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IP/Optical Coordination Guide

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About this document

Purpose

The *IP/Optical Coordination Guide* introduces the IP/Optical Coordination GUI to operators and administrators by describing usage and features.

Scope

The help for IP/Optical Coordination covers the full set of features; however, some feature sets described in the help require the purchase and configuration of additional feature packages.

See the *NSP System Architecture Guide* for more information about feature packages and installation options.

Document support

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1 IP/Optical Coordination

1.1 Overview

1.1.1 Why use IP/Optical Coordination?

IP/Optical Coordination enables the discovery and management of cross-domain links between IP and optical networks. It realizes a fine-grained, multi-layer correlation of topology properties such as Shared Risk Groups (SRG) and latency to improve the IP service performance and resiliency. The data can be manually synchronized with other NSP functions, thereby achieving full integration.

WS-NOC support

IP/Optical Coordination provides integration with external optical controller WaveSuite Network Operations Center and Resource Controller (WS-NOC/WS-RC), and Open Networking Forum T-API. Integration provides features such as optical service and link discovery, cross-domain link discovery, and topology retrieval.

Note: In shared-mode deployments, WS-NOC:

- does not support multiple interfaces to segregate traffic for client, internal, and mediation communication
- does not support IPv6

Fault management support

NSP provides fault management support for IP/Optical Coordination by displaying network alarms on optical NEs and objects. See the *NSP Troubleshooting Guide* for more information.

IP/Optical Coordination API support

IP/Optical Coordination functions are available for OSS using programmable APIs. For general information about developer support, visit the Nokia Network Developer Portal at *https://network.developer.nokia.com/api-documentation*.

For specific information about the REST APIs for IP/Optical Coordination, append **/sdn/doc** to the server URL. For example: https://*server-ip*:8543**/sdn/doc**.

1.2 How do I enable viewing of L2 and L3 topologies?

To enable viewing of L2 and L3 topologies in IP/Optical Coordination, you must download a set of NSP IETF topology artifacts files and import them to NSP using a REST API POST call. The files are available from Nokia ALED in the “artifacts” or “beta-artifacts” hierarchy for the current release.

For listing IGP links in IETF table

POST Load IETF mapping files

https://*server*:443/restconf/operations/nsp-yang-mapping-converter:nsp-yang-mapping-converter/uploadFile?nsp-plugin-id=yang

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where

server is the NSP IP address

See the “Topology API” tutorial in the Network Developer Portal for more information, or contact Nokia support.

For listing existing LSPs in IETF table

Import and Install *nsp-mdt-intents-<REL>-rel.<VERSION>-tunnel-mapping-bundle.zip* using the Artifact manager.

1.3 How do I add a controller?

See Chapter 3, “IP/Optical Coordination compatibility table” for information on T-API/WS-RC/WS-NOC controllers’ version supported in IP/Optical Coordination.

IP/Optical Coordination supports the addition, modification and deletion of optical controllers. Nokia's Model-Driven Mediation (MDM) platform is required in order to enable this functionality, as are adaptors that correspond to the supported controller types. See the *NSP Installation and Upgrade Guide* for more information about installing WS-RC and T-API adaptors.

The addition, modification, and deletion of optical controllers is supported both when WS-NOC is integrated with the NSP and when WS-NOC is deployed as an independent system. If integrated, the WS-NOC server must be restarted whenever the associated NSP cluster is restarted. As an independent system, the WS-RC security certificate must be installed on the MDM server. After WSRC certificates are copied to the MDM server, retrieve the password using the following command:

```
kubectl get secret -n nsp-psa-privileged
nsp-tls-truststore-pass-nspdeployer -ojsonpath="{.data..truststore-pass}
"  | base64 -d
```

Login to the MDM server and import the certificate using the following command:

```
/opt/nsp/os/jre/bin/keytool -alias nfmt -file /<path_where_WSRC_cert_is_
imported>/certificate.pem -import -keystore /opt/nsp/os/ssl/nsp.
truststore -storepass <password_from_kubectl_get_secret>
```

1

Open **IP/Optical Coordination, Controller and Simulator**.

2

Click **Add** + and choose Add Controller. The Create Controller page opens.

3

Configure the required parameters:

Parameter	Description
Identification	

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Parameter	Description
Name	Specifies the name of the controller
Description	Describes the controller
Vendor	Specifies the controller's vendor
Domain	Specifies the domain(s) managed by the controller
IP Address	Specifies the IP address of the controller
Port	Specifies the port used in REST communications
Re-sync Frequency (minute)	Specifies the time, in minutes, to re-sync
Secured Connection	Specifies whether the Cross domain resource control to MDM connection will be secured
Push Data To NSP Store	Specifies whether data will be pushed to the NSP store
Controller Parameters	
Controller Type	Specifies the type of controller
Controller Version	Specifies the controller version
Protocol Type	Specifies the protocol type used for communication
Protocol Version	Specifies the version of the protocol to be used for communication
Mediation Parameters	
User Name	Specifies the user name
Password	Specifies the password
Port	Specifies the port used in REST communications
Base URL	Specifies the endpoint used in REST communications
Idle Timeout (seconds)	Specifies, in seconds, the rest idle timeout
Retries	Specifies the number of retries
Authentication Server IP Address	Specifies the IP address of the server that authenticates all requests
Secured Connection	Specifies whether the MDM to WS-NOC connection is secured

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Parameter	Description
Additional Parameters	
Cross Launch URL	Specifies the cross launch URL for physical links
Cross Launch Service URL	Specifies the cross launch service URL for physical links
SRLG Minimum Value	Specifies the minimum numeric SRLG value for the controller
SRLG Maximum Value	Specifies the maximum numeric SRLG value for the controller

4

Click **CREATE**. The controller is added.

5

As required, modify the controller by hovering over **More** and clicking **Edit**.

6

As required, delete the controller by hovering over **More** and clicking **Delete**.

END OF STEPS

Note: When a controller is added, an NE policy and a mediation policy are created. If the IP/Optical Coordination database is dropped, the controller will be deleted, but these policies will remain on the NSP host and MDM servers. The policies must be deleted before the controller can be re-added.

1.4 How do I upgrade a controller?

Note: The procedure requires that the WS-NOC/WS-RC controllers are integrated with the NSP, and that the controllers are added to IP/Optical Coordination. If these conditions are not true, you must perform the following steps in advance of the main procedure.:

1. Perform the Migration procedure of WS-NOC/WS-RC controllers to upgrade the controller. See *WS-NOC Upgrade Guide* for more information.
2. Integrate the controller with the NSP when the migration of controllers is complete.

   The controller state in IP/Optical Coordination is displayed as *Sync Failed* or *UP*.

1

Open **IP/Optical Coordination, Controller and Simulator**.

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2

Initiate **Sync with Network** for the controller.

The Controller state in the IP/Optical Coordination, at the Controller view, is displayed as *Version Mismatch*.

3

You need to change the controller version in the IP/Optical Coordination to the controller version it is upgraded to. For example, if the controller is upgraded from release 19.2.0 to the release 21.4.0. Edit the controller by selecting the *Edit Controller* option and change *Controller Version* to release 21.4.0.

4

Click the **UPDATE** button.

Wait for the controller sync to succeed after the update operation and ensure all the Optical Services, Link Layer Interconnects, and Physical Links at network map gets discovered successfully.

Note: If the controller is upgraded to release 21.4.0, the port in the Mediation Parameters section should be changed to 8443 before the UPDATE operation. No changes are required to the port in the Controller Identification section.

5

Initiate the Restore CDL option via the IP/Optical Coordination API to restore the cross-domain links, if upgraded from release 19.2.x to release 20.x.x or release 21.4.0.

Ensure all the cross-domain links are restored and link layer interconnect links are discovered.

END OF STEPS

1.5 How do I add a simulator?

1

Open **IP/Optical Coordination, Controller and Simulator**.

