Plan Your Network with Cisco Optical Network Planner

This chapter provides an overview of Cisco Optical Network Planner and its primary functions for optical network design and validation.

Cisco ONP enables users to model and test Optical Transport Network (OTN) and Dense Wavelength Division Multiplexing (DWDM) optical networks in a graphical environment.

- Cisco ONP is used to design and validate networks for the NCS 1000 and NCS 2000 series platforms.
- The tool generates the Bill of Materials (BoM) based on the modeled network.
- Cisco ONP provides detailed network information, including rack views, cabling reports, optical reports, traffic matrices, and optical setup files used for bringing up the COSM network.

Cisco Optical Network Planner prerequisites and user management

Understand the minimum system requirements and administrative considerations required before deploying Cisco Optical Network Planner.

This table describes the prerequisites and recommended configurations that are essential for Cisco Optical Network Planner installation and operation:

Table 1: Cisco Optical Network Planner prerequisites

Item	Description
Installation	Install Cisco Optical Network Planner in the customer environment. For more details, see: • Cisco Optical Network Planner Installation Guide for detailed installation steps. • To install a Cisco Optical Network Planner SMU package, see Install the SMU. • See Troubleshoot for troubleshooting common Cisco Optical Network Planner issues.
System requirements	• **Operating system:** Ubuntu Server 22.04 or 24.04, or Red Hat Enterprise Linux 8.8 or 8.10 • **CPU:** 8 cores • **Memory:** 96 GB RAM • **Storage:** 500 GB free disk space after installation • **Capacity:** Supports 10 concurrent parallel Cisco Optical Network Planner analyses
Download and licensing	Cisco Optical Network Planner can be downloaded from CCO with a valid license agreement. Contact the account team for download issues.
First-time login	After installing Cisco Optical Network Planner, log in as admin and change the default password during the first-time Cisco Optical Network Planner login.
User access	Users must register in Cisco Optical Network Planner, and an administrator must authorize their accounts before GUI access.
Planning inputs	Have topology details available, including site or device details, fiber parameters, and circuit details.

Users with administrator privileges can:

- Approve new users by assigning a role to a user group.
- Receive email notifications when new users register.
- For more details, see Assign a role to a user group.

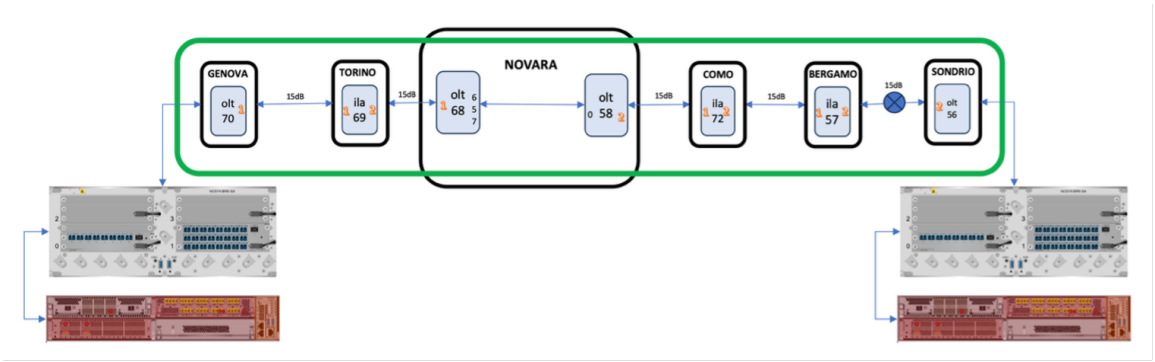
Plan your NCS1010 Network

Plan an NCS 1010-based network using Cisco Optical Network Planner to design a topology with the required specifications, analyze it, and generate planning data. For detailed instructions, see Design and Analyze Networks.

This reference network topology described here illustrates these NCS 1010 bring-up scenarios.

- It is a two-degree topology that uses seven NCS 1010 nodes.
- The BRK-8 modules are used to create express interconnect in Site-Novara using MPO cables.

Figure 1: Multi-degree Topology



Design the topology in Cisco Optical Network Planner

Use this procedure to create a Cisco Optical Network Planner model that matches the physical design for a new region or pilot network.

