Visualize and Manage SR Policies

Cisco Crosswork Optimization Engine visualization provides the most value by giving you the ability to easily view and manage SR policies. By visually examining your network, the complexity of provisioning and managing SR policies is significantly reduced.

This section contains the following topics:

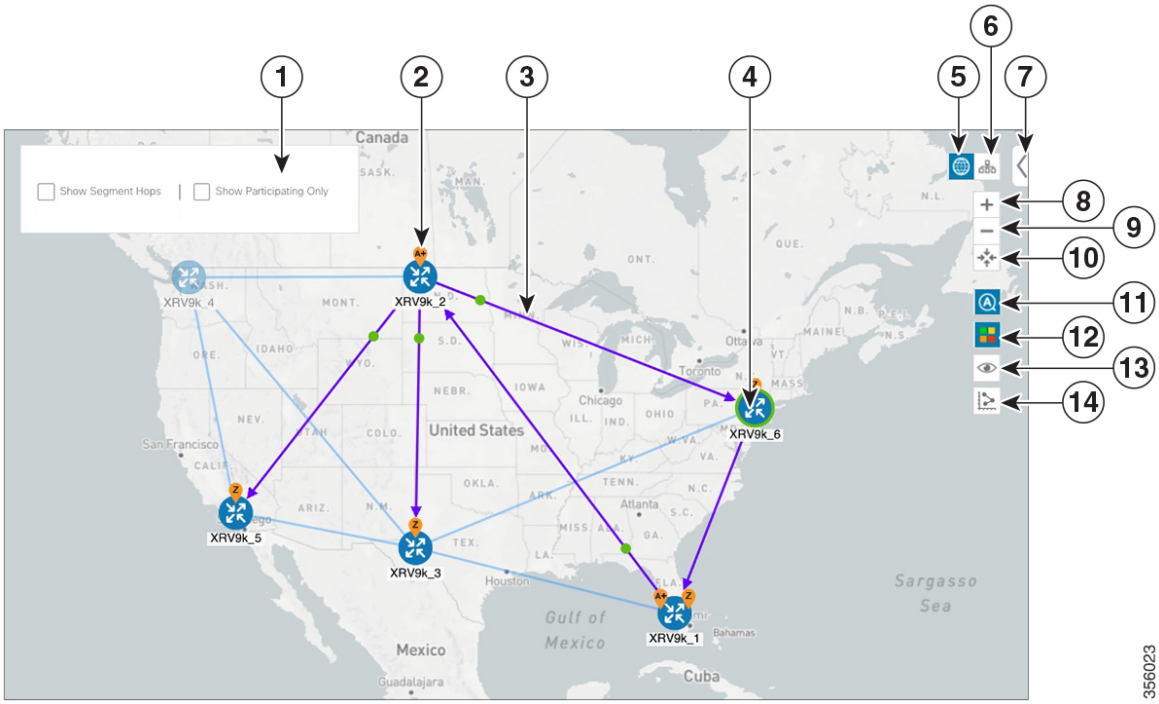
SR Policies Topology Map

To get to the topology map, choose **Optimization Engine** from the left navigation bar, and click **SR Policies**.

For information on topology issues, or using the map to get information about devices and links, see Network Topology Map and Troubleshoot Network Topology Map.

The following figure shows the topology map with SR policies highlighted. See the Visualize SR Policies Example, on page 6 for information on how to select SR policies so that they appear on the topology map/

Figure 1: SR Policies Topology Map



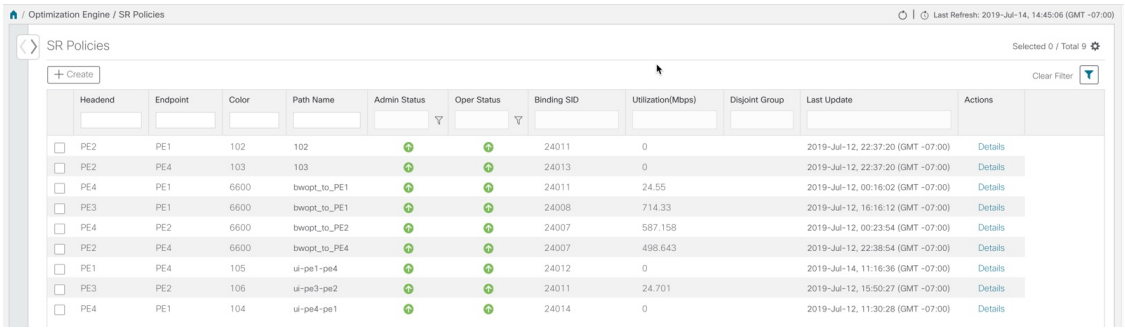
Callout No.	Description
1	Click the appropriate check box to enable the following options: • **Show Segment Hops**—Displays segment hops for the selected explicit SR policies. • **Show Participating Only**—Displays only links that belong to selected SR policies. All other links and devices disappear.
2	**SR Policy Origin and Destination**: If both **A** and **Z** are displayed in a device cluster, at least one node in the cluster is a source and another is a destination. The **A+** denotes that there is more than one policy that originates from a node. The **Z+** denotes that the node is a destination for more than one policy.
3	**SR Policies**: When SR policies are selected from the SR Policies Table, on page 3, they show as purple directional lines on the map indicating source and destination. An adjacency segment ID (SID) is shown as a green dot on a link along the path ( ).
4	A device or device cluster with a green outline ( ) indicates there is a node SID associated with that device or a device in the cluster.