2

Click **Add** + and choose Add Simulator. The Create Simulator page opens.

3

Configure the required parameters:

Parameter	Description
Name	Specifies the name of the simulator
Description	Describes the simulator

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Parameter	Description
Domain	Specifies the domain(s) accessible to the simulator
IP Address	Specifies the IP address of the NRC-S server
Username	Specifies the username used to log in to the NRC-S server
Password	Specifies the password to be used with the above username
NSD_NRC IP Address	Specifies the IP address of the NSP host server
NSD_NRC User Name	Specifies the user name to be used to log in to the NSP host server
NSD_NRC Password	Specifies the password to be used with the above username

4

Click **CREATE**. The simulator is added.

5

As required, delete the simulator by hovering over **More** ••• and clicking **Delete** 🗑.

END OF STEPS

1.6 How do I enable user access control?

IP/Optical Coordination supports user access control (UAC), which enforces user-specific access rights. For detailed information about UAC, see “What is User Access Control?” in the *NSP System Administrator Guide*.

Note: IP/Optical Coordination enforces UAC on individual ports and NEs, rather than services.

1.7 How do I configure the network map?

Note: IP/Optical coordination's NE clustering functionality is currently disabled.

1

Open **IP/Optical Coordination, Network Map**.

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2

In **Map Layout Regions**, choose a layer from the Layers drop-down menu. If the Physical layer was selected, choose a domain from the Domains drop-down menu. Your selections are visualized on the map.

Note: If Link Layer is chosen from the Layers drop-down menu, the network map will display a representation of router-to-router link connectivity going over either directly connected fibres or over Link Layer Interconnects (i.e. over L0/L1 Optical networks).

3

As required, perform the following to isolate objects on the network map:

1. Click **Search** and choose one of the followings from the drop-down menu to select from a list of the specified objects: Links, Nodes, Regions, and Zones.

   Alternatively, enter the name of the desired object to search by name.
2. Start typing in the field to display the filtered list.
3. Click or double-click the row to search.

4

As required, click on any of the following map control buttons/sliders to customize your view:

- **Fit To Screen** - Automatically lay out the network map to fit within the confines of your screen
- **Adjust Clusters** - Opens the Clustering Controls panel
  - Cluster charts - Specifies whether or not cluster charts are enabled
  - Show boundaries - Draws a boundary around the coordinates of the nodes/zones enclosed in a zone/region. You can select either *with immediate parent* or *with top region*.
  - Move region with content - Moves all the objects inside regions to the new coordinates when regions are moved
- **Adjust Vertexes** - Opens the Vertex Controls panel
  - Vertex labels - Toggles vertex labels on or off
  - Vertex size - Increases or decreases the size of on-screen vertexes
- **Adjust Links** - Opens the Link Controls panel
  - Show Links - Toggles the appearance of links on the map on or off
  - Link curvature - Increases or decreases the curvature of links on the map
  - Link grouping threshold - Specifies the number of links that can exist between the same two vertexes before grouping is implemented
- **View control** - Opens the Map Controls panel
  - Background layer opacity - Increases or decreases the opacity of the background layer
- **Zoom in** - Zooms in on the map as centered
- **Zoom out** - Zooms out from the map as centered

Note: For vertexes to be organized into regions, these regions (and any zones contained therein) must first be configured. Any subsequent changes made to the regions using IP/

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Optical Coordination will be saved. See the *NSP System Administrator Guide* for more information about configuring regions and groups.

5

Select an object on the map to view more information about the selected object. If a cross-domain link was selected, click **More** ⋮ and choose **Navigate To**. Choose one of the following from the menu:

- IGP Link
- IP Service
- Link Layer Interconnect
- LSP
- Optical Service

Note: Navigation to IP Services is only supported for services that are marked as “NSD managed” within NFM-P and are riding over the following types of LSPs:

- With pcep-report enabled, RSVP or Segment-Routed
- With pcep-report disabled, only strict-hop RSVP LSPs for primary-path

Note: After navigating to LSPs, you can click **View in Path Control** to highlight the path.

6

Click **Legend** to learn more about the icons and colors used on the map.

7

Click **View Options** and perform any of the following:

1. Use the **View Paths** drop-down menu to select your preferred method of highlighting:
   - Normal - highlighted paths are superimposed over map objects, including regions that contain affected nodes
   - Only Show Paths - all map objects not part of the highlighted path, including regions, are hidden from view
   - Pop Out Paths - highlighted paths are superimposed over map objects, affected nodes appear distinct from their regions
2. If Link Layer Interconnects are present, click on the **ADD LINK LAYER INTERCONNECT(S)** button. A form opens:
   - Enable the Identify individual links radio button to search for individual LLI links by name, or enable the Identify all links in a group radio button to search for groups of LLI links by name.
   - Select up to five LLI links, then click **DONE**. The LLI links are highlighted on the map.
3. If optical services are present, click **ADD OPTICAL SERVICE(S)**. A form opens:
   - Select up to five optical services, then click **DONE**. The optical services are highlighted on the map.

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8

Click **Sync with Network** to reload the page.

Note: The UI, including the map, is automatically updated.

END OF STEPS

1.8 How do I automatically discover cross-domain links?

1

Open **IP/Optical Coordination, Cross Domain Link**.

2

Click the **Discover Cross Domain Links** icon. The Discover Cross Domain Links form opens.

3

Specify one of more LLDP discovery methods.

4

Choose a Context Type and, if required, select one or more Discovery Targets from the displayed list.

5

Click **START** and monitor the Discovery Progress until completion. Close the Discover Cross Domain Links form.

6

As required, perform 1.11 “How do I delete cross-domain links?” (p. 17) to delete a cross-domain link.

7

As required, click **Commit** inline with any discovered cross-domain link to commit that link.

Note: You can auto commit cross-domain links also. See 1.9 “How do I automatically commit cross-domain links?” (p. 16) to auto commit cross-domain links.

Note: In a scenario where IP/Optical Coordination was added to an existing NSP deployment, cross-domain links may have been provisioned previously using NFM-P or NSP. A REST API call can be used to migrate these links from the common NSP store to IP/Optical Coordination. For more information, visit the Nokia Network Developer Portal at *https://network.developer.nokia.com/api-documentation*.

END OF STEPS

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1.9 How do I automatically commit cross-domain links?

This procedure can be used to configure IP/Optical Coordination to automatically commit cross-domain links as soon as they are discovered.

1

Open **IP/Optical Coordination, Cross Domain Link**.

2

Click **More** ⋮ and select Application Properties. The Application Properties form opens.

3

Select the CDL Auto Commit Policy tab in the form.

4

Select the Automatic option in the CDL Auto Commit Policy section for auto commit of cross-domain links.

5

Click **UPDATE**. The Application Properties form closes.

The next time a cross-domain link is discovered, it is automatically committed.

END OF STEPS

1.10 How do I manually create cross-domain links?

1

Open **IP/Optical Coordination, Cross Domain Link**.

2

Click **Create Physical Links** ＋. The Create Physical Links form opens.

3

Configure the parameters:

Parameter	Description
Description	A custom description of the cross-domain link
Latency	The amount of latency for the cross-domain link

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4

Choose an NE and Port to serve as the First Endpoint.

5

Choose an NE and Port to serve as the Second Endpoint.

6

Click **CREATE**. The manually-created cross-domain link appears in the list.

7

As required, perform 1.11 “How do I delete cross-domain links?” (p. 16) to delete a cross-domain link.

END OF STEPS

1.11 How do I delete cross-domain links?

1

Open **IP/Optical Coordination, Cross Domain Link**. A list of existing cross-domain links is displayed.

2

Click **Delete** inline with any cross-domain link to delete that link. A dialog box opens. Perform one of the following:

a. If a Link Layer Interconnect link is riding on the link, perform Step 3.

b. If no Link Layer Interconnect link is riding on the link, perform Step 4.