The output is a topology file that you can use for Cisco Optical Site Manager exports and downstream bill of materials validation.

The sample node names (Genova, Novara, Sondrio, Torino, Como, Bergamo) correspond to the reference network and should be adapted as necessary.

Consider these inputs before you create the network plan. Apply them according to your network design requirements.

- Create the number of circuits based on the channel plan and use the appropriate card type for each circuit.
- Force the add/drop type according to the design requirements. For details about add/drop configuration, see Modify Network Properties.

Before you begin

- Confirm licensing for Cisco Optical Network Planner and verify that your account can create and save projects.
- Gather topology notes: number of ROADM and OLA sites, fiber lengths, and circuit/service requirements.
- Clarify whether the design needs colored or colorless add/drop behavior per site.

Follow these steps to design the topology.

Procedure

Step 1 Create the base network in Cisco Optical Network Planner.

a) Log in to the Cisco Optical Network Planner home page with a valid user.

b) Choose **File**, then click **New**.
c) In **Create New Network** dialog box, set **L0 Network Platform** to **NCS 1010** and **Band Type** to **C-Band**.

You can set the system release values as follows:

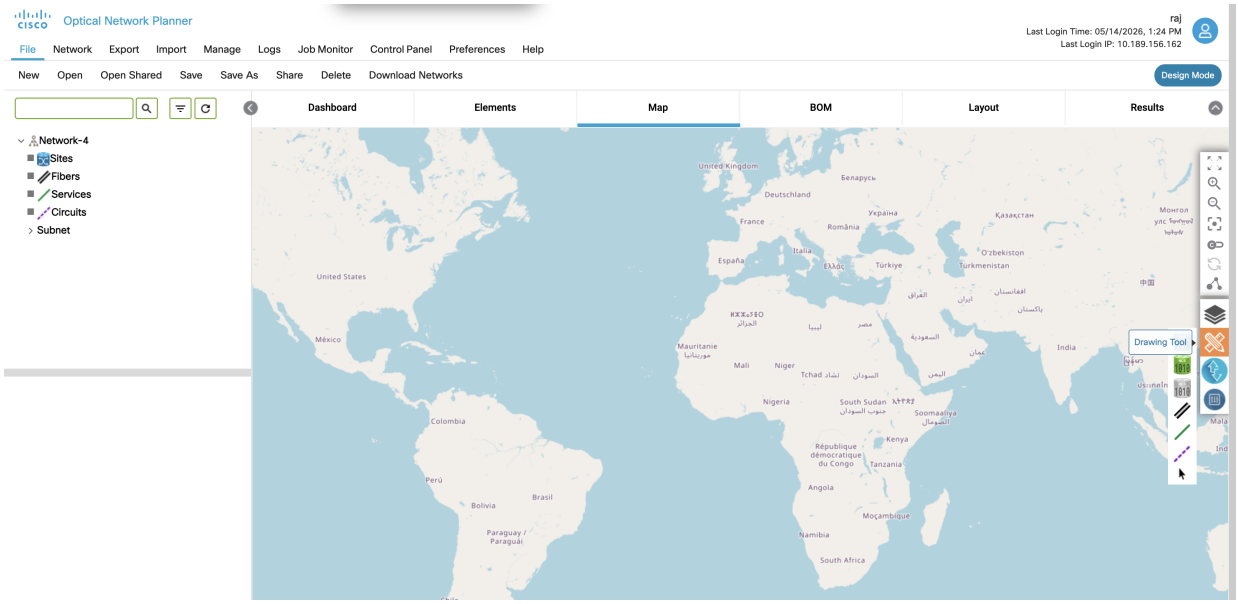
Platform	System Release
NCS 1010	26.1.1
NCS 1014	26.1.1
NCS 1004	25.4.1

Name the network consistently with your deployment tracker (for example, REGION_TOPOLOGY_MMDD).

A new, empty network canvas opens with the drawing tool enabled.

Step 2 Follow these steps to add sites, fibers, circuits, and services with the drawing tool.

a) Click the **Drawing Tool** icon (pencil and ruler).



b) Add ROADM and OLA sites (for example, ROADM: Genova, Novara, Sondrio; OLA: Torino, Como, Bergamo).
c) Use the **Fiber** tool to connect sites following the target topology.
d) Click on the source site and then the destination site in the map to select **Circuit** (purple) to add demands.

