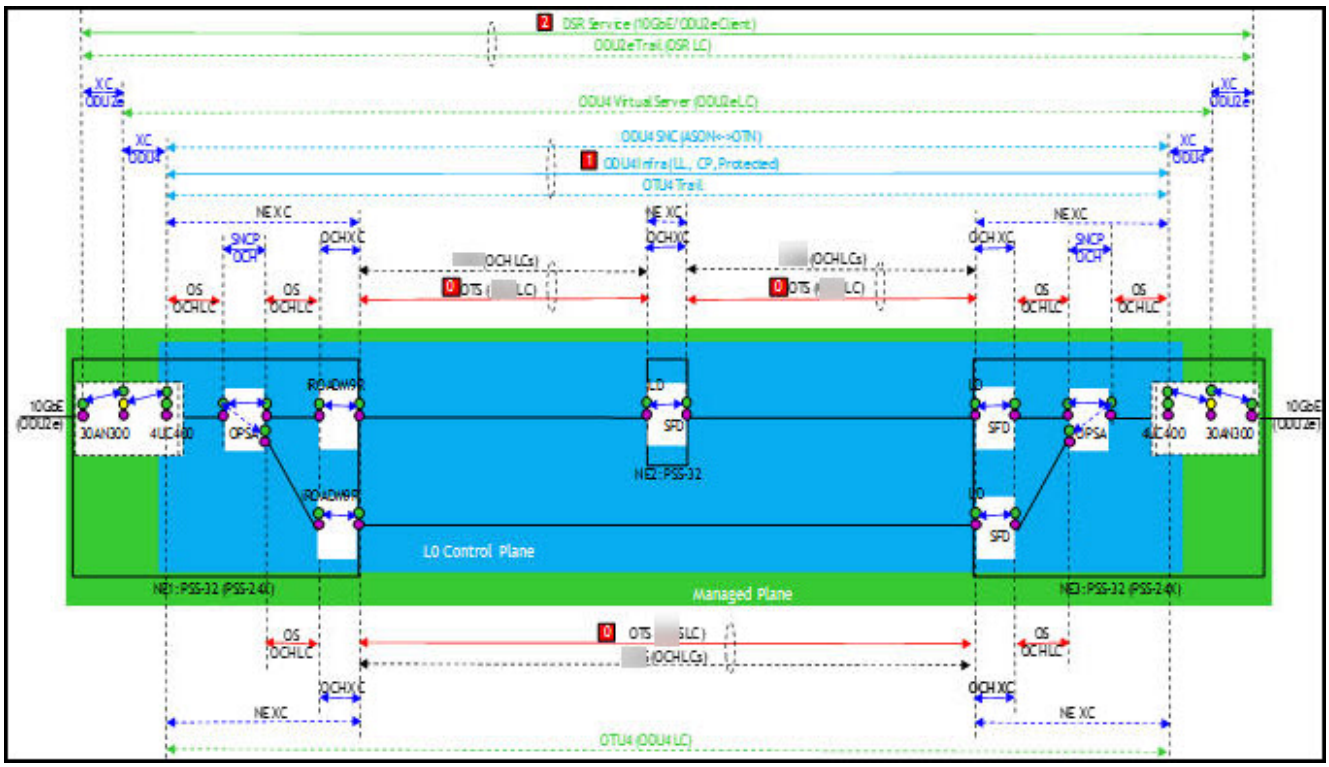
Figure 16-10 iROADM9R with PSS-24X OPSA OCH Protection – 10GbE Client, L0 CP



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16.9 IPREAMP

Description

The IPREAMP has been introduced with the aim to use it in combination with IROADMs for long spans. In particular with iROADM9R, iROADMR20 and WR20TF cards.

IPREAMP is a single slot card with OTDR port included and can work in network with 96 channels or 88 channels. With Release 19.2, both sides of IPREAMP can be used facing the transmission path.

IPREAMP has one LINEIN/LINEOUT bi-directional port that is used for the OTS termination point.

The card is a uni-directional LD pack with port modelling similar to other LD's.

The IPREAMP is a C Band optical amplifier that supports both Flexgrid and Fixgrid Network. The card supports both *Managed Plane* and *L0 Control Plane* domains.

Equipment Management

NE Support

The card is supported on PSS-8, PSS-16, PSS-16II and PSS-32 from Release 11.1 onwards.

Shelves Support

The card can be configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 5 on an 1830 PSS-8 shelf
- Card slots 3 to 9 on an 1830 PSS-16 shelf
- Card slots 3 to 10 on an 1830 PSS-16II shelf
- Card slots 2 to 17 on an 1830 PSS-32 shelf

Supported configurations

The card supports the following configurations:

- IPREAMP with iROADM9R, iROADMR20 and WR20TF as cascaded amplifier
- IPREAMP+iROADMx interworking with IPREAMP+ASWG (96 channel)
- IPREAMP+iROADMx interworking with AM2625A + AM2032A/AM2125A/ASWG amplifier (88 channel) with RA2P-96 as optional configuration.

Depending on the type of card that interworks with IPREAMP the configurations are divided as follows:

1. Interworking with iROADMx cards:

   - iROADMx (9R/20) + IPREAMP (both booster and pre-amp) configured as bi-directional configuration.

   - IROADMx (9R/20) + IPREAMP (both booster and pre-amp) + RA2P-96 configured as bi-directional configuration.

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- IROADMx (9R/20) + IPREAMP (booster) configured as uni-directional configuration + RA2P-96 configured as bi-directional configuration.

2. Interworking with ILA :

   - ASWG+ IPREAMP (both booster and pre-amp) configured as bi-directional configuration.

   - ASWG+ IPREAMP (both booster and pre-amp) + RA2P-96 configured as bi-directional configuration.

   - ASWG+ IPREAMP (booster) configured as uni-directional configuration + RA2P-96 configured as bi-directional configuration.

3. interworking with WR20TF:

   - WR20TF+ASWG/ASWG +IPREAMP as node degree (with and without RA2P-96).

   - WR20TF+ASWG/ASWG +IPREAMP as DGE degree. (dual blade) (with and without RA2P-96).

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Packet Switching Cards

16.10 Overview

Purpose

Packet switching cards (also known as I/O cards) are: 12CE120, 12CE121, 1CE100, 1CE100Q, 30SE300, and 6SE300. The packet switching cards interwork with uplink cards in a packet switch configuration.

Packet switch is a grouping of packet and uplink cards so they together behave as a logical single card. The cards added to packet switch are backplane connected, hence there is a fixed slot positioning for packet cards and uplink cards. The slot positioning varies in 1830 PSS-8 and 1830 PSS-16II.

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16.11 1CE100 and 1CE100Q

Card Description

The 1CE100 and 1CE100Q circuit packs are 1x100G Layer 2 Carrier Ethernet I/O packet switch cards.

The 1CE100 and 1CE100Q are single-slot packs with single 100G CFP4 faceplate ports. Both cards provide Carrier Ethernet services using an Ethernet switch connecting the faceplate port and the back plane ports in a Falcon shelf. It may be combined with another 1CE100 or 1CE100Q to create a single logical Ethernet switch connecting all ports of both packs. 1CE100Q supports QSFP28 faceplate port.

Note: 1CE100 and 1CE100Q cards differ in the pluggables supported. In the port level, both the 1CE100 and 1CE100Q cards are displayed as 1CE100 only.

Equipment Management

NE Support

The cards are supported on 1830 PSS-8 and 1830 PSS-16II.

Interworking

1CE100 and 1CE100Q circuit packs interwork with falcon uplink cards, such as 20P200, 1UC200, and S13X100R.

Shelves Support

The cards can be configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 5 on an 1830 PSS-8 shelf
- Card slots 3 to 10 on an 1830 PSS-16II shelf

Port Configurations

1CE100 and 1CE100Q support or do not support the following port configurations:

- Client signal type of 100GbELANETH.
- FEC mode is not supported.
- Port Protection not supported. Ethernet protection (ERP, LAG) is supported.
- Client and line ports can be separated on different I/O cards.
- LLDP is supported.
- Applications: Managed Plane supported; control plane not supported.
- Supports the following pluggables:

  1CE100
  - C4CLR4D
  - C4CLR4E

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- C4CSR4E

1CE100Q

- Q28C10e
- Q28CWDM4
- Q28LR4d
- Q28LR4e
- Q28SR4e

On 1CE100/1CE100Q, one port is provisioned as 100 GbE LANETH with back plane connectivity on 1 and 2 port. On 20P200, 1 to 20 ports can be either 10GbELANETH or OTU2eWANETH (WANIF).

Alarms and Performance Monitoring

PM

The following PM counters are supported:

- RMON In/Out Port PM counters
- In/Out PM counters per service (no binning)
- Out PM counters per Queue
- Y.1731/Y.1563/MEF S-OAM PM counters per EVC and CoS

FM

Ethernet alarms are supported.

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16.12 12CE120

Card Description

The 12CE120 circuit pack is a 12x10GbE/OTU2e, Layer 2 Carrier Ethernet I/O Packet switch card. 12CE120 is a client card used in Packet Switch Configurations.

The 12CE120 is connected through its backplane ports to an uplink card and provides Carrier Ethernet services using an Ethernet switch connecting all faceplate ports and backplane ports in a Falcon shelf. This card is combined with another 12CE120 to create a single logical Ethernet switch connecting all ports of both packs.

The 12CE120 packet card inter-operates with 20P200 and 1UD200 cards in the same shelf using the backplane interfaces. The 12CE120 functions as the service card, and the 20P200 and 1UD200 functions as the uplink card.

Equipment Management

NE Support

The card is supported on 1830 PSS-8 and 1830 PSS-16II R10.1.

Shelves Support

The card can be configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 5 on an 1830 PSS-8 shelf
- Card slots 3 to 10 on an 1830 PSS-16II shelf

Port Configurations

The following port configurations are known to exist:

- 12CE120 card supports the provisioning of the following Client Signal type port functions on each physical port:
  - OTU2eWANETH (WANIF)
  - 10GBELANETH
- 12CE120 ports are used as both Client and Line signal types. For Line signal type (1 to 12 ports), OTU2eWANETH is supported when the Port Role is Line Port.
- 12CE120 supports 12 ports (highest number of port SFP including the ports possible on faceplate while retaining WT capability.
- FEC mode: EFEC, RSFEC, or No FEC.
- Wavekey is supported.
- Protection: Port Protection is not supported. Ethernet protection (ERP, LAG) is supported.
- LLDP is supported.
- Applications: Managed Plane supported; control plane not supported

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Note: When 12CE120 card is connected to Uplink card 20P200, back planes [1,2] are auto set to XFI. When the 12CE120 card is connected to the Uplink card 1DU200, back planes [1,2] are auto set to CAUI.

Note: SL64TUW is a DWDM tunable pluggable module supported on 12CE120 cards.

This DWDM tunable pluggable module is supported on 12CE120 cards. This card operates at a DWDM frequency and works as a Line port. The client signal rates supported is OTU2eWANETH.

The OTUk trail or Client Service connection provisions the pluggable as a DWDM colored channel with add wavekey option.

Alarms and Performance Monitoring

Loopback

Facility loopback, Terminal loopback, Ethernet loopback, and PRBS loopback is supported.

PM

Ethernet PM is supported for [1..12] ports, no PM on OTU2e, ODU2e, and PMON (Proactive SLM and DM, Saps, Ethernet Port/queues).

15-min and 24-h PM is supported for all PM groups on the client and line ports.

Following PM counters are supported:

- RMON In/Out Port PM counters
- In/Out PM Counters per Service (no binning)
- Out PM Counters per Queue
- Y.1731/Y.1563/MEF S-OAM PM counters per EVC and CoS

FM

Ethernet alarms are supported.

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16.13 12CE121

Card Description

The 12CE121 circuit pack is a 2x10GbE/OTU2e, Layer 2 Carrier Ethernet I/O Card. It is a cost-reduced version with 1GbE or 10GbE client interfaces in support of packet applications that requires 1GbE client interfaces with packet switch cards.

The 12CE121 pack has twelve 1GbE and 10GbE faceplate ports supporting native PHY using SFP/SFP+ modules. This provides Carrier Ethernet services using an Ethernet switch connecting all faceplate ports and backplane ports in a shelf. It can be combined with another 12CE121 to create a single logical Ethernet switch connecting all ports of both the packs.

The 12CE121 packet card inter-operates with 20P200 card in the same shelf using the backplane interfaces. The 12CE121 functions as the service card, and the 20P200 functions as the uplink card.

On 12CE121 card, ports are provisioned as 1GbELANETH or 10GbELANETH or FELANETH; BP[1,2]: XFI

Equipment Management

NE Support

The card is supported on 1830 PSS-8 and 1830 PSS-16II R10.1.

Shelves Support

The card can be configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 5 on an 1830 PSS-8 shelf
- Card slots 3 to 10 on an 1830 PSS-16II shelf

Port Configurations

The following port configurations are known to exist:

- 12CE121 supports 12 ports, up to 12 SFP+ pluggables.
- 12CE121 card supports the provisioning of the following Client Signal types on each physical port:
  - 1GbELANETH
  - 10GbELANETH
  - FELANETH (or FE)
- 12CE121 ports are used as both Client and Line signal types. For Line signal type (1 to 12 ports), OTU2eWANETH is supported when the Port Role is Line Port.

  Client and line ports can be separated on different I/O cards.
- 12CE121 supports 12 ports (highest number of port SFP including the ports possible on faceplate while retaining WT capability).
- FEC mode is not supported.

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- Duplex Mode is supported only for FELANETH (or FE).
- Wavekey is supported.
- LED display supported for ports
- Port attributes: Tx/Rx frequency is not applicable for FELANETH, instead “frequency” is set.
- Applications: Managed Plane supported; control plane not supported.
- If the card is not a part of a packet switch, backplane 1 and backplane 2 are not provisioned on card provisioning. If the card is a part of packet switch, based on the different packet switch configurations, backplane 1 and backplane 2, or both are auto-provisioned as a part of packet switch creation. For 100G configuration (packet switch having 1UD200 or 1CE100/1CE100Q).

  XFI rate is provisioned for the backplane ports. For 10G configurations (packet switch having 20P200 or 12CE120 or 12CE121), CAUI rate is provisioned for backplane ports.

Note: The user cannot provision a port on a 12CE121 card until they are placed in packet switch.

Alarms and Performance Monitoring

Loopback

Facility loopback, Terminal loopback, Ethernet loopback, and PRBS loopback are supported.

PM

Ethernet PM is supported for [1..12] ports, no PM on OTU2e, ODU2e, and PMON (Proactive SLM and DM, SAPs, Ethernet Port/queues).

15-min and 24-h PM is supported for all PM groups on the client and line ports.

Following PM counters are supported:

- RMON In/Out Port PM counters
- In/Out PM Counters per Service (no binning)
- Out PM Counters per Queue
- Y.1731/Y.1563/MEF S-OAM PM counters per EVC and CoS

FM

Ethernet alarms are supported.

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16.14 30SE300

Card Description

30SE300 is a 30x10GbE L2 OTN client card for 1830 PSS-24x. It supports Switched Ethernet and maximum aggregate client capacity of 300. It is Central ODU Switched card (CSW), as the OTN switching for 30SE300 is taken care by the matrix card (2UC200 and 4UC400) in the 1830 PSS-24x shelves.

30SE300 card consists of 30 faceplate ports, and supports client port from 1 to 30 with 1GbE and 10GbE L2 signal rate, using SFP /SFP+ modules.

30SE300 card has dual packet card equipment protection.

Equipment Management

NE Support

This card is supported in the following NEs:

- 1830 PSS-24x
- 7210 SAS

It can be configured on the card slots 1 to 20 on the 1830 PSS-24x shelves.

Packet Card Interworking

30SE300 card can interwork with the other cards listed below:

- 11QPE24
- 11QCE12X
- 11OPE8
- 12CE120
- 12CE121
- 1CE100
- 1CE100Q
- 103SCEC
- 11OCEC
- 1UD200 (in Packet Switch)
- 20P200 (in Packet Switch)

Port Configurations

The following port configurations are supported in 30SE300:

- Supports 30 ports and SFP/SFP+ pluggables.
- Supports provisioning of 10GbELANETH or 1GbELANETH Client Signal Rate on the ports
- Supports the following SFP+ pluggables.

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- S10GB-SR
- S10GB-LR
- SI64.1BD
- SI64.1BU
- SS64.2BD
- SS64.2BU
- SXI64.1
- SXL64.2
- SXS64.2b
- SXL64.2C (CWDM module)
- SXS64.2C (CWDM module)

- Supports ODUPTFs and WANIFs
  - For unstructured ODUPTF: ODU2E, ODU4, and ODUFLEX
    Note: ODUFLEX is not supported in NE Release 11.1.
  - Supports the following WANIF IDs: 101-150 , 201-210 , 301-350, 401-410.
    Note: The 30SE300 card must be part of a packet switch group, to create an ODUPTF.
- Supports OPS in the client ports of 30SE300 card with similar rates.

30SE300 (1GbELANETH) - 30SE300 (1GbELANETH)	30SE300 (10GbELANETH) – 12CE120 (10GbELANETH)
30SE300 (1GbELANETH) – 12CE121 (1GbELANETH)	30SE300 (10GbELANETH) – 12CE121 (10GbELANETH)
30SE300 (1GbELANETH) – L2 cards (11QPE24, 11OPE8, 11QCE12X, 7210 SAS-K) with 1GbE	30SE300 (10GbELANETH) – 20P200 (10GbELANETH)
30SE300 (10GbELANETH) - 30SE300 (10GbELANETH)	30SE300 (10GbELANETH) – L2 cards (11QPE24, 11OPE8, 11QCE12X) with 10GbE

- Packet Switch ID of the card is available in the EQM at the port and Card level.
- Cold and Warm reset of the card is supported.
- Facility and Terminal loopback is supported on 10G interfaces.

FM

WANIF Alarms are supported.

PM

Following PM counters are supported:

- Port/Queues
- SAPs
- Proactive SLM

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- Proactive DM

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16.15 6SE300

Card Description

6SE300 is a 30x10GbE and 3x40/100GbE L2 OTN client card for 1830 PSS-24x. It supports Switched Ethernet and maximum aggregate client capacity of 300. It is Central ODU Switched (CSW) card, as the OTN switching for 6SE300 is taken care by the matrix card (2UC200 and 4UC400) in the 1830 PSS-24x shelves.

6SE300 card consists 6 faceplate ports, and supports 3x40GbE and 3x40/100GbE L2 signal rate client port, using QSFP28 and QSFP+ modules.

6SE300 has a dual packet card equipment protection.

Equipment Management

NE Support

This card is supported in the following NEs:

- 1830 PSS-24x
- 7210 SAS

It can be configured on the card slots 1 to 24 on the 1830 PSS-24x shelves.

Packet Card Interworking

6SE300 card can interwork with other packet cards listed below.

- 11QPE24
- 11QCE12X
- 11OPE8
- 12CE120
- 12CE121
- 1CE100
- 1CE100Q
- 103SCEC
- 11OCEC
- 1UD200 (in Packet Switch)
- 20P200 (in Packet Switch)

Port Configurations

The following port configurations are supported in 6SE300:

- Supports 24 ports and QSFP28 and QSFP+ pluggables.
- Supports provisioning of 100GbELANETH Client Signal Rate on the ports.
- Supports the following QSFP pluggables.

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  - Q28SRe - 8023-bj FEC only
  - Q28LR4e - NOFEC only
  - Q28LR4d - NOFEC only
  - Q28CWDM4 - 8023-bj FEC only
- Supports ODUPTFs and WANIFs
  - For unstructured ODUPTF: ODU2E and ODU4
  - Supports the following WANIF IDs: 101-150 , 201-210 , 301-350, 401-410.

    Note: The 6SE300 card must be part of a packet switch group, to create a ODUPTF.
- Supports OPS in the Client ports of 6SE300 card with similar rates.

  Example
  - 100G: 6SE300 (100GbELANETH) - 6SE300 (100GbELANETH)
  - 1CE100/1CE100Q (100GbELANETH) – 6SE300 (100GbELANETH)
- Packet Switch ID of the card is available in the EQM at the port and card level.
- Cold and Warm reset of the card is supported.
- Facility and Terminal loopback is supported on 100G interfaces.

FM

WANIF Alarms are supported.

PM

Following PM counters are supported:

- Port / Queues
- SAPs
- Proactive SLM
- Proactive DM

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Uplink Cards

16.16 Overview

Purpose

The uplink cards are used for connecting and interworking with the WDM systems.

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16.17 1UD200

Card Description

1UD200 (was 260SCUPF) is a Falcon uplink card - Falcon is a metro optimized product.

The 1UD200 is a client/line compatible single-slot uplink card for PSS-8 and PSS-16II shelves.

1UD200 is 100G/200G Single Port Uplink card, Client/Line, with single slot and full height, supporting Uplink card configurable for 100G QPSK or 200G 16QAM modes (for high capacity/ spectral efficiency transport in Metro).

1UD200 supports regeneration for both 260G mode and 130G mode. The 1UD200 features a 100G/200G adaptive rate design on the DWDM line interface.

Equipment Management

NE Support

The card is supported from 1830 PSS Release 8.1.

Shelf Support

The card can be configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 5 on an 1830 PSS-8 shelf
- Card slots 3 to 10 on an 1830 PSS-16II shelf

Port Configurations

The following port configurations are known to exist:

- Provides interconnectivity compatible with PSS-8, PSS-16II quadrant based slot-slot configuration.
- Provides an optional 100GbE port for Hybrid configuration.
- Support configurations with 20x10G Client I/O card, 2x100G/5x40G I/O card and L2 aggregation cards designed for Falcon platform quadrant based Client/Line connectivity.
- Supports two modes of Signal Rate: OTU4 (100G mode) and OTU4x2 (200G mode).
- FEC mode is set to following:
  - For OTU4, the FEC mode is set to: AFEC or SDFEC.
  - For OTU4x2, the FEC mode is set to SDFEC.
- Wavekey supported on L1, encoder.

Alarms and Performance Monitoring

Loopback

Support both client facility and terminal on L1

No loopback is supported when in Regen mode

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PM

Supported on L1

- Optical PM: OPR, OPT
- Digital PM

FM

Supported on L1 and backplane 1 and 2

For L1, EQPT and OCH alarms are supported.

For backplane 1 and 2, EQPT alarms are supported.

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16.18 20P200

Card Description

20P200 is a very-high-density 10G any rate card with 20 SFP+ ports. It is single-slot, full-height card that acts as the client I/O card to support 1UD200 for 200G uplink applications. It can also work as a stand-alone 10G transponder card to support 20x10G add/drop links with ODU switching and grooming capability. With interconnected mates, this card supports up to 40x10G add/drop links.

Equipment Management

NE Support

The card is supported from 1830 PSS Release 8.2.

Shelf Support

The card can be configured on the following shelves and card slots using the NFM-T EQM application:

- Card slots 2 to 5 on an 1830 PSS-8 shelf
- Card slots 3 to 10 on an 1830 PSS-16II shelf

Port Configurations

The following port configurations are known to exist:

- 20P200 client-1UD200 uplink
- Two mated 20P200 cards configuration

The 20P200 provides cross-connects at ODU2, ODU2e, and ODU4 levels. The ODU cross-connections can use the following connection points:

- OTUODU2/2e NIM and OTUODU2/2e NIM connection (unidirectional or bidirectional)
- ODU2/2e transparent transport and OTUODU2/2e NIM connection (unidirectional or bidirectional)
- High Order ODU4 NIM to ODU4 Termination connection (unidirectional or bidirectional)

The following configurations are supported when 20P200 is supported in pair with 1UD200 as Muxponder configuration:

- 20x10G to 200G DWDM Line (1UD200 running 200G mode)
- 10x10G to 100G DWDM Line (1UD200 running 100G)

Pluggable Module Types

The 20P200 card supports the following pluggable modules at the indicated service rates:

- S10GB-SR at 10 GbE and 10 GbELANETH
- S10GB-LR at 10 GbE and 10 GbELANETH

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- SXI64.1 at STM-64/OC-192, 10 GbE, 10 GbELANETH, OTU2 and OTU2e
- SXS64.2b at STM-64/OC-192, 10 GbE, 10 GbELANETH, OTU2 and OTU2e
- SL64TUW at OTU2 and OTU2e
- SXS64.2C at STM-64/OC-192, 10 GbE, 10 GbELANETH, OTU2 and OTU2e
- SXL64.2 at STM-64/OC-192, 10 GbE, 10 GbELANETH, OTU2 and OTU2e
- SL64TU at OTU2 and OTU2e

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17 Power Management

17.1 Overview

Purpose

This chapter describes in detail wave key assignments, OTDR and MON-OTDR scan, and managing optical power on connections and services.

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Operate wave key assignments

17.2 Wave key and wave key assignments description

Wave key definitions

A *wave key* is a four-digit number that identifies one end of a channel in an optical network.

A *wave key pair* is a set of four-digit numbers that enables a channel to be identified from end-to-end across a network so its optical power can be monitored.

A *wave key assignment* is the set of attributes that identifies wave key pairs, which includes the four-digit number that is assigned to wave key 1, the four-digit number that is assigned to wave key 2, the two four-digit numbers that constitute the wave key pair, along with the frequency (from 9170 to 9605, in increments of 5), tone overlap, and the status (assigned or available) of the pair.

Note: Wave key usage is tracked only for the managed plane connections. For the control plane connections, wave keys are managed by GMRE and usage is not tracked in NFM-T.

Wave key assignments background

When connections support a Provisionable Wave Key that is keyed, Wavelength Tracker and the Optical Power Display are enabled.

Wavelength Tracker uniquely identifies each service/wavelength in the network. Each channel (wavelength) carrying traffic is encoded with a unique wave key pair that allows the channel to be identified from end-to-end across the network so its power can be monitored. The NFM-T OTN enables users to monitor the optical channel power level constantly in their managed network.

Two types of Provisionable Wave Key assignments are supported, which are automatic and manual.

- When a keyed connection uses automatic wave key assignment, the NE automatically assigns the wave key pairs and maintains a database of wave keys in the network. The wave keys are decoded and the optical power is measured and monitored.
- When a keyed connection uses manual wave key assignment, users select the wave key pairs.

It is important to note that the NFM-T uses automatic wave key assignment whenever possible.

To avoid duplications and to prevent wave key collisions, users must be aware of the wave key pairs that are assigned by both the automatic and manual methods because only a single pool of wave keys exist.

A note about the Wave Key Upgrade command line tool

After 1830 PSS R2.0 NEs are upgraded to R2.5 or higher, connections with the Provisionable Wave Key value of **NA** are not automatically updated to the value **Keyed** or **Unkeyed**. A command line tool must be run to update the Provisionable Wave Key value from **NA** to **Keyed** or **Unkeyed** for the connections using the NE.

The command line tool allows the user to input a list of NEs that have been upgraded (for example, the command line tool must be run once no matter how many NEs are upgraded and not once per NE) and finds all connections using the NEs and updates the Provisionable Wave Key parameter to

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Keyed or **Unkeyed**. If the Provisionable Wave Key value is changed from **NA** to **Keyed** the command line tool updates the Wave Key Type parameter to **Automatic**. This command line tool is run after the NEs are upgraded and the cross connection database synchronization is completed.

For more information on the Wave Key Command Line tool, refer to *Administration Guide: System Maintenance and Troubleshooting*.

Wave key related topics

For additional details on the topics that relate to wave key assignments, refer to the following sections:

- "Provisionable Wave Key" (p. 710)
- "Wave Key" (p. 727)
- 17.3 "View wave key assignments" (p. 1718)
- "Support for Wavelength Tracker and the WTOCM card" (p. 1818)
- 17.13 "Optical power visualization" (p. 1818)

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17.3 View wave key assignments

When to use

Use this task to view a list of wave key assignments.

Related information

See the following topics in this document: 17.2 “Wave key and wave key assignments description” (p. 1716)

Task

Complete the following steps to view a list of wave key assignments.

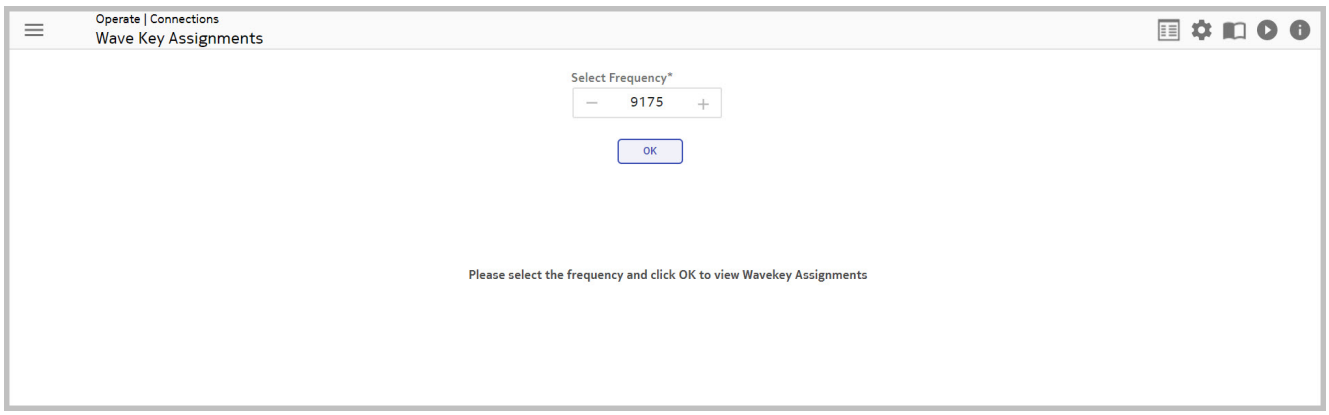
1

From the NFM-T GUI, follow this navigation path:

OPERATE > Wave Key Assignments

Result: Wave Key Assignment frequency selection window is displayed.

Figure 17-1 Wave Key Assignments – Wave Key Frequency selection window



2

Select a frequency value from the list and click **OK**.

Result: The Wave Key Assignments data table is displayed for the selected value.

Example: 9175

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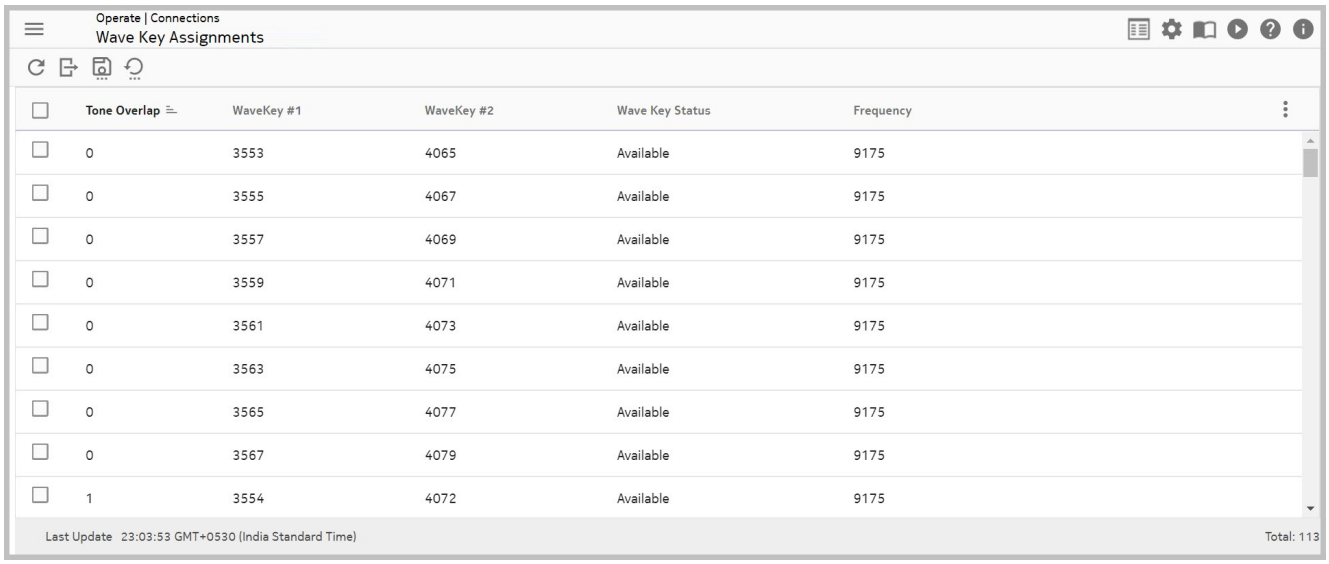
Figure 17-2 Wave Key Assignments – Wave Key Assignments Data Table



Tone Overlap	WaveKey #1	WaveKey #2	Wave Key Status	Frequency
0	3553	4065	Available	9175
0	3555	4067	Available	9175
0	3557	4069	Available	9175
0	3559	4071	Available	9175
0	3561	4073	Available	9175
0	3563	4075	Available	9175
0	3565	4077	Available	9175
0	3567	4079	Available	9175
1	3554	4072	Available	9175

3

Optional: To view the details of a selected item in the data table, refer to "View additional attributes for a selected item in a data table" (p. 2194).

4

Optional: To manipulate the view of the data table, refer to the following for direction:

- "Select objects in a data table" (p. 2185)
- "Sort a single column in a data table" (p. 2187)
- "Manage the columns displayed in a data table" (p. 2192)

5

Optional: To export the contents of the data table that is currently displayed in a **.CSV** file, refer to section26.6 "Export a Data Table to a .csv File" (p. 2209) for detailed steps.

6

Optional: If you have customized the data table and you want to save your display preferences, or if you want to reset a customized view of the data table to its default display, refer to section 26.8 "Save data table preferences and reset data table preferences to default" (p. 2218) for detailed steps.

End of steps

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17.4 View tabbed topics for a wave key assignment

When to use

Use this task to view the tabbed topics for a Wave Key Assignment.

Related information

Refer to section: 17.2 “Wave key and wave key assignments description” (p. 1716)

Task

Complete the following steps to view the tabbed topics that are located below the data table for the selected wavekey.

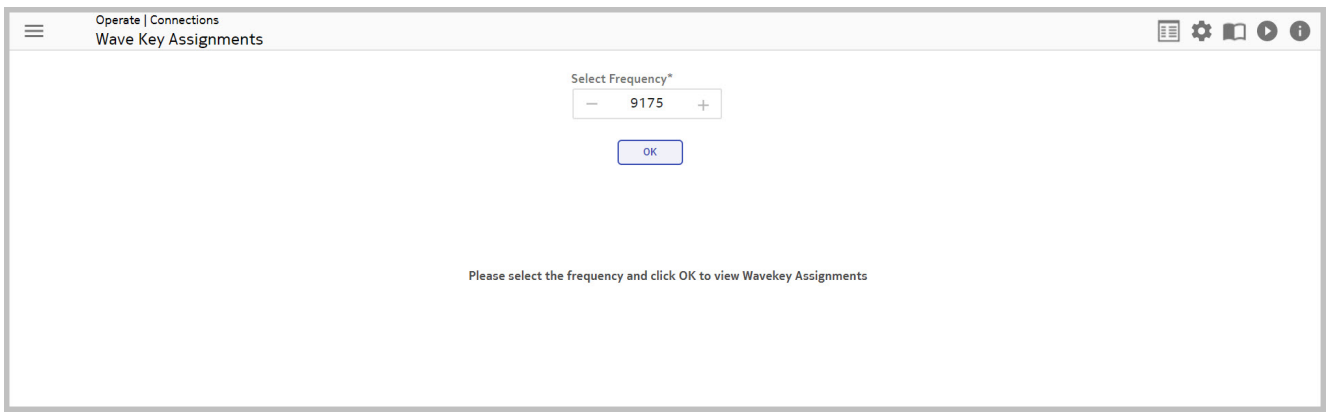
1

From the NFM-T GUI, follow this navigation path:

OPERATE > Wave Key Assignments

Result: Frequency selection window for Wave Key Assignment is displayed.

Figure 17-3 Wave Key Assignments – Wave Key Frequency selection window



2

Select a frequency value from the list and click **OK**.

Result: The Wave Key Assignments data table is displayed for the selected value.

Example: 9175

3

On the selected a wave key, click **360° View** icon and click on one of the available tabs.

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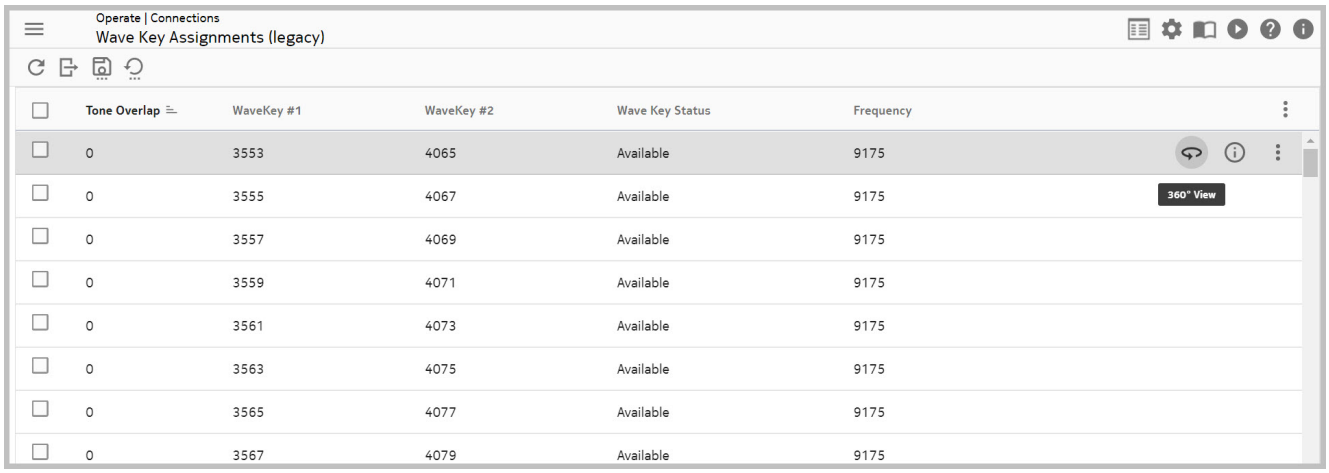
Figure 17-4 Wave Key Assignments – Wave Key Assignments Data Table



Tone Overlap	WaveKey #1	WaveKey #2	Wave Key Status	Frequency
0	3553	4065	Available	9175
0	3555	4067	Available	9175
0	3557	4069	Available	9175
0	3559	4071	Available	9175
0	3561	4073	Available	9175
0	3563	4075	Available	9175
0	3565	4077	Available	9175
0	3567	4079	Available	9175

The available tabs are the following:

25.25 “Infrastructures Connections Tab” (p. 2111)

25.58 “Uncorrelated Cross Connections Tab” (p. 2179)

Important Usability Note:

• The icons and right click functions that are provided with the **Infrastructure Connections** and **Uncorrelated Cross Connections** tabbed topics are the same icons and right click functions that are provided when you access these objects directly from the **OPERATE > Infrastructure Connections** and **OPERATE > Network Inconsistencies > Uncorrelated Cross Connections** navigation paths. All detailed tasks for **Infrastructure Connections** and **Uncorrelated Cross Connections** can be found in the “ Infrastructure Connections and Services” (p. 913) and “Network Inconsistencies ” (p. 1157) sections.

Result: The system activates the tabs and the connection-related information is displayed directly below the data table for the connection.

4

Optional: To view the details of a selected connection, click on the **i** icon. Refer to “View additional attributes for a selected item in a data table” (p. 2194) for details.

Result: The system displays detailed information for the selected item.

END OF STEPS

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OTDR and MON-OTDR

17.5 Manage OTDR/OTDRM/OTDRWB/MON-OTDR cards in Equipment Manager

When to use

Use this task to associate ports, delete association, and scan the following:

- Optical Time Domain Reflectometers (OTDR)
- OTDRM (Metro-optimized OTDR)
- OTDRWB (Wide-band OTDR)
- MON-OTDR cards

EQM supports MON-OTDR card for NEs supported from R8.2 onwards as well as the associated OTDR features and functionalities.

OTDR/OTDRM supports L0 GMPLS network.

Note: You can set up an OTDR scan on a single event or for a series of repeated scans on a physical connection that is associated with an OTDR test capability.

Management of OTDR scans are done in the following ways:

- Port Association can be done from the **Topology View** tab of the shelf.
- Created association can be verified from the **Configure** tab of the required port.
- Scan can be triggered from the **Test Analysis** tab of the required port. Associations cannot be created from the Test Analysis tab.

OTDR Scan can be triggered in two ways:

1. For new packs introduced from R11.0, such as, IRDM20 and ASWG-L and its variants AWBILA, AWBING, AWBEGR, go to OTDR ports P1 to P8, and trigger scans.
2. For legacy packs introduced till R10.1, go to LD LINE or OTDRRX/TX ports or to OTDR ports P1 to P8, and trigger scans.

Note: OTDR is not supported for any OLP based configurations in R18.7.

OTDR/OTDRM/OTDRWB

The OTDR or OTDRM cards can be used along with ASWG, A4PSWG, IRDM20, or RA2P-96 cards for OTDR scan.

- ASWG and A4PSWG packs contain six ports: LINEIN, LINEOUT, OSC, OSCSFP, OTDRRX, and OTDRTX. The OTDRRX and OTDRTX ports can be used with OTDR or OTDRM cards.
- P1 to P8 ports on OTDRM cards can be used for IRDM20.
- RA2P-96 pack contains four ports: OSCOUT, LINEIN, LINEOUT, and OTDRRX. Only OTDRRX can be used with OTDR or OTDRM cards.

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- The OTDRWB cards are used along with ASWG-L cards, and its variants AWBILA, AWBING, AWBEGR for OTDR scan. The OTDRTX/RX ports on the ASWG-L cards, and its variants AWBILA, AWBING, AWBEGR can be connected to any of the P1 to P8 ports for OTDR scan. IRDM32L OTDRTX/RX ports supports association with OTDRWB card.

MON-OTDR

MON-OTDR card is deployed in configuration where the user needs to have embedded OTDR scan capabilities for characterizing and troubleshooting fibers on OTS spans between 1830 PSS NEs. The OTDR/OTDRM card is connected to amplifiers that have dedicated ports for OTDR/OTDRM card connection (for example, ASWG or A4PSWG). If the user deploys OTDR scan on the existing NEs or new installations that do not use amplifiers with dedicated OTDR ports, the MON-OTDR card provides the required functionality. MON-OTDR is installed in 1830 PSS shelf and fibered in front of the amplifier facing the OTS span. Fibers from OTS span are connected to LINEIN/LINEOUT ports of the MON-OTDR, SIGIN/SIGOUT are connected to Ingress and egress amplifiers facing the span. OTDRTX/RX ports of the MON-OTDR cards are connected to any of P1-P8 ports on an OTDR/OTDRM card.

MON-OTDR is supported in following shelves: PSS-32 PSS-16 PSS-16II PSS-8

Supported ports

- LINEIN
- LINEOUT
- SIGIN
- SIGOUT
- OTDRTX
- OTDRRX

Supported cards:

- AHPHG, AHPLG, ALPHG, A2325A cards (bi-directional): LINEIN, LINEOUT
- RA2P card (LD):LINEIN
- IROADMF, IROADMV, IROADM9 cards (uni-directional):LINEIN, LINEOUT
- AM2032A, AM2125A, AM2125B, AM2318A, AM2625A and A2P2125 cards (uni-directional): LINEIN/LINEOUT

There are three main 1830 PSS attributes that contain association information:

- MON-OTDR SIGIN and SIGOUT ports have an attribute that contain information about connected Amplifier LINE port address.
- OTDR/OTDRM P1 to P8 ports have one attribute that describes connected MON-OTDR OTDRTX and OTDRRX ports.
- OTDR/OTDRM P1 to P8 ports have one readable attribute that describes associated amplifier LINE ports.

Note: MON-OTDR SIGIN PORTS can be associated only to supported LINEOUT/LINE-Out ports and MON-OTDR SIGOUT PORTS can be associated only to supported LINEIN/LINE-In ports.

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To create port association, it is always a must to select the OTDR/OTDRM port first.

Example 1 : Between MON-OTDR and ALPHG, we have to select/click MON-OTDR SIGIN and then select/click on ALPHG LINE port in topology view.

Example 2 : Between OTDR/OTDRM and MON-OTDR, we have to select/click OTDR-P1 and then select/click on MON-OTDR OTDRRX port in topology view.

OTDR/OTDRM port associations are shown only on OTDR/OTDRM ports. For example: SIGIN/SIGOUT in MON-OTDR and P1 to P8 in OTDR ports.

Before you begin

Ensure the following:

- NE is *Supervised* and *Up*.
- OTDR/OTDRM/OTDRWB pack is added.
- Line-in and Line-out port has fiber connectivity to enable OTDR scan functionality.

Task : Associate OTDR/OTDRM/OTDRWB/MON-OTDR card from the Configure tab

Perform the following steps to associate the following cards - OTDR with the ASWG and A4PSWG or OTDRM with IRDM20 packs, or OTDRWB with IRDM32L, or ASWG-L packs and its variants AWBILA, AWBING, AWBEGR, or MON-OTDR cards with the legacy LD/Amplifier packs of the supported cards

1

From the NFM-T GUI, follow this navigation path: **OPERATE > Equipment Manager**.

Result: The system displays the Equipment Manager window in its default state.

2

To connect to the OTDR/OTDRM port, select any OTDR/OTDRM P1 to P8 port.

or

To connect to MON-OTDR port, select the MON-OTDR SIGIN and SIGOUT port.

or

To connect to OTDRWB port, select any OTDRWB P1 to P8 port.

and

Click the **Configure** tab.

1. In the **Description** field, enter the description.
2. In **Connected LD OTDR Port**, select either of the following:
   - External
   - Enter the details of the following:
     - OTDRRX port of the RA2P-96 pack for OTDR/OTDRM, or
     - P1 to P8 port of the IRDM20 and ASWG-L pack and its variants AWBILA, AWBING, AWBEGR, or

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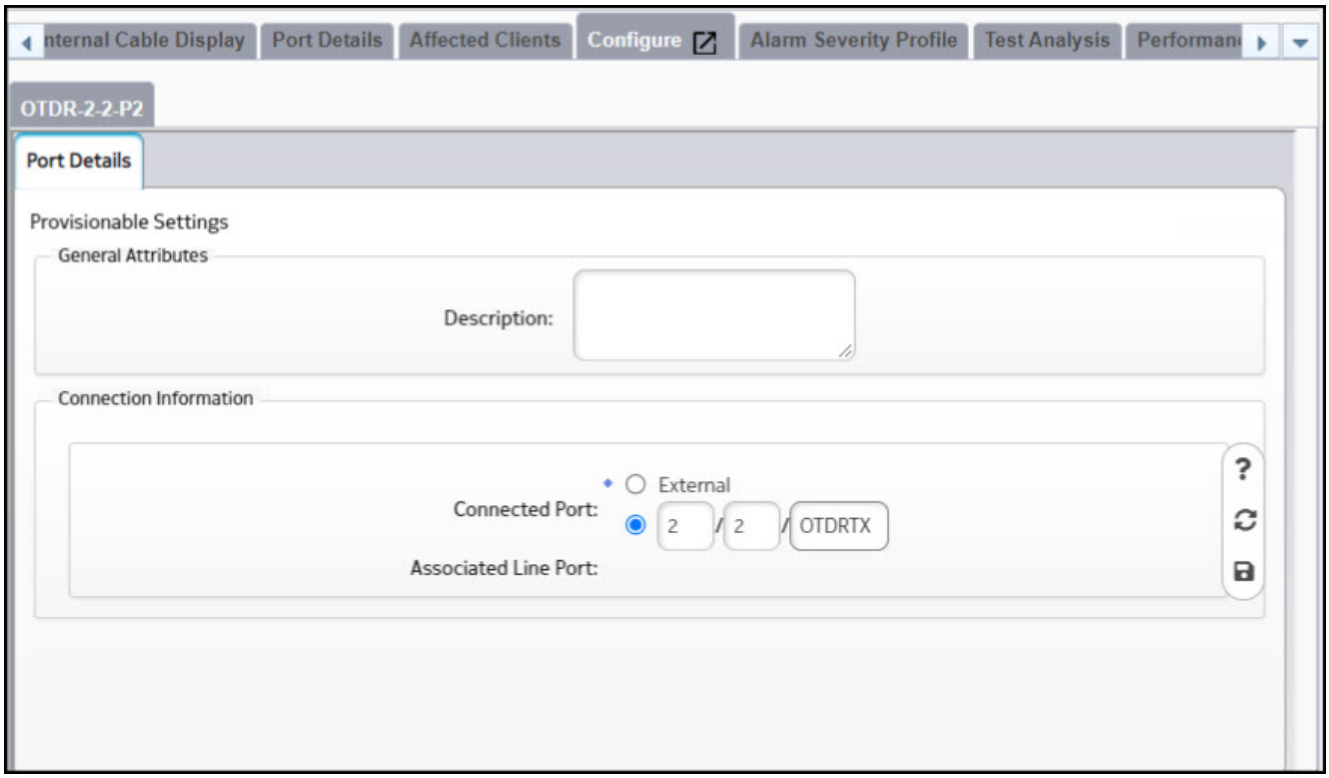
- amplifier packs of the supported legacy LD/Amplifier cards for MON-OTDR

3. Click **Save**.

Note: The **Configure** tab in Figure 17-5, “Equipment Manager – OTDR Configuration” (p. 1724) is displayed only for OTDR/OTDRM/OTDRWB and MON-OTDR ports.

Figure 17-5 Equipment Manager – OTDR Configuration



Result: A success message is displayed.

3

Select the **Refresh** button to see the updated values in the **Configure** tab.

Note: Auto refresh is not supported.

Result: The **Associated LD Line Port** is populated automatically with the values.

Note: The **Associated LD Line Port** field is populated automatically only if the port that you select from the drop-down list for **Connected LD OTDR Port** has been associated with the required amplifier port.

END OF STEPS

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Task : Associate OTDR/OTDRM/OTDWB/MON-OTDR card from the Topology View tab

Perform the following steps to associate the following - OTDR with the ASWG and A4PSWG, or OTDRM with IRDM20 packs, or OTDRWB with ASWG-L and its variants AWBILA, AWBING, AWBEGR or MON-OTDR cards with the legacy LD/Amplifier packs of the supported cards:

1

From the NFM-T GUI, follow this navigation path: **OPERATE > Equipment Manager**.

Result: The system displays the Equipment Manager window in its default state.

2

Click the **Topology View** tab and proceed with an appropriate action based on the type of packs and the supported cards:

- Select any of the following for association:
  - OTDRRX or OTDRTX ports of the OTDR/OTDRM for ASWG or A4PSWG packs
  - P1 and P8 ports of the OTDRWB for ASWG-L packs and its variants AWBILA, AWBING, AWBEGR
  - P1 and P8 ports of the OTDR/OTDRM for IRDM20 packs
  - OTDRRX port of the OTDR/OTDRM for RA2P-96 packs
- Select SIGOUT of the MON-OTDR port and the LINEIN port of the supported legacy amplifier card for association.
- Select SIGIN of the MON-OTDR port and the LINEOUT port of the supported legacy amplifier card for association.

Note: If you select invalid ports for association between MON-OTDR, OTDR, OTDRM, OTDRWB, and Line Drivers, an error message "`Invalid Source / Destination Port`" is displayed.

3

Select the port, right-click, and select **Create Connection**. For associating an OTDR, select **OTDR** from the list of options.

Result: The **Create OTDR Connection** window is displayed.

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Figure 17-6 Create OTDR Connection window

4

Select **Connected Port**, enter the port details, and click **OK** to associate the OTDR/OTDRM port to the ports of the ASWG, A4PSWG, or RA2P-96 packs or OTDRWB P1 to P8 ports for the ASWG-L and its variants AWBILA, AWBING, AWBEGR; and IRDM20 packs or MON-OTDR ports to the legacy LD/Amplifier ports of the supported cards respectively.

Result: The success message is displayed.

Note: For port association, the user must to select the OTDR/OTDRM port first and then the LD/Amplifier for association.
While associating OTDR/OTDRM port and a MON-OTDR port, first select the OTDR/OTDRM port and then the MON-OTDR OTDRRX for association.

Figure 17-7 Topology View - OTDR configuration

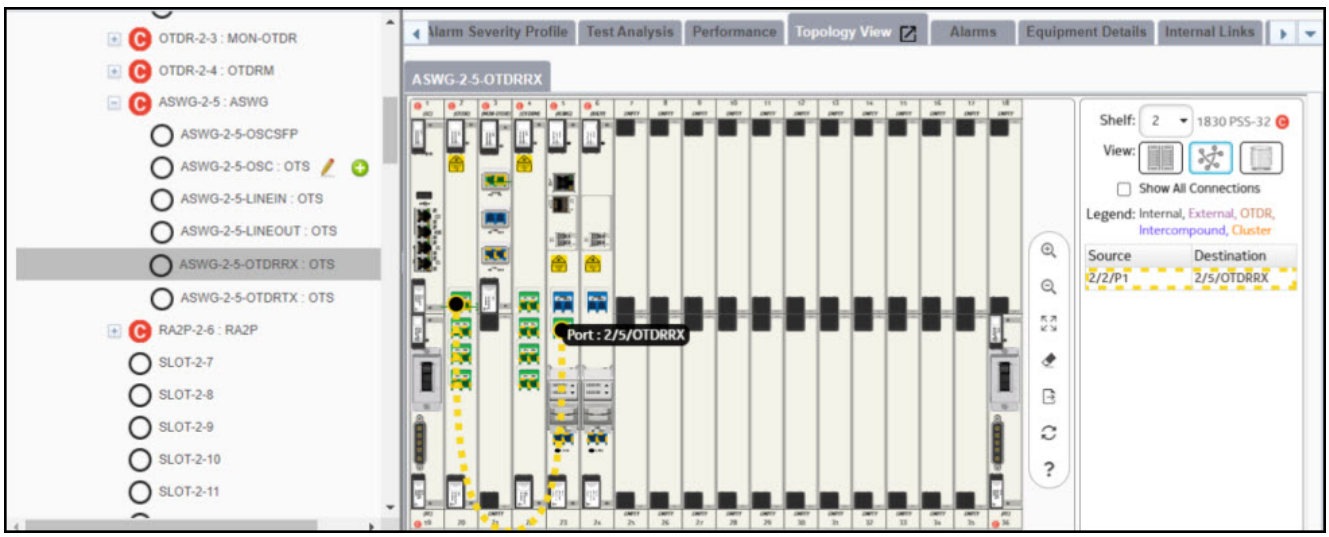

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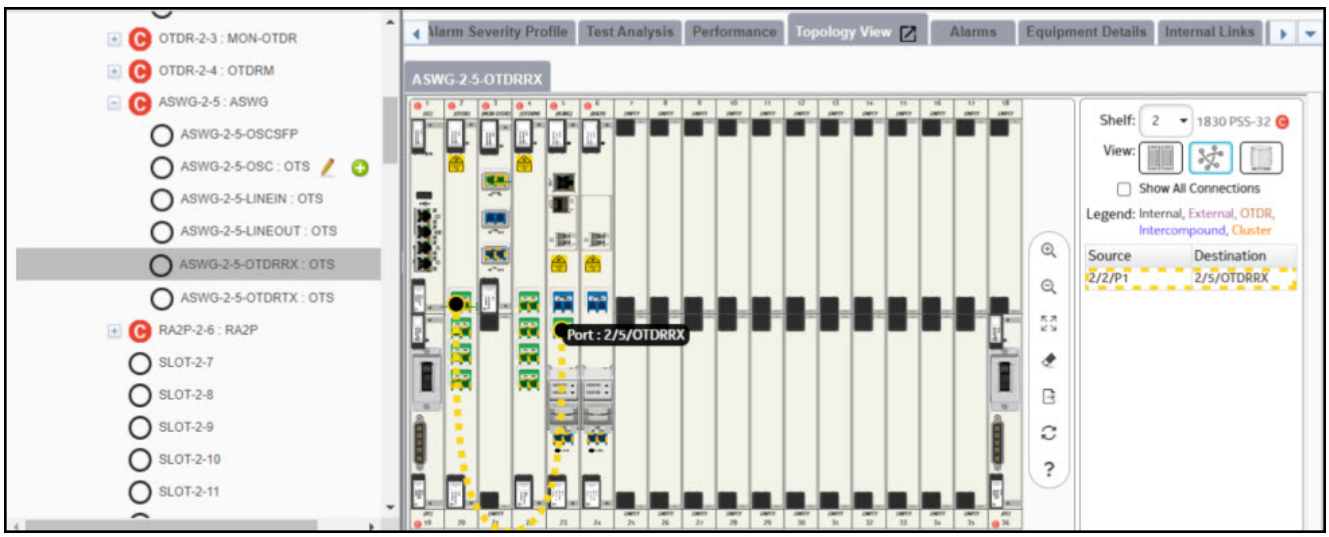
Figure 17-8 Equipment Manager - Topology View OTDR to MON-OTDR

Figure 17-9 Equipment Manager – Topology View - OTDR configuration to ASWG



5

Select the OTDRRX/OTDRTX ports on the MON-OTDR card or the P1 to P8 ports of the OTDR/OTDRM/OTDRWB cards. The **Associated Port** and the **Direction** details are displayed. The further details are displayed on the right side of the window.

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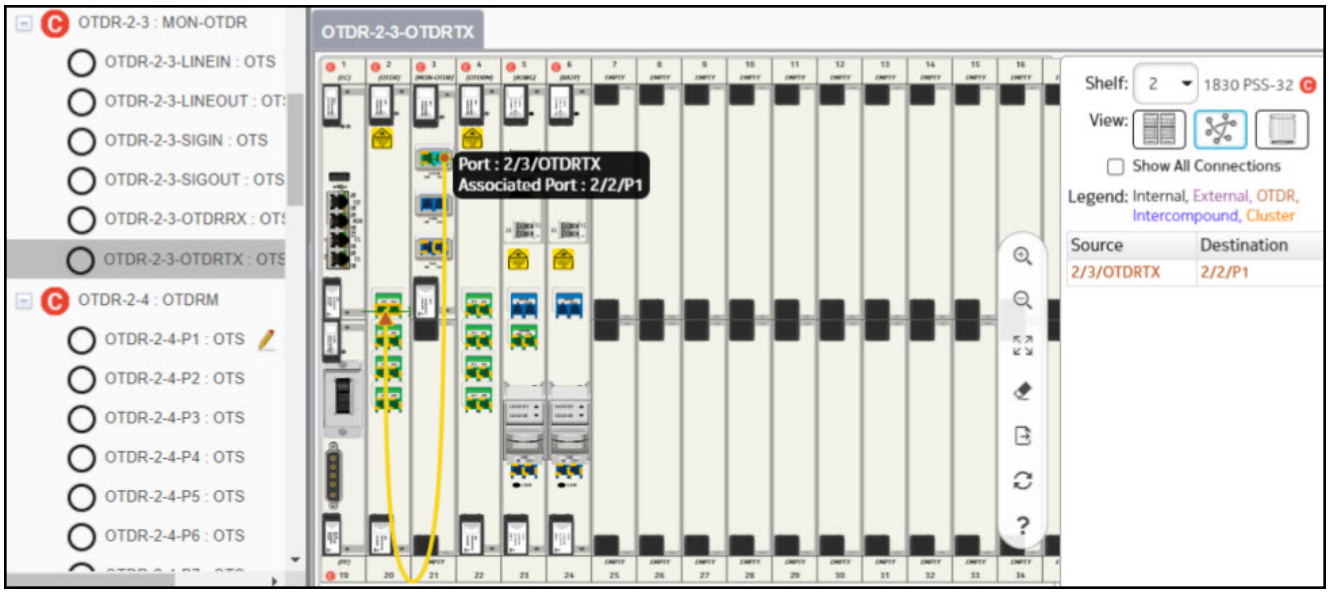
Figure 17-10 Equipment Manager - Associated port for OTDR



Note: If the ports are not assigned, then an error message `One or more selected connection does not have OTDR port configured` is displayed.

6

Click **Refresh** to view the updated values in the **Topology View** tab.

Note: Auto refresh is not supported.

END OF STEPS

Task: Perform OTDR/OTDRM/OTDRWB/MON-OTDR Scan from Test Analysis tab (applicable for both uni-directional and bi-directional in MON-OTDR packs)

Perform the following steps to perform scan on the OTDR/OTDRM/OTDRWB or on uni-directional/ bi-directional ports using MON-OTDR pack:

1

From the NFM-T GUI, follow this navigation path: **OPERATE > Equipment Manager**.

Result: The system displays the Equipment Manager window in its default state.

2

Select the associated ASWG or A4PSWG LINEIN or LINEOUT ports, or select the MON-OTDR SIGIN and SIGOUT ports.

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or

Select the associated P1 to P8 ports on IRDM20 or ASWG-L or its variants AWBILA, AWBING, AWBEGR packs.

Click the **Configure** tab.

Enter the description, select amplifier packs of the OTDR/OTDRM/OTDRWB cards or supported legacy LD/Amplifier cards for MON-OTDR cards in the **Connected Port** drop-down list.

Optional for Bi-Directional in the **Direction** field, the option is selected based on the selection in the **Connected Port** field.

Note: The **Direction** field in the **Configure** tab is enabled only for bi-directional LD pack port name given under **ConnectedTo** parameter for MON-OTDR SIGIN or MON-OTDR SIGOUT ports.

Select for example, the IROADM Line-in or Line-out ports for uni-directional.

Select for example, the AHPHG Line ports for bi-directional.

Result: The **Test Analysis** tab is enabled.

Note:

- If a scan is already triggered on a fiber, then another scan cannot be triggered until the first scan is complete.
- If there is only one OTDR pack and four line ports, and if there is a cut on each of the fibers, then scan can be triggered on only one of the fibers.

3

In the **Test Analysis** tab, modify the following parameters and click **Submit**.

- Enter the value in the **Results File Name**. This is a mandatory parameter.
- In the **Profile Name** field, select the appropriate option.

  If you select **None** as the option, you can edit the following parameters: **Pulse Length**, **Range**, **Resolution**, and **Average Time**. The values of the **Pulse Length**, **Range**, **Resolution**, and **Average Time** are updated based on the selection of each of these fields.

  For NEs prior to R12.0, in OTDR scan profile, you can choose custom profile by selecting Profile Name as **None**. Let us consider the profile prior to R12.0 as Legacy custom profile.

  For NEs from R12.0 onwards, the option **None** is not available and instead three additional custom profiles are added. OTDR custom profiles are not supported on EQM's **Test Analysis** tab.

  Note: Prior to 1830 PSS NE R13.0 and in NFM-T R21.4/ NFM-T R21.12, **Profile Name** field in **Test Analysis** tab of the NFM-T WebUI (EQM window), lists the supported OTDR profiles (Profile 1 to Profile 4), whereas NE WebUI displays Profile 1 to Profile 9 in the **Test/Analysis** tab. The user needs to refer to NE WebUI for new supported OTDR profiles.

  In R19.9, nine profiles for OTDR and seven profiles for OTDRM are introduced but all are not listed in EQM and are only listed in NE WebUI for selection. You could also view the profiles from **OPERATE > NEs > 360º View > OTDR Profiles** tab.

  To know more about OTDR profiles, see 25.35 "OTDR Profiles Tab" (p. 2130).

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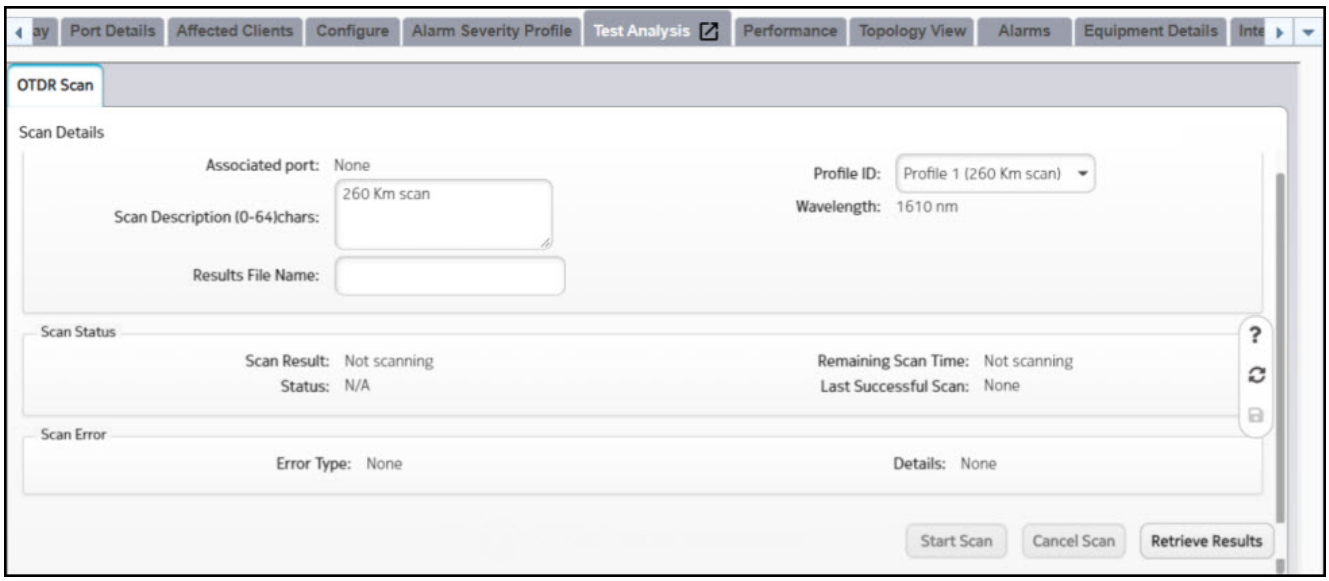
- The **Associated OTDR Port** and **Associated MON OTDR Port** fields are populated by default.
- The **Connected LD OTDR Port** field is populated automatically with the connected port details.

Result: The success message is displayed.

4

Click **Start Scan**.

Figure 17-11 Equipment Manager – Scan Settings and Information for OTDR/OTDRM/OTDRWB



Result: The status in the **Scan Status** panel is updated.

The **Status Scan Result**, and **Last Successful Scan** gets updated on scan completion.

Note: During the performance of the scan, the **Estimated Time Remaining** field is updated every 10 seconds until the scan is completed.

5

To cancel the scan, click **Cancel Scan**.

6

To retrieve the files from OTN to a local computer, click **Retrieve Results**.

Result: The **File List for Retrieval** window is displayed.

The system provides an option to select a file available in NE or in EML to retrieve the scanned information.

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7

To select the file available in NE or in EML, click either one of the following options: **Files in NE** or **Files in EML**.

8

Select the file to be transferred from the drop-down list of the **Files Available** field.

9

Click **Transfer File**.

Result: A success message is displayed and the file can be downloaded by default in the Downloads folder or at a convenient location in the personal computer.

END OF STEPS

Task: Perform Scan for MON-OTDR Pack from the Physical Connections Window

For the complete procedure, see 17.6 "Manage an OTDR Scan for an OTN OTS Physical Connection" (p. 1734).

Task: Delete port association of the OTDR/OTDRM/OTDRWB/MON-OTDR pack from the Topology View tab

Perform the following steps to delete the association between the OTDR/OTDRM and the ports of the ASWG or A4PSWG or IRDM20 packs, or to delete the association between the OTDRWB and the ports of the ASWG-L pack or its variants AWBILA, AWBING, AWBEGR, or to delete the association between the MON-OTDR packs and the legacy LD/Amplifier packs of the supported cards.

1

From the NFM-T GUI, follow this navigation path: **OPERATE > Equipment Manager**.

Result: The system displays the Equipment Manager window in its default state.

2

Click the **Topology View** tab and mouse over on any of the Associated ports.

3

Right-click any of the associated ports and select **Delete Association**

Result: A confirmation box is displayed.

4

Click **OK**.

Result: The connection between the OTDR/OTDRM and the ports of the ASWG or A4PSWG or IRDM20 packs is displayed, or the connection between the OTDRWB and the

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ports of the ASWG-L pack or its variants AWBILA, AWBING, AWBEGR, or the connection between the MON-OTDR packs and the legacy LD/Amplifier cards is displayed, based on the selection.

5

Click **Refresh** button to see the updated values in the **Topology View** tab.

Note: Auto refresh is not supported.

Result: On mouse over on any of the associated ports, the **Associated Port** value is **None**.

END OF STEPS

Task : Delete port association of the OTDR/OTDRM/OTDRWB/ MON-OTDR packs from the Configure tab

Perform the following steps to delete the association between the OTDR/OTDRM and ports of the ASWG or A4PSWG or IRDM20 packs, or to delete the association between OTDRWB and the ports of the ASWG-L pack and its variants AWBILA, AWBING, AWBEGR, or to delete the association between the MON-OTDR packs and the legacy LD/Amplifier packs of the supported cards.

1

From the NFM-T GUI, follow this navigation path: **OPERATE > Equipment Manager**.

Result: The system displays the Equipment Manager window in its default state.

2

In the **Configure** tab, select the check box **Delete this connection** and click **Modify**.

Result: The system displays a message `You are about to delete the association. Do you want to continue?`

3

Click **OK**.

Result: The success message is displayed.

4

Select the **Refresh** button to see the updated values in the **Configure** tab.

Note: Auto refresh is not supported.

Result: The deleted port is listed in the **Connected LD OTDR Port** drop-down list but not as a selected option.

END OF STEPS

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17.6 Manage an OTDR Scan for an OTN OTS Physical Connection

When to use

Use this task to manage an Optical Time Domain Reflectometer (OTDR) scan for an OTN OTS physical connection.

Related information

An OTDR scan is used to find faults in fiber optic cable. An OTDR scan is the optical equivalent of an electronic time domain reflectometer.

The OTDR/OTDRM/OTDRWB pack is a single slot, full height pack with eight optical ports. It is fibered to amplifiers that have dedicated ports for the OTDR/OTDRM/OTDRWB card connection.

An OTDR/OTDRM/OTDRWB pack performs the following functions:

- An OTDR/OTDRM/OTDRWB pack can be used to characterize a fiber span prior to turning on service, especially to determine if the span is suitable for Raman amplification. This use of the OTDR/OTDRM/OTDRWB pack is performed before services are turned up on a fiber.
- An OTDR/OTDRM/OTDRWB pack can be used to determine the location of a fiber break. This use of the OTDR/OTDRM/OTDRWB pack is performed before services are turned up on a fiber.
- Once services are turned up on a fiber, an OTDR/OTDRM/OTDRWB pack can be used to monitor the fiber while services are running. The pack contains an embedded optical time domain reflectometer (EOTDR) module to perform scans, and an 8 x 1 optical switch to allow the pack to be shared among up to 8 fiber spans connected through ports P1..P8 to the LD pack ports that support OTDR scan. These in-service scans can record how the fiber span loss and reflectivity vary over time. Each scan returns information on the background loss of the fiber and on localized areas of unusually high loss or high reflection. The OTDR/OTDRM/OTDRWB pack monitors both ends of the fiber (transmit and receive) to pinpoint exact location of failure.

For installations where OTDR scans are performed on existing NEs, or for new installations that do not use amplifiers with dedicated OTDR/OTDRM/OTDRWB ports, a MON-OTDR pack can provide the required functionality. The MON-OTDR card is one slot wide and 1/2 slot high. It can be installed in an 1830 PSS shelf and fibered in front of the amplifier that faces the OTS scan.

For related information on physical connections in general, refer to 2.15 “Physical connections” (p. 220).

For detailed instruction on how to perform the backup and restoration of any generated **OTDR** scan files, refer to the *Administration Guide: System Maintenance and Troubleshooting*.

Before you begin

You can manage OTDR scans for an OTN physical connection for the following types of connections by using the steps that are provided in this task:

- Physical connections
- Server connections that are physical connections
- Impacted connections, which are those physical connections that are associated with a selected node and its current operational and alarm state

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- Used ports, which are those physical connections that are assigned to a port address on a selected node.

Note: When a Global Baseline OTDR Scan is in progress, the system does not permit to trigger an OTDR scan on a physical link.

OTDR scan is not supported on OTS connection that is created between SFD packs.

This task requires an OTDR/OTDRM/OTDRWB pack to be installed in the NE. You can determine which physical connections are OTDR-scan-capable by following the steps in the 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740) task.

You can run an OTDR scan on the IN and OUT lines of an OTN **OTS** physical connection. The connection shape of the OTS connection must be **Four Ended**. If the OTDR scan is run on either of them; IN or OUT lines of an **OTS** Physical connection, then the connection shape of the OTS connection is **Simple**.

You can start a scan on each port manually or you can schedule a series of scans. You can view these scans at a later time or keep them for historical trending. You can select one or more physical connections from the Physical Connection data table and assign them a common schedule. Up to four actual scans are triggered on one physical connection (Transmit/Receive on both the A and Z sides of the connection.)

The system adjusts schedules automatically to avoid conflicts. If an overlapping scan is scheduled on the same OTDR/OTDRM hardware, the system adjusts the schedule for the scan to avoid the conflict. Multi-selection of physical connections from the displayed data table is supported. If the system detects conflicts in the scan times, it notifies you that it will adjust the scan schedule.

The system names the scan files so that it is easy for you to identify what the file contains.

Example:

NE Name-Port-T/R-OTS Connection Name

Where:

T/R is either *Transmit* or *Receive*.

The system provides you with a set of profiles that you can use to modify the OTDR scan parameters. These profiles set values for the **Pulse Length (ns)**, **Range (km)**, **Resoultion (m)**, **Average Time (Min)**, and **Average Time (Sec)** of the scan. If you do not select a profile, you must specify your own values for the **Pulse Length (ns)**, **Range (km)**, **Resoultion (m)**, **Average Time (Min)**, and **Average Time (Sec)**.

The following are the options for triggering an OTDR Scan:

- **OPERATE > Schedule Baseline OTDR Scan**
- **OTDR > Baseline > Schedule Scan**
- **OTDR > Baseline > Scan Now**
- **OTDR > Troubleshoot > Schedule Scan**
- **OTDR > Troubleshoot > Scan Now**
- **OTDR > Manual Scan Now**

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Baseline Scan

Baseline scan is a reference scan to calculate the fiber length.

Baseline scan can be scheduled only **Once** and the user is not allowed to change the Frequency parameters. **Custom** option with **Profile Name 1** as the default. The user can make changes to the profile in the **Profile selection** panel.

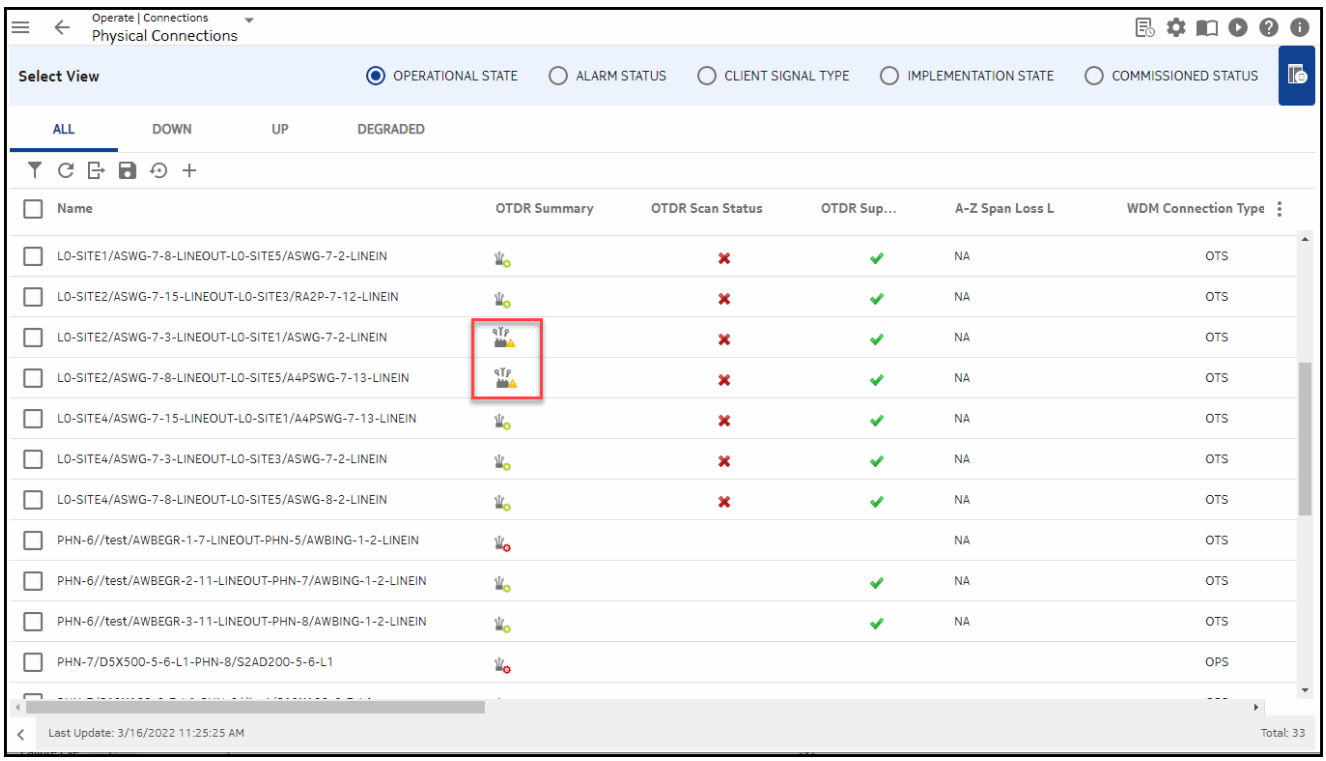
The baseline data creation for OTS links happens in the following three ways:

1. Automatic scan when the Operational State of the physical link is Up for the first time and the Implementation Status is **Implemented**.
2. Manual trigger of the baseline scans for all OTDR-enabled physical links.
3. Manual trigger by the user by selecting an existing scan on the physical link and then can be set to ‘baseline’.

Troubleshoot Scan

Troubleshoot scan is triggered to check if there is any fiber cut. Troubleshoot scan can be triggered manually or automatic. When the troubleshoot scan is triggered, one fiber length value is received. This fiber length must be the same as the Baseline scan value. If there is a difference in the value, then there is a fiber cut. The OTDR Summary column indicates if a fiber cut is detected.

Figure 17-12 Fiber cut detection



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For a Troubleshoot Scheduled scan, **Custom** configuration is the default. If the user makes any changes to revert to the default configuration, then the user must select the **Default** configuration. The default frequency for a Troubleshoot scan is **Quarterly**.

Fiber cut is calculated based on the comparison of scan 'end of fiber' length against the baseline length or the 'user input' fiber length. Both baseline length and user entered length can be viewed from the **Scan Report**.

Note: The default direction of the OTDR Scan is the Transmit direction. If the OTDR capabilities are not known, then on second priority, the scan is triggered from Receive direction. The system will then take this reference to calculate the fiber length.

Scan Report

Provides the "End of Fiber" length for Baseline and fiber cut scenarios.

The scan report comprises of the following information:

- Span - Indicates from which end the scan was triggered.
- Scan Time – Date and time the scan was conducted which includes baseline Time and Last Scan time.
- Triggered By– Indicates specific event. Current values are:
  - Manual or User Request to indicate that this is instantaneously triggered
  - Scheduled to indicate triggered as per schedule
  - Failure Event to indicate that the scan was triggered due to a fiber cut or LOS alarm
- Source Port – The NE/Port were the scan was initiated.
- End of Fiber – the length of the fiber based on the scan which includes Baseline Fiber Length and Last Scan length.

To manage an OTDR scan on an OTN OTS physical connection, the following tasks can be used:

- 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740)
- 17.6.6 "Task: Schedule Global Baseline OTDR Scan" (p. 1745)
- 17.6.7 "Task: Baseline an OTDR Scan" (p. 1747)
- 17.6.8 "Task: Troubleshoot an OTDR Scan" (p. 1749)
- 17.6.10 "Task: Initiate an OTDR Scan Now for Baseline and Troubleshoot" (p. 1758)
- 17.6.11 "Task: Initiate an OTDR Scan Now" (p. 1761)
- 17.6.12 "Task: Modify OTDR Scan Parameters" (p. 1764)
- 17.6.9 "Task: Schedule an OTDR Scan for Baseline and Troubleshoot" (p. 1751)
- 17.6.13 "Task: View the Jobs for Scheduled OTDR Scans" (p. 1767)
- 17.6.14 "Task: View the Fiber Length Report" (p. 1769)
- 17.6.15 "Task: View the OTDR Scan History and Retrieve Files" (p. 1772)
- 17.6.16 "Task: View the Graphical Display" (p. 1774)

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OTDR Event Notifications

For physical link with internal or external port association and dark fibers, according to the status of the OTDR scan the following OTDR event notification types are raised for Baseline and Troubleshoot scans over channel *[/server/events/otdrscan]*:

Notification type	Occurrence
OTDR scan started	When the OTDR scan (baseline/troubleshoot) start command is sent from NFM-T to the NE.
OTDR scan status	When the OTDR scan is in-progress.
OTDR scan complete	When the OTDR scan is completed successfully. It only reports the completion of the scan on the NE, does not include the details such as sor file not found, end of fiber, key not found.
OTDR scan failure	When the OTDR scan start command from NFM-T to the NE is not successful and the scan fails to start.

Based on the notification type, the OTDR event notification includes the following details of the scan:

- Date and time
- NE name
- Scan port name
- Physical connection name
- Scan type
- Profile used
- Scan report (.sor) file name

See *NFM-T REST API Documentation*, to view examples of the notification.

Task: Configure an OTDR port to an OTS Physical Connection

Note: If the pack to be associated has built in OTDR capability, then OTDR external association is not applicable.

OTDR scan can be performed on a physical link, irrespective of association to an OTDR pack or MON-OTDR pack. This is achieved by configuring an OTDR port as an external association to a physical connection. The OTDR port can be associated to only a NFM-T managed end point.

Perform the following steps to associate an OTDR port to a physical connection:

1

From the NFM-T GUI, navigate to **OPERATE** > **Physical Connection**.

Result: The system lists all the existing physical connections in the system.

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2

Hover over a connection, and click **More** icon corresponding to the connection.

Result: The system lists all the further actions possible on a physical connection.

