

Design and Analyze Networks

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Design a Network Using Cisco ONP

You can design a network in one of the following ways:

- Manual Design—Create a network design using a design palette.
- Import Design—Import a network design from an Excel sheet, Live Network Import or from an existing network from CTP, or another instance of Cisco ONP.

Manually Design a Network Using Cisco ONP

Table 1: Feature History

Feature Name	Release Information	Feature Description
Database Operations Optimization	Cisco ONP Release 5.2	Cisco ONP now provides an option to run some operations in the background involving database interaction, such as **Save As**, **Import CPZ**, and **Export CPZ**. You can continue to use the Cisco ONP interface for other operations when these operations are running in the background.

Table 2: Feature History

Feature Name	Release Information	Feature Description
4K-2K SSON Network Creation Support	Cisco ONP Release 5.2	Now you can include the 4K-2K nodes in both SSON and non-SSON networks while designing the network. This helps you to validate 4K-2K nodes in the SSON design which has higher line rates.

Table 3: Feature History

Feature Name	Release Information	Feature Description
NCS 1010 C+L Network Design	Cisco ONP Release 5.1	Cisco ONP now supports the C+L-band networks that help you plan NCS 1010 networks using the OLT-L and ILA-L line cards to increase your network's bandwidth capacity. Enhanced with L-band related properties, the UI enables you to design a C+L-band network for your ever-increasing channel demands. The following L-band types are introduced to suit your design needs: • **C+L**—This band type adds more channels to your network, increasing its traffic carrying capacity. • **C+L Futuristic**—This band type creates a network with C-band edges and future provisions for L-band edges that you can cost-effectively upgrade after exhausting the C-band capacity.

Table 4: Feature History

Feature Name	Release Information	Feature Description
Greenfield NCS 1010 Network Design	Cisco ONP Release 5.0	You can design and validate NCS1010 optical line system. This feature helps to create OLT-C, OLT-R-C, ILA-C, ILA-R-C, and ILA-2R-C based NCS 1010 networks using fixed grid add/drop MD-32-ODD, MD-32-EVEN and flex grid add/drop BRK-24, BRK-16, and BRK-8 passive modules.

Table 5: Feature History

Feature Name	Release Information	Feature Description
Multi-Layer Platform (MLP) Greenfield Design with NCS 4k-1k-2k	Cisco ONP Release 4.1	This feature allows you to perform the following: • Supports NCS 4K-1K-2K multi-platforms • Visualizes new layout for Txp and SVO for NCS 2000 node • Supports different OTN service types with protection • Edits layout for NCS 4000 and NCS 1004 nodes

You can create any of the following network designs:

- Spectrum Switched Optical Network (SSON) that uses flexible spectrum allocation, where the required minimum spectral resources are allocated adaptively based on traffic demand and network conditions
- Non-SSON network that allocates single spectrum (fixed spectrum) irrespective of the traffic demand and network conditions
- NCS 1010 network

Perform the following steps to create a network in the Cisco ONP:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **New**.

The **Create New Network** dialog box appears.

Step 2 From the **L0 Network Platform** drop-down list, choose one of the following:

- NCS 2000—To create a non-SSON network that contains NCS 2000 and NCS 4000 nodes, or an SSON network including NCS 2000, NCS 1004, and NCS 4000 nodes
- NCS1010—To create a network that contains only NCS 1010 nodes

Step 3 If you want to create an SSON network, check the **SSON Network** check box, else leave the **SSON Network** check box unchecked.

This option is not for the NCS 1010 network.

Step 4 Choose **NCS (4K_1K_2K)** or **NCS (4K_2K)** from the **Traffic Type** drop-down list.

If you had chosen to create an SSON Network in the previous step, you can view the **Traffic Type** drop-down list.

Note Once the network is created you cannot change the **Traffic type** from 4K_1K_2K to 4K_2K or vice versa. Hence, we recommend you export the network into an Excel sheet, do the required modification and then import it as a new network.

Step 5 Choose the **System Release** for NCS 2K or NCS 1010 from the drop-down list.

You cannot change the system releases that are available for NCS 4K and NCS 1K.

The **Band Type** drop-down list appears for NCS 1010 R7.9.1 network.

Step 6 From the **Band Type** drop-down list for NCS 1010, choose one of the following:

- C-Band—Only C-band edges are created and ANS is generated based on C-band. For L-band upgrade, ANS unlock is required.
- C+L Futuristic—Only C-band edges are created and ANS is generated based on C-band and L-band. For L-band upgrade, ANS unlock is not required.
- C+L—Both C-band and L-band edges are created and ANS is generated based on C-band and L-band.

Note After the creation of a NCS 1010 R7.9.1 network, if required, you can change the network band type under the **Network Application Configuration** section in the Network Properties.

Step 7 Click **Create**.

You can view a map and the design palette. For more information, see Design Palette.

Step 8 Click the **Drawing Tool** icon (pencil and ruler crossed).

Step 9 Add sites to the map using the drawing tool.

a) Zoom into the map to the desired level. Click any of the site icons (**ROADM**, **OLA** or **Traffic**(4K-1K-2K)), and drag it to the sites on the map. Drag or click the map where a site has to be placed, when the cursor changes to the site icon.

SRLG is not supported in the SSON networks

Traffic node is not supported on the NCS 1010 network.

b) Click the **Fiber** icon and drag it to connect from one site to another site. Continue this for all sites.

Note By default, the fiber length is updated as 1 km for all the fibers. If you want the length to be auto updated based on the x, y coordinates, then enable the **Use Coordinates Distance** property under the network properties.

Step 10 Create services between the sites (only for SSON and non-SSON networks).

Cisco ONP provides only OTN service.

a) Click the **Drawing Tool** icon and select **OTN Service** (Green in color).
b) Add the service between the existing Traffic sites on the map.

Step 11 Create circuits (for NCS 1010), media channels (for SSON), or waves (for non-SSON) between the sites.

a) Click the **Drawing Tool** icon, and select **Circuit** (purple in color), **Media channel** (purple in color), or **Waves** (red in color).
b) Add the circuit, media channel, or waves between the existing sites on the map.

In the left pane, you can view a network tree panel with a default network name. The network elements added are displayed in the tree panel.

Step 12 Choose **File** > **Save As**.

Step 13 Enter a network name in the **Give a Network Name** dialog box.

Step 14 Click the **Run in Background** check box, if you want this operation to run in background.

A notification pops-up after the background operation is completed. Go to **Job Monitor** to view the progression of the operation running in the background.

Step 15 Click **Save**.

Create Shared Risk Link Group

You can use the Shared Risk Link Group (SRLG) feature for routing protected services. You can create SRLGs through the Excel import file SRLG tab or through the Cisco ONP GUI using the following procedure:



Note SRLG is supported only for the non-SSON network including the traffic nodes.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Click the network tree panel in the left.

Step 2 Expand **Fibers**.

Step 3 Check the check box next to each fiber in the same SRLG.

Step 4 After all fibers are checked, right-click, and select **Create SRLG**.

SRLG is created with a unique name. You can rename the SRLG.

Import Network Using Excel Sheet

Use this task to import a network into Cisco ONP, using an Excel sheet.

Table 6: Feature History

Feature Name	Release Information	Feature Description
CX Unified Planning Tool Network Import	Cisco ONP Release 5.0	The integration between CX Unified Planning Tool (UPT) and Cisco ONP enables you to import the networks created and analyzed in Cisco CX UPT into Cisco ONP. This helps you avoid recreating the networks that are already created in UPT. This feature allows you to import networks having NCS 1010 and NCS 2000 nodes into Cisco ONP.

Table 7: Feature History

Feature Name	Release Information	Feature Description
Export and Import of Network Topology in Excel Format	Cisco ONP Release 5.1	It is now possible to export the topology data of an existing network into an Excel file. You can easily modify the exported data in Excel and import it back into Cisco ONP to create a new network or modify an existing network. The following are the supported Excel formats: • **xlsx**—Standard Excel with multiple sheets, each corresponding to a network element such as Network, Sites, Circuits, Spans, OTNdemands, and so on. • **xlsm**—Macros-enabled Excel file that can filter out and display only the applicable network element sheets based on the platform selected in the Network sheet. Cisco ONP has the built-in intelligence to automatically calculate the shortest path between a source and a destination, even if only a partial fiber path is mentioned in the imported Excel file.

Note By default, the system release of the Excel imported network is 11.0.

Note From Release 5.0, Cisco ONP supports import of networks created using CX UPT via Cisco ONP Import Excel option. CX UPT does not populate the *DWDMChannel Type* and *Add/Drop Type* values in the Excel sheet. If the values are not found in the Excel sheet, then Cisco ONP picks the default options. By default, **DWDMChannel Type** is *NCS1004_QPSK_SP_16QAM_200G_27%SDFEC_60GBd* and **Add/Drop Type** is *Colored*. We recommend you to check the *DWDMChannel Type* and *Add/Drop Type* values before importing the Excel sheet into Cisco ONP to avoid any discrepancies.

From Release 5.1, in addition to exporting the template, you can also export the entire network design data of an existing network in the form of the Excel sheet, modify the network properties available in the Excel sheet and reimport. The network can be exported in all modes and reimported on Design mode, Upgrade mode, and Release Upgrade mode.

Note Transponders are not supported as part of Export/Import Excel. When you export an existing network with transponder card forced, the exported Excel sheet will have the Traffic type set to Pluggable Card in DWDMChannels/MediaChannels tab. Make necessary changes in the exported Excel sheet before you import it into Cisco ONP.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **Export** > **Excel**.

a) Choose the **Network Type** as Template or Current Network.

b) Choose the **File Type** as xlsx or xlsm (Macro Enabled)

The Macros Enabled Excel sheet automatically customizes the tabs on the Excel sheet based on the platform that you choose. It also provides additional functionalities such as selection of fibers in the path selection, wavelength count validation in case of regen selection.

c) Click **Download**.

The template has the following mandatory tabs, and the respective fields to be filled in the Excel sheet.

Tabs	Description
Network	Label (name of the network), Platform (NCS2000(NON SSON), NCS2000 (SSON), NCS1010), and System Release
Sites	Site Label, Type, X coordinates, Y coordinates, Pre Equip Degree, Grooming Site, CLLI code, and Site Address, Degree (Scalable upto degree), and State.
Spans	Span label, A (Source site name), Z (Destination site name), Kms (Distance), Loss, Type, A_Edge, Z_Edge, AZ_Loss, ZA_Loss, AZ_Kms, ZA_Kms and State.
OTNDemands	Primary Path and Secondary Path (Work and Protect Path for NCS4000 OTN Services), Demand Label, A (Source), Z (Destination), Y (Tertiary Source), B (Tertiary Destination), Type of Demand, Quantity, and Protection. Note: Y and B can be used with Unprotected Disjoint Service.
OTNDemands-SSON	Demand Name, Source, Destination, Service Group, Type, A/D Type, Protection, Primary Wavelength, Secondary Wavelength, Primary Path, Secondary Path, First Restoration path, Second Restoration Path, Primary ODU Timeslot, Secondary ODU Timeslot, Primary Regen, Secondary Regen, Trunk Mode, Baud Rate, and State.
MediaChannels	Channel Label, Source, Destination, Primary Wavelength, Secondary Wavelength, Protection, Traffic Type, Card Type, A/D Type, Primary Path, Secondary Path, Primary Regen, Secondary Regen, and State.
ServiceGroup	ServiceGroup Name, Demand Types, 4K Exclusive LC Usage, 4K Symmetric Aggregation, 1K Exclusive LC Usage, 1K Symmetric AggregationChannel Label, and State.

Tabs	Description
DWDMChannels	Primary Wavelength and Secondary Wavelength (Work and Protect Wavelength for NCS2000 non-SSON waves), Primary Path and Secondary Path (Work and Protect Path for NCS2000 Wave/Media Channel and NCS1010 circuit), A/D Type (Colored/Colorless/Contentionless), Channel label, A, Z, Wavelength, Protection, and Type
Circuits	Circuit Label, Source, Destination, Primary Wavelength, Protection, Traffic Type, Card Type, A/D Type, Primary Path, Primary Regen, and State.
Flex Optical Source	Flex Optical Source Name.
SRLG	SRLG Label, Spans, and State.

Step 2 Fill the network details in the template file or edit the current network file, and save the file.

Step 3 Choose **Import** > **Excel**, and select the **Import Type**.

- New—Choose this option if you want to create a new network using the design data available in the Excel sheet.
- Existing—Choose this option if you want to update an existing network with the data available in the Excel sheet. Open the network before you import the Excel sheet. The network must be on Design mode, Upgrade mode, or Release Upgrade mode.

You can view the data available in the Excel sheet before importing the network data. The **View Data** check box remains checked by default. Uncheck it of you do not want to view the imported data.

Step 4 Browse, select the saved file, and click **Import**.

During the import for the Existing network, if the state is Locked, Cisco ONP does not consider the data, if the state is Unlocked, Cisco ONP changes the existing parameter, provided the network is in upgrade mode, and if the state is New, the parameters in the Excel is added as a new entry into the network.

During new network import, new network design is created irrespective of the State.

Note If there are errors in the imported data, a pop-up error message is shown in case of new import, and the errors are available under the **Elements** > **Messages** tabs in case of updating the existing network.

Cisco Transport Planner Network Import Support

You can import the networks that are created and analyzed from Cisco Transport Planner (CTP) to Cisco ONP, to avoid recreating the networks that are already created in CTP. The CTP network files are in .mpz format. You can, release upgrade, the imported networks.

Note

- Network must be in design-analyzed or upgrade-analyzed mode.
- You cannot import networks which are earlier than Release11.0.