3

As required, enable the Delete Optical Infrastructure checkbox. When this checkbox is enabled, the underlying infrastructure of the LLI link (such as the optical services) is also deleted. If this button is not enabled, the underlying infrastructure is preserved for future use. Continue to Step 4.

4

Click **DELETE**. The specified action is taken.

END OF STEPS

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1.12 How do I configure misconfigured cross-domain links?

Misconfigured cross-domain links have one or both the ports deleted or missing due to a network event. Instead of deleting the link, IP/Optical Coordination highlights it with the Misconfigured option. This procedure can be used to troubleshoot and rectify the misconfigured cross-domain links.

Note: When a cross-domain link is misconfigured, you can use the **Delete Link** option only.

1

Open **IP/Optical Coordination, Cross Domain Link**.

2

Select the object that has the Misconfigured option selected.

3

Click **Info** to view the cross-domain link detail on the Info panel.

4

Expand the Info panel to see **Misconfiguration Details**.

You can use **Misconfiguration Details** to troubleshoot what went wrong with the cross-domain link.

5

The Misconfigured flag gets cleared automatically once the issue described under **Misconfiguration Details** is resolved.

END OF STEPS

1.13 How do I automatically upload optical SRLG and/or latency?

This procedure can be used to configure IP/Optical Coordination to automatically upload optical SRLG and latency information to the NSP host server. To manually upload the data, see 1.14 “How do I manually upload or withdraw optical SLRG and/or latency?” (p. 19).

1

Open **IP/Optical Coordination, IP-Optical Correlation**. A list of IP links is displayed.

2

Click **More** and choose Application Properties. The Application Properties form opens.

3

Select the Correlation Defaults tab in the form.

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4

For both Correlated SRLG Upload and Correlated Latency Upload, enable either the Automatic or Manual radio buttons to set the global policy.

5

Click **UPDATE**. The Correlation Defaults form closes.

6

If required, use the drop-down menus in the Correlated SRLG Upload Policy and Correlated Latency Upload Policy to override the global policy.

END OF STEPS

1.14 How do I manually upload or withdraw optical SLRG and/or latency?

This procedure can be used to configure IP/Optical Coordination to manually upload or withdraw optical SRLG and latency information to the NSP host server.

1

Open **IP/Optical Coordination, IP-Optical Correlation**.

2

Perform one of the following:

a. Click **IP-Optical Upload/Withdraw for all** at the top of the screen to perform a bulk modification of IGP links.

b. Click **More** and choose **IP-Optical Upload/Withdraw** with an IGP link to modify that link.

3

Choose one of the following from the contextual menu:

- **Upload SRLG** - optical Shared Risk Link Groups (SRLGs) are retrieved from transport controllers, correlated with the corresponding IP links, and exported into the NSP host server in order to ensure optical diversity
- **Upload Latency** - optical latency information is retrieved from the WS-RC, correlated with the corresponding IP links, and propagated into the NSP host server in order to circumvent delay measurements within the IP layer
- **Upload SRLG and Latency** - both SRLGs and Latency information are retrieved and uploaded
- **Withdraw SRLG** - previously-uploaded SRLGs are withdrawn
- **Withdraw Latency** - previously-uploaded Latency is withdrawn
- **Withdraw SRLG and Latency** - previously-uploaded SRLGs and Latency are withdrawn

END OF STEPS

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1.15 How do I place link sets into maintenance mode?

1

Perform one of the following:

a. Open **IP/Optical Correlation, Network Map**, then select a link on the map. The Info panel opens. Proceed to Step 2.

b. Open **IP/Optical Correlation, IP-Optical Correlation** from the drop-down menu. Go to Step 3.

2

Perform one of the following:

a. Click **More** ⋮ and choose **More** > **Activate Maintenance**. A dialog box opens. Go to Step 4.

b. Click **More** ⋮ and choose **Navigate To** > **IGP Links**. A list of IGP links riding over the selected link is displayed. Continue to Step 3.

3

Click **More** ⋮ and choose **Activate Maintenance Mode for Link Set** to place the link set into maintenance mode. A dialog box opens.

4

Click **OK**. The link set is placed into maintenance mode.

END OF STEPS

1.16 How do I import existing Link Layer Interconnect links?

1

Open **IP/Optical Coordination, Link Layer Interconnect** from the drop-down menu, then click **Sync with Network** ↻. All existing LLI links are imported into IP/Optical Coordination and appear in the list.

2

As required, click **Delete** 🗑 inline with any imported LLI link to delete that link.

END OF STEPS

1.17 How do I manually create Link Layer Interconnect links?

1

Open **IP/Optical Coordination, Link Layer Interconnect**, then click **Create Link Layer Interconnect** ＋. The Create Link Layer Interconnect form opens.

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2

Configure the parameters:

Parameter	Description
Identification	
Description	A custom description of the LLI link
Group Name	The name of the group to which the LLI link will belong
Path Profile	The name of the path profile
Optical Service Identification	
Name	Specifies the name of the optical service.
Service Template	Specifies the Optical Service template to be used.
Service Shape	—
Signal Type	—
Admin State	Specifies the Optical Service Admin State.
Wave Key	Specifies if service needs to be keyed or unkeyed. **Note**: This option is only available if the signal type is OCH.
Wave Key Type	Specifies if the Wave Key needs to be manual or automatically configured. **Note**: This option is only available if the signal type is OCH.
Endpoints	
Node Name	The site name of the endpoint.
Port	The port identifier of the endpoint.
Connectivity Constraints	
Direction	Specifies whether or not a return path is required. Select one of the following options: undefined, unidirectional, or bidirectional.
Service Level	Specifies metrics such as class of service, priority, resiliency, availability.
Service Type	Specifies the connectivity type of service.
Capacity Unit	Specifies the capacity unit that is applicable for digital layers.

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Parameter	Description
Capacity Value	Specifies the capacity (Bandwidth) values that are applicable for digital layers.
Schedule Start Time	Specifies the execution date of the task.
Schedule End Time	Specifies the termination date of the task.
Routing Constraints	
Diversity Policy	—
Route Direction	Specifies whether or not a return path is required. Select one of the following options: undefined, unidirectional, or bidirectional.
Route Objective Function	Specifies the objective for the route.
Is Exclusive?	Specifies if the resources are exclusive to the service.
Cost Characteristics	Specifies information about cost characteristics such as name, value, algorithm.
Latency Characteristics	Specifies information about latency characteristics for a particular stated traffic property.
Risk Diversity Characteristics	Specifies a list of risk identifiers related to the risk diversity characteristic.
Resilience Constraints	
Protection Type	Specifies the protection type.
Restoration Policy	Specifies whether the restoration is end-to-end or per domain.
Restoration Coordinate Type	Specifies the coordination mechanism between multi-layers.
Reversion Mode	Specifies whether the protection scheme is revertive or non-revertive.
HoldOff Time	Specifies the time, in milliseconds, between declaration of signal degrade or signal fail, and the initialization of the protection switching algorithm.
Wait to Revert Time	If the protection system is revertive, specifies the time, in minutes, to wait after a fault clears on a higher priority (preferred) resource before reverting to the preferred resource.