3

Click **OTDR** > **Configure**

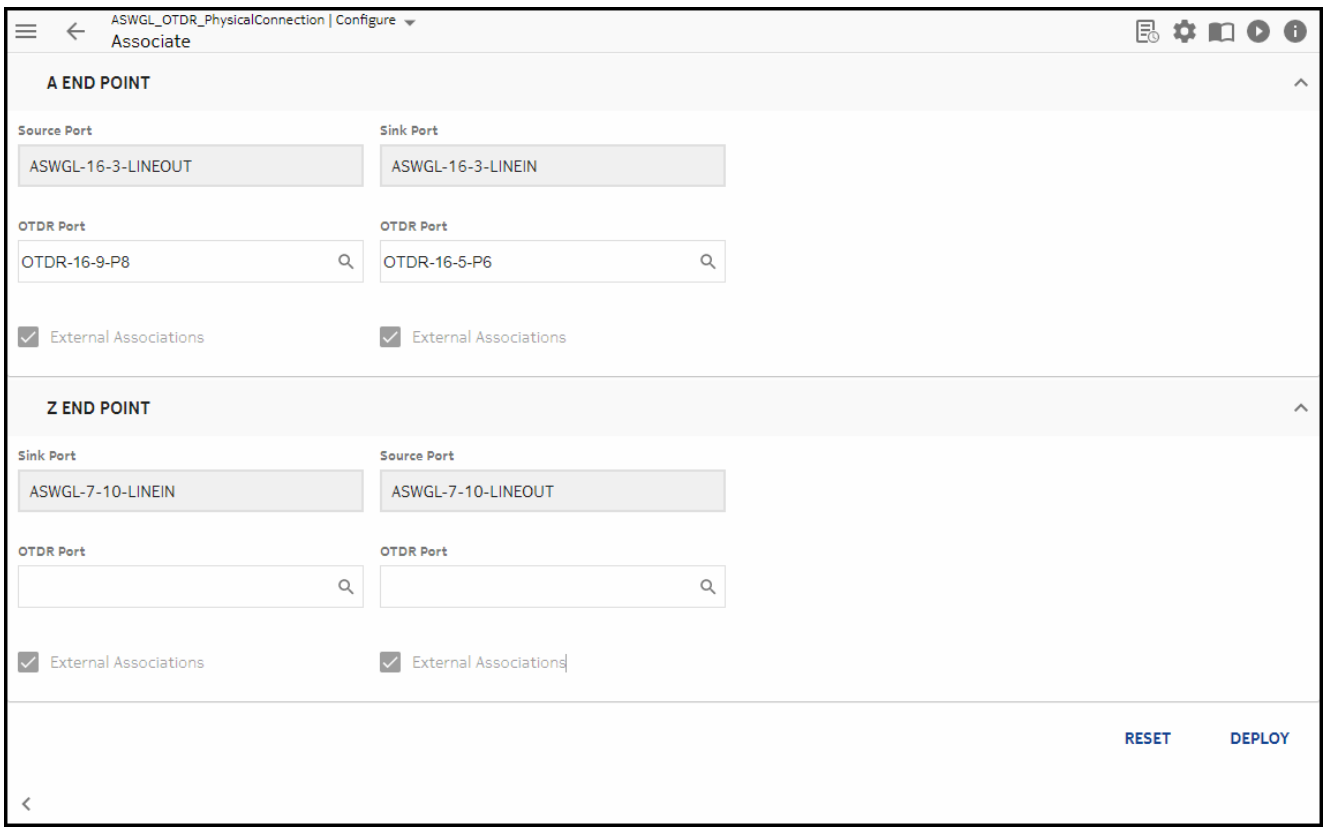
Result: The system displays the available options **Associate** or **Disassociate**.

4

Click **Associate**.

Result: The system displays the OTDR Port Association window.

Figure 17-13 OTDR Port Association



5

Provide the name of the OTDR port and select from the list. Otherwise, you can use the search icon, and select the applicable OTDR port on the A end and Z end.

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Note: The OTDR port is associated as an external association, and hence ensure to select the correct OTS. Due to the OTDR port configured as external association, NFM-T does not validate the association.

6

Click **Deploy**.

Result: The OTDR port is configured as an external association to the physical connection.

In the **Test Analysis** tab of the OTDR port, the **Connected LD OTDR Port** field reflects as **External**.

END OF STEPS

Task: Determine support of OTDR Scan and related details

Complete the following steps to determine if an OTN OTS physical connection supports OTDR scans.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Infrastructure Connections > 360° View > Servers (tab)

OPERATE > Node > Impacted Connections (tab)

OPERATE > Node > Used Ports (tab)

OPERATE > Services > 360° View > Servers (tab)

Result: The system displays a data table that lists the selected connections.

Important!

To determine which connections are physical connections when using the **OPERATE > Node > Impacted Connections (tab)** , **OPERATE > Node > Used Ports (tab)** , **OPERATE > Infrastructure Connections > 360° View > Servers (tab)**, or **OPERATE > Services > 360° View > Servers (tab)** navigation path, filter the **Type** column in the displayed data table to show the **Physical link** column. Then go to Step 2 if needed.

2

In the **Select View** area, click the **Manage Columns** icon.

Result: The **Manage Columns** window is displayed.

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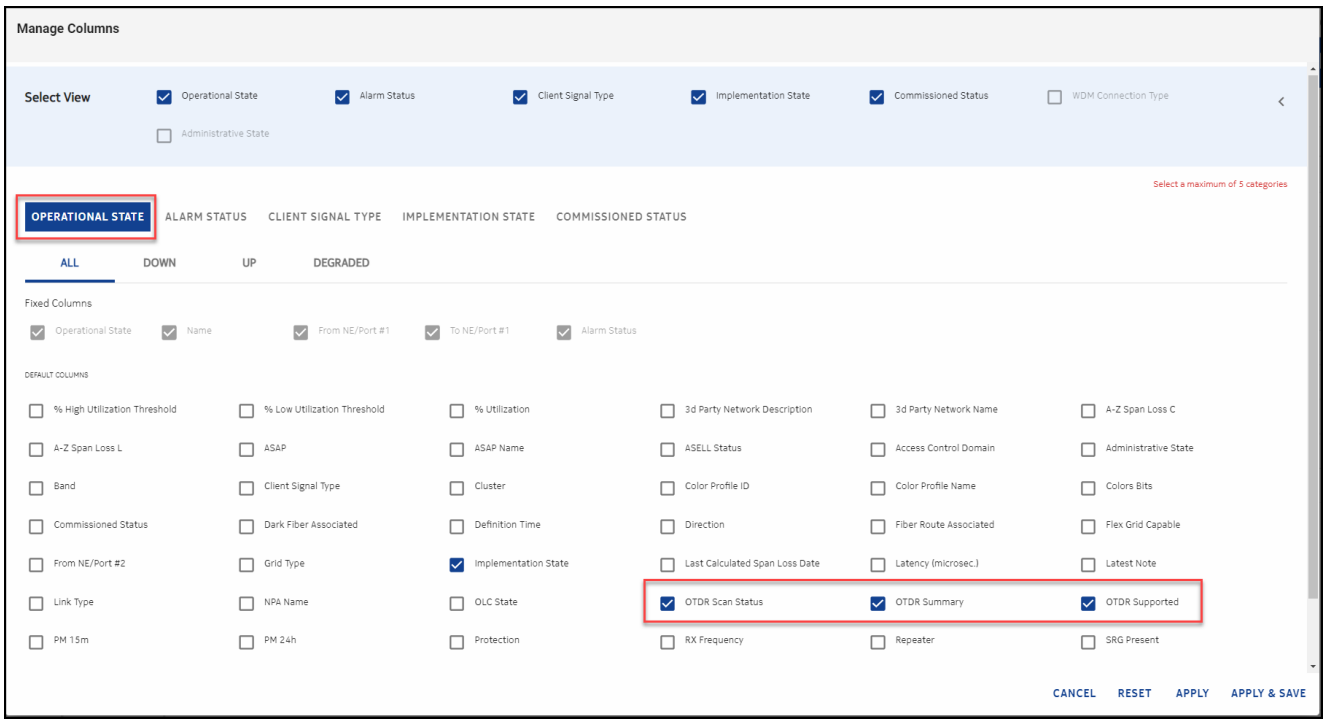
Figure 17-14 Manage Columns - OTDR Columns



See 26.7 “Manage data columns” (p. 2213) for a detailed description and usage of the Manage Columns window.

3

Select one or all of the following, as required, from the DEFAULT COLUMNS region:

- **OTDR Supported**: To determine the OTN OTS physical connections supporting OTDR scans.
- **OTDR Scan Status**: To determine the OTN OTS physical connections that have an OTDR scan status available.
- **OTDR Summary**: To check the details of the OTDR scan.

Result: Depending on your selections, the system displays the **OTDR Scan Status** ,**OTDR Supported**, and the **OTDR Summary** columns in the data table.

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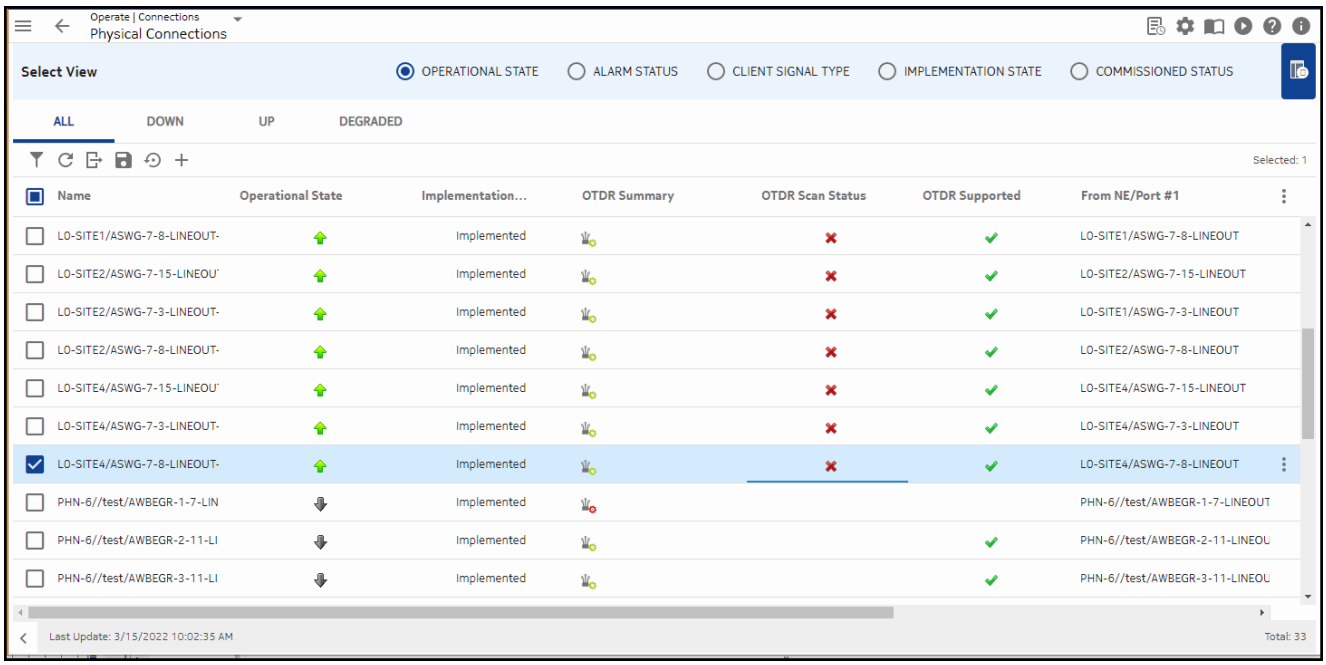
Figure 17-15 Physical Connections – OTDR Scan Status, OTDR Supported, and OTDR Summary



The **OTDR Scan Status** column provides three status indicators:

Symbol	Indicates
An open symbol	Upcoming OTDR scans have not been scheduled.
A green check mark	An OTDR schedule exists and that the last scan was successful or has not yet been triggered.
A red check mark	The last OTDR scan that was run has failed.

The **OTDR Supported** column provides the following status indicators:

Symbol	Indicates
A green check mark	OTDR scans are supported on the selected physical connection.
A blank table cell	OTDR scans are not supported on the selected physical connection.

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The **OTDR Summary** column provides a quick summary of the scan, such as:

Symbol	Indicates
	A fiber cut against the Baseline data.
	Baseline data is not available.
	No fiber cut is deducted.
	Baseline scan is not completed.
	Baseline scan is complete.
	OTDR scan is supported, however scan is not triggered or scan data is not available.

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Symbol	Indicates
	OTDR scan is not supported.

4

If an OTN OTS physical connection supports OTDR scans and if OTDR scan status is available, click **More** icon corresponding to the connection, and click **OTDR Details**.

Note: OTDR Scan Status is available only if the Baseline or Troubleshoot scan is triggered.

Result:

The system displays the **OTDR Details** page and displays the details of the OTDR scan which includes the following:

- The list of OTDR scans by port.
- The baseline fiber length.
- The OTDR Scan triggering info, whether manual or automatic by the scheduler.
- Access to the Scan Report.
- Access to the Scan History.
- Access to the Scan Graph.

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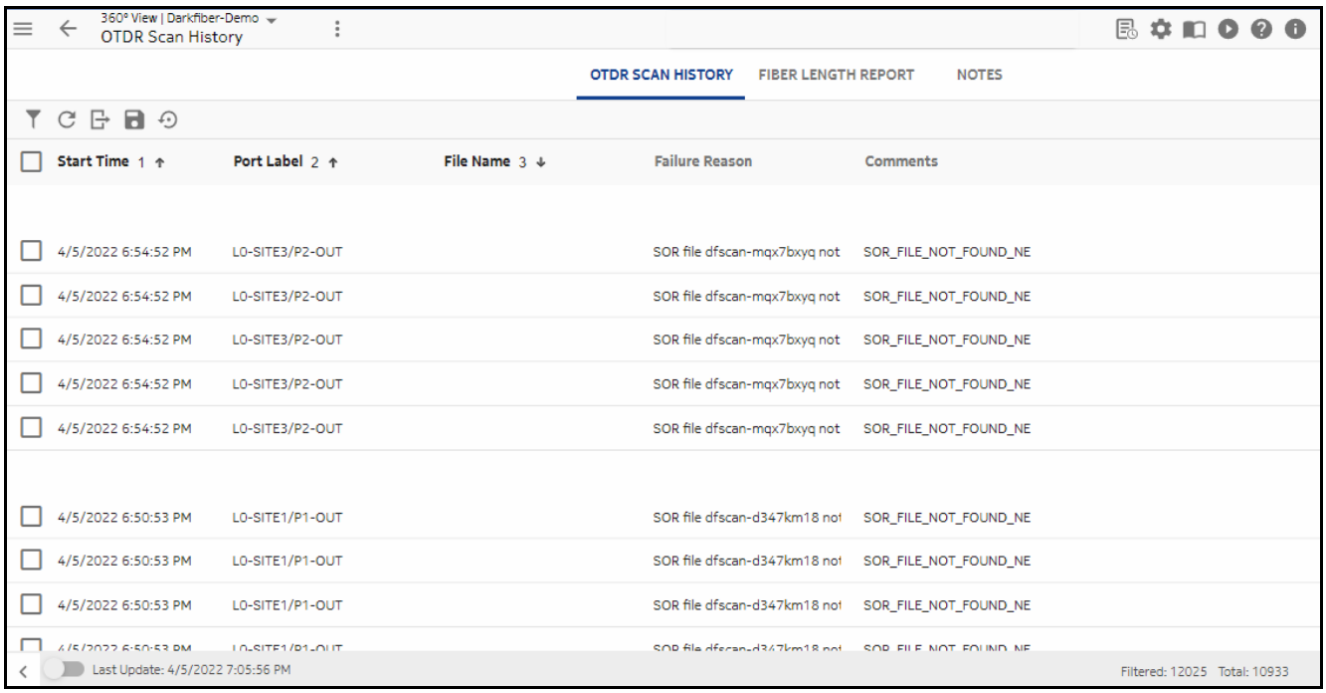
Figure 17-16 OTDR Details



END OF STEPS

Task: Schedule Global Baseline OTDR Scan

Note: When a Global Baseline OTDR Scan is in progress, the system does not permit to trigger an OTDR scan on a physical link.

Complete the following steps to schedule baseline OTDR scan for global physical connections. The Schedule Baseline OTDR Scan is triggered the first time to determine the fiber length.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Schedule Baseline OTDR Scan

Result: The system displays the **OTDR Scan Scheduler - Schedule** window.

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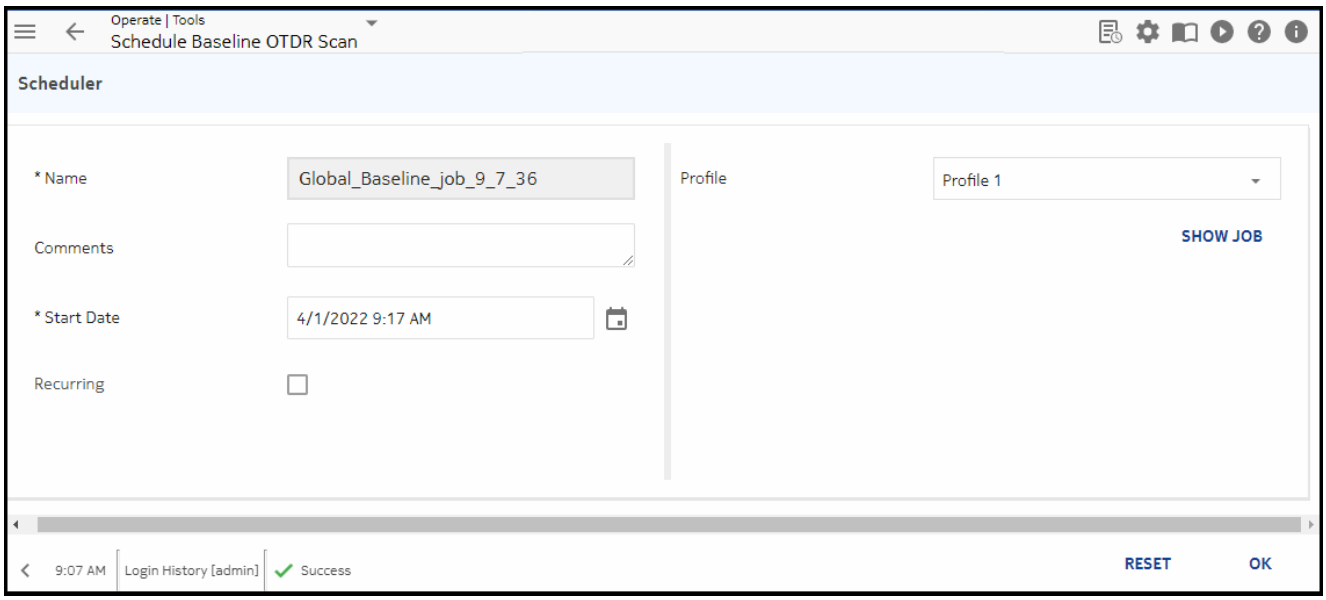
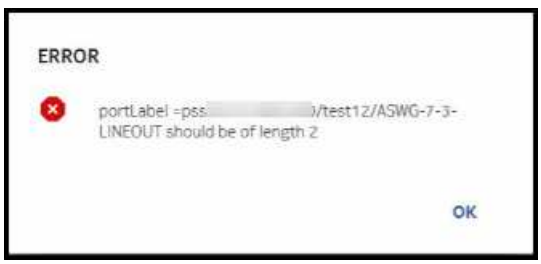
Figure 17-17 Global Baseline OTDR Scan



The default configuration is **Custom** with Frequency as **Once** and default Profile set to **Profile 1** and current Start Date and Start Time.

Note: The user must run the **Custom** configuration for a global OTDR Baseline Scan. If the user tries to change the configuration to **Default** and change any of the parameters such as Frequency, the system displays an error message.

Figure 17-18 Baseline scheduler - Error message



2

Click **Schedule**.

Result: The Global Baseline scan is triggered.

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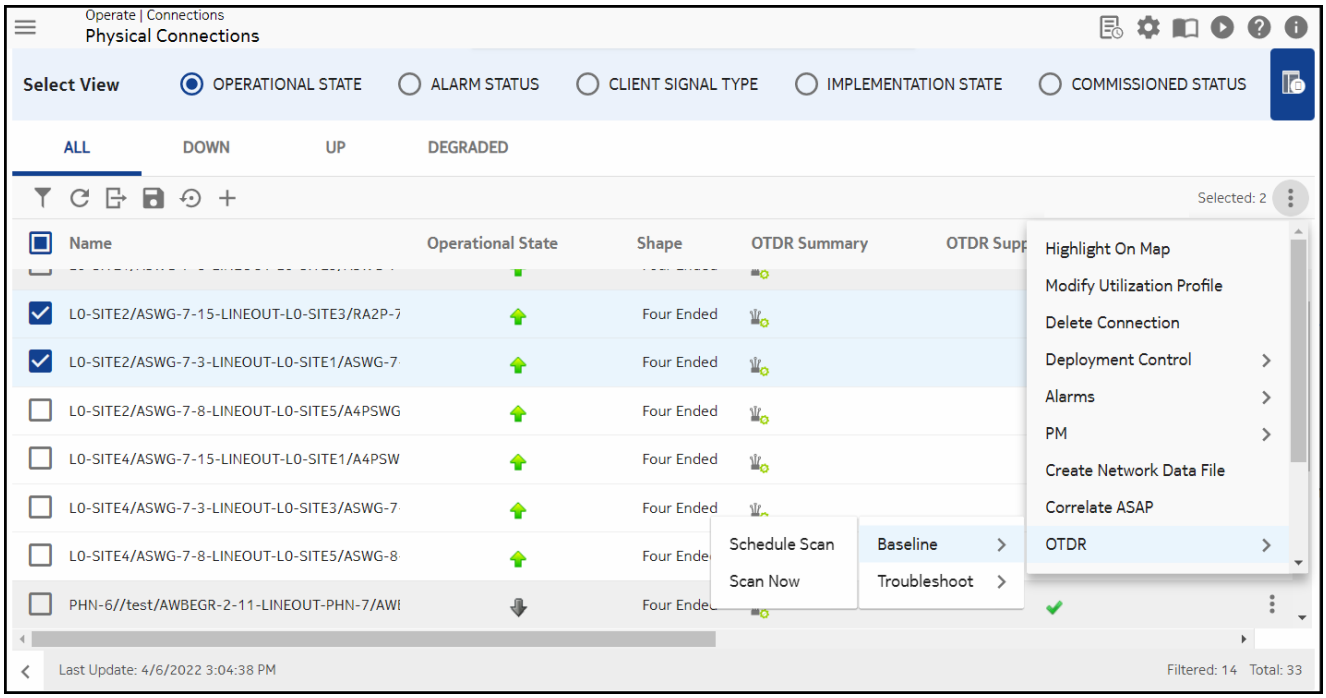
Note: When multiple physical connections are selected, click the **More** icon at the top right of the data table and follow this path: **OTDR > Baseline > Schedule Scan** . The Jobs window lists the physical connections on which the bulk scan is triggered.

Figure 17-19 Show Physical Connections



END OF STEPS

Task: Baseline an OTDR Scan

Complete the following steps to baseline an OTDR scan for an OTN OTS physical connection.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Schedule Baseline OTDR Scan

OPERATE > Node > Impacted Connections (tab)

OPERATE > Node > Used Ports (tab)

Result: The system displays a data table that lists the selected connections.

Important!

To determine which connections are physical connections when using the **OPERATE > Node > Impacted Connections (tab), OPERATE > Node > Used Ports (tab), OPERATE >**

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Infrastructure Connections > 360° View > Servers (tab), or **OPERATE > Services > 360° View > Servers (tab)** navigation path, filter the **Type** column in the displayed data table to show the **Physical link** column. Then go to Step 2 if needed.

2

Optional: To determine which OTN OTS physical connections support OTDR scans, go to Step 2 in the 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740).

3

Perform one of the following:

- Click **More** icon corresponding to the connection where you want to baseline an OTDR scan and select **OTDR > Baseline > Scan Now or Schedule Scan**.
- Select the physical connection and click on the **Structure** tab. Once the **Structure** is activated, right click on the physical connection and select **OTDR > Baseline > Scan Now or Schedule Scan**.
- Hover over a physical connection where you want to view the Routing Display, click the corresponding icon.

  From the Routing Display, right click on the icon for physical connection and follow this path: **OTDR > Baseline > Scan Now or Schedule Scan**.

Note: The **Scan Now** option is available only if the ports involved in physical connections have associated OTDR/OTDRM ports.

Result:

Based on the selection, the following events occur:

- If you select **Schedule Scan**, the **OTDR Scan Scheduler** window is displayed.

  Note: The **Schedule** button is activated only after modifying the schedule details in the **OTDR Scan Scheduler** window.

  For NEs prior to R12.0, in OTDR scan profile, you can choose custom profile by selecting Profile Name as **None**. Let us consider the profile prior to R12.0 as Legacy custom profile. To know more about the Legacy custom profile, see 25.35 "OTDR Profiles Tab" (p. 2130).

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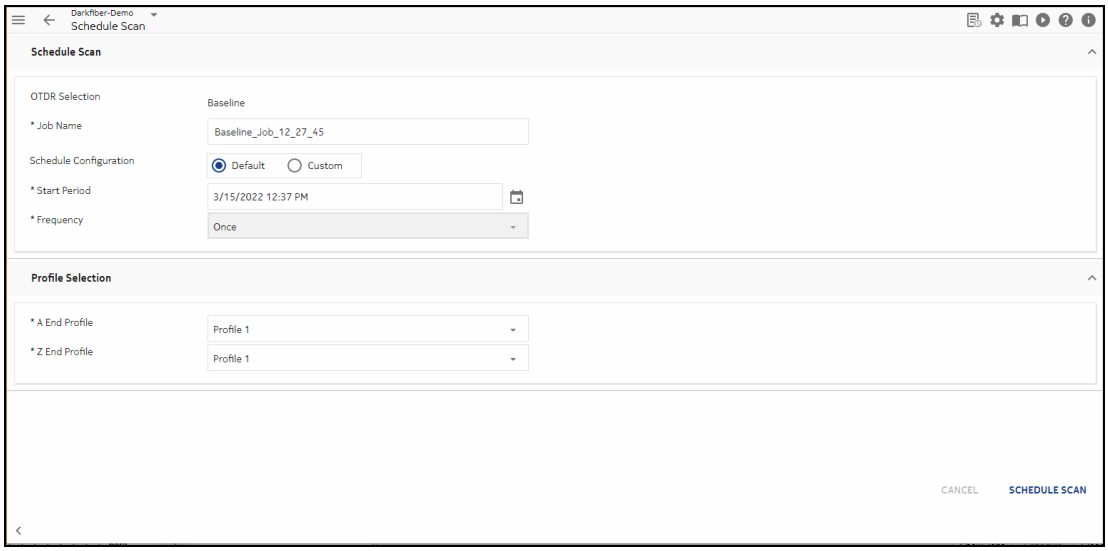
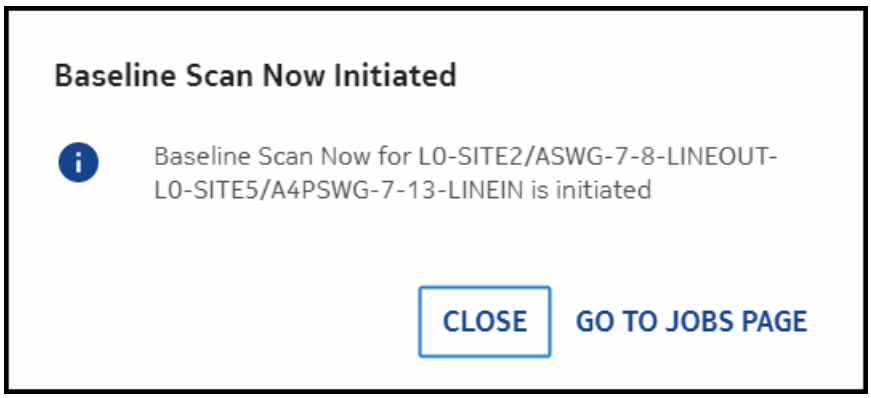
For NEs from R12.0 onwards, there are standard profiles and custom profiles. To know more about custom profiles, see 25.35 “OTDR Profiles Tab” (p. 2130).



- If you select **Scan Now**, the **Baseline Scan Status** message is displayed.



END OF STEPS

Task: Troubleshoot an OTDR Scan

Complete the following steps to troubleshoot an OTDR scan for an OTN OTS physical connection.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Node > Impacted Connections (tab)

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OPERATE > Node > Used Ports (tab)

Result: The system displays a data table that lists the selected connections.

Important!

To determine which connections are physical connections when using the **OPERATE > Node > Impacted Connections (tab), OPERATE > Node > Used Ports (tab), OPERATE > Infrastructure Connections > 360° View > Servers (tab)**, or **OPERATE > Services > 360° View > Servers (tab)** navigation path, filter the **Type** column in the displayed data table to show the **Physical link** column. Then go to Step 2 if needed.

2

Optional: To determine which OTN OTS physical connections support OTDR scans, go to Step 2 in the 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740).

3

Perform one of the following:

- Click **More** icon corresponding to the connection where you want to troubleshoot an OTDR scan and select **OTDR > Troubleshoot > Scan Now or Schedule Scan**.
- Click the corresponding **360° View** icon. Select the **Structure** tab. Once the **Structure** is activated, right click on the physical connection and select **OTDR > Troubleshoot > Scan Now or Schedule Scan**.
- Hover over a physical connection where you want to view the Routing Display, click the corresponding icon.

  From the Routing Display, right click on the icon for physical connection and follow this path: **OTDR > Troubleshoot > Scan Now or Schedule Scan**.

Note: The **Scan Now** option is available only if the ports involved in physical connections have associated OTDR/OTDRM ports.

Result: Based on the selection, the following events occur:

- If you select **Schedule Scan**, the **OTDR Scan Scheduler** window is displayed.

  Note: The **Schedule** button is activated only after modifying the schedule details in the **OTDR Scan Scheduler** window.

  For NEs prior to R12.0, in OTDR scan profile, you can choose custom profile by selecting Profile Name as **None**. Let us consider the profile prior to R12.0 as Legacy custom profile. To know more about the Legacy custom profile, see 25.35 "OTDR Profiles Tab" (p. 2130).

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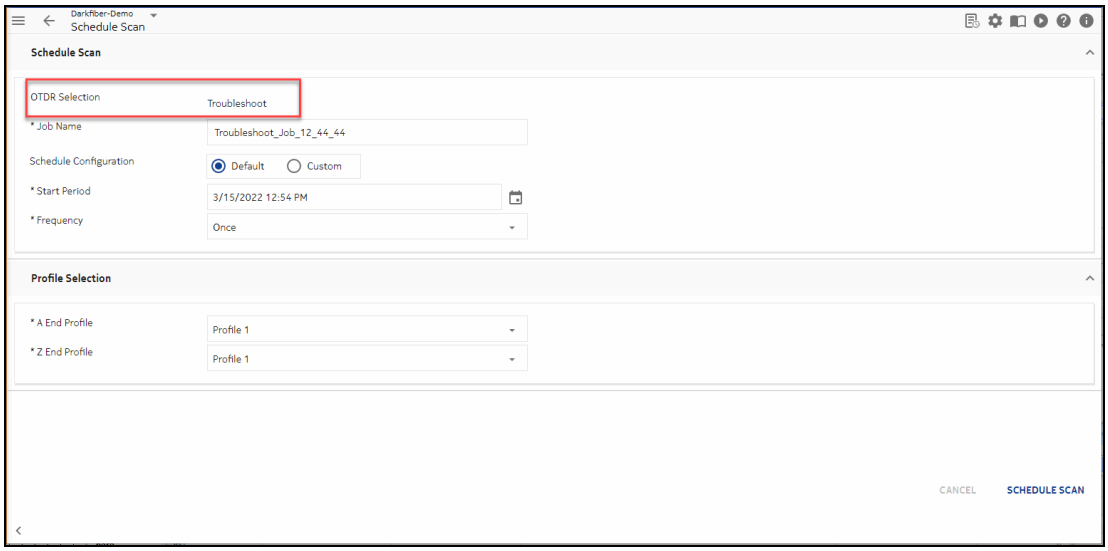
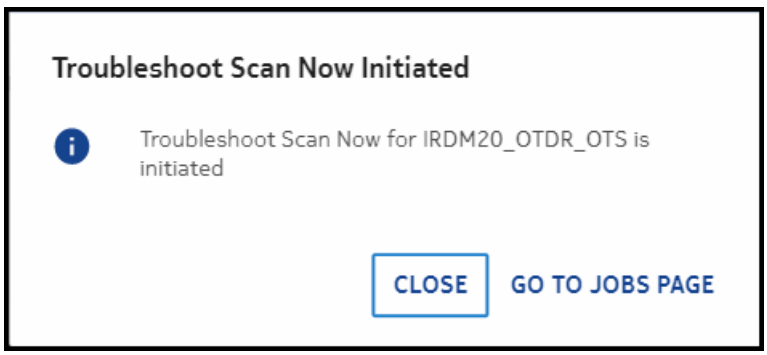
For NEs from R12.0 onwards, there are standard profiles and custom profiles. To know more about custom profiles, see 25.35 "OTDR Profiles Tab" (p. 2130).



- If you select **Scan Now**, the **Troubleshoot Scan Status** message is displayed.



END OF STEPS

Task: Schedule an OTDR Scan for Baseline and Troubleshoot

Important! OTDR scans must be retrieved within an hour of when they were scheduled.

Complete the following steps to schedule an OTDR scan for an OTN OTS physical connection for both Baseline Scan and Troubleshoot Scan.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

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OPERATE > Node > Impacted Connections (tab)

OPERATE > Node > Used Ports (tab)

Result: The system displays a data table that lists the selected connections.

Important!

To determine which connections are physical connections when using the **OPERATE > Node > Impacted Connections (tab)** , **OPERATE > Node > Used Ports (tab)** , **OPERATE > Infrastructure Connections > 360° View > Servers (tab)**, or **OPERATE > Services > 360° View > Servers (tab)** navigation path, filter the **Type** column in the displayed data table to show the **Physical link** column. Then go to Step 2 if needed.

2

Optional: To determine which OTN OTS physical connections support OTDR scans, go to Step 2 in the 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740).

3

Perform one of the following:

- Click **More** icon corresponding to the physical connection where you want to baseline an OTDR scan and select **OTDR > Baseline > Schedule Scan**.
- Click the corresponding **360° View** icon. Select the **Structure** tab. Once the **Structure** tab is activated, right click on the physical connection and select **OTDR > Baseline > Schedule Scan**.
- Hover over a physical connection where you want to view the Routing Display, click the corresponding icon.

  From the Routing Display, right click on the icon for physical connection and follow this path: **OTDR > Baseline > Schedule Scan**.
- Click **More** icon corresponding to the physical connection where you want to troubleshoot an OTDR scan and select **OTDR > Troubleshoot > Schedule Scan**.
- Click the corresponding **360° View** icon. Select the **Structure** tab. Once the **Structure** tab is activated, right click on the physical connection and select **OTDR > Troubleshoot > Schedule Scan**.
- Hover over a physical connection where you want to view the Routing Display, click the corresponding icon.

  From the Routing Display, right click on the icon for physical connection and follow this path: **OTDR > Troubleshoot > Schedule Scan**.

Result: Based on the selection, whether Baseline or Troubleshoot, the **OTDR Scan Scheduler - Schedule** window for the physical connection that you selected is displayed.

Note: To schedule the scan at a later time, change **Start Date** and **Start Time**. This allows the user to schedule OTDR scans for either a single event or repeated scans. If there is an overlapping scan scheduled on the same OTDR/OTDRM hardware then the schedule for the scan will be adjusted to avoid the conflict. Multi-selection of physical

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connections from the physical connection list is supported. In the event that there are detected conflicts in the scan times, the user will be notified that there is already a scheduled scan running.

Figure 17-20 Physical Connections – Baseline OTDR Scan – OTDR Scan Scheduler - Schedule Window

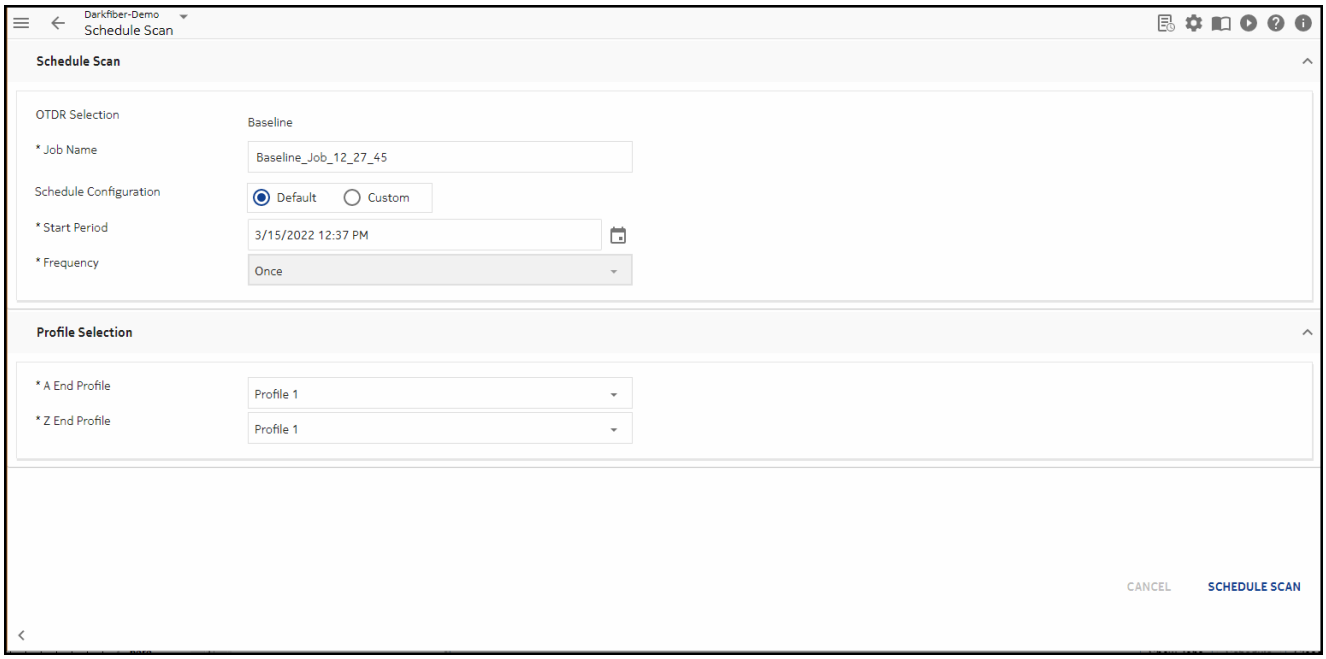

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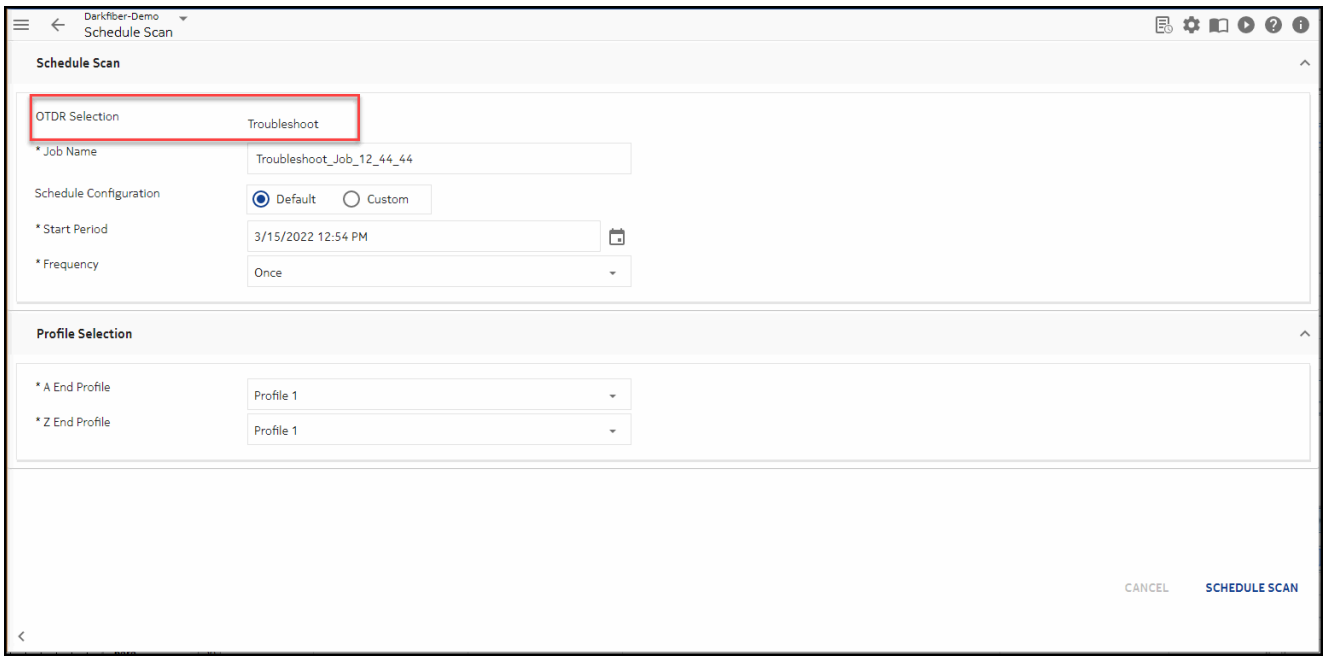
Figure 17-21 Physical Connections – Troubleshoot OTDR Scan – OTDR Scan Scheduler - Schedule Window



4

In the **Job Name** field, a name for the job is auto-populated based on if it is a Baseline Scan or a Troubleshoot Scan.

5

For both Baseline and Troubleshoot Scans, the **Custom** configuration is selected by default and the field is disabled. The default details for the scheduled scan is today's date, with the current time, Frequency once.

- For Baseline Scan, the user is not allowed to change the Frequency.
- For Troubleshoot Scan, the user is allowed to make changes to the Frequency and Profile settings. If the user wants to revert to the default settings, then click on the **Default** button.

6

For the **Custom** schedule, the default frequency is **Once**.

If you selected the **Frequency** to be **Once**, go to Step 7.

For the **Default** schedule, the default frequency is **Quarterly**.

If you selected the **Frequency** to be **Quarterly**, go to Step 13.

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7

If the **Frequency** field is **Once**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar in which the OTDR scan is to begin.
- In the **Start Time** field, click the drop-down menu and select a the time in which the OTDR scan is to begin.
- Go to Step 15.

8

If you selected the **Frequency** to be **Once**, go to Step 7.

If you selected the **Frequency** to be **Hour & Minute**, go to Step 9.

If you selected the **Frequency** to be **Daily**, go to Step 10.

If you selected the **Frequency** to be **Weekly**, go to Step 11.

If you selected the **Frequency** to be **Monthly**, go to Step 12.

If you selected the **Frequency** to be **Quarterly**, go to Step 13.

9

If the **Frequency** field is **Hour & Minute**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar in which the scan is to begin.
- In the **Start Time** field, click the drop-down menu and select a the time in which the scan is to begin.
- In the **Recur Every** field, enter the hour and minute in which the scan is to occur.
- Go to Step 14.

10

If the **Frequency** field, is **Daily**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar in which the scan is to begin.
- In the **Start Time** field, click the drop-down menu and select a the time in which the scan is to begin.
- In the **Recur Every** field, enter the number of days in which the scan is to occur.
- Go to Step 14.

11

If the **Frequency** field is **Weekly**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar in which the scan is to begin.

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- In the **Start Time** field, click the drop-down menu and select a the time in which the scan is to begin.
- In the **Recur Every** field, enter the number of weeks and check the days in which the scan is to occur.
- Go to Step 14.

12

If the **Frequency** field is **Monthly**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar in which the scan is to begin.
- In the **Start Time** field, click the drop-down menu and select a the time in which the scan is to begin.
- In the **Recur Every** field, the number of months in which the scan is to occur.
- Go to Step 14.

13

If the **Frequency** field is **Quarterly**, perform the following:

- In the **Start Date** field, click the drop-down menu to enter a date from the calendar in which the scan is to begin.
- In the **Start Time** field, click the drop-down menu and select a the time in which the scan is to begin.
- In the **Recur Every** field, enter a number that equals the number of quarters in which the scan is to occur.
- Go to Step 14.

14

In the **Schedule Ends** field, click the drop-down menu and select **Never**, **No. of Events**, or **Ends by**.

- If the **Schedule Ends** field is **Never**, go to Step 15.
- If the **Schedule Ends** field is **No of Events**, in the **Count** field, enter the number of times in which the schedule is to complete and go to Step 15.
- If the **Schedule Ends** field is **Ends by**, in the **End Date** field, click the drop-down menu to enter a date from the calendar; and, in the **End Time** field, click the drop-down menu and select a time. Go to Step 15.

15

In the **Profile** field, select **None** , **Profile 1 (160 km Scan)** (the default), **Profile 2 (80 km Scan)**, **Profile 3 (5 km Scan)**, or **Profile 4 (10 km Scan)** from the drop-down list.

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	Profile Number				
	None	**1**	**2**	**3**	**4**
Description	User selectable	160 km scan	80 km scan	5 km scan	10 km scan
Wavelength (nm)	User selectable	1610	1610	1610	1610
Pulse length (ns)	User selectable	3000	1000	10	30
Range (km)	User selectable	160	80	5	10
Resolution (m)	User selectable	5	2.5	0.16	0.32
Averaging time (min:ss)	User selectable	3:00	3:00	1:00	1:00

For NEs from R12.0 onwards, the option **None** is not available and instead three additional custom profiles are added.

The parameters of the profiles are updated as follows:

	Profile Number					
	1	**2**	**3**	**4**	**5**	**6**
Descrip-tion	260 km scan	160 km scan	80 km scan	40 km scan	20 km scan	10 km scan
Wave-length (nm)	1610	1610	1610	1610	1610	1610
Pulse length (ns)	10000	3000	1000	100	30	10
Range (km)	260	160	80	40	20	10
Resolution (m)	10	5	2.5	0.64	0.32	0.16
Averaging time (min:ss)	3:00	3:00	3:00	3:00	3:00	3:00

To know more about custom profiles, see 25.35 “OTDR Profiles Tab” (p. 2130).

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16

Perform one of the following:

- If the **Profile** is **None**, go to Step 17.
- If the **Profile** is **Profile 1 (160 km Scan)**, **Profile 2 (80 km Scan)**, **Profile 3 (5 km Scan)**, or **Profile 4 (10 km Scan)**, in the **Scan Description** field, enter any text to describe the OTDR scan that you are scheduling and go to Step 18.

17

Note: For NEs prior to R12.0, in OTDR scan profile, you can choose custom profile by selecting Profile Name as **None**. Let us consider the profile prior to R12.0 as Legacy custom profile.
For NEs from R12.0 onwards, the option **None** is not available and instead three additional custom profiles are added.

If the **Profile** is **None**, perform the following:

- In the **Scan Description** field, enter any text to describe the OTDR scan that you are scheduling.
- In the **Pulse Length (ns)** field, select a value from the drop-down list. The default is **10** nanoseconds.
- In the **Range (km)** field, select a value from the drop-down list. The default is **5** kilometers.
- In the **Resoultion (m)** field, select a value from the drop-down list. The default is **0.16** m.
- In the **Average Time (min)** field, specify a value in the write-in field. The default is **3** minutes.
- In the **Average Time (sec)** field, specify a value in the write-in field. The default is **0** seconds.
- In the **Wavelength (nm)** field, specify a value in the write-in field. The default is **1610** nanometers.
- Go to Step 18.

Refer the table "Task: Schedule an OTDR Scan for Baseline and Troubleshoot" (p. 1757) for details on the scheduling for different profile types.

18

Click **Schedule**.

Result: The system outputs the following message and displays the results of the scan in the **Scan Report** panel of the **OTDR Details** tab.

```
Message: Scan scheduled successfully.
```

END OF STEPS

Task: Initiate an OTDR Scan Now for Baseline and Troubleshoot

Complete the following steps to initiate an OTDR scan for an OTN OTS physical connection now.

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1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Node > Impacted Connections (tab)

OPERATE > Node > Used Ports (tab)

Result: The system displays a data table that lists the selected connections.

Important!

To determine which connections are physical connections when using the **OPERATE > Node > Impacted Connections (tab)** , **OPERATE > Node > Used Ports (tab)** , **OPERATE > Infrastructure Connections > 360° View > Servers (tab)**, or **OPERATE > Services > 360° View > Servers (tab)** navigation path, filter the **Type** column in the displayed data table to show the **Physical link** column. Then go to Step 2 if needed.

2

Optional: To determine which OTN OTS physical connections support OTDR scans, go to Step 2 in the 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740).

3

Perform one of the following:

- Click **More** icon corresponding to the physical connection where you want to baseline an OTDR scan and select **OTDR > Baseline > Scan Now**.
- Click the corresponding **360° View** icon. Select the **Structure** tab. Once the **Structure** tab is activated, right click on the physical connection and select **OTDR > Baseline > Scan Now**.
- Hover over a physical connection where you want to view the Routing Display, click the corresponding icon.

  From the Routing Display, right click on the icon for physical connection and follow this path: **OTDR > Baseline > Scan Now**.
- Click **More** icon corresponding to the physical connection where you want to troubleshoot an OTDR scan and select **OTDR > Troubleshoot > Scan Now**.
- Click the corresponding **360° View** icon. Select the **Structure** tab. Once the **Structure** tab is activated, right click on the physical connection and select **OTDR > Troubleshoot > Scan Now**.
- Hover over a physical connection where you want to view the Routing Display, click the corresponding icon.

  From the Routing Display, right click on the icon for physical connection and follow this path: **OTDR > Troubleshoot > Scan Now**.

Result: The **Baseline Scan Status** or the **Troubleshoot Scan Status** message is displayed based on the option that you selected. Refer 17.6.7 "Task: Baseline an OTDR Scan" (p. 1747) and 17.6.8 "Task: Troubleshoot an OTDR Scan" (p. 1749) to see the scan messages.

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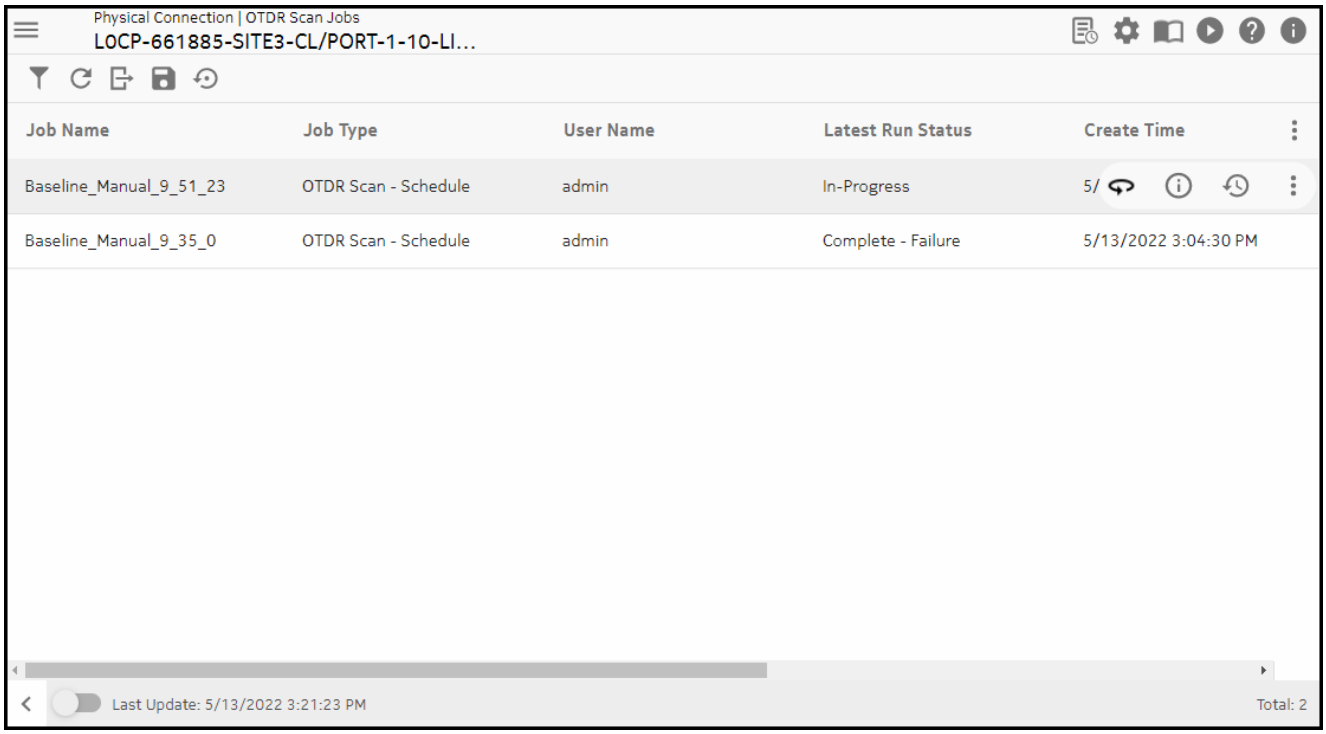
4

Click **GO TO JOBS PAGE** to view the status of the scans.

Figure 17-22 Jobs page



Result: The Jobs page is displayed.

The names of the Jobs for each of the scans are as follows:

- Global_Baseline_Job - For OPERATE > Schedule Baseline OTDR Scan.
- Baseline_Manual_Time - When a Baseline Scan Now is triggered.
- Troubleshoot_Manual_Time - When a Troubleshoot Scan Now is triggered.
- Baseline_Job_Time - When a Baseline Schedule Scan is triggered.
- Troubleshoot_Job_Time - When a Troubleshoot Schedule Scan is triggered.
- Bulk_Baseline_Job_Time - When a Schedule Baseline scan is triggered on multiple physical connections.
- Bulk_Troubleshoot_Job_Time - When a schedule troubleshoot scan is triggered on multiple physical connections.
- Bulk_Baseline_Manual_Time - When a scan now baseline scan is triggered on multiple physical connections.
- Bulk_Troubleshoot_Manual_Time - When a scan now troubleshoot scan is triggered on multiple physical connections.

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- LOSXXX_Time - When there is a fiber cut and an auto scan is triggered.

END OF STEPS

Task: Initiate an OTDR Scan Now

Note: If the user performs any OTDR scan from the EQM page , OTDR scan data is not stored in the NFM-T database.

Complete the following steps to initiate an OTDR scan for an OTN OTS physical connection. **Manual Scan Now** allows user to trigger a scan on the port level and on an individual basis.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Node > Impacted Connections (tab)

OPERATE > Node > Used Ports (tab)

Result: The system displays a data table that lists the selected connections.

Important!

To determine which connections are physical connections when using the **OPERATE > Node > Impacted Connections (tab)** , **OPERATE > Node > Used Ports (tab)** , **OPERATE > Infrastructure Connections > 360° View > Servers (tab)**, or **OPERATE > Services > 360° View > Servers (tab)** navigation path, filter the **Type** column in the displayed data table to show the **Physical link** column. Then go to Step 2 if needed.

2

Optional: To determine which OTN OTS physical connections support OTDR scans, go to Step 2 in the 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740).

3

Enter a name for the **Results File Name** field. If you do not enter the name, the system does not allow you to run an OTDR scan.

4

Note: The **Manual Scan Now** option is available only if the ports involved in physical connections have associated OTDR ports.

On the selected OTDR supported physical connection, perform one of the following:

- Click **More** options ⋮ corresponding to the physical connection where you want to baseline an OTDR scan and select **OTDR > Manual Scan Now**.

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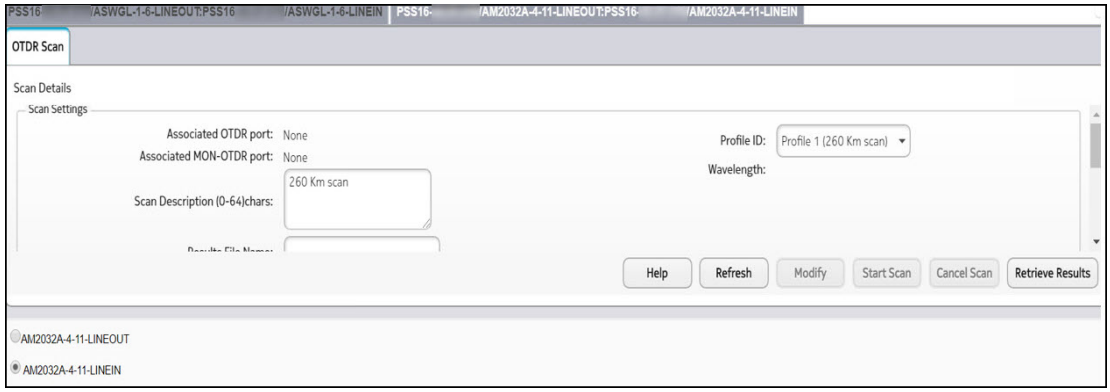
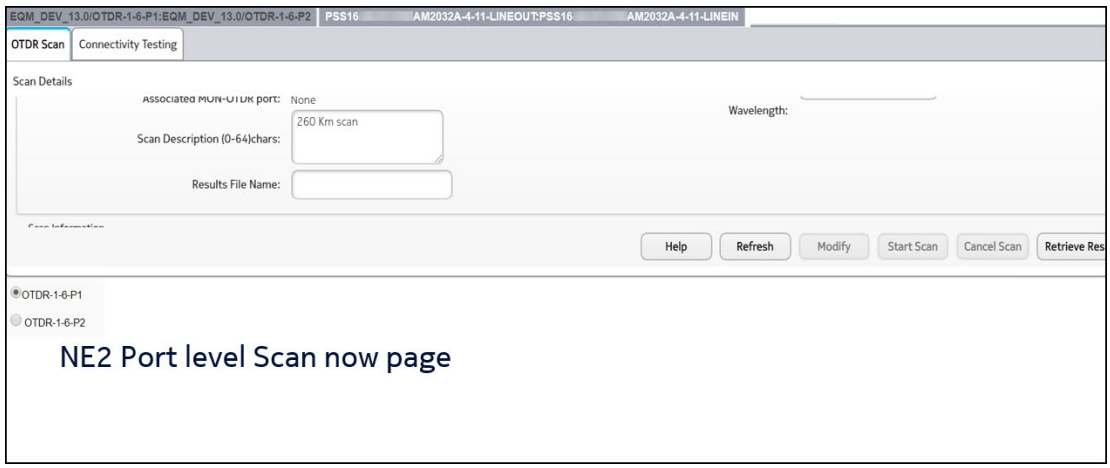
NE1 Port level Scan now page



NE2 Port level Scan now page



In the OTDR scan page, when you click on the 1st tab, NE1's tab has to be loaded. Similarly, on the second page, NE2 's tab has to get loaded. It is needed to have a mechanism to simultaneously open two NE webUI pages with different data.

Since the NE sessions are handled with user configured timeouts, now both the NE pages will be active till timeout and user can perform modify and scan operations simultaneously.

- For a physical connection where you want to view the Routing Display, navigate as:
  OPERATE > Physical Connections > More options ⋮ > Routing Diaplay

5

In the **OTDR** window, select the scan for either the **LINEIN** or the **LINEOUT**.

6

In the **Scan Settings** panel, default values are populated based on the **Profile Name**. Select **Profile Name**, if you do not want the default settings.

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7

Optional: To initiate the OTDR scan, in the **Scan Description** field, enter a description of the scan that you are initiating.

8

If the **Profile Name** is **None**, perform the following:

- In the **Pulse Length (ns)** field, select a value from the drop-down list. The default is **3000** ns.
- In the **Range (km)** field, select a value from the drop-down list. The default is **20** km.
- In the **Resoultion (m)** field, select a value from the drop-down list. The default is **5** m.
- In the **Scan Description** field, enter any text to describe the OTDR scan that you are initiating.
- In the **Average Time (min)** field, specify a value in the write-in field. The default is **3** minutes.
- In the **Average Time (sec)** field, specify a value in the write-in field. The default is **0** seconds.

9

If you selected a named profile in the **Profile Name** field, go to Step 10.

If you selected **None** in the **Profile Name** field, go to Step 8.

10

Click **Start Scan**.

Result: The system displays the results of the scan in the **Scan Information** panel of the window.

Example: The following figure illustrates the successful scan of a LINEIN.

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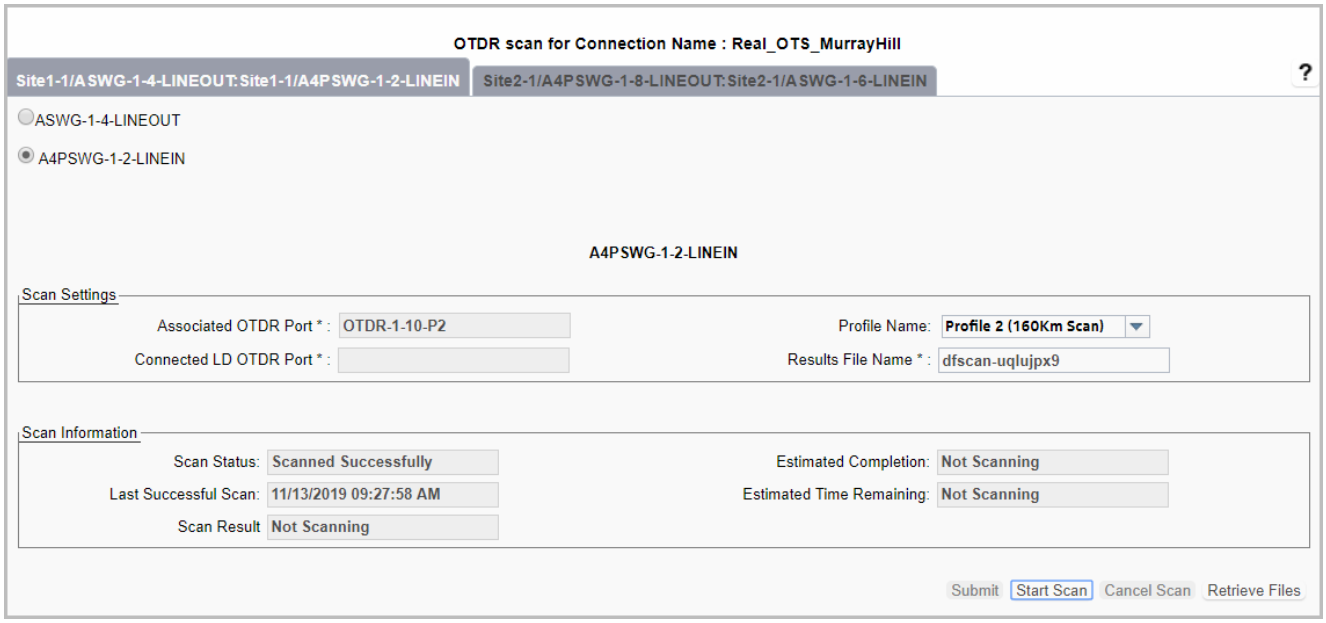
Figure 17-23 Physical Connections – OTDR Scan – **LINEIN** – Successful Scan



END OF STEPS

Task: Modify OTDR Scan Parameters

Complete the following steps to modify OTDR scan parameters for an OTN OTS physical connection.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Node > Impacted Connections (tab)

OPERATE > Node > Used Ports (tab)

Result: The system displays a data table that lists the selected connections.

Important!

To determine which connections are physical connections when using the **OPERATE > Node > Impacted Connections (tab)** , **OPERATE > Node > Used Ports (tab)** , **OPERATE > Infrastructure Connections > 360° View > Servers (tab)**, or **OPERATE > Services > 360° View > Servers (tab)** navigation path, filter the **Type** column in the displayed data table to show the **Physical link** column. Then go to Step 2 if needed.

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2

Optional: To determine which OTN OTS physical connections support OTDR scans, go to Step 2 in the 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740).

3

Perform one of the following:

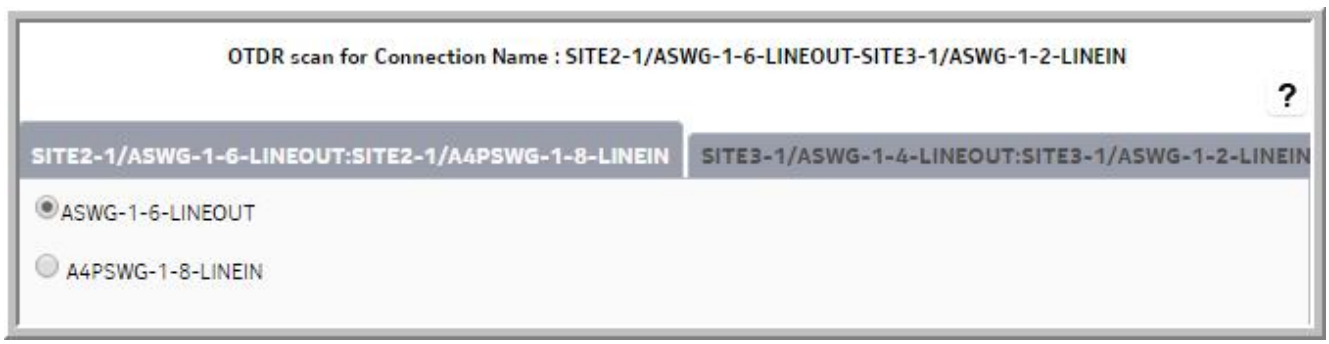
- Click **More** icon corresponding to the physical connection where you want to baseline an OTDR scan and select **OTDR > Scan Now**.
- Click the corresponding **360° View** icon. Select the **Structure** tab. Once the **Structure** tab is activated, right click on the physical connection and select **OTDR > Schedule Scan**.
- Hover over a physical connection where you want to view the Routing Display, click the corresponding icon.

  From the Routing Display, right click on the icon for physical connection and follow this path: **OTDR > Scan Now**.

  Result: The **Test Analysis** window for the physical connection that you selected is displayed.

Example: The following figure illustrates a valid, initial **OTDR Scan Test Analysis** window.

Figure 17-24 Physical Connections – OTDR Scan – Initial Test Analysis Window – Valid



Example: The following figure illustrates an invalid **OTDR Scan Test Analysis** window.

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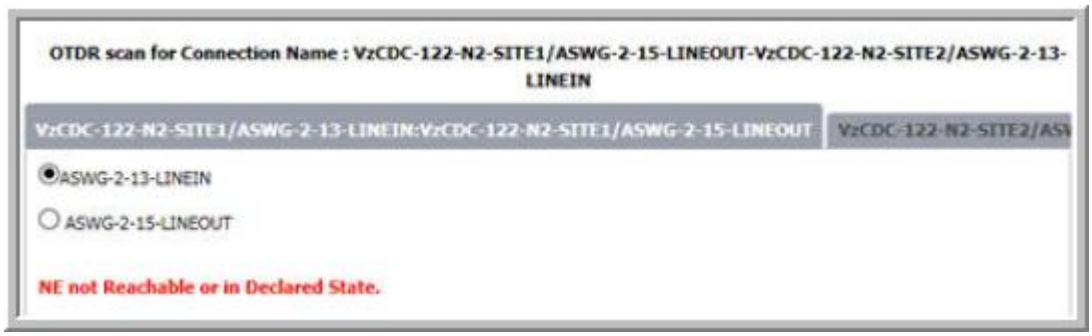
Figure 17-25 Physical Connections – OTDR Scan – Initial Test Analysis Window – NE Not Reachable or in Unknown State



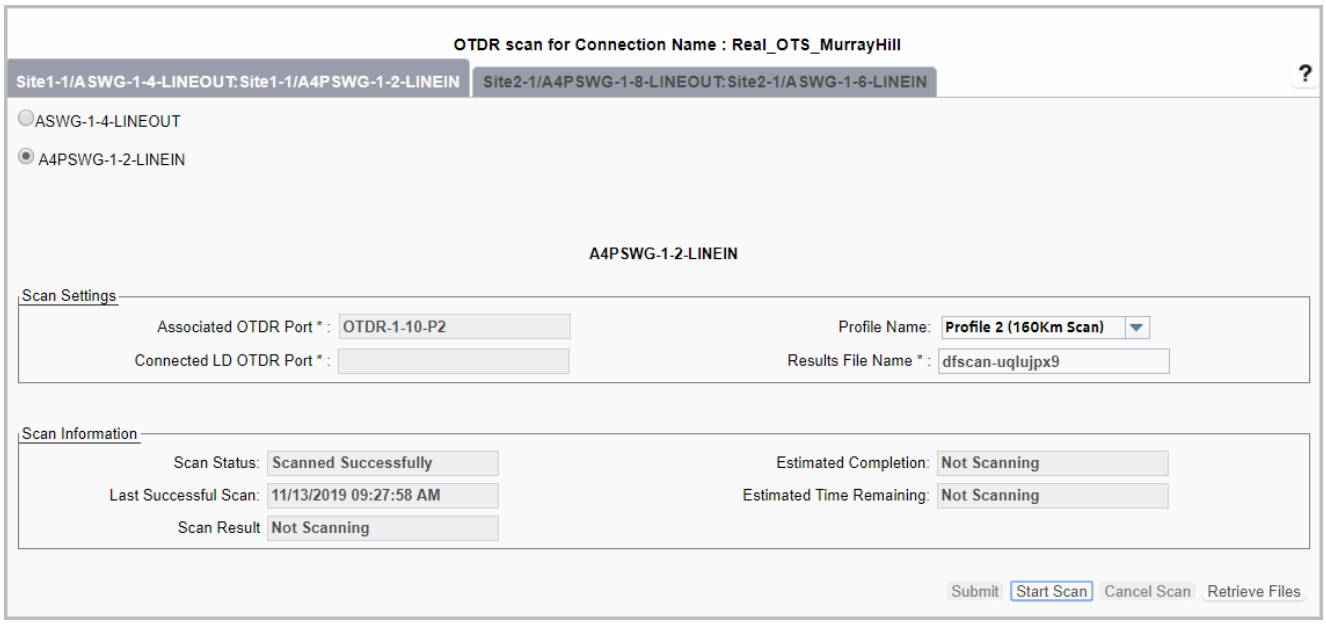
4

In the OTDR window, select the scan for either the **LINEIN** or the **LINEOUT**.

Result: The **Test Analysis** window for the physical connection line that you selected is displayed.

Example: The following figure illustrates an valid **OTDR Test Analysis** window for **LINEIN**.

Figure 17-26 Physical Connections – OTDR Scan – Test Analysis Window – **LINEIN**



5

In the **Results File Name** field, enter a name for the OTDR results scan file.

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6

To modify the OTDR scan parameters, in the **Profile Name** field, select **None**, **Profile 1 (160KmScan)**, **Profile 2 (80KmScan)**, **Profile 3 (5KmScan)**, or **Profile 4 (10KmScan)** from the drop-down list.

For NEs prior to R12.0, in OTDR scan profile, you can choose custom profile by selecting Profile Name as **None**. Let us consider the profile prior to R12.0 as Legacy custom profile.

For NEs from R12.0 onwards, the option **None** is not available and instead three additional custom profiles are added.

To know more about custom profiles, see 25.35 "OTDR Profiles Tab" (p. 2130).

7

Optional: To modify the OTDR scan parameters, in the **Scan Description** field, enter a description of the scan that you are initiating.

8

If the **Profile Name** is **None**, perform the following:

- In the **Pulse Length (ns)** field, select a value from the drop-down list. The default is **3000** nanoseconds.
- In the **Range (km)** field, select a value from the drop-down list. The default is **160** km.
- In the **Resoultion (m)** field, select a value from the drop-down list. The default is **5** m.
- In the **Scan Description** field, enter any text to describe the OTDR scan that you are initiating.
- In the **Average Time (min)** field, specify a value in the write-in field. The default is **3** minutes.
- In the **Average Time (min)** field, specify a value in the write-in field. The default is **0** seconds.

9

If you selected a named profile in the **Profile Name** field, go to Step 10.

If you selected **None** in the **Profile Name** field, go to Step 8.

10

Click **Submit**.

Result: The system displays a pop-up window in the bottom right of the main **Test Analysis** window that informs you that the modification request has been submitted and it displays its success or failure.

END OF STEPS

Task: View the Jobs for Scheduled OTDR Scans

Complete the following steps to view the OTDR scan jobs that are scheduled for an OTN OTS physical connection.

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1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Schedule Baseline OTDR Scan

OPERATE > Node > Impacted Connections (tab)

OPERATE > Node > Used Ports (tab)

We can view jobs also by right clicking on physical connection and operate jobs list

Result: The system displays a data table that lists the selected connections.

Important!

To determine which connections are physical connections when using the **OPERATE > Node > Impacted Connections (tab)** , **OPERATE > Node > Used Ports (tab)** , **OPERATE > Infrastructure Connections > 360° View > Servers (tab)**, or **OPERATE > Services > 360° View > Servers (tab)** navigation path, filter the **Type** column in the displayed data table to show the **Physical link** column. Then go to Step 2 if needed.

2

Optional: To determine which OTN OTS physical connections support OTDR scans, go to Step 2 in the 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740).

3

Perform one of the following:

- Navigate to **OPERATE > Schedule Baseline OTDR Scan**.
- Click **More** icon corresponding to the physical connection where you want to troubleshoot an OTDR scan and select **OTDR > Troubleshoot > Scan Now or Schedule Scan**.
- Click the corresponding **360° View** icon. Select the **Structure** tab. Once the **Structure** tab is activated, right click on the physical connection and select **OTDR > Troubleshoot > Scan Now or Schedule Scan**.
- Hover over a physical connection where you want to view the Routing Display, click the corresponding icon.

  From the Routing Display, right click on the icon for physical connection and follow this path: **OTDR > Troubleshoot > Scan Now or Schedule Scan**.

  Result: The **OTDR Scan Scheduler - Schedule** window for the physical connection that you selected is displayed.

4

In the Schedule window, click the **Show Jobs** button, which is located on the bottom right of the window.

Result: The system displays the Jobs list for the scheduled OTDR scans.

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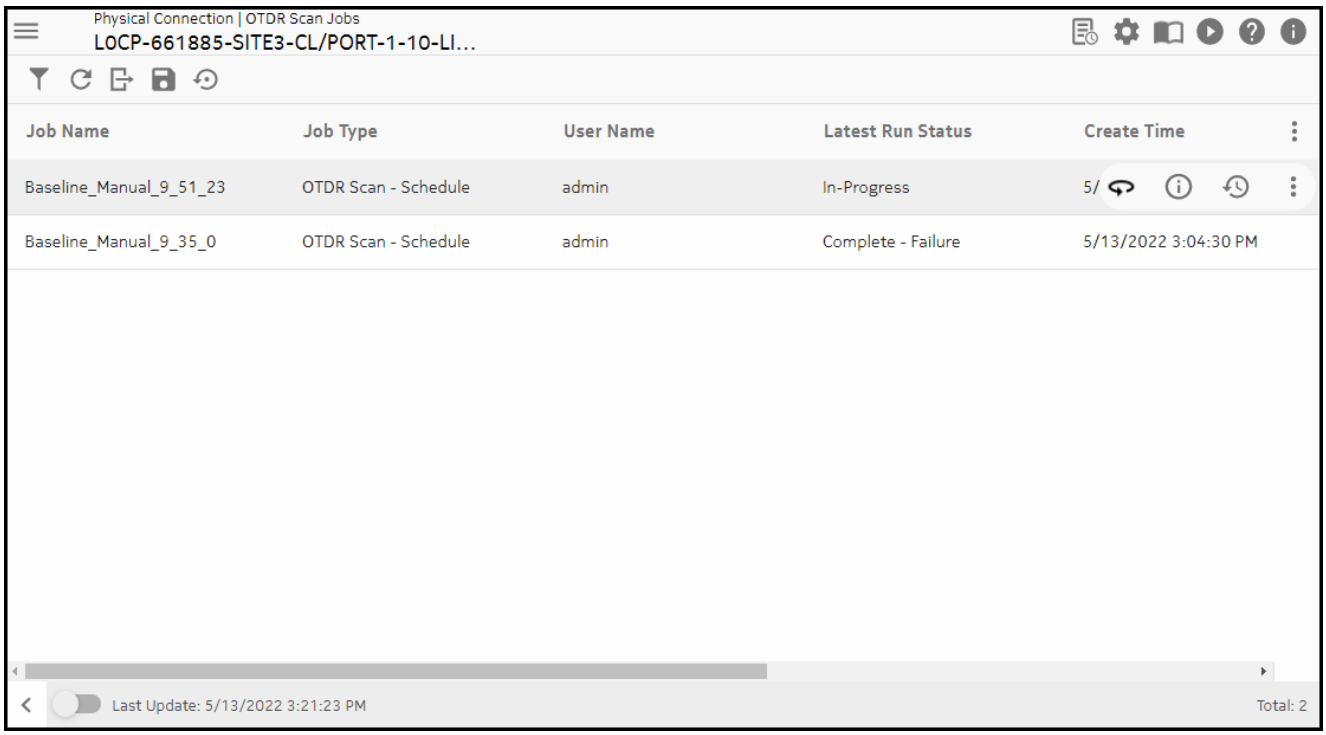
Figure 17-27 Physical Connections – OTDR Scan – Scheduled Scan Successful - Jobs Window



Note: If the **Last Run Status** is aborted, this might be due to the NE/System being down and system restart. Usually, the status is Complete - Success or Complete - Failed.

5

Optional: For more information on jobs and for the detailed tasks that are related to jobs, refer to the "Jobs" (p. 1194) section.

END OF STEPS

Task: View the Fiber Length Report

Complete the following steps to view the fiber length report:

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Nodes > Impacted Connections (tab)

OPERATE > Nodes > Used Ports (tab)

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Result: The system displays a data table that lists the selected connections.

2

Click **More** icon corresponding to the connection, and click **OTDR Scan Based Details**.

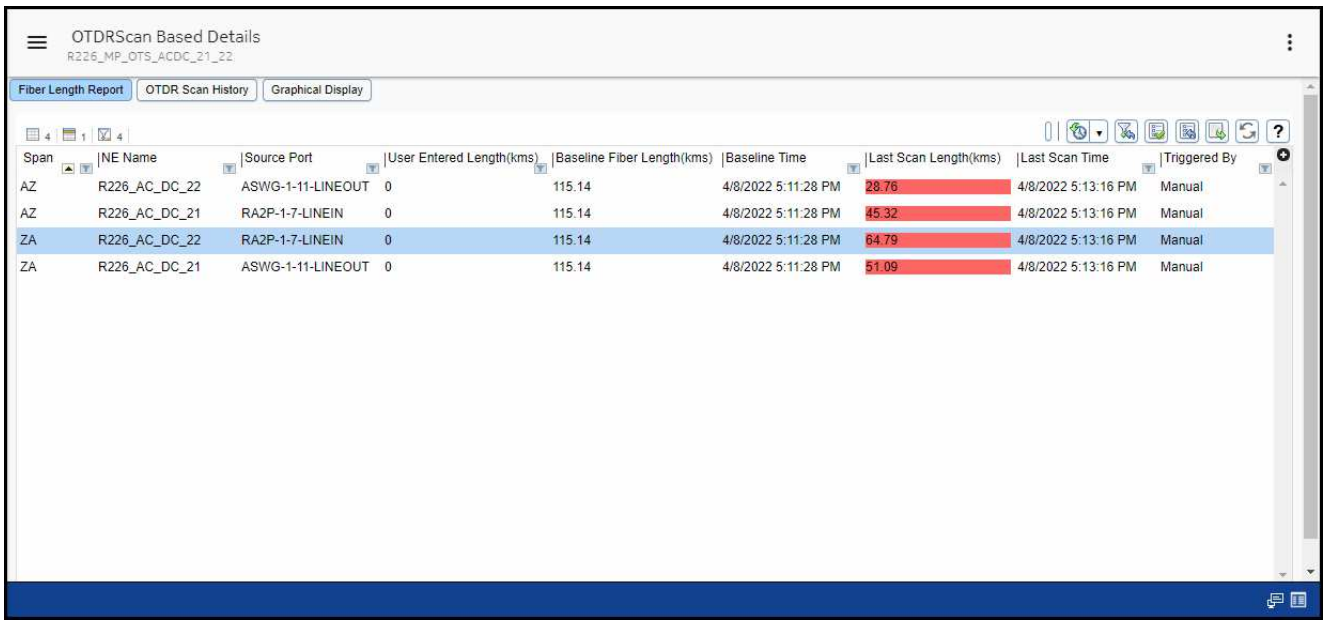
Result: The system provides a list of all the OTDR scans that are currently available against the physical link.

3

Select the **Fiber Length Report** panel.

Result: The system displays the complete details of the scan.

Figure 17-28 Fiber Length Report



Span	NE Name	Source Port	User Entered Length(kms)	Baseline Fiber Length(kms)	Baseline Time	Last Scan Length(kms)	Last Scan Time	Triggered By
AZ	R226_AC_DC_22	ASWG-1-11-LINEOUT	0	115.14	4/8/2022 5:11:28 PM	28.76	4/8/2022 5:13:16 PM	Manual
AZ	R226_AC_DC_21	RA2P-1-7-LINEIN	0	115.14	4/8/2022 5:11:28 PM	45.32	4/8/2022 5:13:16 PM	Manual
ZA	R226_AC_DC_22	RA2P-1-7-LINEIN	0	115.14	4/8/2022 5:11:28 PM	64.79	4/8/2022 5:13:16 PM	Manual
ZA	R226_AC_DC_21	ASWG-1-11-LINEOUT	0	115.14	4/8/2022 5:11:28 PM	51.09	4/8/2022 5:13:16 PM	Manual

When a scan is triggered, a fiber length value is received. This value is the **Last Scan Length** and must be same as the **Baseline Fiber Length**. If there is a difference in the value, then it is understood that there is a fiber cut. When there is a fiber cut, the values in the **Last Scan Length** column are marked in red.

Each value in the **Baseline Fiber Length** and **Last Scan Length** columns have a hyperlink. When you click the link, a scan report (.sor) file is downloaded to your local PC.

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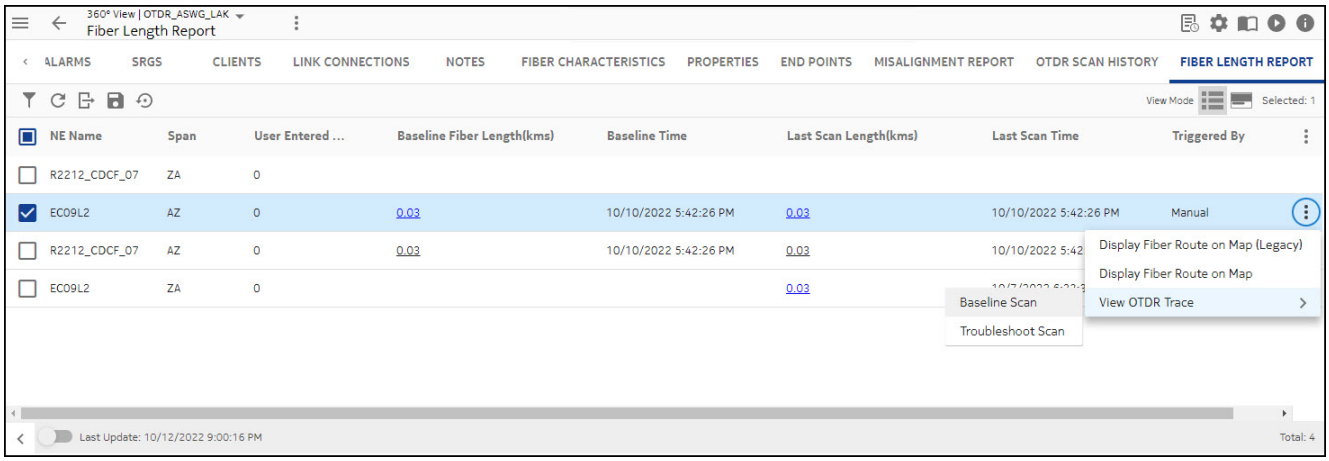
Figure 17-29 Difference in the Baseline fiber length and Last Scan fiber length



4

Right click on any of the rows.

Result: The following options are displayed.