Supported Hardware

- Optical source files and transponders

  See Supported Optical Sources, and Supported Cards and Pluggables.

- Contentionless, colorless, and colored point-to-point demands
- Flex network
- Gain Equalizer

Note The Gain Equalizer node changes as a ROADM node when you unlock the site after the release upgrade.

- ROADM-SMR-9 and SMR-20
- All flex supported amplifiers, controller cards, and chassis types

Import MPZ Design File

Use this task to import .mpz file from CTP to Cisco ONP.

Note Importing of mpz networks with P-Ring and A2A demands is not supported. Hence, we recommend you to delete these demands in CTP, reanalyze the networks in CTP and import the mpz into Cisco ONP.

Before you begin

Log in to Cisco ONP Web Interface as a user with network creation permission.

Import the required optical source files and layout template using **Manage** > **Optical Source** and **Manage** > **Optical Source** options. For more information, refer **Manage Alien** and Import Layout Template for NCS 2000 Network in to Cisco ONP Database.

Delete the parameters that are not supported by Cisco ONP from the .mpz file and then import the .mpz file to Cisco ONP.

Step 1 Choose **Import** > **MPZ**.

The **Import File (.mpz)** dialog box appears.

Step 2 Browse to the .mpz file stored in your local system.

Step 3 Choose **4K_1K_2K** or **4K_2K** from the **Traffic Type** drop-down list.

If you had chosen an SSON MPZ file, you can view the **Traffic Type** drop-down list.

Step 4 Click **Import**.

The .mpz file gets imported to Cisco ONP.

Note If you view a blank screen when you click waves in the network tree, refresh the browser.

Step 5 Choose **Network** > **Upgrade** or **Network** > **Release Upgrade** to make any changes on the imported network.

Note
- You cannot go back to design mode on the imported mpz network.
- The wave label of imported mpz network in Cisco ONP is the service name present in the CTP properties window.

Export the CPZ File

Cisco ONP stores the network design file as .cpz file in its database. You can export the design file into your local system.

- The .cpz file of a network in the design mode includes design file, layout template, and optical source details.
- The .cpz file of a network in the analyze mode includes a design file, analyze file, ANS file, per side ANS file, BOM, error messages, trace files, layout template, mpz, and report.
- For the network in upgraded mode, you can export only the last child in the parent child hierarchy.
- You can export only one network at a time.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the network that you want to export, from the list of networks.

The network opens.

Note If you view a blank screen when you open a network, refresh the browser, or log in to Cisco ONP again.

Step 3 Choose **Export** > **CPZ**.

The **Export .cpz file** dialog box appears.

Step 4 Rename the file if required.

Step 5 Click the **Run in Background** check box, if you want this operation to run in background.

A notification pops-up after the background operation is completed. Go to **Job Monitor** to view the progression of the operation running in the background.

Step 6 Click **Export**.

Step 7 Save the file in your local system.

Import CPZ File

You can import the cpz network design files that are exported from another Cisco ONP instance.

Note You can import only the networks that are exported from the current release.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **Import** > **CPZ**.

The **Import .cpz file** dialog box appears.

Step 2 Click **Choose file**, and select a cpz network design file that you want to import into Cisco ONP, from your local system.

Step 3 Click the **Run in Background** check box, if you want this operation to run in background.

A notification pops-up after the background operation is completed. Go to **Job Monitor** to view the progression of the operation running in the background.

Step 4 Click **Import**.

If the names of the optical source and layout template files available in the Cisco ONP database and the imported network file are the same, you are prompted to confirm whether you want to overwrite the existing file.

Note The error message **"Network already exists in the system with another user. New network will be created"** is just an information. You do not need to perform any action. Cisco ONP automatically imports as a new network specific to the user. There is no impact on the already existing network.

Step 5 Check the **Overwrite Network** check box, if you want to overwrite the existing file.

If you leave the check box unchecked, Cisco ONP saves the imported network as a new network.

Step 6 Choose the optical source files and layout template that you want to replace.

If you do not choose the optical source or the layout template file, the files will not be imported.

Step 7 Click **Confirm**.

The imported network is saved in the Cisco ONP database.

Live Network Import

Table 8: Feature History

Feature Name	Release Information	Feature Description
Live Network Import	Cisco ONP Release 4.1	This feature allows you to import a live deployed network having NCS 1004, NCS 2000, and NCS 4000 nodes into Cisco ONP, using the LNI (Live Network Import) import template. This feature also allows you to view network topology, BOM, and layout report.

The Live Network Import (LNI) feature allows you to perform a live import of network having NCS 1004, NCS 2000, and NCS 4000 nodes into Cisco ONP. You must have Network Management role to perform the LNI operation. After importing you can visualize the complete deployed network details in Cisco ONP. Map shows the network topology, and you can view the node, fiber, OTN service, and media channel properties in the Network Tree, and the Entity Editor.

Perform Live Network Import

Use this task to perform live import of a network:

Before you begin

- Perform LNI only when the network is in a stable or running state. Do not perform LNI during the maintenance period for software upgrade.
- Configure all the mandatory parameters on the circuit.
- Make sure that the following Cisco IOS XR Software Maintenance Updates (SMUs) are loaded on the NCS 4000 devices on top of Cisco IOS XR Release 6.5.28:
  - ncs4k-6.5.28.CSCvu93045.tar
  - ncs4k-sysadmin-6.5.28.CSCvt67465.tar
  - ncs4k-6.5.28.CSCvv79518.tar
- Make sure that there is a provision for opening three TL1 sessions per NCS 2000 device for Live data collection. NCS 2000 devices should not be overloaded with too many TL1 sessions.
- Make sure that the fibers are configured with the same channel numbers (Spectral Density, ex: 91.0/82.0) on both source and destination ends.
- Check the card label set for the following NCS 2000 cards and update it if they are not aligned.

PID	Card Label
NCS2K-16-AD-CCOFS	AD-16-FS
NCS2K-20-SMRFS	SMR20-FS-CV

PID	Card Label
NCS2K-20-SMRFS-L	SMR20-FS
NCS2K-9-SMR17FS	SMR9-17-FS
NCS2K-9-SMR24FS	SMR9-24-FS
NCS2K-9-SMR34FS	SMR9-34-FS
NCS2K-9-SMR34FS-L	SMR9-34-FS
15454-M-RAMAN-COP=	OPT-RAMP-COP
15454-M-RAMAN-CTP=	OPT-RAMP-CTP
NCS2K-OPT-EDFA-35	OPT-EDFA-35

- You must install Microsoft Excel in the Client Machine from where the browser is launched to open Cisco ONP application.
- Log in to Cisco ONP Web Interface

.

Step 1 Choose **Export** > **Download LNI Import Template**, and download the template which is in the form of an Excel sheet.

Step 2 Fill the template with the details of all the nodes belonging to the network to be imported and save the file.

The following fields are mandatory:

- Node IP
- User Name
- Password
- Connectivity Type—TL1 for NCS 2000 nodes and NETCONF for NCS 1004 and NCS 4000 nodes
- Connectivity port—830 for NCS 4000 and NCS 2000 nodes

Note Enter a value in the range of 60–180 in the Connectivity Timeout field or leave the field empty.

Step 3 Choose **Import** > **Live Import**.

Step 4 Browse and choose the saved file.

Step 5 If you want to clean the existing LNI database of the nodes and perform a fresh import, check the **Fresh Import (Cleanup LNI Database)** check box.

Note We recommend fresh import of the live network.

Leave this check box unchecked, if you want to import the details of only few of the nodes which had issues during the previous import.

Note LNI import is not user-specific. When you perform a fresh import, Cisco ONP overwrites all the LNI data that are imported by the other users.

Step 6 Click **Import**.

Step 7 In the **Device Onboarding** dialog box, click **OK**.

Note If you try to import a network of unsupported version, the device collection does not happen, and an error message "device collection failed" appears. See Supported Hardware and Software for LNI, on page 18.

Step 8 Click **Job Monitor**, and click **Check Progress** for the IMPORT_LIVE_NETWORK task, to view the status of the LNI operation in the **LNI Progress** dialog box. Click **Refresh** to see the updated status.

After LNI is completed, the job is removed from the **Job Monitor** page.

Step 9 Click **Logs** to view the list of events that are related to the LNI operation, as logs.

Step 10 After the completion of the LNI operation, choose **File** > **Open**.

The format of the LNI imported network filename is LNI_<Date>_<Time>.

Step 11 Click the imported network name to view the network under the **Map** tab and its corresponding network tree in the left panel.

The aggregated node including NCS 1004, NCS 2000, and NCS 4000 is indicated in purple color, and the aggregated node including NCS1004 and NCS 2000 is indicated in orange color in the network tree. You can view the tag **Imported from Network** in the top-right corner.

Note

- Even If some errors occur during the LNI operation, the LNI operation is not canceled. In such case, when you open the imported network, a warning message is displayed.
- You can view the errors under the **Elements > Messages** tab.
  - Device collection failure is listed under critical messages.
  - The reason for failure is listed under noncritical messages.
- If both NCS and Non-NCS PIDS are present in the inventory, Cisco ONP enables the **Enable NCS** option. You can edit this option during upgrade after unlocking the site, if necessary.
- Service path for the restored circuits is displayed as follows in the Cisco ONP UI:
  - Primary Path: Working path before restoration
  - Secondary path: Protected path
  - Restoration path: Current work path after restoration

  Note If the circuit is not in the restored state, the restoration path is not shown.
- SSON circuits carrying protected OTN services are merged as Client 1+1 protected Media Channel. Due to this, you may see difference in total number of SSON circuits between the imported network in Cisco ONP and the actual network.
- If LNI is not installed properly, you may encounter the errors such as LNI failure or LNI not able to purge the data. In such cases, we recommend starting and stopping the LNI services in the server where Cisco ONP and LNI are installed using the following commands:
  - Stop the LNI services.

    ```
    root:~/$ONP_HOME# cd LNI
    root:~/$ONP_HOME/LNI# bash ciscolniinstaller.sh -o stop -t update -m offlinemode
    ```
  - Start the LNI services.

    ```
    root:~/$ONP_HOME/LNI# bash ciscolniinstaller.sh -o start -t update -m offlinemode
    ```

Note Wait for a minimum of five minutes after starting the services, for the LNI services to resume before triggering a new live network import. You can

Step 12 Click the **BOM** tab to view the BOM details of the network.

Note The PIDs of prototype cards are shown as "NA" in the BOM details of the LNI network.

You can export the CPZ, import the CPZ, and share the imported network. You can check the properties of the network using the **Entity Editor**.

Ports Used in LNI

LNI application uses the following ports. If any port is shut down due to any failure, then the service is restarted by the Docker system.

Port	Service	Usage
8761	Eureka Service	Registration and discovery service, which holds the information about all microservice applications
8080	API Gateway	Receives all the incoming requests, and then delegates the requests to internal microservices like LNI Broker
8080	Collector Service	Collects metrics and operation data from the devices
8080	Device Manager	Responsible for device onboarding process
8080	Inventory Service	Provides inventory data
9888	TL1 plug-in Service	South bound interface plug-ins for TL1 protocol-based NCS 2000 devices
8888	NCS 2K Inventory Adapter Service	Adapter module to transform NCS 2000 device response from collector to Cisco ONP NCMS schema-based POJO
8888	NCS 4K Inventory Adapter Service	Adapter module to transform NCS 4000 device response from collector to Cisco ONP NCMS schema-based POJO
8888	NCS 1K Inventory Adapter Service	Adapter module to transform NCS 1004 device response from collector to Cisco ONP NCMS schema-based POJO
9976	NETCONF plug-in Service	South bound interface plug-ins for NETCONF based 1K/4K devices
8888	LNI Broker Service	Provides interfaces for Cisco ONP BE service to trigger live network import
8085	Topology Service	Provides network topology data
8090	Circuit Service	Provides network circuit data
8024	NETCONF Adapter Service	Common adapter for Topology and Circuit services
8888	Model Aggregator Service	Aggregates inventory, topology, and circuit details under NCMS schema-based networks
8092	TL1 Adapter Service	Common adapter for Topology and Circuit Service
5601	Kibana	Data visualization and exploration tool that is used for log and time-series analytics, application monitoring, and operational intelligence use cases **Note** The default Edge browser on Windows OS is not supported for viewing the Kibana logs. Cisco recommends using Firefox or Chrome browser for viewing the Kibana logs.
2181	Zookeeper	Keeps track of status of the Kafka cluster nodes, and also keeps track of Kafka topics, partitions publish-subscribe messaging system that enables inter service communication

Port	Service	Usage
9092	Kafka	Publish-subscribe messaging system that enables inter-service communication
5432	Postgres	Database to persist services data

Supported Hardware and Software for LNI

The following table describes the software versions and hardware requirements of the network imported through LNI.

