



# Overview of Cisco Crosswork Optimization Engine

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This section mainly describes what Cisco Crosswork Optimization Engine does and how to navigate the main user interface. To quickly get started, you should understand some basic concepts and look over the high-level workflows described in [Get Started](#).

The following topics are addressed in this section:

- [Audience, on page 1](#)
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## Audience

This guide is for experienced network administrators who want to use Cisco Crosswork Optimization Engine in their network. This guide assumes that you are familiar with the following topics:

- Networking technologies and protocols (BGP-LS, IGP (OSPF and IS-IS), PCEP, model-driven telemetry, and so on)
- Cisco IOS XR Traffic Controller (XTC) or Segment Routing Path Computation Element (SR-PCE) functionality
- Segment routing (SR) and SR policy provisioning

## Overview of Cisco Crosswork Optimization Engine

Cisco Crosswork Optimization Engine is part of the Cisco Crosswork Network Automation suite of products. Cisco Crosswork Optimization Engine provides real-time network optimization allowing operators to effectively maximize network utilization as well as increase service velocity.

Crosswork Optimization Engine provides the following:

- A topology map that gives valuable real-time visualization of devices, links, link utilization, and Segment Routing (SR) policies in the network.
- A UI that allows for easy manageability of SR policies. Crosswork Optimization Engine enables the network operator to perform the following tasks:
  - Provision SR policies and modify or remove them using an intuitive workflow
  - Continuously track SR policy dynamic path computations to maintain SLA objectives
  - Preview an SR policy before deploying it to the network
- Crosswork Optimization Engine function packs (with correct licensing) that provide closed-loop optimization to define the optimization intent, implement the intent, and continuously monitor, track, and react to maintain the original intent.
- A framework that enables other function packs that can be developed in the field to support additional use cases that are not available out of the box. By leveraging SDKs and APIs, network operators can build additional function packs to support more optimization workflows.




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**Note** To get a quick overview on how to start using Crosswork Optimization Engine, see [High-Level Workflows](#).

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## Segment Routing Path Computation Element (SR-PCE)

Crosswork Optimization Engine uses the combination of telemetry and Cisco Segment Routing Path Computation Element (SR-PCE) to analyze and compute optimal SR policy paths.

Cisco SR-PCE (formerly Cisco XR Traffic Controller (XTC)) runs on the Cisco IOS XR operating system. SR-PCE provides stateful PCE functionality that helps control and move SR policies to optimize the network. PCE describes a set of procedures by which a Path Computation Client (PCC) can report and delegate control of head-end tunnels sourced from the PCC to a PCE peer. The PCC and PCE establish a Path Computation Element Communication Protocol (PCEP) connection that SR-PCE uses to push updates to the network.

Crosswork Optimization Engine discovers all devices that are part of the IGP domain including those that do not establish PCEP peering with SR-PCE. However, PCEP peering is required to deploy SR policies to the device.

## Log In and Log Out

The Cisco Crosswork Optimization Engine user interface is browser based. See the *Cisco Crosswork Optimization Engine Installation Guide* for supported browser versions.

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**Step 1** Open a web browser and enter:

`https://<CrossworkVMManagementIPAddress>:30603/`

**Step 2** The Cisco Crosswork Optimization Engine browser-based user interface displays the login window. Enter your username and password.

**Figure 1: Cisco Crosswork Optimization Engine Log In Window**



**Note** The default Cisco Crosswork Optimization Engine administrator user name and password is **admin**. This account is created automatically at installation (see [Administrative Users Created During Installation](#)). The initial password for this account must be changed during installation verification. Cisco strongly recommends that you keep the default administrator credential secure, and never use it for routine logins. Instead, create new user accounts with appropriate privileges and their own credentials (as explained in [Add Users](#)) and use only those accounts for all subsequent user logins.