- **Mark as Baseline** - This option is available when the Last Scan Length values are not equal to Baseline Fiber Length values. To know more about Mark as Baseline, see Step 5
- **Display Fiber Route on Map** - To know more about Display Fiber Route on Map, see Step 6
- **View OTDR Trace** - This option is available for ports where the fiber length value is hyper-linked, which indicates that the OTDR scan is successful. To know more about View OTDR Trace, see Step 7

5

Select the **Mark as Baseline** option.

Result: When you click the **Mark As Baseline** on the red colored values in the **Last Scan Length**, then that value is considered as the **Baseline Fiber Length**.

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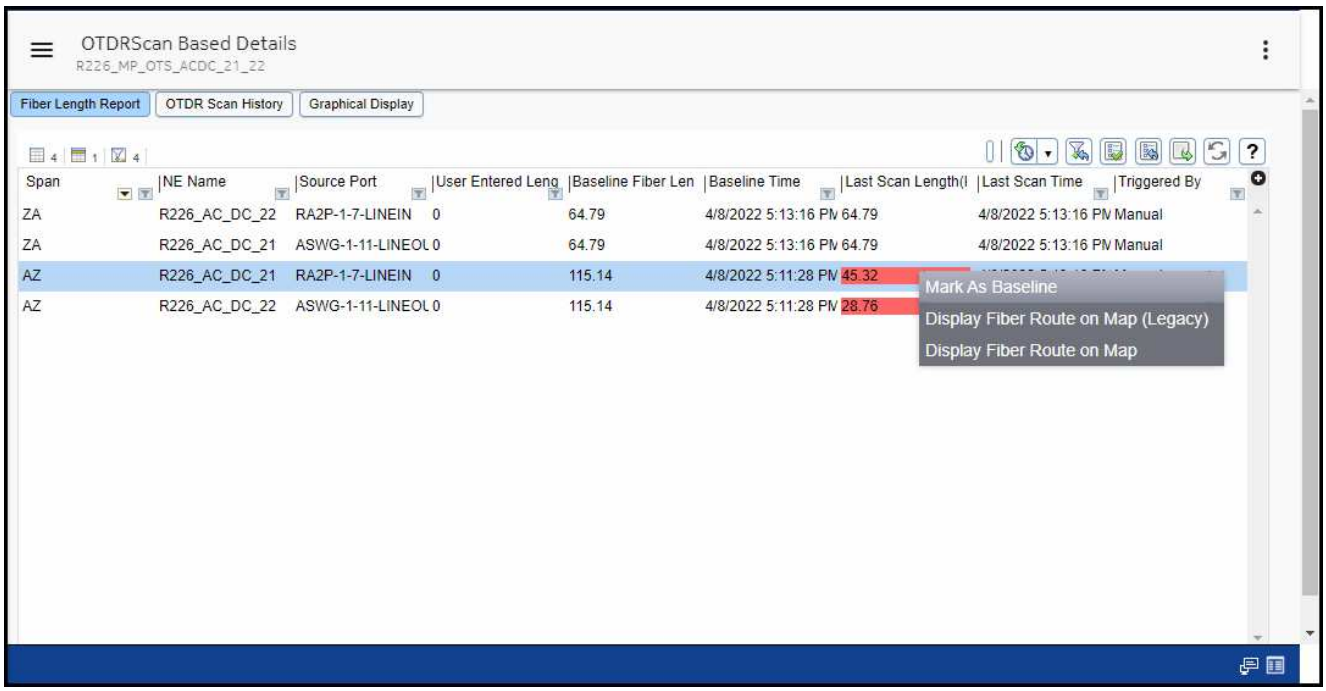
Figure 17-30 Mark as Baseline



Note: The Fiber Length derived from the **Fiber Charateristics** tab is used as reference and is shown in the **User Entered Length** column in OTDR Details tab.

6

Select the **Display Fiber Route on Map** option.

Result: The map window is displayed providing the exact path of the fiber and the location of the fiber cut on the path.

7

Select the **View OTDR Trace > Baseline Scan** or **View OTDR Trace > Troubleshoot Scan** option.

Result: Select the Baseline or Troubleshoot Scan option to go to the **OTDR Trace Viewer Page**, where you can view **OTDR Trace Graph**. The **OTDR Trace Viewer** page provides a graphical representation of the summary and events received during the scan.

To know more about the OTDR Trace Viewer, see 24.8 “OTDR trace viewer” (p. 1999)

END OF STEPS

Task: View the OTDR Scan History and Retrieve Files

Complete the following steps to retrieve the scan files.

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1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Nodes > Impacted Connections (tab)

OPERATE > Nodes > Used Ports (tab)

Result: The system displays a data table that lists the selected connections.

2

Click **More** icon corresponding to the connection, and click **OTDR Scan Based Details**.

Result: The system lists the **OTDR Details** page with all the scans triggered.

3

Select the **OTDR Scan History** panel.

Result: The system lists all the jobs completed for the OTDR scans.

The following details for each job is displayed:

- **Start Time** - Start time of the scan
- **Port Label** - A-end of the connection
- **File Name** - Scan report (.sor) file
  The scan report (.sor) file has the following naming convention: `<Type of scan>-<NE Label>-<Scan Triggered Port>-<Name of OTS Connection>-<Job History ID>-<Scan Completion Time>`
  Example: *BL-EC06L-1-OTDR-1-5-P1-OTDR-IROADM-RA2P-6-197-20220422_07-00-29.sor*
  - *BL* - indicates the type of scan either Baseline (BL) or Troubleshoot (TS) scan
  - *EC06L-1* - indicates the name of the NE
  - *OTDR-1-5-P1* - indicates the port on which the OTDR scan is triggered
    Note: For all cards that support OTDR scan, the scan is triggered on the OTDR port of the associated OTDR pack. Except for OMDCL card, where the scan is triggered on it's LD port.
  - *OTDR-IROADM-RA2P-6* - indicates the name of the OTS connection
  - *197* - indicates the job history ID of the scan
  - *20220422_07-00-29* - indicates the OTDR scan completion time
- **Failure Reason** - The reason for the scan to fail
- **Comments** - Job status of the scan

4

Select one of the scan file and right click to either **Download Scan File(s)**, **Delete Scan File(s)**, or **View OTDR Trace**.

The file can also be downloaded, deleted or viewed from the **Download Scan File(s)**, **Delete Scan File(s)**, or **View OTDR Trace** icon available in the top right corner.

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Note:

- NFM-T does not process or correlate .sor files which do not have an end of fiber key event. The **View SOR File**, **Download Scan File(s)** or **View OTDR Trace** option is available for events where *SOR_KEY_NOT_FOUND* or for cases where the OTDR scan is successful.
- **OTDR Scan History** always has files only for 30 days, and it gets purged as part of regular cleanup/purge activity.

  Jobs are deleted as part of purge, this results deletion of the job run history. If run history is deleted then scan history (that is, job run history) will not be shown in NFM-T UI, since it is deleted.

Figure 17-31 OTDR Scan History Tab

Result: A .sor file is downloaded by default to the **Downloads** folder or a convenient location on the PC specified by you. The file is deleted if **Delete Scan File(s)** is selected. If **View OTDR Trace** is selected, the system displays a new tab with a graphical representation of the summary and events received during the scan.

END OF STEPS

Task: View the Graphical Display

Complete the following steps for the Graphical view of the OTS physical span.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Node > Impacted Connections (tab)

OPERATE > Node > Used Ports (tab)

Result: The system displays a data table that lists the selected connections.

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2

Click **More** icon corresponding to the connection, and click **OTDR Scan Based Details**.

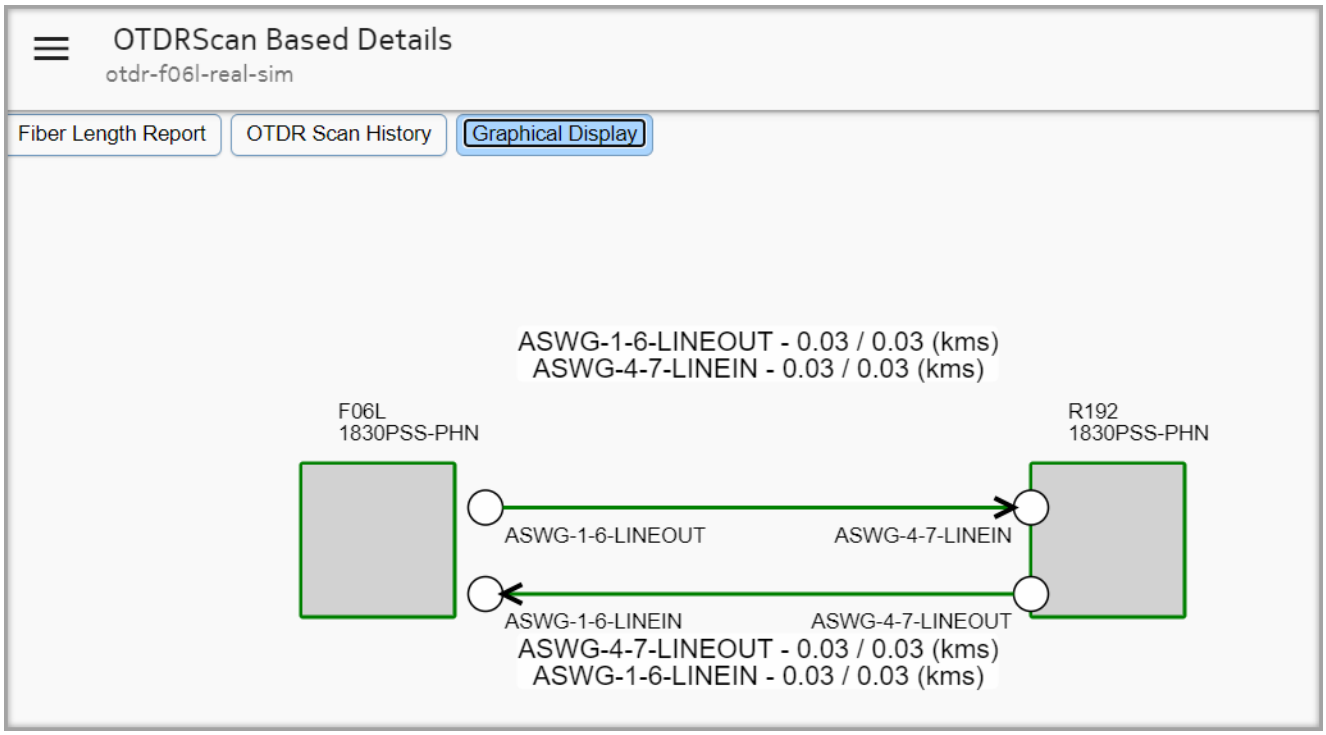
Result: The system lists the **OTDR Details** page with all the scans triggered.

3

Select the **Graphical Display** panel.

Result: The system displays the Graphical view of the OTS Physical span.

Figure 17-32 Graphical Display



Note: Two fibers are shown in the display between the sites. If there is any fiber cut, then the fiber is marked with an ‘X’ on the fiber display. Scan data from all the four ports (two on each fiber) are shown in the display as ‘fiber cut’ distance from each endpoint. Depending on single or multiple fiber cuts, as well as accuracy of scan data from each port, the ‘fiber cut’ distance aligns or are distributed. The area spanning all the fiber cut ‘X’ marks indicates the localization of the fiber cuts.

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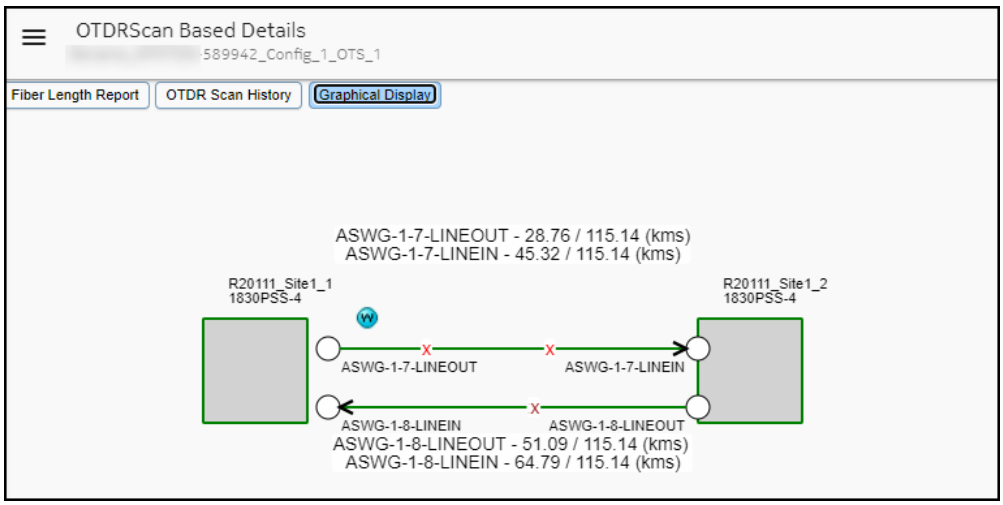
Figure 17-33 Scan Graph - Fiber cuts



End of steps

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17.7 View automatic triggering of the OTDR Scan

Purpose

Use this task to verify the automatic triggering of the OTDR Scan upon a fiber cut.

In the event of a fiber cut, an OTDR scan detects the distance to the fiber cut which is detected by the NFM-T application and reported to the user. The OTDR scan is triggered automatically upon receiving an external fiber Loss of Signal (LOS) and the log file is analyzed to find the End of Fiber distance. The automatic OTDR scan is done for all fibers that have OTDR enabled.

Note: When an LOS alarm is seen on the physical link, a job is created and scheduled, subsequently a scan is run on all the four ports. Even if there is a fiber cut in any one single direction, the auto scan is triggered on all the four ports. If any of the ports has no association, then the NE throws an error.

If the Root Cause alarm is an LOS on an external fiber, then an OTDR scan is triggered in both directions on the fiber. The OTDR files are analyzed and the End of Fiber information is retrieved. The end of fiber is the distance between the monitoring point and the end of the fiber. Since there is a fiber cut, the end of fiber is the distance from the A or Z end of the physical link to the fiber cut. This information is retrieved from both ends.

Example: Fiber cut in both directions

If an LOS is received on both ends of the physical link, then there is a cut in both the directions and four scans are initiated. A cut in both directions is most likely, since both directions are usually in the same fiber bundle.

Task: Determining if Automatic OTDR Scans was run

Perform the following steps to determine if the automatic OTDR Scan was run upon a fiber cut.

1

From the NFM-T GUI, follow this navigation path: **OPERATE > Physical Connections**.

Result: The system displays a data table that lists the selected connections.

2

Select a four ended connection where an LOS alarm is raised. Click the **360° View** tab to view the **Alarms** tab for alarm details.

Note: The automatic scan is triggered 20 sec after the LOS alarm is raised. The scan is triggered for all four ends of the connection and Profile 1 is the default profile used for the automatic scan.

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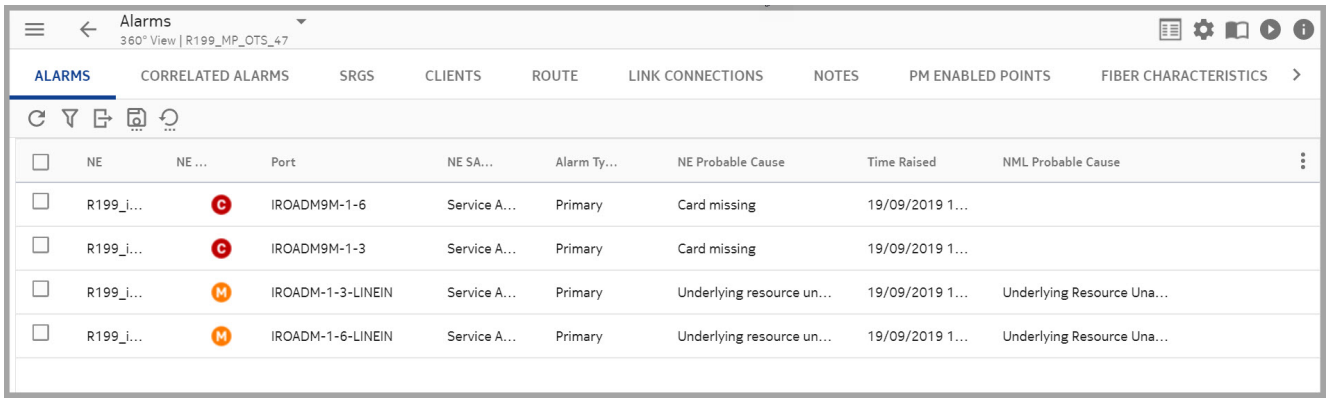
Figure 17-34 Alarm - Automatic OTDR Scan



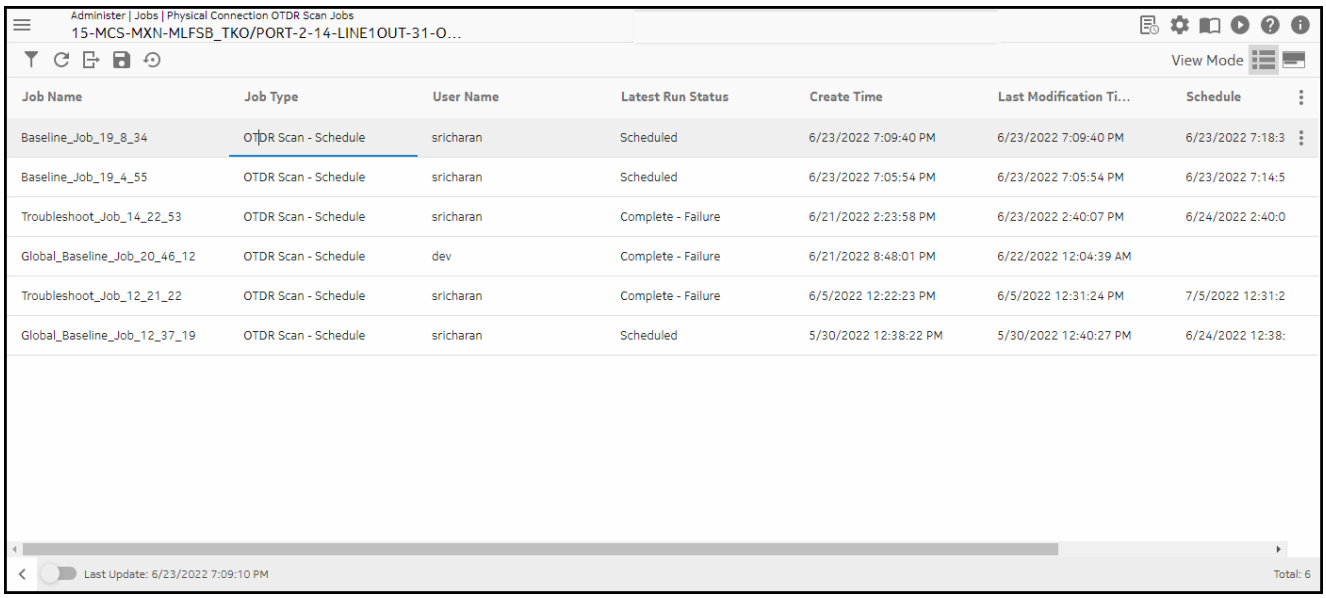
Note: If two physical connections are using the same OTDR/OTDRM pack and if there is a fiber cut on both the connections, then the trigger of the scan is delayed by 10 mins.

3

Click **More** icon for the corresponding **Physical Connections** and follow the navigation path: **OTDR > Jobs**.

Result: The auto triggered OTDR scan is listed on top of the Scheduled Jobs list. The Name of the file always starts with **`LOSx`**.

Figure 17-35 Scheduled Job - Automatic OTDR Scan



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END OF STEPS

Task: Reading the OTDR Files to Determine Distance to Fiber Cut

Perform the following steps for reading the OTDR files to determine the distance to the fiber cut.

1

From the NFM-T GUI, follow this navigation path: **OPERATE > Physical Connections**.

Result: The system displays a data table that lists the selected connections.

2

Select the connection, click the corresponding **360° View** tab. Navigate to view the **Alarms** tab to check if a fiber has failed to a LOS, indicating that there has been a fiber cut.

Note: If the fiber is an OTDR Enabled fiber, then an OTDR scan is automatically triggered due to the detection on the LOS alarm.

3

Navigate to the **Physical Connections**. Click **More** icon corresponding to the connection, and click **OTDR Details**.

Result: The system lists the **OTDR Details** page with all the scans triggered.

4

Select the **Scan History** panel.

Result: The system lists all the jobs completed for the OTDR scans. If automatic OTDR scan for the fiber cut was triggered, it is listed with a timestamp that corresponds to the time the LOS alarm was active.

5

Select one of the scan file and right click to either **Download Scan File(s)** or **Delete Scan File(s)**.

The file can also be downloaded or deleted from the **Download Scan File(s)** or **Delete Scan File(s)** icon available in the top right corner.

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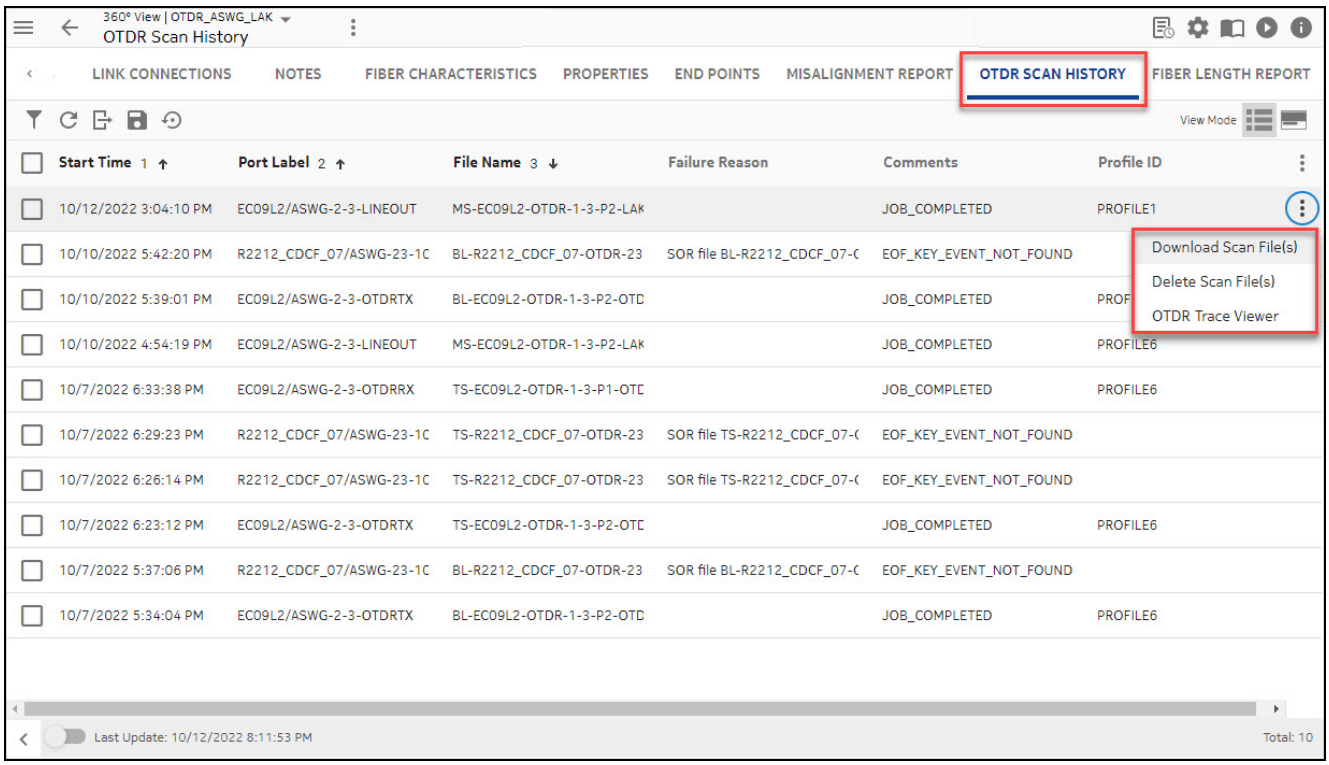
Figure 17-36 Retrieve files



Result: A .sor file is downloaded by default to the **Downloads** folder or a convenient location on the PC specified by you. The file is deleted if **Delete Scan File(s)** is selected.

6

Download the scan file (.sor).

Note: Scan results/files are available in **360° View** tab as well as on the physical connection and can be downloaded.

7

Open the OTDR viewer for the OTDR scans that were initiated during the LOS alarm and view the End of Fiber details to determine the distance of the fiber cut from the A and Z end of the fiber.

END OF STEPS

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17.8 Manage fiber cut localization

Purpose

Use this task to manage the fiber cut localization from the Network Map and the Physical Connections. OTDR scans are run on fibers with or without fiber cuts and the scan data is used to display Fiber Route alone, without any cuts.

Overview

The automatic fiber cut localization feature provides the location details of the fiber cut by displaying the exact path of the fiber on the map (from customer fiber route data in .kml or .kmz format) and displaying the location of the fiber cut on the path. When an equipment or management system detects LOS on OTDR equipped fiber span, the fiber cut localization feature triggers an OTDR scan automatically in an attempt to locate the cut prior to the operator being engaged or engineer being sent to the field to fix the fiber cut.

There are two operations that can be managed from this task:

- upload fiber route data
- display OTDR scan data superimposed on fiber route in the network map for physical connection

Related information

Keyhole Markup Language (KML) is an XML notation for expressing geographic annotation and visualization within Internet-based browsers. The KML file specifies a set of features (place marks, images, polygons, 3D models, textual descriptions, and so on) for display in any geospatial software implementing the KML encoding. Each place always has a longitude and a latitude. KML files are distributed in zipped form, with a .kmz extension.

Users are required to use/create KML files to describe fiber routes. KML files with placemarks provide information for each Node and the direction of the fiber route (for example, A-Z and Z-A). One KML file is used per fiber or multiple fibers. One KMZ file can contain data for upto four fibers. If the file contains details for both directions, then the routes are associated to each direction of the physical connection. Both directions of a physical connection are represented by the same fiber route. If there are multiple routes, then the routes are associated to separate physical connections. If a single fiber route is available, then the same route is used for both the directions. If the user needs to upload separate fiber routes for each direction, then it can be done by providing fiber routes in the file for both AZ and ZA direction.

KML file can contain all or either of the following:

- Co-ordinates only (LineString only),
- Fiber route only (Placemark with LineString)
- Node and Fiber Route data (Placemarks with Point and LineString)

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Table 17-1 The XML notation tags

Notations	Descriptions
<Folder>	to define or group a bunch of entities together such as a region or configuration.
<Placemark>	to define entities on the map such as nodes and fiber connectivity.
<Point>	to define a node on the map and is defined as a Node location.
<LineString>	to define a fiber route.
<coordinates>	to provide one or more longitude - latitude coordinates for the placemark.

KML files include some or all tags from the above list to determine nodes, fibers between nodes, and the route information. The tags that are currently used are - placemark, point, linestring and coordinates.

Example Node Definition

```
<Placemark>
                <name>REG_NODE3
                </name>
                <address>xyz
                </address>
                <Point>
                                <coordinates>
                                            -121.2929905,37.
                                            3690604,0
                                </coordinates>
                </Point>
</Placemark>
```

Example Fiber Route Definition

```
<Placemark>
                <name>REG_
                NODE4##REG_NODE3
                </name>
                <LineString>
                                <coordinates>
```

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```
                                                    -122.13776,37.40832,0

                                                    -122.13679,37.40948,0
                                                    -122.13672,37.40959,0

                                          </coordinates>
                  </LineString>
 </Placemark>
```

Workflows

There are two workflows that allow users to associate fiber route information with physical connections. For both the workflows, association of the fiber route co-ordinates for both directions of the physical connections are supported. For both workflows, import of both KML and KMZ files with file extensions **.kml** and **.kmz** respectively, are supported.

Workflow 1 - Association of multiple fiber routes using single KML file (Bulk Import) / Automatic association of routes from Fiber Characteristics file

Workflow 1 is used for association of multiple fiber routes or bulk import using a single KML file. Workflow 1 is also used for automatic association of the routes from the KML or Fiber Characteristics file. Navigation of Workflow 1 is as follows: **ADMINISTER > Import Fiber Routes**.

In Workflow 1, the following association rules are followed:

- The Node Placemark tags match the Node names. Refer to the example, "Example Node Definition" (p. 1782).
- The Fiber Route Placemark tags match the Node names. Refer to the example, "Example Fiber Route Definition" (p. 1782).
- The Node name format is also used to determine the direction (AZ) and the reverse order of co-ordinates is used for direction (ZA).
- The Node names in the KML/KMZ files must match the node names in NFM-T. For example, <name>REG_NODE3##REG_NODE4</name>.
- The Node Names associates the fiber route to the physical connection between the matched nodes. If there are more than one physical connections between nodes, then the association fails, and an error message is displayed.
- The fiber route is associated to both AZ and ZA directions of the physical connection, by default. If separate fiber routes are required for each direction, then the KML file contains separate association information for respective AZ and ZA directions.
- Import operations are tracked as a Job and the user can generate a report or view the **Run History** under **OPERATE > Connections > Job**. Jobs report includes unassociated physical connections between the associated Nodes as well as unassociated fiber routes in the file. The user can also access the Job operation results at a later time.
- There is no option provided to store or upload the KML files. The user must store the file in the local machine and import the file when required.

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Workflow 2 - Association of single fiber route from KML file

Workflow 2 is used for association of single fiber route from the KML file. Workflow 2 is also used for association of single fiber route to single physical connection. Workflow 2 allows the user to directly associate fiber routes against a single physical connection or associate fiber routes individually as required. If an association exists on the physical connection and the user selects **Import Fiber Route** to perform fiber maintenance, and changes the route for AZ direction only, then the user needs to update AZ (new file) and retain ZA (old file) as it is in NFM-T. Navigation of Workflow 2 is as follows: Hover over a connection, click **More** icon corresponding to the connection, select **Fiber Characteristics > Import Fiber Route**.

Workflow 2 is the preferred Workflow for the following scenarios:

- When new spans are added.
- When fiber repair or maintenance is undertaken with changes in the fiber route.
- When separate fiber routes must be associated for the connections between the same nodes.
- When one KML file represents single fiber route.

In Workflow 2, the following association rules are followed:

- Enables the user to associate a fiber route using KML file which contains the following:
  - Co-ordinates only (LineString) - the KML file includes longitude and latitude coordinates for a single fiber route.
  - Fiber Route only (Placemark with LineString) - the placemark is used to define physical connection, the longitude and latitude coordinates which includes it. This could be for one or more fiber routes in the network.
  - Node and Fiber Route data (Placemarks with Point and LineString) - the placemarks are used to define both nodes and fiber connectivity in the file. The sub-tag <Point> is used to define location (co-ordinates) of a node and sub-tag <LineString> is used to describe the co-ordinates of the fiber route.

  The Node names in placemark tags need not match NFM-T node names.

  Multiple fiber routes or co-ordinates is not provided in the single file. If the fiber routes are separate for each direction, then each fiber route is provided in separate files.
- Allows the user to specify the direction where co-ordinates are provided in the file. It also ensures that the user provides fiber route input for both the directions.

  NFM-T completes association only if the inputs for both the directions are provided.

  The opposite direction association is specified in three ways:
  - Using the same file
  - Using separate files
  - Retaining the existing data (if association already exists for the physical connection)

Ensure that fiber route files are imported and associated with nodes and physical connections for both the workflows.

For Workflow 1, ensure that the association to both directions of the physical connection is provided by default to have a complete association.

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For Workflow 2, ensure that complete association takes place.

For the complete association to take place, the user must ensure the following:

- The input file specifies if it is for AZ or ZA direction.
- The input file indicates same co-ordinates in reverse order for the other direction. If not, then the user must provide a separate file.
- Perform association only if both the directions are addressed by the user.

Association can be done in either of the following ways:

- Using a single file where same set of co-ordinates are used for forward and reverse direction.
- Using separate sets of co-ordinates that are provided within the same file.
- Using separate files with co-ordinates that are provided for each direction.

NFM-T follows the fiber route association as per the following table:

Table 17-2 Variables and their association behavior in NFM-T

Variables				Specifies how NFM-T handles behavior based on the variables
KML File Contains	Node Names in KML file	User Input Direction	User Input for Opposite Direction	NFM-T Association behavior
Co-ordinates Only	Not available	AZ or ZA	Same file or retain the existing data	Association is based on user input direction. Opposite direction has same co-ordinates in reverse order. If retain option (Use same KML for AZ/ZA) is selected, then there is no change.
Co-ordinates Only	Not available	AZ or ZA	Separate file	Association is based on user input direction. Opposite direction is provided in a separate file.
Fiber Route Only	If present, does not match NFM-T node names	AZ or ZA	Same file or retain the existing data	Ignore node names, if present. Association is based on user input direction. Opposite direction has same co-ordinates in reverse order. If retain option (Use same KML for AZ/ZA) is selected, then there is no change.

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Table 17-2 Variables and their association behavior in NFM-T (continued)

Variables				Specifies how NFM-T handles behavior based on the variables
KML File Contains	Node Names in KML file	User Input Direction	User Input for Opposite Direction	NFM-T Association behavior
Fiber Route Only	If present, does not match NFM-T node names	AZ or ZA	Separate file	Ignore node names, if present. Association is based on user input direction. Opposite direction is provided in a separate file.
Nodes and Fiber Route data	Does not match NFM-T node names	AZ or ZA	Same file or retain the existing data	Ignore node names, if present. Association is based on user input direction. Opposite direction has same co-ordinates in reverse order. If retain option (Use same KML for AZ/ZA) is selected, then there is no change.
Nodes and Fiber Route data	Does not match NFM-T node names	AZ or ZA	Separate file	Ignore node names, if present. Association is based on user input direction. Opposite direction is provided in a separate file.

Note: If multiple sets of co-ordinates are present in a file, then Workflow 2 association fails.

Disassociation of the Fiber Route

Disassociation of the fiber route is possible in the following ways:

- Navigating the path: **ADMINISTER > Delete Fiber Route**. Bulk deletion is possible from this path. All the associated fiber routes in the system is deleted.
- Navigating the path: **OPERATE > Physical Connections**, then hover over a physical connection, and click **More** icon corresponding to the connection.

  Select **Fiber Characteristics > Delete Fiber Route**. Single fiber deletion against the physical connection is supported with this option.
- Deleting the physical connection which will automatically delete the fiber route association.

Fiber Route Operations Authorization

NFM-T provides the following rules to import, modify, and delete the fiber route association:

- The operations are available to users with Administrator privileges only.

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- Workflow 1 is available to a user with access to all partitioned domains.
- Workflow 2 is available to domain user where the nodes are within the same domain only (with Administrator privilege)
- Fiber route, OTDR scan data, and Network map display operations are allowed for all users.

Display of Fiber Route on Network Map

The fiber route is displayed irrespective of the fiber cut on the physical connection.

The fiber route is displayed on the network map, which provides the exact location of the fiber cut - the user can view the exact geographical location of the fiber cut. Only the Physical Connections that have the fiber route details, are displayed as the fiber route on the map.

A number of OTDR scan data is available in ‘OTDR summary’ 360 degree tab for the physical connection. The latest OTDR scan is considered for display on the Network Map and shown in a red color.

A new network map window displays the nodes at both ends of the connection along with the fiber route.

These details are useful to handle multiple fiber cuts or to perform fiber repair verification. The distance can be calculated from the imported KML/KMZ data. Based on this calculation, the exact longitude and latitude of the fiber can be located. From the OTDR scan result, fiber cuts are calculated. If any cuts are found, a lightening bolt icon at the fiber cut locations is displayed on the Network Map. The user is able to select a point on the map and get the longitude/latitude information in the pop-up window.

On mouse over the fiber cut, a pop-up message displays the following details:

- The latitude and the longitude
- Span Direction
- Baseline Fiber length
- Last Scan length
- Originating port of the OTDR Scan
- Date and Time the Scan was conducted

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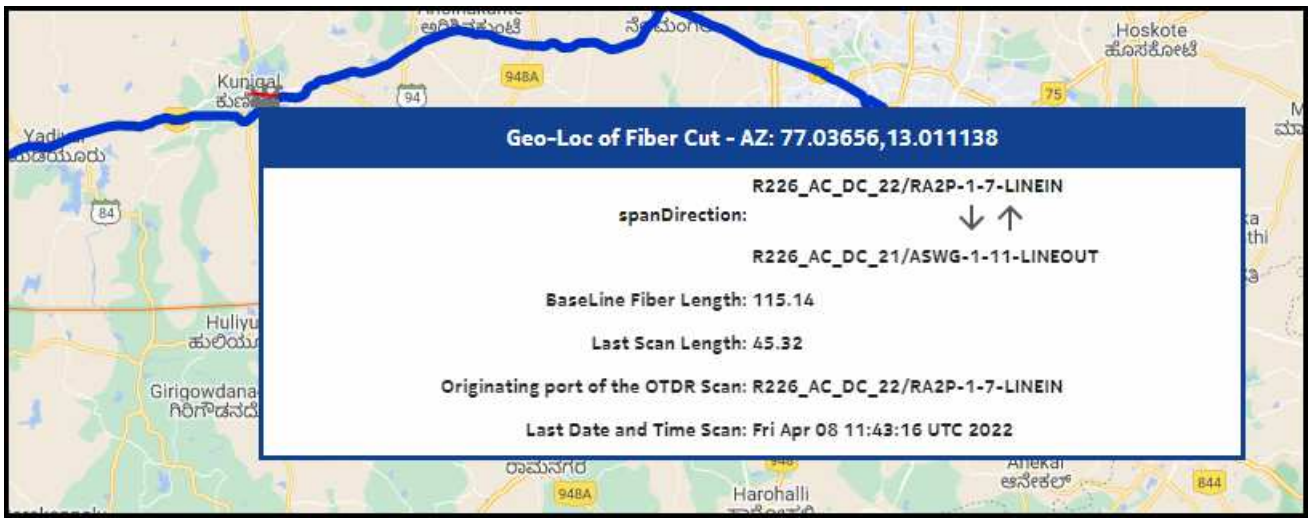
Figure 17-37 Fiber cut pop-up message



Following are the rules for display of Node and Fiber Route co-ordinates on the Map:

- Real co-ordinates synchronized from KML/KMZ files are used to display the location of the nodes.
- If the real co-ordinates are available, and do not match with the start/ end of the fiber route of co-ordinates, then the A/Z node location is taken as start/end co-ordinates. Fiber route is generated from node locations to the actual start/end of fiber route co-ordinates.
- If the real node co-ordinates are not available, then the start and end of the fiber route co-ordinates are used for A-end and Z-end node locations respectively.

An OTDR Scan can be triggered from the Network Map. Right click on the node and use the following options to trigger an OTDR scan:

- **OTDR > Manual Scan Now**
- **OTDR > Baseline > Scan Now**
- **OTDR > Baseline > Schedule Scan**
- **OTDR > Troubleshoot > Scan Now**
- **OTDR > Troubleshoot > Schedule Scan**

Refer 17.6 “Manage an OTDR Scan for an OTN OTS Physical Connection” (p. 1734) for more information on triggering an OTDR Scan for a Physical Connection.

Before you begin

KML and KMZ files are available for fiber route description and for association.

Task: Association of multiple fiber routes using single KML file (Workflow 1)

Complete the following steps to create association of multiple fiber routes using a single KML file.

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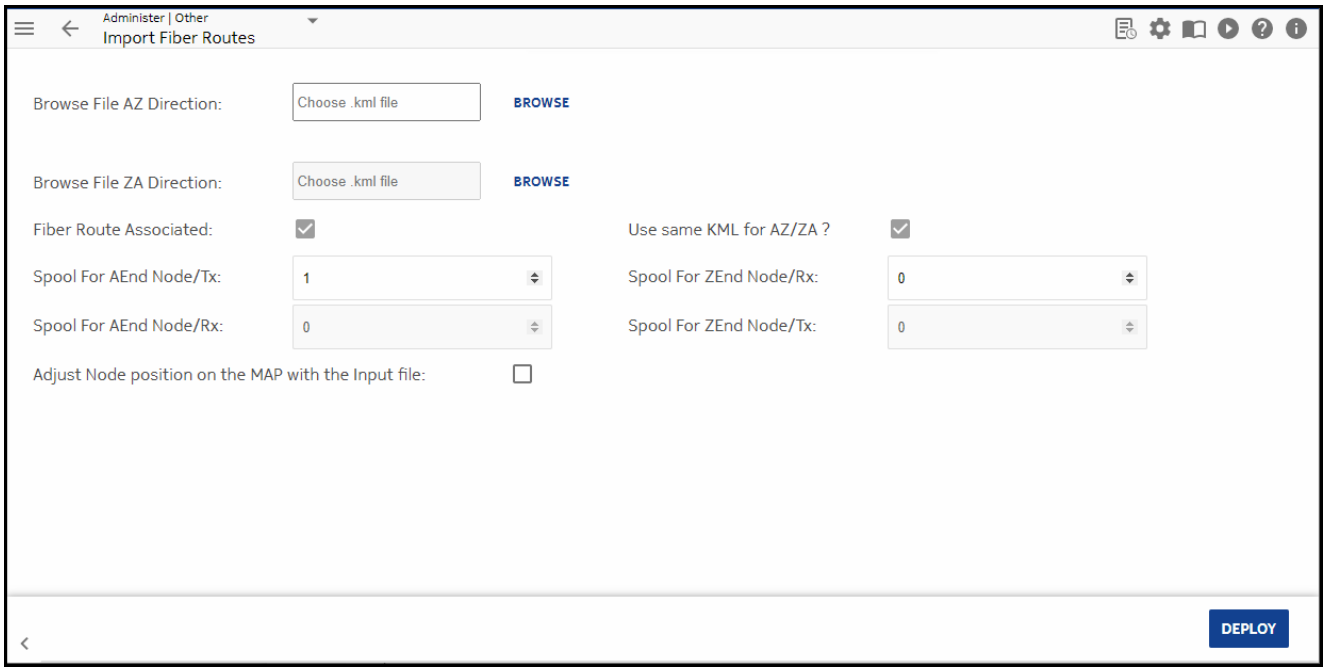
1

From the NFM-T GUI, follow this navigation path:

ADMINISTER > Import Fiber Routes

Result: The **Import Fiber Route** window appears.

Figure 17-38 Import Fiber Route



2

In the **Browse File AZ Direction** field, click **BROWSE** and browse to select a .kml or .kmz file from the desktop or the location where the file is stored in the PC. The .kml/.kmz file is used for association of the fiber route for the direction A to Z only.

Note: The file must be of a .kml or .kmz format only. Other file formats are not supported.

3

In the **Browse File ZA Direction** field, select the **BROWSE** button and browse and select a .kml or .kmz file from the desktop or the location where this file is stored in your PC. The .kml/.kmz file is used for association of the fiber route for the direction Z to A only.

Note: The file must be of a .kml or .kmz format only. Other file formats are not supported.

4

The **Fiber Route Associated** field, is not applicable for Bulk import and the value is blank.

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The **Use same KML for AZ/ZA?** check box is selected and disabled by default. When the check box is selected, it indicates that the same KML file is used for association of the fiber routes in both the directions.

5

In the **Spool for A End Node/Tx** field, enter a value for the spool length for the A end node or at the transmitting end. The spool length is measured in ‘meters’ at both A and Z ends of the connection.

6

In the **Spool for Z End Node/Rx** field, enter a value for the spool data for the Z end node or at the receiving end. The spool length is measured in ‘meters’ at both A and Z ends of the connection.

7

In the **Spool for A End Node/Rx** field, enter a value for the spool data. In case AZ and ZA direction are different, then enter the spool data in both the direction.

Note: This field is disabled by default. The field is enabled when the fiber route is for both the directions.

8

In the **Spool for Z End Node/Tx** field, enter a value for the spool data. In case AZ and ZA direction are different, then enter the spool data in both the direction.

Note: This field is disabled by default. The field is enabled when the fiber route is for both the directions.

9

Optional Select **Adjust Node position on the MAP with the Input file** check box, to adjust the node position on the map from the .kml or .kmz file.

10

Select **DEPLOY** to import the fiber route files.

Result: The fiber route files are imported successfully and success message is displayed in the status bar. A job is also created.

Note: During the import, if the existing fiber route association is deleted or over-ridden, then a warning message is displayed.

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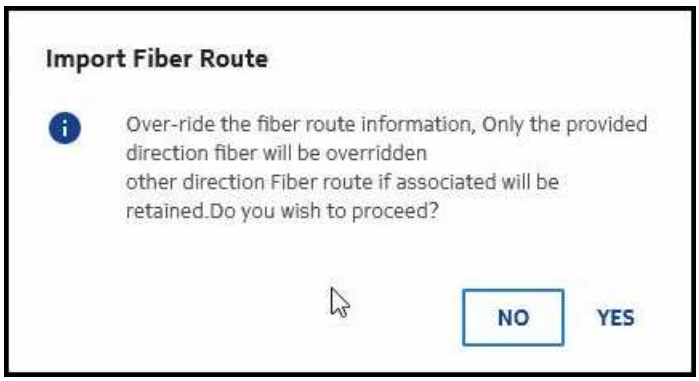
Figure 17-39 Fiber Route over-ride message



11

Navigate to the **ADMINISTER > Jobs** page to view the job details.

END OF STEPS

Task: Association of a single fiber route from KML file (Workflow 2)

Complete the following steps to create association of single fiber route using a single KML file:

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Physical Connections.

Result: The system displays a list of connections.

2

Select the physical connection from the displayed list and then click **More** icon corresponding to the connection.

3

Select **Fiber Characteristics > Import Fiber Route**.

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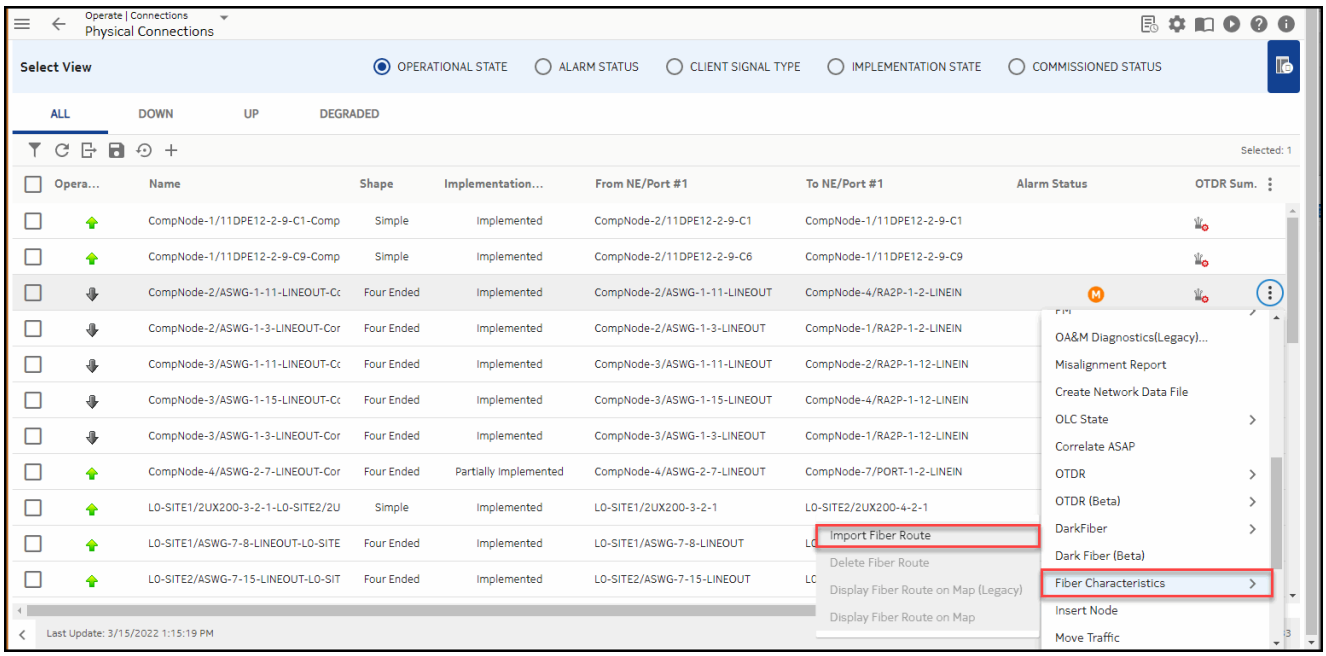
Figure 17-40 Import Fiber Route from Physical Connections window



Result: The **Import Fiber Route** window appears.

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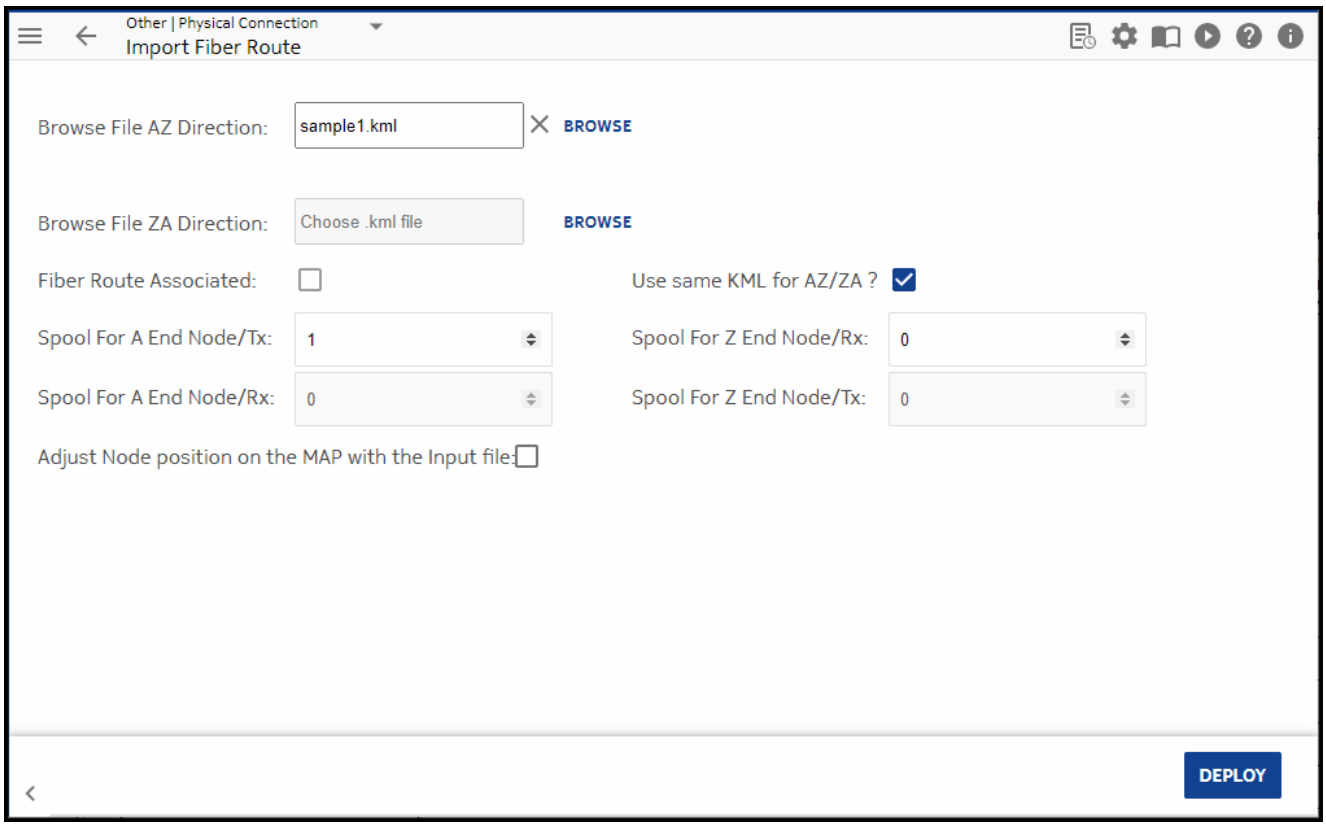
Figure 17-41 Import Fiber Route from Physical Connections window



4

In the **Browse File AZ Direction** field, click **BROWSE** and browse to select a .kml or .kmz file from the desktop, or from the location where the file is stored in the PC. The .kml/.kmz file is used for association of the fiber route for the direction A to Z only.

Note: The file must be of a .kml or .kmz format only. Other file formats are not supported.

5

The **Browse File ZA Direction** field, is by default disabled. This field is enabled only when **Use same KML for AZ/ZA?** check box is deselected. In the **Browse File ZA Direction** field, click **BROWSE** and browse to select a .kml or .kmz file from the desktop or the location where the file is stored in the PC. The .kml/.kmz file is used for association of the fiber route for the direction Z to A only.

Note: The file must be of a .kml or .kmz format only. Other file formats are not supported.

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6

The **Fiber Route Associated** field displays a green check or red cross mark. If the field has a green check, it indicates that the Fiber is associated to the Physical connection. A red cross indicates no association.

Note: If the field has a red cross and the user selects the same physical connection and tries to import a new kml file for association, then there is a green check mark against the **Fiber Route Associated** field. This indicates that the physical connection is already associated to a fiber route.

7

Select the **Use same KML for AZ/ZA?** check box if the same KML file is used for association of the fiber routes in both the directions.

Note: The check box is selected by default. When you deselect the check box, **Spool for A End Node/Rx** and **Spool for Z End Node/Tx** fields are enabled.

8

In the **Spool for A End Node/Tx** field, enter a value for the spool data for the A end node or at the transmitting end. The spool length is measured in ‘meters’ at both A and Z ends of the connection.

9

In the **Spool for Z End Node/Rx** field, enter a value for the spool data for the Z end node or at the receiving end. The spool length is measured in ‘meters’ at both A and Z ends of the connection.

10

In the **Spool for A End Node/Rx** field, enter a value for the spool data. In case AZ and ZA direction are different, then enter the spool data in both the direction.

Note: When the **Use same KML for AZ/ZA?** check box is selected, the field **Spool for A End Node/Rx** is disabled by default. The field is enabled when the**Use same KML for AZ/ZA?** check box is deselected.

11

In the **Spool for Z End Node/Tx** field, enter a value for the spool data. In case AZ and ZA direction are different, then enter the spool data in both the direction.

Note: When the **Use same KML for AZ/ZA?** check box is selected, the field **Spool for A End Node/Rx** is disabled by default. The field is enabled when the**Use same KML for AZ/ZA?** check box is deselected.

12

Optional Select **Adjust Node position on the MAP with the Input file** check box, to adjust the node position on the map from the .kml file.

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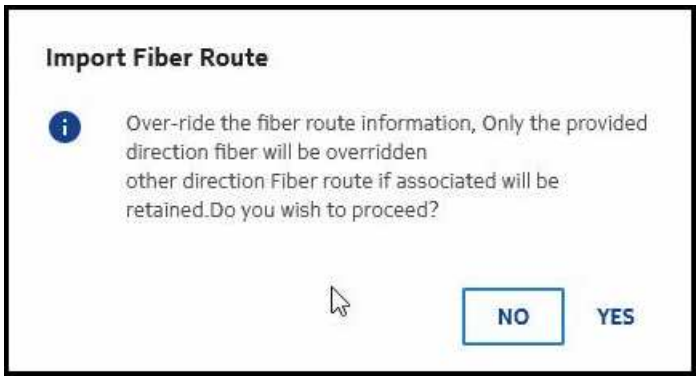
13

Click **DEPLOY** to import the fiber route files.

Result: The fiber route files are imported successfully and success message is displayed in the status bar.

Note: During the import, if the a fiber route association already exists, then a warning message is displayed. If the user proceeds, the existing fiber is replaced with a new one.

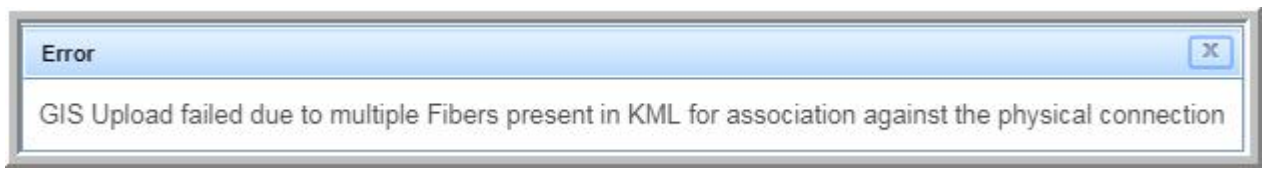
Figure 17-42 Fiber Route over-ride message



14

Optional If you upload a file with multiple fibers for the Workflow 2 from Physical Connections page, then an error message is displayed.

Figure 17-43 GIS Upload error



15

The **Fiber Route Associatiod** column in the physical connections list indicates the fiber route association status of the physical connection. It is indicated by a green check. A blank or no check mark indicates that there is no fiber route association. By default this column is hidden. Click **Manage Columns** in the Select View area and select **Fiber Route Associated** column from the DEFAULT COLUMNS region of the **Manage Columns** window that appears.

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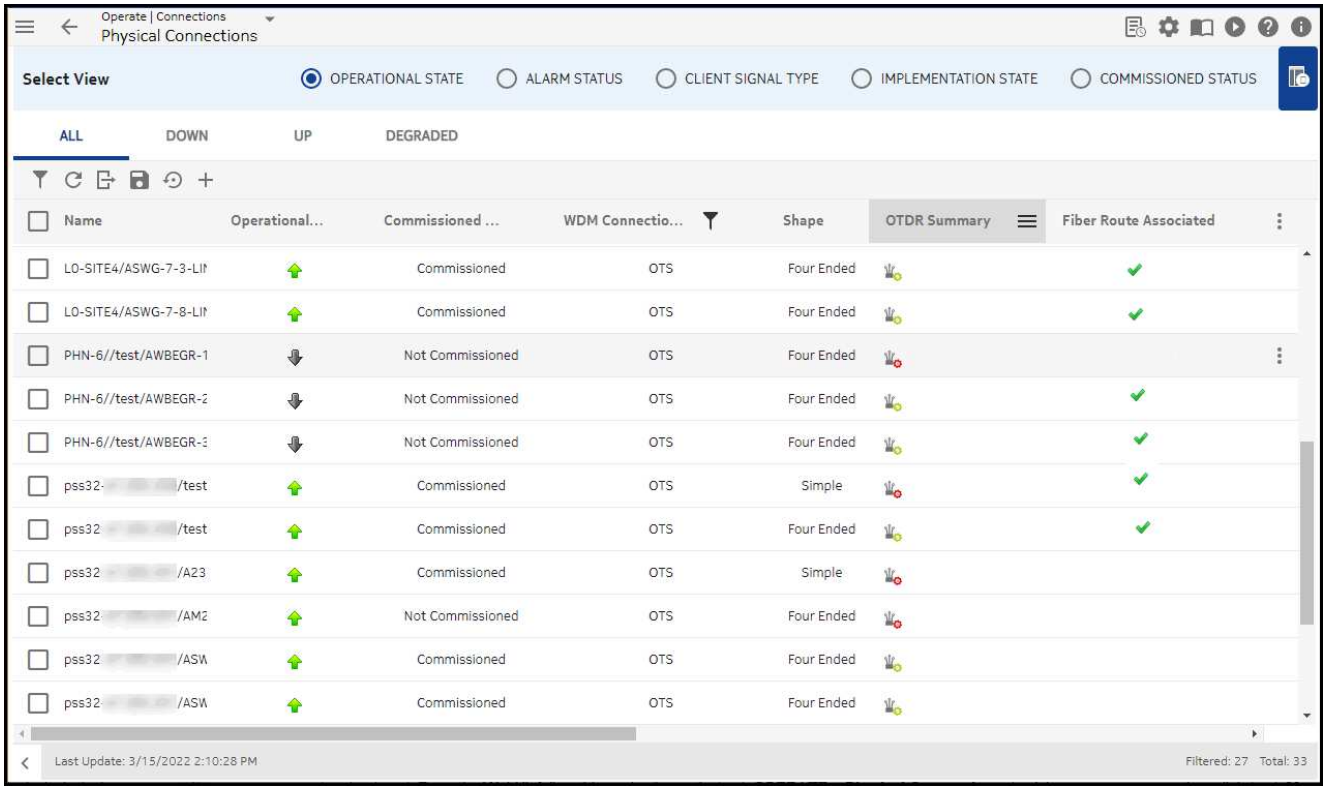

Result: The **Fiber Route Associated** column now appears in the data table. A green check indicates that the fiber route association is established.

END OF STEPS

Task: Delete Fiber Route Association

Complete the following steps to delete fiber route association:

1

Deletion of Fiber route association is possible in one of the following ways:

- From the NFM-T GUI, follow this navigation path: **ADMINISTER > Delete Fiber Route**. Bulk fiber route deletion is possible from this option. All the associated fiber routes in the system is

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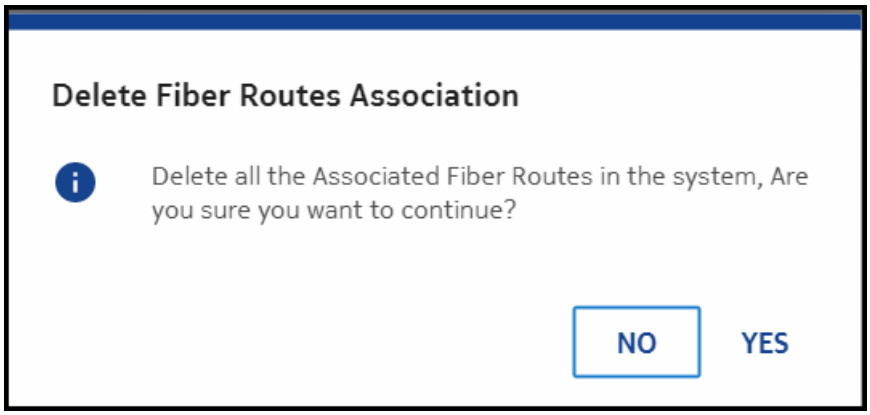
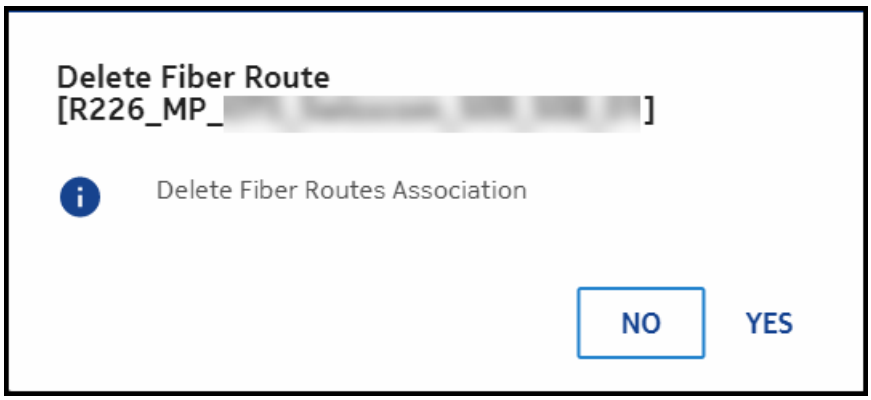
deleted.



- From the NFM-T GUI, follow this navigation path: **OPERATE > Physical Connections**, hover over a connection, click **More** icon corresponding to the connection, select **Fiber Characteristics > Delete Fiber Route**. Single fiber deletion against the associated physical connection is supported with this option.
- Delete the Physical Connection to automatically delete the fiber route association.



2

Click **OK** to delete the fiber route association.

Result: The fiber route(s) association is/are deleted successfully, and a success message is displayed in the status bar.

3

In the **Fiber Route Association** column in the physical connections window, the green check mark is not shown. This indicates that the fiber route is not associated to a physical connection.

END OF STEPS

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Task: Display Fiber Route on Map

Complete the following steps to display the fiber route association on the Network Map.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Physical Connections

Result: The system displays a list of physical connections.

2

Select a physical connection on which a Fiber cut is detected.

Note: Display fiber route on map is also applicable for both Simple and Four Ended types of physical connections and connections without fiber cut. Only the physical connections that have the fiber characteristics details, will have the option to display the fiber route on the Map.

3

Perform any one of the following actions:

- Click **More** icon corresponding to the connection on which the fiber cut is detected, select **Fiber Characteristics > Display Fiber Route on Map**.
- Click **More** icon corresponding to the connection, and click **OTDR Details**, right click on the OTDR scan row and select **Display Fiber Route on Map**.

Result: The **Network Map** displays the end nodes, fiber route, and the fiber cuts.

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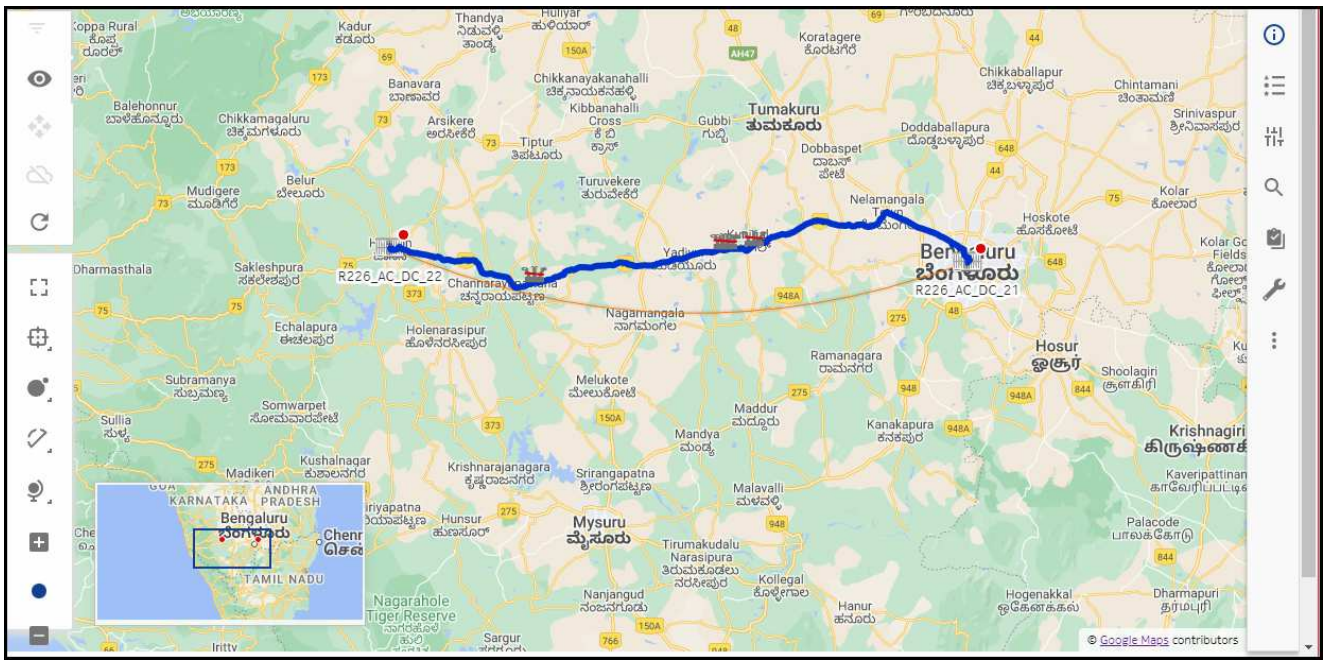
Figure 17-44 Fiber Route - display triggered from physical connection



Note: If there are multiple lightning bolt icons in the image, then the last scan data from all the four ports are used.

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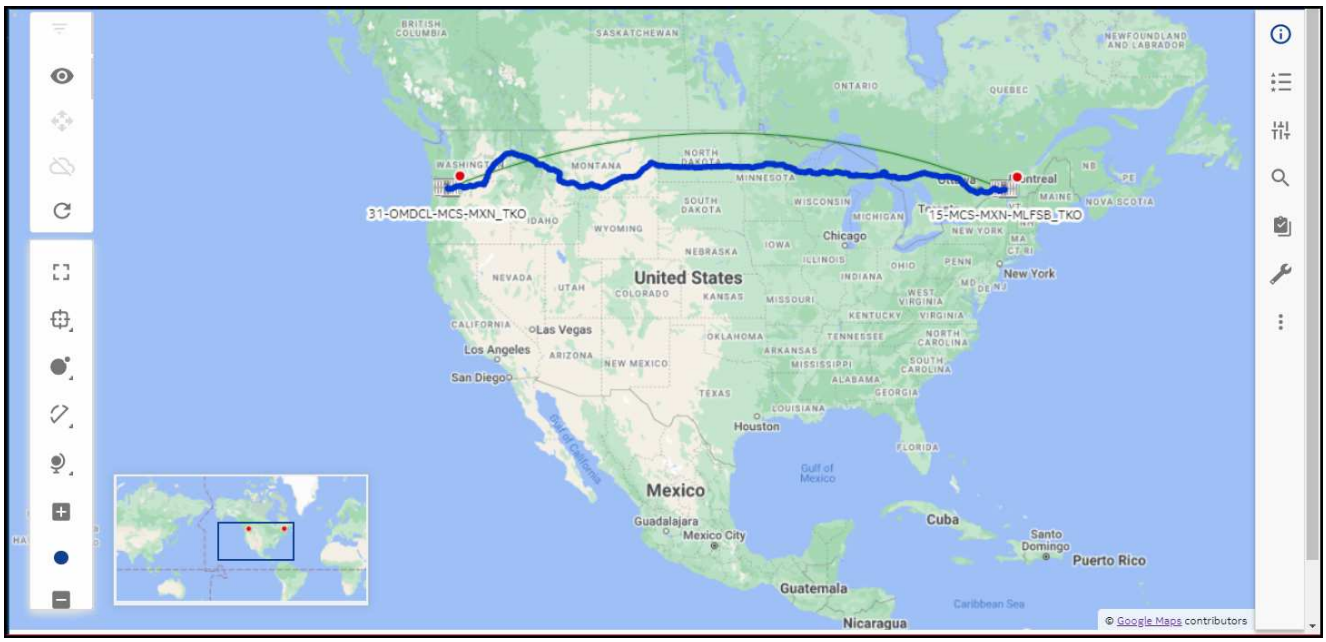
Figure 17-45 Fiber Route - display triggered from OTDR Details tab



4

Mouse over the fiber route to view the complete details of the fiber cut.

Result:

A pop-up message displays the following details:

- The latitude and the longitude
- Span Direction
- Baseline Fiber length
- Last Scan length
- Originating port of the OTDR Scan
- Date and Time the Scan was conducted

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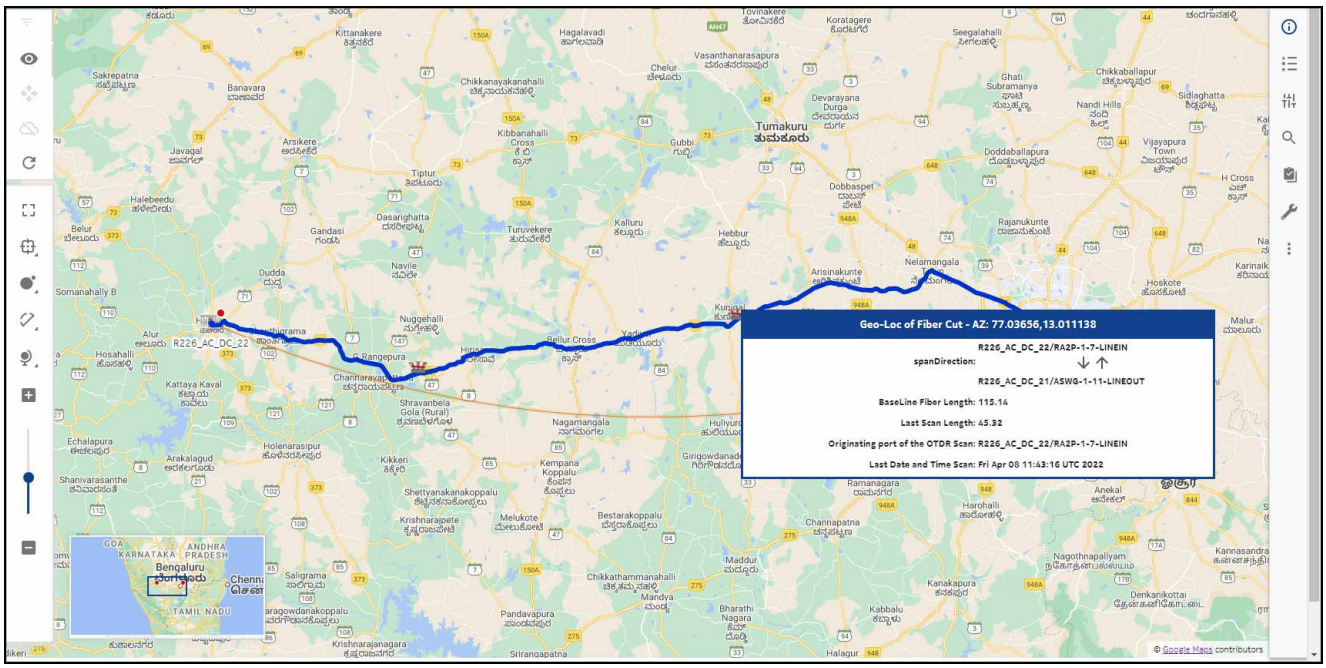
Figure 17-46 Geo-localization of the Fiber cut



Note: If there is a mismatch with the node position on the Map and against the details in the KML file, then a warning message is displayed and existing fiber route information is over-ridden.

End of steps

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17.9 Set the OTDR scan setting preferences

When to use

Auto OTDR scans are performed on external physical links (OTS) which are connected to OTDR ports.

The **OTDR Scan Settings** tab allows the users to enable or disable auto scan on LOS. When the OTDR scan Hold-off timer is enabled, the system allows the users to set a hold-off timer range between 0 and 60 in minutes and seconds.

In the event of an LOS alarm, the user can add delay before initiating an auto scan. If hold-off timer is provisioned to a value, then the scan is deferred to the set time. OTDR scan settings, if configured, apply to all physical links in the network and also applicable for all the OTDR scans which gets scheduled by LOS. OTDR Scan is triggered automatically after the hold-off period. The timer applies to the scan on all the four ports.

The **OTDR Hold-off Timer** parameter is configured with the following values:

- **OTDR Holdoff Timer** is a toggle button. Enables or disables the timer for delaying the execution of auto troubleshoot scan when LOS alarm received on physical link. When the button is disabled, the OTDR Troubleshoot scan is not triggered when LOS is detected.

  If the job is in scheduled state, the scheduled scan job gets auto deleted when the timer settings / alarm is cleared before the scan is triggered.

  When the button is enabled and timer = 0. Triggers OTDR Troubleshoot scan immediately on LOS detection.
- The **OTDR Holdoff Duration (HH:MM:SS)** - Specifies the duration where OTDR auto troubleshoot scan is performed. Click the field to open the time picker. Pick the time and click OK. The values ranges between minimum 10 seconds and maximum 5 mins 59 seconds.

  Note: There is a default system delay of 15 seconds.

Only an user with admin privileges can modify the **OTDR Holdoff Timer**.

The OTDR Holdoff timer preference is applicable to OTDR, OTDRM, and MON-OTDR.

Task

1

From the NFM-T GUI, follow this navigation path:

ADMINISTER > Preferences > System.

Result: The **Preferences** window is displayed.

2

Navigate to **CONNECTION MANAGEMENT** tab and then to **OTDR** sub-pane.

Result: The Properties related to OTDR are displayed.

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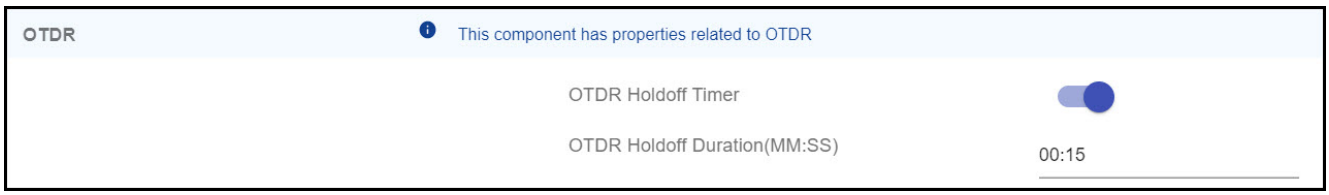
Figure 17-47 OTDR System Preferences



3

In the **OTDR Holdoff Timer** field which is a toggle button. Enable or disable the timer for delaying the execution of auto troubleshoot scan when LOS alarm received on physical link.

4

In the **OTDR Holdoff Duration (HH:MM:SS)** field, click the field to open the time picker. Pick the time and click **OK**. Click **SUBMIT**.

Result: A confirmation message stating the following is displayed: `Are you sure, you want to submit the changes ?` A successful message is displayed stating the following:

5

Click **YES**.

Result: A confirmation message stating the acceptable range of the OTDR Holdoff Duration is displayed as follows:

```
OTDR Holdoff Duration(MM:SS): Acceptable range : Min 10 sec and Max 5
min and 59 sec;
```

6

Click **OK**.

Result: The **OTDR Holdoff Duration (HH:MM:SS)** is set to the user-provided value.

END OF STEPS

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Managing Dark Fibers

17.10 Dark Fiber

Overview

From NFM-T perspective, dark fiber refers to an unused fiber-optic cable. A dark fiber can be connected to active cards in a NE and hence be converted to a physical connection carrying traffic when required.

Alternatively, dark fiber can be used to represent fibers in the same fiber duct, and hence be considered as a single fiber without traffic to represent a set of active fibers. This helps to perform OTDR scan on the dark fiber, instead of using active fibers carrying traffic. This is achieved by associating a dark fiber to a set of physical links.

With the help of dark fiber, instead of having to associate OTDR pack on all the ports or links of a connection. You can associate connections to dark fiber, trigger an OTDR scan on the dark fiber, to scan all the associated connections.

When a dark fiber is associated to physical connection(s), if there is an LOS alarm on any one of the associated physical connection, the automatic OTDR scan is triggered on the corresponding dark fiber. Therefore a fiber cut indication on the dark fiber implies that the LOS alarm is due to the associated physical links.

Note: Dark fiber cannot be associated to OPS connections and to physical links which are configured to OTDR ports.

Refer to the following sections for more information:

- 17.11 “Create a Dark Fiber” (p. 1805)
- 17.12 “Manage a Dark Fiber” (p. 1808)

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17.11 Create a Dark Fiber

Steps

Note: Only a user with Constructor profile and above can create a dark fiber.

Perform the following steps to provision a dark fiber:

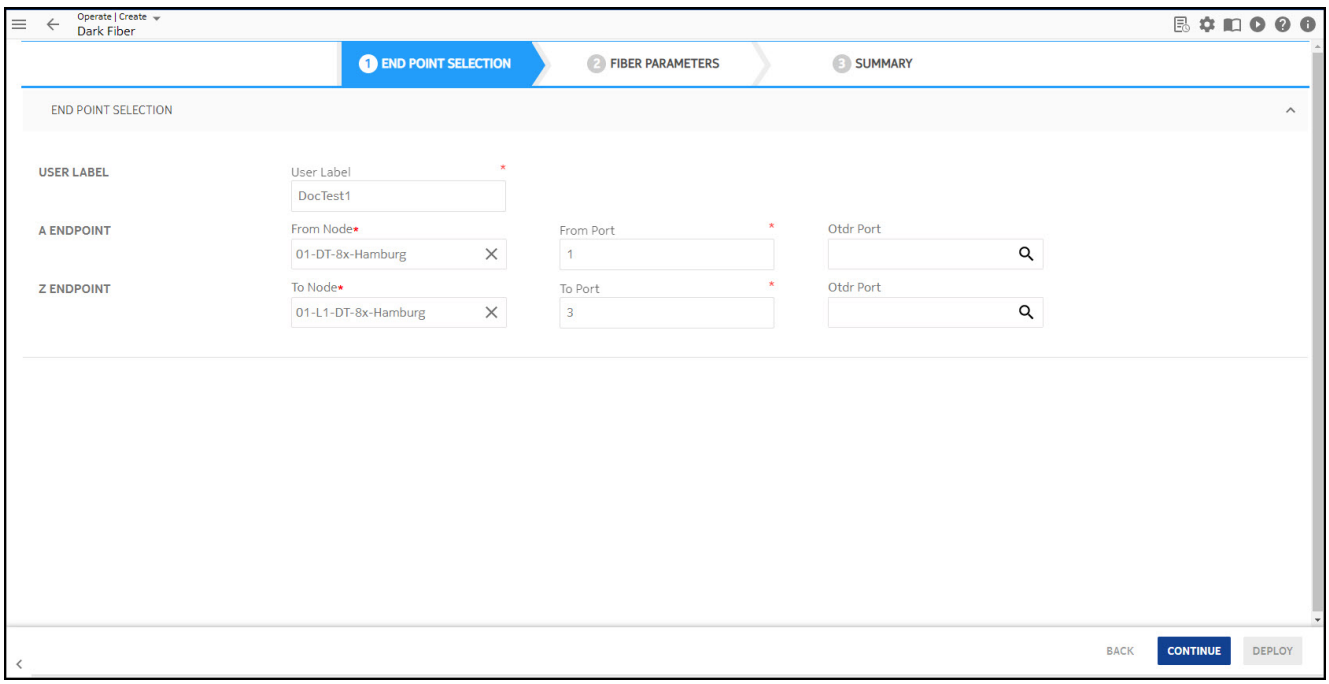
1

From the NFM-T GUI, follow one of the following navigation paths:

- **DEPLOY** > **New Dark Fiber**.
- **OPERATE** > **Dark Fibers**, click the plus icon on the top right corner.

Result: The **Dark Fiber Creation** window is displayed.

Figure 17-48 Create Dark Fiber - END POINT SELECTION



2

In the **User Label** field, provide a name to identify the dark fiber.

3

In the **End Points** panel, choose the A and Z points of the connection.

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Click on the Map or click the Search icon, to display the list of available Nodes.

Note: It is not mandatory for the both the end points of the connection to be managed by NFM-T. However, one end point of the dark fiber must be managed by NFM-T.

4

Provide a name for the port in the **Port** field for future reference.

5

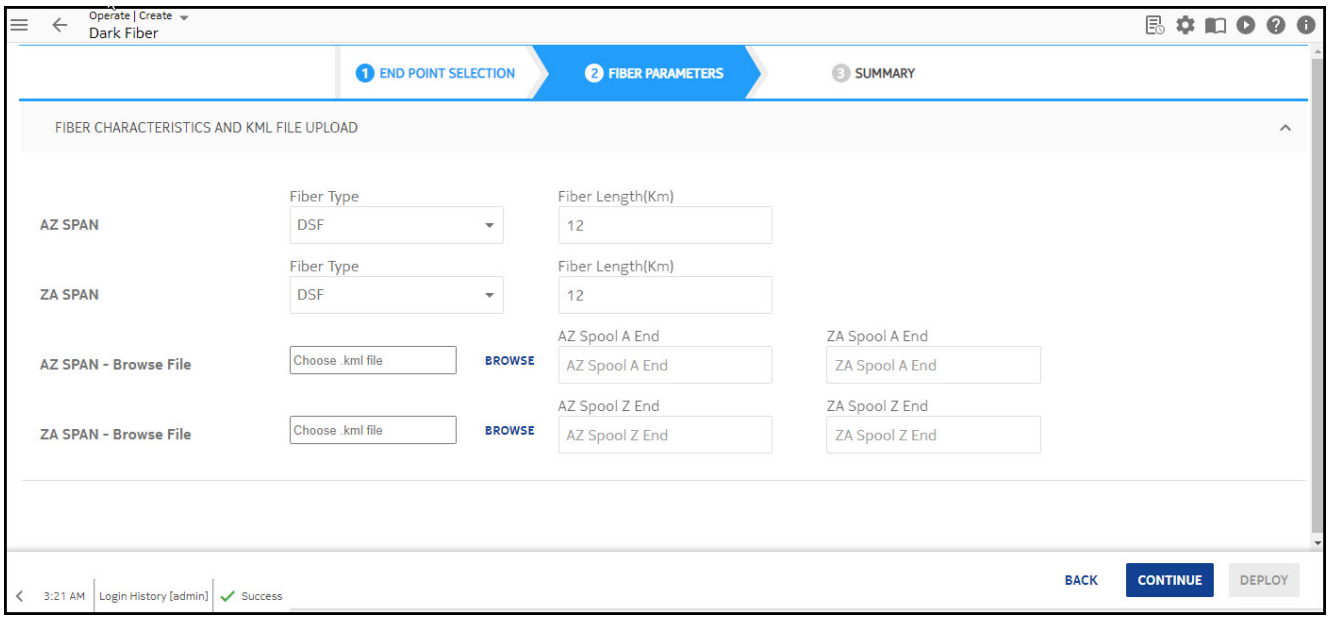
[Optional] Click the Search icon corresponding to the **Otdr Port**, and select the applicable OTDR port from the list.

6

Click **CONTINUE** or the **FIBER PARAMETERS** panel

Result: The following figure shows the options available on the **FIBER PARAMETERS** tab.

Figure 17-49 Create Dark Fiber - FIBER PARAMETERS



7

[Optional] In the **FIBER PARAMETERS** panel, select the **Fiber Type** and provide the **Fiber Length(Km)** of the dark fiber for the AZ SPAN and ZA SPAN.

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8

[Optional] In the **AZ SPAN - Browse File** field and the **ZA SPAN Browse File** field, enter the kml file name or click **BROWSE** to upload the KML file to specify the fiber route of the dark fiber.

9

[Optional] Enter the **AZ Spool A End** and **ZA Spool A End** for the AZ SPAN.

10

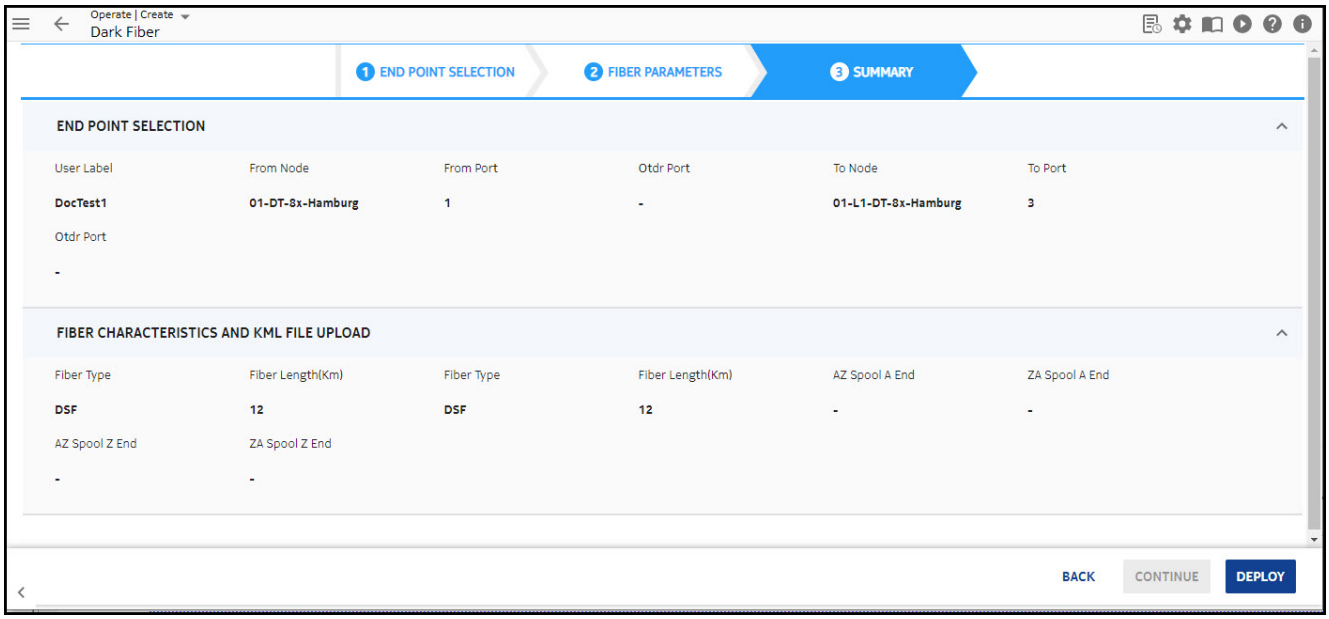
[Optional] Enter the **AZ Spool Z End** and **ZA Spool Z End** for the ZA SPAN.

11

Click **CONTINUE** or the **SUMMARY** panel.

Result: The following figure shows the options available in the **SUMMARY** tab.

Figure 17-50 Create Dark Fiber - SUMMARY



12

Click **DEPLOY**.

Result: The dark fiber is created. The status bar indicates the status of the creation.

On successful creation of the dark fiber, the system displays the dark fiber in the **OPERATE > Dark Fibers** page.

END OF STEPS

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17.12 Manage a Dark Fiber

Purpose

This section describes the various operations that can be performed on a dark fiber:

- "Modify a Dark Fiber" (p. 1808)
- "Associate or Disassociate Physical Link(s)" (p. 1810)
- "Fiber Route on Map" (p. 1812)
- "Trigger an OTDR Scan" (p. 1813)
- "Display on Network Map" (p. 1814)
- "Delete Dark Fiber(s)" (p. 1815)

Modify a Dark Fiber

1

From the NFM-T GUI, navigate to **OPERATE** > **Dark Fibers**.

Result: The system displays the list of existing dark fibers.

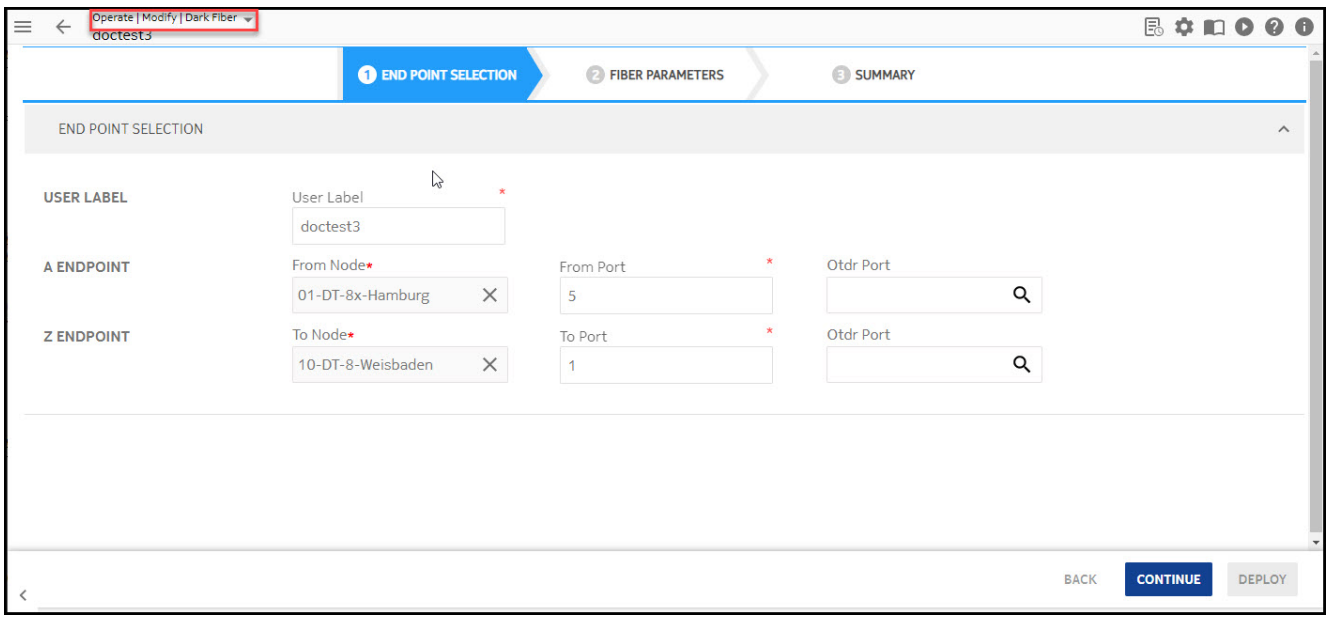
2

Select a dark fiber and click the **More** icon, and select **Modify** from the popup menu that appears.

OR

Result: The **Modify Dark Fiber** window is displayed.

Figure 17-51 Modify Dark Fiber - END POINT SELECTION



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3

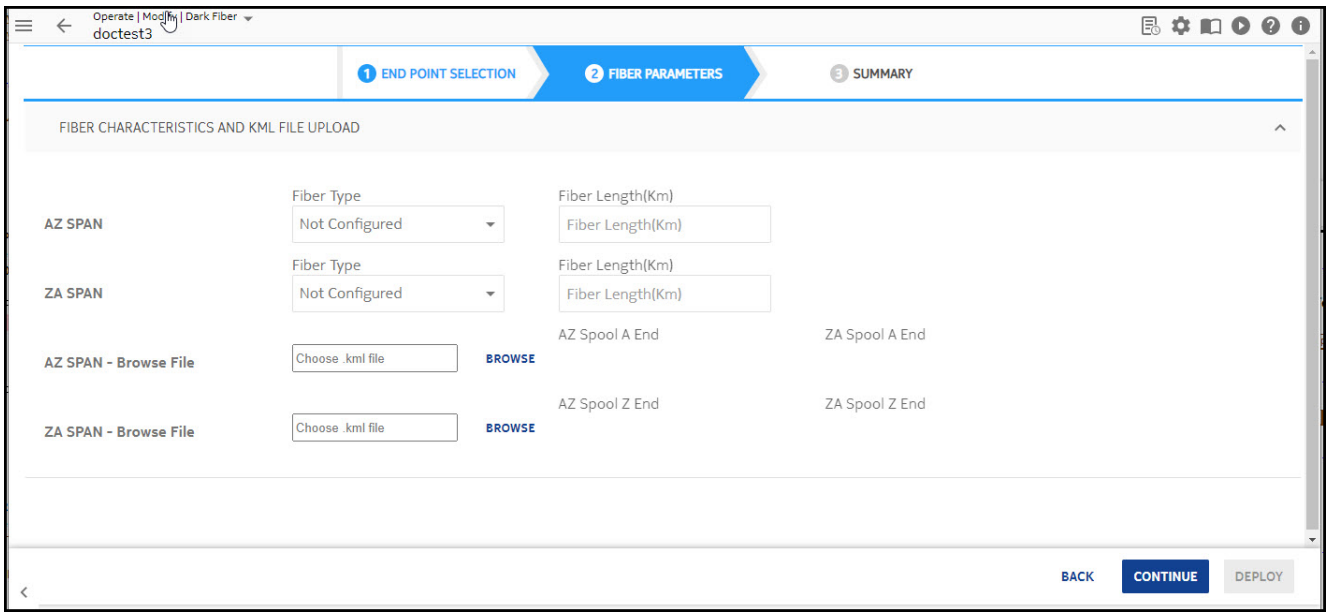
In the **END POINT SELECTION** panel, modify the modify the **A ENDPOINT, Z ENDPOINT, From Port, To Port,** and the **Otdr Ports** as required.

The **Node** of a NE managed by NFM-T cannot be modified. However, a node not managed by NFM-T can be modified.

4

In the **FIBER PARAMETERS** panel, modify the **Fiber Type** and **Fiber Length(Km)**.

Figure 17-52 Modify Dark Fiber - FIBER PARAMETERS



5

In the **AZ SPAN - Browse File** and the **ZA SPAN - Browse File** fields, upload the KML file to specify the fiber route of the dark fiber. Click **BROWSE** to select a KML file from the local folder.

6

Modify the Spool parameter at A end and Z end in both the directions of the dark fiber.

7

Click **CONTINUE** Or click the **SUMMARY** panel

Result: The **SUMMARY** panel shows the dark fiber details.

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8

Click **DEPLOY**.

Result: The dark fiber details are modified. The status bar indicates the status of the modification.

END OF STEPS

Associate or Disassociate Physical Link(s)

A dark fiber can be associated to one or more physical links. Based on the end-point of the dark fiber, the physical links in the node can be associated to the dark fiber. If the pack to be associated has built in OTDR capability, then dark fiber association is not applicable.

When a physical link associated to a dark fiber is deleted from the **Physical Connections** page, the physical link is disassociated from the dark fiber.

Perform the following steps to determine the dark fibers currently associated to physical links:

1

From the NFM-T GUI, navigate to **OPERATE** > **Dark Fibers**.

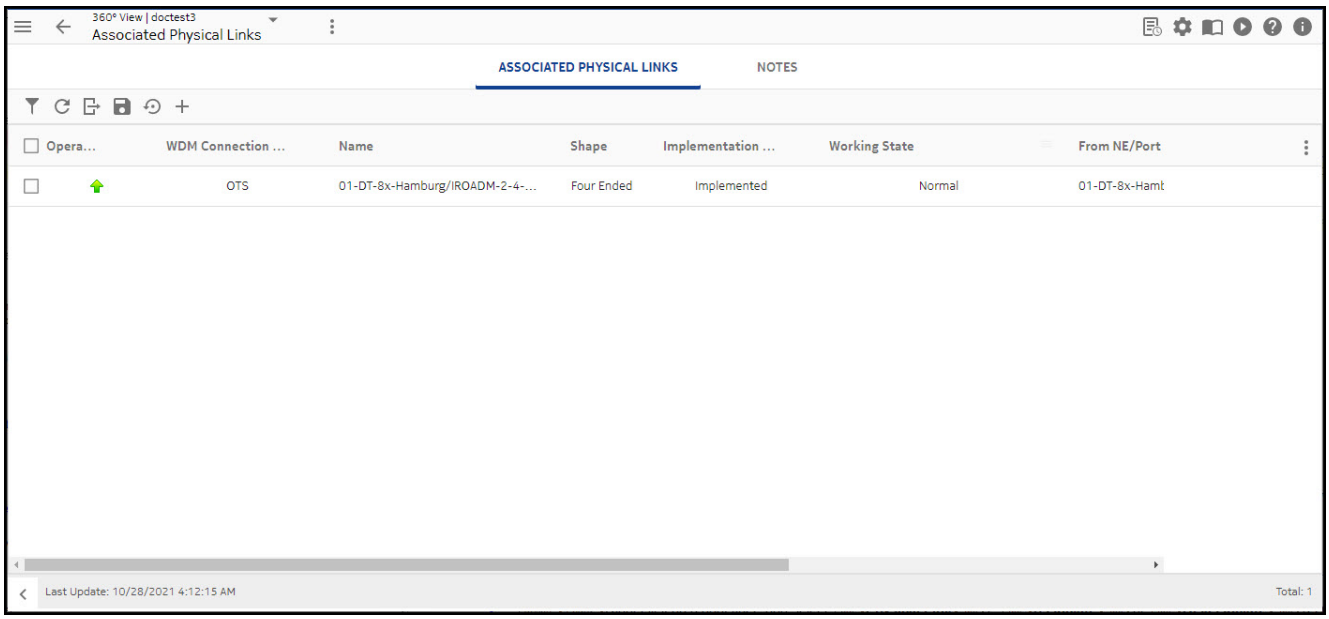
Result: The system displays the list of existing dark fibers.

2

Select a dark fiber and click on the 360^0 View icon.

Result: The Associated Physical Links page is displayed.

Figure 17-53 Dark Fiber - Associated Physical Links



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END OF STEPS

To associate or disassociate physical link(s)

1

From the NFM-T GUI, navigate to **OPERATE** > **Dark Fibers**.

Result: The system displays the list of existing dark fibers.

Note: A physical link can be associated from **OPERATE** > **Physical connections** as well. See 7.24 "Associate/Disassociate dark fiber to physical connection" (p. 817), for more details.

2

Select a dark fiber and click the **More** icon, and select **Physical Link** from the popup menu that appears.

Result: The system displays the **Physical Link List** page.

The **Physical Link List** page lists physical connections that are:

- Not configured with OTDR port(s).
- Not associated to any other dark fiber.
- In implemented state.
- Matching the A end and Z end of the dark fiber.

3

Select the connections to be associated or disassociated, and click **Associate** or **Disassociate** as required.

Note: The system allows to associate two or more physical links to a single dark fiber. Therefore, when associating an OLP-OTS connection to a dark fiber, ensure not to associate both the working path and protection path to the same dark fiber.

Result: The status bar displays the status of the operation.

4

Refresh the page to view the association or disassociation of the link to the dark fiber.

Result: The associated link is displayed in the **Associated Physical Links** panel of the 360° view of the dark fiber.

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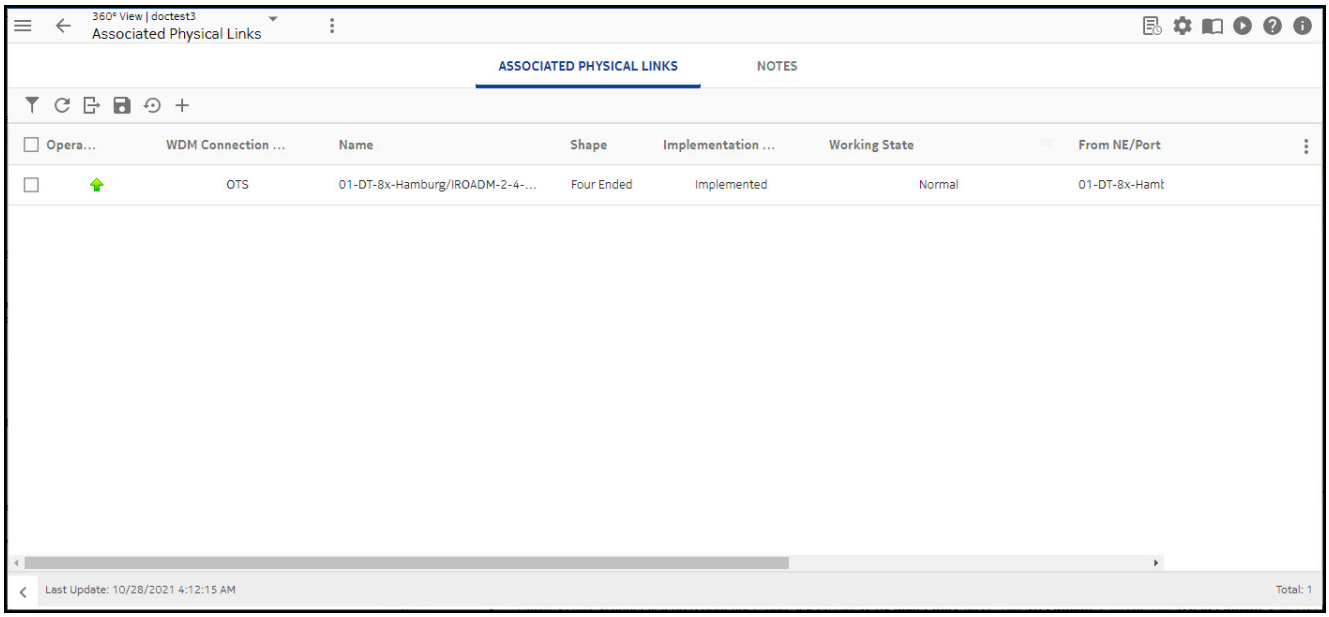
Figure 17-54 Dark Fiber - Associated Physical Links



The **ASSOCIATED PHYSICAL LINKS** tab corresponding to a dark fiber is displayed only when the dark fiber is associated to physical connections.

END OF STEPS

Fiber Route on Map

Note: The system displays Fiber Route on Map only when the following conditions are met:

- Both the end points of the dark fiber are managed by NFM-T.
- The AZ Direction KML file is uploaded.
- The corresponding direction's route is uploaded through a KML file.

The **Fiber Route Associated** column indicates if a dark fiber exists with fiber route. To view the **Fiber Route Associated** column, click the **+** icon at the upper right corner of the data table and select the **Fiber Route Associated** check box.

1

From the NFM-T GUI, navigate to **OPERATE** > **Dark Fibers**.

Result: The system displays the list of existing dark fibers.

2

Right click on the dark fiber, from the list of options click **Fiber Route on Map**.

Result: The available options **Display Fiber Route on Map** and **Delete Fiber Route** are displayed.

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To View Fiber Route on Map

3

Click **Display Fiber Route on Map**.

Result: A new network map window displays the nodes at both ends of the connection along with the fiber route. If there is a fiber cut, the network map provides the exact location of the fiber cut.

To Delete Fiber Route

4

Click **Delete Fiber Route**.

Result: A confirmation message saying `Delete Fiber Route Association from the dark fiber connection. Are you sure you want to continue?` is displayed.

5

Click **OK**.

Result: The status bar and **ADMINISTER** > **Jobs** page display the details of the deletion.

END OF STEPS

Trigger an OTDR Scan

Note: To perform an OTDR scan on a dark fiber, the dark fiber must be configured with OTDR ports.

Global Baseline scan is not supported for dark fibers.

When an OTDR scan is initiated on a dark fiber, the scan is applicable to all the associated physical links. You can perform both Baseline and Troubleshoot scan on a dark fiber. You can trigger an OTDR scan immediately or schedule it for a later time.

The **OTDR Supported**, **OTDR Summary**, and **OTDR Scan Status** columns indicate OTDR scan related information for the dark fiber. See 17.6.5 "Task: Determine support of OTDR Scan and related details" (p. 1740) for more information.

1

From the NFM-T GUI, navigate to **OPERATE** > **Dark Fibers**.

Result: The system displays the list of existing dark fibers.

2

Right click on a dark fiber, from the list of options click **OTDR**.

Result: The available options **Baseline**, **Troubleshoot**, **Jobs** are displayed.

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Note: Baseline and **Troubleshoot** option is displayed only when OTDR ports are associated to the dark fiber.

3

To perform a baseline scan, click **Baseline**.

To perform a troubleshoot scan, click **Troubleshoot**.

Result: The system displays the available options: **Schedule Scan** and **Scan Now**.

Using the **Schedule Scan** and **Scan Now** options, you can schedule a scan or perform a scan immediately as required.

To perform an OTDR scan, go to Step 4.

To schedule an OTDR scan, go to Step 5.

4

Click **Scan Now**.

Result: The Baseline Scan Status message is displayed. See 17.6.10 "Task: Initiate an OTDR Scan Now for Baseline and Troubleshoot" (p. 1758), to know more about immediate OTDR scan.

5

Click **Schedule Scan**.

Result: The OTDR Scan Scheduler window is displayed. See 17.6.9 "Task: Schedule an OTDR Scan for Baseline and Troubleshoot" (p. 1751), to know about the parameters in the Scheduler window.

6

To view the results of the scan, click the **OTDR Details** tab in the 360° view.

Result: The system displays the results of the scan in the **Scan Report** panel.

END OF STEPS

Display on Network Map

Note: The system displays the route of dark fiber on Network Map, only if both the end points of the dark fiber are managed by NFM-T.

1

From the NFM-T GUI, navigate to **OPERATE** > **Dark Fibers**.

Result: The system displays the list of existing dark fibers.

2

Right click on the dark fiber, click **Display Route on Map** from the list of options.

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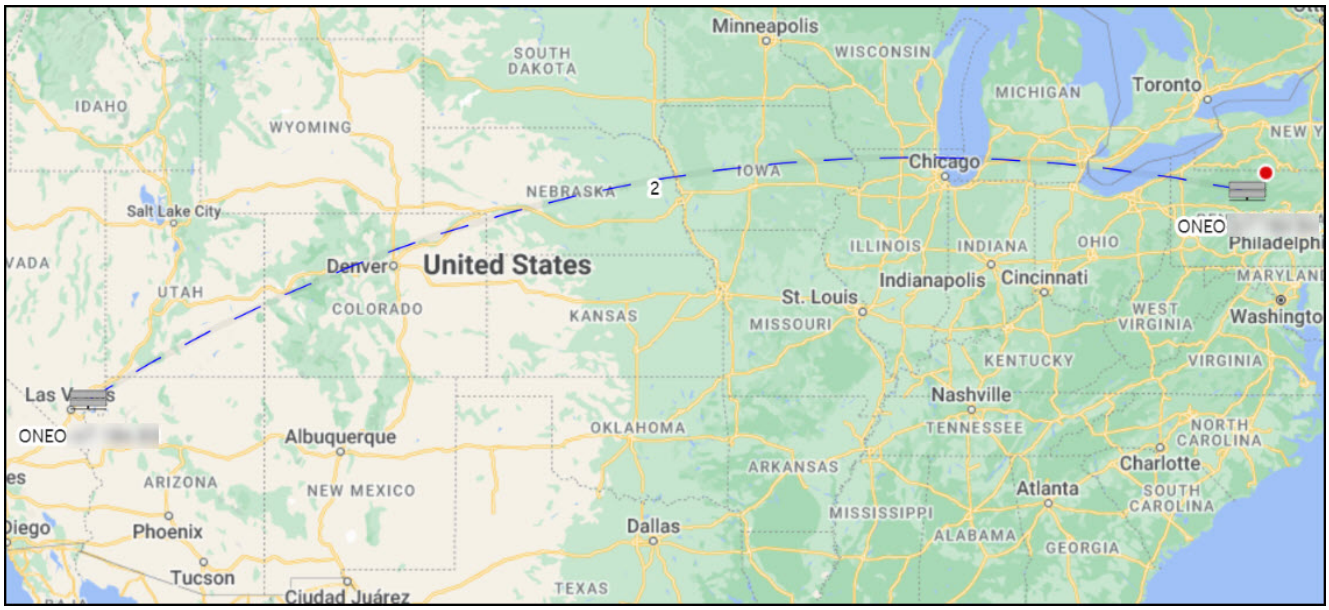
Result: The system opens a new browser tab and the route of the dark fiber is displayed on the Network Map.

The Network Map also displays the number of associated physical links to the dark fiber.

Figure 17-55 Dark Fiber on Route Map



END OF STEPS

Delete Dark Fiber(s)

Note: A dark fiber cannot be deleted if physical connections are associated to it.

Deleting a dark fiber, deletes the related association with the OTDR ports. To convert a dark fiber to a physical connection carrying traffic, the dark fiber must be deleted and recreated as a physical connection.

Perform the following steps to delete a dark fiber:

1

From the NFM-T GUI, navigate to **OPERATE** > **Dark Fibers**.

Result: The system displays the list of existing dark fibers.

2

Select a dark fiber to delete, and click the Red Delete icon at the end of the row. .

OR

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Select a dark fiber and click the **More** icon at the end of the row, and select **Delete** from the popup menu that appears.

Result: A delete confirmation dialog box is displayed.

3

Click **OK**.

Result: The system deletes the dark fiber and the status bar displays the success message.

4

To delete multiple dark fibers, select more than one of the dark fibers that you want to delete, or click the checkbox **Name** column to select all the dark fibers.

5

Click the **More** icon that appears at the top right corner of the action menu, and select **Delete** from the popup menu that appears.

Result: A delete confirmation dialog box is displayed.

6

Click **OK**.

Result: The system deletes the dark fiber and the status bar displays the success message.

END OF STEPS

Tabs in 360° View

The following tabs are applicable to a dark fiber:

Tab	Description
Associated Physical Links	This tab is displayed when the dark fiber is associated to physical connection(s). It lists all the connections associated to the dark fiber. See "Associate or Disassociate Physical Link(s)" (p. 1810), for more information. See 7.44 "Physical Connections table columns" (p. 896), to know about the columns displayed.
OTDR Details	This tab is displayed when OTDR ports are configured to a dark fiber. See the following sections for more information: • 17.6.14 "Task: View the Fiber Length Report" (p. 1769) • 17.6.15 "Task: View the OTDR Scan History and Retrieve Files" (p. 1772) • 17.6.16 "Task: View the Graphical Display" (p. 1774) See 17.11 "Create a Dark Fiber" (p. 1805) and "Modify a Dark Fiber" (p. 1808), to configure OTDR ports.

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Tab	Description
Notes	This tab is displayed for all dark fibers.
Scan Report	Displays the Scan report.
Scan History	Displays the scan history.
Scan Graph	Displays a graphical view.

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Manage Optical Power

17.13 Optical power visualization

Optical power visualization definition

Optical Power Visualization is a NFM-T OTN feature in which users can visualize, monitor, and measure optical power for NEs that support Optical Power Visualization and that are directly managed by the NFM-T OTN on the NFM-T GUI.

A Wavelength Tracker power spectrum can be displayed at each port with decoder information. This information displays all the detected channels, their current power, expected power, and allowable deviations. Optical Power Visualization displays NEs and ports of an OTS, OCH, or OTUk span at a time.

For OTSig tunnel, one OTSig trail is represented one OCH trail for each line port.

Power Monitoring screen displays a complete signal path of optical channel through the 1830 PSS nodes. For example, it now displays ports of passive cards such as filters (SFD, SFC), and other cards that do not have per-channel power measurement capability but are part of the optical channel topology.

The ports that do not report power, or ports where the network element does not return a per-channel power value are color coded differently from other ports with optical power measurement capabilities. They are displayed as white colored bars on the Power Monitoring screen.

Complete representation of signal path on the Power Monitoring screen helps in the troubleshooting of optical transmission through the node, as the user can view all the packs and ports impacting the transmission.

Optical Power monitoring and measurement

Optical power monitoring and measurement in the NFM-T OTN ensures that the optical power for each wavelength in the transmission is maintained within the required limits. Optical power must be maintained for each wavelength for the following reasons:

- Power degradation due to fiber bend or kinks in the fiber.
- Power equalization across multiple wavelengths when new services are provisioned.
- Power degradation and loss in fiber patch panels due to interconnection errors.
- ROADM provisioning errors.

Support for Wavelength Tracker and the WTOCM card

Wavelength Tracker uniquely identifies each service or wavelength in the network. Each channel or wavelength carrying customer traffic in a NFM-T OTN network is encoded with a unique pair of Wave Keys that allow the channel to be identified from end-to-end across the network and that ensures its power to be monitored. The Optical Power Visualization feature enables the users to monitor the optical channel power level constantly in their managed network.

The assignment of Wave Keys is managed by the NEs that maintain a database of Wave Keys in the network. The Wave Keys are decoded and the optical power is measured and monitored.

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The 1830 PSS R3.0 and later NEs support both *standard* Wavelength Tracker (WT) for regional applications, and *Long-Haul* Wavelength Tracker (LH-WT) for long haul applications. The LH-WT is supported by the Wavelength Tracker Optical Channel Monitoring (WTOCM) card, which is connected to the external facing line driver (LD) (also called *Ingress LD*) on an optical line.

Note: The Wave Tracker monitors that are built into the LD type packs could have impaired performance; whereas, the WTOCM card performs enhanced WaveTracker key detection and power per channel measurement of four input ports for network configurations.

.

Bidirectional Optical Power Display

NFM-T helps the user to visualize the optical power readings of ports along the Service or Infrastructure connection paths. The new **Bidirectional Optical Power** screen is introduced for this purpose. It allows the user to view instantaneous optical signal power readings of client and network ports in one screen, including both AZ and ZA directions of the signal propagation.

The bi-directional optical power display is supported for OTS, OTUk, ODUk infrastructure connections, and all services except for the following:

- Connections with CWDM frequency
- Auto discovered OPS connections
- Direct connections (OT to OT)

To view the bi-directional optical power display, the selected service or connection must be in Commissioned state.

Note: If you are using Mozilla Firefox browser, go to **Open Menu** on the top right corner, navigate to **Options > Privacy & Security > Cookies and Site Data**. Ensure that the **Delete cookies and site data when Firefox is closed** check box is unchecked to see the Power Monitoring View. Please refresh the Services/Infrastructure Connections page after the changes are applied.

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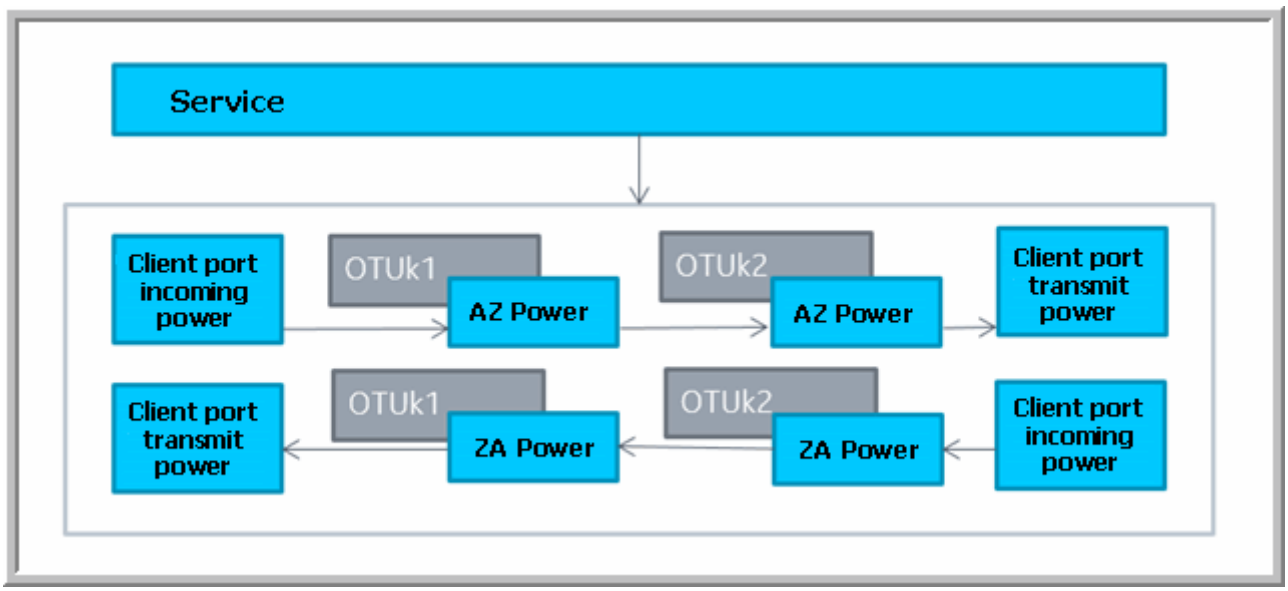
Figure 17-56 Basic Optical Power Along a Service



Note:

- The power values are not refreshed automatically.
- NFM-T supports setting and viewing the lane powers for the optical lanes in the Equipment Manager (EQM). These optical lanes are used for transmission depending on the pluggable module available on the selected port. In the Bidirectional Optical Power Display, the lane powers are not shown and one power value is displayed per port with an orange power bar.

See the following procedures for more information:

- 17.15 “View Bidirectional Optical Power display for ODUk infrastructure connections and services” (p. 1859) provides the procedure to view the bi-directional optical power display of an ODUk infrastructure connection or service.
- 17.17 “Manage optical power for an OTUk infrastructure connection” (p. 1868) provides the procedure to adjust, export, view, and refresh the optical power of an OTUk infrastructure connection.

ODUk connection and Services Bidirectional Power Display

The power graph is divided into two halves. The upper half displays the NEs and ports of the ODUk trail or service in the A to Z (starting point to the terminating point) direction. Conversely, the lower half displays the NEs and ports of the ODUk trail or service in the Z to A direction (terminating point to starting point).

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Figure 17-57 Bidirectional Optical Power Display for a Service - An Example

In each of the graphs, the horizontal axis lists the ports of the participating NEs, and the vertical axis indicates the power in dBm. The power levels at each port are displayed graphically as a vertical rectangular bar.

Note: In the **Bidirectional Optical Power Display**, since the MLFSB is a non-power reporting card, the direction is displayed as *OUT*.

OTUk icons represent the wavelengths that transport client signals through the 1830 PSS DWDM network. To open the **Bidirectional Optical Power Display** window of the corresponding OTUk from this window, click on the OTUk icon between the participating NEs.

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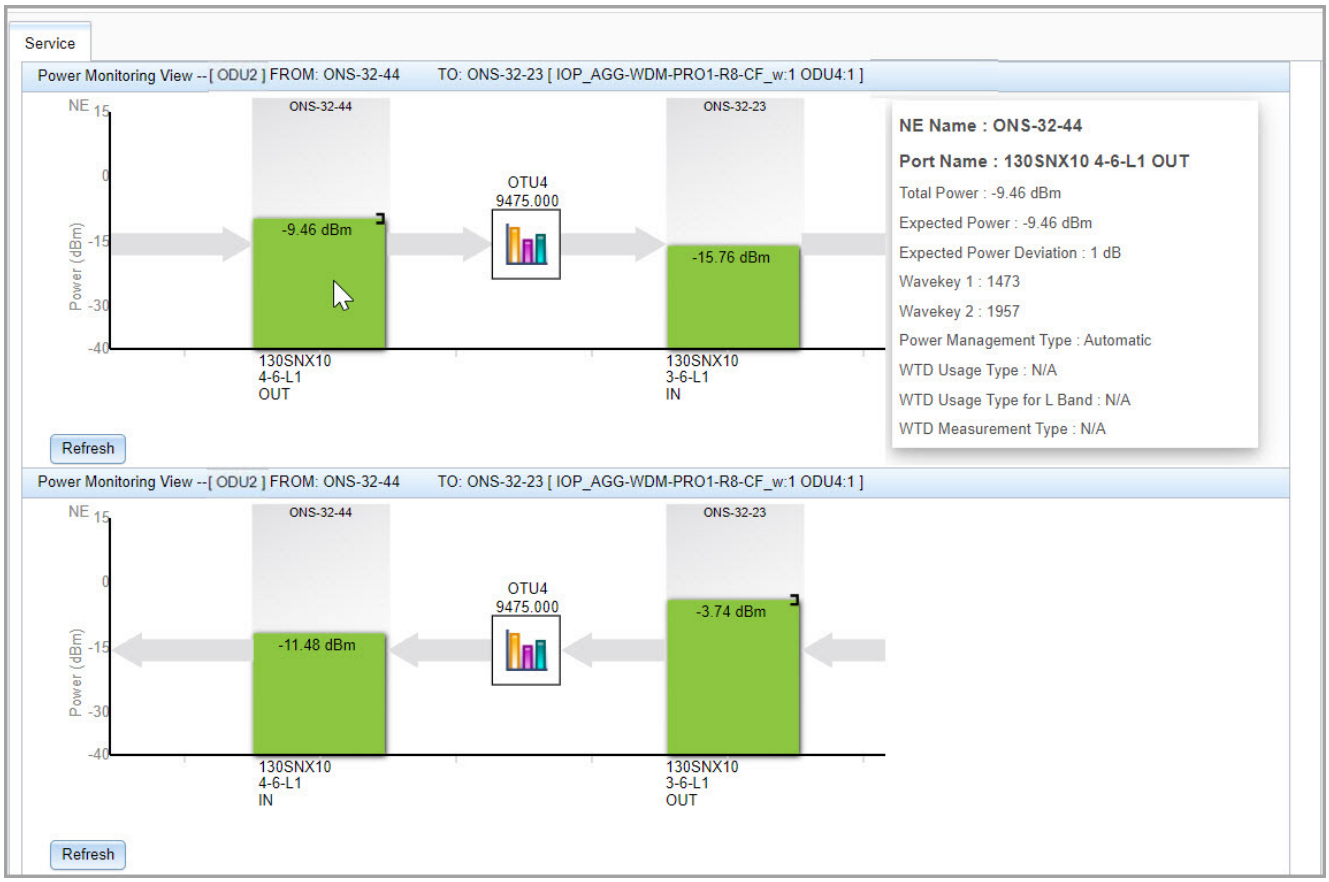
You can click the corresponding **More** icon in the ODUk on the Infrastructure Connection list and select **Optical Power > Bidirectional Optical Power** to view the **Bidirectional Optical Power Display** window of the ODUk.

A mouse-over on the ports displayed in the power graph shows the following attributes on the top right corner of the graph.

- NE Name
- Port Name
- Total Power
- Expected Power
- Expected Power Deviation
- WTD Usage Type
- WTD Measurement Type

Figure 17-58 An Example of Mouse Over the power bars



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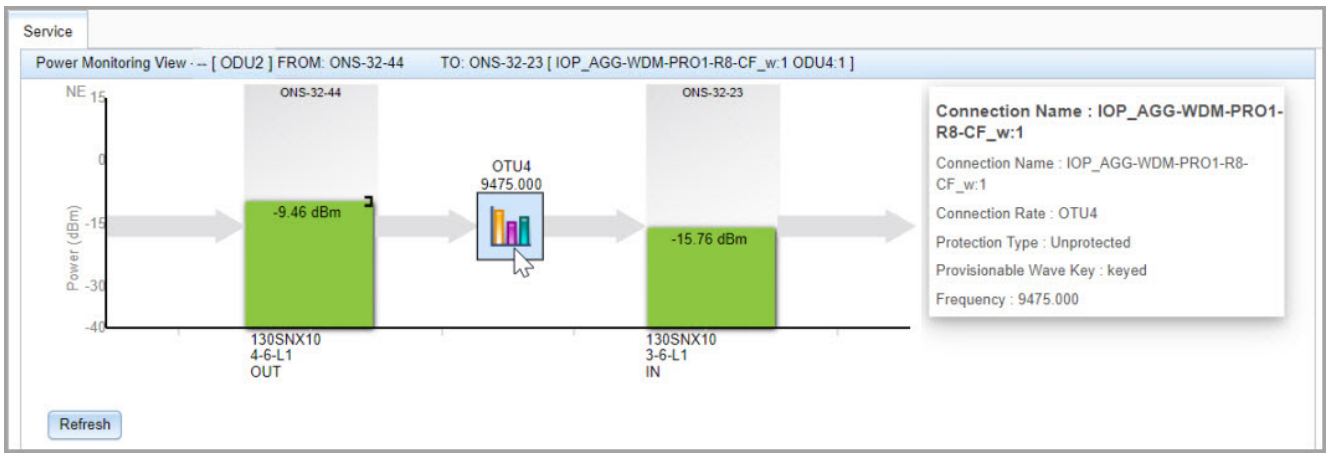
A mouse-over on the OTUk icon displayed in the power graph shows the following attributes on the top right corner of the graph.

- Connection Name
- Connection Rate
- Protection Type
- Provisionable Wave Key
- Frequency

Figure 17-59 Mouse Over OTUk icon on Power Graph



In case of a protected service or protected ODUk connection, the power graph of the protection path is displayed under the **Protection** tab. If the ODUks and the OTUks of a service or ODUk connection are both protected, the power levels of the ports of the ODUk route is displayed on the graph.

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Figure 17-60 Example of a Protection Tab for a Protected ODUk Connection

OTUk connection Bidirectional Power Display

The power graph is divided into two halves. The upper half displays the NEs and ports of the OTUk trail in the A to Z (starting point to the terminating point) direction for a particular frequency. Conversely, the lower half displays the NEs and ports of the OTUk trail in the Z to A direction (terminating point to starting point) for a particular frequency.

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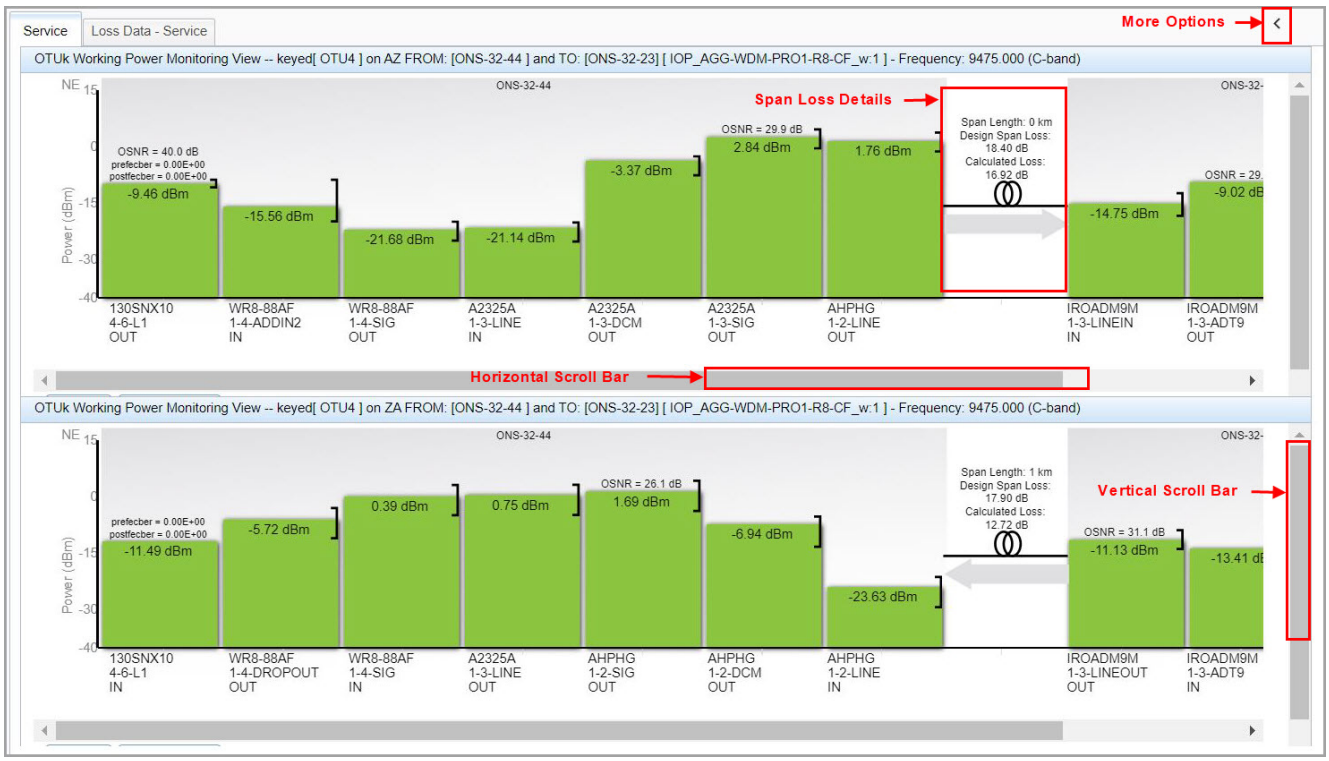
Figure 17-61 Bidirectional Optical Power Display for an OTUk - An Example



For intermediate OTS connection an OTS Span icon is displayed with the values for the following parameters:

- Span length
- Design Span Loss
- Calculated Loss

Users can export the values by clicking on the **Export to CSV** button for A to Z direction or Z to A direction. The exported file stores the values for the parameters **NE Name**, **Port Name**, **Port Direction**, **Expected Power**, **Expected Power Deviation**, and **Measured Power**. The ports on which the power values cannot be measured are listed as **null**. The user edits the .csv files for example, highlight a value. In some cases, editing and saving a .csv file may not be supported on the user's machine. In such a scenario, the original .csv file must be saved in .xlsx format and then edited.

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Figure 17-62 OTUk Export to CSV Example

Connection Name	Direction	Frequency	Pre-FEC BER	Post-FEC BER	
LL1-OTU3E2-FEC-43SCA1 OTU3#1	AZ	9400	1.74E-07	7.08E-08	
NE Name	Port Name	Port Direction	Expected Power (dBm	Expected Power De	Measured Power (dBm)
nR207_CDCF_01	43SCX4 5-7-L1	OUT	-1.3	1	-1.3
nR207_CDCF_01	MCS8-16 1-9-AD4	IN	null	null	null
nR207_CDCF_01	MCS8-16 1-9-SIG1	OUT	null	null	null
nR207_CDCF_01	AAR2X8A 1-11-AMPIN8A	IN	null	null	null
nR207_CDCF_01	AAR2X8A 1-11-AMPOUT8	OUT	null	null	null
nR207_CDCF_01	WR20-TFM 1-4-AD10	IN	-2.83	5	null
nR207_CDCF_01	WR20-TFM 1-4-SIG	OUT	-18.9	2.5	null
nR207_CDCF_01	ASWG 1-3-LINEIN	IN	-19.1	2.5	null
nR207_CDCF_01	ASWG 1-3-LINEOUT	OUT	-1.32	2.5	null
nR207_CDCF_02	RA2P-96 1-2-LINEIN	IN	null	null	null
nR207_CDCF_02	RA2P-96 1-2-LINEOUT	OUT	null	null	null
nR207_CDCF_02	ASWG 1-6-LINEIN	IN	-17.29	2.5	null
nR207_CDCF_02	ASWG 1-6-LINEOUT	OUT	3.18	2.5	null
nR207_CDCF_02	WR20-TFM 1-4-SIG	IN	2.98	2.5	null

A mouse-over on the ports displayed in the power graph shows the following attributes on the top right corner of the graph.

- NE Name
- Port Name
- Measured Power
- Power Management Type
- Total Power
- OSNR
- Expected Power
- Expected Power Deviation
- Wavekey1
- Wavekey2
- WTD Usage Type
- WTD Measurement Type

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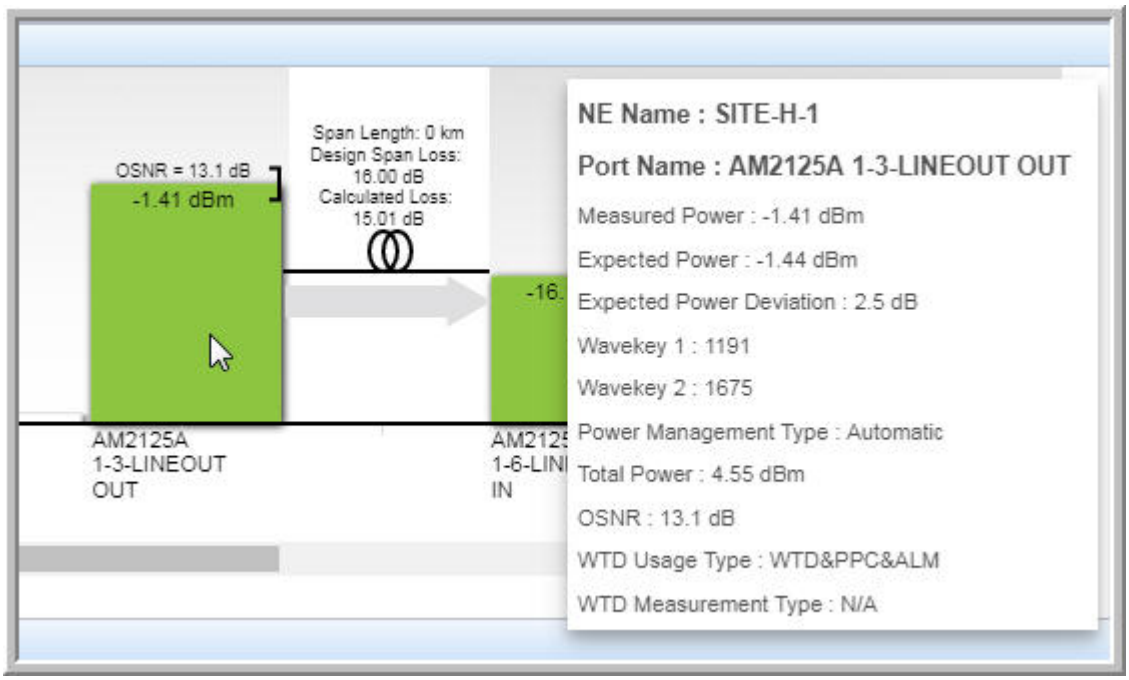
Figure 17-63 An Example of Mouse Over power bar of OTUk



When there is a WTOCM attached to an LD pack, the WTD Measurement Type is displayed as WTOCM and the power bar for the LD port has an asterisk (*) next to the power value as illustrated in the following figure.

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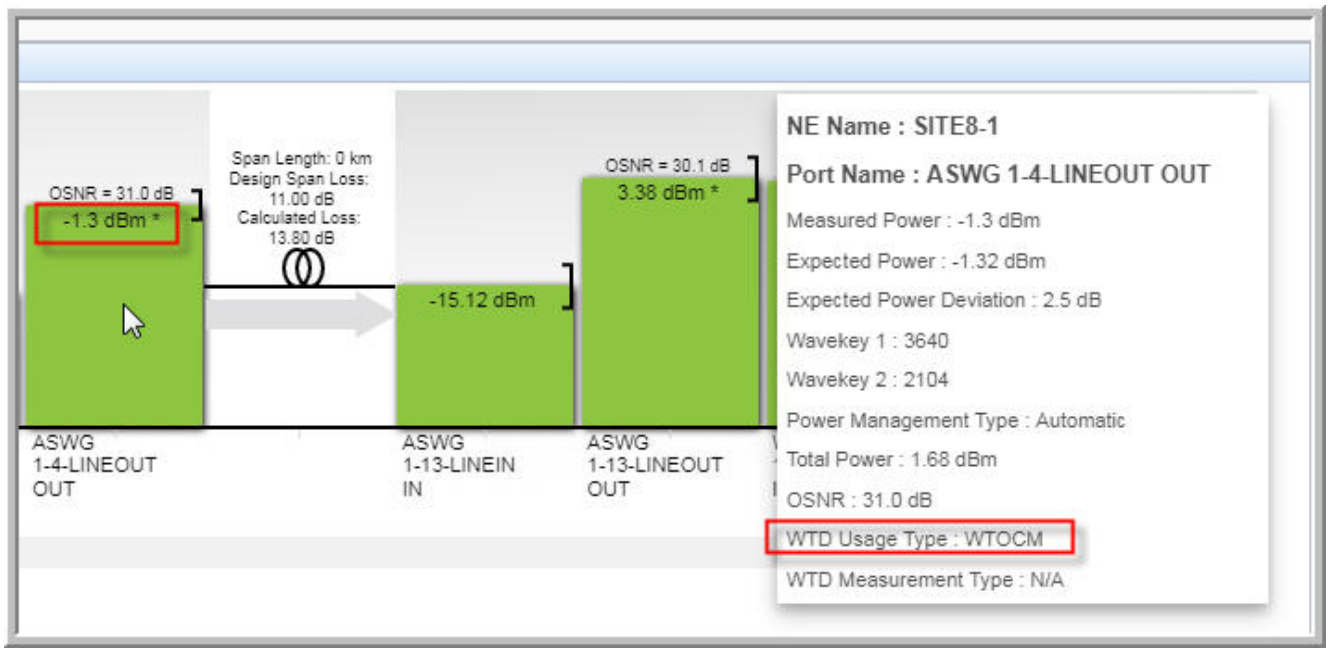
Figure 17-64 WTOCM attached LD pack Power bar with *



The More User Options arrow icon on the top right corner allows the user to perform the functions such as viewing additional information of the OTUk connection, configuring the auto refresh cycle, and adjusting power.

Pre-FEC and Post-FEC Bit Error Ratio (BER)

The following Figure 17-65, “OTUk power monitoring with Pre-FEC and Post-FEC BER - An Example” (p. 1829) displays the Pre-FEC and Post-FEC Bit Error Ratio (BER) values at the connection end points in the Bidirectional Optical Power for OTUk window, along with OSNR values.

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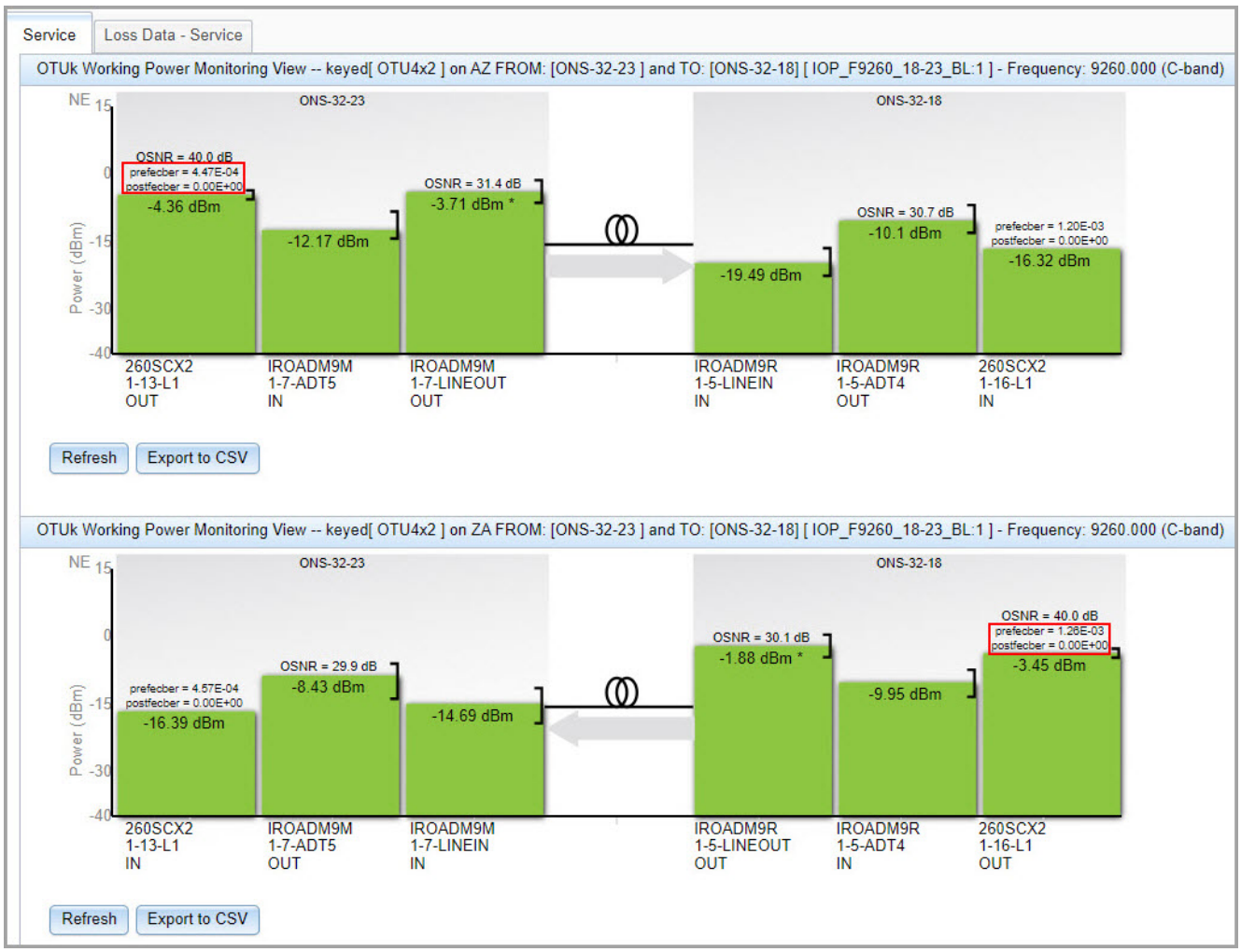
Figure 17-65 OTUk power monitoring with Pre-FEC and Post-FEC BER - An Example



The values are shown for both directions in the bi-directional view. For example, in the A to Z direction, the Pre-FEC and Post-FEC BER values calculated at Z end are also displayed at the A end for the OTUk channel. Similarly, in the Z-A direction, values calculated at A are also displayed at Z end of the OTUk channel.

Note:

- The Pre-FEC and Post-FEC BER (Bit Error Ratio) is a unitless performance calculation and is expressed as a percentage. It doesn't represent Bit Error Rate.
- The value of BERs are calculated and updated at every one second interval.

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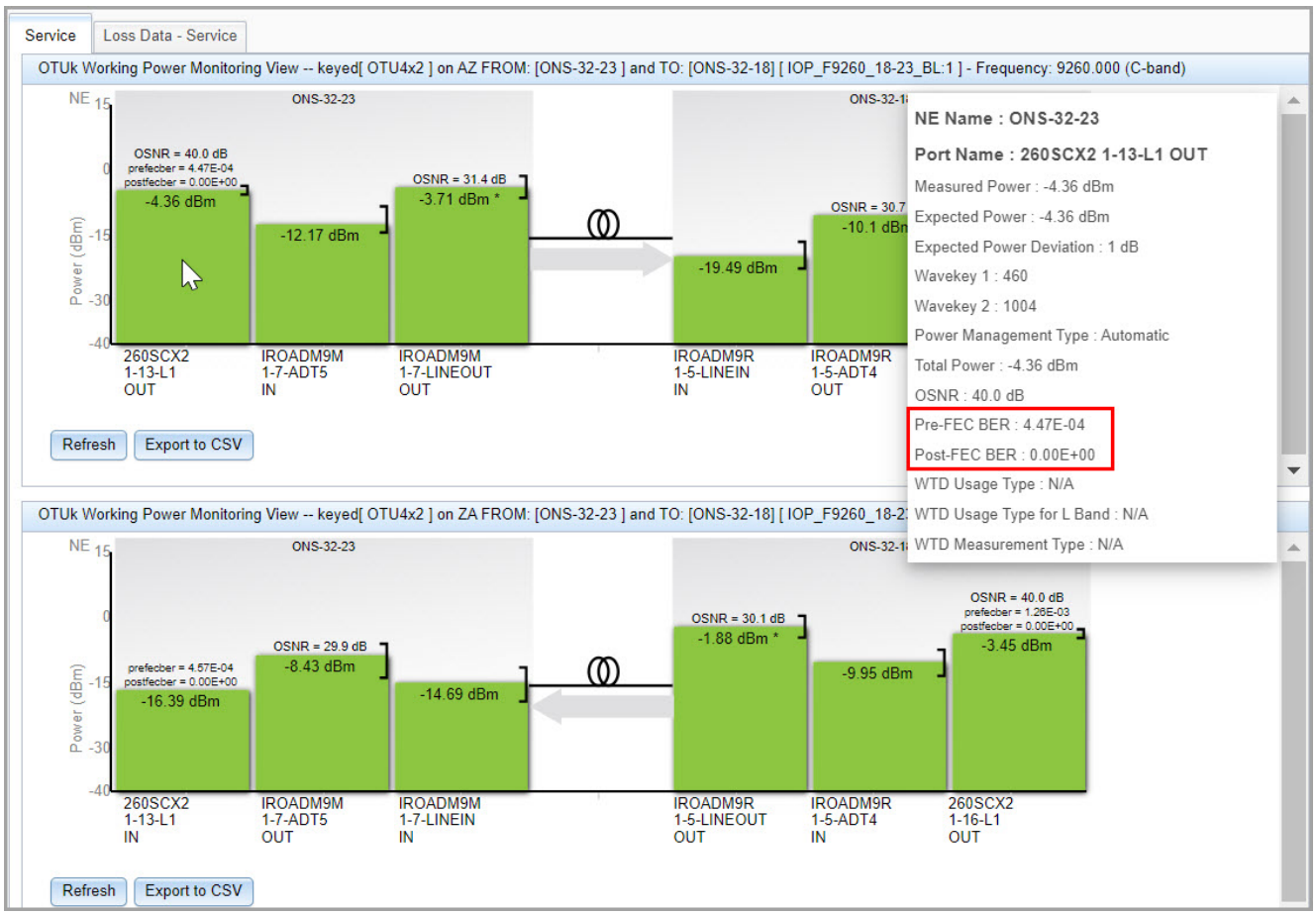
A mouse-over on the ports displayed in the power graph shows the following attributes on the top right corner of the graph. The following Figure 17-66, “Mouse Over power bar with Pre-FEC and Post-FEC BER” (p. 1829) of the Bidirectional Optical Power display shows the Pre-FEC and Post-FEC BER values.

Figure 17-66 Mouse Over power bar with Pre-FEC and Post-FEC BER



Note: The Pre-FEC and Post-FEC BER values are displayed only for OT and uplink cards.

Interworking of S13X100 and 4UC400 packs

The following Figure 17-67, “Interworking of S13X100 and 4UC400 - An Example” (p. 1831) shows interworking of S13X100 and 4UC400 for OTU4 connection.

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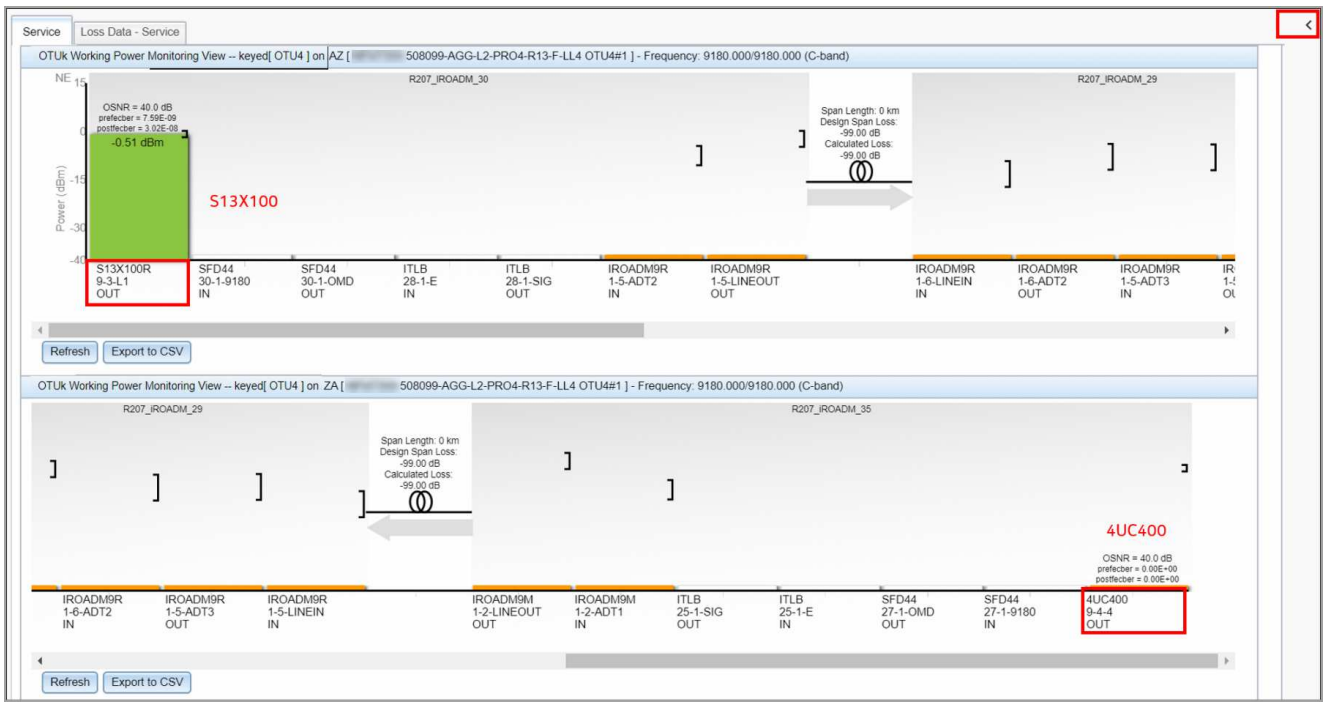
Figure 17-67 Interworking of S13X100 and 4UC400 - An Example



Click icon located at the top right corner to view the additional information. The following Figure 17-68, “Additional Information - Pre/Post FEC values for A to Z and Z to A” (p. 1832) displays the Pre/Post Fec values for A to Z and Z to A.

A to Z – Pre/Post Fec BER shows the value of Z end (4UC400). So, for AZ direction, BER values are shown of the receiver which is 4UC400.

Z to A - Pre/Post Fec BER shows the value of A end (S13X100). So for ZA direction, BER values are shown of the receiver which is S13X100.

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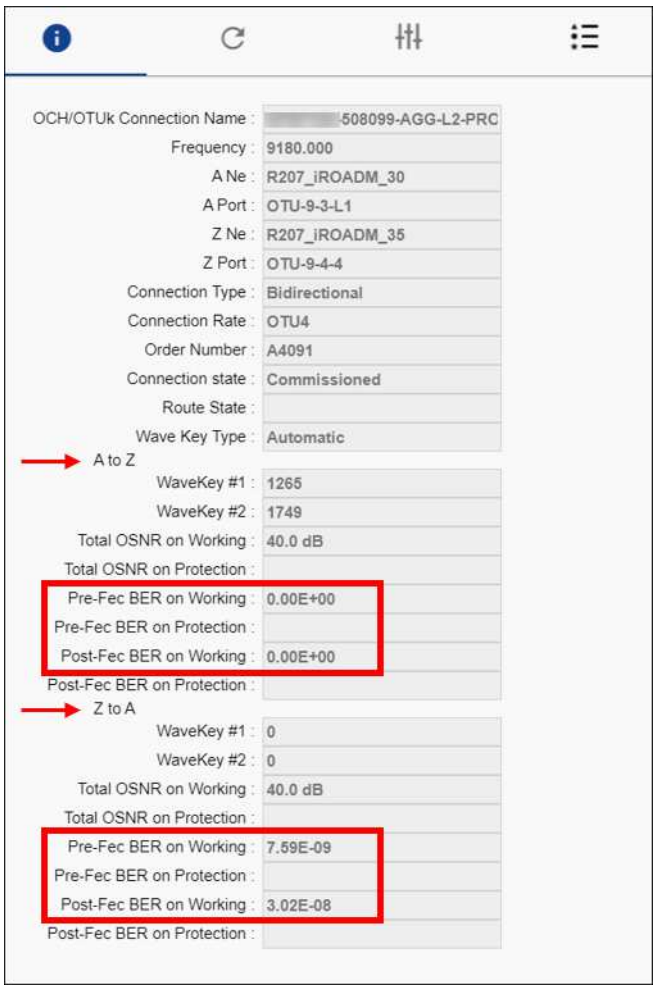
Figure 17-68 Additional Information - Pre/Post FEC values for A to Z and Z to A



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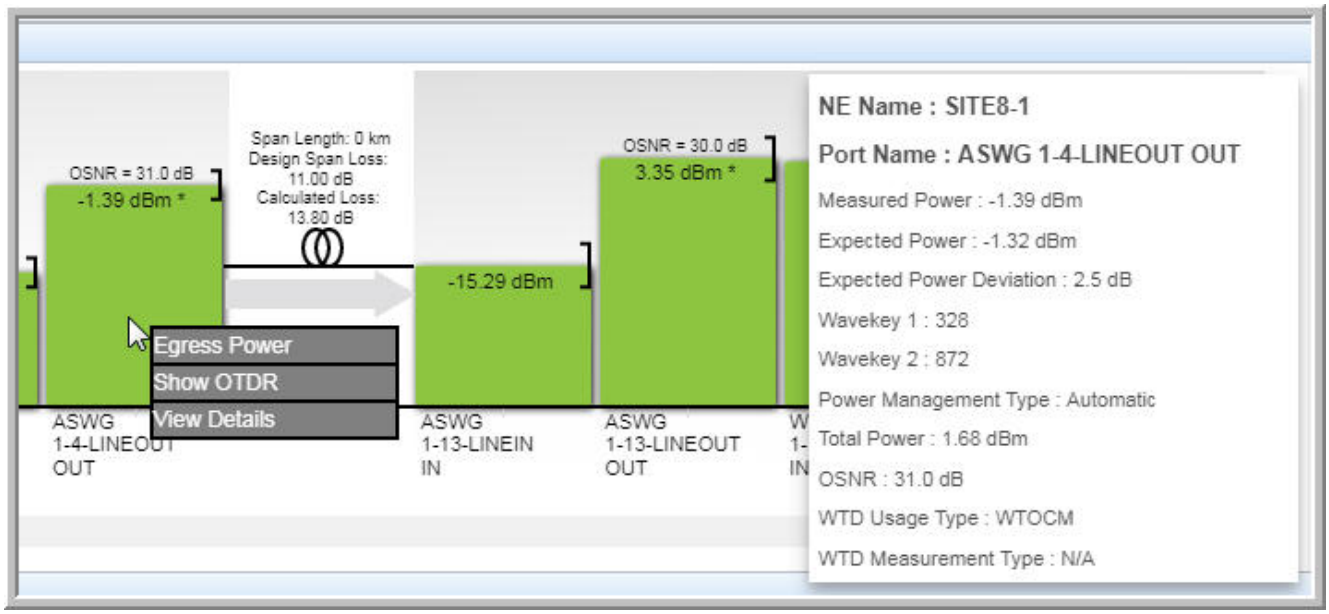
Right click actions on Power Graph

Figure 17-69 Right Click LD Port Bar Beside an OTS Span



Right click on the power graph adjacent to an OTS span for the following actions:

- **Egress Power**: Navigates to the OTS wavelength.
- **Show OTDR**: Displays the OTDR scan settings and scan information of the selected connection in another browser tab.
- **View Details**: Displays the details of the chosen port. This option is available for all the ports displayed in the power graph.

Loss Graph Display

The **Loss Graph** tab of a bidirectional power display for an OTUk connection displays the power loss along the path of the OTUk connection. The power loss is calculated as the difference between the measured power levels between the two ports where the powers are measurable.

Loss Graph information provides additional information to help diagnose network issues. As an example, a view of how the loss at the power monitoring points connected directly to the OTS span helps diagnose issues such as high span loss and LDs compensating for this loss, even though the power monitoring may appear to be within limits. Thus, a view of loss on a OTUk provides additional insight into the state of the packs and fibers that an OTUk trail crosses and helps diagnose problems that are associated with OTUk optical power.

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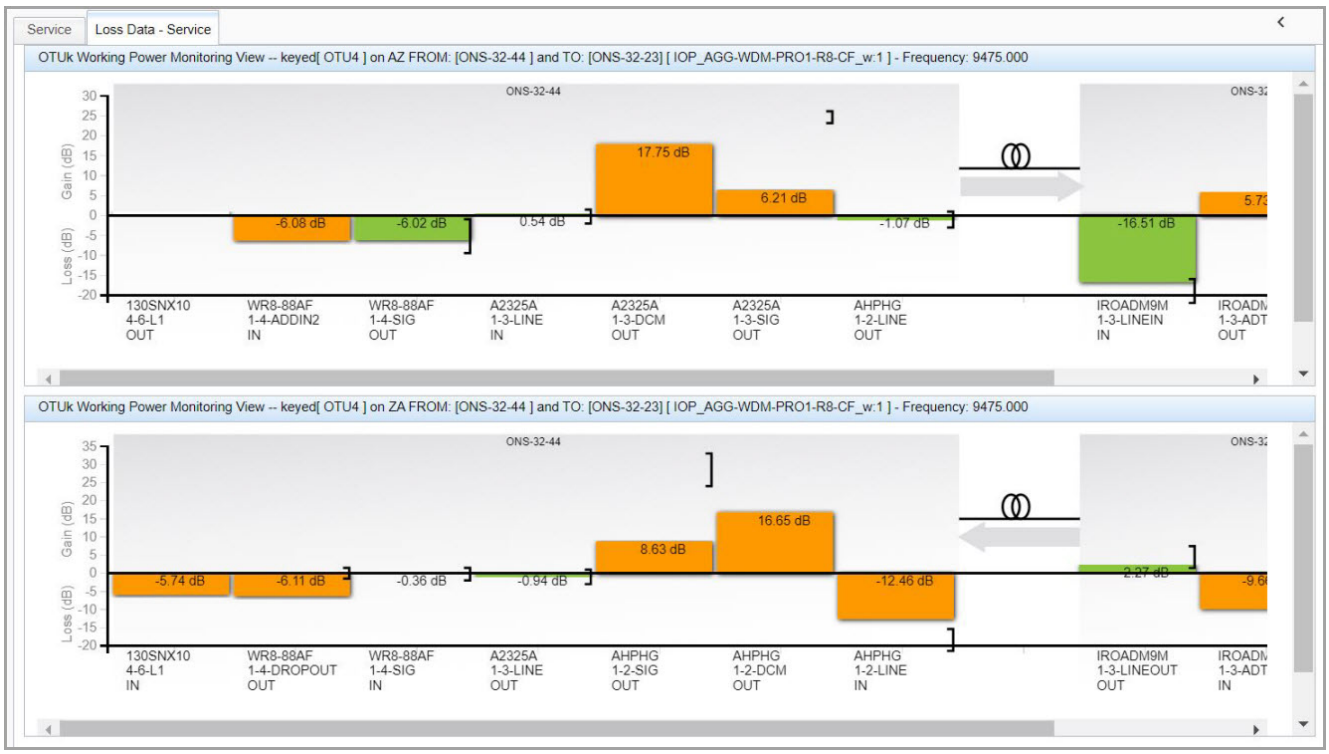
Figure 17-70 Loss Graph for an OTUk



Mouse over the rectangular bars in the graph to view the following values for the selected port:

- **NE Name** - Name of the selected NE from the node list.
- **Port Name** - Name of the chosen port.
- **Power Loss** or **Power Gain** - Power loss if the difference between the adjacent Power Monitoring points is negative and power gain if the difference is positive.
- **Target High** - Value retrieved from the NE at the chosen port representing the maximum power limit configured.
- **Target Low** - Value retrieved from the NE at the chosen port representing the minimum power limit configured.

Note: Certain areas to be noticed for these values include the following:

- **Target High** and **Target Low** are displayed only if they are configured on the NE during power commissioning. If not available, the values are displayed as **Not Available**.
- If the power loss or gain cannot be calculated due to no power on one of the adjacent Power Monitoring points, then the values for **Power Gain** or **Power Loss** is displayed as **Not Available**.
- Packs such as RA2P, RA2P-96, and DCM do not provide any wavelength information. For such packs the values for **Power Loss** or **Power Gain**, **Target High** and **Target Low** are displayed as **Not Applicable**.

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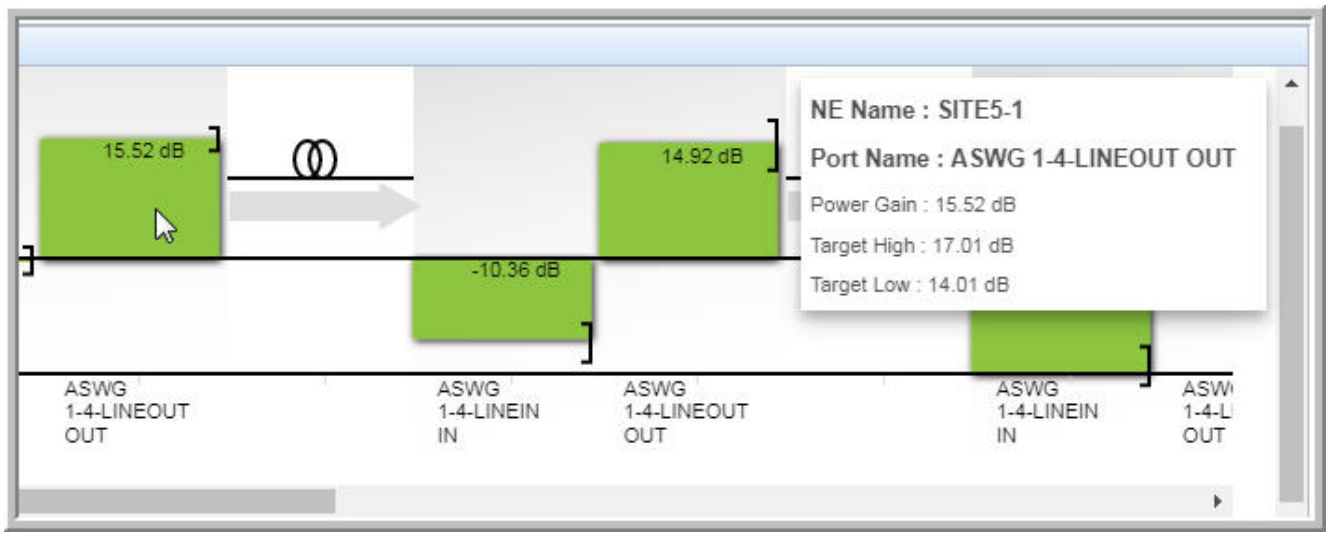
Figure 17-71 Mouse Over Loss Graphs



Power gain is displayed in the positive Y axis and power loss is displayed in the negative Y axis. For more information on the legend of the graph, see "Task: View the power graph or loss graph legend" (p. 1883).

The loss graph report can be exported. The exported data contains values for the parameters including connection name, direction, NE name, port name, port direction, lower range limit, upper range limit, measured loss/gain. The user may then edit the .csv files for example, highlight a value. In some cases, editing and saving a .csv file may not be supported on the user's machine. In such a scenario, the original .csv file must be saved in .xlsx format and then edited.

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Figure 17-72 Loss Graph for OTUk Export to CSV Example

Loss Data - Service					
Connection Name	Direction	Frequency			
raji-260SCX2-real-lon	AZ	9365			
NE Name	Port Name	Port Direction	Lower Range Limit (dB)	Upper Range Limit (dB)	Calculated Loss/Gain (dB)
SITE8-1	260SCX2 5-16-L1	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MCS8-16 5-2-AD2	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MCS8-16 5-2-SIG1	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MCS8-16 5-2-AAR1	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	AAR-8A 5-3-MCS	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	AAR-8A 5-3-AMPIN8	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	AAR-8A 5-3-AMPOUT8	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	AAR-8A 5-3-FSM	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MSH8-FSM 25-1-WSS1TO4AD1	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MSH8-FSM 25-1-WSS1ADD1OUT	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	WR20-TFM 1-5-ADD1IN	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	WR20-TFM 1-5-AD9	IN	Not Applicable	Not Applicable	-1.08
SITE8-1	WR20-TFM 1-5-SIG	OUT	-4.75	-7.75	-11.34
SITE8-1	ASWG 1-4-LINEIN	IN	1.5	-2	-0.53
SITE8-1	ASWG 1-4-LINEOUT	OUT	13.61	16.61	15.11
			Not Available	Not Available	0
SITE5-1	ASWG 1-13-LINEIN	IN	-8.5	-13.5	-13.82
SITE5-1	ASWG 1-13-LINEOUT	OUT	11.5	18	18.5
SITE5-1	WR20-TFM 1-16-SIG	IN	1.5	-2	-0.49

OTS Ingress and Egress Power Display

The power graph is divided into two halves depending on the selection of the user. If the user selects A to Z Ingress/Egress Power from the right click option on an OTS link, the Egress power at A End and Ingress Power at Z End are displayed in the same window. For both fixed and flexgrid OTS connections, only the channels with active connections are displayed.

Note: If an SNC is rerouted, then the channel/frequency used by the current route is displayed instead of the channel/frequency used by the nominal route.

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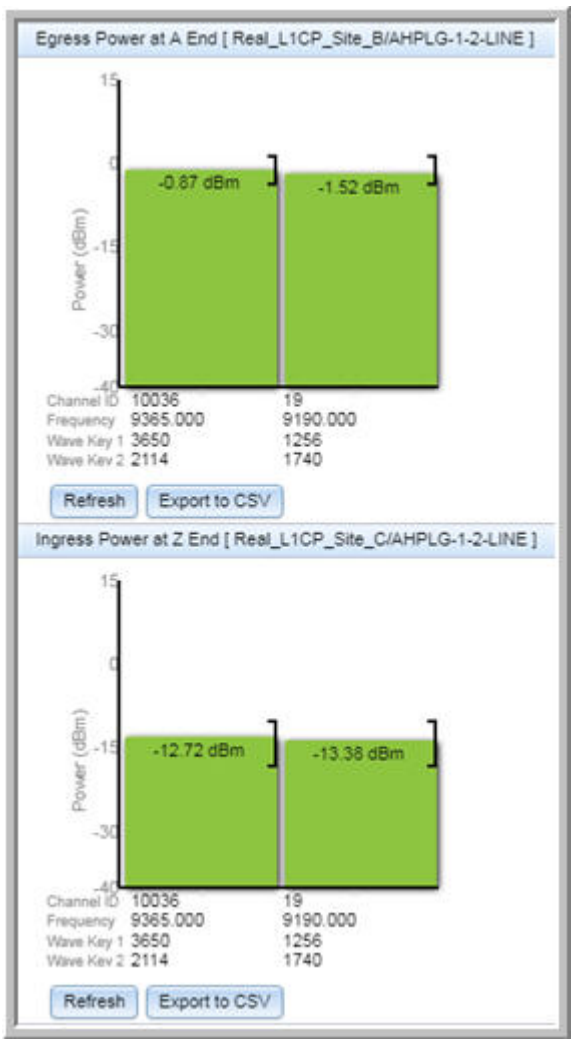
Figure 17-73 OTS A to Z Ingress/Egress Power Display Example



Users can export the values of the OTS span by clicking on the **Export to CSV** button for the Ingress/Egress power at A or Z ends. Users may need to change the .csv format to .xlsx format to edit or save the changes made to the exported file.

Mouse over a power bar displays the values for the parameters **Measured Power**, **Expected Power**, and **Expected Power Deviation** on the top right corner of the chart. The more user options arrow button on the top right corner of the power chart window helps the user to view the additional parameter information for A End and Z End, configure the auto refresh cycle, and perform power adjustment.

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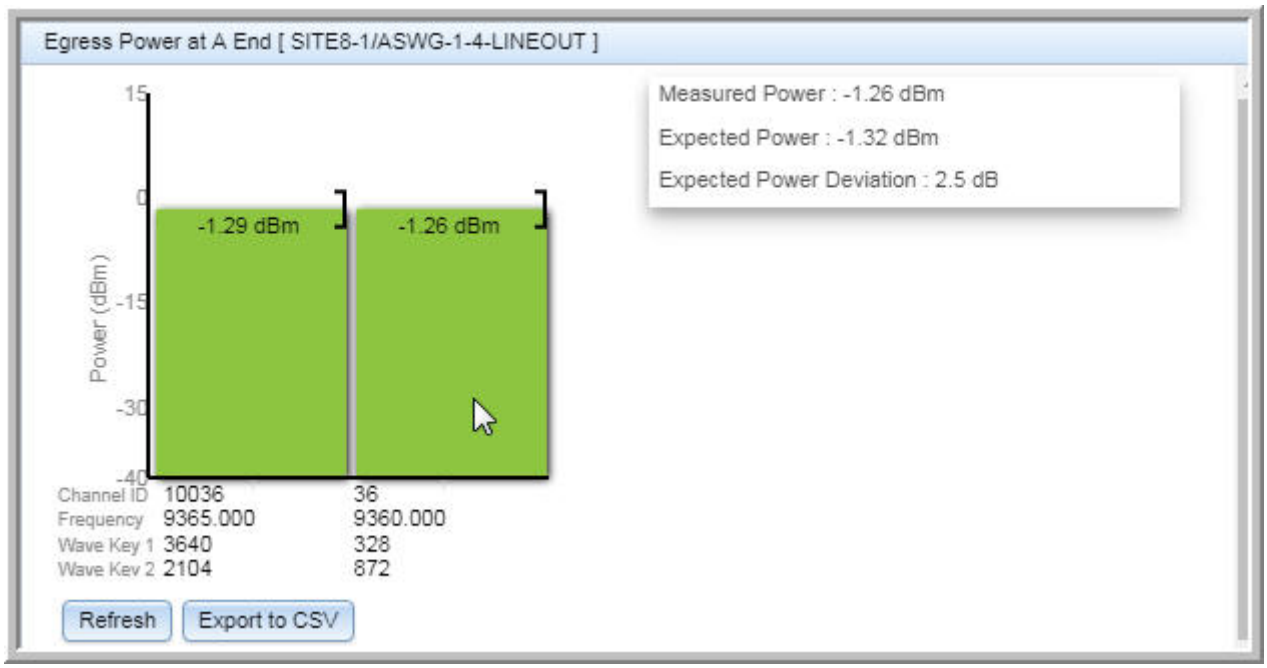
Figure 17-74 Example for Mouse Over OTS Power Bar



Right click the power bar and select **Optical Power Trail** to display the corresponding OTUk bi-directional wavelength of the OTS span.

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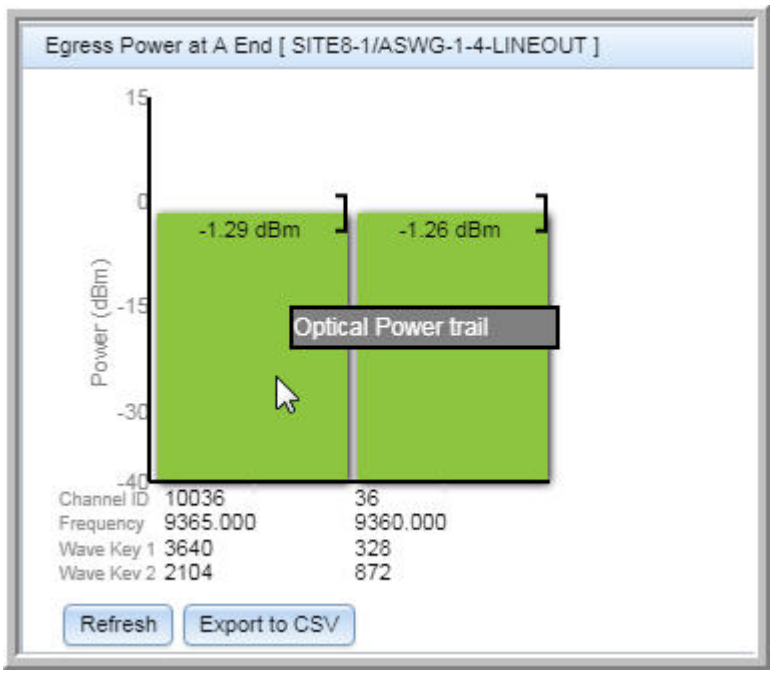
Figure 17-75 Right click on OTS Span



To view the Optical Power values for the Control Plane connections, select the ODU/OTSig tunnel connection from the Infrastructure Connections page. Click the corresponding **More** icon and then select **Optical Power > Bidirectional Optical Power**. The **Bidirectional Optical Power** window is displayed. Click the OTU/OTSig icon to navigate to the corresponding OTUk or OTSig current route for end to end optical power details.

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Figure 17-76 Control Plane Connection – Optical Power Trail Menu

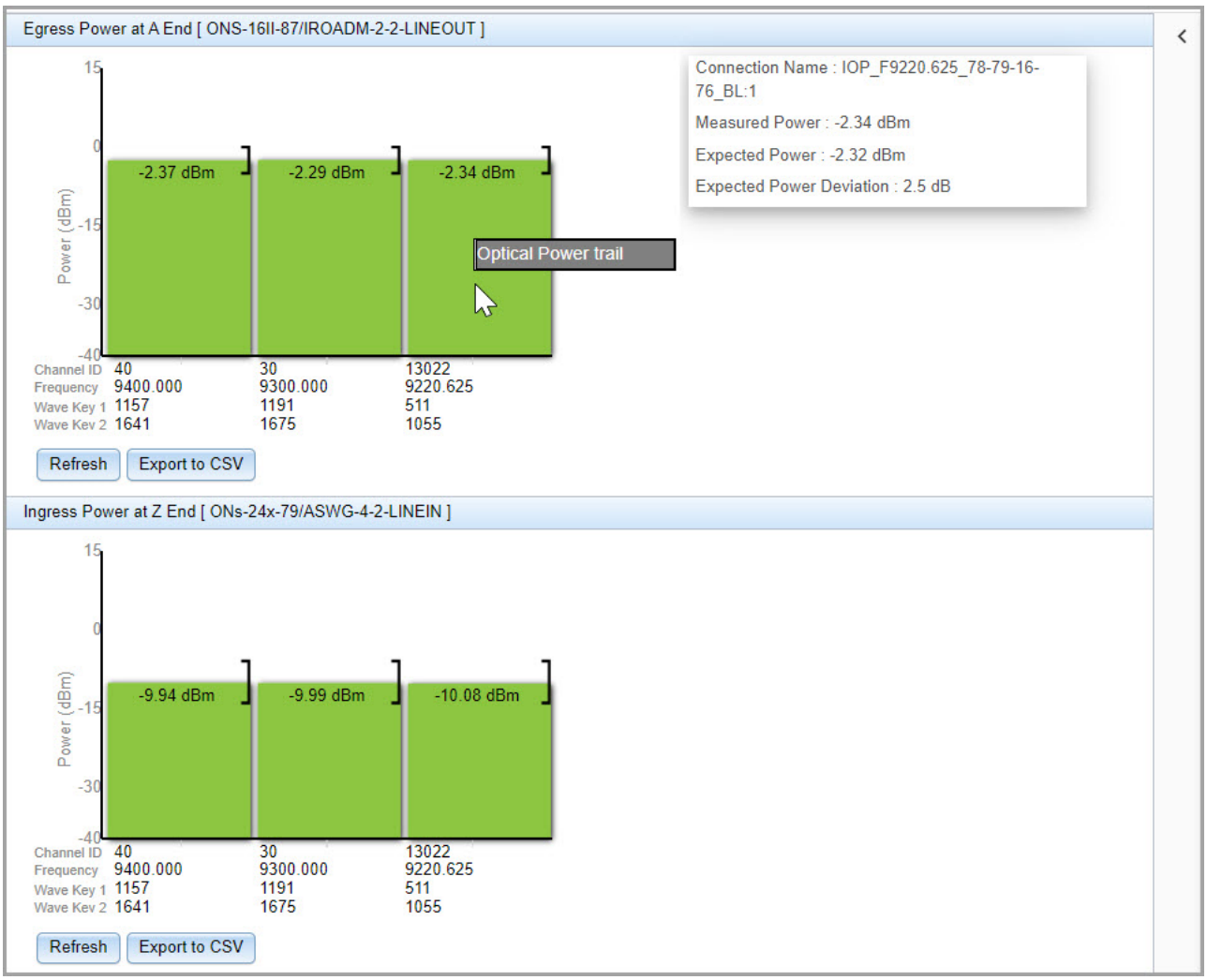

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Figure 17-77 Control Plane Connection – Associated ODU Connections

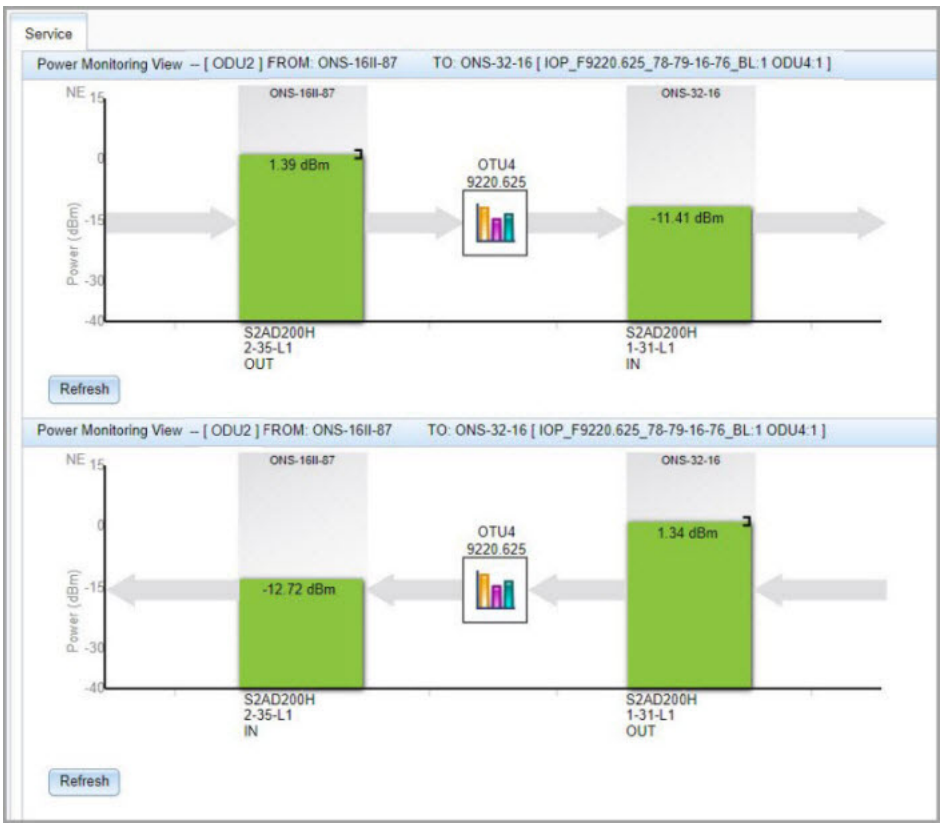

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Figure 17-78 Control Plane Connection – OTU Current Route

Bidirectional Power Graph for Wavelite NE

NFM-T supports bidirectional optical power graph to display transmit and receive power value for Wavelite. TX power (dBm) and Rx power (dBm) power information are available in Wavelite. These power values are mapped to Total Power (Tx and Rx values are mapped to total power for the port with the direction *OUT* and *IN* respectively) in dBm to display power bars on the **Bidirectional Optical Power** page.

NE MIB object provides average power over all lanes (mW) in case of lanes power supported by Wavelite NE port. If lanes are present on the Wavelite NE port, the total power is displayed for the Tx and Rx values in dBm.

Clicking OTUk icon allows the user to expand the Bidirectional Optical Power Monitoring view to display Optical Channel Power and OSNR information. It is not supported for the following scenarios.

- Pure Wavelite network without 1830 PSS interworking.
- Connection between Wavelite and 1830 PSS, 1830 PSI-M & 1830 PSD networks.

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The part of the network involving 1830 PSS/PSI-M and the other supported configurations must have the OTUk icon option (expansion on user click) for support of Optical Channel Power and OSNR information.

Optical power graph options to show Ingress/Egress power is disabled for OTS connection.

The displayed power bars in the Bidirectional Optical Power Monitoring View do not indicate the power values that are being within range or not, as there is no support for the same from the Wavelite platform. Bidirectional power graph with green color indicates irrespective of power values are within ranges or not. The measured power is available as Tx & Rx powers for the pluggable ports and there is no information available from Wavelite platform for the other parameters *TargetPower* and *PowerDeviation*.

Note: Wavelite Access 200, Wavelite Metro 200, Wavelite Metro 200OP for NE version <2.0 : Power values that are shown on NE Uplink1, Uplink2, Uplink, C21 and C25 port do not match with the total power of NFM-T Bidirectional power graph as a known issue on the NE, which is fixed in the NE version >=2.0.

OSNR

NFM-T has the capability to display the OSNR (Optical Signal to Noise Ratio) of a light path, at various packs along its route, up to the end of the light path. This includes traversing the signal from source to destination and calculating the cumulative OSNR on a specific pack in the given direction.

The **Bidirectional Optical Power for OTUk** window in the A to Z direction of a wavelength displays the cumulative OSNR from the starting point of the path until various packs through the path. The window also displays the total OSNR at the destination of the path. Similarly, the **Bidirectional Optical Power for OTUk** window in the Z to A direction displays the OSNR at various packs in the opposite direction of the path.

The OSNR calculations is supported on the following 1830 PSS PHN NEs:

- 1830 PSS-4
- 1830 PSS-8
- 1830 PSS-16
- 1830 PSS-16II
- 1830 PSS-32

The following configurations are supported:

- FOADM
- WR8 based ROADM
- CDC-F ROADM with uni-directional amplifiers (AM2125A, AM2125B, AM2318, AM2625, AM2032, and ASWG)
- Non CDC-F ROADM with Line Driver packs such as ASWG and APSWG
- Raman amplifiers RA2P, RA2P-96, A4PSWG, A2P2125, RA5P, RA5PB
- C-F, CD-F, D, D', and D" configurations
- TOADM
- C+L configuration

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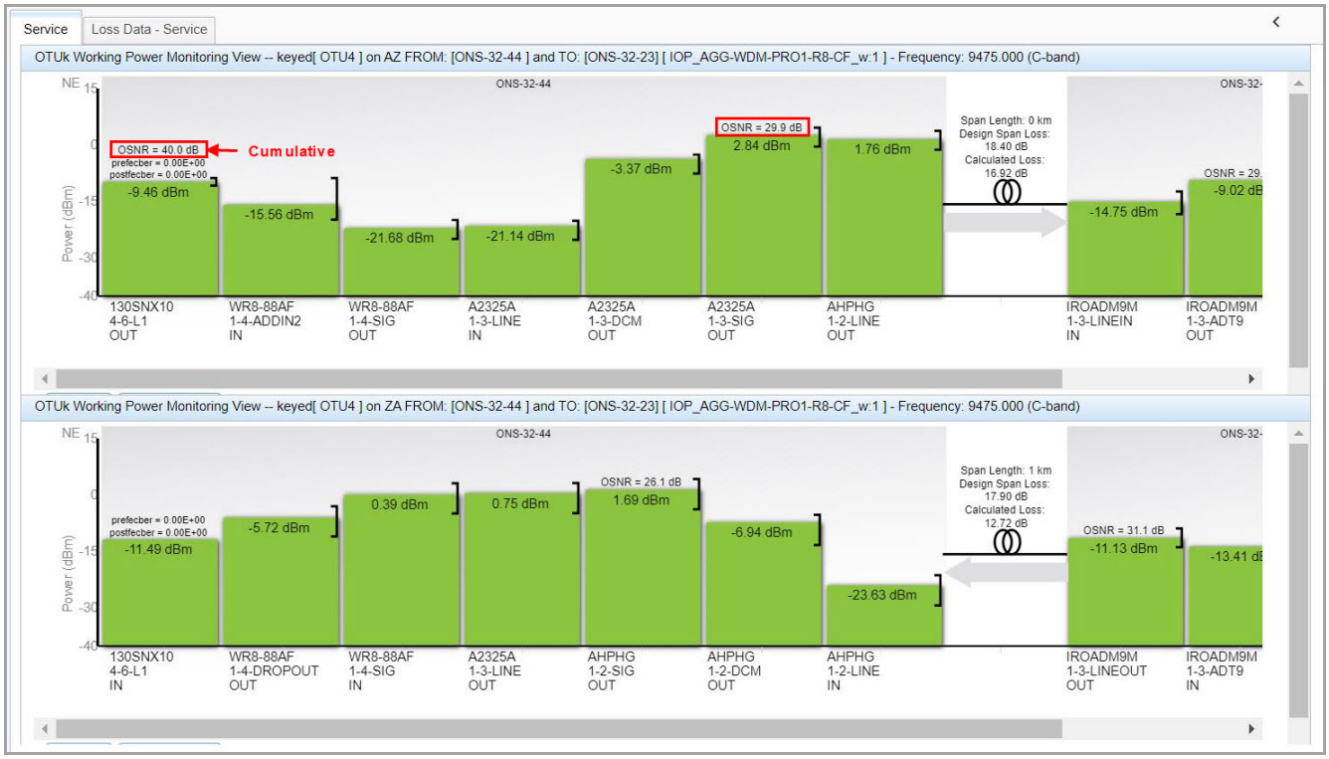
Figure 17-79 Example of OSNR Displayed on the Bidirectional Optical Power for OTUk - AZ Direction



Note: The OSNR values for **Bidirectional Optical Power for OTUk** page for an active, nominal, or working path of an L0 GMPLS is displayed in a similar way as the managed plane OTUk wavelength. However, OSNR values for a rerouted connection is not displayed.

For OTSig Tunnels, OSNR calculation is performed individually for each OCh server.

User interaction with the Optical Power Visualization

Users can view the optical power display and adjust optical power. Refer to the following tasks for detailed steps:

- "Task: View the Optical Power of an OTS Connection" (p. 1846)
- "Task: Adjust the Optical Power of an OTN OTS Connection" (p. 1852)
- "Task: View and Refresh Optical Power for an OTUk Infrastructure Connection" (p. 1868)
- 17.14 "Manage optical power of an OTN OTS connection" (p. 1846)
- 17.15 "View Bidirectional Optical Power display for ODUk infrastructure connections and services" (p. 1859)
- "Task: Adjust the optical power of an OTUk infrastructure connection" (p. 1877)

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- 17.17 “Manage optical power for an OTUk infrastructure connection” (p. 1868)

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17.14 Manage optical power of an OTN OTS connection

When to use

Use this multi-task procedure to manage the optical power of an OTN OTS connection.

Related information

The management of optical power is applicable only for OTN OTS physical connections and OTUk and OCH infrastructure trails. For details on the export of optical power for OTUk and OCH infrastructure trails, refer to 17.17 “Manage optical power for an OTUk infrastructure connection” (p. 1868).

In addition, see the following topics.

- 2.15 “Physical connections” (p. 220)
- 17.13 “Optical power visualization” (p. 1818)

Before you begin

You can adjust, export, or view the optical power for the following types of an OTN OTS connections by using the steps that are provided in this task:

- OTN OTS physical connections
- The PM enabled points of a selected OTS physical connection
- Impacted connections of a selected OTS physical connection

  Impacted connections are those physical connections that are associated with a selected node and its current operational and alarm state.
- Used ports of a selected OTS physical connection

  Used ports are those physical connections that are assigned to a port address on a selected node.

The sub-tasks in this procedure enable you to view and export the optical power of a selected OTS connection directly from the Physical Connections data table or indirectly from its NFM-T OTN Routing Display.

You can also adjust the optical power of an OTS physical connection from the **Link Maintenance Window**; refer to the 10.25 “Perform link maintenance” (p. 1497) task for detailed steps.

You can export the optical power for an OTS physical connection from the Physical Connection data table or from the Routing Display. This set of tasks provides you with both methods.

Task: View the Optical Power of an OTS Connection

Important! You can view the optical power for an OTN OTS physical connection from a data table that contains an OTN OTS physical connection or from the OTS icon on the Routing Display. This task opens a new browser tab.

Complete the following steps to view the optical power of an OTN OTS connection.

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1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Physical Connections > More icon > Structure

OPERATE > Physical Connections > 360° View > PM Enabled Points (tab)

OPERATE > Node > 360° View > IMPACTED CONNECTIONS (tab)

OPERATE > Node > 360° View > OTN PHYSICAL CONNECTIONS (tab)

OPERATE > Node > 360° View > USED PORTS (tab)

Result: Depending on your selection, the system displays a data table that lists all of the requested connections.

2

Perform one of the following:

- To view the optical power of an OTN OTS physical connection from a data table that displays an OTN OTS physical connection, go to Step 3.
- To export the optical power of an OTN OTS physical connection from the Routing Display, go to Step 6.

3

Select the OTS physical connection where you want to display optical power and, depending on the connection, perform the following:

Click **More** icon and follow one of these paths:

Optical Power > A to Z Ingress/Egress Power

Optical Power > Z to A Ingress/Egress Power

Result: Depending on the selection, the system displays the optical power for the selected OTS connection.

Example: The following figure illustrates A to Z ingress/egress bi-directional optical power of an OTS connection.

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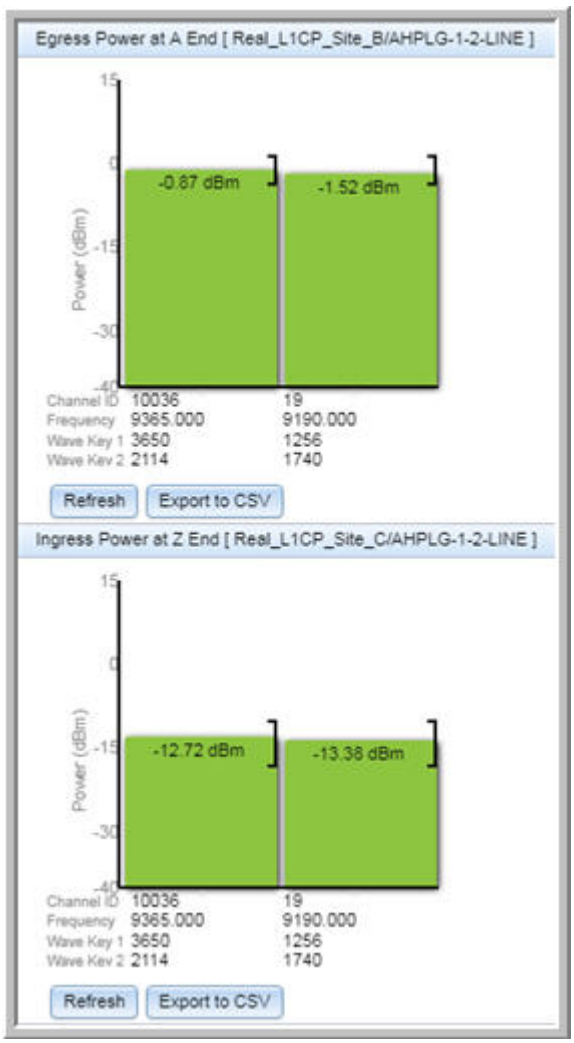
Figure 17-80 OTS Physical Connections Optical Power – A to Z ingress/egress



4

Mouse over the bars to view the values of the parameters **Measured Power**, **Expected Power**, and **Expected Power Deviation**. If the selected connection contains Raman amplifiers such as RA2P, RA5P, or RA5PB in the ingress direction, the power bar is displayed in white in the OTS optical power display, and does not display a value for power on mouse over action.

5

Click on the more user options icon on the top right corner of the A to Z/Z to A Ingress/Egress Bidirectional Power window, and click **Additional Information** icon to view more information of the selected OTS link.

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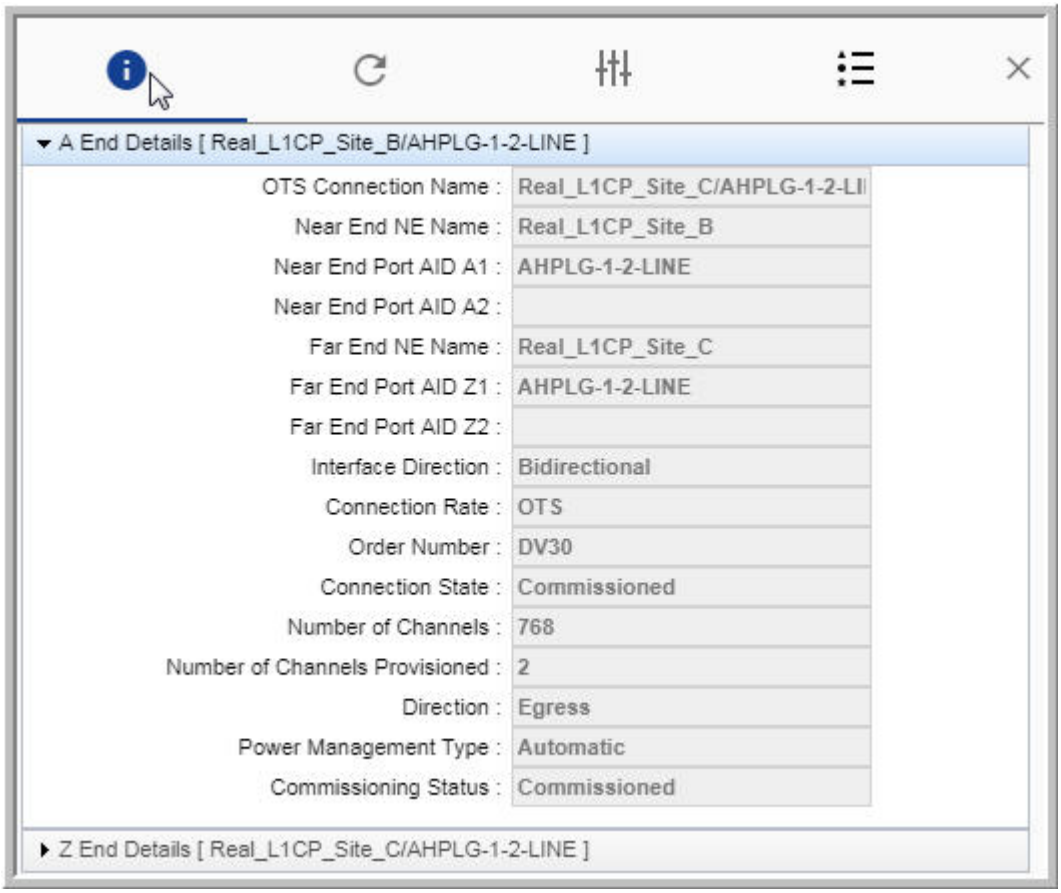
Figure 17-81 OTS More information



6

To view optical power from the Routing Displays, locate the OTS physical connection where you want to display optical power, click the corresponding **More** icon, and follow this path: **Routing Display**.

Result: The system opens the Routing Display in a new browser tab.

END OF STEPS

Task: View and refresh the optical power for the client of an OTN OTS connection

Important! This task opens a new browser tab. The connection must be a **Commissioned** OCH/OTUk connection.

Complete the following steps to view and refresh the optical power for the client of an OTN OTS connection.

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1

From the NFM-T GUI, follow this navigation path:

OPERATE > Physical Connections

Result: The system displays a data table that lists the OTN physical connections.

2

Optional: Filter the list so only the OTS physical connections are visible.

3

Select the OTS physical connection where you want to view the optical power of its client and click the **Clients** tab.

4

Select the **Commissioned** OCH/OTUk connection where you want to view the optical power and depending on the connection, perform one of the following:

Click the corresponding **More** ⋮ icon and select one of the following navigation options:

Optical Power > Channel Optical Power A->Z

Optical Power > Channel Optical Power Z->A

Optical Power > Connection Optical Power A->Z

Optical Power > Connection Optical Power Z->A

Optical Power > Bidirectional Optical Power

Result: The system opens a new browser tab and the optical power values for the selected connection are displayed.

Example: The following figures illustrates an example for a connection optical power from A to Z. Scroll down to view the total power display.

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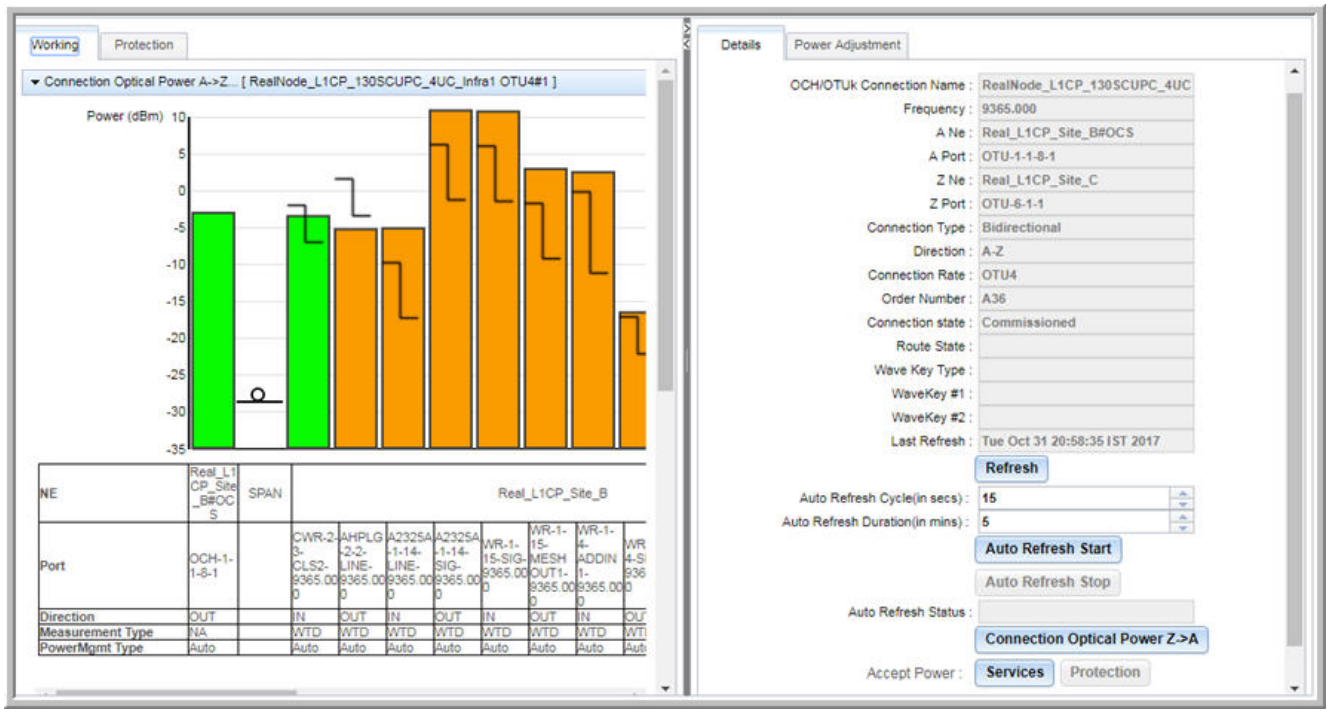
Figure 17-82 Physical Connections – OTS – Connection Optical Power A->Z



5

In the Bidirectional Power window, click on the More User Options icon on the top right corner of the power graph.

Result: The additional tasks for viewing more information, adjust power, and setting auto refresh configuration tab icons are listed. For more information, see 17.17 "Manage optical power for an OTUk infrastructure connection" (p. 1868) and 17.15 "View Bidirectional Optical Power display for ODUk infrastructure connections and services" (p. 1859) for more information.

6

To refresh the channel or connection optical power display for the selected connection, perform one or both of the following:

- To refresh the optical power display for the selected connection for this one instance, click the **Refresh** button.
- To refresh the optical power display for the selected connection automatically and for multiple instances, click the **Auto Refresh Start** button and use the drop-down menus to specify the **Auto Refresh Cycle (in seconds)** and **Auto Refresh Duration (in minutes)** values.

  Result: The refresh result is displayed in the status bar. To stop a refresh in progress, click **Auto Refresh Stop**.

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7

Click **Connection Optical Power Z->A** or **Connection Optical Power A->Z** to view the power in the opposite direction.

END OF STEPS

Task: Adjust the Optical Power of an OTN OTS Connection

Important! When you adjust optical power, you can affect service. This task can only be performed if you have **Constructor** and/or **Map Constructor** privileges. You can only perform optical power adjustments, if the Power Management of the LD pack is **Auto**. The **Abort** power adjustment function is not applicable for ingress ports.

Complete the following steps to adjust the optical power of an OTN OTS connection.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Physical Connections > 360° View > PM Enabled Points (tab)

OPERATE > Physical Connections > More icon > Structure

OPERATE > Node > 360° View > IMPACTED CONNECTIONS (tab)

OPERATE > Node > 360° View > OTN PHYSICAL CONNECTIONS (tab)

OPERATE > Node > 360° View > USED PORTS (tab)

Result: Depending on your selection, the system displays a data table that lists all of the requested connections.

2

Locate the OTS physical connection where you want to display optical power and, depending on the connection, do one of the following:

- Click **More** icon and follow one of these paths:
  Optical Power > A to Z Ingress/Egress Power
  Optical Power > Z to A Ingress/Egress Power
- Select the connection; click the **Structure** tab; right click on the connection, and follow one of these paths:
  Optical Power > A to Z Ingress/Egress Power
  Optical Power > Z to A Ingress/Egress Power

Result: Depending on the selection, the system displays the optical power for the selected OTS connection.

3

Perform one of the following actions:

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If **A to Z Ingress/Egress Power** or **Z to A Ingress/Egress Power** is selected, go to step Step 6.

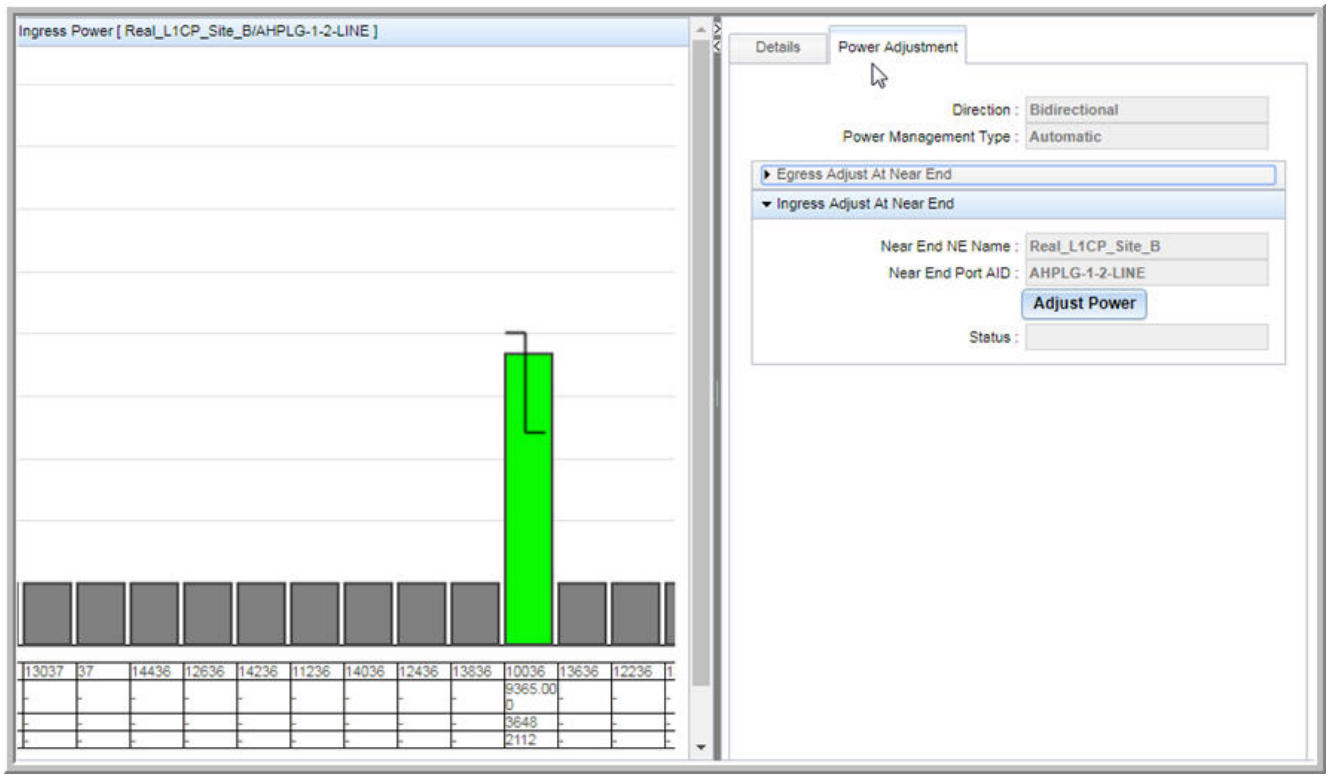
4

Click the **Power Adjustment** tab.

Result: The **Ingress Adjust At Near End** or **Egress Adjust At Near End** panel is displayed depending on the selection.

The following figure illustrates an example of the **Power Adjustment** tab for the **Ingress Adjust At Near End**, if **Ingress Power at A End** is selected.

Figure 17-83 Example of Power Adjustment Tab for Ingress Adjust at Near End



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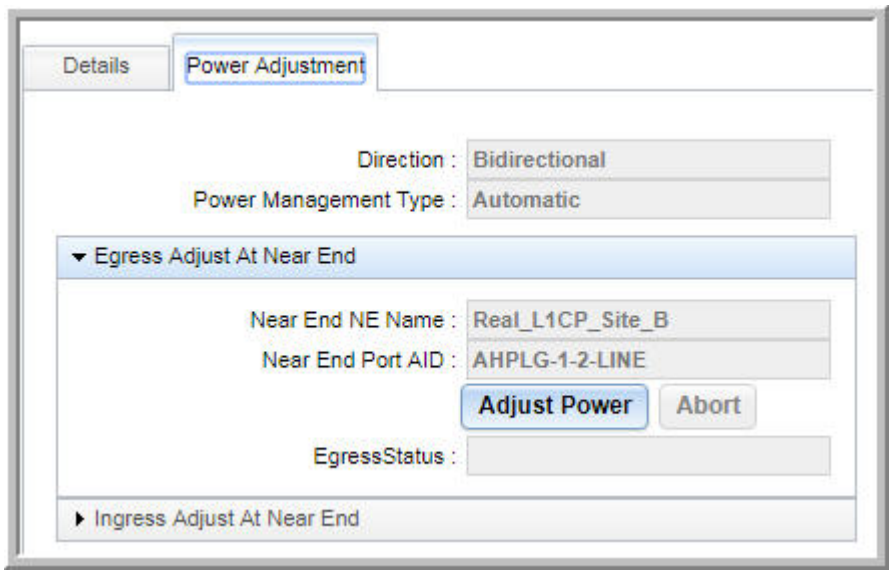
The following figure illustrates an example of the **Power Adjustment** tab for the **Egress Adjust At Near End**, if **Egress Power at A End** is selected.

Figure 17-84 Example of Power Adjustment Tab for Egress Adjust at Near End



5

Make the appropriate adjustments for the connection and click the **Adjust Power**.

Important! When the optical power adjustment process is in progress, click **Abort** to stop the power adjustment. The **Abort** power adjustment is available for egress ports only. The function is not applicable for ingress adjust ports

Result: The system displays the status of the power adjustment in the **Status** field.

6

Click the More User Options icon on the top right corner of the graph.

Result: The possible user actions are displayed.

7

Click the **Power Adjustment** icon.

Result: The system displays the Power Adjustment tab which lists the NE/NEs (and port) involved in the selected connection.

Example: The following figure illustrates the Power Adjustment tab after selecting **A to Z Ingress/Egress Power** option.

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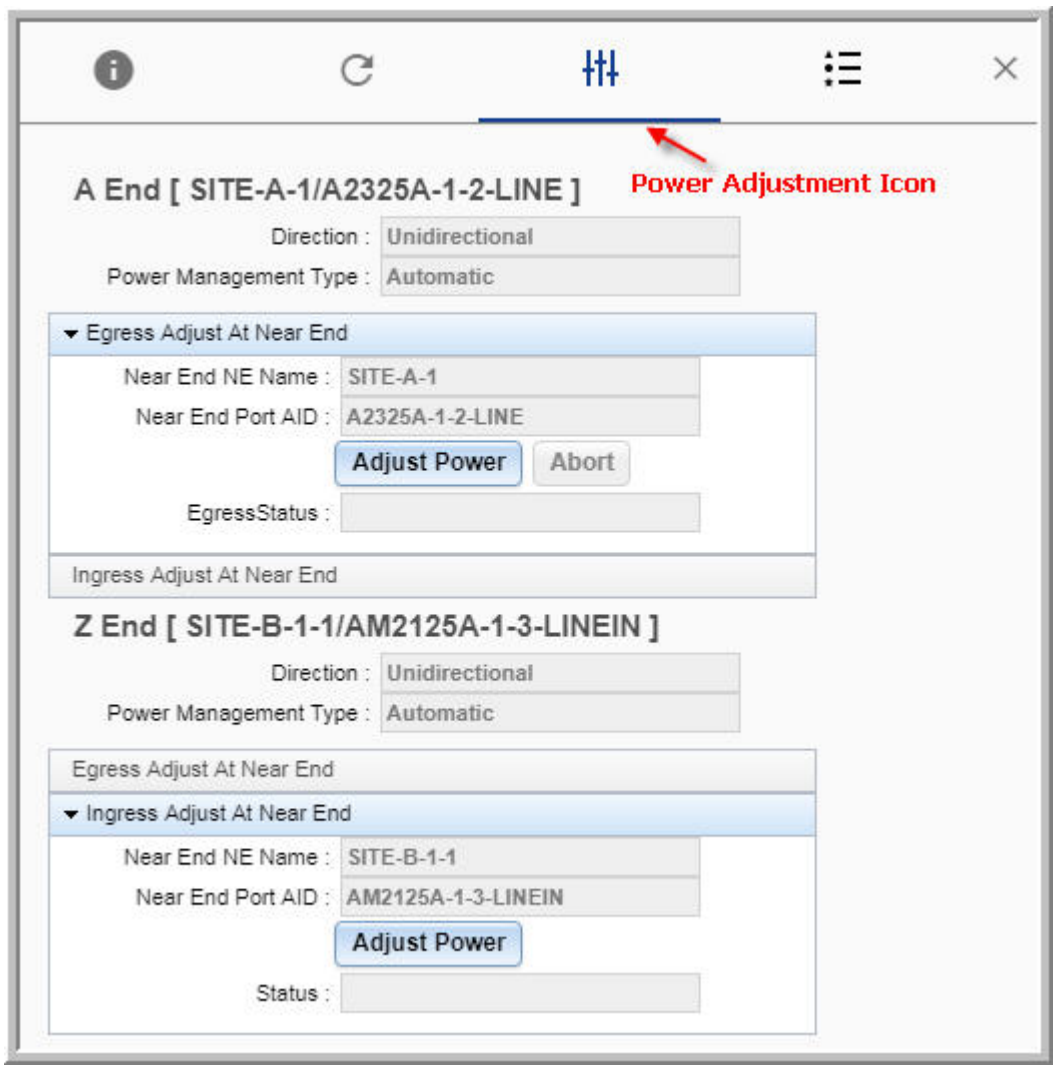
Figure 17-85 OTS Physical Connections Optical Power Adjust – A to Z Ingress/Egress Power



8

Click the **Adjust Power** button.

Important! When the optical power adjustment process is in progress, click **Abort** to stop the power adjustment. The **Abort** power adjustment is available for egress ports only. The function is not applicable for ingress adjust ports

Result: The system displays the status of the power adjustment in the **Status** field.

END OF STEPS

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Task: Export the Optical Power for an OTN OTS Physical Connection to Excel

Important! You can export the optical power for an OTN OTS physical connection to Excel from a data table that contains an OTN OTS physical connection or from the OTS icon on the Routing Display.

Complete the following steps to export the optical power for an OTN OTS physical connection to Excel from a data table.

1

From the NFM-T GUI, follow one of these navigation paths:

OPERATE > Physical Connections

OPERATE > Physical Connections > 360° View > PM Enabled Points (tab)

OPERATE > Physical Connections > More ⋮ icon > Structure

OPERATE > Node > 360° View > IMPACTED CONNECTIONS (tab)

OPERATE > Node > 360° View > OTN PHYSICAL CONNECTIONS (tab)

OPERATE > Node > 360° View > USED PORTS (tab)

Result: Depending on your selection, the system displays a data table that lists all of the requested connections.

2

Perform one of the following:

- To export the optical power of an OTN OTS physical connection to Excel from a data table that displays an OTN OTS physical connection, go to Step 3.
- To export the optical power of an OTN OTS physical connection to Excel from the Routing Display, go to Step 4.

3

Select the OTS physical connection where you want to export the optical power and perform one of the following:

Click **More** ⋮ icon and follow this navigation path: **Optical Power > Export to Excel**.

Result: The system displays a message that is similar to the following:

```
<time stamp> Export to Excel <[connection name]> Request submitted.
```

The system then displays a pop-up that gives you the options of **Open**, **Save**, or **Save as**.

Go to Step 5.

4

Right click **on the icon for the physical connection** where you want to export the optical power and follow this navigation path: **Optical Power > Export to Excel**.

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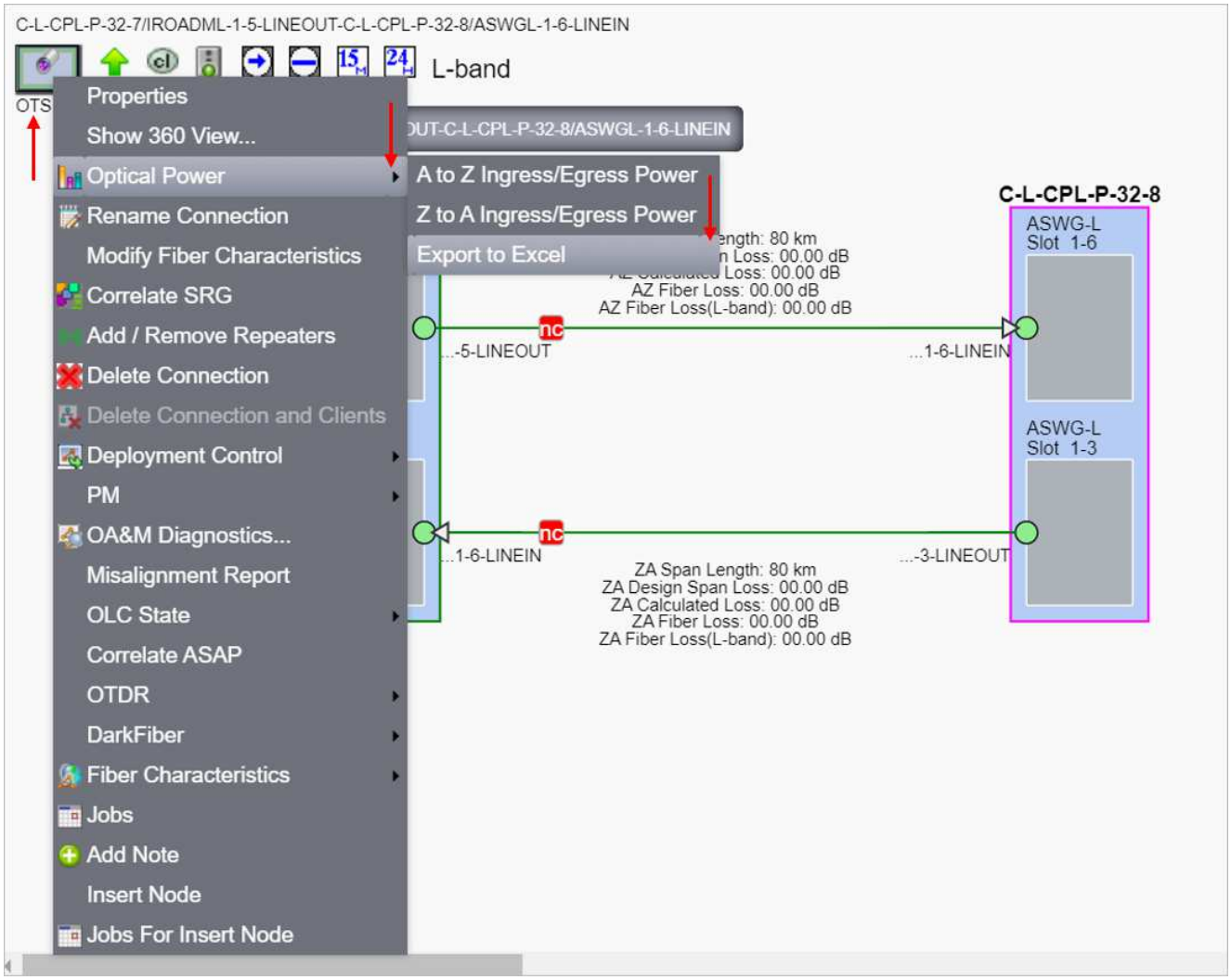
Figure 17-86 Physical Connections – Routing Display – Optical Power – Export Options



Result: The system displays a message that is similar to the following:

```
<time stamp> Export to Excel <[connection name]> Request submitted.
```

The system then displays a pop-up that gives you the options of **Open**, **Save**, or **Save as**.

Go to Step 5.

5

Open, save or, save as the csv file and access the file to view it.

Result: The **csv** file is opened.

Example:

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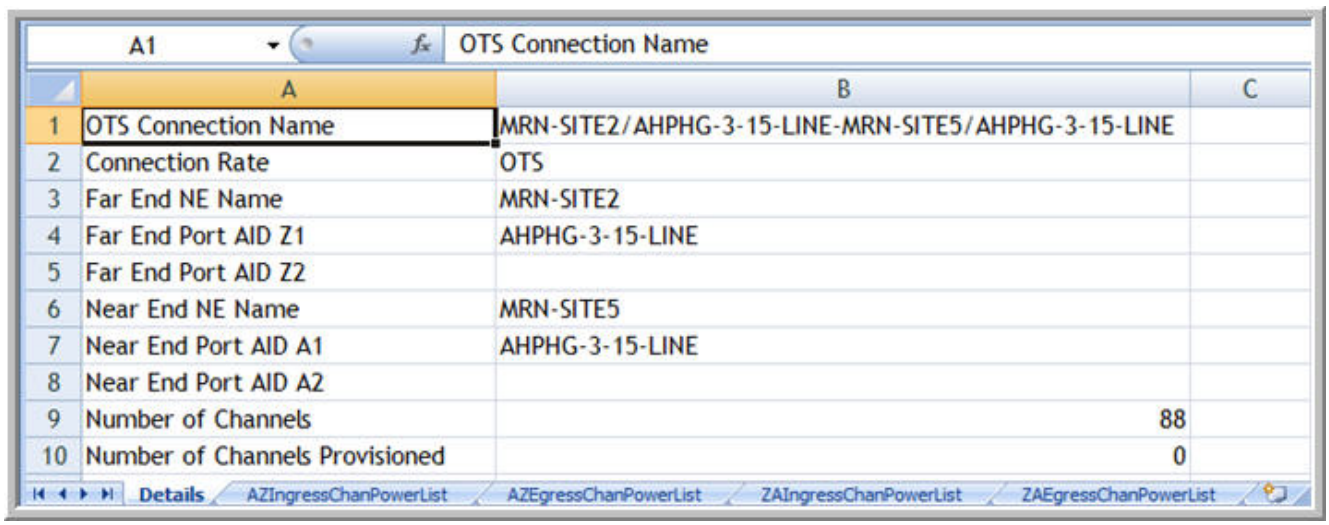
The following figure illustrates the optical power data for an OTN OTS physical connection that was exported to Excel, was saved in **.xlsx** format, and was opened in Microsoft Office Excel. The spreadsheet has five sheets; one out of the five sheets is populated with data.

Figure 17-87 Physical Connections – Optical Power – Export to Excel – Sheet 1: Data



A1 | OTS Connection Name

	A	B	C
1	OTS Connection Name	MRN-SITE2/AHPHG-3-15-LINE-MRN-SITE5/AHPHG-3-15-LINE	
2	Connection Rate	OTS	
3	Far End NE Name	MRN-SITE2	
4	Far End Port AID Z1	AHPHG-3-15-LINE	
5	Far End Port AID Z2		
6	Near End NE Name	MRN-SITE5	
7	Near End Port AID A1	AHPHG-3-15-LINE	
8	Near End Port AID A2		
9	Number of Channels	88	
10	Number of Channels Provisioned	0	

Details | AZIngressChanPowerList | AZEgressChanPowerList | ZAIngressChanPowerList | ZAEgressChanPowerList

End of steps

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17.15 View Bidirectional Optical Power display for ODUk infrastructure connections and services

When to use

The bi-directional power display feature helps in visualizing power levels of optical signals received from client equipment, or transmitted to client equipment, at both ends of inventoried service and infrastructure connections. Power visualization display also provides launch points for optical channel power visualization view using the 1830 PSS Wavelength Tracker technology.

Use this feature for verification or troubleshooting of fiber connections and optical signal levels between 1830 PSS and external equipments. Bidirectional Optical Power Display can also be used for verification or troubleshooting of bi-directional transmission of optical wavelength signal within 1830 PSS network.

Related information

See "Bidirectional Optical Power Display" (p. 1819) for more information.

Before you begin

The **Bidirectional Optical Power** screen can only be accessed for services or infrastructure ODUk connections in **Commissioned** state.

Task: View Bidirectional Optical Power display for ODUk infrastructure connections and services

1

Perform one of the following actions:

- From the NFM-T GUI, follow one of these navigation paths to view the ODUk connections:
  - **OPERATE > Infrastructure Connections**
  - **OPERATE > Protected Connections**
- From the NFM-T GUI, follow this navigation path to view the services:
  OPERATE > Services

  Result: The system displays a data table that lists all of the selected connections or services.

2

Select a commissioned ODUk connection or service, as required. Click **More** icon and follow this navigation path:

Optical Power > Bidirectional Optical Power.

Result: The **Bidirectional Optical Power** browser tab opens, displaying power values represented by rectangular bars on ports where the Network Element provides optical power measurement capability.

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For Control Plane connections, if a connection is rerouted, then the ports involved in the current route are shown instead of the ports involved in the nominal route.

The bar color is green, if the total power is available in a particular port. The bar is orange when the power is out of range on the port. For Y-cable services, the power level is unavailable on individual ports. In such cases, power levels are indicated by a white color bar.

Example: The following figure illustrates bi-directional optical power for ODUk connection
The screen title of the graph depicts the details in the following format:
`Power Monitoring View – [Layer connection rate] FROM: [SITE A Name] TO: [SITE Z Name] [Connection Name]`

Figure 17-88 Connections – ODUk Connection Bidirectional Optical Power

Note: If there is no current route in ASON SNC page for the selected infrastructure SNC, the following error message is displayed:

```
Unable to display Optical Power Display. Please verify current route
for the SNC is proper and reload power display for the DSR or ODU, and
```

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```
re-invoke the OTU power display by clicking on the appropriate OTU
icon.
```

After the launch of OTUk/OTSig power monitoring view for a connection, if the current route of the connection has changed or if the **ASON SNC** tab is opened, it is possible for the layout or route to change. Hence it is required to relaunch the ODU/DSR power monitoring view for the connection and then navigate to the OTUk/OTSig power monitoring view. In such a scenario the following error message is displayed:

```
Unable to display Optical Power Display as SNC route is modified.
Please reload power display for the DSR or ODU, and re-invoke the OTU
power display by clicking on the appropriate OTU icon.
```

3

Click on the **Protection** tab, in case of protected and commissioned ODUk connections or services to view the power values for the ports of the participating NEs.

4

Mouse over the rectangular bars to view the following attributes:

Parameter	Description
Port Name	Full name of the port.
Total Power	The total power on the port in dBm.
Expected Power	The expected power associated with the received wave keys.
Expected Power Deviation	The threshold power for declaring a power out of range.

5

Mouse over the OTUk icon to view the following attributes:

Parameter	Description
Connection Name	Full name of the OTUk infrastructure connection.
Connection Rate	The transmission rate assigned to the connection. For example, OTU4, OTU2, OTU2e.
Protection Type	Indicates whether the OTUk infrastructure connection is protected or unprotected.
Provisionable Wave Key	Indicates whether the wave key provisioning is keyed, unkeyed, or not applicable.

6

Click the OTUk icon between the NEs to view the keyed/unkeyed OTUk power on the ports of the intermediate NEs through which the OTUk passes.

Result: The **Bidirectional Optical Power for OTUk** browser tab opens, displaying the power levels for each of the ports on the intermediate NEs through which the OTUk passes.

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See Figure 17-89, “Connections – Example for OTUk Power Monitoring for a keyed connection ” (p. 1861) for an example of the OTUk wavelength display. This view simply displays the power levels at the ports and does not support power adjustment and power report refresh or export.

The screen title of the graph depicts the details in the following format: **`Power Monitoring View – Keyed/Unkeyed [Layer connection rate] on AZ FROM: [SITE A Name] TO: [SITE Z Name] [Connection Name] [Frequency, Band (C/L)]`**

Note: For an OTUk ASON Implicit Server connection, the option to navigate to **Optical Power** window is not available. User must navigate to the optical power of client ODU infrastructure or DSR service optical power, and click the appropriate OTUk icon to view the optical power of the selected OTUk or OCH.

Figure 17-89 Connections – Example for OTUk Power Monitoring for a keyed connection

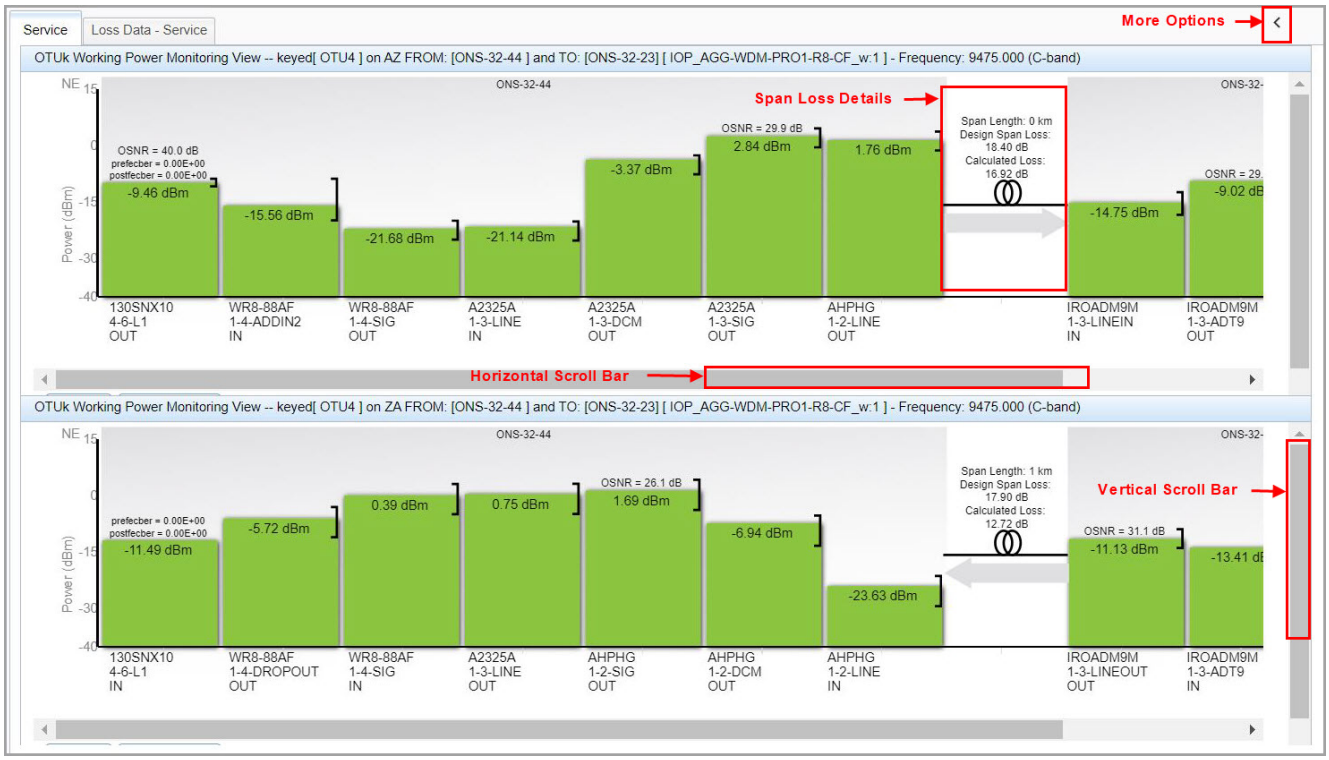

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Figure 17-90 Connections – Example for OTUk Power Monitoring for a unkeyed connection

7

Scroll to the right side with the horizontal scroll bar to view the power on each of the ports.

8

Mouse over the rectangular bars to view the following parameters:

Table 17-3 Port Properties Displayed for OTUk Window

Parameter	Description
Port Name	Name of the selected port.
Measured Power	The measured power associated with the selected port.
Expected Power	The expected power associated with the selected port.

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Table 17-3 Port Properties Displayed for OTUk Window (continued)

Parameter	Description
Expected Power Deviation	The threshold power for declaring a power out of range.
Total Power	The total power on the selected port.
OSNR	The cumulative optical signal to noise ratio from the starting point of the OTUk to the current port in the display.
Pre-FEC BER	Displays the BER before Forward Error Correction (FEC) stage.
Post-FEC BER	Displays the BER after Forward Error Correction (FEC) stage.

9

Click **Adjust Power** on the bottom right corner of the window.

Result: The system opens a new browser tab and the optical power values for the selected infrastructure connection are displayed. See 17.17 "Manage optical power for an OTUk infrastructure connection" (p. 1868) for more information about adjusting, exporting, viewing, and refreshing the optical power of an OTUk infrastructure connection.

End of steps

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17.16 Set the optical power chart preferences

When to use

If an NE boundary on the loss graph is misaligned on a recently upgraded NFM-T system, which contained previously working loss graph displays, use this procedure to set the preferences of the optical graph displays.

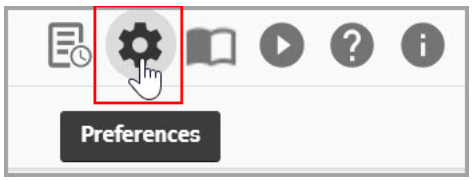
The white bars on **Bidirectional Optical Power Display** windows indicate non power reporting packs, and users can choose to show or hide these by selecting or deselecting the **Show Non Power Reporting Packs** check box from **Preferences**.

Task

1

In the NFM-T NFM-T GUI, navigate to **OPERATE > Preferences** or click the **Preferences** icon on the top right corner of the window.

Figure 17-91 More Options - Preferences



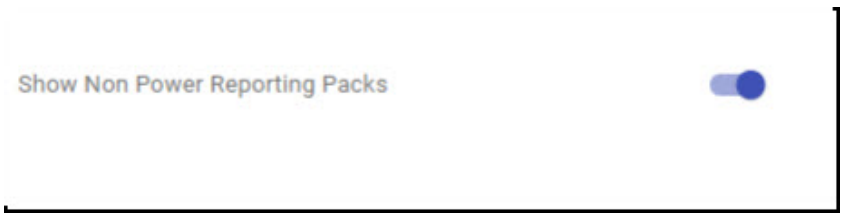
Result: The **Preferences** window is displayed with the USER tab selected by default.

2

Click the **Optical Power Chart** tab, and then select the **Show Non Power Reporting Packs** option.

Note: If the check box is not displayed, click **RESTORE DEFAULTS**.

Figure 17-92 Select Show Non Power Reporting Packs



Result: The selection is auto-saved.

A successful message is displayed stating the following:

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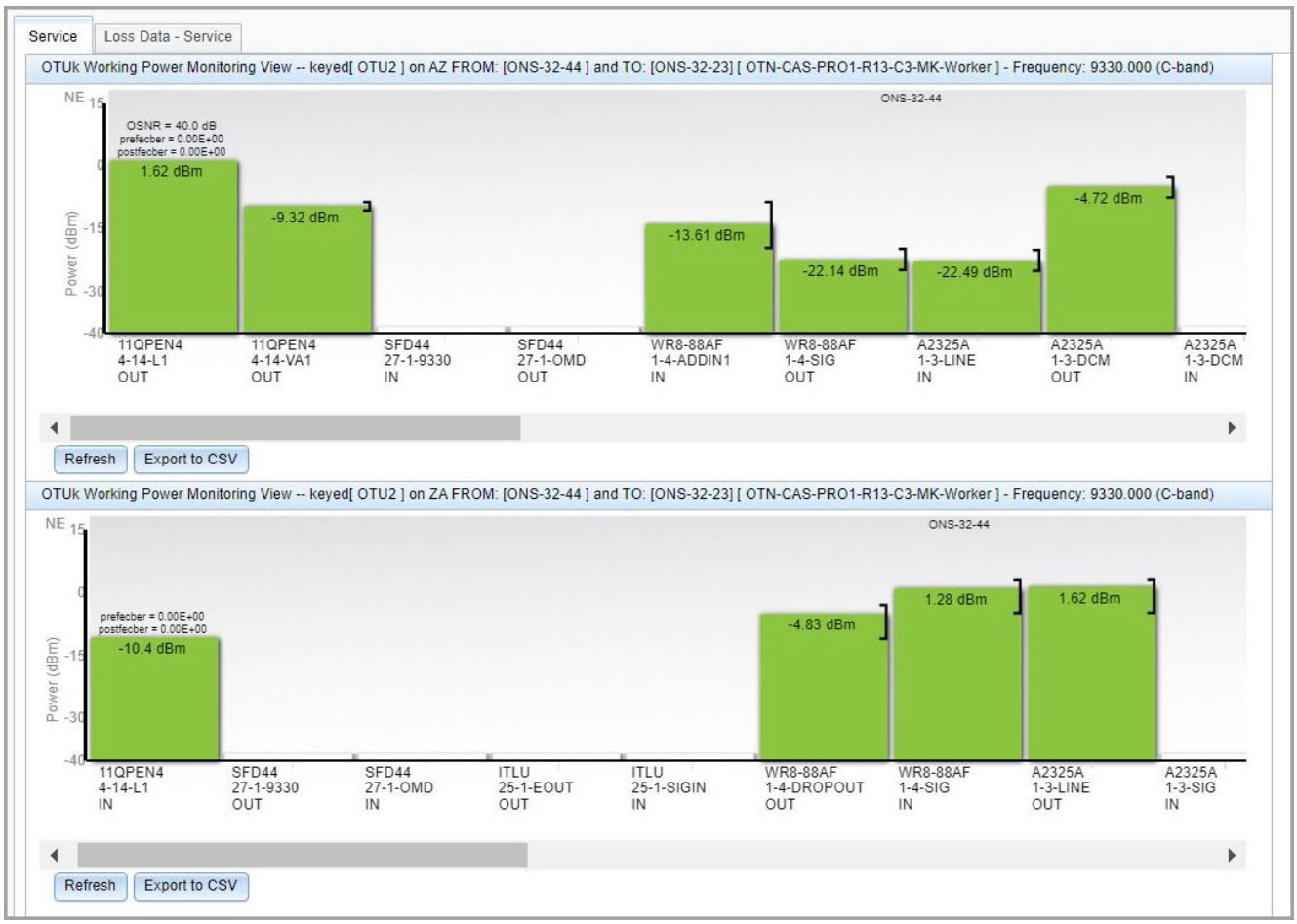
```
GUI Preferences successfully saved.
```

3

Refresh the browser and launch the required optical power display.

Result: When the **Show Non Power Reporting Packs** option is selected, the graph displays the white color bars with no power on them, as illustrated in the following figure.

Figure 17-93 Optical Power Chart with Non Power Reporting Ports



When the **Show Non Power Reporting Packs** option is deselected, the graph does not display the white color bars with no power on them, as illustrated in the following figure.

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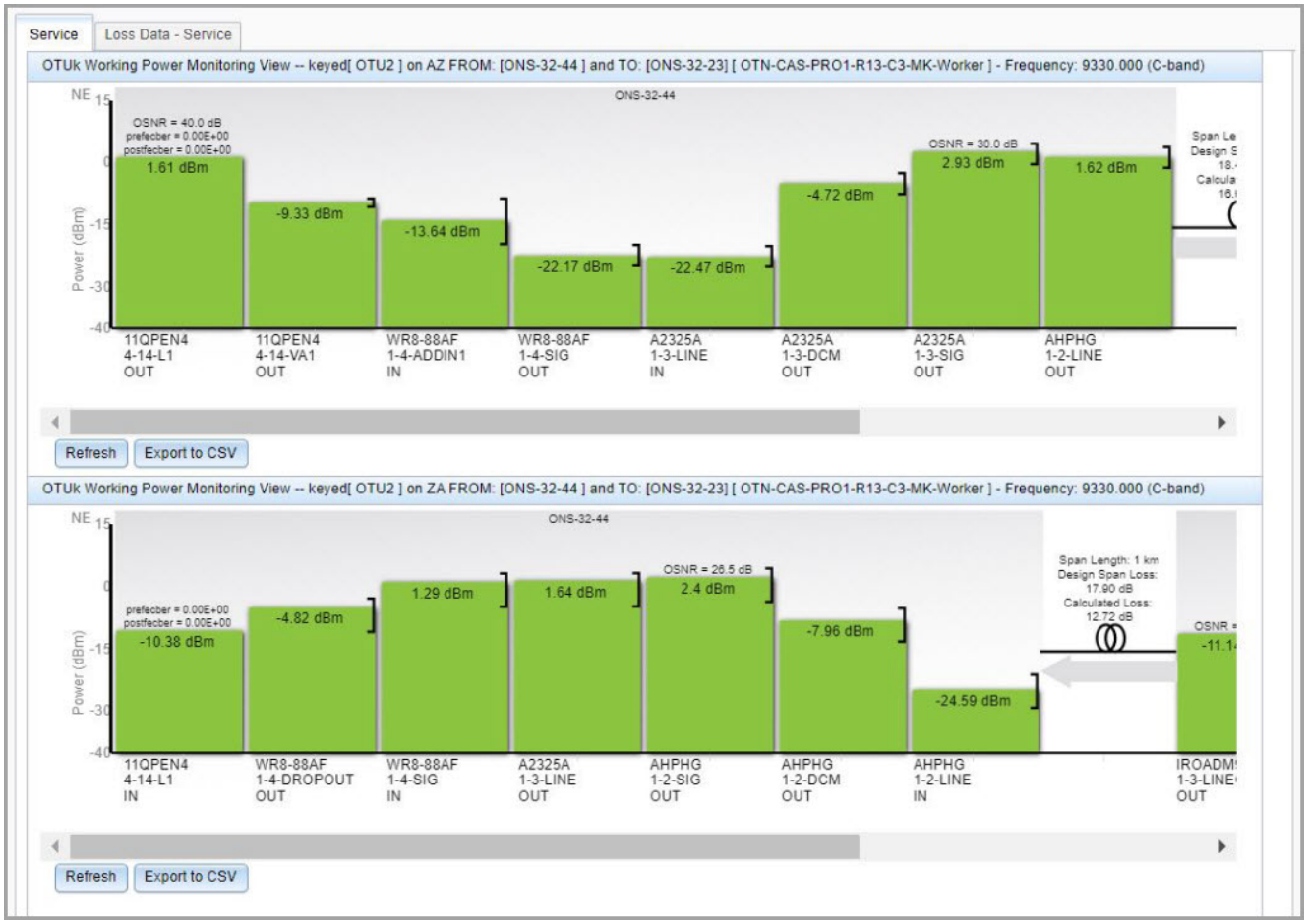
Figure 17-94 Optical Power Chart without Non Power Reporting Ports



END OF STEPS

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17.17 Manage optical power for an OTUk infrastructure connection

When to use

Use this multi-task procedure to manage the optical power for an OTUk infrastructure connection.

Related information

The export of optical power is applicable only for OTUk and OCH infrastructure trails and OTS physical connections. To export optical power for an OTS physical connection only, refer to the "Task: Export the Optical Power for an OTN OTS Physical Connection to Excel" (p. 1856) task.

In addition, see the following topics in this document:

- 2.17 "Infrastructure connections and services" (p. 224)
- 17.13 "Optical power visualization" (p. 1818)

Before you begin

Because optical power is available only on the 1830 PSS PHN NEs (such as the 1830 PSS-32) on DWDM wavelengths, optical power visualization and adjustment is applicable only for OTUk infrastructure trails. The enabling of optical power is based on provisioned wave keys, which are applicable only for OTUk/OCH infrastructure trails.

This task opens a new browser tab.

Task: View and Refresh Optical Power for an OTUk Infrastructure Connection

Important! The **OCH/OTUk** infrastructure connection must be in the **Commissioned** state. You can view the optical power for an OTUk or OCH infrastructure trail connection from a data table that displays an OTUk or OCH infrastructure trail or from the OTUk/OCH icon the Routing Display. This task explains both methods.

Complete the following steps to view and refresh the optical power for an OTUk infrastructure connection.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Infrastructure Connections

OPERATE > Protected Connections

Result: The system displays a data table that lists all of the selected connections.

2

To view the optical power for an OTUk/OCH infrastructure connection from a data table that displays an OTUk/OCH infrastructure connection, go to Step 3.

To view the optical power for an OTUk/OCH infrastructure connection from the Routing Display that displays an OTUk/OCH infrastructure connection, go to Step 7.

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3

To view optical power in a data table, select the **Commissioned OCH/OTUk** connection where you want to view the optical power and, depending on the connection, perform one of the following:

- Click **More** ⋮ icon and follow this navigation path:
  Optical Power > Bidirectional Optical Power
- Mouse over the icons on the top right, locate and click on the **Optical Power** icon, and select **Bidirectional Optical Power**.

  Result: The system opens a new browser tab and the optical power values for the selected connection are loaded and displayed.

While the OTUk bi-directional optical power display is loaded, a message stating "`Loading: Retrieving Data From Network`" is displayed to the user until the data is loaded. This message appears in both AZ and ZA direction. The following figure illustrates an example of such a message in the AZ and ZA directions for loss graph.

Figure 17-95 Retrieving Power Data

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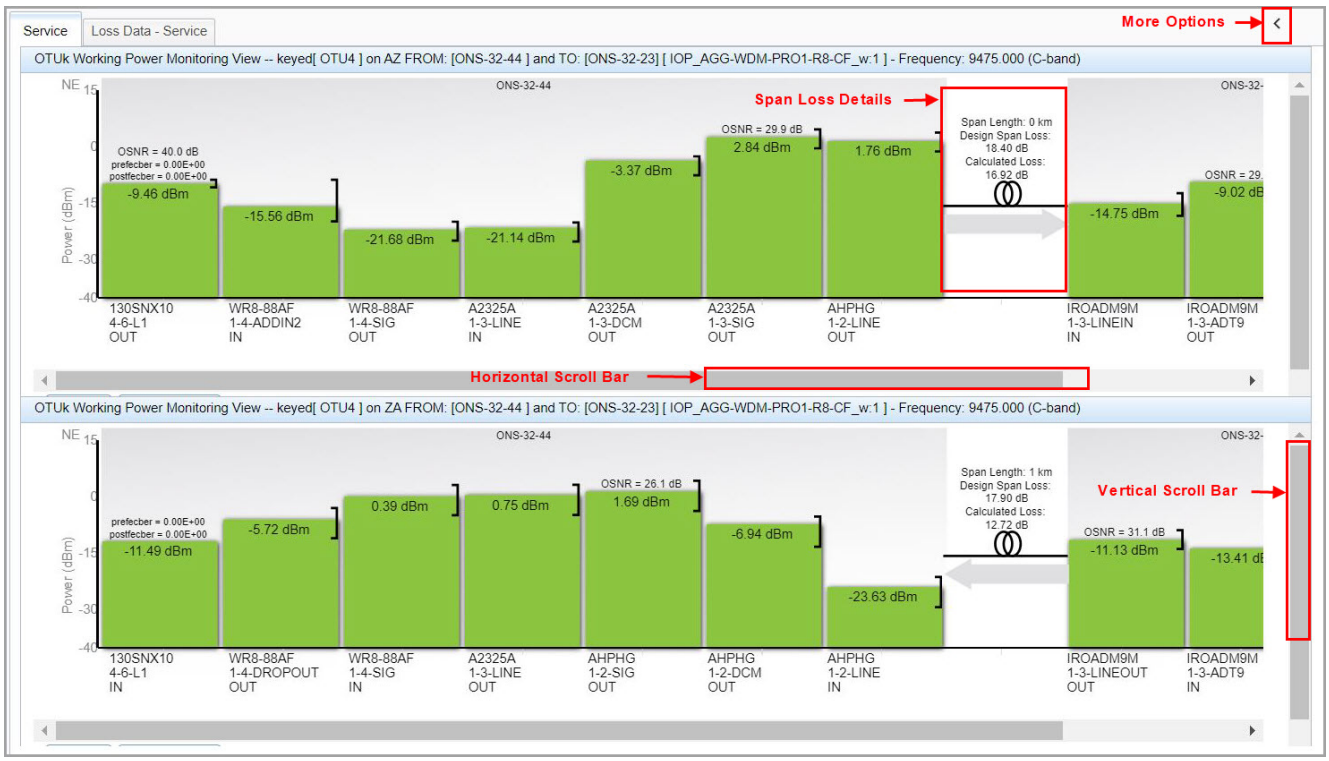
Figure 17-96 OTUk Connections Bidirectional Optical Power



When an NE is not reachable or not supervised in the path of an OTUk connection, the power values for all the ports of the NE are displayed as Not Available and highlighted in red, as NFM-T cannot fetch the power levels at the egress port of previous NE.

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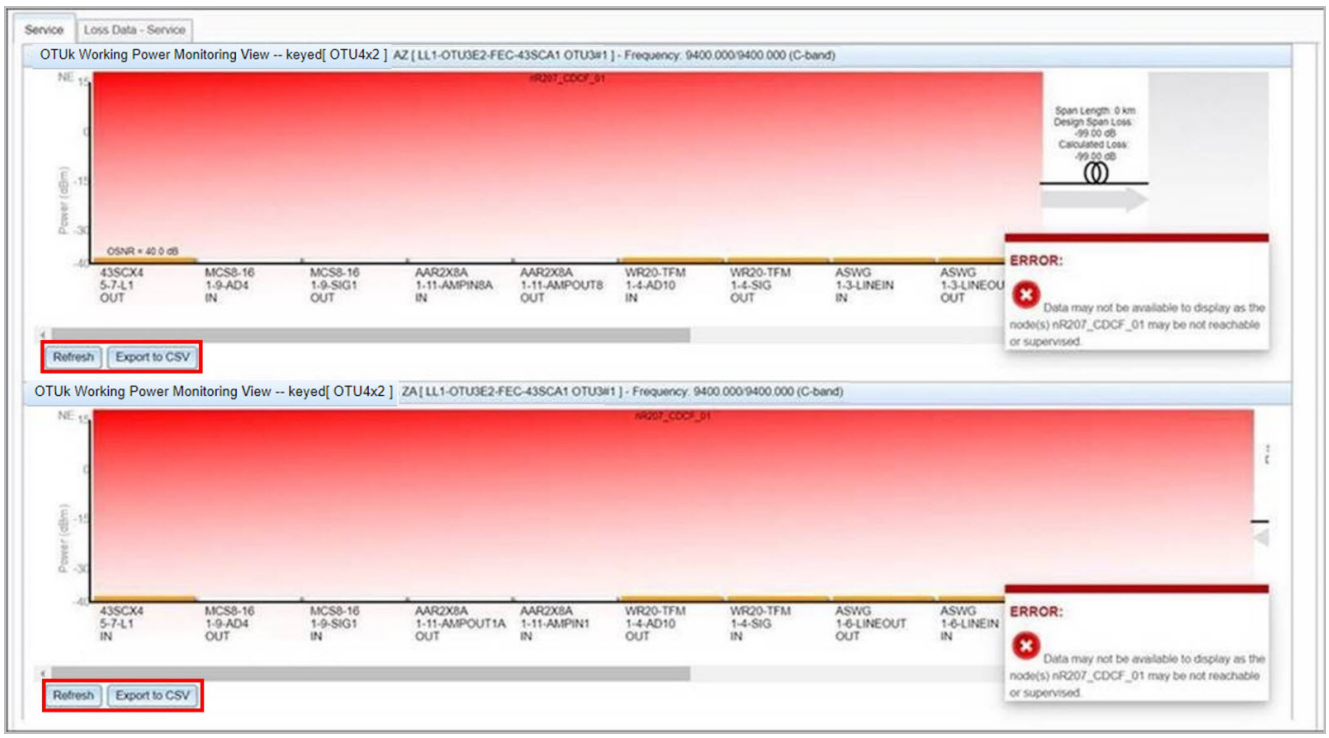
Figure 17-97 OTUk Graph with Not Supervised NE in the Connection



4

Mouse over the ports to view additional information as a pop up on the top right corner of the graph.