Table 9:

Property	Values
Network	
Network Type	SSON
Platform	ETSI
System Release	NCS 2000: R11.1, and R11.1.1.2 NCS 1004: XR 7.0.1 NCS 4000: XR 6.5.2.8
Site/Node	
Site Type	4K-1K-2K: ADD/DROP, 1K-2K;Regen, 2K:ROADM/OLA
ROADM	SMR-20, SMR-9-17FS, SMR-9-34FS, SMR-9-24FS
Amplifier	RAMAN-CTP, RAMAN-COP, EDFA35-24, EDFA35-35
Degree Mesh Type	DEG-5/UPG-4
Chassis Type	4K: NCS4016, 2K:NCS2006, 1K:NCS1004
Power Supply	4K-DC, 1K-DC, 2K-DC40
ECU	ECU-S
Controller Card	TNCS-2, TNCS-2O
Channel Rule	82
Line Cards	NCS1K4-1.2T-K9=, NCS4K-4H-OPW-QC2
Evolved Mesh	ON and OFF
Node Protection	2K: Separated shelves, 4K: Single shelf

Property	Values
Mpo16Lc	MPO-16LC Unit
Mpo16ToMpo08	MPO16TO2MPO8Cable
Cascaded SMR	Yes
Enable NCS	Yes
Use Payg	No
Connection Verification	Yes, No
MF Unit	MF-6RU, MF6-10RU, or MF-1RU
Structure	Line, Multidegree, Terminal
Scalable upto degree	4, 8, 12
Power redundancy	Yes
IP Address	IPv4
Fiber	
OSC Frame Type	Auto
DCN Extension	Yes
ENE/GNE	Yes
Length	Yes
Loss	Yes
Measurement Unit	KM
Length based Loss	No
Raman Amplified	Yes
Fiber Type	G652-SMF-28E
Connector Loss A	Yes
Connector Loss B	Yes
Cross OSC and Parallel OSC	Yes
Media Channel	
Traffic Type	NCS1004_SP_16QAM_16QAM_300G_27%SDFEC_60GBd
Protection	Unprotected, and 1+R
Path	Actual Path

Property	Values
Regen	Regen site
Multicarrier	No
Contentionless	Yes
Circuit State	Restored, Unrestored
Service	
Service Type	100GE, 10GE, STM-64
Protection	1+1, Unprotected, 1+R, 1+1+R, 1+1+R+R
Path	Actual Path
Client Type (1K)	OTU4
Interface Type (1K)	BH
Trunk Mode (1K)	200G, 300G
Baud Rate (1K)	60 and 69 GBd
Client Pluggable	ONS-QSFP28-LR4=, QSFP-100G-SR4-S=,ONS-QSFP-4X10-MLR=

Limitations of LNI

The LNI feature has the following limitations:

- You cannot perform multiple LNI at the same time.
- Scheduled LNI is not supported.
- LNI does not support the following:
  - Non-SSON Network import
  - Non-Contentionless configuration import
  - Circuit import with NCS 2000 Transponder or Muxponder cards
- Chassis position in layout may not be accurate in the live imported network.

  Workaround: NCS 2000, NCS 1004, and NCS 4000 chassis are placed in separate racks for a better view of the layout. You can edit the same after network upgrade and analysis.
- If X, Y coordinates are not configured in the devices, nodes are overlapped in the Cisco ONP map.

  Workaround: Configure X, Y coordinates before importing the network for a better view of the topology in Cisco ONP map; otherwise, you can drag and drop the nodes in the Cisco ONP map and adjust the node position after importing.

- Scalable up to degree parameter is not imported from the real device. Cisco ONP chooses the maximum scalable up to degree based on the number of line sides and contentionless sides present on the node.

  Workaround: You can unlock node after upgrading and change the scalable up to degree. After unlocking the site, use layout template to rearrange the layout.

- Cisco ONP imports the proto-PID, if any, present in inventory, and show as N/A PID in the Cisco ONP BOM.
- Duplicate media channel label is not supported. If there are multiple media channels with same label present in the network, only one media channel is imported and the rest of them are discarded.
- Fiber name, source, and destination names may not match between the first and the second import. Source and destination site names may interchange for bidirectional fibers.
- If the regenerated demand is in restored state, the restored path is shown as working or protected path, and the service protection is shown as 1+R in Cisco ONP. The restoration details will not be available.
- Service protection type is shown as 1+1+R or 1+1+R+R only if restoration path is available. Otherwise, service protection type will be shown as 1+1.
- Preprovisioned cards are not listed in the Cisco ONP BOM, and they are populated after successful upgrade and analysis of the LNI network. Make sure that the cards are equipped to retrieve the PID details.
- Fibers may not be associated with correct optical subnet if the fibers are not configured with the same channel number at both source and destination ends. Due to this amplifier output power may not be within valid range. Hence, you either correct channel number at both source and destination nodes and re-import the network, or associate the fiber with correct optical subnet after network upgrade in Cisco ONP.

Create Optical Subnet for Non-SSON Networks

An optical subnet is a collection of spans with certain associated properties. When you create a new network, Cisco ONP automatically creates an optical subnet that is associated to the network. At least one optical subnet must exist for each network.



Note Check the **Current Subnet** check box in the properties window, to make the subnet you created as the current subnet. You cannot uncheck the **Current Subnet** check box.

The following procedure creates an optical subnet for Non-SSON networks:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Click **Subnet** in the network tree panel.

Step 2 Click the **Ellipsis** icon available in the right side of **Optical Subnet**.

Step 3 Click **Create Optical Subnet**.

The **Create Optical Subnet** dialog box appears.

Step 4 From the **Cband Rules** drop-down list, choose the C-band design rules for the new optical subnet that you want to create.

Step 5 Click **Save**.

A new optical subnet with the design properties you selected is created and placed in the network tree panel under **OpticalSubnet**.

Note You can select new Cband rules from the **Cband Rules** drop-down list in the properties window.

Note You can add a fiber to a subnet from the **Fiber links** drop-down list in the properties window.

You can also add a fiber to a subnet from the network tree panel. To add a fiber to a particular subnet in the network tree panel, perform the following steps:

- Click the **Ellipsis** icon available in the right side of the required optical subnet and select **Edit Fibers**.

  An **Info** dialog box appears displaying "*Do you want to continue?*.

- Click **OK**.

  The UI freezes. You can only select a fiber from the map.

- Select the required fiber and click the **Done** button appearing near the zoom icon.

  The fiber now appears in the **Fiber links** field. When you select the optical subnet, its corresponding fiber is highlighted in the map.

When a fiber is added to one of the subnets, it will be automatically removed from the other subnets. Only one subnet rule will be associated with one fiber.

Create Optical Subnet for SSON Networks

The following procedure creates an optical subnet for SSON networks:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Click **Subnet** in the network tree panel.

Step 2 Click the **Ellipsis** icon available in the right side of **Optical Subnet**.

Step 3 Click **Create Optical Subnet**.

The **Create Optical Subnet** dialog box appears.

Step 4 From the **Spectral Density** drop-down list, choose the spectral density for the new optical subnet that you want to create.

The **Name**, **CBand Rules**, and **Maximum Number of Channels** the you seenin the **Create Optical Subnet** dialog box, are set based on the spectral density that you have selected.

Step 5 Click **Save**.

A new optical subnet with the design properties you selected is created and placed in the network tree panel under **OpticalSubnet**.

Note You can select a new spectral density from the **Spectral Density** drop-down list in the properties window.

Note You can add a fiber to a subnet from the **Fiber links** drop-down list in the properties window.

You can also add a fiber to a subnet from the network tree panel. To add a fiber to a particular subnet in the network tree panel, perform the following steps:

- Click the **Ellipsis** icon available in the right side of the required optical subnet and select **Edit Fibers**.

  An **Info** dialog box appears displaying "*Do you want to continue?*.

- Click **OK**.

  The UI freezes. You can only select a fiber from the map.

- Select the required fiber and click the **Done** button appearing near the zoom icon.

  The fiber now appears in the **Fiber links** field. When you select the optical subnet, its corresponding fiber is highlighted in the map.

When a fiber is added to one of the subnets, it will be automatically removed from the other subnets. Only one subnet rule will be associated with one fiber.

Create Optical Subnet for NCS 1010 Networks

Note From Release 7.9.1, both C-Band and L-Band optical subnets appear by default for the NCS 1010 networks.

For C-Band and C+L Futuristic networks, the L-Band optical subnet contains no fiber links. To add fiber links for the L-Band optical subnet, you must upgrade the existing network to a C+L-Band network or add an L-Band edge for each C-Band edge.

The following procedure creates an optical subnet for SSON networks:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Click **Subnet** in the network tree panel.

Step 2 Click the **Ellipsis** icon available in the right side of **Optical Subnet**.

Step 3 Click **Create Optical Subnet**.

The **Create Optical Subnet** dialog box appears.

Step 4 From the **Band Type** drop-down list, choose either **C-Band** or **L-Band**.

Note From R7.9.1, **Band Type** drop-down list is available when creating optical subnet for NCS 1010.

Step 5 From the **Spectral Density** drop-down list, choose the spectral density for the new optical subnet that you want to create.

From Release 5.2, the range of spectral density has increased (ranges from 30 to 100).

The **Name**, **CBand Rules** or **LBand Rules**, and **Maximum Number of Channels** values that appear in the **Create Optical Subnet** dialog box are set based on the spectral density that you have selected.

Step 6 Click **Save**.

A new optical subnet with the design properties you selected is created and placed in the network tree panel under **OpticalSubnet**.

Note You can select a new spectral density from the **Spectral Density** drop-down list in the properties window.

Note You can add a fiber to a subnet from the **Fiber links** drop-down list in the properties window.

You can also add a fiber to a subnet from the network tree panel. To add a fiber to a particular subnet in the network tree panel, perform the following steps:

- Click the **Ellipsis** icon available in the right side of the required optical subnet and select **Edit Fibers**.

  An **Info** dialog box appears displaying "*Do you want to continue?*.

- Click **OK**.

  The UI freezes. You can only select a fiber from the map.

- Select the required fiber and click the **Done** button appearing near the zoom icon.

  The fiber now appears in the **Fiber links** field. When you select the optical subnet, its corresponding fiber is highlighted in the map.

When a fiber is added to one of the subnets, it will be automatically removed from the other subnets. Only one subnet rule will be associated with one fiber.

Convert Non-SSON Network to SSON Network

The following procedure converts non-SSON networks to SSON networks:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click a non-SSON network that you want to convert to SSON.

The network opens. Ensure that the network is in **Design Mode**.

Step 3 Choose **Network** > **SSON Convert**.

Step 4 Click **Ok**.

The error message, "Network cannot be converted to SSON due to following errors : [Network contains waves with invalid traffic types: [100G-SD-FEC, 200G-SD-FEC]]" appears.

Step 5 Choose **Network** > **Entity Editor** > **Services**.

Step 6 Expand **Waves** and navigate to trail, and click a trail.

Step 7 Choose any CFP-2optical source from the **Src Card Type** drop-down list.

Step 8 Click **Update**.

Step 9 Choose **File** > **Save**.

Step 10 Choose **Network** > **SSON Convert**.

In the **Warning** pop-up window, choose **4K-2K** or **4K-1K-2K** from the **Traffic Type** drop-down list and click **Ok**. 4K-1K-2K is the defalut option. After the network is coverted, you cannot change the site type from 4K-2K to 4K-1K-2K or vice versa.

- Select SSON optical source from the **Traffic Type** drop-down list in the properties window.
- You cannot convert a non-SSON network with Traffic Sites to SSON.
- To convert a non-SSON network to SSON network in **Analyze** mode, upgrade or release upgrade the analyzed network. In the **Upgrade** mode, or **Release Upgrade** mode network, unlock all the channels, and force CFP-2 optical source.

Convert NCS 2000 Network to NCS 1010 Network

Use the following task to convert an NCS 2000 network (both SSON and non-SSON) into to NCS 1010 network:

Table 10: Feature History

Feature Name	Release Information	Feature Description
Convert NCS 2000 Network to NCS 1010 Network	Cisco ONP Release 5.1	The newly introduced **NCS 1010 Convert** option under the **Network** menu enables you to directly convert an existing NCS 2000 network into an NCS 1010 network. This conversion eliminates the need to build an NCS 1010 network from scratch.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click an NCS 2000 network (non-SSON or SSON) that you want to convert to NCS 1010 network.

The network opens. Ensure that the network is in **Design Mode**, **Upgrade Mode** or **Release Upgrade Mode**.

Step 3 Choose **Network** > **NCS 1010 Convert**.

Step 4 Click **Ok**.

The network does not get converted and shows an error message, when"

- The network contains traffic sites.
- The fiber type is LS or TWClassic.
- The network contains OTN services.
- The traffic Type property is set to anything other than **Optical Source** or **Pluggable Card**.
- If the Traffic Type is 100G-SD-FEC or 200G-SD-FEC in non-SSON networks.

Step 5 Choose **File** > **Save**.

The following parameters get automatically updated after the conversion:

- Contentionless sides are deleted and contentionless demands are automatically changed as colorless.
- Protected channels are converted to two unprotected channels. The path, wavelength, regen sites and cards that are configured are retained.

Share a Network

Use these steps to share a network with one or more users or user groups:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Select a network from the list of networks.

The map of the selected network opens.

Step 3 Choose **File** > **Share**.

Step 4 Select one or more users or user groups from the **Share Network** dialog box.

Step 5 Click **Share**.

You can share the network with selected users or user groups in read-only mode.

Access a Shared Network

Use these steps to access a network shared by another user:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File > Open Shared Network**.

The **Select Network To Open** dialog box appears with a list of networks that are shared by other users.

Step 2 Click a network name from the list.

The shared network opens in read-only mode.

Step 3 Choose **File > Save As**.

Step 4 Enter the name in the **Give a network name** dialog box, and click **Save**.

A copy of the shared network is saved.

Note You can work on this copy of network, depending on the privileges of your user role. For example, if your user role is Designer, you can change the design of the saved copy of the shared network, but you cannot analyze the shared network.

Step 5 (Optional) Share the updated network with other users.

Unshare a Network

Use these steps to unshare a network with one or more users or user groups:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click a network from the list of networks.

The network opens.

Step 3 Choose **File > Share**.

Step 4 In the **Share Network** dialog box, remove the name of one or more users or user groups from the list.

Step 5 Click **Share**.

The shared network is no longer available to the users or user groups that are removed.