Both Alien and NCS1000 TXP Trunk to Trunk demands can be created with this option.

e) Select **Service** (green) to create client services of native NCS1000 TXP.

The service automatically creates a trunk-to-trunk circuit.

Note
For the specified topology, create a circuit, a service, or both. Define at least one before you run an analysis.

The visual topology reflects the required sites, fibers, circuits, and services.

Step 3 Follow these steps to set site properties using **Entity Editor**.

a) Choose **Network**, then click **Entity Editor**.
b) Under **Site**, then click **Name**, rename the ROADM and OLA nodes.
c) Add the **NCS 1010 Line Card** property value as *Enhanced Faceplate* or *Standard Faceplate*.

   By default, *Enhanced Faceplate* is selected.

d) For OLA nodes, set **Functionality**, then click **Line amplifier** within the C-Band section.
e) Drill down into **Fibers** to update **Fiber Type**, **Aging Loss**, and **SOL Loss** values.
f) Update the fiber values in **Properties**.
g) Click **Show Advance properties** to update advanced parameters.
h) Expand **Subnet**, then click **OpticalSubnet** and adjust **spectral density** (for example, **Flexgrid-SD-81%**).

- Keep a change log of any forced parameters so installers know which passives to deploy.
- By default fibers are 1 km. Enable **Use Coordinates Distance** under **Network Properties** if you want lengths derived from coordinates.
- To apply Raman amplification, expand a site to C-band and set **Raman Amp** accordingly.

Sites, fibers, and subnet properties match the physical design data.

Step 4 Optional: To select specific colored Add/drop MD-32-E/MD-32-O Mux/Demux patch panels based on the topology, set these properties.

Note
If you do not force this setting and leave it set to **Auto**, Cisco Optical Network Planner automatically selects the default Add/drop.

a) Choose **Network**, click **Entity Editor**, and then click the **Service** tab.
b) In the left tree panel, expand the circuit that connects to the site where the patch panel is connected, and then drill down to the trail properties.
c) Under the trail properties, set **Add/Drop Type** to **Colored**.
d) Click **Select Similar** to apply the properties in bulk to all the trails.
e) Click **Update**.
f) Click the **Site** tab.
g) Expand the ROADM site interface, drill down to the Add/Drop properties of the side, and then under **General**, set **Colored Add/Drop** to **MD-32-Even** or **MD-32-Odd** as per the topology.
h) Click **Select Similar** to apply the properties in bulk to all the add/drops.
i) Click **Update**.

Step 5 Optional: To select specific BRK-24 and BRK-8 breakout panels, set these properties.

Note
If **Auto** is selected, Cisco Optical Network Planner automatically selects the default Add/drop.

a) Choose **Network**, click **Entity Editor**, and then click the **Service** tab.
b) In the left tree panel, expand the circuit that connects to the site where the breakout panel is connected, and then drill down to the trail properties.
c) Under the trail properties, set **Add/Drop Type** to **Colorless**.
d) Click **Select Similar** to apply the properties in bulk to all the trails.

e) Click **Update**.
f) Click the **Site** tab.
g) Expand the site interface, drill down to the Add/Drop properties of the side, and then under **MPO Connector Add Drop**, set **Colorless Add/Drop** to **BRK-8** or **BRK-24**.
h) Click **Select Similar** to apply the properties in bulk to all the add/drops.
i) Click **Update**.

Step 6 To add NCS 1014 (NCS1K14-2.4T-K9=), set these properties in the left tree panel:

a) Expand the service that connects to the site where NCS 1014 (NCS1K14-2.4T-K9=) is connected in the left tree panel, and then drill down to the service properties.
b) Under **Service Properties**, in **Primary Channel Source**, set **Card Type** to **NCS1K14-2.4T-X-K9** and **TXP Chassis** to **NCS1014**.
c) Click **Update**.
d) Click **Show Advance Properties**, and set **Src Add/drop Type** and **Dst Add/drop Type** to **Colorless/Colored**.

Note
If **Show Advance Properties** is not displayed, check whether a service is selected in the left panel. If a service is selected, clear the selection, and then click the service again.

e) Click **Update**.