Result:

The following parameters are displayed:

- NE Name
- Port Name
- Measured Power
- Power Management Type
- Total Power
- OSNR
- Expected Power
- Expected Power Deviation
- Wavekey1
- Wavekey2
- WTD Usage Type

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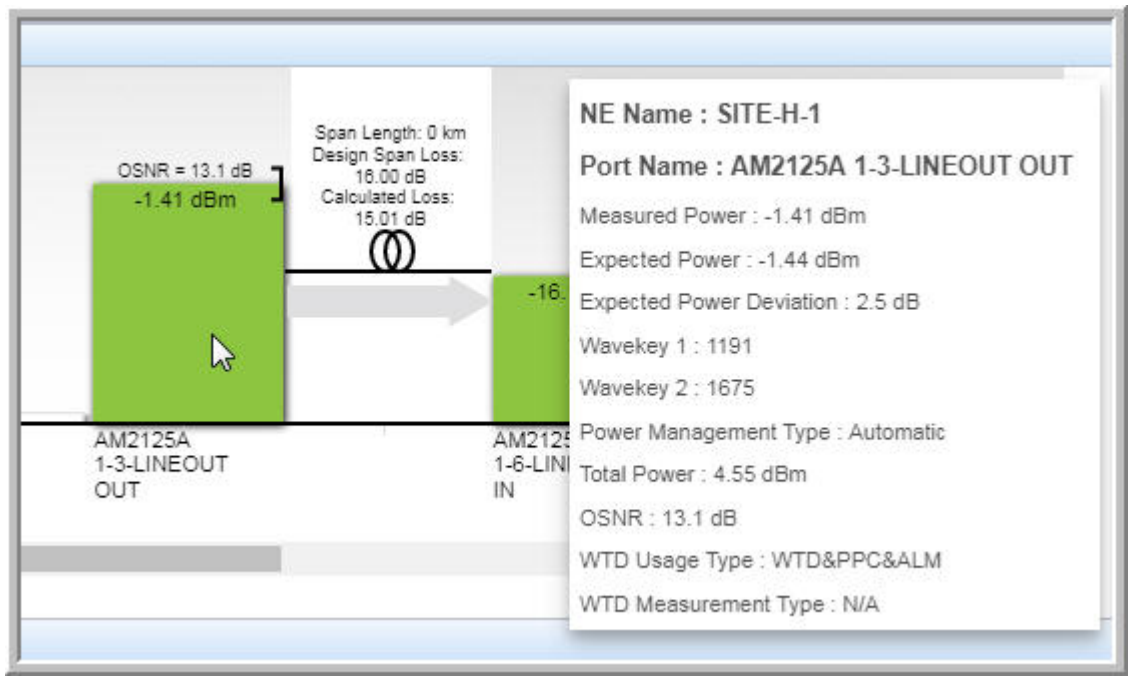
- WTD Measurement Type
- Target PSD
- Measured PSD
- Channel Type

Note: Target PSD, **Measured PSD** and **Channel Type** are applicable for IRDM32 and IRDM32LP only.

Figure 17-98 An Example of Mouse Over power bar of OTUk



5

Click on the More User Options arrow icon on the top right corner and then click Additional Information tab icon to view other parameters values.

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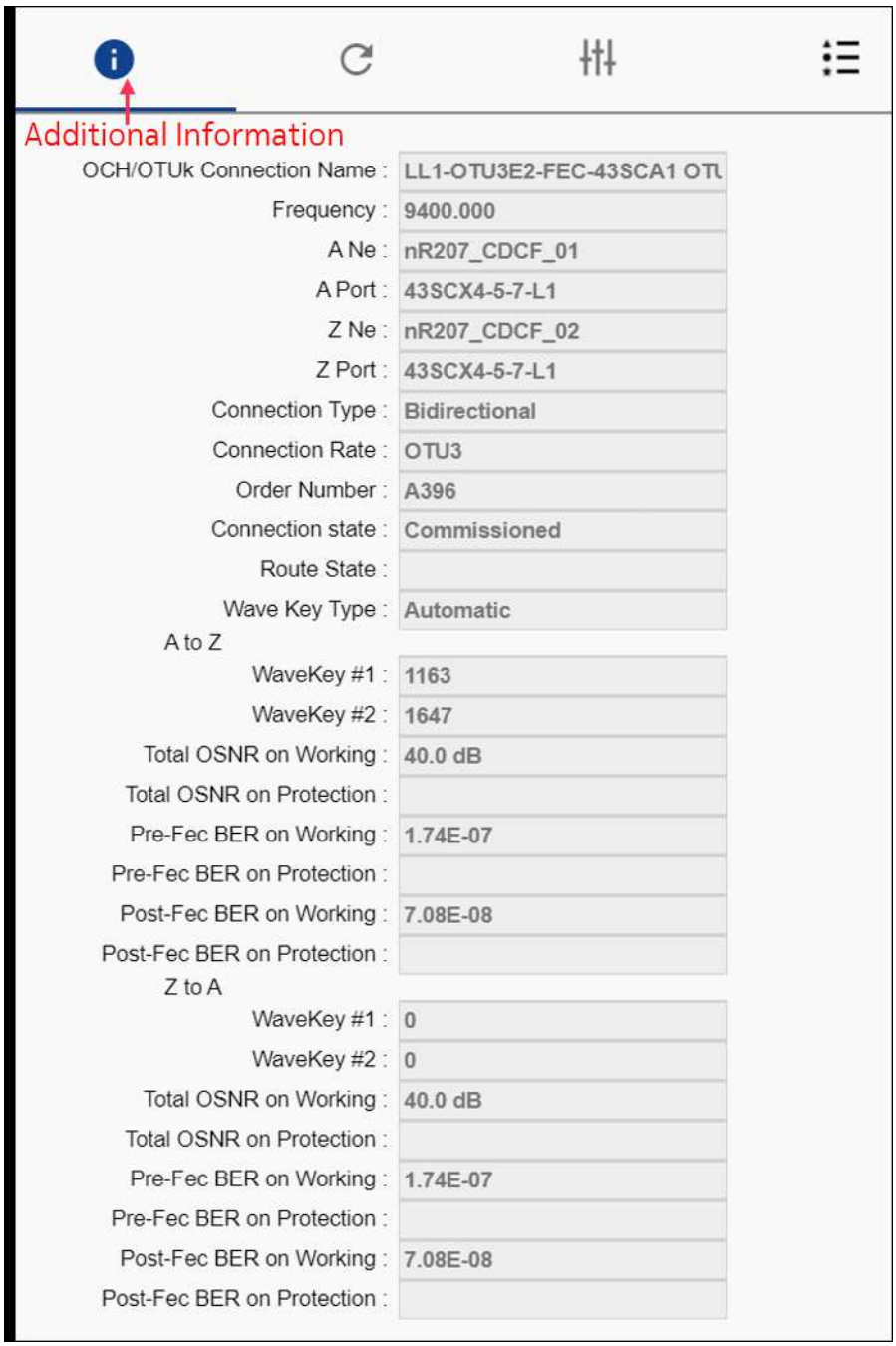
Figure 17-99 Additional attributes for OTUk Connection



6

Locate the Span Loss icons on the graph to view related parameter values.

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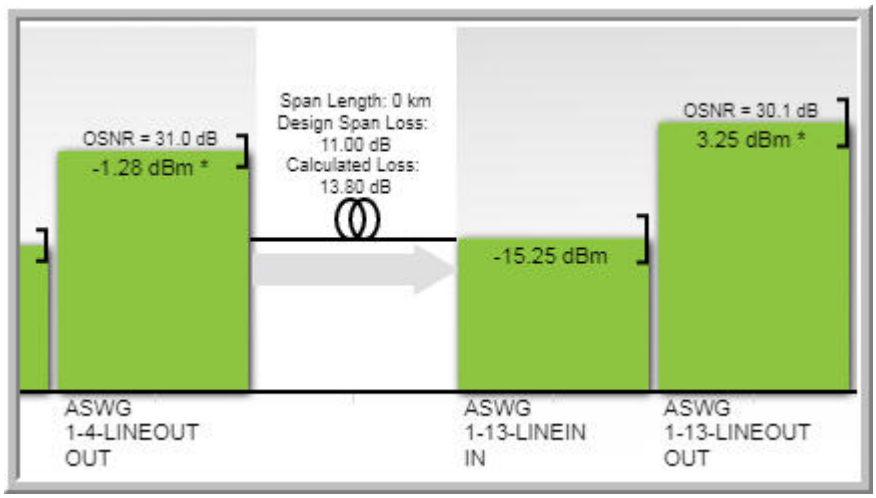
Figure 17-100 Span Loss Icons on OTUk Connections



7

To view optical power from the Routing Display, select the **Commissioned** OCH/OTUk infrastructure connection where you want to export the optical power, select the **Route** tab and select **Graph** in the **Route** tab.

Go to the next step.

Result: The system displays the Routing Display.

8

Click **More** icon for the **Commissioned** OCH/OTUk infrastructure connection where you want to view the optical power and follow one of these navigation paths:

Optical Power > Bidirectional Optical Power

Result: The system opens a new browser tab and the optical power values for the selected connection are displayed. Go to Step 6.

9

Optional: To refresh the optical power display for the selected infrastructure connection, do one or both of the following:

- To refresh the optical power display for the selected OTUk infrastructure connection for this one instance, click the **Refresh** button.
- To refresh the optical power display for the selected OTUk infrastructure connection automatically and for multiple instances, click on the **More User Options** arrow icon on the top right corner, then click the **Refresh** icon and use the drop-down lists to specify the **Auto Refresh Cycle (in secs)** and **Auto Refresh Duration (in mins)** values, and click **Start Refresh**.

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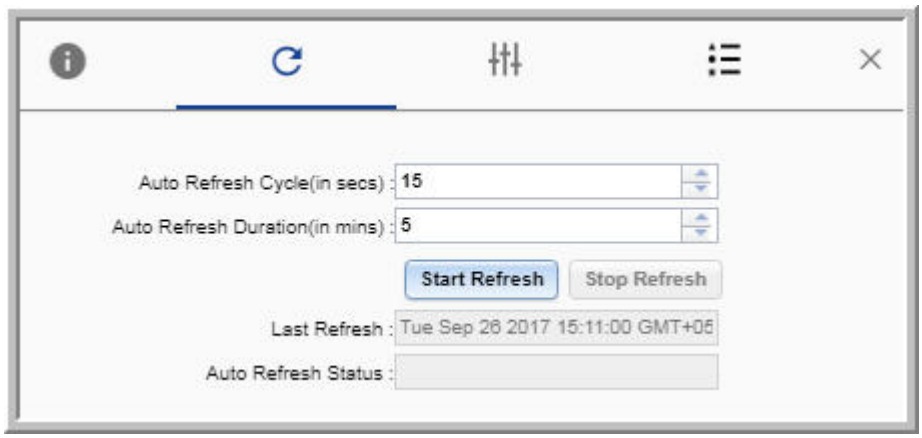
Figure 17-101 Configuring Auto Refresh



END OF STEPS

Task: Export the optical power of an OTUk infrastructure connection

Important! This task can only be performed if you have **Constructor** and/or **Map Constructor** privileges. The OTUk/OCH infrastructure connection must be in the **Commissioned** state. You can export the optical power of an OTUk or OCH infrastructure trail connection from a data table that displays an OTUk or OCH infrastructure trail or from the OTUk/OCH icon the Routing Display. This task provides you with both methods.

Complete the following steps to export the optical power of an OTUk/OCH infrastructure connection to Excel from a data table.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Infrastructure Connections

OPERATE > Protected Connections

Result: The system displays a data table that lists all of the requested connections.

2

To export the optical power for an OTUk/OCH infrastructure connection to Excel from a data table that displays OTUk/OCH infrastructure connections, go to Step 3.

To export the optical power for an OTUk/OCH infrastructure connection to Excel from the Routing Display that displays, go to Step 4.

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3

To export optical power from a data table, select the **Commissioned** OCH/OTUk infrastructure connection where you want to export the optical power and do one of the following:

- Click **More** icon and follow one of these navigation paths:
  Optical Power > Export all OTS to Excel
- Click the **Export to CSV** button on the bi-directional power display graph.

Result: On a successful export, the status bar message indicates the same.

The system then displays a pop-up that gives you the options of **Open**, **Save**, or **Save as**.

Note: If an associated ODU connection is rerouted, **Export All OTS to Excel** still saves data for all the OTS in the nominal route because the operation is performed from the nominal route OTUk/OCH.

Go to Step 6.

4

To export optical power from the Routing Display, select the **Commissioned** OCH/OTUk infrastructure connection where you want to export the optical power, select the **Route** tab and select **Graph** in the **Route** tab.

Result: The system displays the Routing Display.

5

Click **More** icon for the **Commissioned** OCH/OTUk infrastructure connection where you want to export the optical power and follow one of these navigation paths:

Optical Power > Export to Excel

Optical Power > Export all OTS to Excel

Result: On success the system displays a successful message on the status bar.

The system then displays a pop-up that gives you the options of **Open**, **Save**, or **Save as**.

Go to Step 6.

6

Access the saved or opened excel to view the exported parameter values for the connection.

Result:

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Figure 17-102 Infrastructure Connections – Optical Power – Export to Excel – Sheet 1: Data

	A	B	C	D	E
1	Connection Name	siv-test-1-2-3-4-5-8-real-wlt OTU4#1			
2	Connection Rate	OTU4			
3	Frequency	9360			
4	Connection Type	Bidirectional			
5	A NE Name	SITE8-1			
6	A Port	130SCX10-1-11-L1			
7	Z NE Name	SITE1-1			
8	Z Port	130SCX10-1-11-L1			
9					
10					

Details | AZchannelPowerWorking | AZchannelPowerProtected | ...

The tabs in the excel file include the following - Details, AZchannelPowerWorking, AZchannelPowerProtected, ZAchannelPowerWorking, and ZAchannelPowerProtected.

END OF STEPS

Task: Adjust the optical power of an OTUk infrastructure connection

Important! When you adjust power, you can affect service. You can only perform power adjustments if the Power Management of the LD pack is **Auto**. The OTUk/OCH must be in the **Commissioned** state. When you open optical power for an infrastructure connection, the system enables you to jump from the LD ports to the respective OTS power screen, from which you can do a power adjustment or an abort. This task can only be performed if you have **Constructor** and/or **Map Constructor** privileges. This task opens a new browser tab.

1

Click **More User Options** arrow icon on the top right corner of the OTUk power graph.

Result: More options available to the user to view additional information, configure auto refresh cycle, and perform power adjustment are displayed.

2

Regardless of the direction that you selected, click the **Power Adjustment** tab.

Result: The system displays the **Power Adjustment** tab.

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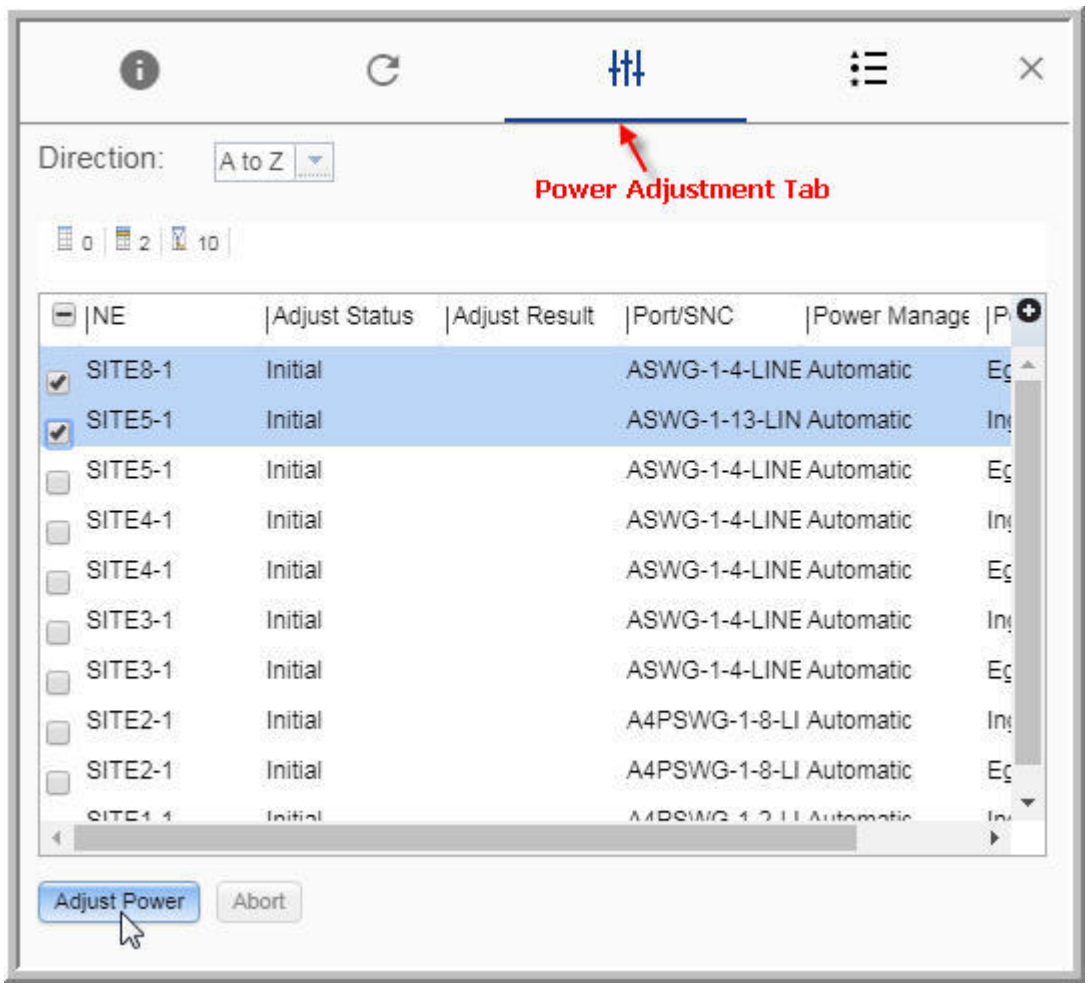
Figure 17-103 OTUk Connections – Power Adjustment Tab



3

Choose the **Direction** from the drop-down list.

4

Select the appropriate site or sites and click the **Adjust Power** button.

Result: The **Adjust Status** column displays the status for the power adjustment.

5

If, at any time, you want to stop the power adjustment and the **Power Adjust** status is **In Progress**, click the **Abort** button.

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Result: The system changes the **Adjust Status** column in the data table from **Initial** to **In Progess** then to **Failure** or **Success**, depending on the outcome of the power adjustment.

END OF STEPS

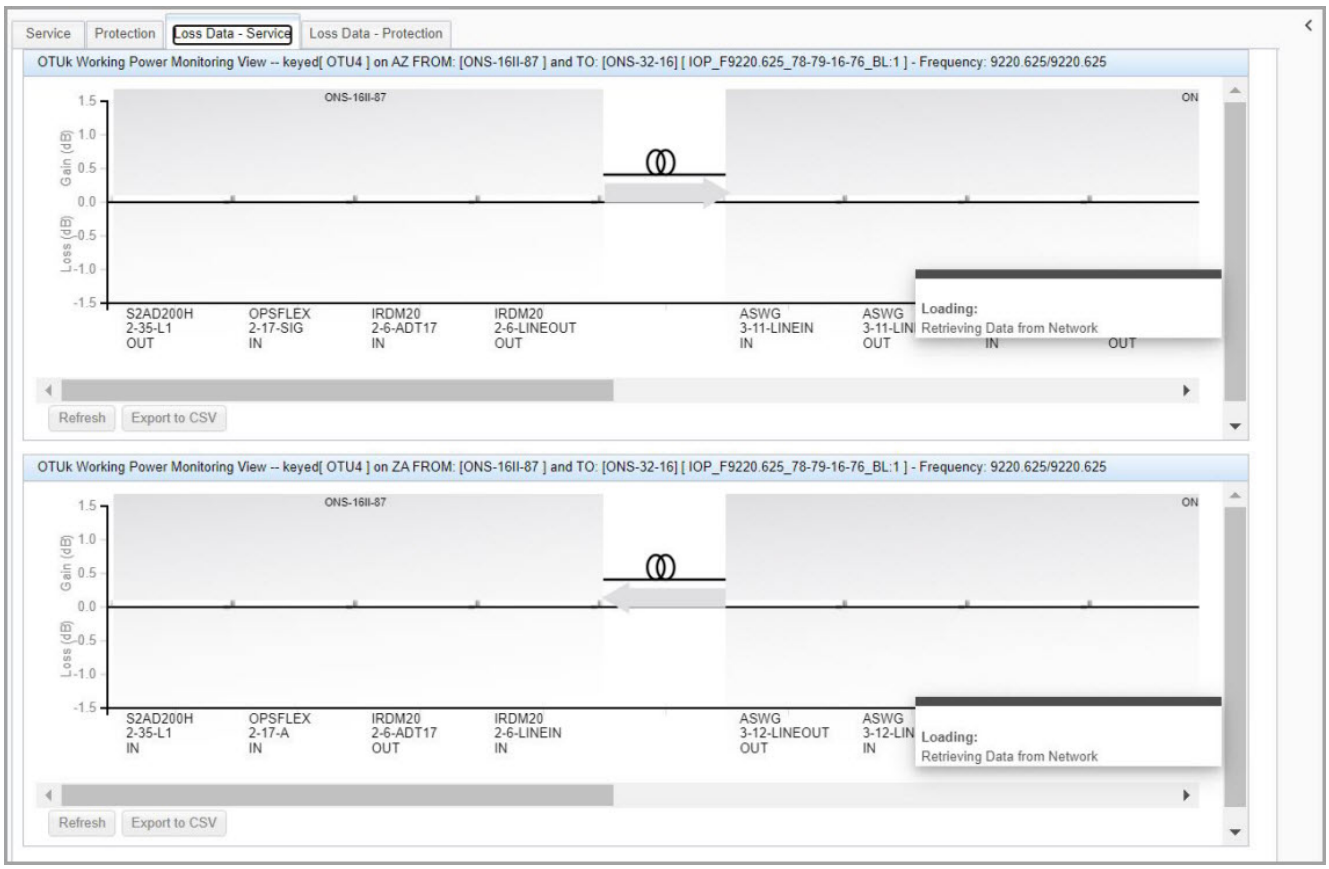
Task: View loss graph of an OTUk infrastructure connection

1

On the **Bidirectional Optical Power** window for an OTUk infrastructure connection, click on the **Loss Data - Service** or the **Loss Data - Protection** tab.

Result: While the loss graph is loaded, a message stating "`Loading: Retrieving Data From Network`" is displayed to the user until the data is loaded. This message appears in both AZ and ZA direction. The following figure illustrates an example of such a message in the AZ and ZA directions for loss graph.

Figure 17-104 Example of Retrieving Power/Loss Graph Data in AZ Direction



The loss data for the selected OTUk infrastructure is displayed.

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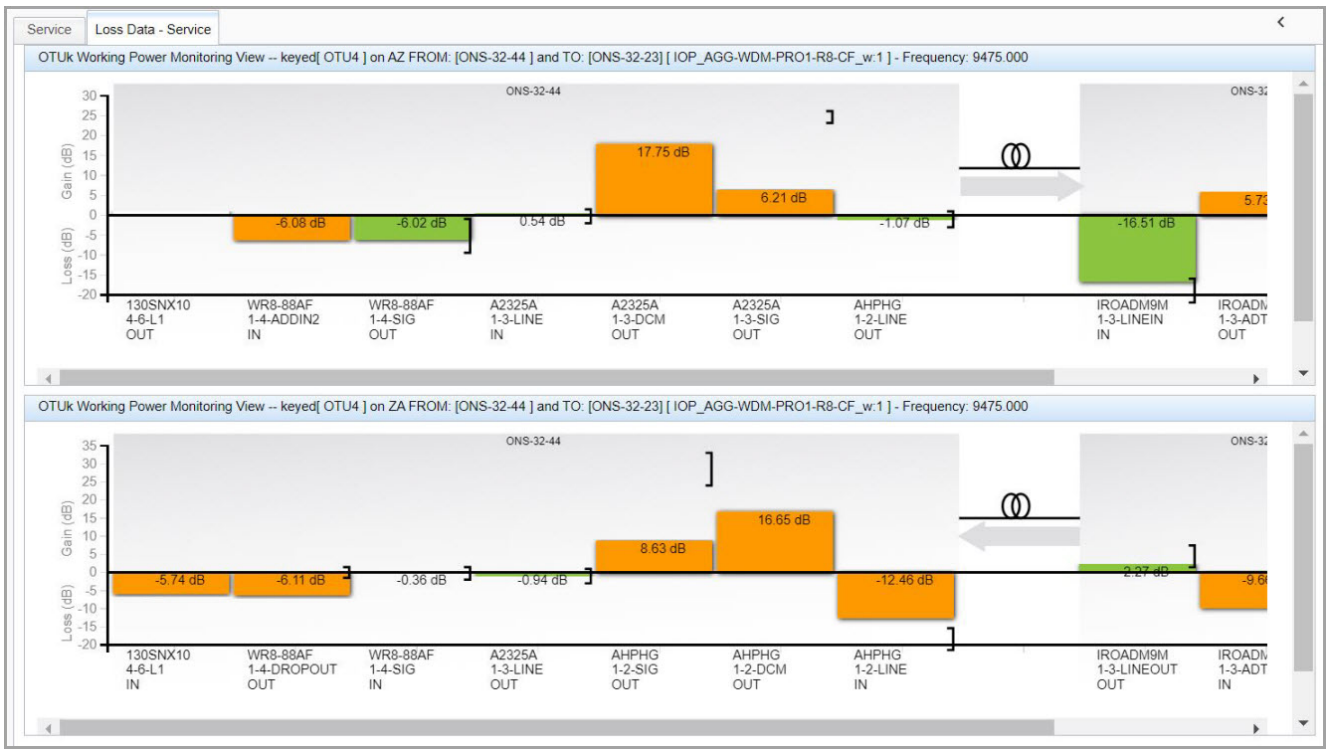
Note: The **Loss Data - Protection** tab is displayed only if there is a protection associated with the OTUk infrastructure connection.

Figure 17-105 Loss Graph for an OTUk



When an NE is not reachable or not supervised in the path of a connection, the loss value in the next ingress LD port is displayed as "Not Available", as NFM-T cannot fetch the power levels at the egress port of previous NE.

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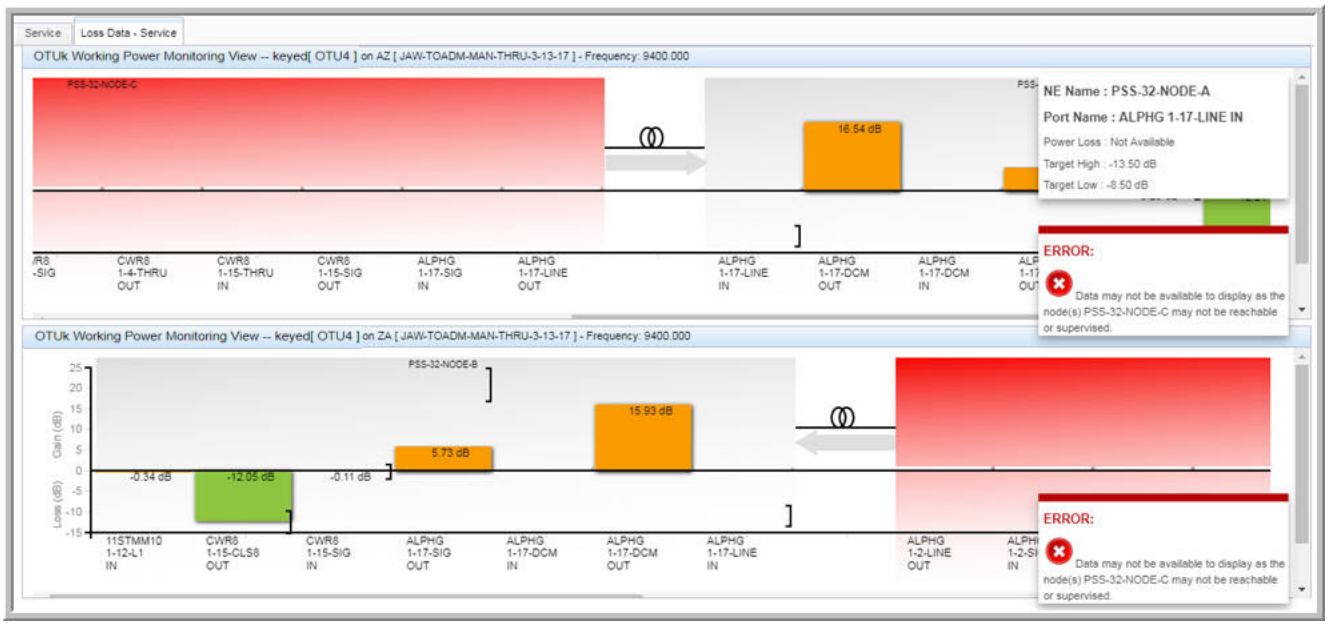
Figure 17-106 Loss Data for not supervised NE in the Connection Path



If an NE boundary on the loss graph is misaligned on a recently upgraded NFM-T system which contained previously working loss graph displays, set the preferences for the optical power graph using 17.16 “Set the optical power chart preferences” (p. 1865).

2

Mouse over the rectangular bars in the graph to view the following values for the selected port:

- **NE Name** - Name of the selected NE from the node list.
- **Port Name** - Name of the chosen port.
- **Power Loss** or **Power Gain** - Power loss if the difference between the adjacent power monitoring points is negative and power gain if the difference is positive.
- **Target High** - Value retrieved from the NE at the chosen port representing the maximum power limit configured.
- **Target Low** - Value retrieved from the NE at the chosen port representing the minimum power limit configured.

Note: Certain areas to be noticed for these values include the following:

- **Target High** and **Target Low** are displayed only if they are configured on the NE during power commissioning. If not available, the values are displayed as **Not Available**.
- If the power loss or gain cannot be calculated due to no power on one of the adjacent power monitoring points, then the values for **Power Gain** or **Power Loss** is displayed as **Not Available**.

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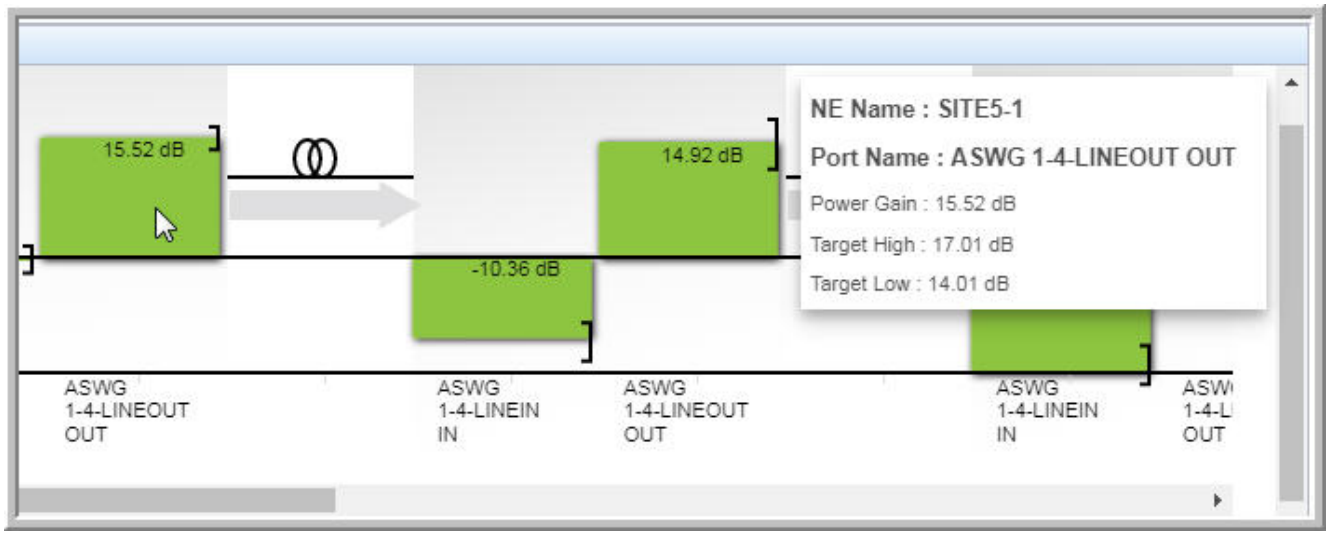
- Packs such as RA2P and DCM do not provide any power information. For such packs the values for **Power Loss** or **Power Gain**, **Target High** and **Target Low** are displayed as **Not Applicable**.

Result:

Figure 17-107 Mouse Over Loss Graphs



Power gain is displayed in the positive Y axis and power loss is displayed in the negative Y axis. For more information on the legend of the graph, see "Task: View the power graph or loss graph legend" (p. 1883).

3

Click **Refresh** to refresh the values on the loss graph.

4

Click **Export to CSV** in the A to Z, or Z to A direction to download a csv file containing the loss graph information in the particular direction.

Result: The exported file stores the values for the parameters **NE Name**, **Port Name**, **Port Direction**, **Expected Power**, **Expected Power Deviation**, and **Measured Power**. The ports on which the power values cannot be measured are listed as **null**. The user may then edit the .csv files for example, highlight a value. In some cases, editing and saving a .csv file may not be supported on the user's machine. In such a scenario, the original .csv file must be saved in .xlsx format and then edited.

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Figure 17-108 Loss Graph CSV File

Loss Data - Service					
Connection Name	Direction	Frequency			
raji-260SCX2-real-lon	AZ	9365			
NE Name	Port Name	Port Direction	Lower Range Limit (dB)	Upper Range Limit (dB)	Calculated Loss/Gain (dB)
SITE8-1	260SCX2 5-16-L1	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MCS8-16 5-2-AD2	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MCS8-16 5-2-SIG1	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MCS8-16 5-2-AAR1	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	AAR-8A 5-3-MCS	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	AAR-8A 5-3-AMPIN8	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	AAR-8A 5-3-AMPOUT8	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	AAR-8A 5-3-FSM	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MSH8-FSM 25-1-WSS1TO4AD1	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	MSH8-FSM 25-1-WSS1ADD1OUT	IN	Not Applicable	Not Applicable	Not Applicable
SITE8-1	WR20-TFM 1-5-ADD1IN	OUT	Not Applicable	Not Applicable	Not Applicable
SITE8-1	WR20-TFM 1-5-AD9	IN	Not Applicable	Not Applicable	-1.08
SITE8-1	WR20-TFM 1-5-SIG	OUT	-4.75	-7.75	-11.34
SITE8-1	ASWG 1-4-LINEIN	IN	1.5	-2	-0.53
SITE8-1	ASWG 1-4-LINEOUT	OUT	13.61	16.61	15.11
			Not Available	Not Available	0
SITE5-1	ASWG 1-13-LINEIN	IN	-8.5	-13.5	-13.82
SITE5-1	ASWG 1-13-LINEOUT	OUT	11.5	18	18.5
SITE5-1	WR20-TFM 1-16-SIG	IN	1.5	-2	-0.49

5

Click **More User Options** arrow button on the top right corner of the graph, click **Refresh** tab, and then configure auto refresh parameters and click **Start Refresh** to perform auto refresh.

Result: The loss graph is refreshed as per the configured auto refresh parameters.

END OF STEPS

Task: View the power graph or loss graph legend

1

Click on the **More User Options** icon on the top right corner of the power/loss graph.

Result: More options available to the user to view additional information, configure auto refresh cycle, perform power adjustment, and view legends of the graph are displayed.

2

Click the **Legends** tab.

Result: The legends for the colors and icons used on the graph is displayed.

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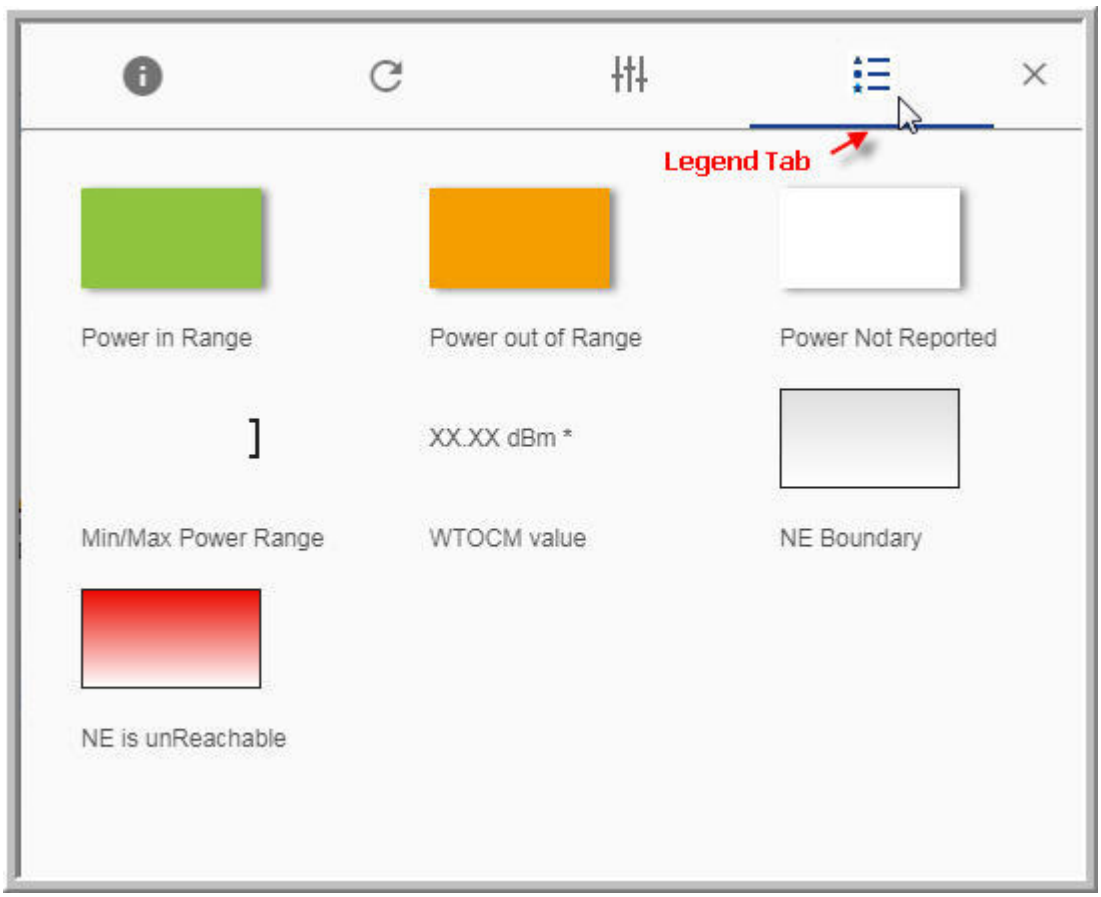
Figure 17-109 Power/Loss Graph Legend



End of steps

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18 General Maintenance

18.1 Overview

Purpose

This chapter provides the information and procedures required for the system maintenance.

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Card Migration

18.2 Card Swap

Introduction

This feature enables the seamless card swap-out without impacting the traffic. This is done without any connection reconfiguration by reconfiguring provisioned card type and settings over a warm restart.

This feature supports the replacement of the **WTOCM**, **WTOCMA**, and **WR8-88A** cards which must be swapped with their latest versions: **WTOCM-F** and **WR8-88A-F**. This applies with 1830 PSS rel 9.1.

Moreover, supports the replacement of the Raman amplifier **RA2P** card with the **RA2P-96**. This applies with 1830 PSS rel 10.0. However, the replacement of the Raman amplifier **RA2P** card with the **RA2P-96** on an 1830PSS-16 is supported from 1830 PSS rel 10.1.

As the swap out procedure involves NE warm reboot, NFM-T procedure allows operator to swap out together the WTOCM ,WR and RA2P cards associated with the same OTS link, in a single procedure

This feature applies to NE with the following type of shelf: 1830PSS-8, 1830PSS-8x, 1830PSS-16, 1830PSS-16II and 1830PSS-32.

The card replacement can be dictated by the need to switch from Fixed grid model to Flex grid model, resulting in a change in the OTS connection capacity. NFM-T is able to automatically detect the new frequency model and upgrade the OTS link from Fixed to Flex grid in OTN when applicable.

RA2P swap out alone does not cause a change to the Flex capability of the OTS link, but in combination with WR and WTOCM swap outs can result in a change to the Flex capability of the OTS link.

The feature provides a controlled approach to address the card swap-outs and OTS link upgrades with NFM-T system; simplifying hardware replacement procedure, not removing the connections and links on the NE.

General considerations and constraints

To reduce the cost and the time spent for the swap, the following recommendations must be taken into consideration:

- Plan card swap to replace all associated card to same OTS.
  All cards (WR, WTOCM, and RAP) which are associated to the single OTS can be replaced at the same time.
- Restrict the card swaps to single degree per NE. Only when all cards (WTOCM, WR and RA2P) need to be swapped a single reboot of the NE should be done to migrate both cards.

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- To avoid too many OTS links going down at same time; restrict the card swap impact to single OTS link in the network at a time.

From the traffic point of view, the following must be considered:

- **WR8-88A**, **RA2P** cards replacement impact traffic on the OTS link from the time the old card is pulled out till the migration activation is completed on the NE. Whereas, no traffic impact is foreseen for **WTOCM** swap-out.
- Alarms will be generated on all client layer connections on the impacted OTS link. The operator can choose to set alarm profiles to suppress alarms on the impacted connections.
- Traffic switching/re-routing to be managed by operator separately.
- NE swap-out commands will seamlessly reconfigure existing connections for packs on the optical lines from fixed-grid to Flex-grid model, only where applicable. OTS link becomes flex-grid capable depending on combination of the cards (WR, WTOCM and LD). New cards after swap should meet requirements for OTS link to become flex-grid capable.

  Note: This procedure is available only from NE R9.1 onwards. For earlier release NE's, the connection reconfiguration to be managed by operator using existing mechanisms to spare cards/reconfigure connections.
- **RA2P-96** card is not supported in the software catalog of NE Equipment Controller (EC) with less than 4GB Compact Flash. In these cases, before migrating from RA2P to RA2P-96 the equipment must be updated.
- Re-fibering to/from **RA2P-96** must be performed exactly on the same existing cards and ports prior to the RA2P swap. Though there is opportunity to re-fiber OTDR connection directly to RA2P-96 and remove MON-OTDR on the line, this has design trade-offs and requires re-engineering to determine and adjust power levels and gain settings on the line. Such re-engineering will not be done as part of swap-out of procedure and should be undertaken separately after card migration
- **RA2P-96** card has an OSC drop port. After the exchange, is needed to add a new fibering so that the OSC drop output on the RA2P-96 should be fibered to the OSC SFP receiver on the LD that follows. This fibering is in the scope of the swap-out operation

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18.3 WT0CM, WR8-88A and RA2P cards swap out procedure

Purpose

This procedure defines the operations to be followed by operators for managing seamless card swap-out via NFM-T . Seamless card swap-out procedure enables migration of older cards existing in physical slot of the NE to newer versions of the card with enhanced features. The main benefit is NE hardware replacement procedure is simplified and does not require any connection rearrangement.

This procedure applies for the swap of the following cards: **WTOCM**, **WTOCMA**,**WR8-88A** and **RA2P**.

Operator may use the procedure for any of the following use cases:

- Card Migration only: replacing existing hardware with new ones of the same card type.
- Optical Degree / Add Drop direction migration: replacing **WTOCM(A)**, **WR8-88A** and **RA2P** cards on the line
- OTS link Migration: replacing cards at optical degrees at both ends of the OTS link. This is the same case as the previous point but managed at both ends of the link.

Recommended mode of operations

1. Perform card swap only on single card or single degree per NE.
2. For swaps involving these cards, they should be activated with a single NE warm reboot. It is left to the operator to ensure packages are associated with the same degree / OTS link.
3. Perform card swap such that only one OTS link in the network is impacted at a time.

   Note: WTOCM swap will likely impact two OTS links and should be handled as special case But only include WR and/or RA2P packs associated with one OTS link so that traffic is impacted only on that OTS link, not both.
4. Traffic is impacted only for WR and RAP card swap from time of hardware swap on NE, and will be restored after NE reboot that occurs as part of the procedure. Traffic Protection or connection reconfiguration, if required, should be planned and managed independent of the swap operation.
5. During this duration, alarms are expected on the swapped cards/ links and all connections/ services riding on the impacted OTS link. Alarms will be cleared after the NE reboot as well. Alarm suppression if required may be done by operator by setting ASAP profiles on the impacted network connections.

How to swap the cards

The following procedure has the aim to supply operator and field team, a detailed guide on how to swap a card properly.

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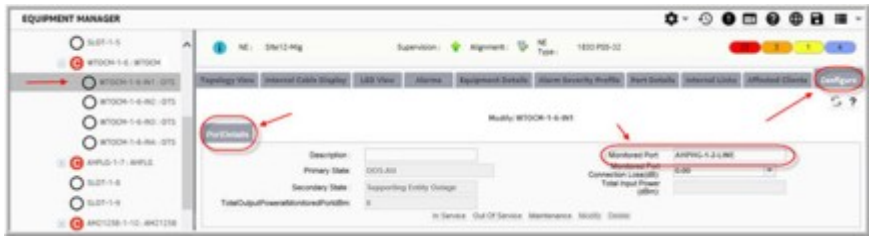
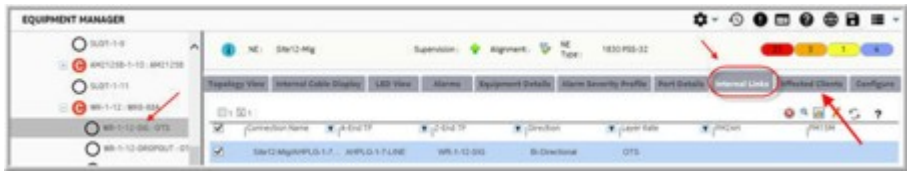
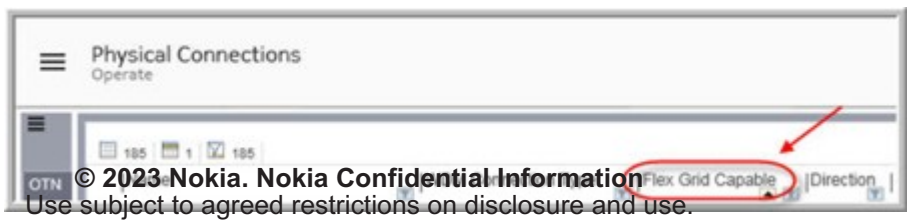
STEP	GROUP	ACTION
1	Operator/ NOC	**Identify the cards to be swapped and associated degree and OTS link.** **Determine the type of OTS link and if it belongs to GMPLS domain.** Open the EQM tool from the WebUI. Select the correct WTOCM pack IN port or the WR pack (check shelf/slot) or the RA2P IN port) in the equipment tree. *Note the card name and the card description labels.* • For WTOCM, select the **Configure** tab and refer to the **Monitored Port** field, to identify the LD pack port being monitored by the WTOCM pack. **Note:** WTOCM has 4 IN ports that are connected to 4 LD ports. LD transmit and receive ports are always monitored by the same WTOCM pack. There should be at maximum two LD packs (4 ports) monitored by the same WTOCM.  • For WR pack, select the correct WR pack SIG port from the equipment tree then select the **Internal Links** tab to the LD pack port connected to it.  • Select the correct LD pack line port from the equipment tree, then select the **Affected Clients** tab to view the OTS link associated to the port. • For RA2P, determine OTS link and whether MON-OTDR pack is present on the OTS link Refer to **Internal Links** on LINE IN port to determine if MON-OTDR pack is present on OTS link. The MON-OTDR pack shelf/slot details. **Note:** **-** OTS link is modeled on the Line Ports of the outermost egress AMP that it is listed under the tab Affected **-** For the case of bi-directional AMPs or Raman Amp in the topology, operator may need to walk through multiple internal topology links until outermost amplifier is reached. **Note:** **-** If present, identify and list the OTS link for potential impacts due to card migration procedure. Refer to **Flex Capable** attribute on the OTS link. Reports values are Yes/No for flex-grid. **-** If not present, refer to **Internal Links** for other LD pack ports involved in transmission (SIG, LINE) to view the next connected amplifier port. 

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STEP	GROUP	ACTION
1	Operator/ NOC	**Note:** **-** If starting from an OTS link, identify the LD or RA2P pack port in EQM tree and refer 'Internal Links' to walk the topology in opposite direction i.e. towards WTOCM and WR.

STEP	GROUP	ACTION
2	Operator/ NOC	**Identify all the impacted clients/connections from the impacted OTS link.** **Important!** This is an optional step for WR and RA2P pack swap only. It is not required for WTOCM pack swap. • For each identified OTS link, find all the impacted clients/connections: **-** Go to Physical Connections List and select the OTS link. **-** Go to the 360o view and select the Clients tab. **-** Identify and list all connections impacted due to card migration procedure.

STEP	GROUP	ACTION
3	Operator/ Field Team /NOC	**For PSS NE < R9.1, refer existing Card Sparing Procedures for PSS NE < R9.1** • For PSS NE < R9.1, card migration commands are not supported. **-** Refer to the existing NE Operating Procedures to replace provisioned hardware packs in the NE slots. **-** Rest of the procedure in this document does not apply to PSS NE < R9.1. **Note:** **-** Connection re-configuration required to move traffic away from impacted packs and OTS links. **-** Upgrade of impacted OTS from Fixed to Flex Grid will not happen in this case. **-** After sparing the cards, connections reconfiguration required to put traffic back on the OTS links.

STEP	GROUP	ACTION
4	Operator/ NOC	**Apply Protection Switch or re-route critical traffic** **Important!** This is an optional step, if additional protection is required. • For each impacted client connection, determine criticality and protection requirement. **-** If protection is required and it is already available, apply the protection switch. **-** If protection is required but not available, re-route the traffic away from impacted OTS link. **Note:** Both above steps depend on the protection scheme and the network topology. Operator should use existing procedures for the same.

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STEP	GROUP	ACTION
5	Operator/ NOC	**Block GMRE Routing and Restoration on ASON logical links crossing the impacted OTS links.** • For each impacted OTS link, determine if ASON logical links are routed through it. **-** Find OTS link in the **OTN Physical connections** list, and refer to its 360_o view. • From the **Infrastructure Connections** list, in the **Service rate** column filter the OMS service, then in the **Category** column, ASON Logical Link. • For each connection, set the **administrative state** of the ASON link to **Shutting Down**. For the procedure refer to 10.27 "Set the ASON administrative state of links" (p. 1504)

STEP	GROUP	ACTION
6	Operator/ NOC	**Set ASAP to all impacted connection layers to suppress alarms due to WR card swap-out.** **Important!** This is an optional step for WR and RA2P pack swap only. It is not required for WTOCM pack swap. • For each impacted client layer connection, apply ASAP to suppress alarms from NE. Refer to 7.29 "Correlate an OTN physical connection with an ASAP" (p. 830)

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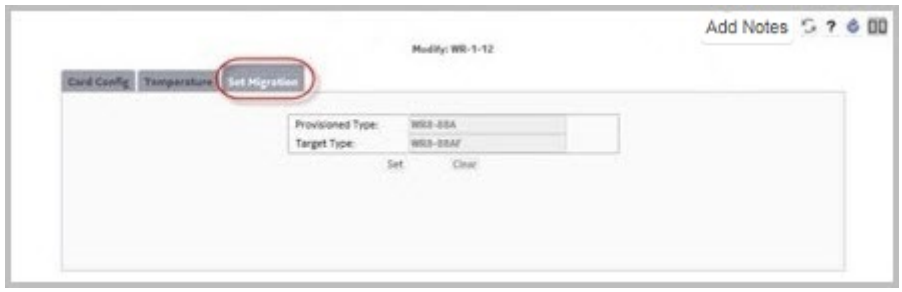
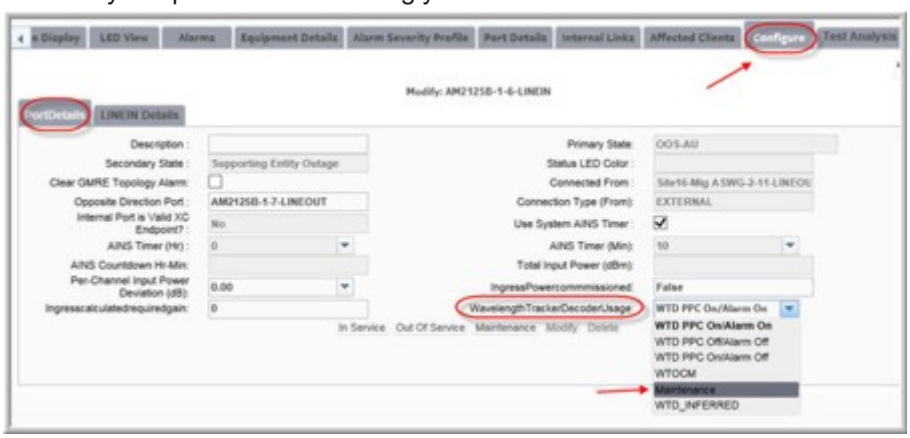
STEP	GROUP	ACTION
7	Operator/ NOC	**Setup NE slots for card migration.** **Important!** Disable the WTOCM power monitoring from NFM-T, if not done automatically. For each card identified for swap, setup the NE shelf/slot for card migration. Slots with provisioned card types but present type ‘empty’ can also be setup for migration. Set the card migration from NFM-T system: 1. From the EQM tool, select the card from the equipment tree. 2. Select the **Configure** tab, then select the sub-tab **Set Migration**. 3. Target Card Type should be auto-selected in the **Target Type** field. Click on **Set** button.  For WTOCM card migration, check that channel power monitoring is disabled on the impacted LD ports 1. From the EQM tool, select the correct LD pack shelf/slot/port that is monitored by WTOCM. 2. Select the **Configure** tab, then refer to the attribute **Wavelength Tracker Decoder Usage Type** in the **Port Details** sub tab. 3. If is not set to **Maintenance**, select this option from the drop-down menu and modify the parameter accordingly. 

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STEP	GROUP	ACTION
7	Operator/ NOC	**Note:** **-** For PSS R9.1, if slot has WR8-88A, target card type defaults to WR8-88AF, If slot has WTOCM or WTOCMA, target card type defaults to WTOCMF. For PSS R10, if slot has RA2P, target card type defaults to RA2P-96 only if NE EC has more than 4GB compact flash. **-** NFM-T will send commands to NE to setup migration. For WTOCM migration, NFM-T will first disable the channel power reporting on monitored LD ports by setting the WT monitoring type to maintenance. NFM-T will then set slot migration targets for the NE slots holding impacted cards. **-** If an incorrect shelf/slot has been setup for migration, this can be cleared from the same GUI. This will also re-enable the WTOCM channel power reporting on LD ports. Check if re-enabled, else it can be done manually as described in the above step.

STEP	GROUP	ACTION
8	Operator/ NOC	**Validate all NE slots marked for card migration** **Important!** This is an optional step. To be used only if NOC need to validate the NE cards/slots setup for migration. • To Review all the Slot migrations set on the NE, from the NFM-T, follow the steps: **-** Open the EQM GUI and select the correct PSS WDM NE from the equipment tree list. **-** Select the **Configure** tab, then select the sub-tab **Card Migration**. **-** List of cards for migration is displayed. **Note:** This page is not automatically refreshed. To manually update the page select the **Refresh** button on the top right.

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STEP	GROUP	ACTION
9	Field Team /NOC	**Perform hardware swap in field at each identified Site/Node.** **Important!** This procedure is for WTOCM/WTOCMA card swap. The WTOCM/WTOCMA swap should be done first in case WR and RA2P packs are identified for swap on the same OTS link along with WTOCM. 1. Perform Field works on the WTOCM/WTOCMA to be migrated at the node *Field Procedure:* **-** Adhere to proper ESD procedures and fiber optic handling procedures in all pertinent steps **-** Label each fiber connected to the WTOCMx with TO/FROM Shelf/Slot/Port labeling scheme **-** Carefully disconnect the fiber jumper cables connected to the WTOCMx card **-** Cap the fiber ends of the fiber cables **-** Remove the WTOCMx card **-** Signal to the NOC that WTOCMx is removed. **Warning:** NOC is able to see and verify that the target WTOCM/WTOCMA card is removed. **Card Missing** alarm is raised on the NFM-T system. This can be checked in the EQM **Card Migration** tab for the NE performing a manual refresh. Refer to Step 8. 2. Perform Field works on the slot to be migrated to WTOCM-F at the node after removing the old WTOCM/WTOCMA in the prior step. *Field Procedure:* **-** Adhere to proper ESD procedures and fiber optic handling procedures in all pertinent steps **-** Insert properly the new WTOCM-F into the intended slot **-** With careful attention to the fiber labels, reconnect the fibers cables to the intended ports that were in use **-** Wait for the new WTOCM-F pack to boot up by observing the LED indications. Repeat the procedure for each identified Sites/Nodes. **Warning:** The slot that will be migrated will have a card type mismatch condition raised at this point. **Card Missing** alarm is cleared and **Card Mismatch** alarm is raised on the NFM-T system. NOC can verify that the target WTOCM-F card is inserted into the slot opening the EQM **Card Migration** tab. A manual refresh is requested. Refer to Step 8. **-** Check the SW version on the new WTOCM-F and if necessary wait for the SW to upgrade. From the WebUI, select shelf and slot from system tree on the left side of the screen and ensure that the Provision Information has been selected under **Select Function** at top of the page

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STEP	GROUP	ACTION
10	Field Team /NOC	**Replace hardware cards in field, in each identified site / node.** **Important!** This procedure applies to WR8-88A card swap only. 1. Perform field works on the WR8-88A to be migrated at the node. *Field Procedure:* **-** Adhere to proper ESD procedures and fiber optic handling procedures in all pertinent steps **-** Label each fiber connected to the WR8-88A with TO/FROM, Shelf/Slot/Port labeling scheme **-** Carefully disconnect the fiber jumper cables connected to the WR8-88A card **-** Cap the fiber ends of the fiber cables **-** Remove the WR8-88A card **-** Signal to the NOC that WR8-88A is/are removed. **Warning:** NOC can see and verify that the target WR8-88A card is removed. **Card Missing** alarm is raised on the NFM-T system. This can be checked in the EQM **Card Migration** tab for the NE performing a manual refresh. Refer to Step 8. Traffic is impacted on all the connections going through degree/OTS link associated with card. Alarms are raised in NFM-T for all client connection layers. 2. Perform Field works on the slot to be migrated to WR8-88AF at the node after removing the old WR8-88A in the prior step. *Field Procedure:* **-** Adhere to proper ESD procedures and fiber optic handling procedures in all pertinent steps **-** Insert properly the new WR8-88AF into the intended slot **-** With careful attention to the fiber labels, reconnect the fibers cables to the intended ports that were in use **-** Wait for the new WR8-88AF pack to boot up by observing the LED indications **-** Repeat the procedure for each identified Sites/Nodes **Warning:** The slot that is migrated has a card type mismatch condition raised. **Card Missing** alarm is cleared and **Card Mismatch** alarm is raised on the NFM-T system. NOC can verify that the target WR8-88AF card is inserted into the slot opening the EQM **Card Migration** tab. A manual refresh is requested. Refer to Step 8. **-** Check the SW version on the new WR8-88AF and if necessary wait for the SW to upgrade. From the WebUI, select shelf and slot from system tree on the left side of the screen and ensure that the Provision Information has been selected under **Select Function** at top of page.

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STEP	GROUP	ACTION
11	Field Team /NOC	**Perform hardware swap in field at each identified Site/Node.** **Important!** This procedure is for RA2P card swap. 1. Perform Field works on the RA2P to be migrated at the node *Field Procedure:* **-** Adhere to proper ESD procedures and fiber optic handling procedures in all pertinent steps **-** Label each fiber connected to the RA2P with TO/FROM Shelf/Slot/Port labeling scheme **-** Carefully disconnect the fiber jumper cables connected to the RA2P card **-** Cap the fiber ends of the fiber cables **-** Remove the RA2P card **-** Signal to the NOC that RA2P is removed. **Warning:** NOC is able to see and verify that the target RA2P card is removed. **Card Missing** alarm is raised on the NFM-T system. This can be checked in the EQM **Card Migration** tab for the NE performing a manual refresh. Refer to Step 8. Traffic is impacted on all the connections going through degree/OTS link associated with card. Alarms are raised in NFM-T for all client connection layers. 2. Perform Field works on the slot to be migrated to RA2P-96 at the node after removing the old RA2P in the prior step. *Field Procedure:* **-** Adhere to proper ESD procedures and fiber optic handling procedures in all pertinent steps **-** Insert properly the new RA2P-96 into the intended slot **-** Note that the OSC signal is dropped from the RA2P-96 instead of the ingress LD; therefore, be sure to fiber the connection between the RA2P-96 OSC Out port and OSCSFP receiver of the ingress LD. **-** With careful attention to the fiber labels, reconnect the fibers cables to the intended ports that were in use **-** Wait for the new RA2P-96 pack to boot up by observing the LED indications. Repeat the procedure for each identified Sites/Nodes. **Warning:** The slot that will be migrated will have a card type mismatch condition raised at this point. **Card Missing** alarm is cleared and **Card Mismatch** alarm is raised on the NFM-T system. NOC can verify that the target RA2P-96 card is inserted into the slot opening the EQM **Card Migration** tab. A manual refresh is requested. Refer to Step 8. **-** Check the SW version on the new RA2P-96 and if necessary wait for the SW to upgrade. From the WebUI, select shelf and slot from system tree on the left side of the screen and ensure that the Provision Information has been selected under **Select Function** at top of the page

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STEP	GROUP	ACTION
12	Operator / NOC	**Activate slot migration on NE to new card types.** 1. Start the migration sequence: **-** Open the EQM and select the correct PSS WDM NE from the equipment tree list **-** Select the **Configure** tab, then select the sub-tab **Card Migration**. 2. Verify that the slot type has been migrated directly to all targeted cards on the NE. **-** Access the NE and select the shelf and slot from the tree.

STEP	GROUP	ACTION
13	Operator /NOC	**Validate Slot Migration after NE Reboot. Enable WTOCM channel power monitoring, if not enabled.** Before perform the commands included in this step, wait for NFM-T to connect and align with the network element. Wait for card's alarms as well as all impacted connection layers, have been cleared. **Important!** Alarms may not appear if operator has applied ASAP on connections to suppress alarms. 1. Check the slot type has migrated for all targeted cards. **-** From the EQM, select the card from the equipment tree **-** Select the **Equipment Details** tab. Check **Provisioned type** column changed to **new target card type**. Validate that card name and card description labels are reset correctly on the new card **- Card Mismatch** alarm on the pack is cleared. 2. Check that channel power reporting and power control setting is enabled on impacted LD ports. **-** From the EQM, select the correct LD pack shelf/slot/port that is monitored by WTOCM **-** Select the **Configure** tab and refer to Attribute **WT Decoder Usage Type** **-** If not set to *WTOCM,* select this option from the drop-down menu and modify parameter. **Note:** After NE warm reboot, if WTOCM is involved in the migration, NFM-T automatically enable the channel power reporting and power control by setting the WT monitoring type to WTOCM.

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STEP	GROUP	ACTION
14	Operator /NOC	**Perform Port Parameter Sync on Nodes involved in swap and migration (NE's rebooted). Validate OTS Link Upgrade in NFM-T.** • For synchronizing Flex-Grid attributes from the LD ports associated with the OTS link, do the following: **-** Visualize the **Nodes** List, then select the nodes associated with the ends of the OTS link **-** Check that the NE's are **Supervised** and **Aligned** **-** Highlight the Node, Right-click and follow the path **Synchronize > Ports** **-** Wait for ports synchronization is completed. • Validate that OTS links have been upgraded to Flex-Grid, where applicable. **-** Visualize the Physical Connections list and find the impacted OTS link. **-** Refer to attribute column **Flex Capable** to determine the flex capability of the link

STEP	GROUP	ACTION
15	Operator /NOC	**Set ASAP at all impacted connection layers to ensure alarms are not suppressed anymore.** **Important!** This is an optional step if ASAP is already set up on impact connections. • For each impacted client layer connection, apply appropriate ASAP to raise alarms from NE: **-** Refer to this procedure 7.29 "Correlate an OTN physical connection with an ASAP" (p. 830), to set ASAP on network connections.

STEP	GROUP	ACTION
16	Operator /NOC	**Unlock ASON logical links crossing the impacted OTS links for GMRE Routing and Restoration.** • This step applies to all ASON logical links whose administration status has been changed into **Shutting Down**. **-**Refer to this procedure 10.27 "Set the ASON administrative state of links" (p. 1504), to set the ASON link administrative state to **Unlocked State**.

STEP	GROUP	ACTION
17	Operator /NOC	**Release Protection Switch OR re-route critical traffic back onto impacted OTS link.** **Important!** This is an optional step if protection switches were applied. • For each client connection that was switched or re-routed, put it back onto impacted OTS link. **-** If protection switch applied, release it. **-** If traffic re-routed away from OTS link, re-route it back onto the OTS link.

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18.4 Software Support for Seamless swap of cards

Support for Seamless swap of cards

NFM-T supports seamless card swaps through this feature and the same GUI feature will also be used for non-seamless card swaps in future.

NFM-T has introduced a new menu item **Card Swap** under **DEPLOY**, which is used to activate the cards configured for card swap operation in the Equipment Manager.

The card swap is triggered by clicking **Card Swap** from the hover over option on a supported card from the EQM tree.

The feature supports the seamless card swap for the following amplifiers:

Table 18-1 Supported Migration Packs Detail

From card	To card	PSS NE Software
AM2125A / AM2125B / AM2318A	ASWG	R13.0
ASWG	ASGLP	R13.0
ASWG, and AM2125A, AM2125B, AM2318A	ASG	R13.0
RA5P	RA5PB	R13.0

Note: RA5P to RA5PB swap is not supported for L0 Control Plane.

The feature is supported on following shelves:

Shelves Supported

1. PSS8
2. PSS16II
3. PSS16 legacy
4. PSS32

Note: Restrictions

1. These shelves have WDM optics transport related cards and related switching shelves can be included in the NE configuration.
2. For PSS4 shelf, no card types are supported for migration.
3. In this feature, it is not possible to swap the amp card with the WR8-88 or WTOCM card . Due to this limitation, this feature does not support any fixed to flex grid conversion (used

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for WR8-88 swap). The swap of Amp card is only possible with another Amp card plugged in the same slot. Currently, card swapping is supported on the same slot.

This feature is supported for Managed plane and Control plane connections. The following scenarios are supported:

- L0 Managed plane
- L0 Managed plane with L1 GMPLS
- L0 GMPLS
- L0 GMPLS + L1 GMPLS in overlay or MRN configuration

Important Considerations

The NE Software automatically reconfigures all the connections and services that are riding the OTS link. The automatic reconfiguration and rerouting operation is achieved by the NE software from R13.0 onwards.

One or both the endpoints of the link can undergo card swap operation and you do not have to manually delete and re configure all the connections and services.

Seamless card swap operation details

The following steps are followed for a card swap.

Before you Begin

Any planned traffic rerouting under an NE, must be done prior to the card swap operation.

Open a 360° View of the OTS link and view the clients affected to take the steps to ensure any impact on the configured services on the NE.

Card Swap Operation Steps

1. From the WebUI, navigate to:

   OPERATE > **Equipment Manager**

   From the EQM tree, select the compatible card and choose the Card Swap option from the drop-down list.

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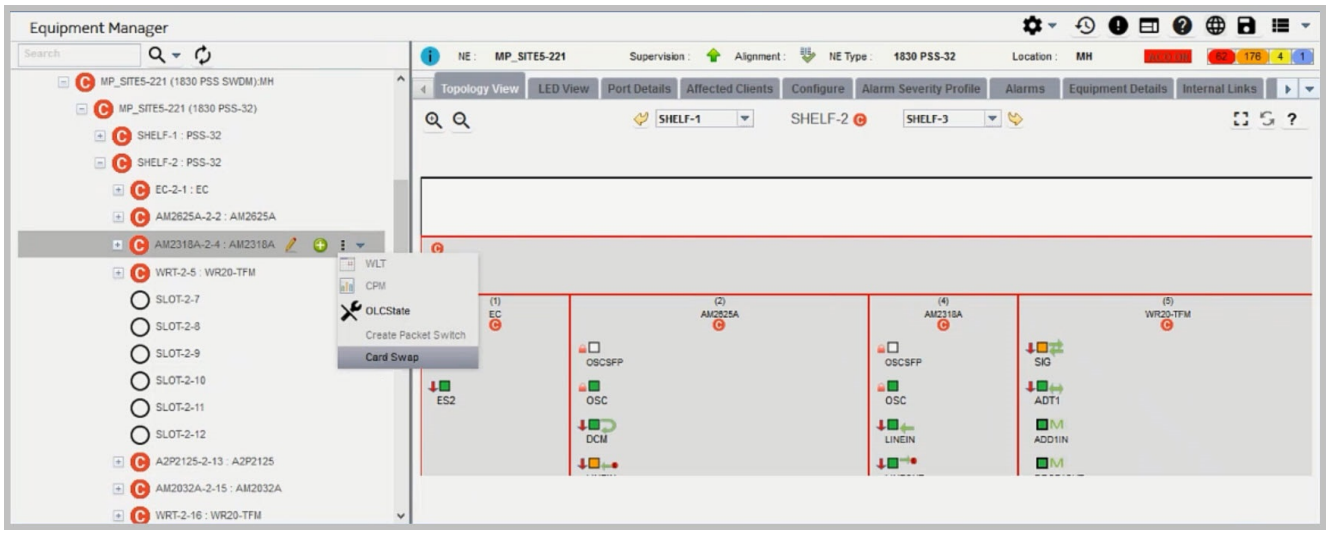
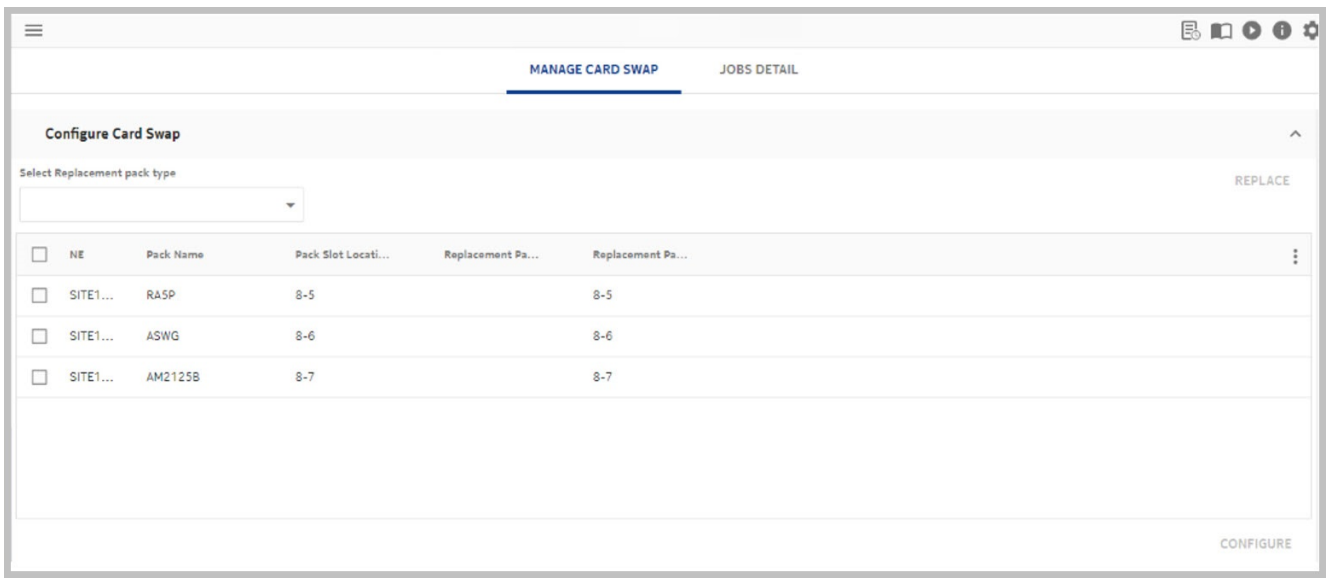


Result: EQM configures the selected NE information and redirects to **MANAGE CARD SWAP** page in **DEPLOY > Card Swap**.

Figure 18-1 Card Swap Page



Note: You can select multiple cards for a swap simultaneously. The selected cards are listed on the Card Swap Page.

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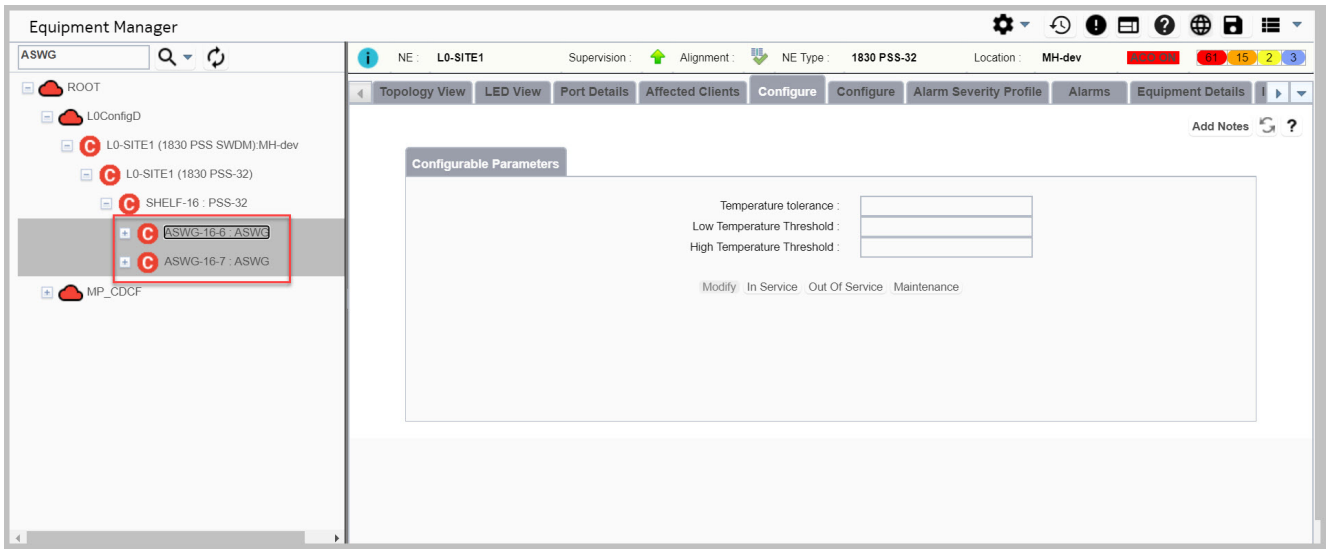
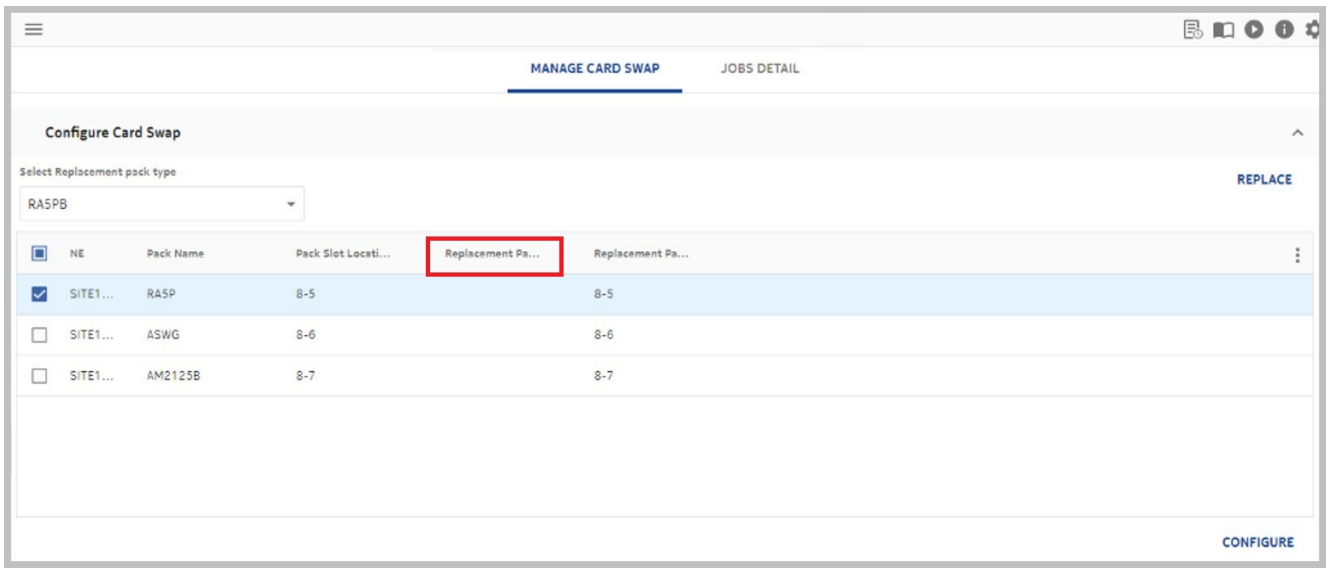
Figure 18-2 Multiple Cards selection



2

Select the desired card for swap from the cards list in EQM, select the compatible cards for swap operation, listed under **Select Replacement pack type** drop down list.



3

Click on **REPLACE** to update **Replacement Pack Name** .

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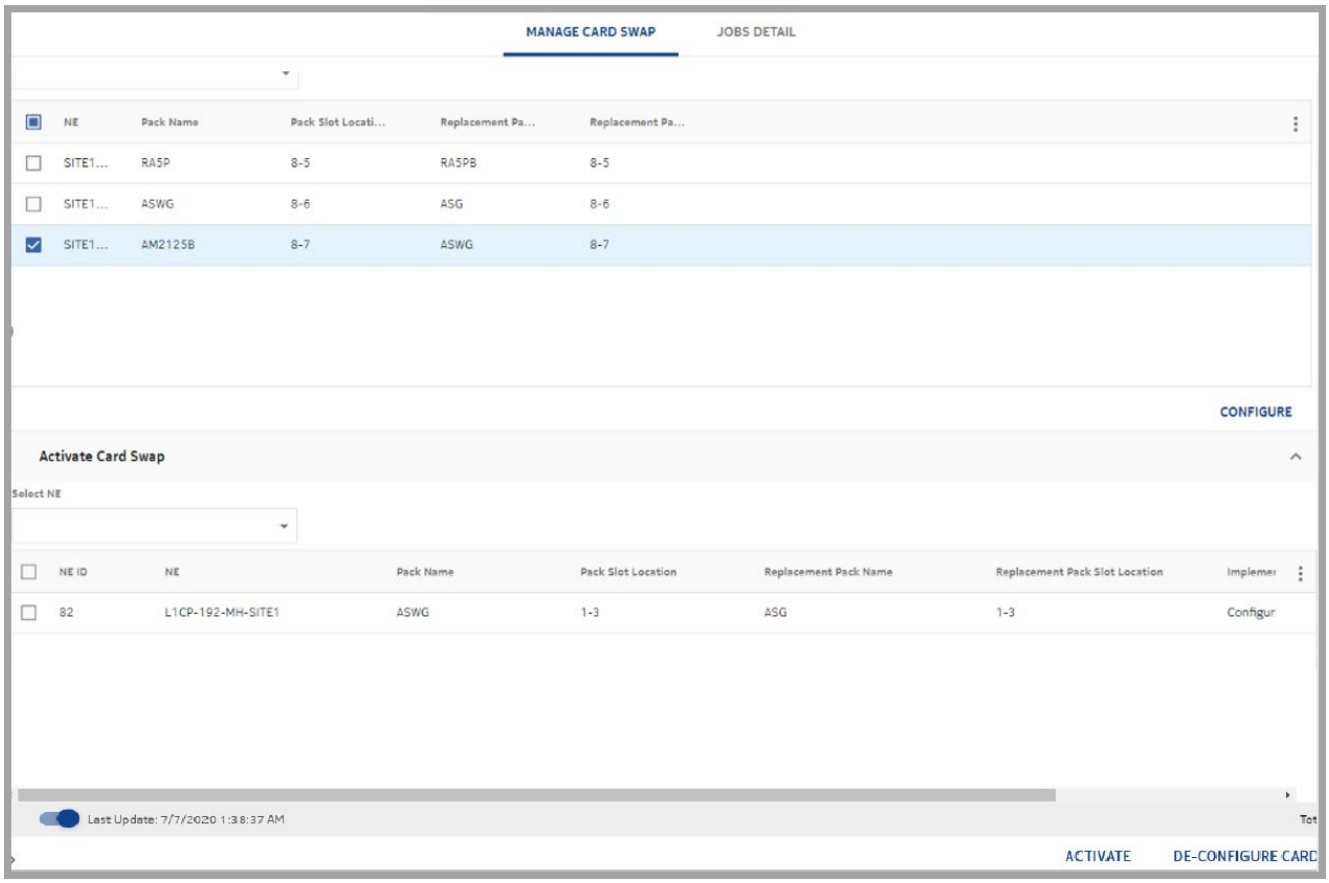
Result: The **Replacement Pack Name** column is updated with the replacement card name.

4

Select one or more cards for migration and click **CONFIGURE**.

Result: Request is sent to NE and **Successfully sent configure command to Network Element** message is displayed.

Note: At this state, to tag the alarms arising due to the card swap procedure, NFM-T automatically updates the impacted OTS link in OLC State to **Maintenance**. Post clicking the **CONFIGURE** button, the card and slot configuration information is sent to the **Activate Card Swap** section at the bottom with the status of **Implementation State**.



Note:

- After completion of the above steps for card swap operation, the field engineer is expected to physically swap the card with the Migration Pack Type. You can configure card swap multiple times from EQM before deciding to activate the card swap.

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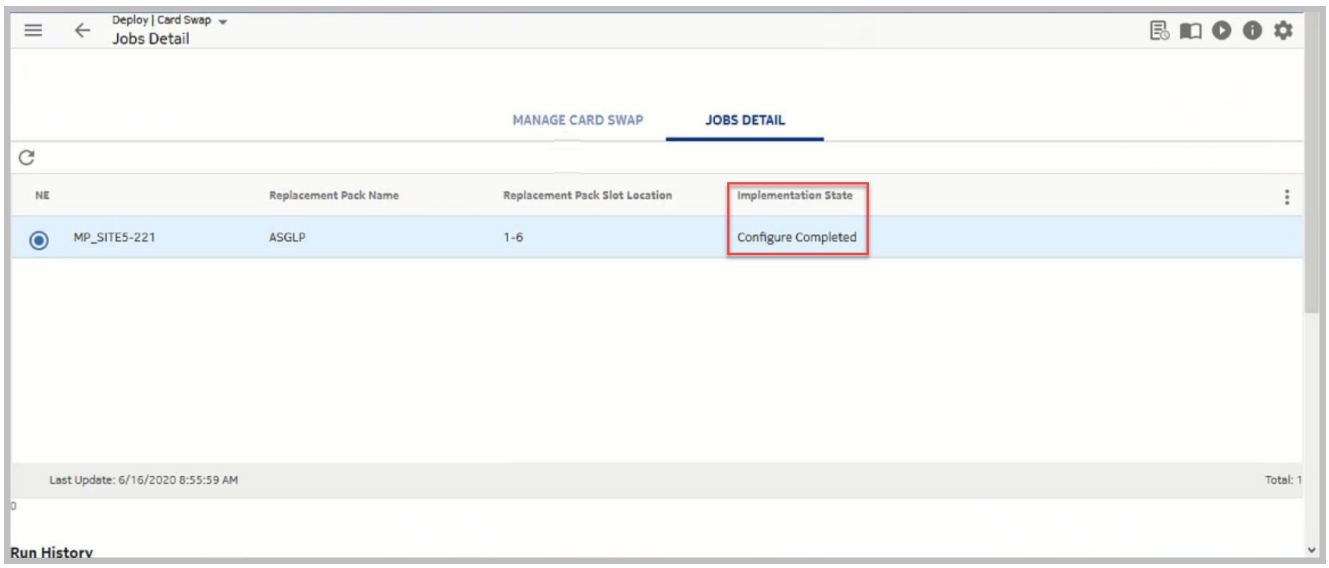
At this stage, you can de-configure the card by clicking on **DE-CONFIGURE CARD** button. Card swap action cannot be undone after physical swap of the card on the site and after you perform the **ACTIVATE** action.