Analyze the Network

Table 11: Feature History

Feature Name	Release Information	Description
Detailed Tooltip for Sites on the Map View	Cisco ONP Release 5.1	The **See More Details** option has been introduced in the tooltip displayed on hovering over Sites on the **Map** view of an analyzed network. This option shows the Amplifier data and PSD (Power Spectral Density) profile graph. The **See More Details** option avoids navigating to the **Entity Editor** to view these details.

The Analyze tool allows you to analyze the network after design completion.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click a network that you want to analyze, from the list of networks.

The network opens.

Step 3 Choose **Network** > **Analyze**.

The Cisco ONP analysis progress indicator indicates the analysis status.

If there is any failure in the analysis stage, a dialog box appears with the message, “Analysis Failed.”

Step 4 Choose the **Elements** > **Messages** tab to see the list of error details in the analyzed network..

By default, it shows only the key messages when the **Critical Only** toggle button is enabled. If you want to view the entire network message, disable the **Critical Only** toggle button.

Note

Step 5 If you find an error message under the **Messages** tab, resolve the error and analyze the network again. Repeat this step until all errors are resolved.

Note The error message "Unexpected Situation 999" may occur when the optical simulation becomes inconsistent due to incorrect values of properties entered or modified while designing the network. Call Cisco TAC to know the exact cause of the error and modify the suggested property value for the successful analysis of the network.

Step 6 (Optional) After the successful analysis of the network, to view the details such as **Amplifier Data** and **PSD Profile** graph for a site, hover the mouse over a site and click **See More Details**.

The amplifier data includes output power, EOL gain, attenuator in, attenuator out, and Raman gain. The attenuator details are not displayed for the NCS 1010 site. The PSD profile graph is displayed only for the NCS 1010 site.

Bottom-Up Flow

Bottom-up support enables step-by-step creation of a network. Adding all the services and waves on day 0 itself is not mandatory to analyze the network and view reports. Bottom-up flow enables you to build a network over a period.

Day 0: Create a network with only the topology added. Add all sites and add fibers between them. Analyze the network and view the reports without adding any services or waves.

Day 1: Add waves between the sites that are added on Day 0 and newly added sites and fibers. Analyze the network and view the reports.

Day 2: Add services and tag waves that are created on Day 1 and newly added sites and fibers. Analyze the network and view the reports.



Note After you have created the topology with sites and fibers added, you can add either a service or a wave. You need not follow any specific order.

Bottom-up flow is applicable only for Non-SSON networks. In order to achieve this, you must set A2A mode as A2A_fast in network properties. You can also set the A2A channel type as contentionless, colorless, and colored.

Idle Timeout in the Analyze Mode

If you keep the browser idle for more than 15 minutes, you are logged out of Cisco ONP. The default timeout is set to 15 minutes. The System Admin can disable this feature by changing the enabled option in the configuration file on the server to false. You can change the default time of 15 minutes by editing the duration option in the configuration file.

During a long network analyze cycle, you get logged out due to idle timeout, and the network analysis runs in the background. When you log back, the same network opens in one of the following states:

- If the analysis is still on, the analysis progress bar is shown, and you cannot perform any other action.
- If the analysis is complete, the network opens in the Analyze mode.
- If the analysis has failed, the network opens in the design mode, and you can view the reason for failure on the **Elements > Messages** page.

The session time out does not redirect you to the login page always; so, reload or enter the URL again.

Upgrade the Analyzed Network

Table 12: Feature History

Feature Name	Release Information	Description
NCS 1010 Network Upgrade Flexibility	Cisco ONP Release 5.0	After a network is analyzed, all the network elements get locked. With this feature, you can selectively unlock certain network elements to upgrade the network further. This helps in preventing accidental updates to the part of the network that does not need any modification.

Cisco ONP allows you to upgrade an existing network that is in analyzed mode. You can modify certain properties of a network element in the network while retaining the existing network layout and design in the locked state. Upgrade is supported for NCS2K, NCS4K-2K, NCS4K-1K-2K and NCS1010 networks.

Use these steps to upgrade your network:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the analyzed network that you want to upgrade.

The network opens.

Step 3 Choose **Network** > **Upgrade**.

Step 4 Click **Yes** in the **Warning** dialog box.

The message “Network Upgraded Successfully” appears. The network goes into upgrade mode and network elements such as sites, fiber, waves (for non-SSON), media channel (for SSON), and circuits (for NCS 1010) are locked.

Step 5 Click the **Ellipsis** icon available in the right side of the network element that you plan to modify from the network tree panel, and choose **Unlock**. You can unlock individual element and one at a time for multiple elements until the lower level in the network tree hierarchy.

For example, you can hierarchically unlock at the node level, side level, side add/drop card level, and side amplifiers level.

If you want to change only the add/drop between MD-32-ODD/Even or BRK_24/16/8 in the NCS 1010 network, you can unlock the add/drop without unlocking the network elements that are higher in the hierarchy.

Step 6 You can make the following modifications according to your requirement:

a) Edit the properties of network elements.
b) Delete the network elements from the network.

c) Add a new site, wave, services, demands, optical subnet, or fiber into the network map.

The newly added elements are automatically displayed in the network tree panel, and by default, remain unlocked.

Note You can insert a node in the upgrade mode only for the unlocked fiber. Therefore unlock the fibers that are connected to the node and add nodes to the network.

Step 7 Choose **File** > **Save**.

Step 8 Choose **Network** > **Analyze**.

After the analysis is completed, the newly added elements are locked, and the optical reports and installation parameters of the upgraded network are updated.

When you add services or fibers while upgrading a network that has where layout template is applied, the template gets updated with the newly added service or fiber. You can export this template, make changes and reapply it to another network.

Step 9 Choose **Network** > **Design** to further upgrade the newly upgraded network design.

When you upgrade a network every time, Cisco ONP saves the new version of the network as a child network, and maintains the parent and child relationship.

Upgrade LNI Network

Table 13: Feature History

Feature Name	Release Information	Feature Description
Upgrade LNI Network	Cisco ONP Release 4.1	This feature allows you to upgrade and modify the imported LNI (Live Network Import) network as required. You can also correct LNI errors, reanalyze the network, and view the updated parameters such as BOM, layout, connections, and optical results.

The Upgrade feature can be used to correct LNI errors, modify the network, reanalyze the network and view updated BOM, Layout, Connections, and Optical Results.

Use these steps to upgrade the LNI network:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click a network imported through LNI that you want to upgrade.

The network opens.

Step 3 Choose **Network** > **Upgrade**.

Step 4 Click **Yes** .

The message “Network Upgraded Successfully” appears. After upgrading the network, the network goes into upgrade mode, and network elements such as Sites, Fiber, OTN Services and Media Channels are locked.

You can modify certain properties of the network element, while retaining the existing network layout and design locked.

Step 5 Click the **Ellipsis** icon available in the right side of the network element that you plan to modify from the network tree panel, and choose **Unlock**. You can unlock individual element and multiple elements until the lower level in the network tree hierarchy.

For example, you can unlock node level, side level, side add/drop card level, and side amplifiers level.

Step 6 You can make the following modifications according to your requirement:

a) Edit the properties of network elements.
b) Delete the network elements from the network.
c) Add a new site, wave, services, demands, optical subnet, or fiber into the network map.

The newly added elements are automatically displayed in the network tree panel, and by default, remain unlocked.

Note
- Unlocking media channel has few constraints. See Media Channel Unlocking Scenarios, on page 33.
- Cisco ONP automatically sets the scalable up to degree value based on certain design rules, as this value is not present in the network that is imported through LNI. Hence, we recommend you to check and update the actual scalable up to degree value, if necessary.

Step 7 Choose **File** > **Save**.

When you upgrade a network every time, Cisco ONP saves the new version of the network as a child network, and maintains the parent and child relationship.

Step 8 Choose **Network** > **Analyze**.

Note Analysis is successful only if a consistent and valid network is imported from LNI.

Step 9 If the analysis fails, go to **Elements** > **Messages** tab and check for the failure reason.

Step 10 If any validation error is thrown from any component, resolve the issue by manually changing the network or by reimporting the LNI networks after correcting some configuration on the live network. See Possible Error Scenarios and the Workarounds, on page 34.

Step 11 Re-Analyze the network.

Step 12 Click **Layout** tab and edit the layout manually to adjust chassis or card position for NCS 4000 and NCS 1004 platforms. See

Step 13 Click the **BOM** tab, and the **Results** tab to view the BOM and optical results.

Note

a. If the LNI inventory has any unconnected cards, that will be removed from the CONP reports after upgrading and analyzing the LNI network.

b. The following PIDs are added in the Cisco ONP BOM after upgrading and analyzing the LNI network. These PIDs are not part of the LNI network BOM.

- Pre-provisioned PIDs
- Release software PIDs
- Optical cables—Cables used for Internal Patch-cord Connection (IPC) is not imported in LNI as this data cannot be retrieved from device
- Attenuators
- SMR port license PIDs—Only SMR card PID is imported as part of LNI. If licensed PID is retrieved, corresponding port licenses are added after upgrading and analyzing the LNI network, based on the number of ports used
- USB cables—Added if pre-provisioned passive cards present
- Blank cards—Blank cards are not imported. They are added in Cisco ONP after upgrading and analyzing the LNI network

Media Channel Unlocking Scenarios

The following table explains the various media channel conditions and the unlocking possibilities.

Table 14:

Conditions	Unlocking Possibilities
Channel has OTN services going over it. For 4K-2K, the service is directly mapped to the channel, and for 4K-1K-2K, the service is mapped via OTU4 trail.	Cisco ONP throws an error indicating that there are OTN services associated with the media channel. You can neither update nor delete the channel. To unlock and delete the media channel, unlock associated OTN services first and then unlock the media channel.
Channel does not have OTN services going over it. For example, in case of 4K-1K-2K, the media channel carries empty OTU4s.	Cisco ONP allows you to unlock the channel but does not automatically clear the properties of the channel or its child entities such as Trail and Section, irrespective of whether the properties or user-defined or auto-assigned. Also, the channel is not unlocked automatically, if it has any associated OTU4. After unlocking the channel, you can delete the channel, but cannot update the properties of the channel or its child entities. (When the properties of the media channel or its child entities are auto-assigned, only wavelength is cleared and set to Auto, and all other properties are not cleared.)

Conditions	Unlocking Possibilities
Channel has neither OTN services nor OTU4(s) going over it. In case of 4K-1K-2K networks, Media Channel does not carry even empty OTUs.	Cisco ONP allows you to unlock the channel and automatically clears auto-assigned properties. After unlocking you can perform the following: • Update various properties of the channel and its child entities. • Delete the channel.

Possible Error Scenarios and the Workarounds

Following table describes the workarounds for the errors that are shown under the **Elements > Messages** tab.

Table 15: Error Scenarios and the Workarounds

Error Message	Workarounds
Device Authentication failure	Check the username and password of the device, which is given in LNI input Excel and retry LNI import with valid device credentials.
Device collection failed or Device not reachable.	Check for any connectivity issue in the setup, fix it and retry LNI import.
In Site4.A, output power setting is not supported by the amplifier.	Unlock C-Band amplifiers for side A inside Site4 in the Network tree and force the valid output power. If not sure, set it to Auto and analyze. Cisco ONP chooses the best value based on the configuration.
Cannot Route demand! Did not find any valid Omnidirectional Side.	For protected OTN service or SSON service, a minimum of two contentionless sides must be present on the source and destination sites. Check and add contentionless sides on the target service source and destination site and analyze.
• Demand OTU3 has unrecognized type [OTU3] • ServiceGroup does not support the demandType OTU3 for OTU3	Only 100GE, 10GE, and STM-64 service rates are supported. If any other service rate is present in the network, unlock the specific service, change it to one of the supported service types and update the ODU time slot accordingly and analyze.
Primary OTN Demand [100GE_Flex] has invalid Timeslot ranges. Allowed ranges are [1-80]	100GE service type must have ODU time slot in the range of 1–80. If any other value is set, update the correct value or leave it blank so that Cisco ONP can set it to the correct value.
Cannot complete mesh connections at Site3.	Unlock the site and reanalyze.
No OTN demand found for NCS4K trunk port - NCS4016-B - OTU40/8/0/1.	No action required. This is an information message to the user.

Error Message	Workarounds
Fiber between Node1.A and Node2.B has an invalid value in connector loss value	Unlock the corresponding fiber couple and update the correct connector loss value to be greater than zero. The typical value is 0.2.
Fiber between Nod1.C and Node2.C has an invalid value in Tot SOL Loss w/o Connectors.	Unlock the corresponding fiber couple and update the correct Tot SOL Loss w/o Connectors. The value should be greater than zero.
Span Fiber-2 is forced as Raman but no traffic is present.	Remove Raman forcing on the fiber, or check and force the path for any service so that it goes through Raman enabled span.
Couple Fiber-2 has Raman enabled on the duct but corresponding Raman Forcing is missing.	Force RAMAN-CTP or COP on the Fiber-2 connecting node interface or remove RAMAN forcing on the Fiber-2

Note No specific action is required for noncritical messages. These are just information messages to the user.

Upgrade the Software Release of a Network

Table 16: Feature History

Feature Name	Release Information	Feature Description
Release Upgrade	Cisco ONP Release 4.1	This feature allows you to choose the NCS 2000 system release to the desired release (11.1.0, 12.0.1, or 12.1.0), while performing the release upgrade of CTP network, Cisco ONP network, network imported through Excel, and LNI network.

You can upgrade the software version of a network that is imported from CTP, the network created in Cisco ONP, LNI Network, and Excel imported network to any desired release. Release upgrade is supported for both SSON and non-SSON networks having NCS 2000 nodes with ROADM, OLA, Traffic, or the Passthrough functionality.

Release upgrade is supported starting with NCS 2000 Release 11.1.0.