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Parameter	Description
Restore Priority	—
Max Switch Times	Specifies the maximum switch times. When a work fault clears, and traffic returns to the original work path, the switch counter resets.
Is Lockout?	Specifies that a particular resource is temporarily unavailable for use in the protection scheme(s). This setting overrides all other protection control states including forced. If the resource is in lockout, it cannot be used. **Note**: This parameter is only applicable when it is part of a protection scheme.
Is Frozen?	Temporarily prevents any switch action to be taken and freezes the current state. Until the freeze is cleared, additional near-end external commands are rejected and fault condition changes and received APS messages are ignored. All administrative controls of any aspect of protection are rejected.
Is Coordinated Switching Both Ends?	Specifies if switching at both ends of each flow across the FC is coordinated at both ingress and egress ends.
Preferred Restoration Layer	The preferred-restoration-layer can be used to configure the WS-NOC ASON restoration Wait For Server Restoration field. If PHOTONIC_MEDIA is selected, the ASON L1 service enables Wait For Server Restoration, otherwise it is set to false. Currently, the preferred-restoration-layer is also used to create L1MP over L0CP in SSTEP case. There is no conflict with the Wait For Server Restoration config as it is used for the L1 CP service.
Topology Constraints	
Nodes	Specifies the site name and domain for nodes.
Links	Specifies the name, source domain, and destination domain for links.
Services	Specifies the site name and domain for services.

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Parameter	Description
Endpoints	Specifies the network element and port for first and second endpoints.
Additional Parameters	
Name	You can add any additional parameter that can also work with WS-RC Controller, such as ASON_ROUTED. If ALLOW_ASON is enabled, ASON resource can be allocated for this end-to-end MP connection and used by ASON for restoration.
Value	Yes or No
Configuration Template	
Name	The name of the configuration template created by importing an ICM intent into Device Management.
Target Identifier	The identifier of the target endpoint.
Target Data	The configuration data for the target endpoint.

3

Choose an NE and Port to serve as the First Endpoint.

4

Choose an NE and Port to serve as the Second Endpoint.

5

Click **CREATE**. The manually-created Link Layer Interconnect appears in the list.

6

As required, click **Delete** inline with any created LLI link to delete that link.

END OF STEPS

1.18 How do I view Link Layer Interconnect links on a multi-layer map?

1

Perform one of the following:

a.

1. Open **IP/Optical Coordination, Link Layer Interconnect**. A list of existing Link Layer Interconnect links is displayed.

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2. Click **More** ⋮ , **Multi-Layer View** for any LLI link to view that link on a multi-layer map.

b.

1. Open **IP/Optical Coordination, Network Map**, then select Link Layer from the Layers drop-down menu. Link Layer Interconnect links are displayed on the map.
2. Click on an LLI link in the network map to open the Info panel.
3. Click **More** ⋮ , **Multi-Layer View** in the Info panel to view that link on a multi-layer map.

2

The multi-layer view opens, which can include the following layers (depending on the selected link):

- LLI
- Switched Ethernet
- DSR
- Physical

3

Click on an LLI link in the multi-layer map to open a linear diagram. Click on any icon within the linear diagram to highlight that portion on the multi-layer map.

4

See 1.7 “How do I configure the network map?” (p. 12) for more information about the on-screen controls that can be used to configure the multi-layer map.

END OF STEPS

1.19 How do I view existing optical services?

1

Open **IP/Optical Coordination, Optical Service**. A list of existing optical services is displayed.

2

Click on an optical service to open the Link Details panel and perform one of the following:

a. Click **Show on Map** to highlight the service on the network map.

b. Click **More** ⋮ and choose **Navigate To** > **IP Service** to see a list of IP services associated with the service.

c. Click **More** ⋮ and choose **Navigate To** > **Link Layer Interconnect** to see a list of Link Layer Interconnects associated with the service.

d. Click **More** ⋮ and choose **Navigate To** > **LSP** to see a list of LSPs associated with the service.

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e. Click **Delete** to delete the service.

END OF STEPS

1.20 How do I view transport controllers?

1

Open **IP/Optical Coordination, Controller & Simulator**. The controllers IP/Optical Coordination is interfacing with are displayed.

2

Click on any controller to view additional details for that controller.

END OF STEPS

1.21 How do I perform a diversity analysis?

1

Perform one of the following:

a. Open **IP/Optical Coordination, Network Map**, then click the **Diversity Analysis** button. The Diversity Groups form opens.

b. Open **IP/Optical Coordination, Link Layer Interconnect**, then click the **Diversity Analysis** button. The Diversity Groups form opens.

2

Specify the scope of the analysis.

Note: In order for a diversity analysis to be performed on IP Services, the services must be marked as “NSD managed” within NFM-P and must be riding over the following types of LSPs:

- With pcep-report enabled, RSVP or Segment-Routed
- With pcep-report disabled, only strict-hop RSVP LSPs for primary-path

3

Click **START** and monitor the Diversity Progress until completion, then select a diversity group from the list to view Group Details.

4

Click **Download Previous Diversity Report** to export the results as a .csv file.

END OF STEPS

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1.22 How do I export lists to CSV?

1

Open **IP/Optical Coordination,** and select **Cross Domain Link, IP-Optical Correlation, Link Layer Interconnect,** or **Protection Groups**.

2

Click **More** ⋮ located at the top-right of a link table and choose **Export all**.

3

Choose **CSV export**.

The displayed list is saved as a .csv file. You can also choose options for Excel export.

END OF STEPS

1.23 How do I simulate link failures?

This procedure can be used to simulate the failure of any physical link, which allows the user to assess the impact that the failure would have on the network.

Note: In order to use this functionality, IP/Optical Coordination must be part of a deployment that includes IP/MPLS Simulation. See the *NSP Installation and Upgrade Guide* for more information about integrating these systems. In addition, 1.5 “How do I add a simulator?” (p. 11) must be performed.

1

Open **IP/Optical Coordination, Network Map**.

2

Select one or more physical links from the map. The Info panel opens.

3

Click **More** ⋮ and choose **More** > **Simulate Link Failure**. A dialog box opens.

4

Click **DONE**. The dialog box closes and the simulation runs in the background. The **View Simulation Results** button is colored to reflect the status of the simulation:

- Orange - simulation in progress
- Green - simulation completed successfully
- Red - simulation failed with error

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5

When the simulation has completed successfully, click **View Simulation Results** . A dialog box opens.

6

Perform one of the following:

a. Review the results of the simulation and click **CLOSE**. The dialog box closes. End of procedure.

b. Review the results of the simulation and click **VIEW RESULTS** to open the Simulation Results page. Continue to Step 7.

7

Click **Show on Map** inline with any rerouted LSP to highlight the pre-simulation and post-simulation paths on the network map.

END OF STEPS

1.24 How do I create an optical service?

1

Open **IP/Optical Coordination, Optical Service**.

2

Click **Create Optical Service** . The Create Optical Service form opens.

3

Configure the required parameters:

Parameter	Description
Identification	
Name	Specifies the name of the optical service.
Description	Specifies the optical service description.
Service Template	Specifies the Optical Service template to be used.
Signal Type	—
Service Shape	—
Admin State	Specifies Optical Service Admin State.

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Parameter	Description
Wave Key	Specifies if service needs to be keyed or unkeyed. **Note**: This option is only available if the signal type is OCH.
Wave Key Type	Specifies if the Wave Key needs to be manual or automatically configured. **Note**: This option is only available if the signal type is OCH.
Connectivity Constraints	
Direction	Specifies whether or not a return path is required. Select one of the following options: undefined, unidirectional or bidirectional.
Service Level	Specifies metrics such as class of service, priority, resiliency, availability.
Service Type	Specifies the connectivity type of service.
Capacity Unit	Specifies the capacity unit that is applicable for digital layers.
Capacity Value	Specifies the capacity (Bandwidth) values that are applicable for digital layers.
Schedule Start Time	Specifies the execution date of the task.
Schedule End Time	Specifies the termination date of the task.
Routing Constraints	
Diversity Policy	—
Route Direction	Specifies whether or not a return path is required. Select one of the following options: undefined, unidirectional or bidirectional.
Route Objective Function	Specifies the objective for the route.
Is Exclusive?	Specifies if the resources are exclusive to the service.
Cost Characteristics	Specifies information about cost characteristics such as name, value, algorithm.
Latency Characteristics	Specifies information about latency characteristics for a particular stated traffic property.