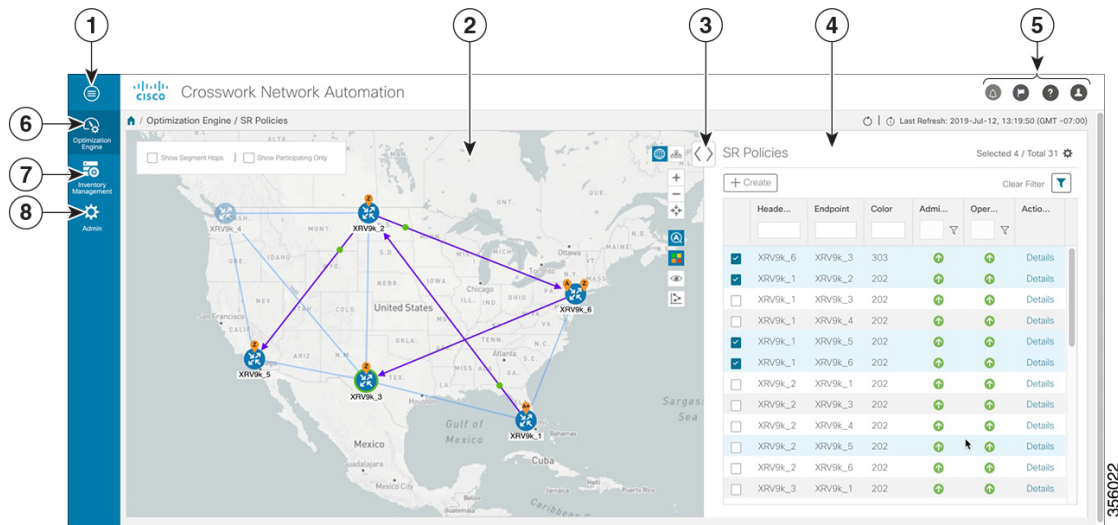
**Step 3** Click **Log In**.

When you access Cisco Crosswork Optimization Engine from your browser for the first time, some browsers display a warning that the site is untrusted. When this happens, follow the prompts to add a security exception and download the self-signed certificate from the server. After you do this, the browser accepts the Cisco Crosswork Optimization Engine server as a trusted site in all subsequent logins.





**Step 4** To log out, click  in the top right of the Cisco Crosswork Optimization Engine main window and choose **Log out**.

# Crosswork Optimization Engine Home Page

Figure 2: Crosswork Optimization Engine Home Page



Callout No.	Description
1	<p><b>More:</b> Toggles the main menu to compact mode or expanded mode.</p> <p>In compact mode, you must hover over the main menu items to view and select available options.</p> <p>In expanded mode, you must click on the main menu item to display the available options. In this mode, when a main menu item is expanded, it will remain so until you collapse the menu item.</p>
2	<p><b>Network Topology Map:</b> Displays a geographical or logical map view of the devices, links, and SR policies in your network. It also shows the general condition of devices and links. See <a href="#">Visualize the Network</a>.</p> <p>In conjunction with the <a href="#">SR Policies Table</a>, it quickly highlights selected SR policies and associated SR policy information such as metrics, adjacency segment IDs, segment hops, source and destination nodes. See <a href="#">Visualize and Manage SR Policies</a>.</p>
3	<p><b>Expand/Collapse/Hide Side Panel:</b> Expand or collapse the contents of the side panel. Close the side panel to get a larger view of the topology map.</p>


Callout No.	Description
4	<p>The <a href="#">SR Policies Table (Optimization Engine &gt; SR Policies)</a> is shown by default. The content of this panel changes depending on what is selected on the topology map, or whether you are in the process of viewing and managing SR policies. You can do the following:</p> <ul style="list-style-type: none"> <li>• <a href="#">Create and Manage SR Policies</a></li> <li>• <a href="#">Get More Information About an SR Policy</a></li> <li>• <a href="#">Get More Information About Devices on the Map</a></li> <li>• <a href="#">Get More Information About Links</a></li> </ul>
5	<p>Settings icons:</p> <p> The <b>Alerts</b> icon notifies you of any current error conditions related to the system operations which require attention, and provides a link to detailed information about those conditions.</p> <p> The <b>Events</b> icon notifies you of new events related to system operation, and also provides access to the history of all system events.</p> <p> The <b>About</b> icon displays the current version of Crosswork Optimization Engine.</p> <p> The <b>User Account</b> icon lets you view your username, change your password, and log out.</p>
6	<p><b>Optimization Engine Menu:</b> You can access the following SR policy related options:</p> <ul style="list-style-type: none"> <li>• <b>SR Policies</b>—Returns you to the main window as shown above.</li> <li>• <b>Affinity Mapping</b>—Lets you map an affinity to a bit position. See <a href="#">Configure Affinity Mapping</a>.</li> <li>• <b>Function Packs</b>—Lets you enable and configure function packs. See <a href="#">Get Started with Function Packs</a>.</li> </ul>
7	<p><b>Inventory Management Menu:</b> You can access the following inventory related options:</p> <ul style="list-style-type: none"> <li>• <b>Devices</b>—Lets you add, update and view information about the devices in your network. See <a href="#">Manage Devices</a>.</li> <li>• <b>Providers</b>—Lets you add, update and manage providers. See <a href="#">Manage Providers</a>.</li> <li>• <b>Credentials</b>—Lets you add, update and manage credential profiles that control access to devices and providers. See <a href="#">Manage Credential Profiles</a>.</li> <li>• <b>Tags</b>—Lets you add, update and manage the tags you use to sort and group devices. See <a href="#">Manage Tags</a>.</li> <li>• <b>Job History</b>—Lets you review device related jobs. See <a href="#">View Device Job History</a>.</li> </ul>