Note NCS 2000 supports SVO from the Release 12.1.0.

The following table lists the releases to which the existing system release can be upgraded, for each type of network..

Network	Upgrade Release
CTP network (.mpz)	• From 11.0.0 to 11.1.0, 12.1.0, 12.2.0, and 12.3.1 • From 11.1.0 to 12.1.0, 12.2.0, and 12.3.1
Cisco ONP network	• From 11.0.0 to 11.1.0, 12.1.0, 12.2.0, and 12.3.1 • From 11.1.0 to 12.1.0, 12.2.0, and 12.3.1 • From 12.1.0 to 12.2.0, and 12.3.1
Excel imported network	• From 11.0.0 to 11.1.0, 12.1.0, 12.2.0, and 12.3.1
LNI network	11.1.0 to 12.0.1, 12.1.0, and 12.3.1 11.1.0 to 12.1.0, 12.2.0, and 12.3.1 **Note** You cannot directly release upgrade an LNI network. Perform the following: • Upgrade the LNI network. see Upgrade LNI Network, on page 31) • Analyze the network. (see Analyze the Network, on page 28 • Release upgrade the analyzed LNI network.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the network in which you want to perform system release upgrade.

The network opens.

Step 3 Choose **Network** > **Release Upgrade**.

Step 4 Choose the **System Release** of NCS 2000, to which you want to upgrade, from the drop-down list.

Step 5 Click **Submit**.

The upgraded network is saved as a child network.

The network elements are locked in the network tree after the release upgrade. You can unlock and modify the elements.

Note If the PMD coefficient does not get updated with the expected value, update the fiber type first, followed by the PMD value when you edit the fiber properties.

Plan Mode

Table 17: Feature History

Feature Name	Release Information	Feature Description
What-if Analysis for OTN Services	Cisco ONP Release 4.1	This feature extends the current implementation of What-if analysis for the OTN Services that are connecting the aggregated nodes. The failure report includes the number of failed services, restored services, and unrestored services. This feature is supported for SSON (4K-1K-2K and 1K-2K) and non-SSON (4K-2K) networks.

Plan mode enables you to perform what-if analysis on the existing network resources, such as failing and restoring the fiber, OTN services, and site. This mode is applicable only for PLANNER and ADMIN roles. This mode simulates the actual network behavior during failure and determines whether a service can be rerouted; however, this mode does not suggest how to turn-up new wave lengths, insert new nodes, cards, or ports, and so on.

The network can enter the **Plan** mode only from the **Analyze** mode. The what-if analysis can be done on the NCS 2000 aggregated node (ROADM, OLA, Passthrough), Traffic node (1K-2K, 4K-2K and 4K-1K-2K), the node created in Cisco ONP, CTP imported (mpz), and LNI imported networks.

Enter the Plan Mode

The following procedure shows how to enter the Plan mode:

Before you begin

Log in to Cisco ONP Web Interface as a user with admin or planner role.

Step 1 Open the network in Analyze mode.

Step 2 Choose **Network** > **Enter Plan Mode**.

Switching to Plan Mode progress bar appears. The message, *Entered Plan Mode successfully* appears in the **Success** dialog box.

Exit the Plan Mode

The following procedure shows how to exit the Plan mode:

Before you begin

Log in to Cisco ONP Web Interface as a user with admin or planner role.

Step 1 Open the network in the Analyze mode.

Step 2 Choose **Network** > **Exit Plan Mode**.

Fail a Fiber

The following procedure shows how to fail a fiber or a list of fibers in the Plan mode:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Expand the **Fibers** option in the network tree panel.

Step 2 Click the **Ellipsis** icon available in the right side of the fiber, and click **Fail**. You can choose multiple fibers to fail by checking the check boxes next to the fibers.

All media channels or waves, OTN services, and demands that pass through the failed fiber fail. You can see the failed media channels from the Map option or from the network tree.

Note
- You can also fail a fiber or undo a fiber failure from Map.
- You can view the unrestored channel details in the failure report and the reason for restoration failure under **Elements** > **Messages** tab.
- Failed channels are indicated with a red cross symbol, impacted fibers are marked with yellow cross symbol, and the restored channels with a green tick symbol.

Undo Fiber Failure

The following procedure shows how to undo fiber failure in the Plan mode:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 In the network tree panel, click **Fiber**.

Step 2 Click the **Ellipsis** icon available in the right side of the failed fiber, and click **Undo Fail**.

Create a Failure Set

You can click any set of fibers or sites, click the **Ellipsis** icon available in the right side, and fail them. The failed fibers or sites are marked with a red cross mark beside them. You can also choose multiple fibers or sites.

- Cisco ONP saves the user created failure sets.
- You can save multiple failure sets under a given failure group.

The following procedure shows how to create a failure set:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Click the **Ellipsis** icon available in the right side of the **Failure Groups** option in the network tree panel.

Step 2 Click **Add Failure Group**.

A Failure group gets created.

Step 3 Choose the **Fibers or Sites** to fail by checking the check boxes next to the them.

Step 4 Click the **Ellipsis** icon available in the right side of the chosen **Fibers or Sites** and click **Fail**.

Step 5 Select the network name, and right-click.

Step 6 Click **Add Failure Set**.

Step 7 Select the Failure Group to which the failed fibers or sites must be added.

The Failure Set gets created under the Failure Group. The failed fibers or sites are added to the created **Failure Set**.

Note If networks have dark fibers (which does not carry any traffic), that path is not considered for restoration.

Fail a Site

The following procedure shows how to fail a site or a list of sites in the Plan mode.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Expand the **Sites** option in the network tree panel.

Step 2 Click the **Ellipsis** icon available in the right side of the site, and click **Fail**. You can choose multiple sites to fail by checking the check boxes next to the sites.

You can also fail a site from the network map view.

Undo Site Failure

The following procedure shows how to undo the site failure in the Plan mode:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 In the network tree panel, click **Site**.

Step 2 Click the **Ellipsis** icon available in the right side of the failed site, and click **Undo Fail**.

You can also undo the site failure from the network map view.

Failure Report

The failure report shows the following parameters:

Report	Description
Failed Fibers	Shows the failed fibers in the network.
Failed Sites	Shows the failed sites in the network.
Impacted Fibers	Shows the fibers that are impacted due to the site failure.
Total Channels	Shows the total number of media channels in the network.
Failed Channels	Shows the total number of media channels that are passing through the failed ducts or sites in the network.
Restored Channels	Shows the total number of media channels that are restored from the failure state.
Unrestored Channels	Shows the total number of media channels that are not restored from the failure state due to the unavailability of alternate paths.
Fiber HotZones	Shows the fibers that have utilized greater than or equal to 80% of the bandwidth. You can modify the threshold by updating the value in the Feature.Properties file. • **Fiber**: Shows the fibers that are listed under fiber hot zones. • **Utilization Before (%)**: Shows the percentage of bandwidth that is utilized before the channel restoration. • **Utilization After (%)**: Shows the percentage of bandwidth that is utilized after the channel restoration.
Total Services	Shows the total number of services going through the fiber that was failed.
Failed Services	Shows the number of failed services going through the fiber that was failed.
Restored Services	Shows the number of restored services going through the fiber that was restored.

Report	Description
Unrestored Services	Shows the number of unrestored services going through the fiber that was restored.

:

Export Failure Report

The following procedure shows how to export the failure report.

Before you begin

Log in to Cisco ONP Web Interface.

Choose **Export** > **Failure Report** to export the failure report as an Excel sheet.

You can save the Excel sheet.

Export Failure Report from Map

The following procedure shows how to export the failure report from the map:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Click **Failure Report** under **Map**.

Step 2 Click **Export** to export the failure report as an Excel sheet. You can save the Excel sheet.

Restore Failed Channels

The following procedure shows how to restore the failed fibers:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **Network** > **Enter Plan Mode**.

Step 2 Click **Restore**.

The message, "Restoration is in progress" appears.

Step 3 Click **Failure Report** to view the number of media channels that are restored or unrestored.

Note Restored channels are indicated with a green color tick mark in the network tree and map.

All media channels or waves, and demands that pass through the restored fiber also get restored. The Path Computation Element (PCE) supports the restoration of the OTN services based on the optical feasibility and OTN constraints.

Automatic Suggestion for Regeneration Sites in Plan Mode

Table 18: Feature History

Feature Name	Release Information	Feature Description
Automatic Suggestion for Regeneration Sites	Cisco ONP Release 5.0	Cisco ONP displays feasibility report in the Plan mode. This report automatically suggests regeneration sites for the channels with high and marginal risk of failure. You can incorporate these regeneration sites in the optical network to make the channel optically feasible. This feature avoids multiple iterations required to manually create the regeneration sites and test the optical feasibility of large networks.

Cisco ONP submits the networks that are not optically feasible (the channels that have marginal and high risk of failure assessed based on the EOL and SOL indicated as red, and orange in the **Optical Results** page). PCE runs a regen suggestion algorithm and suggests the regeneration sites. When you enter the plan mode, Cisco ONP displays regen sites in the **Feasibility Report** displayed at the bottom of the map. You can apply the suggested regen sites to make the network optically feasible.

Auto regen site suggestion is supported for both SSON and non-SSON network that has contentionless channels or waves between NCS2K (ROADM) or 4K-1K-2K(TRAFFIC) sites.

If the channels have already regen forced, the regen suggestion is shown at sections level.

The Feasibility Report table includes the following fields:

Table 19: Feasibility Report

Field	Description
Channel Name	Displays the list of channels (trail and sections) that are not optically feasible.
Alarm	Displays the color of alarm (red, orange, or yellow)
Paths	Displays the actual path of the channel as hyperlink. If you click the link, the path is highlighted in the map.

Field	Description
Suggested Regens	Displays the intermediate sites that can be used as regen sites so that the channel becomes optically feasible.

You can also export the report by clicking **Export**.

The **Suggested Regen** field is displayed as NA for the following reasons:

- The channels with yellow alarms, as the loss is negligible.
- When the loss is high and the number of available intermediate sites are not enough to compensate the overall loss.
- The intermediate sites where no contentionless sides are added will not be considered for regen sites.

Apply Suggested Regen

Use this task to apply the suggested regeneration sites to make the network optically feasible.

Before you begin

Log in to Cisco ONP Web Interface as a user with admin or planner role.

Step 1 Enter the Plan Mode, on page 37.

Step 2 Choose **Network** > **Open Feasibility Report**.

The **Feasibility Report** is displayed at the bottom of the map.

Step 3 Select the channels for which regeneration has to be applied and click **Apply**.

Step 4 Click **Ok** in the **Suggested Regen Applied** dialog box.

Step 5 Click **Exit Plan Mode**.

Step 6 Click **Yes** in the **Warning** dialog box.

The network gets auto upgraded and saved as a new network. The channels with regens applied are unlocked with the Regen Sites property auto updated and noneditable.

Step 7 Analyze the network.

In the **Optical Results** page, the SOL, and EOL fields become green, and the channels are not displayed in the feasibility report again when you switch to the plan mode.

Line Rate Tuner Mode

Table 20: Feature History

Feature Name	Release Information	Feature Description
Automated Selection of Optimal Wavelength Bitrate: Flexible Modelling	Cisco ONP Release 5.2	You can now automate the calculation of optical sources for your networks using the new Line Rate Tuner Mode. This mode reduces human errors while finding the correct optical source for your network from a set of network resources.

Line Rate Tuner Mode significantly reduces turnaround time, avoiding manual calculation of different possibilities of network resources.

Enter the Line Rate Tuner Mode

Use these steps to enter the Line Rate Tuner mode.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Open the network in Analyze mode.

Step 2 Choose **Network** > **Enter Line Rate Tuner Mode**.

Switching to line rate tuner mode.. progress bar appears.

The network opens in the Line Rate Tuner Mode.

Create a Custom Optical Source

Use this procedure to create a custom optical source.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Open the network in Line Rate Tuner mode.

Step 2 Click **Open Tuner Input**.

Input Tuner pane appears below the map area.

Step 3 In the network tree, select the section of the media channel that you want to add the tuner input.

In **Select Input Parameters**, the selected section appears with default parameter values.

Step 4 Modify the following Input Parameters as required.

Property	Platform	Description
Optical Family	NCS 2000 SSON NCS 1010	Choose the optical family. Based on the analyzed network, Cisco ONP provides the options. Based on the optical family chosen, the remaining parameters provide related options.
Optical Source	NCS 2000 SSON NCS 1010	Choose the optical source. Based on the optical sources that are already imported, Cisco ONP provides the list of optical sources.
Data Rate	NCS 2000 SSON NCS 1010	Choose the data rate. Based on the optical family chosen, Cisco ONP provides options to choose the channel capacity for the new section.
Bit Rate Range	NCS 2000 SSON NCS 1010	Choose the bit data rate. Based on the optical family chosen, Cisco ONP provides options to choose the speed of data transfer in the new section.
Baud Rate Range	NCS 2000 SSON NCS 1010	Choose the baud rate range. Based on the optical family chosen, Cisco ONP provides options to choose the minimum signal width for new each channel.
FEC Type	NCS 2000 SSON NCS 1010	Choose the FEC type. Based on the optical family chosen, Cisco ONP provides the list of supported FEC types
Result Type	NCS 2000 SSON NCS 1010	Choose the Result Type. The available options are: • Best OSNR—Provides results based on maximum OSNR margin. • Maximum Capacity—Provides results based on the maximum capacity of the channels.
Optical Feasibility	NCS 2000 SSON NCS 1010	Choose optical feasibility for the new section. The available options are: • Green • Yellow • Orange • Red Each color represents the severity of alarms that may arise in the new section.
Sigma Number	NCS 2000 SSON NCS 1010	Choose the sigma number from 0 to 3. The sigma number calculates the OSNR margin.