- It is recommended to take NFM-T and MIB back up for the NEs before performing card swap operation as card swap is supported only in one direction. User can roll back only using existing backup functionality as there is no roll back functionality.

5

The **CONFIGURE** operation initiates the card swap operation for the selected cards and sets up the configuration to be activated further. Navigate to **JOBS DETAIL** page to check the status. The **Implementation State** will show as **Configure Completed** for a successful card swap configuration.



6

Choose the NE from the drop-down list and select the cards from the **Activate Card Swap** section data table.

Result: ACTIVATE button is enabled

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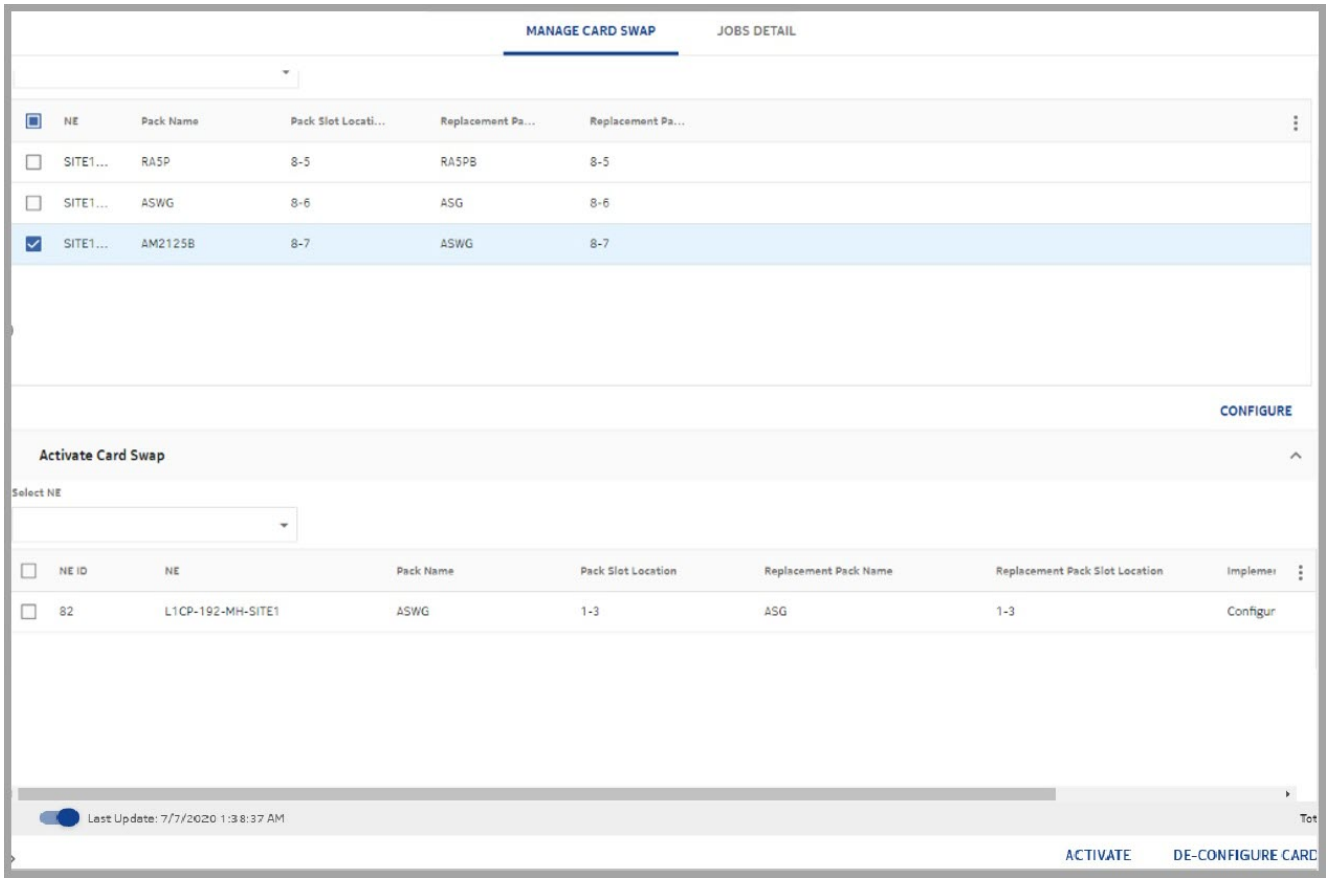

Note: ACTIVATE button must not be clicked unless this slot contains the Migration Pack Type.

7

Click **ACTIVATE** to activate the swap operation on selected cards.

Result: A traffic impact WARNING message with other recommendations, is displayed.

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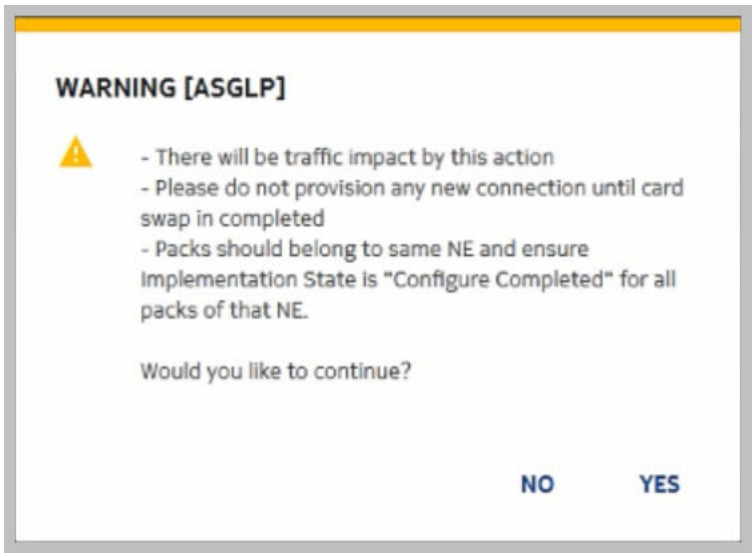

Note: When you click **ACTIVATE** button, NFM-T displays a warning about traffic impact and OTDR impact. The warning message also advises to refrain from provisioning any new connections and services until the card swap is completed.

8

Click **YES** to continue.

Result: The **Successfully sent activation command to Network Element** message is displayed and NE Software causes NE warm boot after Activate operation. All existing connections and services riding on this OTS link are reconfigured internally by the NE software

Note:

- **ACTIVATE** operation is only possible at NE level.
- **ACTIVATE** operation is possible only when the slot is populated with replacement hardware on the field.

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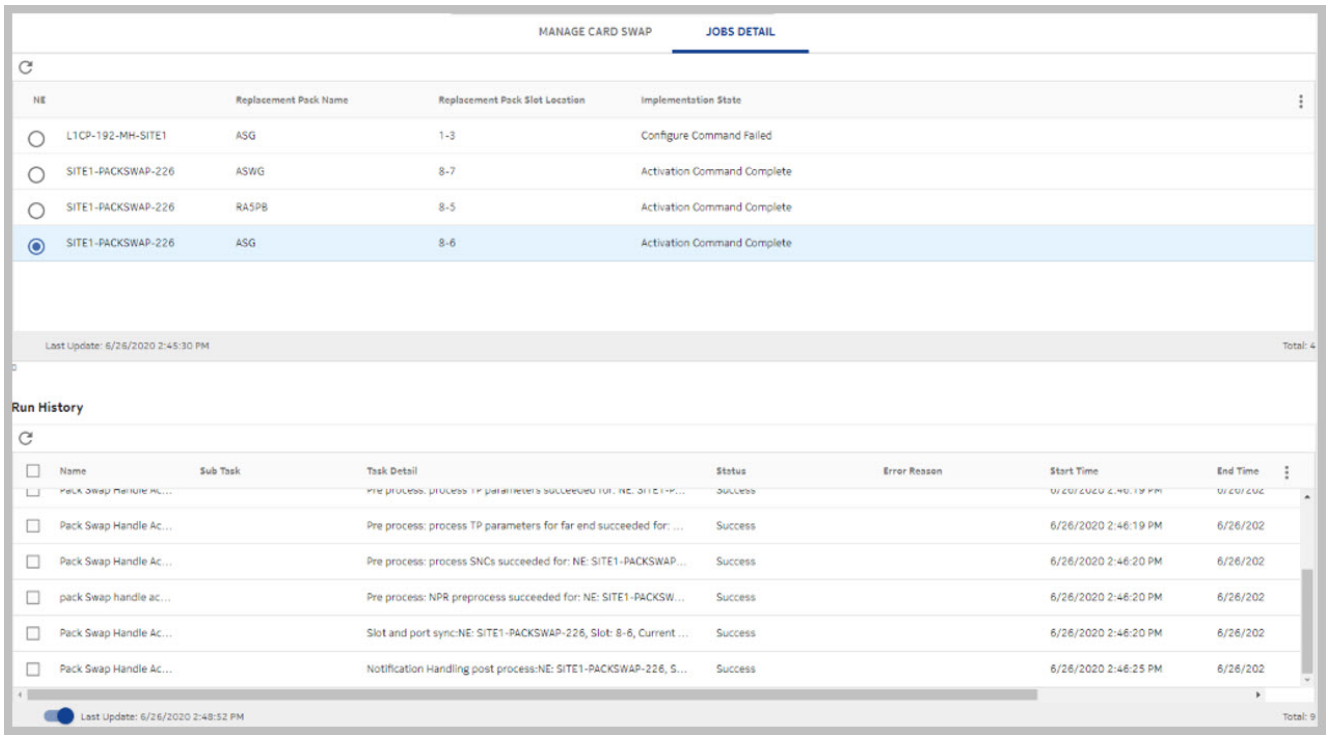
- Post successful activation, health checks are performed, and OTS links, connections and services are restored. After ensuring successful restoration of the impacted configuration, the OLC State sets to **In Service**.

9

Go to **JOBS DETAIL** tab to view the status and history of the jobs submitted.

The activation takes ideally three to five minutes depending upon how long NE's warm reboot lasts. The process on NFM-T starts after receiving the notification from NE. You can monitor the progress of the process from the **JOBS DETAIL** tab.



End of steps

New Card State and Functions

Card View

Post successful Activation of the swapped card, NFM-T correctly reports the new card and ports in Equipment Manager view.

NFM-T is updated with the following views of the new amplifier card:

- Equipment Tree
- Topology View tab

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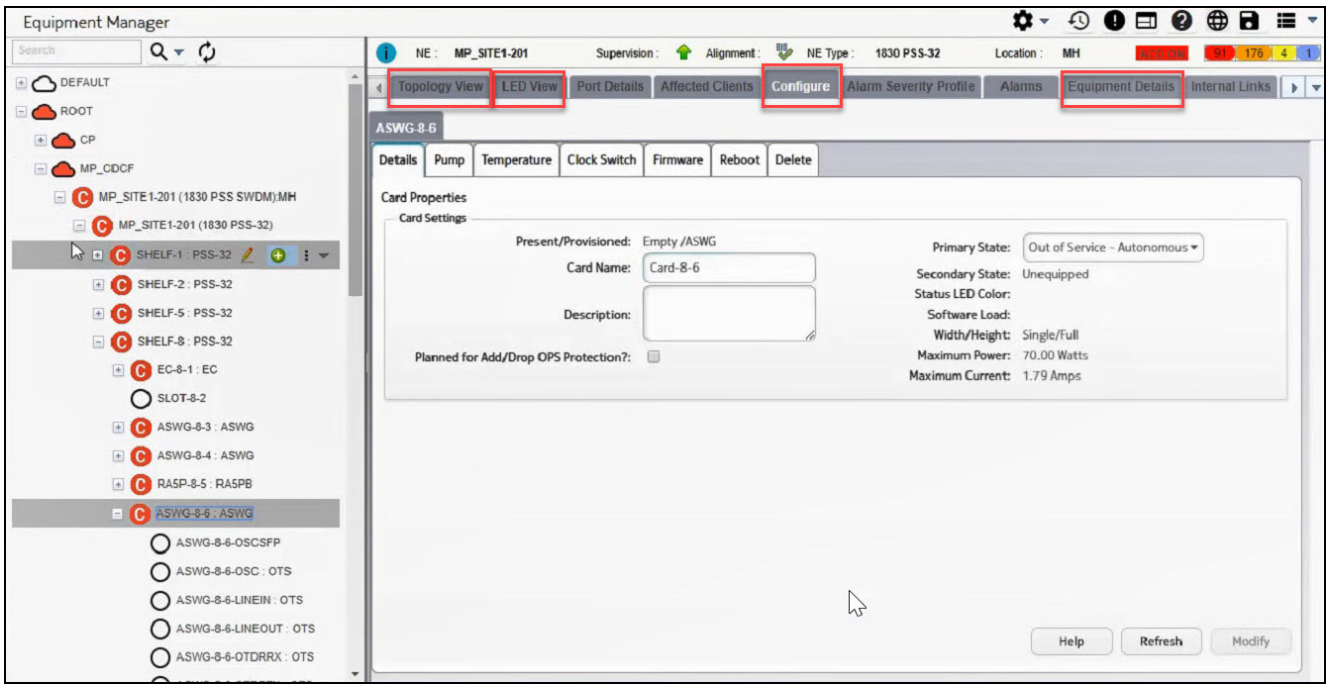
- LED View tab
- Configure tab
- Equipment Details tab

Figure 18-3 Equipment Manager View



OTS View

The OTS can be viewed in following ways in NFM-T:

- Physical Connection
- Routing Display
- Optical Power

Alarms

After successful card swap, any alarm raised on the new card must be correctly reported where Alarmed Object reflects the new card.

PM data

PM data from the old card is restored after the card swap.

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Recommendations for swap procedure in Managed plane and Control plane

Following table summarizes the recommendation for swap procedure in Managed plane and Control plane scenarios

Table 18-2 Card swap phases in Managed Plane and Control Plane Configuration

Managed Plane	Control Plane
Configure Pack Swap	Configure Pack Swap
Physically swap the amplifier	Physically swap the amplifier (Here reroute happens automatically)
Activate card swap	Activate card swap has limited relevance here. The action of reconfiguration of connections and services is achieved by the NPA when switch to Nominal Route is triggered or when auto reversion happens. However, you can choose **ACTIVATE** action over **Switch to Nominal Route** in case of Manual Reversion. Activate action is rendered superfluous in case of auto reversion setting.

Note: Ensure to check the following steps to confirm whether the card swap operation was successful or not:

- In **ADMINISTER > Jobs** window, the latest **Run Status** for Pack swap should show **Complete-Success**.
- In **OPERATE > NEs**, click **Properties** icon against the target node and check if the working state shows as **Normal**.
- In **Routing Display**, check if the card details is updated with the swapped card details. Wait for an appropriate time [approx. 15 mins] for the card swap operation to be successful.

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Part V: Tools

Overview

Purpose

This part of the document provides explanation of the tools, for managing the network that can be activated from the WebUI for different actions on the NFM-T..

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Chapter 22, Link Utilization	1959
Chapter 23, Physical Connections Report	1965

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19 License Management

19.1 Overview

Purpose

This section describes support of License Management for cards from NFM-T. There are different levels of licensing for cards (for example, D5X500) based on the supported modulations and pay as you grow.

The Nokia Licensing Application (ASLM) enables customers to self-service and generate required licenses, and then apply them to the packs. NFM-T supports License distribution and management, implementation, fraud detection, and return mechanism.

From the NFM-T WebUI, follow the path to navigate to License Management window: **Operate** > **Tools** > **License Management**.

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Introduction to License Management

19.2 Nokia Software License Management (ASLM)

License management overview

Software keys generated from ASLM are tied to a particular hardware and capacity. For example, D5X500 card serial number is used as a hardware input and the bandwidth such as, 100 G and 200 G on line side is used as an input for capacity.

ASLM based software key generation and licensing feature is available only on the D5X500 pack in the current release.

The types of licenses supported are as follows:

- Unrestricted or Full feature set - capable of using all card features for a one-time cost. There is no software RTU requirement.
- Restricted or Commercially restricted - Low cost, variant allowing purchase of High-Capacity RTU and Extended-Reach RTU. It requires the purchase, distribution, application, and removal of software RTU for the hardware.

  High-Capacity RTU - for applications capable for 400 G and 500 G per card. This license type allows transmission of QPSK or SP-QPSK modulated traffic.

  Extended-Reach RTU - enables longer reach on the cards. This license type allows all modulation formats.

  BPSK modulation is not supported by a *commercially restricted* D5X500.

Note: When ordering D5X500 hardware, WDM Blade License Point Fees should be applied.

If the card provisioned does not match or exceeds the capacity of the stored licenses, an alarm is triggered. This alarm can be cleared by applying missing licenses. BPSK modulation is supported only on the unrestricted hardware.

D5X500 restrictions

Provisioning a commercially restricted D5X500 without an appropriate license generates an alarm that can only be cleared by administering the software key. Licenses are allocated to a card and not to a slot. If the card is moved, the license stays with the card. License transfer between cards requires returning license to ASLM, and then redistribution to another card. If a commercially restricted D5X500 is returned for repair, the user can transfer the license to a spare. The user can provision D5X500 capacity licenses on commercially restricted cards.

If the user provisions a D5X500 line port before applying the software key, the user needs to re-provision the card to align the license with the card configuration.

The minimum procurement to be made by customer to enable 100 G of line-side traffic on restricted D5X500 are:

- Restricted D5X500
- WDM Blade License Point
- ESWL - RTU 100 G CAP High Capacity

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See the procedure 19.8 “Apply License” (p. 1924).

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19.3 Nokia License Management Framework

Workflow of the Nokia License Management

There are various entities involved in license management framework.

The entities are as follows:

- Ordering System, supports purchase and procurement
- ASLM, supports license generation and return management
- NE, supports License Validation, Application, and Removal
- NFM-T, supports the License Distribution, Inventory, and License Return

NFM-T supports the following functionalities in managing the license:

- Imports ASLM generated text file containing pool of licenses.
- Extracts list of cards (card type and serial number) from text file. License key is transparent to OMS.
- Associates serial numbers with cards present in the network through inventory. Associates license keys with present and provisioned packs in the network.
- Displays inventory of licenses for customer. Both used licenses associated with hardware packs and available licenses is displayed.
- Maintains and updates inventory of software key licenses and hardware packs. It also Leverages NE inventory commands.
- Handles license application, errors detection, and NE License Violation Alarms.
- Enables mechanism for return of software key licenses back to ASLM. Leverages NE commands provided to disassociate software key license from cards and generates RMA codes. The RMA codes with NE license inventory file is generated.

To know more about Nokia license management framework, see Figure 19-1, “Nokia License Management Framework” (p. 1917).

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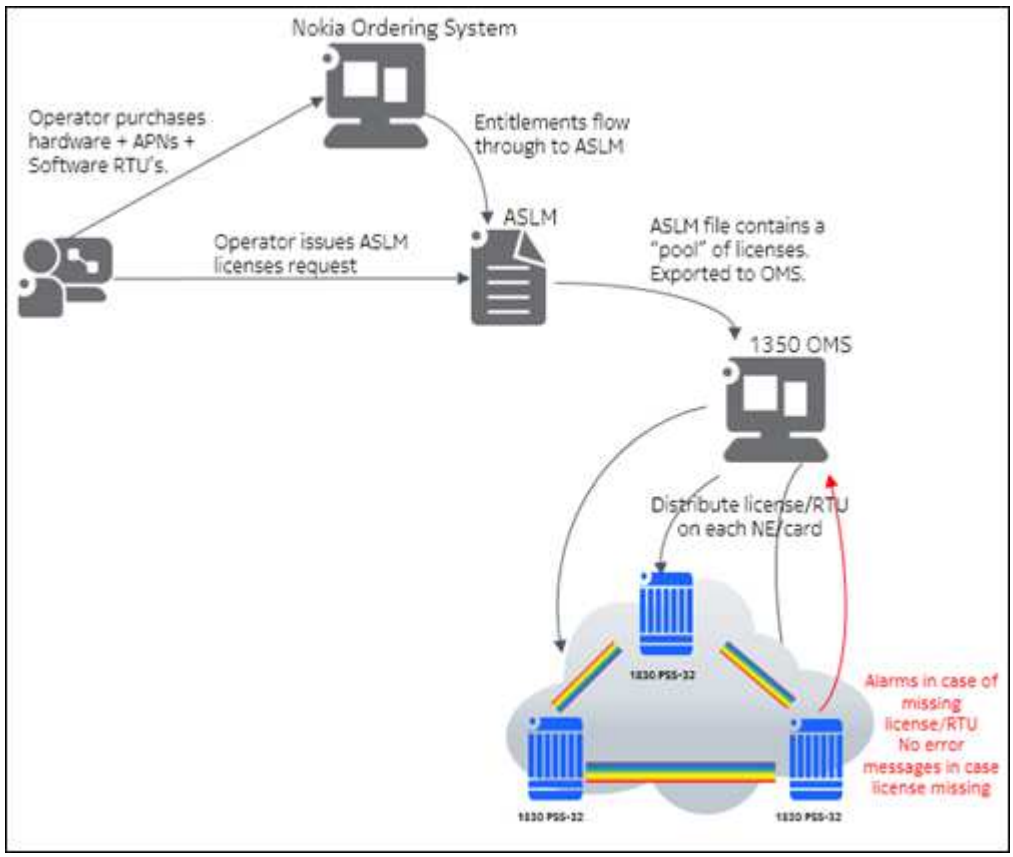
Figure 19-1 Nokia License Management Framework



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19.4 License Management Flow

Overview

License management flow can be summarized in the following sequence of actions.

1. Import the ASLM License file. The ASLM License file must be generated and stored on your local system. On successful import of ASLM file, the ASLM license deployment state is in *Not Deployed* state.

   See the procedure 19.7 “Import ASLM License File” (p. 1922).

2. Apply the License key. The network state must be in *Present* state to apply the license. On successful Apply License task, the ASLM license deployment state is in *Deployed* state. If Apply License action fails, then investigate the root cause and fix the issue to be able to apply the license.

   See the procedures 19.8 “Apply License” (p. 1924) and 19.6 “D5X500 Licensing ” (p. 1921).

3. Delete License key. On successful delete of the ASLM file, the ASLM license deployment state is in *Not Deployed* state and the RMA Available value is *Yes*. If delete license action fails, then the last saved state is retained and the RMA Available value is *No*.

   See the procedures, 19.9 “Delete License ” (p. 1926) and 19.10 “Fetch/Show RMA Key ” (p. 1928).

4. Delete License from Inventory. On successful action of delete license from inventory, the selected rows are deleted from the database. Delete License from Inventory is performed when an old obsolete license entries are available in the database.

   See the procedure, 19.11 “Delete License from Inventory” (p. 1929).

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19.5 Licence Management table columns and icons

Description

To import the ASLM License File in the Licence Management table use the procedure 19.7 “Import ASLM License File” (p. 1922).

Figure 19-2 License Management Inventory

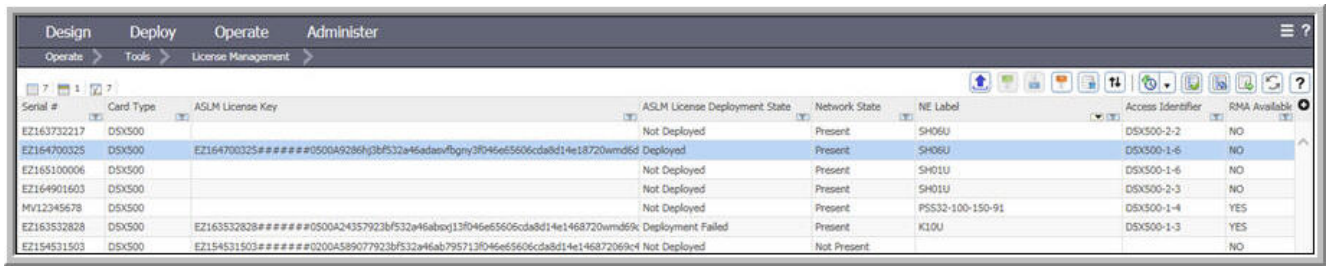

Table 19-1 Inventory Field Descriptions

Field	Description
Serial #	Displays the unique identification number assigned to the card.
Card Type	Displays the card type, such as D5X500.
ASLM License Key	Displays the license key assigned to the selected card.
ASLM License Deployment State	Displays the license deployment state of the card. There are three deployed states: • Deployed - When a license is applied on a card. • Not Deployed - When a license is not applied on a card. • Deployment Failed - When failed to apply a license on a card.
Network State	Displays the network state of the card. If a card is assigned to a network, then the network state is in*Present* state. If a card is not assigned to any network, then the network state is in *Not Present* state.
NE Label	Displays the NE name
Access Identifier	Displays the access point. The access identifier is the card name.
RMA Available	Displays the RMA value as Yes or No. RMA available value is Yes, when a license is deleted from the card and the value is No when a license is applied on a card.

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Table 19-2 License Management Icon Descriptions

Name	Icons	Description
Import ASLM File		Allows the user to import the ASLM license file. For more information, refer 19.7 "Import ASLM License File" (p. 1922).
Apply License		Allows the user to apply license on D5X500 cards.
Fetch/Show RMA Key		Allows the user view the RMA key information.
Delete License		Allows the user to delete license from the card.
Delete License from Inventory		Allows the user to delete license inventory from the License Management window.
Synchronize/Update Inventory		Allows the user to synchronize the updated inventory.
Export to CSV File		Allows the user to export the CSV file. The CSV file is in an excel format with information such as, card type, Serial number, ASLM License, ASLM License Deployment State, Network State, NE label, Access Identifier, and RMA Available.

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19.6 D5X500 Licensing

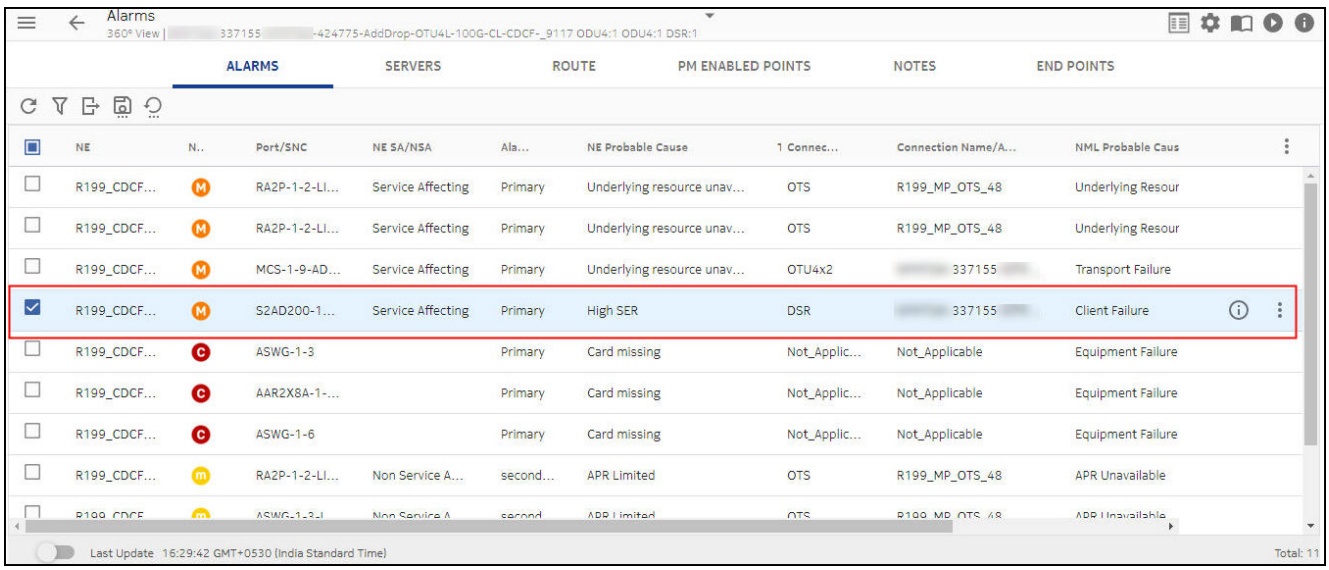
Alarm management

The 1830 PSS NE triggers a card-level violation alarm if the provisioned card capacity does not match the stored license in the card. NFM-T reports the card Level Violation alarms as **License Violation: High Capacity RTU Shortage** or **License Violation: Extended Reach RTU Shortage** with severity **NA**. The alarm text displays license violation details identifying the license type. SNA processes these licensing violation alarms and reports with severity **Indeterminate** on the Fault Management window, Nodes window, and Equipment Manager window.

Note: The only way to clear the alarm is to set the right license key. Refer to the chapter *Licence Management* in the *OTN Guide* for more information.

A new alarm called High SER (High Symbol Error Rate), is generated when a specific symbol error threshold is reached and when the card is provisioned in BJFEC mode. This alarm is generated on the client port of the rate 100GBE for D5X500/Q card, and is correlated to DSR as **CLIENT FAILURE**.

Figure 19-3 High SER alarm



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License Management Procedures

19.7 Import ASLM License File

Purpose

Use this task to perform the following tasks in NFM-T:

- To manage software licenses on D5X500 cards planned or deployed in the network.
- To apply new software licenses to cards.
- To apply license updates to the cards. Updates include adding and removing capacity on the pack or changing the license type.
- To clear license violation alarms on deployed packs in the network, which is a troubleshooting procedure.

Before starting:

- Ensure that the ASLM file is generated with the required license key changes (new license or updated license). The ASLM license file can be generated by the Nokia account representative on behalf of the customer or by the customer directly.
- Ensure that ASLM file is retrieved and stored on your local system, where the NFM-T GUI is accessed. The file must be accessible by the NFM-T during the **Import ASLM file** operation on the NFM-T GUI.

Note: The ASLM files are not stored in NFM-T. The files are just parsed and persisted into database.

Task

Complete the following steps to import ASLM license key from NFM-T.

1

Click the **Import ASLM file** icon on the NFM-T License Management window.

Result: The **Import License** window is displayed.

2

Click the **Browse** option to select a license file.

Result: The local folder window is displayed.

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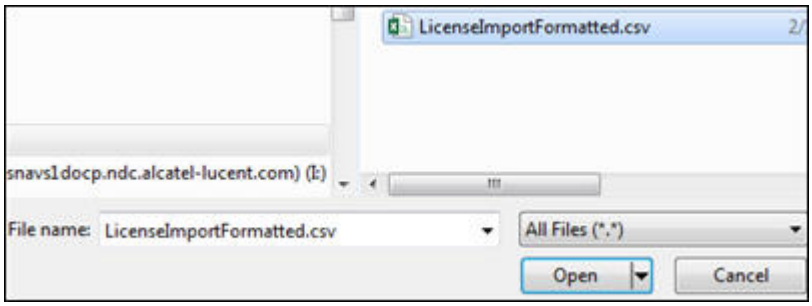
Figure 19-4 License file location window

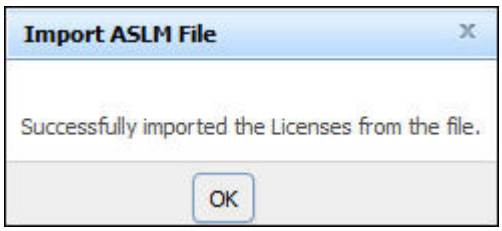


3

Select the license file from the local folder and click the **Open** button.

Result: Import success message is displayed and the imported license is available and displayed on the inventory. Ensure that the user has a valid license file for the import to be successful.

Figure 19-5 License Import Success Window



End of steps

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19.8 Apply License

Purpose

Use this task to deploy license key from ASLM file to specific D5X500 pack. The pack is identified in NFM-T license inventory GUI by its serial number and NE or Shelf or Slot location in the network.

Before starting, ensure that pack is present and the NE is accessible.

Note: User can apply licenses in bulk by selecting the number of rows in the NFM-T license inventory.

Task

Complete the following steps to apply license key to the cards from NFM-T.

1

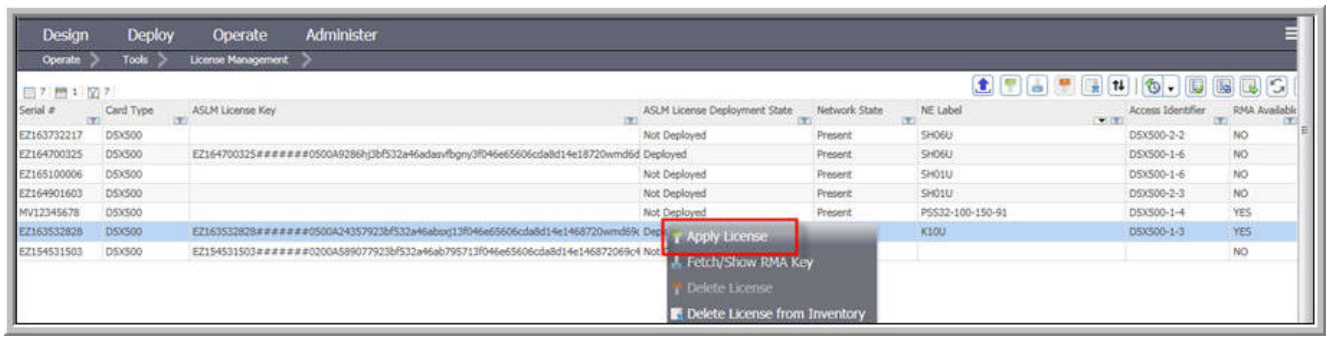
Select a card or cards from the NFM-T License Management window.

2

Perform one of the following tasks to apply license on cards from the NFM-T License Management window.

- click the **Apply License** icon on the NFM-T License Management window.
- Right click and select the **Apply License** option from the list.

Figure 19-6 Apply License Right Click Option



Result: The **Confirm Applying License** window is displayed as shown in Figure 19-7, “Confirm Applying License Window” (p. 1925).

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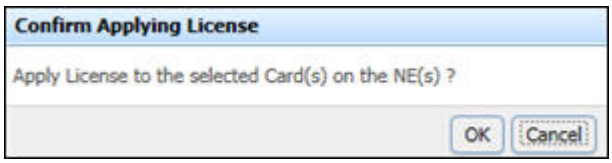
Figure 19-7 Confirm Applying License Window



3

Click **OK**.

Result: The **ASLM License Deployment State** is updated as **Deployed** on the license management inventory.

Note: The report of the tasks performed in License Management window can be viewed in Jobs window. For more information, refer to "Jobs" (p. 1194).

END OF STEPS

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19.9 Delete License

When to use

The delete license task is used to remove the license applied on a pack.

Licenses are deleted or removed from the pack on account of the following reasons:

- To return unused software license to ASLM.
- To support license updates by returning existing license and applying a new license to the pack.
- To spare a card by first returning existing license to ASLM and then deploying the same license to the spared card.

Related Information

This task does not have any related information.

Before you begin

Ensure that the ASLM license key is applied on the pack and the NE is accessible.

Task

Complete the following steps to delete the license from the selected cards.

1

Select a card or cards from the NFM-T License Management window.

2

Perform one of the following tasks to delete the license from the selected cards from the NFM-T License Management window.

- Click the **Delete License** icon on the NFM-T License Management window.
- Right click and select the **Delete License** option from the list.

Result: The **Confirm License Deletion** Window is displayed.

Figure 19-8 Confirm License Deletion window

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3

Click **OK**

Result: The license from the selected card is deleted and the **License Deployment State** in the license management inventory is changed **Not Deployed**.

End of steps

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19.10 Fetch/Show RMA Key

Purpose

Use this task to manage the following activities:

- To manage return of deleted licenses on the D5X500 card to ASLM.
- To return RMA keys associated with license deletion to ASLM. This can be retrieved for only one pack at a time from NE.
- To support license updates on the card.
- To support sparing operation for the card.

Ensure that the applied ASLM license key is deleted from the pack and the NE is accessible. Ensure that the RMA key is saved in a file on your local system.

Note: RMA keys have to be returned back into ASLM system. This can be taken care by the Nokia account representative or the customer. NFM-T user needs to save the RMA key into a file on the local system, and then forward the file to the concerned entity.

Task

Complete the following steps to fetch and show RMA key.

1

Select a card or cards from the NFM-T License Management window.

2

Perform one of the following tasks to fetch and show RMA key for cards from the NFM-T License Management window.

- Click the **Fetch/Show RMA Key** icon on the NFM-T License Management window.
- Right click and select the **Fetch/Show RMA Key** option from the list.

Result: The RMA data is displayed.

END OF STEPS

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19.11 Delete License from Inventory

Purpose

Use this task to delete old license entries for the following reasons:

- When license on cards are managed indirectly without using OMS. The data in NFM-T license inventory is obsolete and must be deleted.
- When ASLM file import and card sync operations do not update the OMS inventory data.

Ensure that license entry in NFM-T is an obsolete data. This needs to be verified by checking the ASLM and the NE.

Note: Delete License from Inventory is a NFM-T recovery procedure and is not required during normal operations or management of licenses.

Task

Complete the following steps to delete the license from the server to remove a row from the inventory for the selected cards.

1

Select a card or cards from the NFM-T License Management window.

2

Perform one of the following tasks to delete license from the server for the selected cards.

- Click the **Delete License From Inventory** icon on the NFM-T License Management window.
- Right click and select the **Delete License From Inventory** option from the list.

Result: The **Delete License From Inventory** Window is displayed.

Figure 19-9 Delete License From Inventory window

3

Click **OK**

Result: The **Delete License from Inventory** window is displayed.

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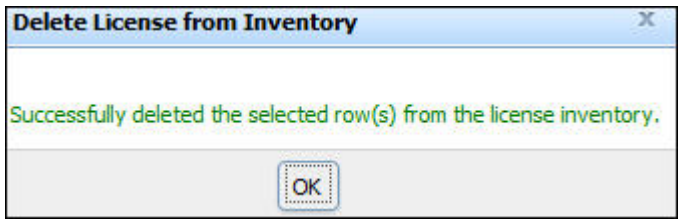
Figure 19-10 License Deletion from inventory successful window



4

Click **OK**.

Result: The selected rows are deleted from the inventory.

END OF STEPS

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20 Network Data Files

20.1 Overview

Purpose

This chapter provides information about the data files supplied by the Engineering and Planning Tool (EPT).

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Operate Network Data Files

20.2 Network data files description

Network Data Files definition

Network Data Files are a set of files that contain actual network data, such as the NE, port, and connection data for an entire network. Individual files are compressed into a single **tar.gz** file. Network Data Files are created for uploading to the Engineering and Planning Tool (EPT).

Network Data Files contents

The Network Data Files contain the following data:

- All Managed NEs and associated parameters
  Note: This file does not include ENEs.
- All location parameters for each NE including latitude, longitude and map position
  Note: This file includes ENEs.
- All shelves, circuit packs, and pluggable modules for each NE and associated parameters
- All physical ports for each NE and associated parameters
- All FTPs for each NE and associated parameters
- All potential CTPs in OMS (potentialctps.json)
- All CEP eligible layers in OMS (cepeligiblelayers.json)
- All topological links for each NE and associated parameters
- All cross -connections for each NE and associated parameters
- All connections including OS, OTS, OMS, OTUk, ODUk, ODUj and service connections and associated parameters
- C-band Optical Feasibility Data for Each Network Element
- L-band Optical Feasibility Data for Each Network Element
- All ASON SNCs in the Network
- All Shared Risk Groups (SRGs) in the Network
- All NPAs (including 3R and TE-Links) in the Network

Note: From R19.9, NFM-T sends notifications over Kafka for all the objects and attributes required by Network Resource Controller - Transport (NRC-T), for example, NE, Equipment, PTP, Topological Link with SRLG and Feasibility Data, Services (Connection, Cross-Connections.

Network Data Files and their relationship to EPT

The Engineering and Planning Tool (EPT) is a software tool that is used in the automated design and planning of photonic networks that are based on the 1830 PSS NEs. The EPT helps users to speed up the overall WDM network planning process. By doing so, it provides the most cost-effective WDM network design for any given traffic requirement or network upgrade.

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The EPT requires an upload of actual network data, which it gets from the Network Data Files. The EPT uses the content of the Network Data Files to verify that the deployed network conforms to its rules, that all equipment matches, and that all of the equipment matches the network view of the equipment. This uploaded network data is then used to support the recommissioning of the network from the EPT design.

User interaction with Network Data Files

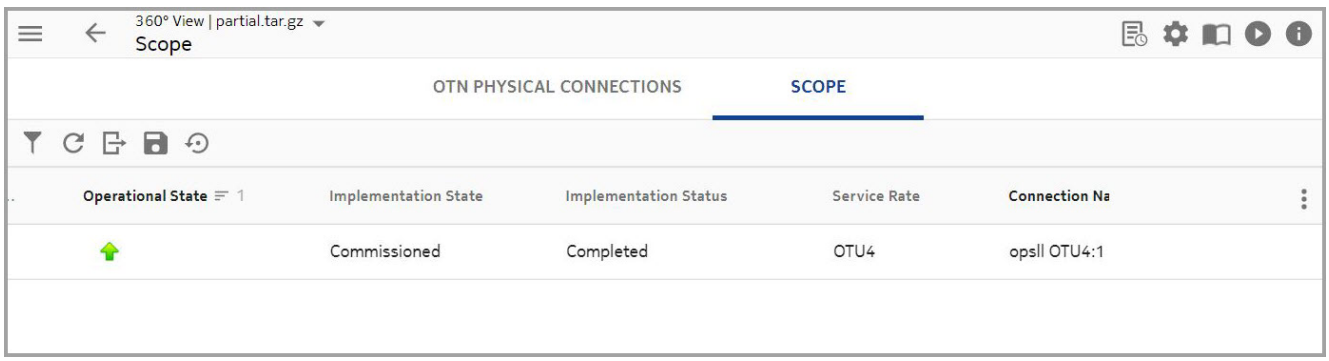
Users can view, create, and delete Network Data Files. Users can also download Network Data Files to their PC and upload them to the EPT.

When only a partial upload of Network Data Files is required, users can create Network Data Files containing a *filtered* list of data. That is, instead of containing data for the entire network, the created Network Data Files will contain only the data for the Physical Connections, Infrastructure Connections, Services, or Shared Risk Groups (SRGs) selected by the user.

For packages of Network Data Files containing filtered lists of data, click the corresponding the 360° view icon of the Network Data File package. The information for these data files are displayed in the following tabs:

- **OTN Physical Connections** – OTS links used to create the Network Data Files
- **Scope** – constraints used to create the Network Data Files (that is, user selected Physical Connections, Infrastructure Connections, Services, or SRGs)

Figure 20-1 Network Data Files – **Network Data Files** page – 360° View



Once a package of Network Data Files has been created, users can create Network Data Files with the same constraints by creating Network Data Files from that package. This enables users to quickly create Network Data Files for:

- the entire network
- a selected group of Physical Connections
- a selected group of Infrastructure Connections
- a selected group of Services
- a selected group of Shared Risk Groups (SRGs) on a routine basis

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For example, to create and upload Network Data Files for a selected group of Services on a weekly basis.

For more information, see:

- “Task: View Network Data Files” (p. 1935)
- “Task: Create Network Data Files” (p. 1936)
- “Task: Create Network Data Files for Selected Physical Connections” (p. 1937)
- “Task: Create Network Data Files for Selected Infrastructure Connections” (p. 1938)
- “Task: Create Network Data Files for Selected Services” (p. 1940)
- “Task: Create Network Data Files for Shared Risk Groups” (p. 1940)
- “Task: Create Network Data Files from a Package of Network Data Files” (p. 1941)
- “Task: Download Network Data Files” (p. 1943)
- “Task: Delete Network Data Files” (p. 1944)

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20.3 Manage Network Data Files

When to use

Use this task to manage Network Data Files for EPT use.

Related information

Refer to the following topic:

- 20.2 “Network data files description” (p. 1932)

Before you begin

When Network Data Files are created, they are packaged into one **tar.gz** file. You can untar the **tar.gz** to view the file names. The Network Data Files are in **.json** format, so you will need a **.json** viewer to open the files and view the contents.

Task: View Network Data Files

Complete the following step to view a list of Network Data Files.

1

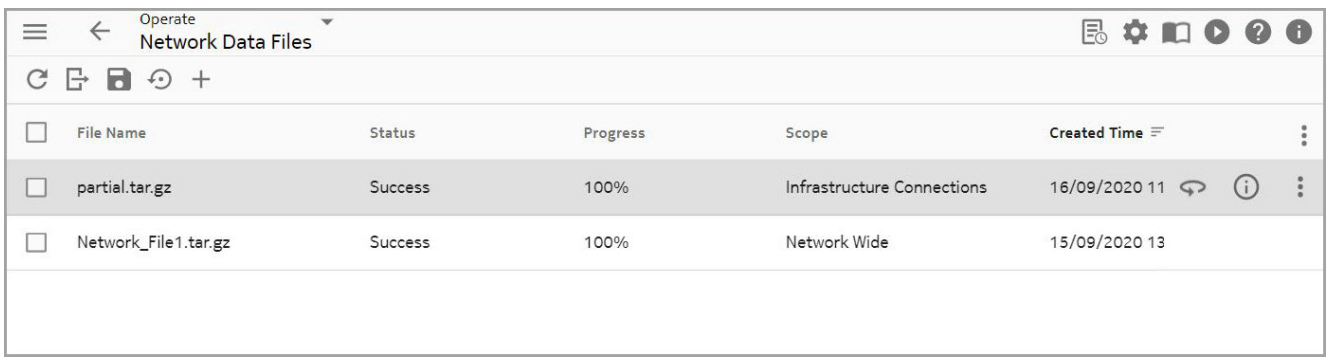
From the NFM-T GUI, follow this navigation path:

OPERATE > Network Data Files

Result: The system displays the **Network Data Files** page with a list of available Network Data Files.

If no Network Data Files have been created, then the system displays “No results found”.

Figure 20-2 Network Data Files – View Network Data Files



END OF STEPS

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Task: Create Network Data Files

Note: Navigating with the path **Operate > Network Data Files**, the first record is selected by default in the Network Data Files list. If you click the **+** icon to create a new Network Data File, the file is generated for the scope of the selected row in the list of generated data files, for example, if the scope of the selected row is **Infrastructure Connection**, the partial upload file is generated for the infrastructure connection which was taken when it was previously created. If the selected file is network wide, then the create button creates the bulk upload file. So if the previous created data file is a partial load, the new created one covers only the previous collection data.

Complete the following steps to create and package Network Data Files for EPT use.

1

From the NFM-T GUI, follow this navigation path:

DEPLOY > New Network Data Files

Note: Alternatively, follow this navigation path:
OPERATE > Network Data Files
and click the **Create Network Data File** icon (plus sign) from the top left bar.

Result: The system displays the **Network Data Files** window.

Figure 20-3 Network Data Files – Create Network Data Files

2

Enter a **File Name** for the package of Network Data Files and click **Create**.

Result: The system displays a series of status messages on the status bar. Also indicates the progress in percentage as the Network Data Files are created.

When all the Network Data Files have been created and packaged into a **tar.gz** file, the system displays a success message on the status bar.

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3

Click **Show Files** to open the **Network Data Files** page in a new browser tab with the refreshed list of Network Data Files packages.

Note: Alternatively, click **Close** to close the **Network Data Files** window and then click the **Refresh** icon at the top left bar to refresh the Network Data Files list.

Result: The Network Data File that you created is in the Network Data Files list.

END OF STEPS

Task: Create Network Data Files for Selected Physical Connections

Complete the following steps to create and package Network Data Files for EPT use for selected commissioned physical connections (OTS links).

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Physical Connections

Result: The system displays the **Physical Connections** page.

2

Filter the **WDM Connection Type** column to select only OTS links and click **OK**.

Result: The system filters the Physical Connections list and refreshes to display only the list of connections for OTS links.

3

Select the connections to include in the Network Data Files.

Result: A **More** icon is displayed in the upper right corner of the window.

4

Click the **More** icon and select **Create Network Data File**.

Result: The system displays the **Network Data Files** window.

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Figure 20-4 Network Data Files – Create Network Data Files – Selected Physical Connections

5

Enter a **File Name** for the package of Network Data Files and click **Create**.

Result: The system displays a series of status messages on the status bar to indicate progress as the Network Data Files are created.

When all the Network Data Files have been created and packaged into a **tar.gz** file, the system displays a success message on the status bar.

6

Click **Close** to close the **Network Data Files** window.

7

Follow this navigation path:

OPERATE > Network Data Files

Result: The Network Data File that you created is in the Network Data Files list.

END OF STEPS

Task: Create Network Data Files for Selected Infrastructure Connections

Complete the following steps to create and package Network Data Files for EPT use for selected commissioned infrastructure connections.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Infrastructure Connections

Result: The system displays the **Infrastructure Connections** page.

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2

Select the connections to include in the Network Data Files.

Result: A **More** icon is displayed in the upper right corner of the window.

3

Click the **More** icon and select **Create Network Data File**.

Result: The system displays the **Network Data Files** window.

Figure 20-5 Network Data Files – Create Network Data Files – Selected Infrastructure Connections

4

Enter a **File Name** for the package of Network Data Files and click **Create**.

Result: The system displays a series of status messages on the status bar to indicate progress as the Network Data Files are created.

When all the Network Data Files have been created and packaged into a **tar.gz** file, the system displays a success message on the status bar.

5

Click **Close** to close the **Network Data Files** window.

6

Follow this navigation path:

OPERATE > Network Data Files

Result: The Network Data File that you created is in the Network Data Files list.

END OF STEPS

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Task: Create Network Data Files for Selected Services

Complete the following steps to create and package Network Data Files for EPT use for selected commissioned services.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Services

Result: The system displays the **Services** page.

2

Select the services to include in the Network Data Files.

Result: A **More** icon is displayed in the upper right corner of the window.

3

Click the **More** icon and select **Create Network Data File**.

Result: The system displays the **Network Data Files** window.

4

Enter a **File Name** for the package of Network Data Files and click **Create**.

Result: The system displays a series of status messages on the status bar to indicate progress as the Network Data Files are created.

When all the Network Data Files have been created and packaged into a **tar.gz** file, the system displays a success message on the status bar.

5

Click **Close** to close the **Network Data Files** window.

6

Follow this navigation path:

OPERATE > Network Data Files

Result: The Network Data File that you created is in the Network Data Files list.

END OF STEPS

Task: Create Network Data Files for Shared Risk Groups

Complete the following steps to create and package Network Data Files for EPT use for selected commissioned Shared Risk Groups (SRGs).

1

From the NFM-T GUI, follow this navigation path:

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OPERATE > Network Profiles

Result: The system displays the **Network Profiles** page.

2

Select the SRGs to include in the Network Data Files.

Result: A **More** icon is displayed in the upper right corner of the window.

3

Click the **More** icon and select **Create Network Data File**.

Result: The system displays the **Network Data Files** window.

4

Enter a **File Name** for the package of Network Data Files and click **Create**.

Result: The system displays a series of status messages on the status bar to indicate progress as the Network Data Files are created.

When all the Network Data Files have been created and packaged into a **tar.gz** file, the system displays a success message on the status bar.

5

Click **Close** to close the **Network Data Files** window.

6

Follow this navigation path:

OPERATE > Network Data Files

Result: The Network Data File that you created is in the Network Data Files list.

END OF STEPS

Task: Create Network Data Files from a Package of Network Data Files

Complete the following steps to create and package Network Data Files for EPT use from a package of Network Data Files.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Network Data Files

Result: The system displays the **Network Data Files** page.

2

Select a package of Network Data Files (**tar.gz** file) with the required constraints.

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Note: The Network Data Files you create will have the same constraints as those in the selected package. If the package resulted from a partial upload of Network Data Files, then the Network Data Files you create will contain the same *filtered* list of data.

3

Click the **More** icon and select **Create Network Data File**.

Result: The system displays the **Network Data Files** window.

Figure 20-6 Network Data Files – Create Network Data Files – from a Package

4

Enter a **File Name** for the package of Network Data Files and click **Create**.

Result: The system displays a series of status messages on the status bar to indicate progress as the Network Data Files are created.

When all the Network Data Files have been created and packaged into a **tar.gz** file, the system displays a success message on the status bar.

5

Click **Show Files** to open the **Network Data Files** page in a new browser tab with the refreshed list of Network Data Files packages.

Note: Alternatively, click **Close** to close the **Network Data Files** window and then click the **Refresh** icon at the top left bar to refresh the Network Data Files list.

Result: The Network Data File that you created is in the Network Data Files list.

END OF STEPS

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Task: Download Network Data Files

Complete the following steps to download Network Data Files to a PC.

1

From the NFM-T GUI, follow this navigation path:

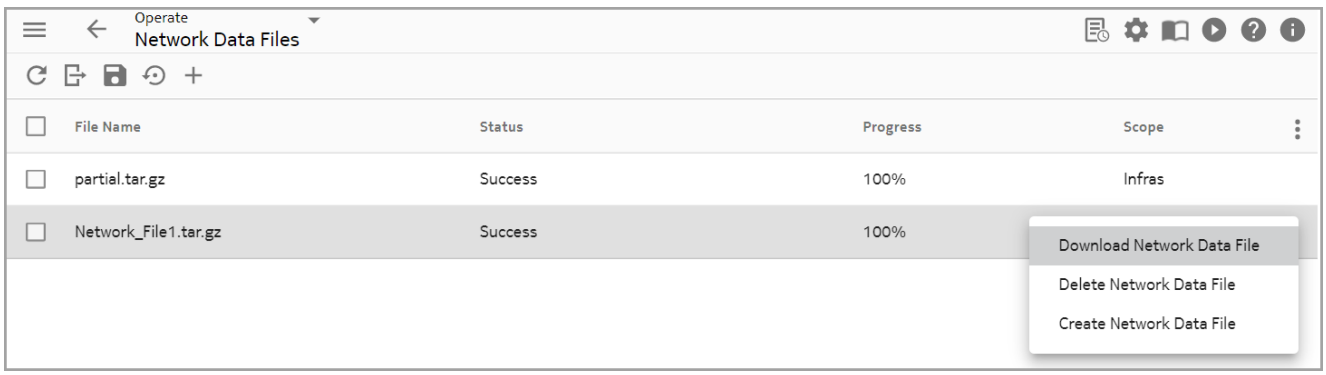
OPERATE > Network Data Files

Result: The system displays the **Network Data Files** page.

2

Hover over a **tar.gz** file entry, click the corresponding **More** icon and select **Download Network Data Files** to save the **tar.gz** file.

Figure 20-7 Network Data Files – Download Network Data Files



Result: The system saves the Network Data Files, in **tar.gz** format, to its default location (usually the Downloads folder).

3

Optional: To view the **.json** file names that are in the **tar.gz** file, untar the file.

Result: The system untars the **tar.gz** file and the **.json** file names are displayed.

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Figure 20-8 Network Data Files – Untar tar.gz file – List of .json Files

Name	Date modified	Type	Size
asonsncs.json	01-09-2019 05:34	JSON File	1 KB
cepeligiblelayers.json	01-09-2019 05:34	JSON File	1 KB
connections.json	01-09-2019 05:34	JSON File	19 KB
crossconnections.json	01-09-2019 05:34	JSON File	99 KB
equipments.json	01-09-2019 05:34	JSON File	136 KB
ftps.json	01-09-2019 05:34	JSON File	1 KB
header.txt	01-09-2019 05:34	Text Document	1 KB
nedetails.json	01-09-2019 05:34	JSON File	1 KB
nes.json	01-09-2019 05:34	JSON File	1 KB
npas.json	01-09-2019 05:34	JSON File	1 KB
opticalfeasibilty.json	01-09-2019 05:34	JSON File	1 KB
opticalfeasibiltyLband.json	01-09-2019 05:34	JSON File	1 KB
physicalports.json	01-09-2019 05:34	JSON File	3,987 KB
potentialctps.json	01-09-2019 05:34	JSON File	2 KB
sharedriskgroups.json	01-09-2019 05:34	JSON File	1 KB
topologicallinks.json	01-09-2019 05:34	JSON File	5 KB

4

Optional: To view the contents of the **.json** files that are in the **tar.gz** file, use a **.json** viewer to open the files.

END OF STEPS

Task: Delete Network Data Files

Complete the following steps to delete Network Data Files.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Network Data Files

Result: The system displays the **Network Data Files** page.

2

Hover over a **tar.gz** file entry, click the corresponding **More** icon and select **Delete Network Data Files** to delete the **tar.gz** file.

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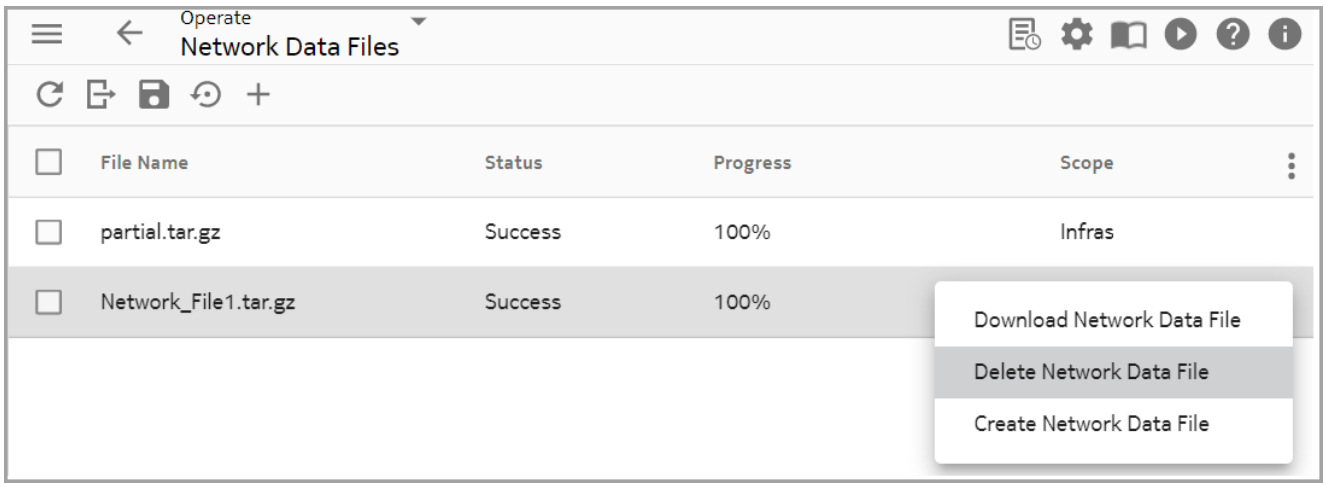
Figure 20-9 Network Data Files – Delete Network Data Files



Result: The system opens a **Delete Confirmation** window.

3

Click **OK**.

Result: The system deletes the **tar.gz** file and displays a success message on the status bar.

4

Click the **Refresh** icon at the top left bar to refresh the Network Data Files list.

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21 Bandwidth Utilization Report

21.1 Overview

Purpose

This chapter provides information about the Bandwidth Utilization Report.

Contents

21.1 Overview	1947
Bandwidth Utilization Report	1948
21.2 Introduction	1948
21.3 OTS Groups	1949
21.4 How to use the Bandwidth Utilization Report	1954

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Bandwidth Utilization Report

21.2 Introduction

Overview

The Bandwidth Utilization Report provides a view of the total bandwidth used on a physical link, in order to help the user in the management of the capacity and consequently with the route planning.

This function allows the user to display the information on bandwidth usage by site (NE) and degree. In this way user can visualize over-utilized or under-utilized bandwidth on particular spans within the selected topology. The user can visualize selected bandwidth utilization on the entire network or on selected physical links or nodes.

In an L0 Control Plan network, only the Nominal route is displayed in the Bandwidth Utilization Report.

The Bandwidth Utilization Report is accessed following the path: **Operate > Bandwidth Utilization Report**

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21.3 OTS Groups

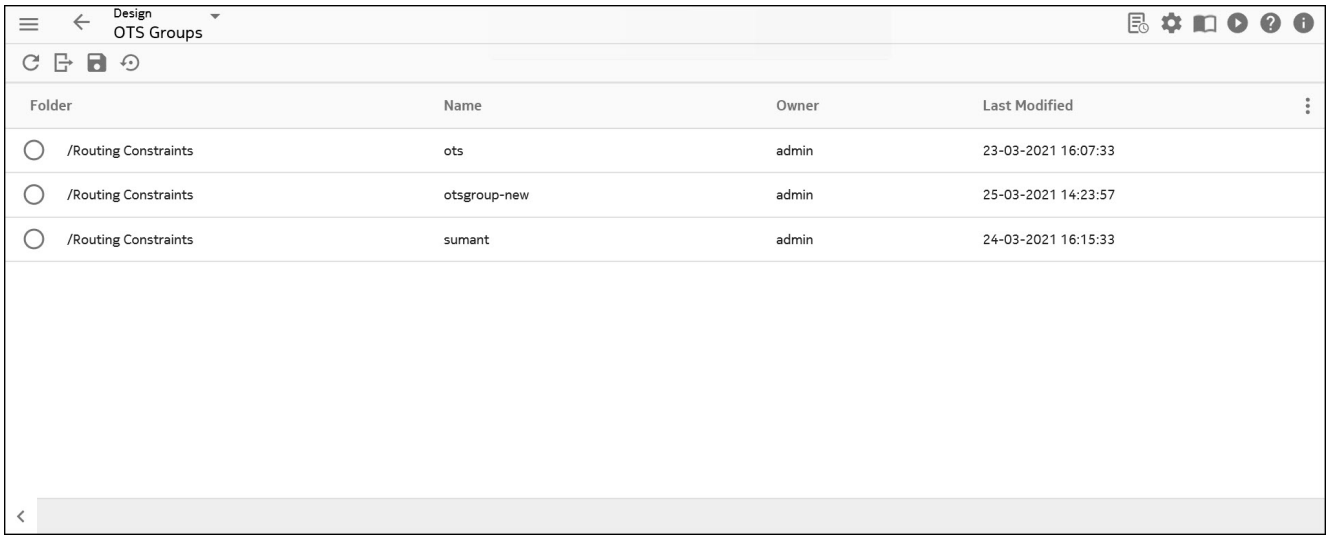
Description

The OTS Groups can be accessed by navigating the following path:

DESIGN>OTS Groups

A tree structure containing the OTS Groups is displayed.

Figure 21-1 OTS Groups



Details

Follow the below steps to view more details about the template:

1. Click the **More** icon and click **Details**.

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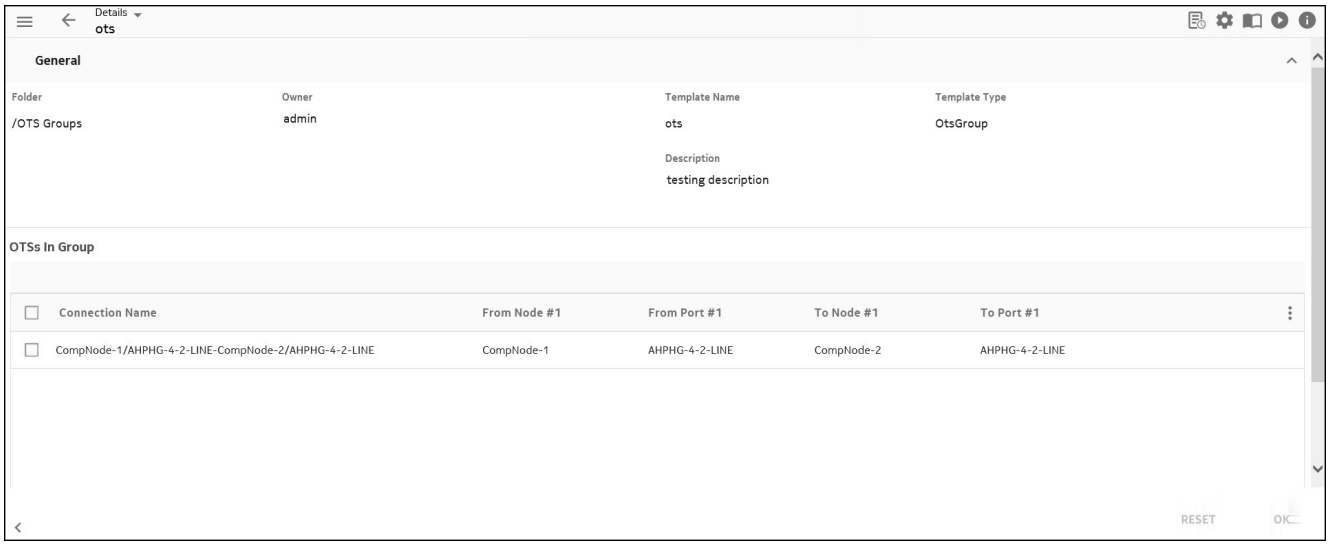
Figure 21-2 OTS Groups - Details



Result:

The following parameters corresponding to the template appears:

- **Folder**
  The Folder field displays the full path of the selected template.
- **Owner**
  The Owner field displays who owns the selected template.
- **Template Name**
  The Template Name field displays the name of the template.
- **Template Type**
  The Template Type field displays **OtsGroup** as a default for OTS Group templates.
- **Description**
  The Description field is an optional field that is provided for any wording that can further identify or clarify the particular connection.
- **OTSs In Group**
  This field displays the OTS groups that are in similar type of connection.

Note: You cannot edit any of these fields in this mode.

END OF STEPS

Modify

Follow the below steps to modify the OTS Groups template:

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1

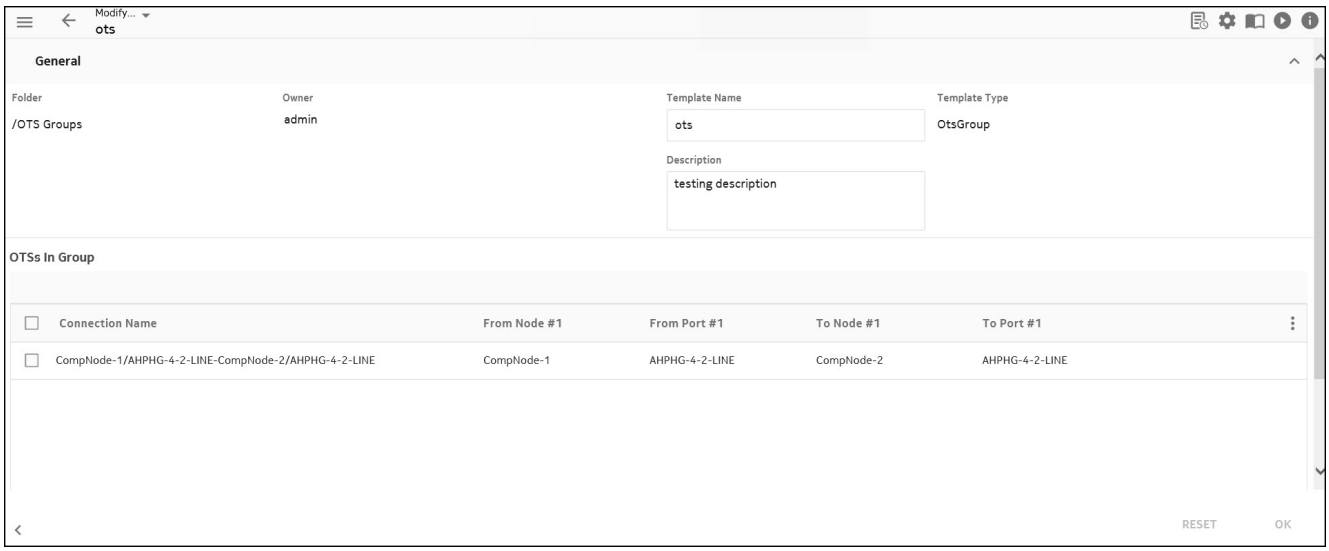
Click the **More** icon and click **Modify**.

Result:

The following information corresponding to the template appears:

- **Folder**
- **Owner**
- **Template Name**
- **Template Type**
- **Description**
- **Connection details**

Figure 21-3 OTS Groups - Modify



2

1. Modify the following fields:
   - Template Name
   - Description
2. Click **OK**

, edit the fields and then click **OK**

Result: The success message appears at the left-bottom of the screen.

3

To retain the previous values in the field, click **RESET**.

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Result: The existing values are retained.

END OF STEPS

Save As

Perform the following steps to make changes to the existing template and save as a new template:

1

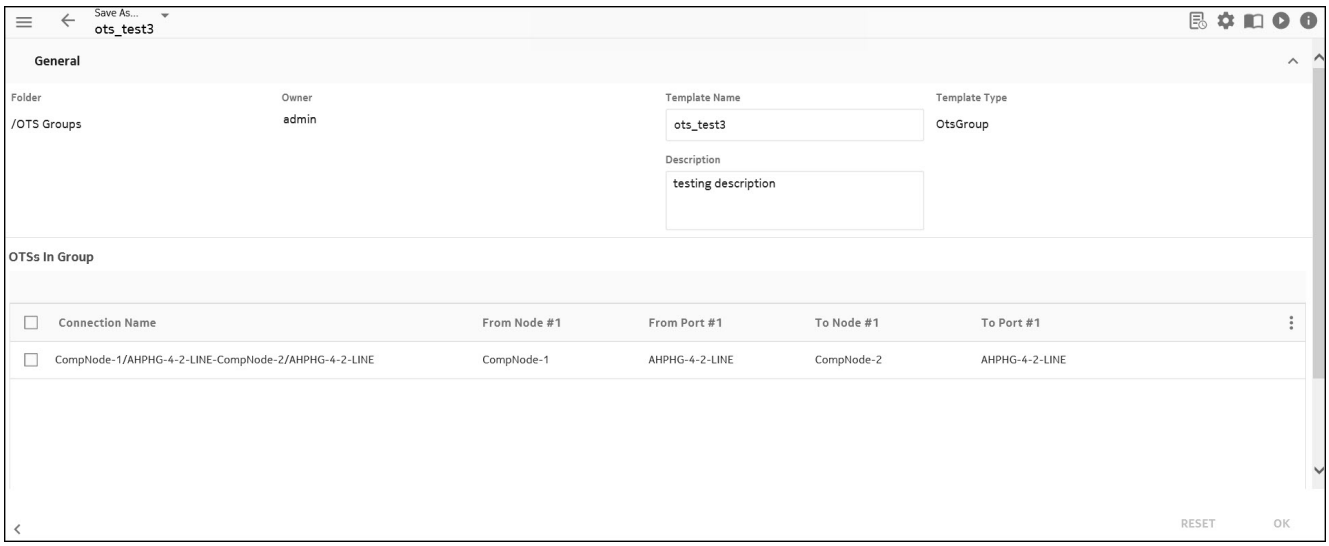
Click the **More** icon and click **Save As**.

Result:

The following information corresponding to the template appears:

- **Folder**
- **Owner**
- **Template Name**
- **Template Type**
- **Description**
- **Connection details**

Figure 21-4 OTS Groups - Save As



2

Edit the **Template Name** and **Description** fields and then click **OK**.

Result: The success message appears at the left-bottom of the window and the newly added template appears in the tree.

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3

To retain the previous values in the field, click **RESET**.

Result: The existing values are retained.

END OF STEPS

Delete

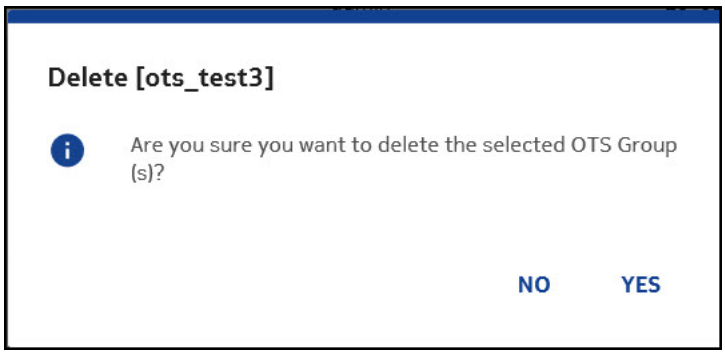
Perform the following steps to delete the selected OTS group:

1

Click the **More** icon and click **Delete**.

Result: The confirmation dialog appears.

Figure 21-5 OTS Groups - Delete



2

To delete the selected OTS group, click **YES**.

Result: The success message appears at the left-bottom of the screen.

END OF STEPS

Bandwidth Utilization Report

Perform the following steps to create the bandwidth utilization report:

1

Click the **More** icon and click **Bandwidth Utilization Report**.

For more information about **Bandwidth Utilization Report**, see 21.4 "How to use the Bandwidth Utilization Report " (p. 1954).

END OF STEPS

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21.4 How to use the Bandwidth Utilization Report

Related information

The following procedure shows the steps to be performed to visualize the Bandwidth Utilization Report of a given set of physical connections. For more details, see 21.2 "Introduction" (p. 1948).

Task

1

From the WebUI, follow the navigation path

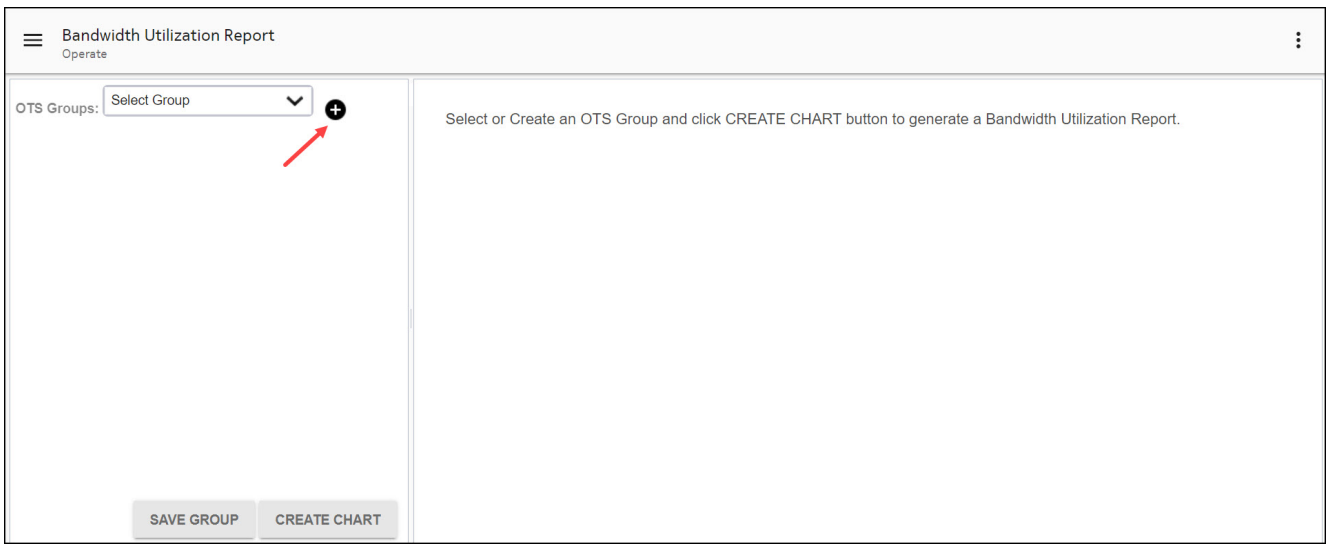
OPERATE > Bandwidth Utilization Report

Result: The system displays the Bandwidth Utilization Report.

2

Click the *plus* icon near the *OTS group* field, to create the group of OTS connections where you need to analyze the bandwidth utilization.

Figure 21-6 Bandwidth Utilization Report - Main Window



Result: The **Filter by Subnetwork(s) and Node(s)** window is displayed.

3

In the **Filter by Subnetwork(s) and Node(s)** window you can filter the set of physical connection by nodes. The nodes themselves are grouped by subnetwork which can be selected or deselected to filter the nodes list.

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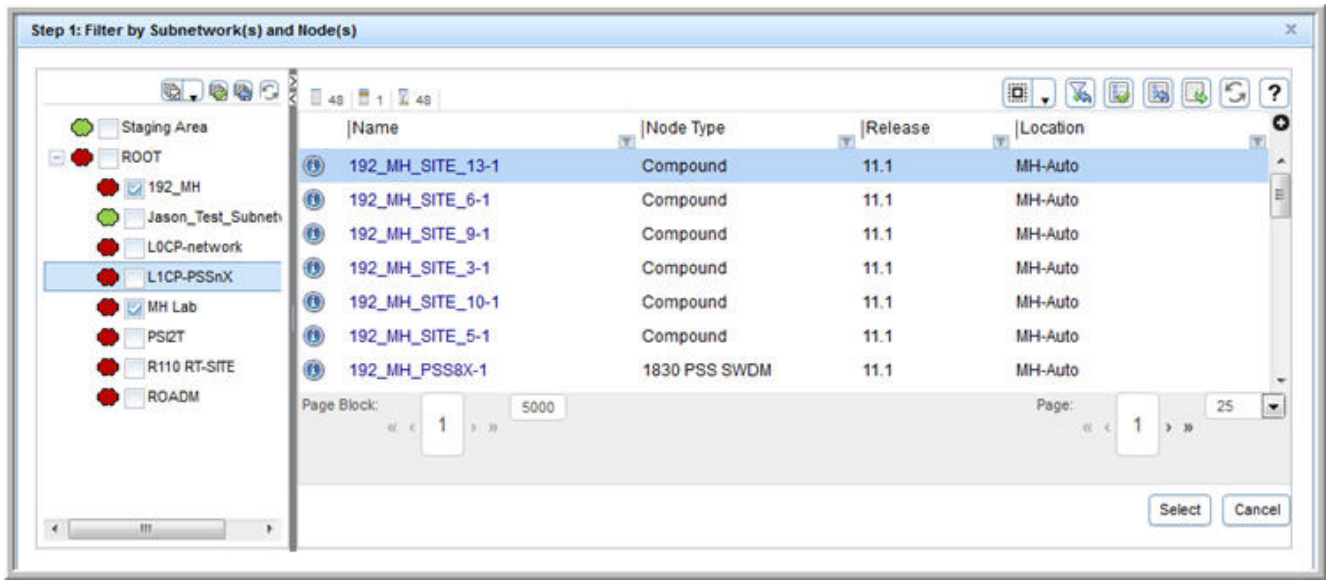
Figure 21-7 Bandwidth Utilization Report - Subnetwork and Node List

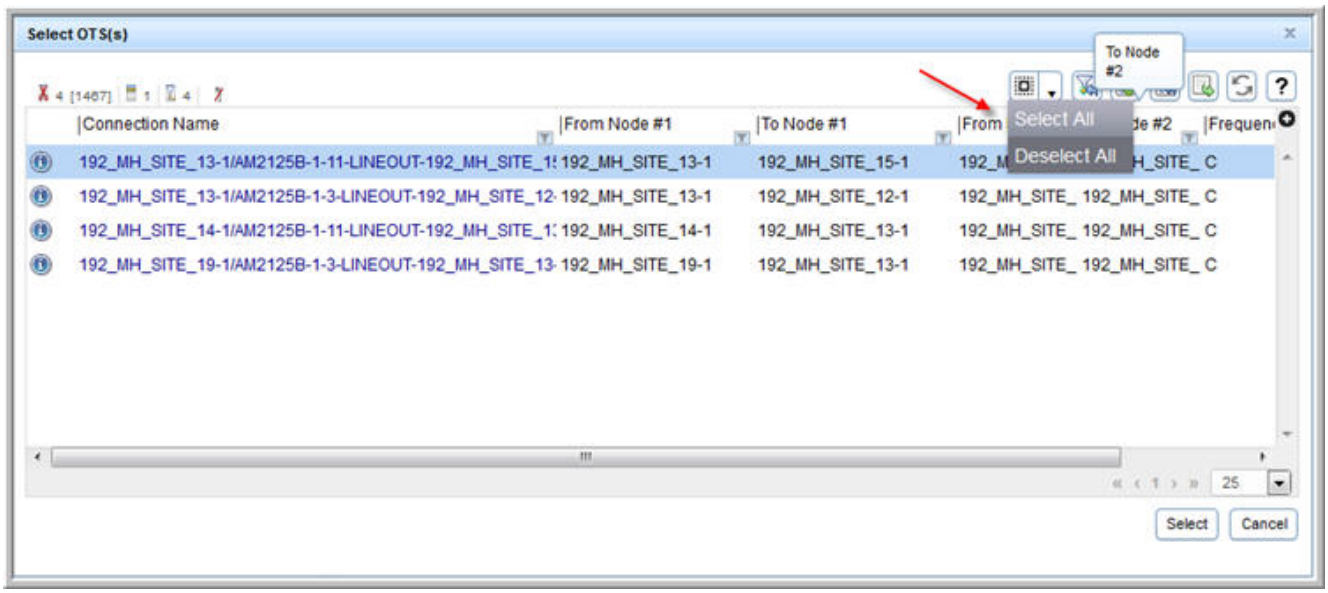


4

The **Select OTS(s)** list is a list of physical links that terminate in the selected nodes. Any or all the physical links can be included in the final selection from the drop- down icon on top right.

Click on **Select** to confirm the selection.

Figure 21-8 Bandwidth Utilization Report - Select OTS(s) List Window



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Result: The **OTS list** on the left window, is populated with the list of the selected OTS connections.

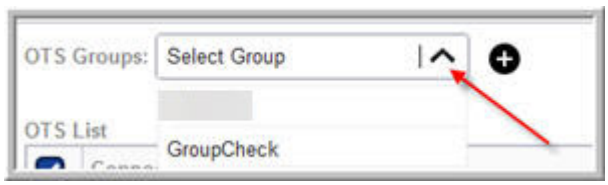
5

Click **SAVE GROUP** to save the OTS group.

In the **Create Template** window, add the *Template Name* and optionally, a *Description*.

Click **Apply** or **OK** to save the template.

From the **OTS Groups** drop-down list, select the configuration that you saved.



Note: Each time the **OTS list** is modified, the *OTS group* must be saved.

6

Optional : The *OTS list* can be directly created from the OTS connections list. Follow any of these navigation path:

- **OPERATE > Physical Connections**, from the list, select the OTS connections, click **More** icon and click **Bandwidth Utilization Report**.
- **DESIGN > OTS Groups**, from the list, select the OTS connections, click **More** icon and click **Bandwidth Utilization Report**.

7

The **OTS list** can be modified by selecting or deselecting each individual OTS, so that the bandwidth analysis can be limited on a selected group of physical links.

Click **CREATE CHART** to create the Bandwidth Utilization Report of the selected OTS(s).

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Figure 21-9 Bandwidth Utilization Report - Example of Bandwidth Utilization View

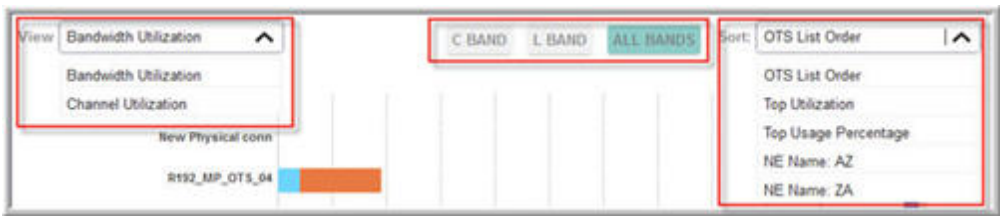
Result: The graphic is generated in the right part of the screen.