Callout No.	Description
8	<p><b>Admin Menu:</b> You can access the following administrative related options:</p> <ul style="list-style-type: none"> <li>• <b>Crosswork Manager</b>—Lets you do the following tasks: <ul style="list-style-type: none"> <li>• Collect logs and metrics. See <a href="#">Collect and Share Cisco Crosswork Network Automation Logs and Metrics</a>.</li> <li>• Monitor the general state of containers. See <a href="#">Monitor Cisco Crosswork Network Automation Functions in Real Time</a>.</li> <li>• Control (stop, start, or restart) services. See <a href="#">Control Cisco Crosswork Network Automation Applications and Services</a>.</li> </ul> </li> <li>• <b>Users</b>—Lets you add, update and view users and roles. See <a href="#">Manage Users</a>.</li> <li>• <b>AAA</b>—Lets you add, update and view TACACS+ servers to authenticate users. See <a href="#">Manage TACACS+ Servers</a>.</li> <li>• <b>Visualization Settings</b>—Lets you update topology map settings. See <a href="#">Configure Geographical Map Settings</a> and <a href="#">Define Color Thresholds for Link Bandwidth Utilization</a>.</li> <li>• <b>Certificate Management</b>—Lets you view and manage certificates. See <a href="#">Manage Certificates</a>.</li> </ul>

## Set, Sort and Filter Table Data

Many Cisco Crosswork Optimization Engine windows show database records in tables.

Any window with a table will also provide column selection, sorting, and filter functions that let you control the database records shown in the tables and help you locate particular records quickly.

Click  to display a list of all the fields in the database for the kind of data record displayed in the table. You can choose which fields you want to display as table columns by checking or unchecking the box next to any field in the list. Your choices are enabled immediately and are permanent.

For example: In the **Devices** window shown below, we have unchecked the **Reachability State** and **Inventory Key Type** fields. These are normally shown as part of the default **Devices** table, but are now removed. We have also checked the **MAC Address** field, adding it to the table.

Figure 3: Devices Window With MAC Address Column Added

The screenshot shows a table titled 'Devices' with 12 columns. The columns are: Host Name, Configured State, Operational State, Lock Status, MAC Address, Product Type, Device Type, and a dropdown menu. The dropdown menu is open, showing options: Host Name (checked), Reachability State, Reachability Check, Inventory Key Type, Inventory ID, MAC Address (checked), and UUID. The table contains 12 rows of device data.

	Host Name	Configured State	Operational State	Lock Status	MAC Address	Product Type	Device Type	
<input type="checkbox"/>	spnac-a9k-s101	UP			0050.56b8.b145	Cisco XRV9000	ROUTER	
<input type="checkbox"/>	spnac-a9k-s105	UP			0050.56b8.309f	Cisco XRV9000	ROUTER	
<input type="checkbox"/>	spnac-a9k-s106	UP			0050.56b8.295f	Cisco XRV9000	ROUTER	
<input type="checkbox"/>	cw-ncs-r1.cisco.com	UP				NCS-5500	ROUTER	device-creds
<input type="checkbox"/>	cw-ncs-r4.cisco.com	UP				NCS-5500	ROUTER	device-creds
<input type="checkbox"/>	spnac-a9k-s102	UP			0050.56b8.48d6	Cisco XRV9000	ROUTER	device-creds
<input type="checkbox"/>	spnac-a9k-s103	UP			0050.56b8.d83f	Cisco XRV9000	ROUTER	device-creds
<input type="checkbox"/>	spnac-a9k-s104	UP			0050.56b8.ed1a	Cisco XRV9000	ROUTER	device-creds
<input type="checkbox"/>	cw-ncs-r2.cisco.com	UP				NCS-5500	ROUTER	device-creds
<input type="checkbox"/>	cw-a9k-r1.cisco.com	UP			00a7.425b.2172	ASR9K	ROUTER	device-creds

You can also sort all the records displayed in the table according to the data in any one column by clicking that column's title:

- To sort the records in ascending order, click the column title once.
- To sort the records in descending order, click the column title again.