Property	Platform	Description
Number of results	NCS 2000 SSON NCS 1010	Choose the number of optical source results that you want for the new section. The default value is set as 5. However, you can choose up to 15 results.

Step 5 (Optional) Click **Reset** to reset the modified parameters to default values.

Step 6 Click **Add**.

In **Select Section**, *Tuner Input is added successfully. Please refer the below table for the added inputs* message appears.

The **Select Section** pane provides the details of the modified section.

Table 21: Select Section Parameters

Section Parameters	Description
Section Label	Name of the modified section.
Src Site	Site name for the optical channel source.
Dst Site	Site name for the optical channel destination.
Path	Fiber paths in the section.
Actions	Icons to edit or delete the modified section.

Step 7 (Optional) To modify or delete the section, choose the following icons as required:

Icon	Actions
Pencil	Edit Input—Modifies the section
Trash Bin	Delete Input—Deletes the section

To edit the modified section:

a. Click the pencil icon.

b. Modify the input parameters as required.

c. Click **Update** to update the edited section parameters.

To delete the modified section:

a. Click the trash bin icon.

A confirmation message appears.

b. Click **Yes**.

Step 8 Click **Run Tuner** to trigger the simulation.

The *Running Tuner Analysis* progress bar appears. The message, *Tuner analysis completed successfully* appears.

Step 9 In **Tuner Result**, click **Export** to export the results as an Excel sheet.

Start the New Tuner Analysis

Use these steps to start a fresh tuner analysis for the new section.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Open the network in Line Rate Tuner mode.

Step 2 Click **Start New**.

The **Start New Tuner** dialog box appears asking for a confirmation.

Step 3 (Optional) Check the **Retain the tuner inputs** check box to retain the previous input values.

Step 4 Click **Yes**.

The message *Started new tuner successfully* appears.

Step 5 Modify the input parameters of the new section.

Step 6 Click **Update**.

Step 7 Click **Run Tuner** to trigger the simulation.

The *Running Tuner Analysis* progress bar appears. The message, *Tuner analysis completed successfully* appears.

Open the Custom Optical Source Tuner Result

Use these steps to open the tuner results for the customized optical sources.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Open the network in Line Rate Tuner mode.

Step 2 Click **Open Tuner Result**.

The **Tuner Result** pane appears.

Add the Custom Optical Source to the Network

Use these steps to add the custom optical sources to the network.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Open the network in Line Rate Tuner mode.

Step 2 Click **Open Tuner Result**.

The **Tuner Result** pane appears displaying the new sections and their demand channels.

The result provides the following action icons to add the optical sources to the network.

- **Add Demand to Network**—Click this icon to add the demand to the network.
- **Download Optical Source**—Click this icon to download the optical sources as an Excel sheet to review offline.

Step 3 To add the optical source to network, perform one of the following actions:

To add manually:

Note For some custom optical source results, the download icon becomes disabled. In that case, go to **Manage** > **Optical Source** to download the optical result as explained in Download Optical Sources.

a. Click download icon.

The *Downloading Optical Source* message appears. The Excel sheet contains data in Cisco ONP format.

b. Open the Excel sheet to review the data.

c. Import optical source as explained in Import Optical Sources.

To add automatically:

a. Click the add icon.

The **No. of demands** pop-up appears asking for the number of demands to add to the network.

b. Enter the demands number and click **Add**.

The *Demand is added successfully* message appears.

The new demand appears in the network tree. Along with the demand, the CONP adds the required optical source also automatically to the server.

Exit the Line Rate Tuner Mode

Use these steps to exit the Line Rate Tuner mode.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Open the network in Line Rate Tuner mode.

Step 2 Choose **Network** > **Exit Line Rate Tuner Mode**.

The **Exiting Tuner** dialog box appears.

Step 3 Choose the following action as required.

Button	Actions
Previous State	Moves the network to previous state with applied changes.
Upgrade	Moves the network to Upgrade mode with applied changes.
Cancel	Cancels the operation.

The network exits the Line Rate Tuner mode.

Import Optical Sources

Table 22: Feature History

Feature Name	Release Information	Feature Description
Create Optical Source using Excel Sheet	Cisco ONP Release 5.0	You can create an optical source by defining the details of interfaces and the corresponding optical classes in an Excel template. This feature provides you with the flexibility to create any required optical source based on existing or new traffic resources.

Optical Source Wavelength is a way to connect a DWDM interface from any external element to a third-party optical network.

Use this procedure to import an optical source:

Before you begin

Log in to Cisco ONP Web Interface.

If you want to import the optical sources from an Excel sheet, download the template by choosing **Export** > **Optical Source Template**. Fill the necessary details in the **Interfaces** and **Optical Classes** sheets of the downloaded template and save the file. See Optical Parameters Available in the Excel Sheet for Optical Sources Creation, on page 50.

The fields in the columns D, E, and F that are not mandatory are hidden by default in the Interfaces sheet of the template. You can expand the columns and fill the details.

Step 1 Choose **Manage** > **Optical Source**.

The **Manage Optical Source** dialog box appears. The default optical sources available in the server are:

- OpticalSources_NCS2K_400GXP-LC_NCS4K-4H-OPW-QC2

- NCS1004_OpticalSources_V3
- ONS-CFP2D-400G-C-OpticalSources-V2.mxd
- QDD-400G-ZRP-S-OpticalSources-V2.mxd

Note By default, all existing optical source files are loaded in the server.

Step 2 To import optical source as .mxd file:

a) Click **Add**.
b) Choose **Optical Source (.mxd)**

The **Import Optical Source (.mxd)** dialog box appears.

c) Click **Choose File** and browse to the .mxd file stored in your local system, and click **Import**.

After the optical source is imported, a list of related interfaces appears.

Step 3 To import the optical source from an Excel sheet:

a) Click **Add**.
b) Choose **Optical Source (.xlsx)**

The **Import Optical Source (.xlsx)** dialog box appears.

c) Click **Choose File** and browse to the .xls file (optical source template) saved in your local system, and click **Import**.
d) Choose the **Release Version** of the NSC2K network.
e) Select the interface.
f) Click **Create**.

After the optical source is imported, a list of related interfaces appears.

Step 4 Choose the interfaces to import by checking the check box next to them. The selected interfaces get added to the **Type** drop-down list in the properties window of the network tree.

When you create waves, you can use the interfaces in the **Type** drop-down list.

Optical Parameters Available in the Excel Sheet for Optical Sources Creation

The following parameters are available in the Excel sheet template for creating optical sources.

Table 23: Optical Parameters for Creating Optical Sources

Parameters	Description
Interface Name	The name of the interface. It should be unique for all the interfaces that are added in the file.
Vendor Name	The name of the vendor.
Vendor IDs	The vendor IDs.

Parameters	Description
Platform	The name of the platform.
Pluggable PID	The PID of the pluggable.
Name	It is the combination of the Data Rate and Open Config Code. For example: R400G#5000.
FEC	The forward error correction type for the given interface.
Data Rate	The line rate for the given interface.
Mod Format	The modulation format to be used for the interface.
Baud rate	The baud rate for the given interface.
BPS	The speed of data transfer (bits per symbol) for the given interface.
Open Config Code	The unique code assigned to the interface as specified by the Open Industry Standard for optical networks. For example: 5000.
Sub Mode	Enter the sub-mode if there are any associated with the interface. If not, leave it blank.
Trunk Rate	The trunk rate of the transponder.
Nominal Bit Rate	The bit Rate for the interface
BER Target	The post FEC BER Target for the interface
Power Min and Power Max	The minimum and maximum Tx Power for the interface.
Ovl	The overload power limit for the interface
OL Power	The Rx power sensitivity for the interface.
OL OSNR	The Rx OSNR sensitivity for the interface.
PL Power	The extended Rx power sensitivity.
PL OSNR	The Rx OSNR sensitivity at the extended Rx power sensitivity.
Variance	The variance in power in the Txp.
Opt Class	The optical class to which the interface will be mapped.
InBand OSNR	The Tx OSNR contribution due to laser instability inside the Txp.

Parameters	Description
Out of Band OSNR	The Tx OSNR contribution due to Add/Drop at 80% and 100% channel spectral density.
ONC Release	The Software release of Cisco ONC from which this interface will be supported.
Interface Type	It is the same as the name of the interface.
Min and Max Frequency	The operating frequency range of the interface.

Table 24: Optical Class Parameters

Class Parameters	Description
Interface Type	The name of the interface. Enter the same name of the interface, if you are doing one to one mapping with the interface.
Opt Class	You can create the optical classes for different optical sources. Certain optical parameters are added in the optical class. Based on interface properties, multiple interfaces can be mapped to the same class. Enter a unique alphanumeric name for the Optical class. While creating new optical classes, we recommend using the name starting with "X" to avoid overlapping in the existing classes.
Bit Rate	The bit rate for the given interface.
Baud Rate	The baud rate for the given interface.
ModGB Coeff	The modulation guard band coefficient.
Modulation OSNR Penalty	The modulation OSNR penalty.
GBf	The filtering GuardBand at different OSNR penalties.
Mux/Demux Filtering Penalty	Enter the mux/demux filtering penalty value, if there are any.
Chromatic Dispersion	The chromatic dispersion limit at different OSNR penalties.

Find Optical Sources Faster

Use these steps to find the optical sources faster.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Choose **Manage** > **Optical Source**.

The **Manage Optical Source** dialog box appears.

Note By default, all existing optical source files are loaded in the server.

Step 2 To find the customized optical sources:

a. Check **Show only line rate tuner generated sources**.

The dialog box displays only the customized optical sources.

Step 3 To filter the required optical source:

a. Enter the optical source name in the Search box.

The dialog box displays the optical sources matching the typed keyword.

Download Optical Sources

Use this procedure to download an optical source:

Step 1 Choose **Manage** > **Optical Source**.

The **Manage Optical Source** dialog box appears.

Step 2 Choose an optical source to download.

Step 3 Click **Download** and select one of the following options to download the optical sources.

- .mxd—Downloads the selected optical sources as .mxd file.
- .xlsx—Downloads only the optical sources which were created and added using the Excel template, as .xls file. Others such as the optical sources which were directly added as .mxd file, are not included in the .xsl file.
- .xml—Downloads the optical source data as a .xml file. This file contains the application codes for circuit provisioning in Cisco ONC, optical parameters of the interfaces, PIDs, and Vendor ID information. You can load the .xml file into Cisco ONC to create circuits with these optical source interfaces. See Alien Import.

  After the import is successful, the optical source will be present under the **Application Code** tab in the **Service Manager** screen of the Cisco ONC application. See Service Manager.

Delete Optical Sources

Use this procedure to delete an optical source:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **Manage** > **Optical Source**.

The **Manage Optical Source** dialog box appears.

Step 2 Choose an optical source to delete.

Step 3 Click **Delete** to delete the selected optical sources.

Layout Template for NCS 2000 Network

Layout templates are reusable templates that are used to design layout configurations for the NCS 2000 network. When you have an NCS 2000 network with fixed layout rules applicable for multiple nodes, you can use these templates to accurately set up the layout for those nodes. These templates save you time, effort, and they minimize errors.

Note Layout template is not supported for a mix of TXP and Real card label of transponders.

Export Layout Template

Table 25: Feature History

Feature Name	Release Information	Feature Description
Layout Template Enhancement	Cisco ONP Release 4.1	This feature allows you to export the layout template for an individual site or for all the sites. The layout template export is possible only if the network is analyzed in Cisco ONP Release 4.1. The export of layout template is supported on 4K, 4K-1K-2K, and 2K nodes.

Use the following procedure to export the layout template of a specific site or all sites:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the network whose network layout template you want to export.

The network opens.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** tab.

Step 5 Click the name of a site in the left side panel, for which you want to download the layout template.

Step 6 Hover the mouse pointer over the **Export** icon and click **Layout Template** for **Current site** or **All Sites**.

The **Export Layout Template** dialog box appears.

Step 7 Click **Export**.

Note
- We recommend that you export the layout template only in the analyze mode. Exporting layout templates in the upgrade and release upgrade modes may be inaccurate.
- You can export the layout template for node of the type 4000 and 1000, but the exported layout template will contain only the layout of NCS 2000 nodes. To export the layout template for the node type NCS4K-1K-2K and NCS1K-2K, perform the following:
  - Right click the site name in the **Layout** panel, and click **Export**.
  - Click **OK** to export the layout template in text format.
- The NCS 2000 layout template is in XML format.

Import Layout Template for NCS 2000 Network in to Cisco ONP Database

Use the following procedure to import a template for NCS 2000 Network into the Cisco ONP database:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **Manage** > **Layout Templates**.

Step 2 Click **Add** in the **Manage Layout Template** dialog box.

Step 3 Click **Choose Files** and select a template from your local system.

Step 4 Click **Import**.

The template is imported to the Cisco ONP database.

Download Layout Template for NCS 2000 Network

Use the following procedure to download a template from the Cisco ONP database:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **Manage** > **Layout Templates**.

Step 2 In the **Manage Layout Template** dialog box, choose the template that you want to download.

You can also choose multiple templates.

Step 3 Click **Download**.

Save the template into your local system.

Delete Layout Template for NCS 2000 Network

Use the following procedure to delete a NCS 2000 Network template from the Cisco ONP database:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **Manage** > **Layout Templates**.

Step 2 In the **Manage Layout Template** dialog box, choose the template that you want to download.

You can also choose multiple templates.

Step 3 Click **Delete** to delete the template from the Cisco ONP database.