Note: The *OTS list* can be modified in any time. Click **CREATE CHART** to update the graphics.

8

The graphic default view shows the list of OTS connections on the vertical axis and the information on the occupied bandwidth on the X axis. The window view can be modified according your needs, using the drop- down menus and the buttons located on top of the window.

Note: The number of bars is twice the number of selected OTS, because they are one for NE endpoint.



9

The **View** field allows to modify the view between **Bandwidth Utilization** or **Channel Utilization**.

In the *Bandwidth Utilization* view, each bar shows the sum of the service carried at each rate and each rate is identified by a different color.

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The *Channel Utilization* view provides information on the total number of channels used on a physical connection.

10

Click on **C BAND** or **L BAND** buttons, only the OTS connections that supports C or L bands are displayed. The default view is **ALL BANDS**.

Note: For OTSig tunnels over an OTS, the **Bandwidth Utilization Report** displays the actual capacity of the tunnels.

11

The default order in the report reflect the OTS list order on the left, the view can be modified through the drop-down menu **Sort** by: *OTS List Order*, *Top Utilization*, *NE name: AZ*, *NE name: AZ*.

The granularity of the display can be changed, by the brushable scroll bar. Dragging form top to bottom, you can increase or decrease the size of the bars.

12

Hover over each bar, according to the window view, a tooltip provides information on the total bandwidth or the number of channels used for each rate.

The legend on the bottom, supplies information on the color used in the graphic.

It provides the percentage of bandwidth or channels used, assuming that each of the remaining connections occupy 100 GB for each remaining channel. The total number of channels calculated is 96 per band.

13

Optional : The *OTS group* can be also visualized and managed following the path **DESIGN > OTS Group**.

Using the icons on the top right or highlighting and right click on one the OTS group line, you can perform the following commands: **Modify**, **Save As** or **Delete** an OTS group.

Select **Bandwidth Utilization Report...** to directly access to the Bandwidth Utilization Report of the selected *OTS groups*.

End of steps

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22 Link Utilization

22.1 Link Utilization Profile

Overview

The Link Utilization feature provides a quick way to view the links or infrastructure connections running out of capacity. This feature provides the functionality to set threshold percentage to indicate the same.

The following profiles help in setting the threshold percentage:

- System defined profile:
  - DEFAULT
- User defined profile:
  - CUSTOM 1
  - CUSTOM 2
  - CUSTOM 3

The following table lists the percentage utilization threshold for each profile:

Table 22-1 Link Utilization Profiles

Profile Name	% Utilization Threshold (Low)	% Utilization Threshold (High)
DEFAULT	50	80

When migrating/upgrading from the older release to Release 21.12, the Link Utilization Profile of the connections is set to **DEFAULT**.

When the system discovers physical or infra links, the Link Utilization Profile of the connections is set to **DEFAULT**.

Note:

- This feature is applicable to ODUk, OTS, OTSig Tunnel connections, and is not applicable to services, ODUj,ODUTCn,ODUCn, and OPS links.
- OTUk layers have a one-to-one relationship with ODUk and are fully utilized.

  % Utilization values are not shown for OTUk layers.
- In Single Fiber OTS, AZ and ZA direction Link connections occupy different frequencies. Hence, these Link connections are considered for **% Utilization** calculation. Multiply the total channel width by 2 in the **% Utilization** calculation.
- Depending on number of connections created or deleted on an underlying connection the **% Utilization** changes.

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22.2 Manage Link Utilization Profiles

Modify Link Utilization Profile

Perform the following steps to view the link utilization system profiles and modify the link utilization custom profile:

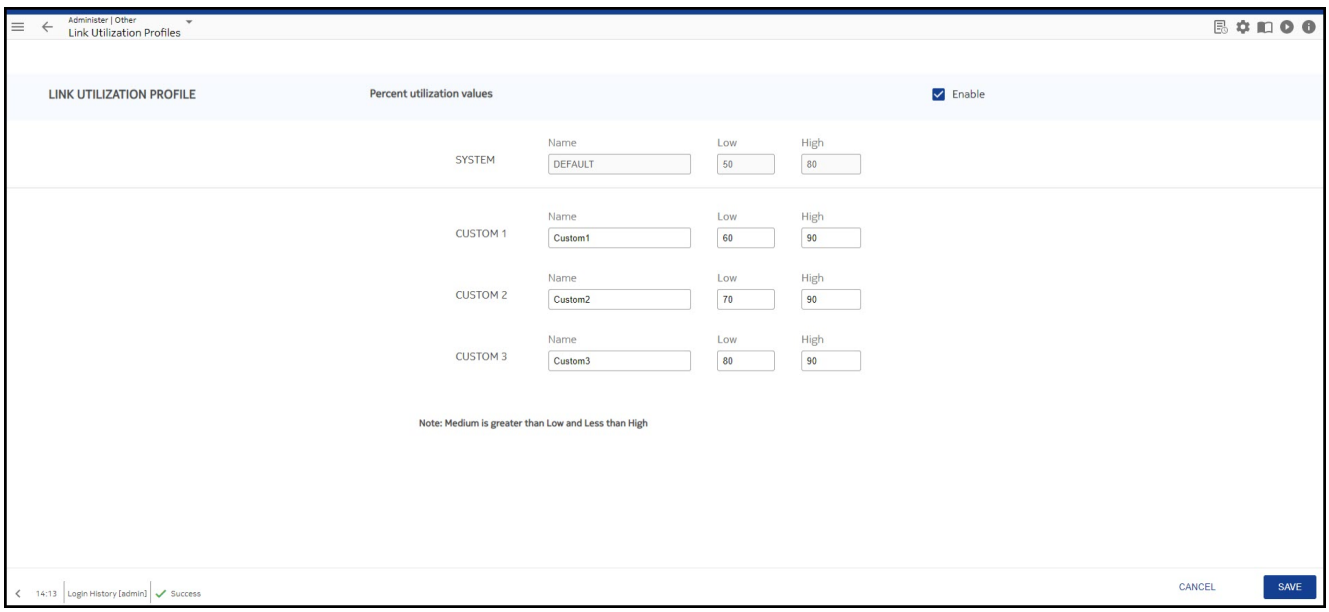
1

From the WebUI, navigate to **ADMINISTER** > **Link Utilization Profile**.

The default value of the **System** profile is **50** and **80** for **Low** and **High** threshold respectively.

Result: The system displays **Link Utilization Profiles** window.

Figure 22-1 Link Utilization Profiles window



2

To create a custom profile, specify the profile name in the **CUSTOM 1**, **CUSTOM 2**, and **CUSTOM 3** profile.

The maximum number of 32 characters is supported.

Note: Leading and trailing spaces in the profile name are removed automatically before saving in the NFM-T database.
For example, <space>CUSTOM 1 or CUSTOM 1<space> is saved as CUSTOM 1 in the NFM-T database.
CUSTOM<space>1 is saved as CUSTOM 1 in the NFM-T database.

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3

Provide the required profile value in the **Low** and **High** fields and click **SAVE**.

The user is allowed to edit the custom profile if **Enable** is checked.

Note: The permitted value range is 1 to 99.

Result: The Custom Profile is created with the provided threshold values.

End of steps

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22.3 Link Utilization Dashboard

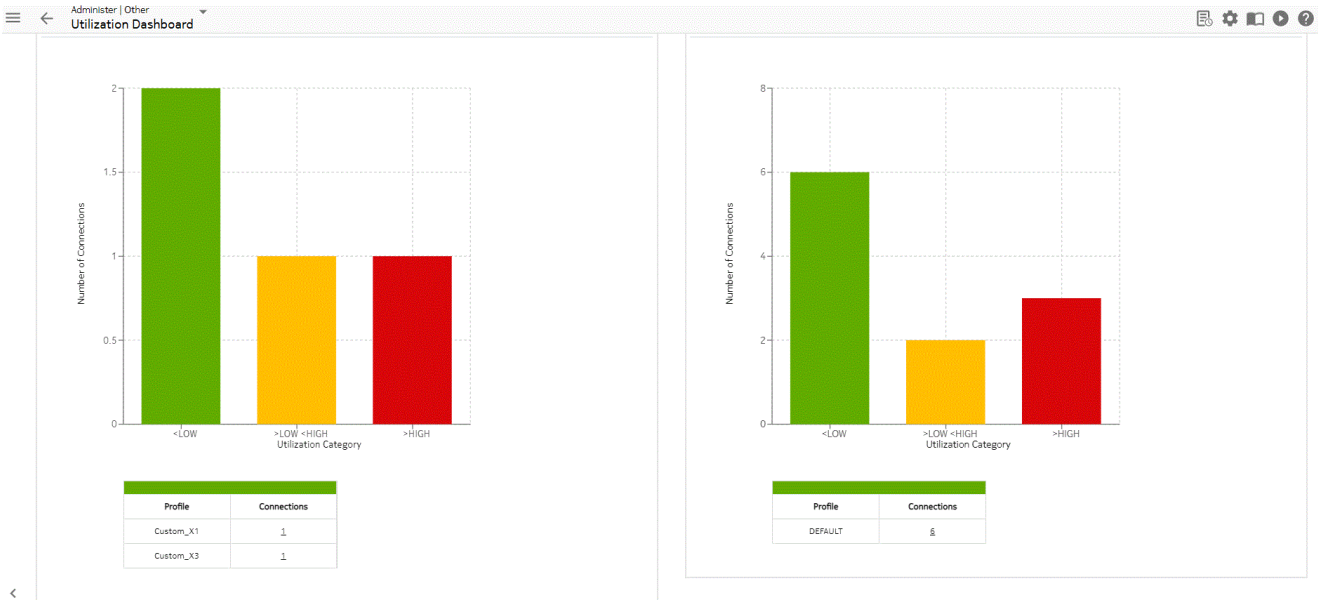
Overview

The Link Utilization Dashboard displays bar charts which depict the current utilization status of physical links and infrastructure connections.

To view the Link Utilization Dashboard, from the WebUI, navigate to **ADMINISTER** > **Link Utilization Dashboard**. The **Link Utilization Dashboard** window displays two bar charts, one for Physical Links and the other for Infrastructure Connections.

Note: All the users can view the **Link Utilization Dashboard**.

Figure 22-2 Link Utilization Dashboard window



The X-axis of the bar charts represent the *Utilization Category* and the Y-axis represents the *Number of Connections*.

The green bar on the graph represents category less than low (< LOW), the yellow bar represents greater than low and less than high category (> LOW < HIGH), and the red bar represents category high (> HIGH).

For a default profile, the connections with less than 50% threshold are considered as low category. The connections between 50% to 80% threshold are considered as medium category. The connections greater than 80% is considered as high category.

Click the bar chart to view the profile and the number of connections associated with profiles. From the table, click the link to navigate to the NFM-T *Physical Connections* and *Infrastructure Connections* reports.

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Manage Data Columns

1

Click **More** icon and select **Manage Columns** on the *Physical Connections* or *Infra Connections* page.

2

In **Manage Columns**, select **% High Utilization Threshold**,**% Low Utilization Threshold**,**% Utilization** and click **Apply**.

Result: The selected columns are displayed on the *Connections* page.

END OF STEPS

Modify a Profile in Physical Connections

In *Physical Connections* window, for a selected connection the current *Utilization Profile* is set as the *DEFAULT* profile. You are allowed to modify the *Utilization Profile*.

1

To modify a profile, click **More** icon and select **Modify Utilization Profile**.

Result: The Manage Utilization Profile page is displayed.

2

In **Link Utilization Profile** field, select a new profile and click **Deploy**.

The Utilization Profile is updated with the modified value.

You can modify the profile for a single connection or multiple connections.

END OF STEPS

Modify a Profile in Infra Connections

In *Infra Connections* window, for a selected connection the current *Utilization Profile* is set as the *DEFAULT* profile. You are allowed to modify the *Utilization Profile*.

1

To modify a profile, click **More** icon and select **Modify Connections > Modify Utilization Profile**.

Result: The *Connections* page is displayed.

2

In **Link Utilization Profile** field, select a new profile and click **Deploy**.

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The Utilization Profile is updated with the modified value. You can modify the profile for a single connection or multiple connections.

End of steps

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23 Physical Connections Report

23.1 Physical Connections Report Description

Physical connections report definition

The **Physical Connections Report** contains details of the physical connections deployed in the network.

Physical connections report format

The Physical Connections report is generated in .csv format. It can be opened immediately after the download is completed or saved to the local drive on your PC.

The Physical Connections Report columns are as follows:

- Connection Name
- Connection Rate
- Allocation Cost
- Connection State
- Direction
- Operational State
- Service State
- Comment
- OTN Latency
- A-Z Fiber Length
- Z-A Fiber Length
- A-Z Fiber Type
- Z-A Fiber Type
- From PortName#1
- From PortRate#1
- From NeName#1
- To PortName#1
- To PortRate#1
- To NeName#1
- From PortName#2
- From PortRate#2
- From NeName#2
- To PortName#2
- To PortRate#2

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- To NeName#2

Downloading the physical connections report

Complete the following step to generate and download the Physical Connections Report in .csv file format.

1

From the NFM-T GUI, follow this navigation path:

OPERATE > Physical Connections Report

Result: The system downloads the Physical Connections Report. A success message is displayed in the status bar at the bottom left of the page.

2

The file is saved to the **Downloads** directory on your local PC.

3

Navigate to the directory where the .csv file is saved and double click to open the .csv file.

End of steps

Using REST API to download the physical connections report

You can use the REST API call generateCSVReportForAllTopologicalLinks : /data/otn/networkinventory/alltopologicalinks to download the Physical Connections Report as a .csv file.

See *NFM-T REST API Documentation*.

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Part VI: WebUI Quick HELP, TAB HELP and Data Tables

Overview

Purpose

This part of the document provides quick help on the common WebUI elements as well as common tabs which are displayed for various network objects in various windows of the NFM-T

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24 Quick Helps

24.1 Overview

Purpose

This chapter provides a quick help to the common NFM-T GUI functions.

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Connections

24.2 Quick Help – The Create Connection Window

What type of connection do you want to create?

An infrastructure connection?

An *infrastructure* is a connection that acts as a hierarchical server layer to carry customer services. Infrastructure connections, which can be unterminated or terminated connections, are categorized on the NFM-T GUI (and are also known) as *trails* and *logical links*.

An *infrastructure trail* is a terminated entity that can multiplex or demultiplex client signals. An infrastructure trail connects the interior, logical network ports that are adapted connections with one or more types of link connections.

A *logical link* is an unterminated entity that provides contiguous, fixed connectivity to the far end, which can be terminated or unterminated.

A Service?

Services are also known as *paths*. A *service* is a connection between the boundary ports of a service provider network that provides service to an end-user/customer of the network. A service is an end-to-end connection that carries the customer's service as a container in Low Order (LO) or High Order (HO) trail. A service connects the logical ports that are entirely used to carry a unique service.

Deploy template settings

A service or infrastructure template (*Connection* window) is divided into sections: **DEPLOY RULES**, **ROUTING CONSTRAINTS**, **PARAMETERS SUMMARY**, and **DEPLOY**. Each tab has parameters that can be set for creating a trail or a service connection.

Deploy rules

DEPLOY RULES section is divided into **END POINT SELECTION** panel and depending on the selected *Signal Rate*, it is further divided into **CONNECTION CHARACTERISTICS** and **OPTICAL LINE CHARACTERISTICS** tabs.

For more information, see “Deploy Rules” (p. 1220).

Routing constraints

ROUTING CONSTRAINTS section is divided into tabs, which allows you to specify the route to be taken for a connection. When an infrastructure or a service connection is created, you can provide a suggestion to the system on how to route the connection. The system takes into account the specified suggestions while it considers the hardware configuration, internal NE topology, and the available capacity to route a connection.

To set the **ROUTING CONSTRAINTS** section parameters, set **Routing Mode** to `Manual` in **CONNECTION CHARACTERISTICS** pane.

For more information, refer “Route Constraints” (p. 1244)

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Parameters

PARAMETERS section is divided into tabs. These tabs depend on the type of service rate, signal type, and template used to create a connection.

The different tabs are: TRANSMISSION, ASSURANCE, WAVE KEY, PROTECTION, RESTORATION, OCHP, OTHERS.

Summary

SUMMARY section is a collection of all the parameters available in the selected template (for example, *ODUk or OTSiG Tunnel* infrastructure template). This section lists all the default parameters and the set parameters. Verify all the parameters before deploying a connection.

For more information, see "Summary" (p. 1263)

Deploy

The **DEPLOY** section displays the status of the provisioning task. The deployment status is represented in a progress bar which increases in percentage as the deployment moves states from **Defined** > **Allocated** > **Implemented** > **Commissioned**.

For more information, see "Deploy" (p. 1266)

Two sides of a design template window

• The *left* portion of the Create Connection window displays the "Map" (p. 1972) tab opened to the **Network Map** and additional top tabs for "Routing constraints" (p. 1972) and the "Planning Tool" (p. 1973).

• The *right* portion of the window displays all of the fields for the "Service definition" (p. 1971), along with "Advanced settings" (p. 1971) and the "Deploy, Save as Template, and Cancel buttons and Provisioning Status" (p. 1973).

Service definition

The Service Definition contains the appropriate parameters (fields) that you must complete to create a basic version of the connection that you have selected. For the Best Practices templates, these fields and their options, the values of each option, and the defaults of each option have been predetermined for each type of infrastructure connection and service.

For more information, refer "Service definition" (p. 688); "Provisioning considerations" (p. 1973).

Advanced settings

In Advanced Settings, you can select the options that define in more detail the particular connection that you need to create. Depending on the template you selected, the panels in the Advanced Settings can include the following:

• **Connection Controls** enables you to use manual routing, to have the system automatically create the server layer for the infrastructure or service or to have it create the connection regardless of the communication status of the optical amplifiers, or to provision wave keys.

For more information, refer "Connection Controls" (p. 708).

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• **Transmission Parameters** enables you to specify additional or, in some cases, to modify transmission parameters.

For more information, refer "Transmission Parameters" (p. 711).

• **ASON** enables you to specify the parameters that control the routing of the connection for the Automatic Switched Optical Network (Control Plane, G.7718). These parameters include Tandem Connection Monitoring, along with timing, priority, and restoration parameters.

For more information, refer "ASON" (p. 716).

• **SNC Protection** enables you to specify the Subnetwork Connection (SNC) protection parameters for the connection. You can specify network protection for all connection shapes; but you can only specify client protection for connections in which the Connection Shape is other than 2-ended.

For more information, refer "SNC Protection" (p. 717).

• **Y Cable Port** enables you to specify the Switch Mode from/to OT working and protection ports for the connection.

For more information, refer "Y-Cable Port" (p. 721).

• **Routing Constraints** enables you to specify the parameters that control the routing of the connection which include order sensitivity and whether the system should assign the frequency.

For more information, refer "Routing Constraints" (p. 723).

• **Assurance** enables you to specify Alarm Management with 15 minute or 24 hour Performance Monitoring (PM) parameters for the connection.

For more information, refer the "Assurance" (p. 726).

• **Wave Key**, which, depending on the connection type and rate, enables you to specify wave key parameters for the connection.

For more information, refer "Wave Key" (p. 727).

Map

The Map tab of the Create Connection window is a smaller view of the Network Map, which is a representation of a particular NFM-T OTN network of NEs, and the groupings and interconnections of those NEs into subnetworks and nodes.

For more information, refer the *Network Maps* chapter in the *NFM-T Getting Started Guide*.

Routing constraints

Use the Routing Constraints tab with the Routing Constraints panel of the Create Connection window. To specify routing constraints for the connection that is being created, click on the Routing Constraints tab and select Trail/Link Constraint or 3R Constraint.

For more information, refer:

- 7.5 "Advanced Settings field descriptions for deploy Best Practices templates" (p. 708); .
- "Route Constraints" (p. 1244)

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Planning Tool

Use the Planning Tool tab when you want to implement a connection in the NFM-T OTN that was originally designed and deployed in the Network Planning Tool (NPT), through the OTN WebUI.

Deploy, Save as Template, and Cancel buttons and Provisioning Status

When you press **Deploy**, the Provisioning Task Status window displays the status of the commands and the state changes of the connection as it is being deployed. You can view more status or view the run history of the command execution. If a failure occurs while implementing the commands in the network, select **Show Command Status** to view a detailed status of the commands.

For more information, refer "Buttons" (p. 707).

Provisioning considerations

The NFM-T follows the G.709 standard layer rates for connection provisioning, but with minimal entry on your part. Many times, the only fields you must populate when provisioning infrastructure connections or services are those fields that specify the from and to nodes and ports. You can populate other fields from the selected template or you can select the default value. The NFM-T typically automatically discovers the required physical connections.

Note: For Mixed networks involving directional and directionless topology such as config D, config D', CDCF, ACDC - if there is network having a mix of directional ADD DROP and multi directional (directionless) Add/Drop, trying to create OPSA or OPSFlex L0 Managed Plane trails, it is not always guaranteed to find a route by auto-routing. In this case you have to provide Physical link (OTS/OPS) constraints for working and protection legs or partial constraints either for working or protection.

The provisioning considerations that you should be aware of are the following:

Want the system to do the work for you?

Besides Auto Discovery, the NFM-T can automatically provision some lower order connections for you.

• With Single Step Provisioning, when you create the DSR service, the system automatically creates the LO-ODUk server connection.

• With Auto Payload, when you create a DSR service, the system automatically creates all point-to-point HO-ODUk trails along with any accompanying LO-ODUk trails, except for HO-ODUk trails that involve pass-through HO cross connections or protected HO-ODUk trails.

• With edge connections, when you create an asymmetric service connection with one endpoint on a black box and the other endpoint on a managed NE, the system automatically creates an edge HO ODUk connection between the black box and the adjacent managed NE when the connection is required. With edge HO trail connections, if you create a DSR or LO-ODUj connection and if the connection is the first connection using a channelized endpoint, the system automatically creates an edge HO infrastructure trail connection. If the DSR or LO-ODUj connection has multiple channelized endpoints, the system automatically creates an edge HO infrastructure trail connection for each channelized endpoint.

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• To support both terminated and unterminated connections, the NFM-T OTN manages unterminated ODUk connections in the Managed Plane, Control Plane, and Mixed Plane environments without having you create an external topological link and an edge NE (ENE).

For more information, refer the2.30 “Single Step Provisioning” (p. 275); 2.32 “Auto Payload” (p. 295); 2.33 “Auto creation of edge connections” (p. 299); and 2.34 “Unterminated OTUk/ODUk infrastructures without virtual termination management” (p. 301).

Which Infrastructure? A Trail or Logical Link?

An infrastructure is typically a user-created or auto discovered entity, such as a trail or a logical link, that is constructed in the network before services can be delivered. The system defaults to the creation of an infrastructure trail.

An *infrastructure trail* is a terminated entity that can multiplex or demultiplex client signals. An infrastructure trail connects the interior, logical network ports that are adapted connections with one or more types of link connections.

A *logical link* is an unterminated entity that provides contiguous, fixed connectivity to the far end, which can be terminated or unterminated.

For more information, refer:

- “Deploy a new service or infrastructure connection with template” (p. 1216)
- 2.8 “Determine the Infrastructure to be created” (p. 168).

ASON Routed or ASON?

To route the connection using either Layer 1 or Layer 0 Control Plane, you can select the **ASON** check box. The **ASON** check box triggers the display of the **MRN Tunnel** and **ASON Restoration** fields, along with the **ASON** panel, which is where you can specify the parameters that control the routing of the connection for the Automatic Switched Optical Network (Control Plane, G.7718). These parameters include Tandem Connection Monitoring, along with timing, priority, and restoration parameters.

For more information, refer:

- “Deploy a new service or infrastructure connection with template” (p. 1216)
- “ASON Routed” (p. 704); “ASON Restoration” (p. 705); “ASON” (p. 716).

Auto Server Creation?

The **Auto Server Creation** field determines if you or the NFM-T creates the server layer for the infrastructure connection or service. When you check the **Auto Server Creation** box, the NFM-T automatically creates the server layer for the infrastructure connection or for the service that you are currently creating, if the server layer is needed. Subsequently, these connections, meaning the infrastructure connection and the service that are being created, along with the server layer connection, become part of a group and are managed as a group.

For more information, refer the “Auto Server Creation” (p. 708).

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Allow uncommissioned links?

Check this box if you want the system to create the connection regardless of the commission status of the optical amplifiers. If you check this box, you must make any manual power adjustments from Wavelength Tracker for both egress and ingress ports on the uncommissioned link. If you do not check this box, the connection fails if any optical amplifier in the connection is not commissioned.

For more information, refer the "Allow Uncommissioned Links" (p. 710); "Support for Wavelength Tracker and the WTOCM card" (p. 1818).

Pluggable modules?

If you select an unassigned To/From port on an 1830 PSS OCS NE that is not a fixed port as the To/From Port, the To/From Port Pluggable Module field is displayed. The valid pluggable modules for the port are based on the card type of the port and the service rate of the connection.

For more information, refer the "From Port Pluggable Module" (p. 696); "To Port Pluggable Module" (p. 699).

Wave Keys?

Depending on the template/connection type, the Provisionable Wave Key field is required for NEs that allow you to select if Wavelength Tracker functionality is enabled or disabled for an OCH/OTUk/OTU4x2/OTL4.4 connection. Since single step provisioning automatically creates OCH/OTUk/OTU4x2/OTL4.4 for you, you typically will only use the Provisionable Wave Key field when creating an ODUk connection. Depending on the settings of the Provisionable Wave Key field, the Wave Key panel requires you to complete additional fields.

For more information, refer the "Provisionable Wave Key" (p. 710); "Wave Key" (p. 727); "Support for Wavelength Tracker and the WTOCM card" (p. 1818).

Protection?

The NFM-T supports OMS Protection, Subnetwork Connection Protection (SNCP), Y-Cable Protection, and OPSB Protection.

For more information, refer the "OMS Protection" (p. 691); "SNC Protection" (p. 717); "Y-Cable Port" (p. 721); 4.4 "Y-Cable protection" (p. 430); 4.5 "OPSB and OPSB5 protection" (p. 447).

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24.3 Quick Help – The Create Physical Connection Window

What's a physical connection?

A *physical connection* is a connection that uses wires, cables, or optical fibers to connect two physical ports in a network. The NFM-T typically automatically discovers the required physical connections for a service. It also enables users to create physical connections manually on the **Physical Connection Creation** window.

Two sides of the Physical Connection Creation window

The *left* portion of the **Physical Connection Creation** window displays the **Map** tab. The **Map** tab of the **Physical Connection Creation** window is a smaller view of the Network Map, which is a representation of a particular NFM-T OTN network of NEs, and the groupings and interconnections of those NEs into subnetworks and nodes. Use the **Map** tab to locate the nodes/NEs in the connections that you want to create.

The *right* portion of the window displays the **Basic Information**, **Specific Information**, **SRGs**, **Enhanced Information**, and **End Points** panels, which contain all of the fields that you must specify to create a physical connection manually. The *right* portion of the window also displays the **Deploy** and **Cancel** buttons that you can use for the final creation of the connection or to terminate any of your input.

What type of physical connection do you want to create?

The type of physical connection that you create depends on your selections in the **Connection Type** and **Interworking Tech** fields of the **Basic Information** panel. Your selections in these two fields enables you to create the following types of connections:

- An OTN Double-Simple (uni) Physical Connection
  Need help? Go to 7.19.4 “Task: Create a 4-ended OTS or OPS physical connection” (p. 788).
- An OTN OTS or OPS Bidirectional Physical Connection
  Need help? Go to 7.19.5 “Task: Create an Bidirectional physical OTS or OPS connection” (p. 793).
- An OTN Y-Cable Physical Connection
  Need help? Go to 7.19.6 “Task: Create an OTN Y-Cable physical connection” (p. 796).

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24.4 Quick Help – The Routing Display Window

What is the Routing Display?

Routing Display

The *Routing Display* is a graphical representation of a specified physical or logical connection along with its connecting node or nodes.

Specifically:

- The physical connections can be an OTS or OPS (OS) physical connection that is in the Implemented state.
- The logical connections can be an infrastructure connection, which can be a trail or logical link, or a service. These connections can reside in the Managed Plane, Mixed Plane, or Control Plane and must be in the Allocated, Implemented (Success or Failed), or Commissioned state. For Layer 0 (OTUk) and Layer 1 (ODUk) ASON or Mixed Plane infrastructure trails, the nominal route, and current route can also be displayed.
- The node can be a single standalone 1830 PSS NE or a virtual NE (black box) or a compound node that connects an 1830 PSS NE and an 1830 OCS NE through an uplink card. Cross connections, which are connections within an NE that internally connect one logical port on an NE to one or more logical ports on the same NE, can also be displayed.

Routing Display

In addition to what is shown by the Routing Display, the **Routing Display** represents in a graphical view *Infrastructure* or *Service* connections, displaying the packs involved in the connection, internal links, physical links including optical lines according with the considered connection.

The Routing Display is displayed for Infrastructure or Service connections independently of the service rate, as long as the connection is in **Implemented** or **Commissioned** state.

Right click over an object, and click the **Properties** button to view information of the connections along with nodes involved in the connection itself.

Moreover, port alarms are displayed, which are the alarms that may exist at physical layer or at any of the corresponding service or infrastructure layers. Additionally, the IN and OUT ports of each packs are displayed including the connection if any, between them.

The GMPLS/ASON connections are also displayed from Routing Display. In this context all the layers (L0 and L1) belonging to the *Nominal route* are displayed. Only *ODUk* connections at level 0 are displayed in the *Current route*.

Note: If traffic has switched to a new current route and is no longer following the nominal route, then not all of the original cross-connect information is available on the Route Display for the Nominal Route.

The Routing Display window

The Routing Display window is divided into the following views:

- The *left* side of the window displays the connection name and **More** icon, which provides a

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list of operations that can be performed from the Routing Display. Below the connection details, a set of icons are available that are related to the selected connection. When you mouse over these icons, the system displays the identity of the icon. Refer to "Routing Display icons associated with the connection name" (p. 1977) for details.

- The *top right* portion of the **Routing Display** window has button **MANAGE ROUTING DISPLAY**. The **MANAGE ROUTING DISPLAY** is a sliding window which contains two panels; **ROUTING DISPLAY DATA** and **LEGENDS**.
- The *main* portion of the window displays the graphical representation of the connection that you selected. When you mouse over a port, connection, or node, the system displays the identity of the port, connection, or node. Refer to "Routing Display colors associated with the node communication state " (p. 1983), "Routing Display colors associated with ports " (p. 1984), "Routing Display lines and icons associated with the node connections" (p. 1984) for details.
- The *bottom right* portion of the **Routing Display** window has buttons to **REFRESH**, **Zoom In**, **Zoom Out**, and **Reset Position**.

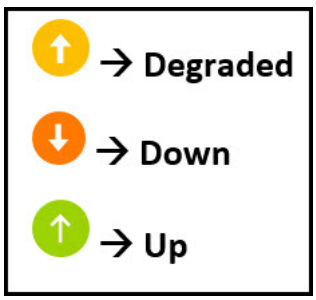
Routing Display icons associated with the connection name

The connection name is displayed in the *left* portion of the window. The connection name can be accompanied with any of the following icons, which, when you mouse over them, display their identity:

• The **Connection** displays the connection name and connection rate.

• The **Operational State** icon is an arrow. It is typed and colored as Enabled (green, up) or Disabled (down).

Figure 24-1 Routing Display – Connection icons – Operational States



• The **Service State** is a combination of small boxes like a window and have a light green tick (check mark) for In Service and a red cross for Maintenance.

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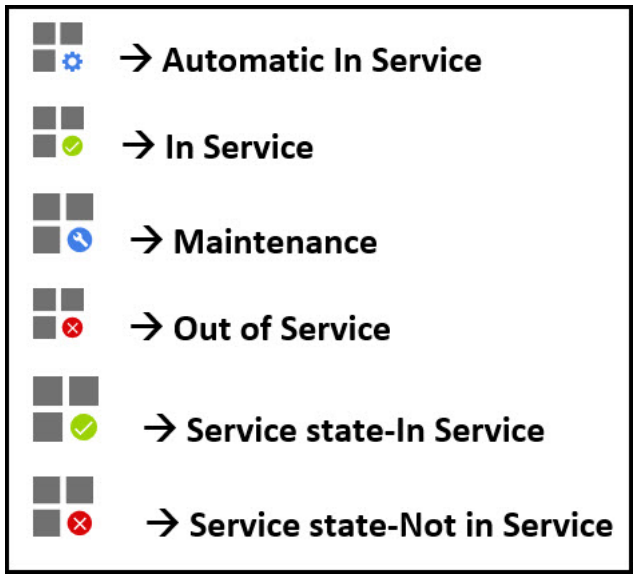
Figure 24-2 Routing Display – Connection icons – **Service States**



• The **Alarm Status** icon is a circle with a letter. It is typed and colored as Critical (Red), Major (Orange), Minor (Yellow), Warning (Blue), Indeterminate (White), or Cleared (Green).

Example:

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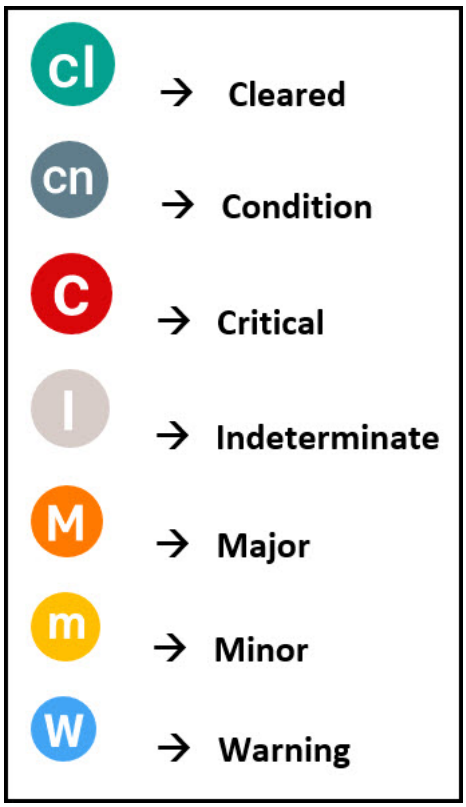
Figure 24-3 Routing Display – Connection icons – Alarm Status



• The **Server Alarm Status** icon is a circle with a letter. It is typed and colored as Critical (Red), Major (Orange), Minor (Yellow), Warning (Blue), Indeterminate (White), or Cleared (Green).

Example:

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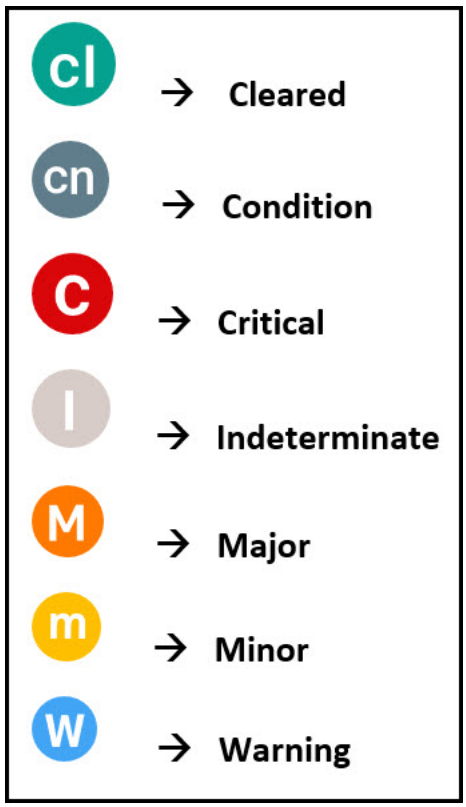
Figure 24-4 Routing Display – Connection icons – Server Alarm Status



• The **Step State** is a green tick icon or a circle with an red X or a circle with orange dotted circle. It indicates if the connection is Completed (green tick) or Failed (red X) or in-progress (orange dotted circle).

Figure 24-5 Routing Display – Connection icons – **Step States**

• The **Connection Direction** icon is a arrow and for bidirectional (double arrow), unidirectional (single arrow), or three/four ended (single arrow pointing into an *E*).

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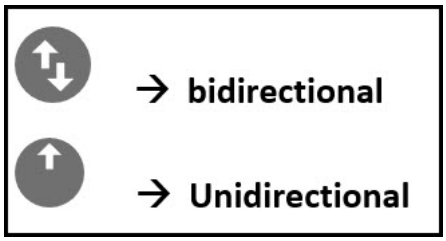
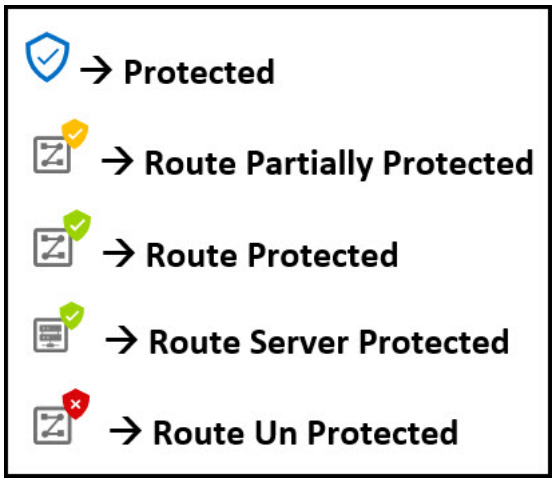
Figure 24-6 Routing Display – Connection icons – Connection Directions



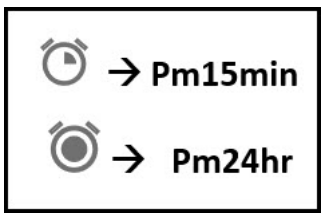
• The **Protection Type** icon is a Routing Display icon with a crown. It has a orange tick for a protected (SNCP-N) connection and a red cross for an unprotected connection.

Figure 24-7 Routing Display – Connection icons – Protection Types



• The **PM** icon is a alarm clock symbol with an indication of a slice for 15 min or full circle for 24 hr. It indicates if 15 minute (min) or 24 hour (hr) performance monitoring data is being collected on the connection. The connection must be Commissioned or in the Implemented/Completed state.

Figure 24-8 Routing Display – Connection icons – **PM** – 15 Minute, 24 Hour PM Enabled



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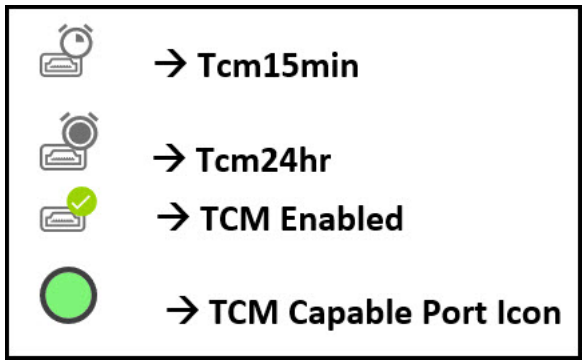
• The **TCM Status** icon is a yellow box with the letters **TC**. It represent the status of Tandem Connection Monitoring, which can be Enabled (displayed) or Disabled.

Figure 24-9 Routing Display – Connection icons – TCM icons



• The **Band** indication. It represent the band of the connection, which can be C-band, L-band, C+L band or C-L band.

Routing Display colors associated with the node communication state

Node/NE icons are rectangles and are colored as follows:

	Node communication state	Note
	Reachable	Green outlined node/NE icons are managed NEs in the Managed Plane that are in communication with NFM-T. These NEs typically do not have any faults. These nodes/NEs include the 1830 PSS-TDMX NEs.
	Unreachable	Purple outlined node/NE icons are managed NEs that are not in communication with NFM-T. These NEs typically have a communication status of *down* or *failed*.
	Deactivated	Grey outlined node/NE icons are managed NEs that are deactivated.
	Unmanaged	Black outlined node/NE icons are virtual NEs, which are also referred to as *unmanaged NEs* or *black boxes*.

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Routing Display colors associated with ports

A circle icon represents a port and depending on the alarm state of the port, is colored as follows:

- A green circle icon indicates that an alarm has been cleared or no alarms raised for the port.
- A red circle icon indicates that a Critical alarm has been raised.
- An orange circle icon indicates that a Major alarm has been raised.
- A yellow circle icon indicates that a Minor alarm has been raised.
- A blue circle icon indicates that a Warning has been raised.
- A white circle icon indicates that a Indeterminate alarm has been raised.

Note: The displayed port alarms, are the alarms that may exist at physical layer or at any of the corresponding service or infrastructure layers. Ports have the coloring of the alarms on the given port, typically the physical layer. If there are corresponding alarms on the infrastructure or service layer, a ring is added around the port with the color of the alarm at that layer.

For a PTP (Center), a green circle is displayed. For a CTP (Outline), a green circle with orange outline is displayed.

Routing Display lines and icons associated with the node connections

Lines and icons can be displayed with node/NE connections as follows:

A solid line that connects adjacent nodes/NEs represents an external connection.

A color is associated to the state of the connection: green for *unprotected*, blue for *working* and purple for *protected*.

A color is associated to the cross-connection links: dotted green line indicates an active connection, dotted orange line indicates Improper Disconnect, dotted grey line indicates Unknown or GMRE connection.

Icons with dark blue line to indicate link highlighted and light green circle to indicate a start and end of a layer port.

The following figures show the icons for Facility loopback, Terminal loopback, Protection group, PM Monitoring ports, and TCM Capable ports that are displayed on the Routing Display.

Figure 24-10 Routing Display – Facility Loopback

Figure 24-11 Routing Display – Terminal Loopback

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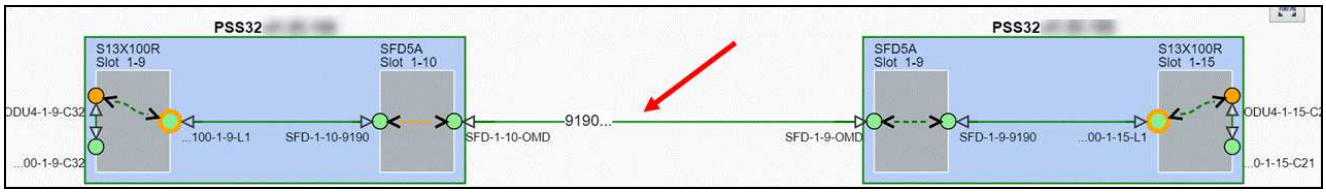
Figure 24-12 Routing Display – Protection Group

Figure 24-13 Routing Display – PM Monitoring Port

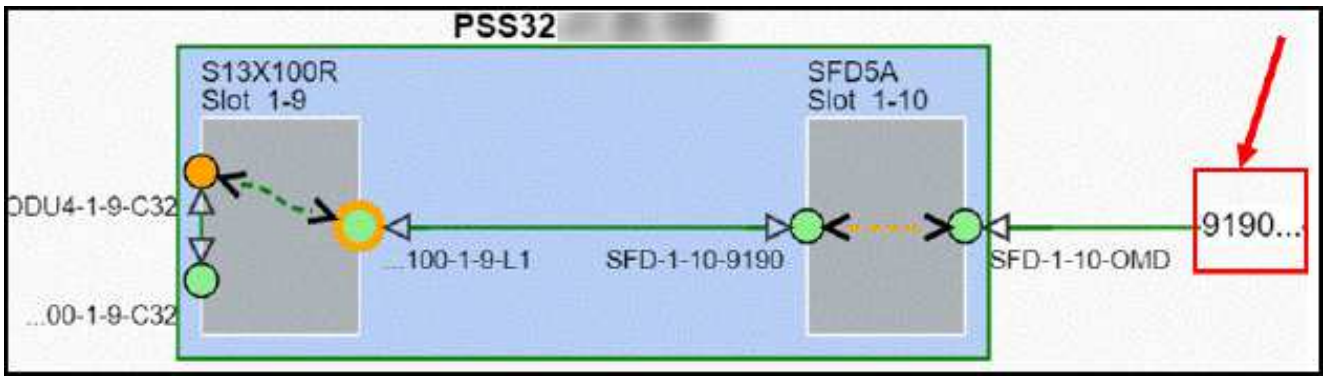
Figure 24-14 Routing Display – TCM Capable Port

Figure 24-15 Routing Display – External Connection



• A solid line that connects adjacent nodes/NEs with a boxed number represents a Timeslot. The solid line in above represents an External Connection.

Figure 24-16 Routing Display – Timeslot



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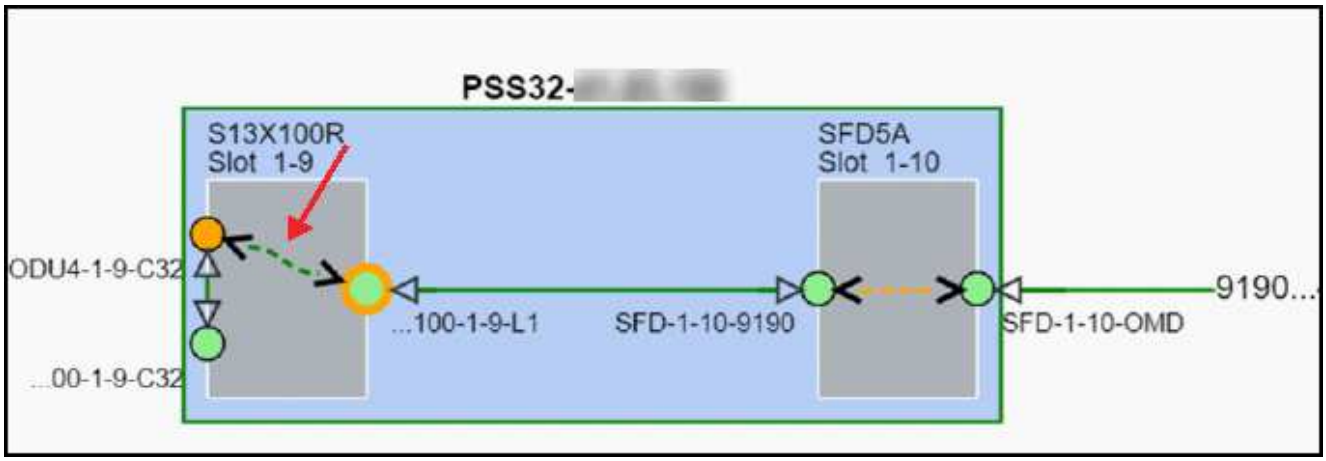
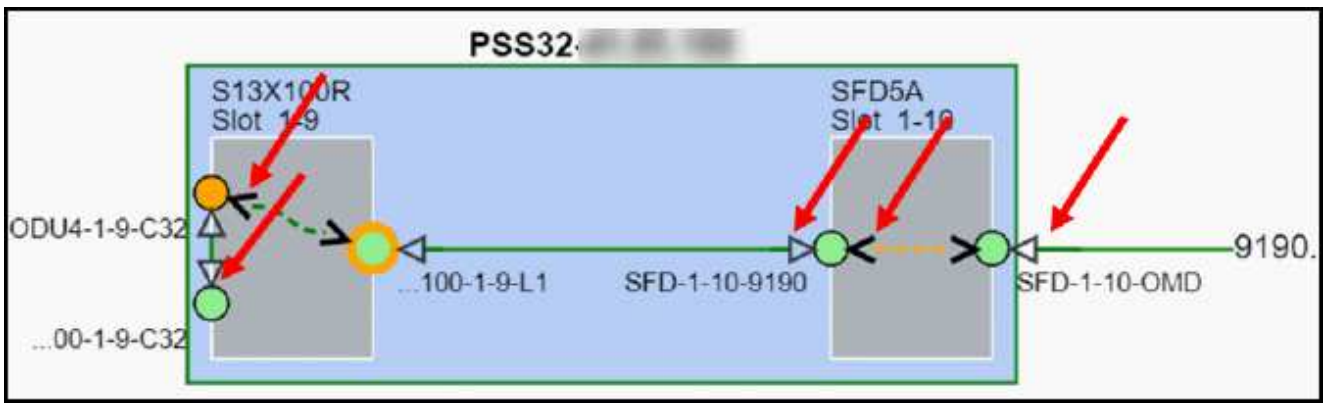
• A dotted line that is within a node/NE represents a cross-connection. Dotted lines can be further colored to represent the state of the connection: green for *active*, orange for *improper disconnect* and grey for *unknown/GMRE* connection.

Figure 24-17 Routing Display – Cross-Connection



An arrow represents the direction of the connection.

Figure 24-18 Routing Display – Connection Direction



A disk with a check mark represents the ConfigDownLoadState, which can be Enabled or Disabled.

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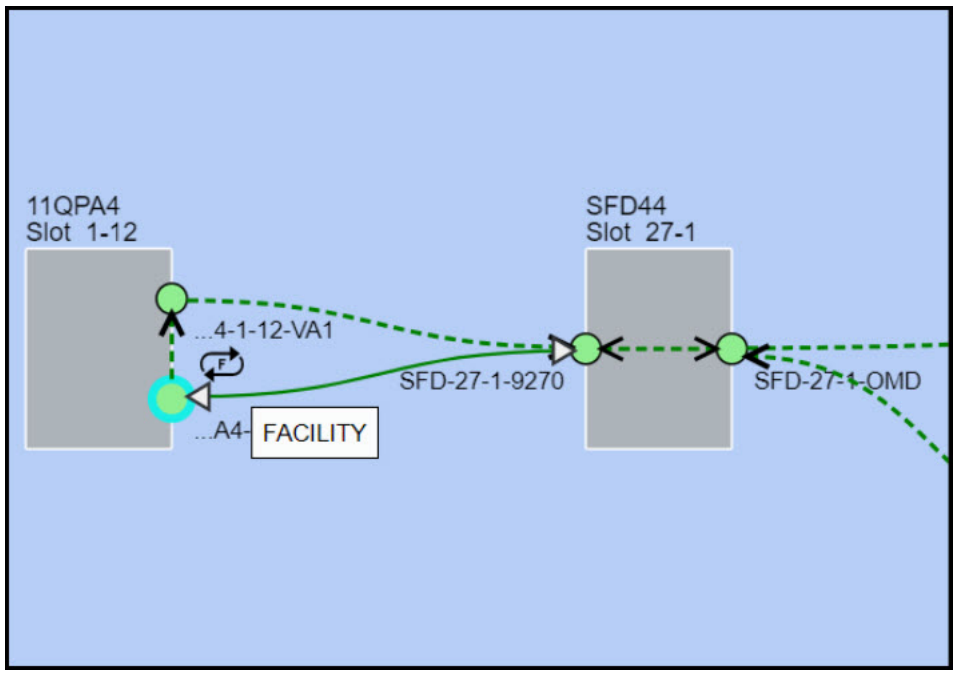
Figure 24-19 Routing Display – Configuration Download State

Curved inward and outward arrows represent loopback connections that are associated with infrastructures and services. TERMINAL loopbacks on internal ports are indicated by curved inward arrows; meaning arrows that point to the left. FACILITY loopbacks on internal ports are indicated by curved outward arrows; meaning, arrows that point to the right.

Figure 24-20 Routing Display – Facility Loopback – Curved Outward Arrows Pointing to the Right



Need more connection info?

Right click the connection lines to view the **Properties**, **Server** and **Routing Display of Server**.

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Figure 24-21 Routing Display – Right Click Options for More Info

Need to rearrange the Routing Display?

Rearrange the **Routing Display** by dragging the node icons to a new location so you can view more objects in the display.

Figure 24-22 Routing Display – rearrange the display – original display

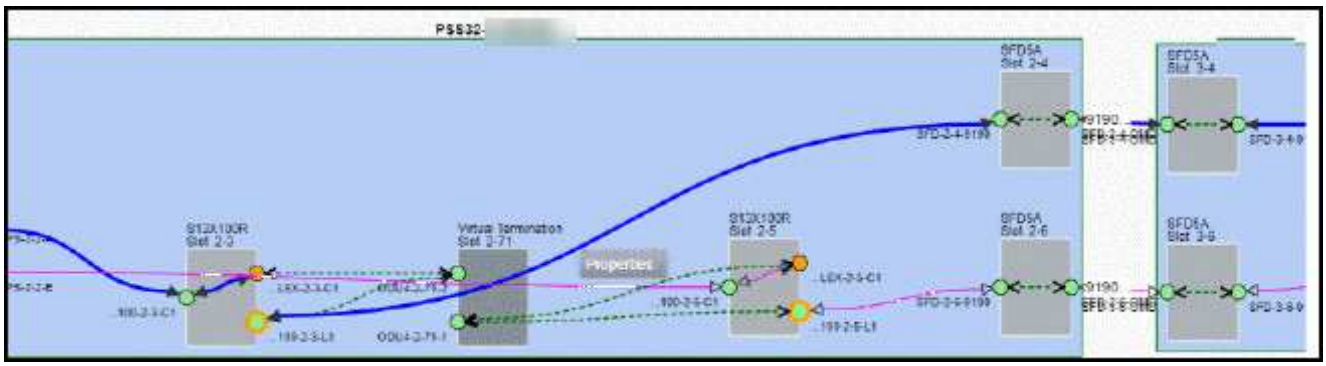

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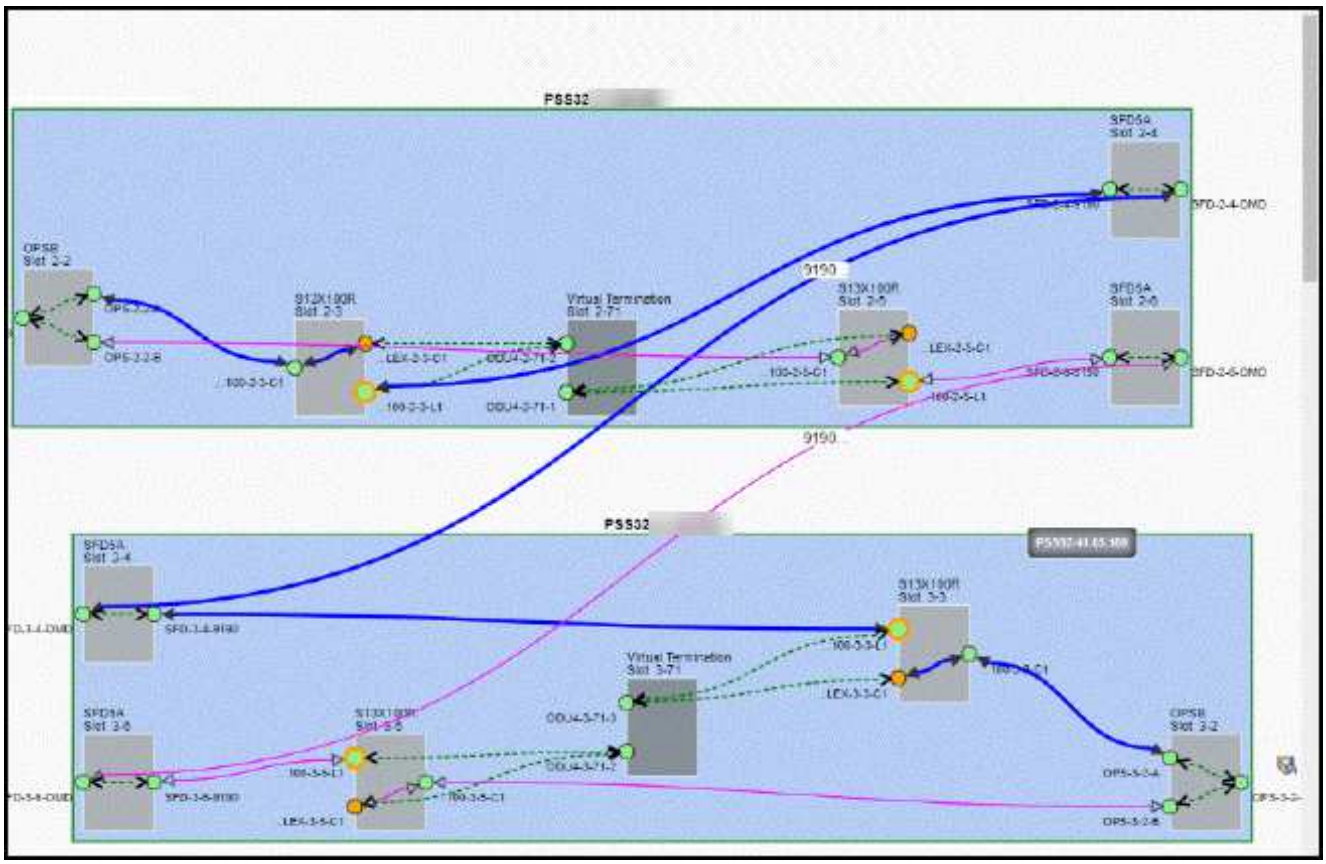
Figure 24-23 Routing Display – rearrange the display – original display rearranged



Need to fix the Routing Display so its easier for you to view the display?

In the bottom right corner of the Routing Display, mouse over and click on the **Refresh**, **Zoom In**, **Zoom Out**, or **Reset Position** icons so you can have a better view of the display.

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24.5 Quick Help – The OA&M Diagnostics Window

OA&M Diagnostics window

The *OA&M Diagnostics* window is designed to provide real timeand summary PM information for a selected connection which is useful when trouble shooting difficult impairments in a service. The *OA&M Diagnostics* window provides a routing display of the connection with all packs viewable that the connection traverses. PM access points are highlighted and available for selection for real time PM counters. The PM results are presented in an overall connection summary as well as graphical real time graphs and charts.

The OA&M Diagnostics window provides a detailed view of the end-to-end route down to the circuit pack and internal connection level across all connection layer rates with an accurate display of alarms and PM information that is related to the connection.

Top and bottom pane of the OA&M Diagnostics window

• The *top* pane of the OA&M Diagnostics window contains the routing display of the selected physical, infrastructure, or service connection. The top pane also has a sliding window to the right corner of the routing display, which displays the **Overlay Route Display Data**.

• The *bottom* pane of the OA&M Diagnostics window contains **Summary** and **Real-Time** tabs.

Overlay Route Display Data window

The sliding window in the right corner of the routing display provides **Overlay Route Display Data**. The **Overlay Route Display Data** does the following:

Shows the active alarms, select the **Alarms** check box. The Alarms check box is selected by default. You can turn off the display of alarms to reduce the clutter on the routing display, when initiating a PM analysis.

Allows to initiate loopbacks where necessary, select the **Loopback Points** check box. The Loopback Points check box is not selected by default. You can turn off the display of active loopbacks to reduce the clutter on the routing display.

Displays the individual connection layers over the routing display, select the layer from the **Highlight Layer** drop-down list. **None** is the default layer. Since the performance monitoring data is collected and displayed on a per layer rate, it is helpful to see the endpoints of each layer rate.

Allows to highlight the ports which can monitor PM, select the **PM Monitoring Points** check box. The PM monitoring points are selected by default. If the PM port is selected, then the real-time monitoring screen displays the selected port.

Routing Display portion of the OA&M Diagnostics window

The Routing Display is a graphical representation of a specified physical or logical connection along with its connecting node or nodes. The connection must be in the **Commissioned** or **Implemented** state. The port is highlighted to indicate that the port supports PM retrieval or ports capable of collecting PM.

From the Real-Time tab, on the routing display select a port (any or all ports in a service/ODUk/OTUk route that supports PM retrieval), right-click and select **PM Monitoring Ports** to retrieve PM.

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Note: The Summary tab is a view only tab. From the **Summary tab**, selecting **PM Monitoring Ports** on routing display will not retrieve PM.

For a detailed description of the Routing Display, go to 24.4 "Quick Help – The Routing Display Window" (p. 1977).

Summary tab

In the **Summary** tab, you can view PM counters for the connection endpoints:

• For an unprotected service, PM data is extracted from the endpoints of the service.

• For a protected service such as Y-cable or OPSB, PM data is extracted from the client ports of transponders and not from the endpoints of the service.

The system preselects a default set of PM counters. Each rate can have a different set of defaults:

• The list of optional PM counters changes based on the connection rate of the port.

• The list of PM counters where data is collected is configurable on a service type basis.

To refresh the window, click the **Refresh** icon, located on the upper right of the window.

Real-Time tab

The **Real-Time** tab provides information on current PM data. PM data is displayed in graphical format for a group of counters or one or more individual counters.

• Click **Start** to update PM data for the selected ports.

• Click **Stop** to terminate the polling of the selected ports.

• In the **Polling Frequency (sec)** field, use the up/down arrows to select the rate in which polling is to occur in seconds. When **Start** is selected, your selections take effect. The default is 10 seconds.

• In the **Total Duration (min)** field, use the up/down arrows to select the number of minutes in which the polling is to last. When **Start** is selected, your selections take effect. The default is 5 minutes.

• Click **Clear Data** to remove existing PM data for the selected ports.

• Click **Pause** to prevent new data from being added to the currently visible window. The system continues to update the data collection; but the screen is not updated until you click **Resume**.

• Click **Resume** to once again update the polling of the selected ports.

• Click the **Show Counters** button to view the default counters for this port. Use the check boxes next to each port name to select any port that you want to view or hide.

The **Hide Counters** will close the view of the list of counters.

• Mouse over and click **Remove** to delete a selected port PM data. To add new ports, click on the port from the routing display.

For more information, refer:

- 24.4 "Quick Help – The Routing Display Window" (p. 1977) for a detailed explanation of the routing display.
- Manage PM report or a Connection in the *NFM-T Service Assurance Guide* for detailed

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provisioning steps for infrastructure connections and services.

- Request a PM Report for an OTN Physical Connection in the *NFM-T Service Assurance Guide* for detailed provisioning steps for physical connections.

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24.6 Quick Help – The Frequency Map Window

Frequency Map window

The Frequency Map window is displayed from the Routing Constraints panel for a clearer graphic representation of the free or occupied frequencies of all the selected trails.

The Frequency Map window is displayed from the Service/Infrastructure Connection Deploy window:

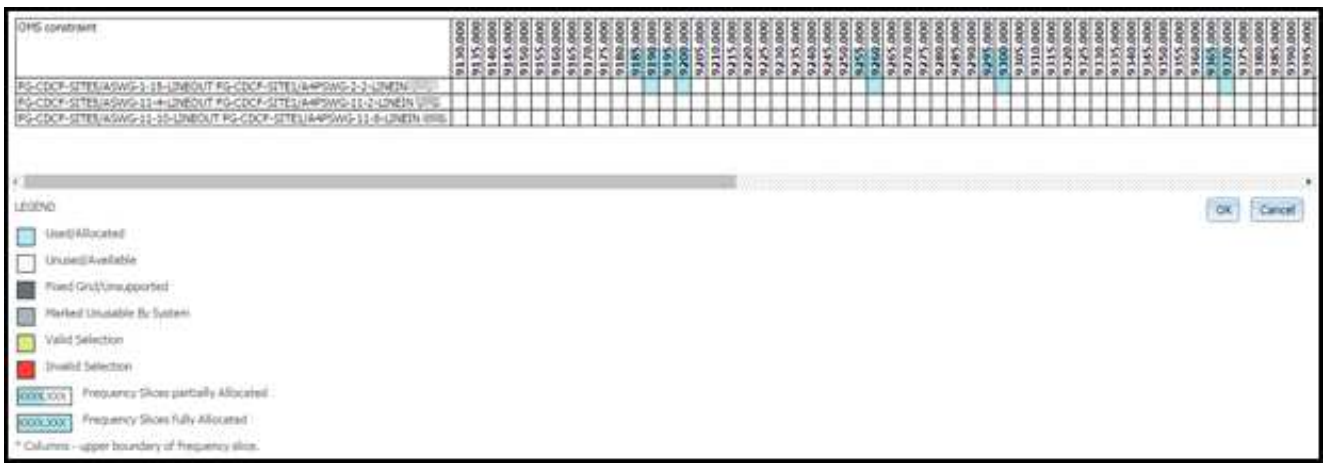
- Select the Routing Constraints panel tab on the provisioning deploy page.
- Select the OMS infrastructure connections on the left side of the provision page, and insert them in the table in the **Routing Constraints** section on the right side of the page by clicking the **Include** button.
- Uncheck the **System Assigned Frequency** checkbox.
- Click the **Frequency Map** button, beside the Frequency field, to display the frequency details panel.

View of the Frequency Map window

In the Frequency Map window, each row represents an OMS constraint that the user selects, each column is a frequency.

There are 768 supported channels in flex grid ([9127.500 – 9606.875], delta=.625), so there are 768 frequency columns. When the page is displayed for the first time, only frequencies on the 50GHz grid are shown, in order to display a clear frequency map. The other frequencies are collapsed.

Figure 24-24 Frequency Map window



To look into the other frequencies, mouse over the frequency on the first row, **Frequency Label**. For each moused over frequency, the frequency grids on its left side and right side will be expanded.

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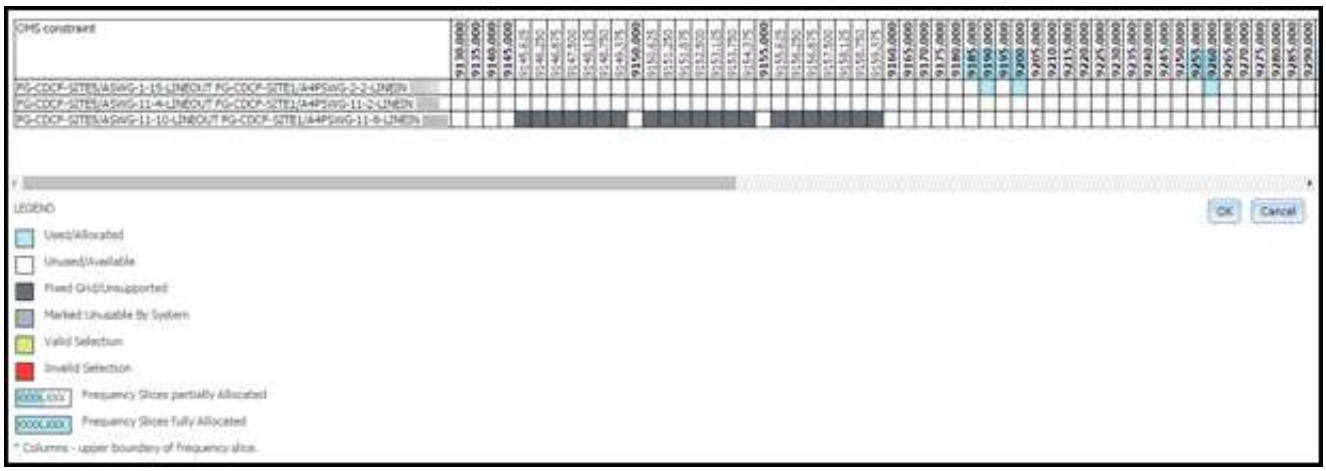
Figure 24-25 Frequency expanded



The legend on the left bottom part of the window explains the colors shown in the grid. Using mouse over on the grid allows to see the valid or invalid selection for the frequency on the trail.

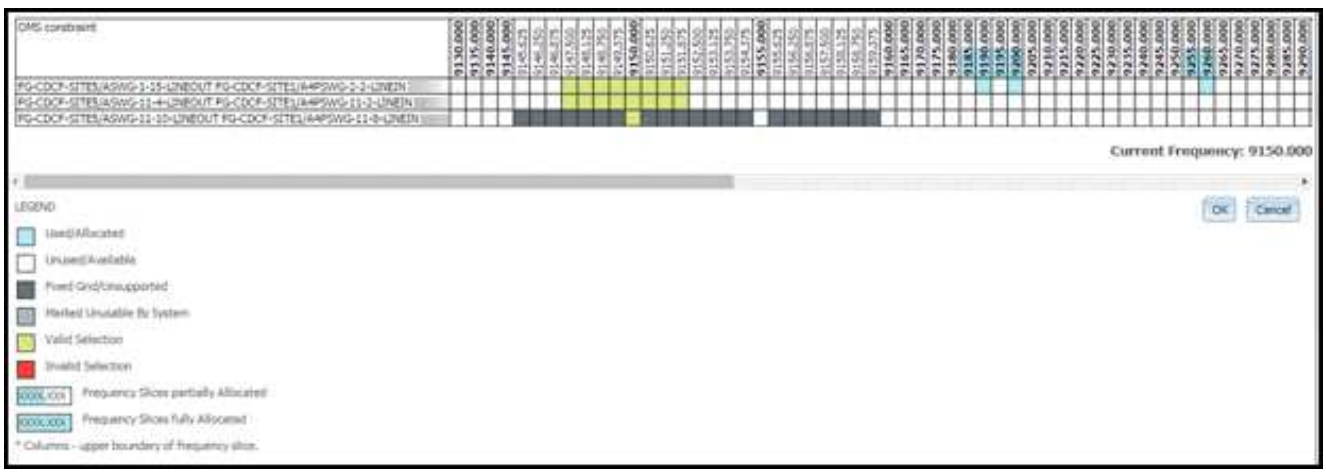
Manage the Frequency Map window

The number of grids that are highlighted is the width of the connection which is being provisioned. The width is calculated based on the endpoint (termination port) packs, encoding mode, and waveshape that user selects on the provision page.

See 5.8 “Flex Grid technology” (p. 545) to have an exhaustive explanation about the frequency calculation.

If the frequency is valid, the cursor is shown as a pointer.

Figure 24-26 Frequency selection



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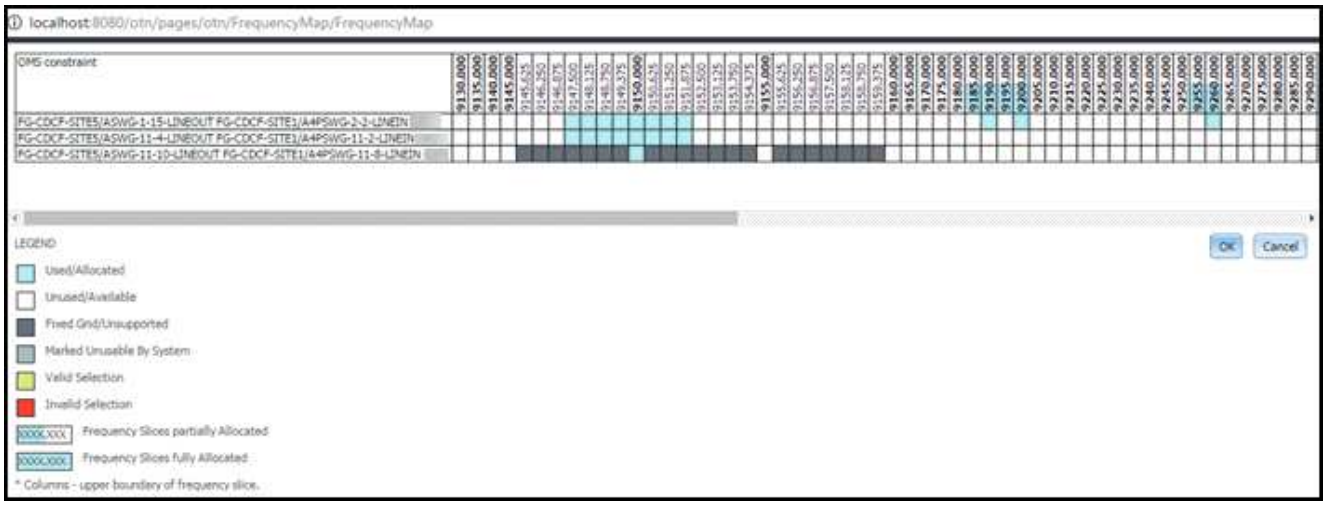
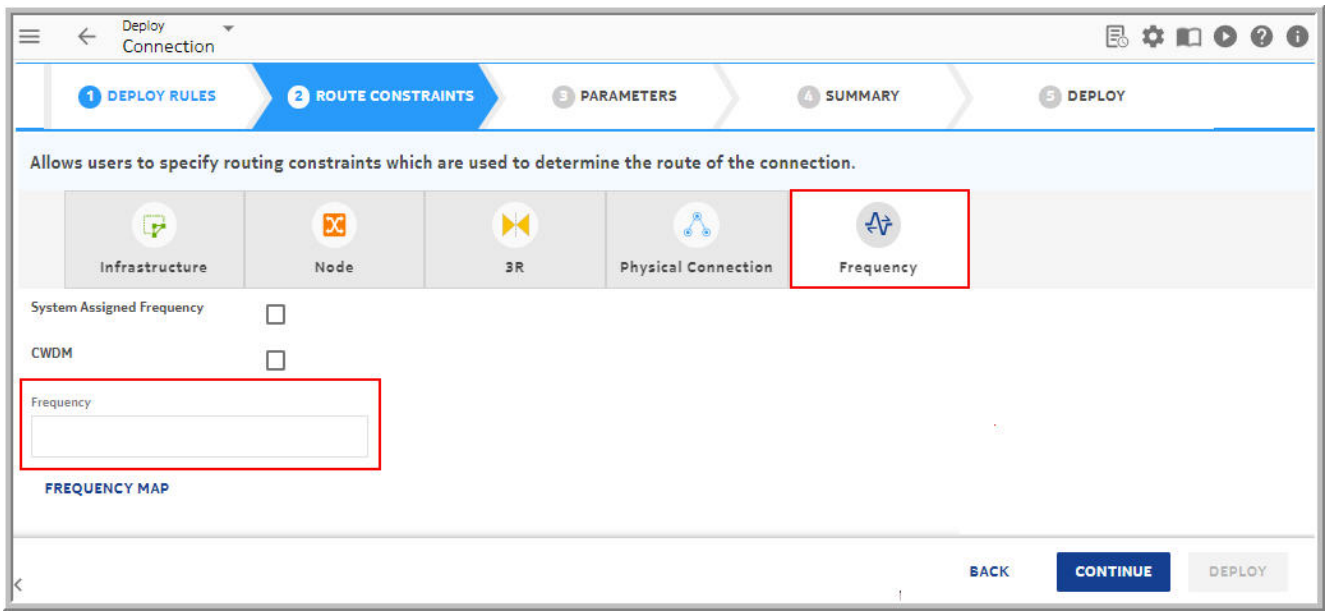
If central frequency is chosen, by clicking the grid, all the highlighted grids change to blue color to indicate that these frequencies are reserved for this connection.

Figure 24-27 Frequency allocation



If you click the **OK** button, the selected central frequency value is assigned to the **Frequency** field in the provision form, and the **Frequency Map** window is closed.

Figure 24-28 Modified frequency field



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If you click the **Cancel** button, the **Frequency Map** window is closed, and the modifications ignored.

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Particular Windows

24.7 Quick Help – The OTDR Details Window

OTDR scan

An Optical Time Domain Reflectometer (OTDR) scan is used to find faults in a fiber optic cable. An OTDR scan is the optical equivalent of an electronic time domain reflectometer.

You can run an OTDR scan on the IN and OUT lines of a physical connection if:

- The circuit pack where the physical connection is connected supports **OTDR**. An OTDR/OTDRM pack is a single slot, full height pack with eight optical ports.
- The physical connection must be an OTN **OTS** connection.
- The connection shape of the **OTS** connection must be **Four Ended**.

If the OTDR scan is run on either of them; In or Out lines of an OTS Physical connection, then the connection shape of the OTS connection is **Simple**.

The options for triggering of an OTDR Scan are:

- For a global scan, navigate to **Operate > Schedule Baseline OTDR Scan**
- Select a Physical Connection, right-click and navigate to **OTDR > Baseline > Schedule Scan**
- Select a Physical Connection, right-click and navigate to **OTDR > Baseline > Scan Now**
- Select a Physical Connection, right-click and navigate to **OTDR > Troubleshoot > Schedule Scan**
- Select a Physical Connection, right-click and navigate to **OTDR > Troubleshoot > Scan Now**
- Select a Physical Connection, right-click and navigate to **OTDR > Scan Now**

Parts of the OTDR Details window

Scan settings

The Scan Settings panel of the **OTDR Details** tab provides information on the following:

- The list of OTDR scans by port.
- The baseline fiber length.
- The OTDR Scan triggering info, whether manual or automatic by the scheduler.
- Access to the Fiber Length Report.
- Access to the OTDR Scan History.
- Access to the Graphical Display.

For more information, refer:

- 17.6.14 “Task: View the Fiber Length Report” (p. 1769)
- 17.6.15 “Task: View the OTDR Scan History and Retrieve Files” (p. 1772)
- 17.6.16 “Task: View the Graphical Display” (p. 1774)

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Options

The OTDR Details window has three options for **Fiber Length Report**, **OTDR Scan History**, and **Graphical Display**.

Schedule an OTDR scan

For more information, refer:

- 17.6.5 “Task: Determine support of OTDR Scan and related details” (p. 1740)
- 17.6.6 “Task: Schedule Global Baseline OTDR Scan” (p. 1745)
- 17.6.7 “Task: Baseline an OTDR Scan” (p. 1747)
- 17.6.8 “Task: Troubleshoot an OTDR Scan” (p. 1749)
- 17.6.10 “Task: Initiate an OTDR Scan Now for Baseline and Troubleshoot” (p. 1758)
- 17.6.11 “Task: Initiate an OTDR Scan Now” (p. 1761)
- 17.6.12 “Task: Modify OTDR Scan Parameters” (p. 1764)
- 17.6.9 “Task: Schedule an OTDR Scan for Baseline and Troubleshoot” (p. 1751)
- 17.6.13 “Task: View the Jobs for Scheduled OTDR Scans” (p. 1767)

Access related tasks to OTDR scans

For more information, refer:

17.6 “Manage an OTDR Scan for an OTN OTS Physical Connection” (p. 1734)

17.7 “View automatic triggering of the OTDR Scan” (p. 1777)

17.5 “Manage OTDR/OTDRM/OTDRWB/MON-OTDR cards in Equipment Manager” (p. 1722)

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24.8 OTDR trace viewer

Overview

The Trace viewer application is integrated within the NFM-T application. The OTDR Trace viewer parses the data in the .sor file and provides a pictorial view of the fiber optic trace graphs.

OTDR Trace viewer is applicable to Physical Links and Dark Fibers.

Note: To view the integrated graphical view of OTDR Scan Result (sor) file from NFM-T, it is required to install a valid license. See Procure New License or Renew Expired License and Install Trace Viewer License in the *Administration Guide*, for more information.

View OTDR trace viewer

The OTDR Trace Viewer window indicates the port for which the scan is performed, file name, and the graph.

The OTDR Trace Viewer window hosts three panes:

- **OTDR Trace Graph**
- **Summary and Events**
- **Properties**

OTDR trace graph

This pane hosts the graph based on the data from the .sor file, the reflections are represented on the Y-axis and the distance on X-axis. The name of .sor file considered to plot the graph is indicated above the graph. The maximum length of the .sor file name is 100 characters. If it exceeds the maximum length, the name in NFM-T GUI is truncated to 100 characters.

Summary and events

This pane hosts the Summary and Events table. The **Summary** table lists the end of fiber length and its associated details. The **Events** table lists key data points indicating the distance when the events are reported as part of the OTDR scan.

The **Event Type** column hosts a character event code which indicates if the event is a reflection event or an end of fiber event. A reflection event is represented with character *F* and an end of fiber event is represented with the character *E*.

Properties

This pane lists all the details existing in the .sor file.

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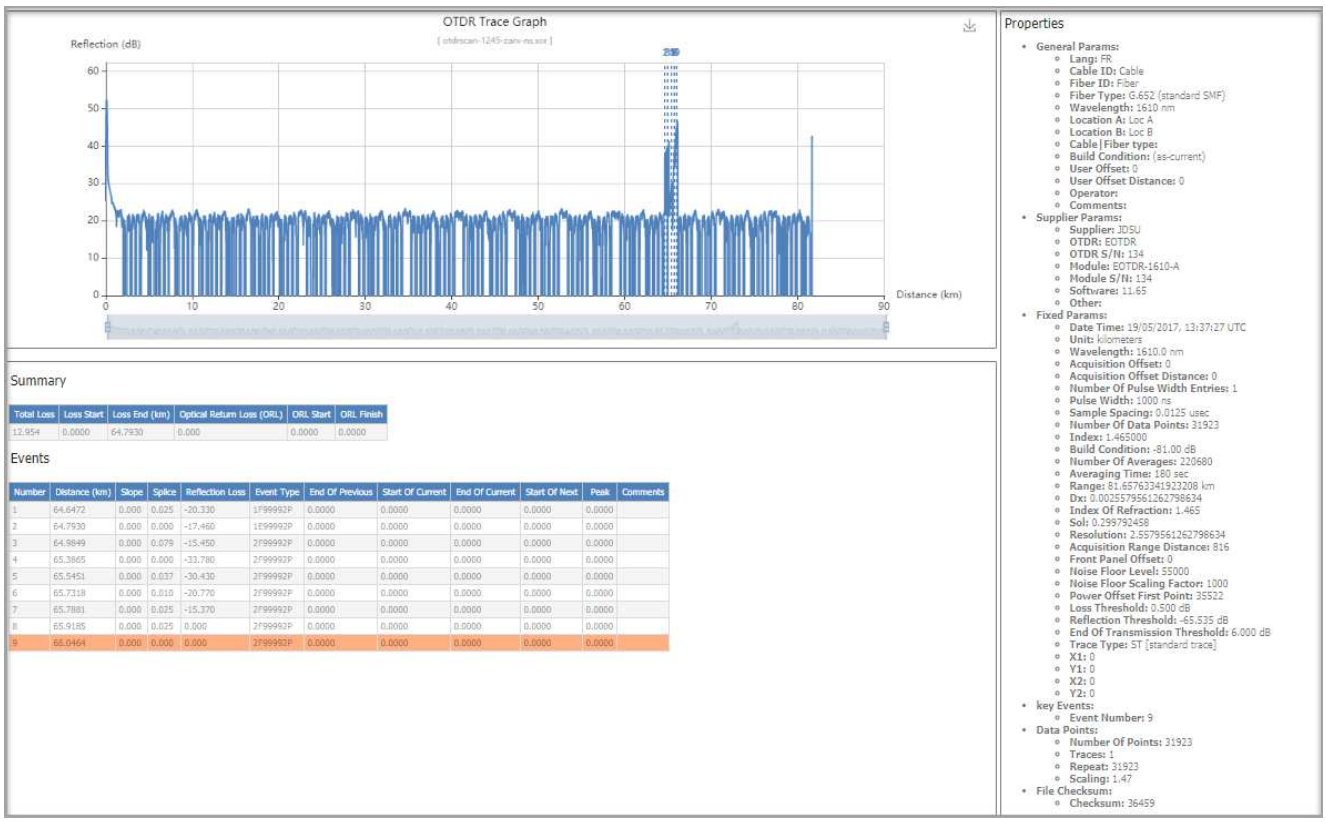
Figure 24-29 OTDR trace viewer



Enable trace and collect logs

1

Login to a VM as a root user.

2

Login to *otntomcat* container.

3

Use the command **`vim /opt/hpws/tomcat/webapps/oms1350/WEB-INF/classes/logback.xml`**

4

Search and replace “**`ERROR`**” with “**`TRACE`**” in “**`CommonWebServices`**” **`< logger name=`** “**`CommonWebServices`**” **`level=`** “**`ERROR`**” **`additivity=`** “**`false`**” **`<appender-ref ref=`** “**`CommonWebServices`**” **`/> </logger>`**

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