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Parameter	Description
Risk Diversity Characteristics	Specifies a list of risk identifiers related to the risk diversity characteristic.
Resiliency Constraints	
Resilience Type	Specifies the resilience type.
Protection Type	Specifies the protection type.
Restoration Policy	Specifies whether the restoration is end-to-end or per domain.
Restoration Coordinate Type	Specifies the coordination mechanism between multi-layers.
Reversion Mode	Specifies whether the protection scheme is revertive or non-revertive.
Restore Priority	—
HoldOff Time	Specifies the time, in milliseconds, between declaration of signal degrade or signal fail, and the initialization of the protection switching algorithm.
Wait to Revert Time	If the protection system is revertive, specifies the time, in minutes, to wait after a fault clears on a higher priority (preferred) resource before reverting to the preferred resource.
Max Switch Times	Specifies the maximum switch times. When a work fault clears, and traffic returns to the original work path, the switch counter resets.
Is Lockout?	Specifies that a particular resource is temporarily unavailable for use in the protection scheme(s). This setting overrides all other protection control states including forced. If the resource is in lockout, it cannot be used. Note: This parameter is only applicable when it is part of a protection scheme.

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Parameter	Description
Is Frozen?	Temporarily prevents any switch action to be taken and freezes the current state. Until the freeze is cleared, additional near-end external commands are rejected and fault condition changes and received APS messages are ignored. All administrative controls of any aspect of protection are rejected.
Is Coordinated Switching Both Ends?	Specifies if switching at both ends of each flow across the FC is coordinated at both ingress and egress ends.
Preferred Restoration Layer	The preferred-restoration-layer can be used to configure the WS-NOC ASON restoration *Wait For Server Restoration* field. If PHOTONIC_MEDIA is selected, the ASON L1 service enables Wait For Server Restoration, otherwise it is set to false. Currently, the preferred-restoration-layer is also used to create L1MP over L0CP in SSTEP case. There is no conflict with the Wait For Server Restoration config as it is used for the L1 CP service.
Topology Constraints	
Nodes	Specifies the site name and domain for nodes.
Links	Specifies the name, source domain, and destination domain for links.
Services	Specifies the site name and domain for services.
Endpoints	
Select Endpoints	Specifies the network element and port for first and second endpoints.
Additional Parameters	
Name	You can add any additional parameter that can also work with WS-RC Controller, such as ASON_ROUTED. If ALLOW_ASON is enabled, ASON resource can be allocated for this end-to-end MP connection and used by ASON for restoration.
Value	Yes or No

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4

Click **CREATE**. The new optical service is created.

END OF STEPS

1.25 How do I view all properties of an optical service?

1

Open **IP/Optical Coordination, Optical Service**.

2

Select an optical service from the list for which you want to see the properties.

3

Click **Info** to view optical service properties.

The info panel displays only limited number of optical service properties.

Note:

- The Working Path Latency property is displayed in the panel only if the WS-NOC supported cards are used. See the *WS-NOC NE Management Guide* and *WS-NOC OTN Guide* for information on the supported cards
- The Working Path Latency property is displayed only for an unprotected optical service.
- The Working Path Latency and Protected Path Latency, both the properties are displayed only for a protected optical service.
- If the Working Path Latency property is not supported by the optical service, the latency upload to NRC-P is still supported by IP/Optical Coordination but not displayed on the info panel.

Note: The info panel for an optical service with two endpoints is different from the info panel for an optical service with three or four endpoints. In case of an optical service with more than two endpoints, the info panel displays optical services properties for each of the endpoints in their own tabs. For example, 4 endpoints means 4 individual tabs for each endpoint in the info panel. In case of two endpoints, the info panel displays optical services properties in one common tab.

4

Click More and select **View All Properties**.

A page opens and displays all properties of the selected optical service.

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1.26 How do I create protection groups?

Before creating a protection group, you must create a LAG. See 1.27 “How do I resize LAGs?” (p. 34) Step 1 through Step 4.

1

Open **IP/Optical Coordination, Protection Group**.

2

Click **Create Protection Group** + . The Create Protection Group form opens.

3

Configure the Group Name parameter.

4

Selection a protection link from the Link Name drop-down menu.

Note: Only links *without* previously-configured infrastructure (such as LLI links in CDRC or LAGs and interfaces on router ports) are eligible to serve as protection links.

5

Click **ADD WORKING LINK(S)**. A dialog box opens.

6

Select one or more working links to add to the protection group and click **DONE**.

Note: Only links *with* previously-configured infrastructure (such as LLI links in IP/Optical Coordination or LAGs and interfaces on router ports) are eligible to serve as working links.

7

Click **CREATE**. The newly-created protection group is listed.

Note: The initial state of the protection group will be “IDLE”, which indicates that no switching has yet occurred.

8

Click on the protection group to see more details in the Info panel, including the operational state of each link in the group (indicated by a green or red bulb), and whether these links are “ACTIVE” (LLI links exist on the link) or “IDLE” (no LLI links exist on the link).

9

As required, click on the Manual Switch button on the Info panel, or inline with any protection group. A dialog box appears.

10

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Select a link from the list and click **MANUAL SWITCH**. The dialog box closes and the designated switch occurs.

Note: While the switch is in progress, the state of the protection group will be “PENDING” and certain actions will be unavailable. A change of state to “PROTECT” indicates that the switch was successful, while a change of state to “FAILED” indicates that the switch was unsuccessful.

11

As required, click on the Manual Revert button on the Info panel, or inline with any protected protection group. A dialog box appears.

12

Click **CONTINUE**. The dialog box closes and the protection group is reverted.

Note: While the reversion is in progress, the state of the protection group will be “PENDING” and certain actions will be unavailable. A change of state to “IDLE” indicates that the reversion was successful, while a change of state to “REVERT_FAILED” indicates that the reversion was unsuccessful.

END OF STEPS

1.27 How do I resize LAGs?

This procedure can be used to increase or decrease the capacity of IP links that are carried over LAGs with traffic running through an optical network.

1

Import and configure the lag-resize intent by performing the following steps:

1. Download the nsp-cdrc-lag-resize intent file for the current release from Nokia Electronic Delivery service.
2. Open **Network Intents**.
3. Click **Import**, select the nsp-cdrc-lag-resize-*rel*.zip intent, and click **Open**. When imported, the intent is named icm-logical-lag-access.
4. Open **Device Management, Configuration Intent Types**.
5. Click **+ IMPORT**, select icm-logical-lag-access, and click **Import**.
6. Wait for the intent to initialize and the **Status** to display “Successful”.

2

Create the configuration template for the intent by performing the following steps:

1. Open **Device Management, Configuration Templates**.
2. Click **+ TEMPLATE**.
3. In the form that opens, perform the following steps:
   - Under **Basic Info**, set Template Name to “lag-resize”. Setting this value is mandatory.

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- Click + **INTENT TYPE**, select icm-logical-lag-access and click **ADD**.
- Click **RELEASE**. The configuration template is created.

3

Deploy the intent by performing the following steps:

1. Open **Device Management, Configuration Deployments**.
2. Click + **DEPLOYMENT** and choose **Logical** from the drop-down list. The **Deploy Logical Configuration form** opens.
3. Under **Select Template**, click + **TEMPLATE**, select the lag-resize template that you created previously, and click **ADD**.
4. Under **Select Targets and Edit Selected Template**, click + **TARGET** select a single NE and click **ADD**. Only one NE can be selected.
5. In **Select Targets and Edit Selected Template**, click **VIEW/EDIT TEMPLATE CONFIG**. The configuration form for lag-resize opens.
6. Set only the following parameter values and click **UPDATE**:
   - Admin State - enabled
   - Max Ports - 64
   - Encap Type - null
   - Mode - trunk
7. If the LAG already exists on the node, in **Assign Identifier for Selected Template**, set the LAG-NAME and LAG-ID parameters as configured on the node. If the LAG has not been created yet, go to step Step 4.
8. Click **DEPLOY**.
9. Wait until the **Deployment Status** displays "Deployed Aligned".
10. Repeat from sub-step 4 to deploy the intent for the second node. If you are creating a protection group, then performing these steps on a single node is sufficient.