Apply NCS 2000 Layout Template into a Site

Use this task to apply the NCS 2000 Layout template into a site. The site can be NCS4K-2K, NCS1K-2K-4K, or NCS1K-2K, but the template will be applied only to the NCS 2000 section of that site.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the network where you want to apply the layout template into an NCS 2000 site.

The network opens.

Step 3 Choose **Network** > **Entity Editor**.

Step 4 In the **Entity Editor** window, expand **Sites** and choose the site.

Step 5 In the right pane, choose the required template from the **Layout Template** drop-down list.

Note Make sure that the other properties under **Layout** section such as **Chassis Type**, **Power Supply**, **Controller Card**, **Node Protection**, **Redundant Controller Card**, and **MF-Unit** are

set to *Auto*. Otherwise the **Layout Template** drop-down list remains disabled.

Import NCS 1000 and NCS 4000 Layout Template into NCS1K-2K and NCS4K-1K-2K Sites

Use this task to import NCS 1000 and NCS 4000 layout templates that were exported, into 4K-2K and NCS4K-1K-2K Sites.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the network that has the site to which you want to apply the layout template.

The network opens.

Step 3 Click the **Layout** tab.

Step 4 Add the required NCS 4000 and/or NCS 1000 chassis, cards, and pluggables to the required slot of the added chassis. See Edit the Layout Manually, on page 59

Step 5 Click **Edit** to enter the edit mode.

Step 6 Right click the name of a site on which you want to import the layout template, and click **Import**.

Step 7 Choose the layout template that you want to import into the site and click **OK**

The layout template gets applied to the site.

Note When you modify an exported template, ensure to rename the modified template before reapplying it to a site in the upgrade mode so that the changes in the template reflect in the layout view.

Layout Visualization

Table 26: Feature History

Feature Name	Release Information	Feature Description
Layout Visualization and Edit	Cisco ONP Release 4.1	This feature allows you to view and adjust the position of NCS 4016 and NCS 1004 chassis and cards in the layout. This feature is supported only on 4K-1K-2K and 1K-2K aggregated nodes and not supported on stand-alone NCS 2000 node.

This feature allows you to visualize the layout of a network, designed using Cisco ONP. You can view the arrangement of racks, chassis inside the racks and cards inserted in the chassis. When you click a particular Rack or Chassis or Card in the**Layout** panel, the corresponding Rack or Chassis or Card gets highlighted in the Layout image. You can zoom in and zoom out the Layout image.

View Network Layout

The procedure to view the network layout is as follows:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 From the **File** menu, click **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the network to open from the list of available networks.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** tab.

Step 5 In the **Layout** panel on the left side, click the site.

Note The OLA sites are highlighted in green color, ROADM sites in blue color and Aggregated nodes in purple color.

Passthrough sites are not listed under layout.

For NCS 1010 network, Aggregated nodes are not available.

Step 6 Click any rack under a site to visualize the rack view of the network under **Layout** tab.

Step 7 Click any chassis under a rack to visualize the chassis view of the network.

Note When you click the Aggregated node under **Layout** panel, NCS 1004, NCS 2000 and NCS 4000 series chassis are placed in separate racks.

You can click the screenshot icon to take screenshot of all racks layout of the selected site.

Edit the Layout Manually

The Manual layout edit feature is used to adjust the position of NCS 4016 and NCS 1004 chassis and cards in the layout.

The procedure to edit the layout manually is as follows:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the network to open from the list of available networks.

Choose the network where 4K-1K-2K and 1K-2K aggregated nodes are added. This feature is not supported on NCS 2000 node.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** tab.

Step 5 Click **Edit** to enter the Edit mode.

Step 6 Select the Chassis (4K-1K-2K and 1K-2K) or Card from a particular rack.

Step 7 Drag and drop the selected Chassis or Card from a particular rack to the empty slot in the same or different Chassis or Rack.

Step 8 To add pluggables to a particular card, perform the following steps:

Note Make sure to add the required cards.

a) Select the Rack.

The cards available in the Rack are displayed.

b) Select the card to which you want to add pluggables.

The ports available in the card are displayed.

c) Select the pluggable for each port.

The following pluggables are displayed:

Card	Supported Pluggables
NCS4K-4H-OPW-QC2	• ONS-QSFP8-LR4= • QSFP-110G-SR4-S= • ONS-QSFP-4*10-MLR=
NCS4K-4H-OPW-LO	• ONS-QSFP8-LR4= • QSFP-100G-SR4-S= • ONS-QSFP-4*10-MLR=
NCS1K4-1.2T-K9=	• ONS-QSFP8-LR4= • QSFP-100G-SR4= • ONS-QSFP28-LR4-S= • QSFP-100G-CWDM4-S= • QSFP-100G-SM-SR=

d) Click the Tick icon.

Step 9 Click **Done** to save the changes in the Layout.

View the Layout Details Using Tooltip

You can hover over the Racks or Chassis or cards in the Rack and view the details using Tooltip. Click **See More Details** to view the details of port no. type, pluggables and rates.

Copy the Configurations of a Particular Node to Another Node

The configuration can be copied from one node to another node only for the manual 4K-1K layout movement. It is not supported for NCS1010 layout movement.

The procedure to copy the configurations of a particular node to another node of a different site is as follows:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the network to open from the list of available networks.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** tab.

Step 5 Select the Rack, Chassis, or Card of a particular site.

Step 6 Select the site to where you want to copy the configurations to, from the **Copy To** drop-down list.

Step 7 Click **New Rack** to add a new rack. The configuration gets copied to the new rack.

Step 8 Click **Done** to save the changes in the Layout.

Note You can also cut, copy, and delete Racks, Chassis, and Cards in the Chassis from the Layout.

Export Port Usage of LNI Network

Table 27: Feature History

Feature Name	Release Information	Feature Description
Multi-Layer Connections Phase 1	Cisco ONP Release 4.1	This feature provides the connection trace of a service across various interfaces in a network. This feature allows you to export the following: • Consolidated port usage report based on network in addition to the internal port details which you can view by hovering the mouse pointer over the tooltip • Port usage report based on sites • Port usage report only for LNI imported networks

Use the following procedure to export the port usage details of an LNI network:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the LNI network whose port usage you want to export.

The network opens.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** tab.

Step 5 Click the name of a site in the left side panel,for which you want to download the port usage.

Step 6 Mouse hover the **Export** icon and click **Port Usage** for **Current site** or **All Sites**.

The **Export Port** dialog box appears.

Step 7 Click **Continue**.

The port usage details are exported in the Excel sheet format.

Note
- If you modify any services in the NCS 4000 node after upgrading the LNI network , the changes will not get updated in the port usage details.
- The demand labels seen against the trunk ports of NCS4K-DWDM line card in the port mapping report are not logically related to the NCS 4000 trunk ports, but are related to NCS 1004 client ports.

Define Multilayer Connections for SSON Network

Table 28: Feature History

Feature Name	Release Information	Feature Description
NCS4K-1K-2K Multilayer Connection Trace	Cisco ONP Release 4.2	You can define Multilayer Connections (MLC) such as cards and pluggables for NCS 4K-1K-2K and NCS 1K-2K aggregated nodes in an SSON network. This new tab in the **Layout** page helps to view end-to-end MLC trace for OTN service starting from **NCS4K IN** until **NCS2K** Add/Drop for LNI network. Also, it helps to define new traces for the newly added service and maintain the network design and deployment.

Use this procedure to define the Multilayer Connections (MLC) such as cards and pluggables for 4K-1K-2K and 1K-2K aggregated nodes in an SSON network.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click a network in which you want to define the multilayer connections.

Make sure that the network is in analyzed mode and 4K, 1K, and cards are defined in the network.

The network opens.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** tab.

Step 5 In the left pane, click the **MLC** tab.

You can also navigate to the **MLC** page by clicking the **Ellipsis** icon available in the right side of the service name in the network tree and clicking **View in MLC**

You can view a table describing the following properties of the service, in the right pane:

Table 29: MLC Details

Properties	Description
Name	Name of the service
Group Name	Name of the group to which the service belongs to
Type	Traffic type
Src Site	Source site
Src NCS4K In	Details of Rack/Slot/Card/Port in the input side of the NCS 4000 chassis in the source site
Src NCS4K Out	Details of Rack/Slot/Card/Port in the output side of the NCS 4000 chassis in the source site
Src NCS1K In	Details of Rack/Slot/Card/Port in the output side of the NCS 1004 chassis in the source site
Src NCS1K Out	Details of Rack/Slot/Card/Port in the output side of the NCS 1004 chassis in the source site
Src NCS2K AddDrop	Add/Drop multiplexer and demultiplexer connected to the NCS 2000 chassis in the source site
Src NCS2K MPO	Media channel between the source and destination sites
Dst NCS4K In	Details of Rack/Slot/Card/Port in the input side of the NCS 4000 chassis in the destination site
Dst NCS4K Out	Details of Rack/Slot/Card/Port in the output side of the NCS 4000 chassis in the destination site
Dst NCS1K In	Details of Rack/Slot/Card/Port in the input side of the NCS 1004 chassis in the destination site
Dst NCS1K Out	Details of Rack/Slot/Card/Port in the output side of the NCS 1004 chassis in the destination site

Properties	Description
Dst NCS2K AddDrop	Add/drop multiplexer and demultiplexer that is connected to the NCS 2000 chassis in the destination site
Dst NCS2K MPO	MPO cable connecting the NCS 2000 chassis in the destination site
Media Channel	Media channel between the source and destination sited
Notes	More notes, if any
Trace Origin	Indicates whether the service connections are user-created or imported through LNI.

Note The details of source and destination NCS2K AddDrop and NCS2K MPO are not displayed for the networks that are created in Cisco ONP Release 4.1 and migrated to Cisco ONP Release 4.2.

Step 6 Click the service name to switch to the layout view.

You will view the layout and the service details in the right pane.

Step 7 Select the rack, shelf, card, and ports from the drop-down lists for NCS4K In, NCS4K Out, NCS 1K In, and NCS 1K out, for both **Source** and **Destination** sites.

The details of the NCS 2000 chassis are auto-populated.

Note For LNI imported network all the details are auto-populated. If you add any new service, you can change the details of the new service as per your requirement.

Step 8 Click the Tick icon to save the changes you have done.

You can click the refresh icon to delete the changes you made after saving.

The updated details are included in the BOM.

Step 9 (Optional) To export the MLC details perform the following steps:

a) Click the Table icon to switch to the table view.
b) Choose **Export** > **MLC Traces**to export all the details available in the MLC table.
c) Choose **Export** > **LMP/TTI Connections** to export the details of Link Management Protocol (LMP) connections which are the connections between NCS 1004 and NCS 2000 cards, and Trail Trace Identifier (TTI) connections which are the connections between NCS 4000 and NCS 1004 cards.

All these connections get added to the BOM.

Step 10 (Optional) Click the Filter icon to filter the services displayed in the left pane, based on the following:.

The following filter options are available:

- Source Site
- Destination Site
- Type of the traffic
- Trace Origin

- LNI—Imported through Import Live Network option
- User Created—Created through Cisco ONP UI

- Trace Status
  - Completed—User has defined all MLC details.
  - Partial—User has defined only partial MLC details.
  - Empty—User has not defined any MLC details.

Step 11 (Optional) Click the three vertical dots and select the following as required:

- **Enable Multi Select—**You can select up to the card level for different OTN.
- **Expand All—**Expands the services tree.
- **Collapse All—**Collapses the expanded services tree.
- **Show Trace Status—**Shows the trace status icon next to the service name.

Step 12 (Optional) Click the three horizontal dots across the service trace and select the following as required:

- **Delete Trace—**Deletes the respective trace.
- **Locate in Map—**Shows the service in the map view.

Note User can enable the same port number on the primary and secondary **NCS4K IN** nodes for Client 1+1 and other protection scheme.

Regenerate BoM Automatically

You can view the new Chassis or Card added to the existing layout under the **BOM** tab. You can also view the regenerated BoM after manual editing of the layout.

Add new Pluggables, Alarm Cables and 100G Client Bandwidth Licenses to BoM

You can add new pluggables, alarm cables and 100G bandwidth licenses of NCS 1004 and NCS 4000 platforms to the existing BoM.

The procedure to add new pluggables, alarm cables and 100G client bandwidth licenses to the existing BoM is as follows.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.
The **Select Network To Open** dialog box appears.

Step 2 Click the network to open from the list of available networks.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **BOM** tab.

Step 5 Click **Add**.
The **New** window opens.

Step 6 Enter the Cisco part number of the pluggable or alarm cable or 100G bandwidth license in the **Cisco Part Number** field.

Step 7 Choose the **Quantity** of pluggables or alarm cables or 100G bandwidth licenses to be added.

Step 8 Click **Add**.

The new pluggables or alarm cables or 100G bandwidth licenses are added to the BoM list.

Export IPC Report

You can export the connections of a current site or all sites to an Excel sheet using the following procedure:

Before you begin

Log in to Cisco ONP Web Interface

Step 1 From the **File** menu, click **Open**.
The **Select Network To Open** dialog box appears.

Step 2 Click the network to open from the list of available networks.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** tab.

Step 5 z

Step 6 Click the **IPC** tab.

You can view the patches that are listed in the left pane. Click each patch to view the details such as position, card, and port of the source and destination sites.

Step 7 Hover over the **Export** icon, and click **Current site** or **All Sites** option.
The **Export IPC** dialog box appears.

Step 8 Click **Continue** to export the connections of the current site or all sites.

The cable-type and Cable ID are included in the report only for the NCS 1010 network.

Edit the Layout Manually for NCS 1010 Networks

Table 30: Feature History

Feature Name	Release Information	Feature Description
Layout Edit Support for NCS 1010 Networks	Cisco ONP Release 5.0	Cisco has introduced NCS 1010 as a new optical line system to meet the growing optical network needs. Using Cisco ONP you can visualize and edit layouts for NCS 1010 chassis and patch panels.