Sorting takes place immediately. You can only have one active sort at a time. The example **Links** window, below, shows an active sort on the **Link Type** field.

You can also filter the table to show only the records you want, using a quick filter or an advanced filter. Many tables have all these features enabled by default. If you cannot see the quick and advanced filter features

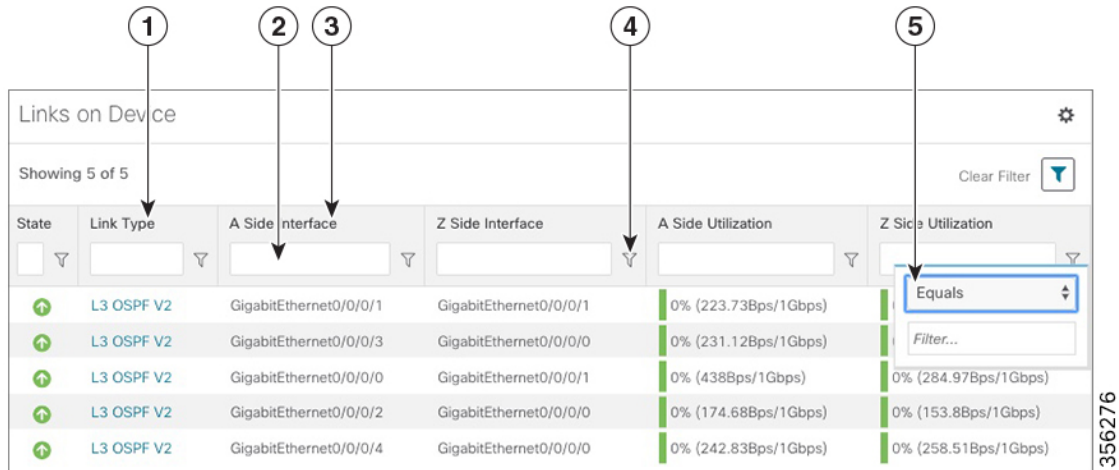
displayed on a window with a table, click



The quick filter displays only the records that match the value you enter above the column in the **quick filter** field (see item 2, below). Filtering takes place immediately, as you type.

The advanced filter narrows the content in the table by applying a filter that includes both a value and a logical operator, such as Equals, Starts with, Contains, and so on. Click in the column header to access the advanced filter (see items 4 and 5, below).

In addition to these quick and advanced filters, you can also use tags to filter the devices shown in the **Devices** window (see [Filter Devices by Tags](#)).

Figure 4: Links Window With Active Sort and Filters



Item	Description
1	<b>Sort active icon:</b> This arrow icon indicates that the user has sorted the links by clicking on the column header. The arrow's direction shows that the table is sorted by <b>Link Type</b> , in ascending order.
2	<b>Quick filter field:</b> Type a text or numeric value in this field to show only the links that match the value you enter. The field shows the values you entered for both quick and advanced filters.
3	<b>Filter active icon:</b> This icon shows that a quick or advanced filter is currently applied to the data in this column.
4	<b>Advanced filter icon:</b> Click  , shown in each column header, to specify an advanced filter on that column, using logical operators as well as alphanumerical values.
5	<p><b>Filter criteria fields:</b> These fields appear in a popup next to the column after you click the  icon. Set the filter criteria by selecting the logical operator from the drop down list in the first field, and then entering the filter value in the second field. Your criteria will be applied immediately. You will then be prompted to enter more operators and values, and to decide if you want to concatenate them using logical AND or OR. The quick filter field shows the values you entered (but not the operators). Logical operators include Equals, Not equal, Starts with, Ends with, Contains, and Not contains.</p> <p><b>Note</b> Some columns will not have all of the logical operators available.</p>