Step 7 To add NCS 1004 (NCS1K4-QXP-K9=), set these properties in the left tree panel:

a) Expand the service that connects to the site where NCS 1004 (NCS1K4-QXP-K9) is connected in the left tree panel, and then drill down to the service properties.
b) Under **Service Properties**, in **Primary Channel Source**, set **Card Type** to **NCS1K4-QXP-K9** and **TXP Chassis** to **NCS1004**.
c) Click **Update**.
d) Click **Show Advance Properties**, and set **Src Add/drop Type** and **Dst Add/drop Type** to **Colorless/Colored**.
e) Click **Update**.

Step 8 Choose **File**, then click **Save** to store the project.

Alternatively, you can click Cisco Optical Network Planner Excel import/export workflow to create a network. For more details, see Import a network using an Excel sheet

The project file captures the designed topology and is ready for analysis.

You now have a fully defined Cisco Optical Network Planner network that aligns with physical requirements and can proceed to Analyze and Cisco Optical Site Manager export stages.

What to do next

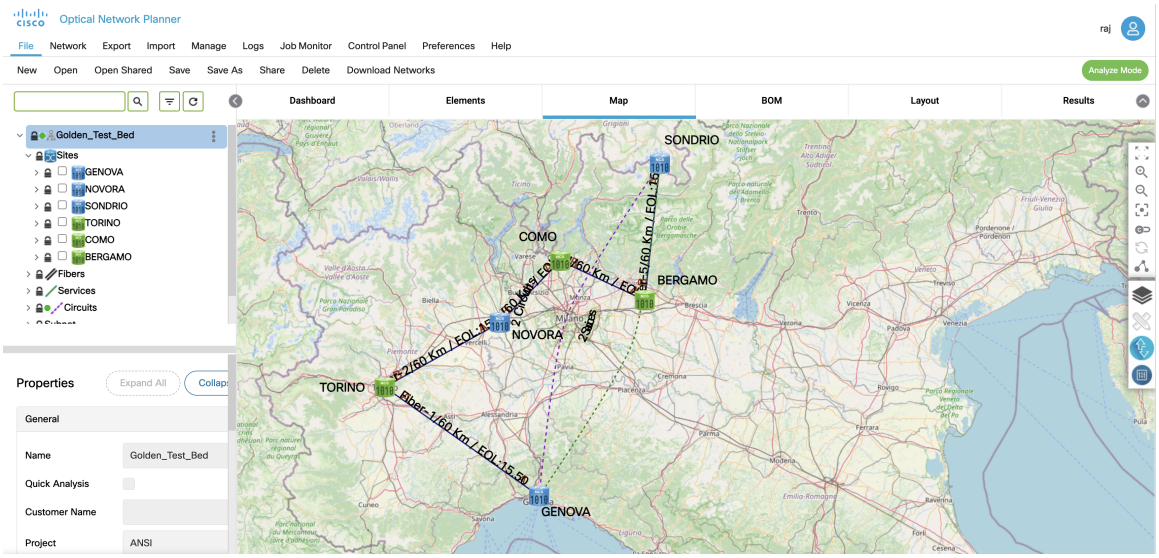
- Analyze the network, on page 7
- Share the screenshots and any Excel import artifacts with reviewers.

Analyze the network

To analyze the designed sample network and check its feasibility using the Cisco Optical Network Planner Web Interface.

After a successful network analysis, you can validate the design by reviewing various reports available in Cisco Optical Network Planner, including Layout, NFV, BOM, and Optical Reports. These reports provide detailed information about hardware placement, interconnections, inventory, and circuit feasibility.

Figure 2: CONP Analyzed Network



Before you begin

Ensure you have access to the Cisco Optical Network Planner Web Interface and have a sample topology network created.

Follow these steps to analyze the network.

Procedure

Step 1 Log in to Cisco Optical Network Planner Web Interface.

Step 2 Click **File**, then click **Open**.

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

Step 3 Click the sample topology network that you have created, from the list of networks.

Step 4 Click **Network**, then click **Analyze**.

The Cisco Optical Network Planner analysis progress indicator indicates the analysis status.

Table 2: Analysis Status

If...	Then...
After successful analysis	The network goes to Analyze Mode.
If there is any failure in the analysis stage	A pop-up window appears with the message, “Analysis Failed.”