4

If the LAG has not yet been created on the node, perform the following steps. Skip to step Step 5 if the LAG already exists.

1. Open **Device Management, Configuration Deployments**.
2. Choose the lag-resize template, click **More** ⋮, **Associate to network**.

   The **Associate Template** form opens with the template already selected.
3. Under **Select Targets and Edit Selected Template**, click + **TARGET** select a single NE and click **ADD**. Only one NE can be selected.
4. In **Assign Identifier for Selected Template**, set the LAG-NAME and LAG-ID parameters.
5. Click **Associate** to apply the configuration. Validate that under the **Configuration Deployments** drop-down an entry is created for the selected node with Deployment Status as Deployed Aligned.
6. Repeat this step and sub-steps to deploy the intent for the second node. If you are creating a protection group, then performing these steps on a single node is sufficient.

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5

To expand a LAG, perform the following:

1. Open **IP/Optical Coordination, IP-Optical Correlation**. A list of IP links is displayed.

   IP links that are part of a LAG will be identified as 'Elastic' in the Elastic column.
2. Select an 'Elastic' IP link in the list and click **Info** ⓘ. The **Info** panel opens.
3. Click **More** ⋮ for a Link Layer Interconnect and choose Expand LAG from the contextual menu. The **Expand LAG** form opens.
4. Click **+ ADD**, then select an endpoint to deploy as Link Layer Interconnects.
5. Click **DEPLOY**. The Expand LAG form closes and the IP link displays “EXPAND IN PROGRESS” in the Elastic column.
6. Click **More** ⋮ and choose View Progress from the contextual menu to show the status of the expansion.

   NOTE: If no operation is ongoing, clicking View Progress will show the results of the most recently-completed operation.

   When successfully completed, the IP link will again be identified as 'Elastic' in the Elastic column.
7. Once the deployment is complete, the following occurs:
   a. a new service is displayed in WS-NOC
   b. a new Optical Service is displayed in the IP/Optical Coordination Optical Service view
   c. an additional LLI is displayed in the IP/Optical Coordination IP-Optical Correlation, **Info** ⓘ view for the relevant IP link

6

If the LAG expansion fails, viewing the **Operational Status** in the **Info** ⓘ for the link displays the failure cause.

7

To contract a LAG, perform the following steps:

1. Open **IP/Optical Coordination, IP-Optical Correlation**. A list of IP links is displayed.
2. Select an 'Elastic' IP link in the list and click **Info** ⓘ
3. Click **Contract** 🗑 inline with any Link Layer Interconnect. A form opens.
4. Click Delete to confirm.

END OF STEPS

1.28 How do I view IP services in Object Troubleshooting?

1

Open **IP/Optical Coordination, Network Map** and click on a link (IP-IP, Optical-Optical, or cross-domain). The Info Panel opens.

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2

Click **More** ⋮ and choose **Navigate To** > **IP Service**. A list of IP services riding over the link is displayed.

3

Select a service and click **More** ⋮ and choose **Open in Object Troubleshooting**. The service is displayed in Object Troubleshooting.

END OF STEPS

1.29 How do I view IGP links in Path Control?

1

Open **IP/Optical Coordination, Network Map** and click on a link (IP-IP, Optical-Optical, or cross-domain). The Info Panel opens.

2

Click **More** ⋮ . Choose **Navigate To** > **IGP Links**. A list of IGP links riding over the selected link is displayed.

3

Select a link and click **More** ⋮ and choose **Open in Path Control**. Path Control opens with the IGP link displayed.

END OF STEPS

1.30 How do I view optical links and services in WS-NOC?

This procedure can be used to view optical links and services within WS-NOC.

Note: In order to be able to launch WS-NOC from IP/Optical Coordination, the POST v4/controllers REST call must be executed, and the crosslaunchInfo portion of the body populated. See the NSP DevOps Portal for more information.

1

Open **IP/Optical Coordination, Network Map** and click on an optical link or optical service. The Info Panel opens.

2

Click **More** ⋮ and choose **More** > **Open in Optical Domain Controller**. WS-NOC opens with the optical link or service displayed in the alarms window.

END OF STEPS

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1.31 How do I manage the 400 ZR managed alien solution?

This procedure describes how to use NSP to initiate link creation, after which the WS-NOC provides the required parameter values using T-API. This feature allows for automated provisioning of 400 ZR links utilizing T-API to communicate the following 4 coherent parameters between NSP and WS-NOC:

- Transmit power level
- Central frequency
- Mode
- Admin state

1

Integrate the WS-NOC and the NSP; see the *NSP Installation and Upgrade Guide* for information. The NSP automatically discovers the optical services of an integrated WS-NOC.

2

Install the T-API adaptor. See 1.3 “How do I add a controller?” (p. 8).

3

Download the nsp-cdc-intent-types-cam.zip artifact file for the current release from Nokia Electronic Delivery service. Included in the archive is a readme.txt file that contains pre-configuration instructions that must be followed before using and installing the artifact.

4

Manage two 7750 SR 400G ZR/ZR+ nodes in NSP.

5

Import and configure the 400 ZR intent by performing the following steps:

1. Open **Artifacts**.
2. Click **IMPORT & INSTALL**, select the nsp-cdc-intent-types-*rel*-cam.zip artifact file, and click **IMPORT & INSTALL**.
3. Open **Device Management, Configuration Intent Types**.
4. Click **+ IMPORT**, select nsp-cdc-zr-endpoint-intent, and click **Import**.
5. Wait for the intent to initialize and the **Status** to display “Successful”.
6. Open **Device Management, Configuration Templates**.
7. Click **+ TEMPLATE**.
8. Click **Basic Info** and enter “nsp-cdc-zr-template” as the value for Template Name.
9. In **Configuration Intent Type**, click **+ INTENT TYPE**.
10. Select nsp-cdc-zr-endpoint-intent and click **ADD**.

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11. Click **Release**. The Life Cycle should display “released”.

The following parameters are displayed for **Coherent Optics**:

- DWDM Frequency
- Compatibility Mode
- Tx Target Power

The parameter settings for Coherent Optics are automatically set by the intent.

6

Create two CDLs between the 7750 SR 400G ZR/ZR+ nodes. See 1.10 “How do I manually create cross-domain links?” (p. 16) for more information.

Upon CDL creation, an LLI is discovered for the nodes in the “Planned” state.

7

Assign the ICM template for the 400 ZR intent.

1. Open **IP/Optical Coordination, Link Layer Interconnect**.
2. Click **More** ⋮ for a discovered 400 ZR LLI and choose Assign ICM Template (this option is only available for LLIs in the “Planned” or “Deployment Failed” states). The **Assign ICM Template** form opens with the endpoint data automatically filled in along with the default 400 ZR template name nsp-cdr-zr-template.
3. In the **Assign ICM Template** form, if required, you can enter the name of a custom 400 ZR ICM template. Otherwise, the default will be used.
4. Click **CONFIRM**. The NSP deploys the template to the selected 400 ZR node endpoints.

Upon successful deployment, the LLI lifecycle state changes from “Planned” to “Deployed”.

In the Link Layer Interconnect table view, Central Frequency and Profile ID are displayed for each LLI.

You can select an LLI and click on the IP endpoint to view values for ICM Template Name, Deployment Status, Central Frequency, and Transmit Power. These values are set by NSP based on events received from WS-NOC. Under Connected Optical Domain, the Profile ID is displayed along with a timestamp of the last update.

8

Verify successful deployments under ICM Deployments for each of the LLI node endpoints. See the *NSP User Guide* for more information about auditing ICM deployments.