The Manual layout edit feature is used to adjust the position of the NCS 1010 chassis and patch panels in the layout.

The procedure to edit the layout manually is as follows:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose **File** > **Open**.

The **Select Network To Open** dialog box appears.

Note You can also create a new NCS 1010 network. For more information, see Manually Design a Network Using Cisco ONP, on page 2.

Step 2 Click the network to open from the list of available networks.

Choose the NCS 1010 network.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** tab.

Step 5 Click **Edit** to enter the Edit mode.

Step 6 In the left panel, click a site.

Step 7 Select a unit (NCS 1010 chassis or patch panel) using one of the following methods:

- In the left panel, expand the rack under a site and choose a unit.
- Or, in the Rack view, click a chassis or patch panel.

Step 8 To adjust the position of the selected units, use one of the following methods:

Note If necessary, click the **+New Rack** button to create more racks.

- In the Rack view, drag and drop the selected chassis or panel from a particular rack to the empty slot in the same or different rack.
- Cut and Paste unit in the left panel:
  - Click **Cut** above the Rack view.
  - Right-click on an empty slot in the same or different rack and click **Paste**.

    Cisco ONP disables the Paste option, if you try to paste the unit in the prohibited slots.

    Cisco ONP disables the Cut option, if an existing cut unit is not pasted.
- Cut and Paste unit in the Rack view:
  - Right-click the selected chassis or panel and click **Cut**.
  - Right-click on an empty slot in the same or different rack and click **Paste**.

    Cisco ONP disables the Paste option, if you try to paste the unit in the prohibited slots.

    Cisco ONP disables the Cut option, if an existing cut unit is not pasted.
- Move unit in the left panel:
  - Go to **Move to** > **Site-X** > **Rack-X** above the Rack view to move the chassis to the same or different rack. Or go to **Move to** > **Site-X** > **+ New rack** above the Rack view to move the chassis to a new rack.
- Move unit in the Rack view:
  - Right-click the selected chassis or panel and go to **Move to** > **Site-X** > **Rack-X** to move the chassis to the same or different rack. Or go to **Move to** > **Site-X** > **+ New rack** to move the chassis to a new rack.

Note The **Move to** option moves the unit automatically to the immediate empty slot. The **Cut** and **Paste** option moves the unit to the selected empty slot.

Step 9 Click **Done** to save the changes in the Layout.

A warning message appears when empty racks are present in the layout.

Step 10 Click **OK** to remove the empty racks.

View Internal Node Connections of NCS 1010 Network

Table 31: Feature History

Feature Name	Release Information	Feature Description
View Internal Node Connections of NCS 1010 Network	Cisco ONP Release 5.0	The Node diagram tab displays a functional view that includes precise connections and port labeling of each component such as OLT or ILA, NCS1K-BRK-8/16/24, AAWG-32-O, and AAWG-32-E, for each site in an analyzed NCS 1010 network.

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 Choose**File**>**Open**.

The **Select Network To Open** dialog box appears.

Step 2 Click the analyzed NCS 1010 network.

The network opens.

Step 3 Choose **Network** > **Analyze**.

Note Network must be successfully analyzed to proceed further.

Step 4 Click the **Layout** > **Node Diagram** tabs.

Step 5 Click each site in the left panel and select a side to view the functional view of the site.

The functional view includes both the combination of physical and logical connections such as:

- Degree interconnections between NCS1010 (OLT or ILA) and NCS1K-BRK-8
- Add/drop connections between NCS1010 and colorless add/drop units (NCS1K-BRK-8, NCS1K-BRK-16, or NCS1K-BRK-24) and colored add/drop units (AAWG-32-O or AAWG-32-E)

Step 6 Hover over the cable to view the details such as name of the ports that are connected and the cable ID.

Design Networks with SVO Card

An SVO card along with the application software provides functionality-based licenses for alarm correlation, performance monitoring, connection verification, and Optical Time Domain Reflectometry (OTDR). You can design a network with ROADM and TRAFFIC nodes that are equipped with SVO cards.

Features

- The SVO card is a two-slot card.
- The SVO card acts as the primary card for all the networks after Release12.1.0.
- To achieve high availability, you can have two SVO cards equipped in one node.
- You can use two 10G SFP+ pluggables to connect two SVO cards present in a node.
- You cannot have two SVO cards in the same chassis, to achieve high availability in the network.
- When designing the network, you can connect a Cisco ASR 920 Switch to the SVO cards.
- The SVO can be used as a card or as a UCS-based solution.

SVO Licenses

SVO cards require either Base License or SVO Full License (High Availability, Connection Verification, Flex Spectrum). If you do not select SVO Full License, by default, SVO Base License and High Availability are enabled.

The different types of SVO licenses are

- Cisco NMS: This includes features such as High Availability, Connection Verification, Flex spectrum, and OTDR.
- Third-Party NMS: This includes features such as NBI (North Bound Interface), Alarm Correlation, Performance Monitoring, and Circuit Provisioning.

Chassis Licensing

- Every chassis added to the network must have license after Release 12.1.0. For the release upgraded network, a new chassis license is added after it is analyzed in Cisco ONP Release 4.0 or higher.
- There are many variants of the chassis license, such as 1-chassis, 5-chassis, 10-chassis, 20-chassis, 50-chassis, and so on. The variants of chassis license are added based on cost optimization.
- A license is required for every chassis that is added to the network after the first chassis.
- Chassis License Flush Out: You can flush out the existing chassis license and purchase a new chassis license. If you hold the existing chassis license, the license remains active even if the site is unlocked.
- Chassis License Flush Out is supported only in the network upgrade mode.
- You can use the existing license with new changes in chassis, if you do not use the Chassis License Flush Out option.

Associate OLA or DGE Sites with SVO Cards

The following procedure shows how to associate OLA sites with the SVO cards:

Before you begin

Log in to Cisco ONP Web Interface.

Step 1 In the network tree panel, click the **Ellipsis** icon available in the right side of any ROADM site.

Step 2 Click **Edit SVO Associations**.

Step 3 Select the OLA sites on the map to toggle the SVO connections. Click **Done** at the top-right corner to confirm the selection.

You can open widgets in the map and select top section to view the association.

Note You can also click the **Ellipsis** icon available in the right side of any ROADM site from the Map and click **Edit SVO Associations**. For the sites that are of DGE type, the **Edit SVO Associations** option is not displayed.

The tool associates the OLA and DGE sites that are not associated by you, with the SVO card during the network analysis.

Export Device NETCONF XML File

You can export the NETCONF (Network Configuration Protocol) XML files for all the individual sites in a network or the complete network. The following procedure, shows how to export NETCONF XML files for the complete network from the Cisco ONP GUI.

Before you begin

Log in to Cisco ONP Web Interface.

Table 32: Feature History

Feature Name	Release Information	Feature Description
Export NETCONF File from NCS 1010 network	Cisco ONP Release 5.0	You can export the NETCONF XML files for all the NCS 1010 nodes, and upload them to the NCS 1010 nodes through the Yang suite. This enables automatic bring up of the NCS 1010 nodes using the NETCONF data.

The network must be in Analyze mode.

Step 1 In the network tree panel, click the three dots.

A pop-up list appears.

Step 2 In the list, click **Generate Device NetConf XML**.

Export window appears with network name.

Step 3 Click **Export**.

Upload NETCONF XML Files on SVO Web Interface

The following procedure shows how to upload the NETCONF XML files on the SVO web interface:

Step 1 In the browser URL field, enter the IP address of the SVO line card.

The login page appears.

Step 2 Enter the username and password.

Step 3 Click **Login**.

Step 4 Click the hamburger icon at the top-left of the page, and select **Node Configuration**.

Step 5 Click the **Node Setup** tab.

Step 6 Click **Select files** .

Step 7 Browse to the NETCONF XML files exported from the Cisco ONP GUI and upload them.

If the passive unit ID in the NETCONF file exceeds the range 1–126, SVO displays an error message. Validate the XML file and reimport.

Note If the value of FEC mode already provisioned in the 200G-CK-C line card does not match with the value available in the NETCONF XML file, SVO displays an error message. We recommend that you remove the provisioned FEC settings for this card and reimport the XML file.

Export Device NETCONF XML Files for Individual Sites

The following procedure shows how to export Device NETCONF XML files for individual sites from the Cisco ONP GUI.

Before you begin

Log in to Cisco ONP Web Interface.

The network must be in Analyze mode.

Step 1 Click the **Ellipsis** icon available in the right side of the site.

Step 2 In the list, click **Generate Device NetConf XML**.

Export window appears with network name.

Step 3 Click **Export**.

The message, "Success. Device NetConf exported successfully" appears.

You can download the zip file that contains Device NETCONF XML files of individual sites.

Upload NETCONF Files to NCS 1010 Device

Use this task to upload the NETCONF files that downloaded from Cisco ONP into the NCS 1010 device using a NETCONF client.

Step 1 Log in to the NETCONF Yang Suite which has access to the NCS 1010 device.

Step 2 Connect to the NCS 1010 device.

Step 3 Copy the NETCONF XML file content that is downloaded from Cisco ONP, and paste it into the Protocol NETCONF Run RPC block.

Step 4 Append the following commit code at the end of the NETCONF XML file content.

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="102">
<commit/>
</rpc>
```

Export Cisco Optical Site Manager NETCONF XML File

You can export the Cisco Optical Site Manager NETCONF XML files for all the individual sites in a network or the complete network. The following procedure, shows how to export Cisco Optical Site Manager NETCONF XML files for the complete network from the Cisco ONP GUI.

Before you begin

Log in to Cisco ONP Web Interface.

Table 33: Feature History

Feature Name	Release Information	Feature Description
Export Cisco Optical Site Manager (COSM) NETCONF File from NCS 1010 network	Cisco ONP Release 5.2	The new **Generate COSM NetConf XML** option allows you to export from the Cisco Optical Network Planner, the Cisco Optical Site Manager NETCONF XML files for all the NCS 1010 nodes. You can then upload these files to the NCS 1010 nodes through the Cisco Optical Site Manager, enabling automatic bring-up of the NCS 1010 nodes.

The network must be in Analyze mode.

Step 1 In the network tree panel, click the three dots.

A pop-up list appears.

Step 2 In the list, click **Generate COSM NetConf XML**.

Export window appears with network name.

Step 3 Click **Export**.

The message, "Success. COSM NetConf exported successfully" appears.

You can download the zip file that contains COSM NETCONF XML files of individual sites.

Note You can choose the destination folder to save the downloaded Cisco Optical Site Manager NETCONF XML files of individual sites.

This feature has limited scope in this release.

Note L-Band Configuration is not certified in Cisco Optical Site Manager for R7.11.1. A future release will be considered for the L-Band configuration.

Upload Cisco Optical Site Manager NETCONF XML to NCS 1010 Device via Cisco Optical Site Manager Web Interface

Use this task to upload the Cisco Optical Site Manager NETCONF files that you downloaded from Cisco ONP into the NCS 1010 device using the Cisco Optical Site Manager web interface.

Before you begin

Log in to Cisco ONP Web Interface

Step 1 Log in to the Cisco Optical Site Manager UI that has access to the NCS 1010 device.

Step 2 Cross-check the device name, UID, and card layout position (Rack ID, RU Position) with CONP XML.

The Cisco Optical Site Manager device name and UID should match with the CONP XML. If any mismatch exists, delete the device from Cisco Optical Site Manager and add back with name and UID as in the CONP XML.

Step 3 Go to **Optical Setup** and browse the CONP-generated XML without OXC for that device and load it.

Step 4 Click the **Select files...** button.

The file explorer window appears.

Step 5 Select the CONP-generated Cisco Optical Site Manager XML from your local device.

Step 6 Click **Open**.

A confirmation message appears.

Step 7 Click **Yes**.

Step 8 Click **Upload**.

The *COSM XML successfully uploaded* message appears.

Step 9 Go to **Optical Configuration** > **ANS parameter** and verify whether the respective configurations are complete.

Step 10 After loading the Cisco Optical Site Manager XML file without optical cross connect, load the Cisco Optical Site Manager XML with optical cross connect.

Step 11 After adding the Cisco Optical Site Manager XML file with optical cross connect, go to the **Optical Cross Connections** tab and verify whether the respective configurations are complete.

Export Planning Data for Cisco Optical Network Controller

Table 34: Feature History

Feature Name	Release Information	Feature Description
Export Network Planning Data for Cisco Optical Network Controller (Cisco ONC)	Cisco ONP Release 5.0	You can export the network planning data in the form of a JSON file. This JSON file can be uploaded into Cisco ONC to configure the managed devices in bulk.

Use this task to export the network planning data which is in the form of JSON file from Cisco ONP. This JSON file is uploaded into Cisco ONC to configure the managed devices.

Before you begin

Log in to Cisco ONP Web Interface.

The network must be in Analyze mode.

Step 1 In the network tree panel, click the **Ellipsis** icon available in the right side of the network name.

Step 2 Click **Generate CONC JSON**.

Step 3 In the **Export File** dialog box, enter the name of the JSON file.

Step 4 Click **Export** to download the JSON file into your local system.

Upload Planning Data into Cisco ONC

Use this task to upload the network planning data (JSON file) downloaded from the Cisco ONP.

Step 1 Log into Cisco ONC.

Step 2 Hover over the **Import** icon in the left panel and click **Planning Data Import**.

Step 3 Click **Import**.

Step 4 Browse and select the JSON file that is downloaded from Cisco ONP.

You can use the planning data to configure the devices managed by Cisco ONC.