Step 5 Choose the **Elements** > **Messages** tab to see the list of error details in the analyzed network.

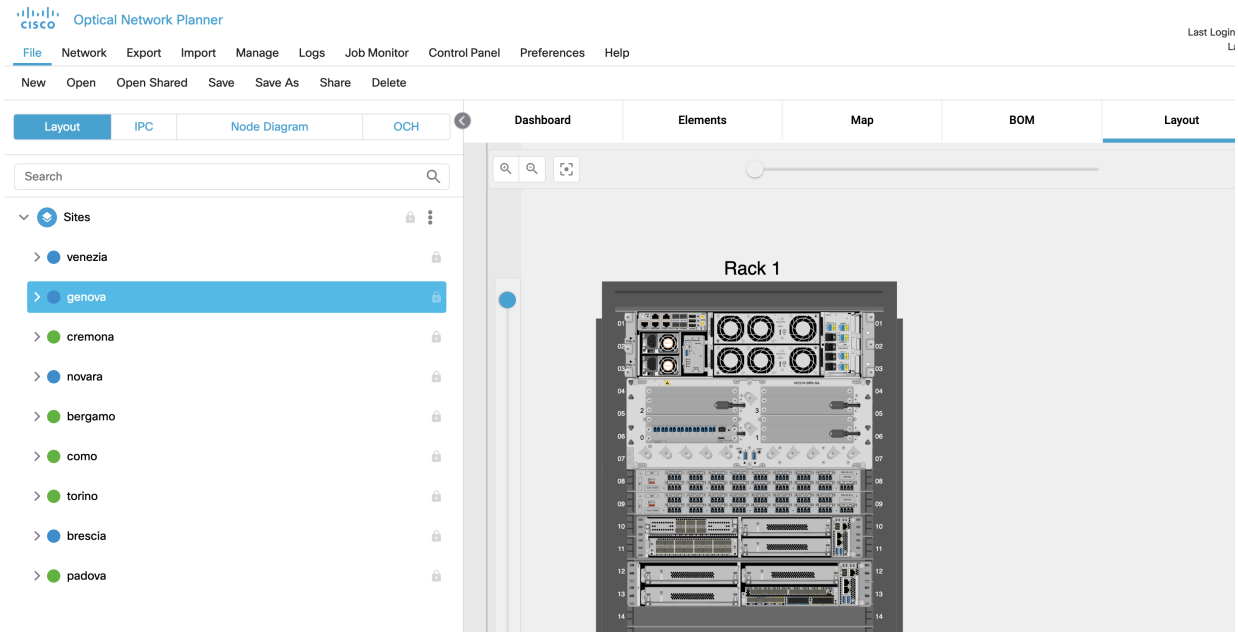
- By default, it shows only the key messages when the **Critical Only** toggle button is enabled.
- If you want to view the entire network message, disable the **Critical Only** toggle button.

Step 6 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.

Step 7 Validate the design by navigating to the **Network View** and reviewing these reports:

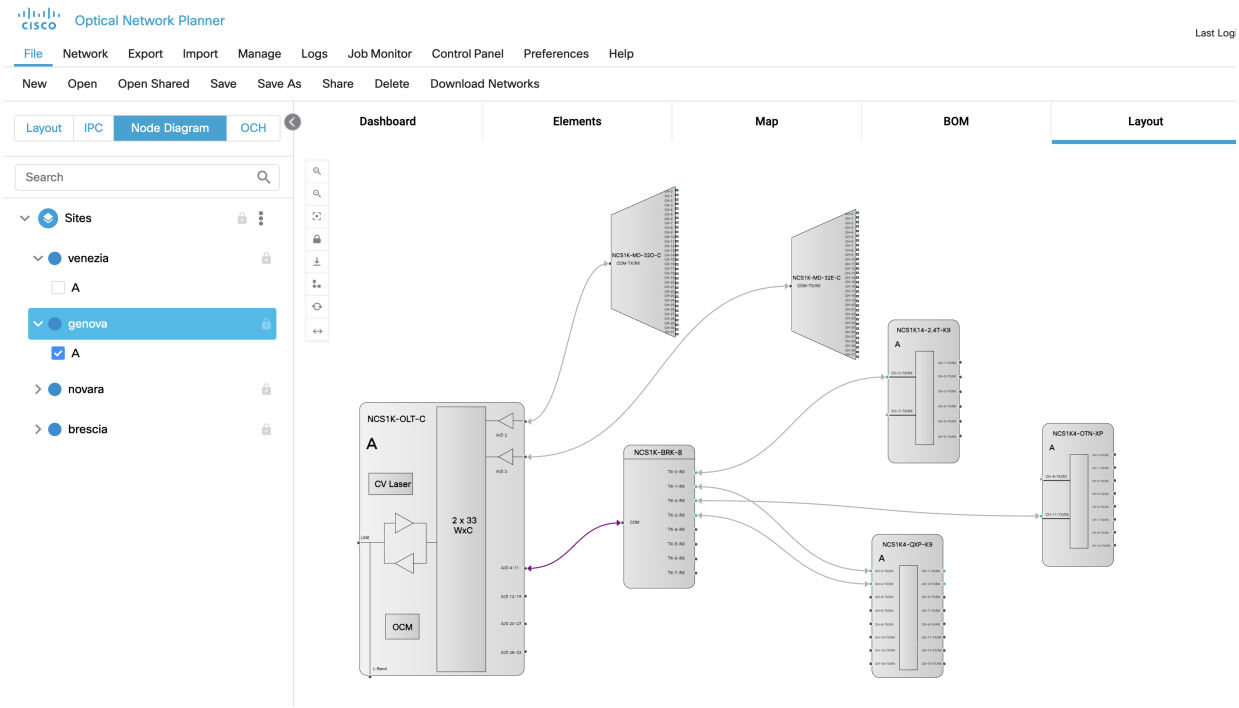
a) **Layout Tab**: View hardware placement, rack level details, and site interconnections (via **Node Diagram** in the left panel).

Figure 3: CONP Layout



b) **Node Diagram**: View the site interconnections.

Figure 4: CONP Node Functional View



c) **BOM Tab**: See the inventory list for each site.
d) **Results** (including **Optical Reports**, **Installation Parameters**, and **Cabling Report**): Validate circuit feasibility and other design parameters.

   For more details about the report parameters, see Optical Report.

The network should be in an analyzed state, and you should have validated the design using the CONP reports.

What to do next

Refer to the **Troubleshoot** section in CONP Analysis Troubleshooting for understanding common analysis errors.

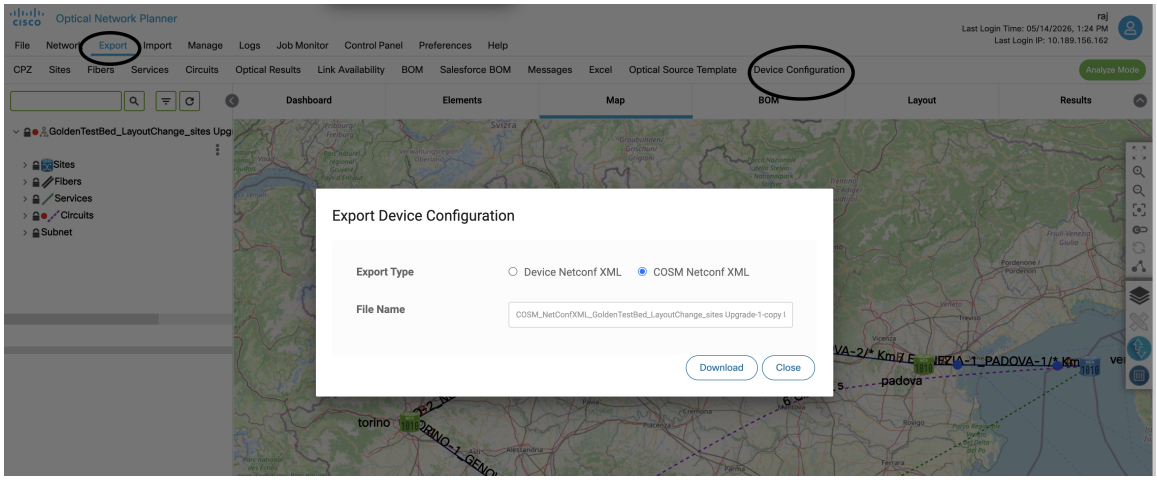
Generate Cisco Optical Site Manager Netconf XML Files

Generate and prepare Cisco Optical Site Manager Netconf XML files from Cisco Optical Network Planner.