Note: If the deployment fails, the LLI still displays in the “Discovered” state and the ICM deployment must be debugged.

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9

If the LLIs are stuck and are not moving to a “Deployed” state, you can Click **More** ⋮ for a discovered 400 ZR LLI, choose Assign ICM Template, and enable the **No Template** option. This is intended to push the LLI through the deployment deadlock.

END OF STEPS

1.32 How do I create planned alien OCh services with add/drop endpoints on MLFSB or ASC4 cards?

This procedure describes how to provision a planned alien OCh service using WS-NOC traversing either MLFSB or ASC4 add/drop endpoints. OCh creation is applicable to all card types.

Note: Virtual NEs (VNEs) in WS-NOC are not supported for this use-case.

1

Create an external topology extending from the add/drop endpoints at each end of the OCh service, either from NE CLI or WS-NOC equipment manager.

a. For 1830 PSS NE CLI on MLFSB cards: use the following commands, assuming the Mx port is directly connected to the iRDM FSx port, index 1 is for input, and index 2 is for output. The LC port role is discovered when multi-topology is created with the MLFSB Mx port and the connected card. The port role is displayed in the UI.

```
config interface <sh/sl/MxN1> type och

config interface <sh/sl/MxN2> type och

config interface topology <sh/sl/MxN1> externalin 1.1.1.1 1/1/1 uni

config interface topology <sh/sl/MxN2> external 1.1.1.1 1/1/1 uni
```

where x = [1..6], N = [A..F], 1 = Input, 2 = Output

The interface topology configuration should display the following, for example:

```
# show interface topology 26/1/m1a1

Shelf: 26 Slot: 1 Port: M1A1 - MLFSB Lc Port

-----------------------------------------------

To Connection Type    : internal

To Destination        : 1/3/ADT12 - IRDM20 Adt Port

From Connection Type  : external

From Destination      : 1.1.1.1 1/1/1
```


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```
Multi-fiber port In    : M1

Multi-fiber port Out   : M1

# show interface topology 26/1/m1a2

Shelf: 26 Slot: 1 Port: M1A2 - MLFSB Lc Port

-----------------------------------------------

To Connection Type     : external

To Destination         : 1.1.1.1 1/1/1

From Connection Type   : internal

From Destination       : 1/3/ADT12 - IRDM20 Adt Port

Multi-fiber port In    : M1

Multi-fiber port Out   : M1
```

b. For 1830 PSS NE CLI on ASC4 cards: use the following commands, assuming the ASC SIG ports are directly connected to the MxN824 ADT ports.

```
config interface topology <sh/sl/ZxIn> externalin 1.1.1.1 1/1/1 uni

config interface topology <sh/sl/ZxOut> external 1.1.1.1 1/1/1 uni
```

where Z = [A..D], x = [1..4]

The interface topology configuration should display the following, for example:

```
# show interface topology 1/9/clin

Shelf: 1 Slot: 9 Port: C1IN - ASC4 Add/Drop Port

-----------------------------------------------

From Connection Type   : external

From Destination       : 1.1.1.1 1/1/1

# show interface topology 1/9/clout

Shelf: 1 Slot: 9 Port: C1OUT - ASC4 Add/Drop Port

-----------------------------------------------

From Connection Type   : external
```


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```
From Destination      : 1.1.1.1 1/1/1
```

2

Provision the planned alien OCh service (ZR+) using WS-NOC using connection type “2-Ended Bi”. Perform one of the following depending on the card type:

a. For MLFSB cards, create and deploy a new service with the following:

- “Alien Wavelength (unkeyed OCH)” service
- the endpoint and connection characteristics from the interface topology CLI output (note the “Connection Type”, “From”, and “To” parameters)
- the “Alien Profile”, “Channel Width”, and “Wave Key” parameters configured

See the WS-NOC documentation for more information about configuring and deploying a service.

b. For ASC4 cards, create and deploy a new service with the following:

- “Alien Wavelength (unkeyed OCH)” service
- the endpoint and connection characteristics from the interface topology CLI output (note the “Connection Type”, “From”, and “To” parameters)
- specify a frequency (the Z-End Add/Drop port belongs to a static filter)
- the “Alien Profile”, “Channel Width”, and “Wave Key” parameters configured

See the WS-NOC documentation for more information about configuring and deploying a service.

END OF STEPS

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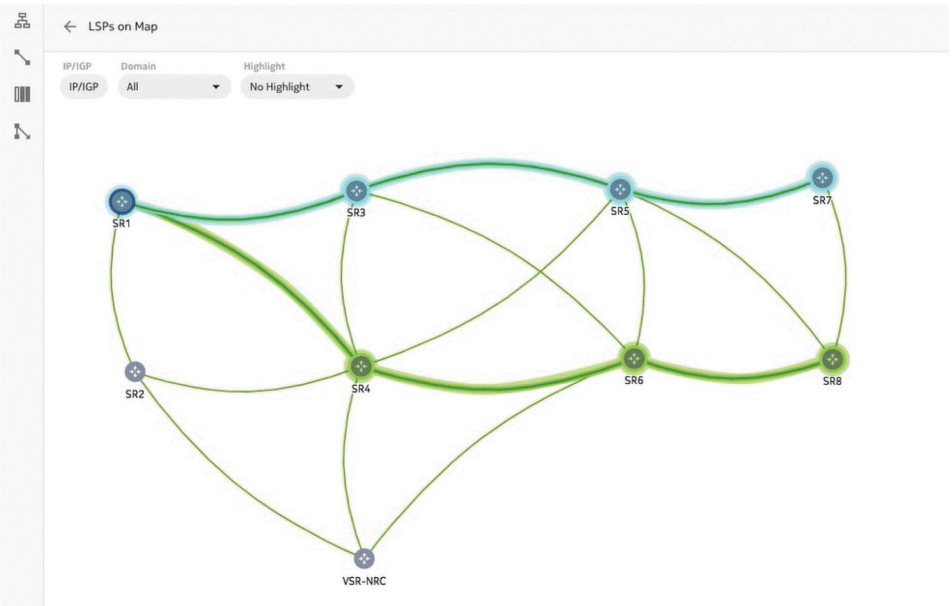
2 IP/Optical Coordination use cases

2.1 Implementing optically-disjoint IP routing

This article shows how to use IP/Optical Coordination to implement optically-disjoint IP routing.

2.1.1 Let’s go

From Path Control, we can see the structure of our IP network by looking at the Network Map. In this example, two LSPs have been highlighted, and we can see that they're taking separate paths.



If we click on any link in an LSP, the Info panel opens, and we can see more details about that LSP. In this example, however, we can see that Path Control doesn't have information about whether the LSPs are part of any shared risk link groups (SRLGs).