After the network has undergone analysis and validation, it is necessary to export the configuration data from Cisco Optical Network Planner in a Netconf XML format.

The exported files are packaged into a Zip archive, and each file within this archive corresponds to a specific site, identified by its unique naming convention.

Figure 5: Export device configurationfrom Cisco Optical Network Planner



Before you begin

Ensure that the network has been thoroughly analyzed and validated.

Follow these steps to generate Cisco Optical Site Manager Netconf XML files.

Procedure

Step 1 Export the Cisco Optical Site Manager Netconf XML file from Cisco Optical Network Planner.

Refer to Export Cisco Optical Site Manager Netconf XML File for detailed instructions on the export process.

Figure 5 illustrates the Cisco Optical Network Planner export interface: **Export** → **Device Configuration** → **Cisco Optical Site Manager Netconf XML**.

A Zip file with a specified name is downloaded.

Step 2 Identify the individual site configuration files within the downloaded Zip file.

The Zip file contains a list of files, where each file represents a distinct site. The file name helps to identify the individual site using the format:

```
<NetworkName-SiteName>
```

.

Step 3 Upload each individual site file into Cisco Optical Site Manager after it is operational.

For details, see Import Cisco Optical Network Planner XML.

The Cisco Optical Site Manager Netconf XML files are successfully generated, extracted, and prepared for Day1 device configuration in Cisco Optical Site Manager.

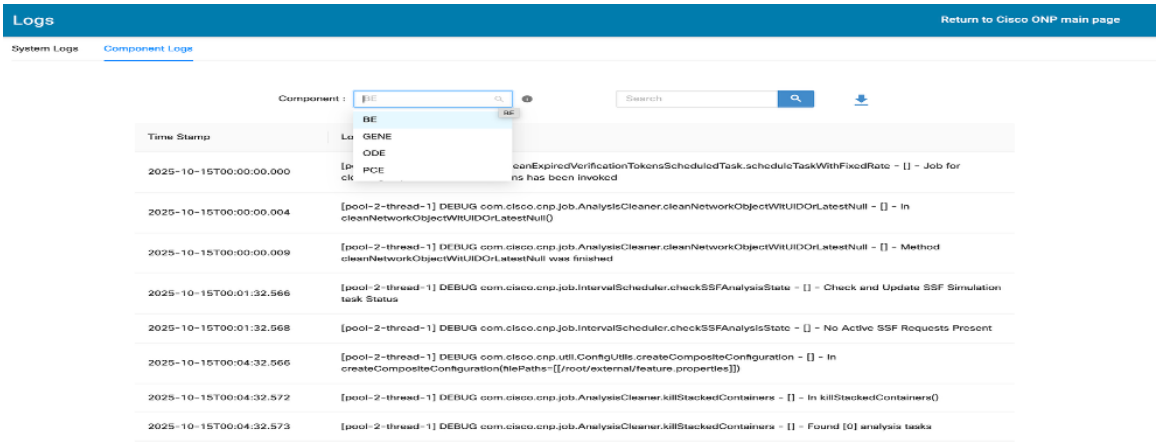
What to do next

Bring up the platform and Cisco Optical Site Manager, and then configure the Day 1 device settings in Cisco Optical Site Manager by using the uploaded files.

Troubleshooting and log collection

Collect the network export and component logs required by engineering support.

Figure 6: Cisco Optical Network Planner logs collection



To resolve any issues encountered during installation, see Troubleshooting Guide.

Before you begin

- Ensure you have administrator access to Cisco Optical Network Planner.
- Verify the target network project is available in the Cisco Optical Network Planner workspace.

Follow these steps to collect troubleshooting logs for engineering support.

Procedure

Step 1 Open the network in Cisco Optical Network Planner, select **Export**, then click **CPZ** to export the CPZ file of the network.

Step 2 Export the component logs.

a) Click **Logs**, then click **Component Logs**.

b) Collect these logs: BE (CONP Backend log), GENE (NCS1010 and NCS1000 TXP Analysis Engine), ODE (NCS4k Analysis Engine), and PCE (NCS1010 Path Computation & Simulation Engine).