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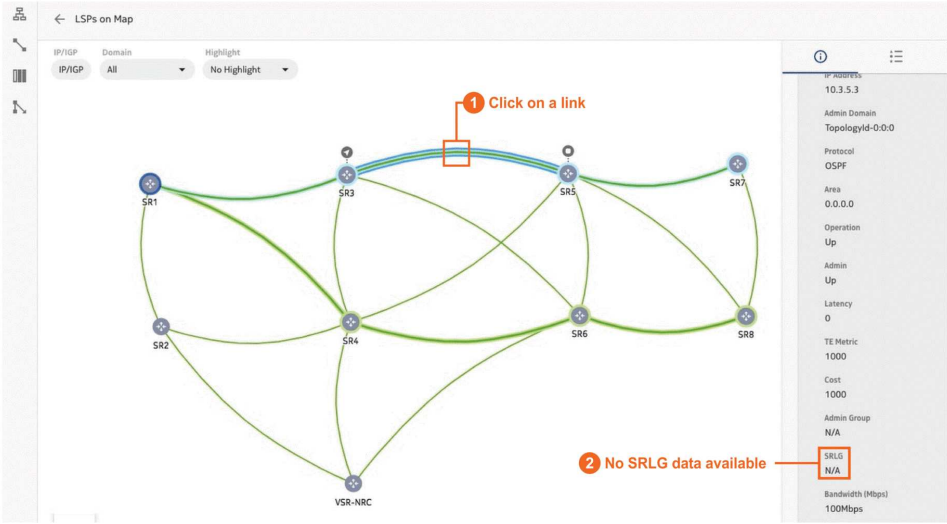

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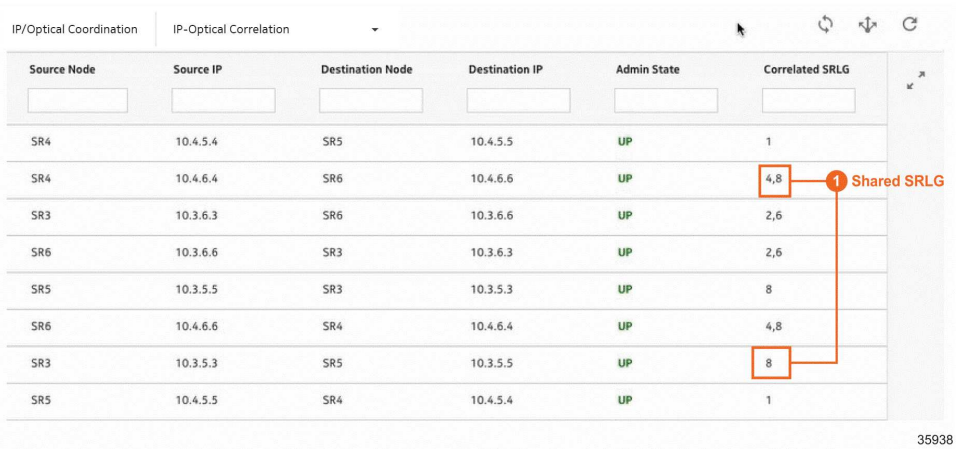
In order to find out, we're going to switch to IP/Optical Coordination. On the IP-Optical Correlation view, we can see from the Correlated SRLG column that our LSPs are actually both members of SRLG 8.



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Now, we're going to send this information to Path Control, to make it aware that the links overlap at the optical level.

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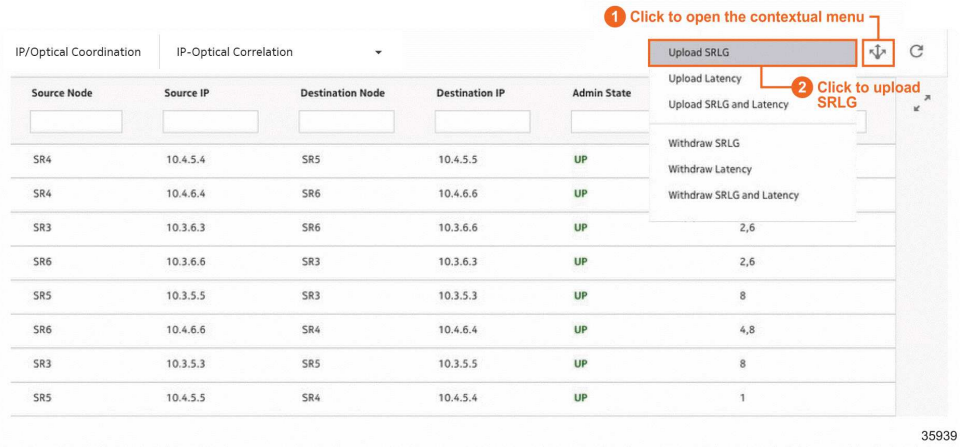
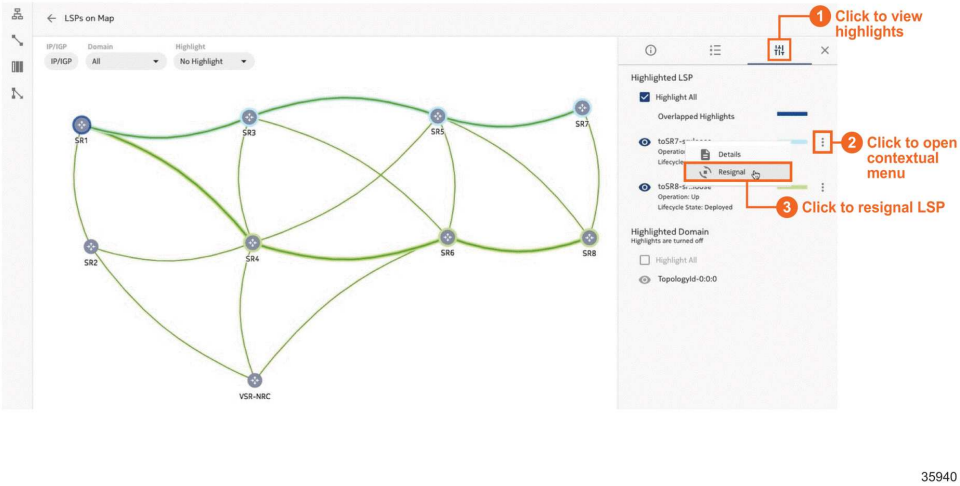


Finally, let's return to Path Control and resignal each of our LSPs.



2.1.2 We're done

Path Control has automatically rerouted the LSPs to ensure they are optically-disjoint. We can again click on any link in an LSP to see more details and verify that they are now part of different SRLGs.

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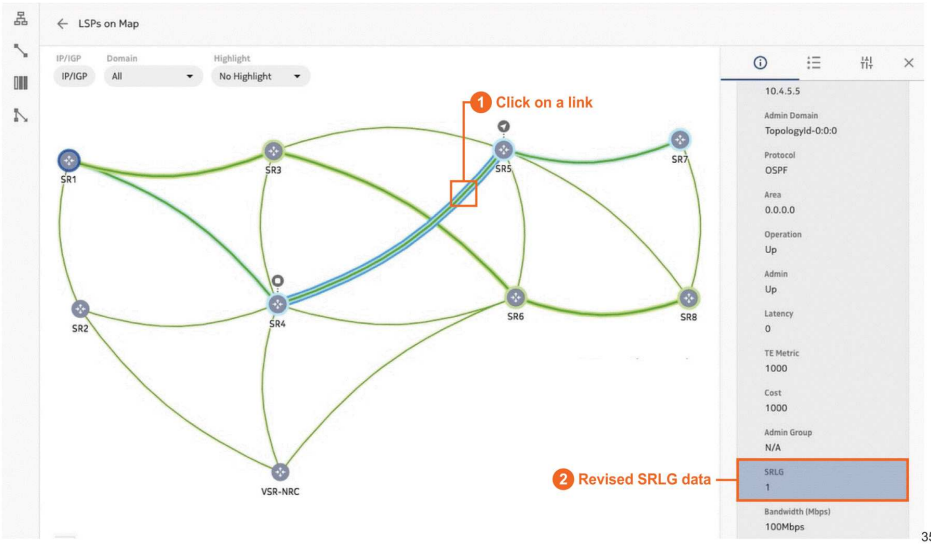

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3 IP/Optical Coordination compatibility table

3.1 Compatibility between NSP , WS-RC, WS-NOC, and T-API

Table 3-1, “Compatibility table for NSP, WS-RC, WS-NOC, and T-API controller version” (p. 47) displays the compatibility between the NSP, WS-RC, WS-NOC, and T-API supported in IP/Optical Coordination.

Table 3-1 Compatibility table for NSP, WS-RC, WS-NOC, and T-API controller version

NSP Release	T-API version	WS-RC controller	WS-NOC controller
24.8	2.1.3, 2.4.1	22.12, 23.6, 23.12, 24.6	22.12, 23.6, 23.12, 24.6

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