Callout No.	Description
5	**Geographical Map**: Click this icon to view the geographical map. The geographical map shows single devices, device clusters, links, and SR policies, superimposed on a map of the world. Each device location on the map reflects the device's GPS coordinates (longitude and latitude) as defined in the device inventory.
6	**Logical Map**: Click this icon to toggle from the geographical map to the logical map. The logical map shows devices and their links, positioned according to an automatic layout algorithm, ignoring their geographical location. You can change the layout algorithm; see Change the Layout of a Logical Map. The logical map displays up to 5000 devices and never displays devices in clusters. If you drill down to the logical map from a geographical cluster at the maximum zoom level, the logical map shows devices that are located in the same location. See Identify the Members of a Cluster.
7	**Expand/Collapse/Hide Side Panel**: Expand or collapse the side panel to see the full and truncated versions of the right-side panel. Close the side panel to get a larger view of the topology map.
8	**Zoom In**: Click this icon to zoom in on the selected area; for example, to view clustered devices on the geographical map.
9	**Zoom Out:** Click this icon to zoom out from a selection area.
10	**Zoom Fit**: Lets you automatically scale the map to fit your zoom area.
11	**Auto Zoom**: Zooms in on selected SR policies. This option is selected by default. If you uncheck this option, navigate away from the map, and later return to the map; it will revert to the default option.
12	**Bandwidth Utilization**: Lets you enable or disable visualization of the bandwidth utilization for the mapped links. See Show Bandwidth Utilization for Links on the Map. This option is selected by default. If you uncheck this option, navigate away from the map, and later return to the map; it will revert to the default option.
13	**Custom Map View**: Lets you create a named custom view using the settings and layout for your current map, or display a custom view you have created previously. See Create Custom Map Views.
14	**Metrics**: Shows IGP, TE, or delay metrics for each link along the SR policy paths (see Show IGP, Delay, and Traffic Engineering Metrics, on page 12).

SR Policies Table

To get to the **SR Policies** table, choose **Optimization Engine** from the left navigation bar, and click **SR Policies**. You will see the topology map and, to the right of the map, the **SR Policies** table.

Figure 2: SR Policies Table



The **SR Policies** table provides the following functions:

- Displays a list of all SR Policies discovered from the network.
- Configure new SR policies.
- Edit SR policies created using Crosswork Optimization Engine (click on **Details** link).

Note Only SR policies created from Crosswork Optimization Engine can be modified or deleted on the Crosswork Optimization Engine UI.

- Highlight SR policies on the map when selected from the table.
- View SR policy details (click on **Details** link). See Get More Information About an SR Policy, on page 24).
- Refresh ( ) the table or policy details (if in the **SR Policy Details** table). You can also view the date and time as to when the last refresh occured.

Note When creating or modifying SR policies, the refresh and auto-refresh functions are disabled in the tables.

The following information is available in the **SR Policies** table:

Note Some fields may be blank depending on the SR policy type.

Table 1:

Column Heading	Description
Headend	Where the SR policy is instantiated.
Endpoint	The destination of the SR policy.

Column Heading	Description
Color	A numerical value that distinguishes between two or more policies to the same node pairs (Headend – Endpoint). Every SR policy between a given headed and endpoint must have a unique color.
Path Name	Name of SR policy path.
Admin Status	Administrative status of the SR policy.This is the status defined by the user.
Oper Status	Operational status of the SR policy. This is the state of the policy as reported by the system. For example, the user can define the Admin status as Up. However, if the policy is operationally down due to some network issues, then the Oper Status will display as Down.
Binding SID	The binding segment is a local segment identifying an SR policy. Each SR policy is associated with a binding segment ID (BSID).
Utilization	Percentage of total bandwidth being used.
Disjoint Group	If applicable, the disjoint group the SR policy belongs in.
Last Update	Time when the most recent update for the policy was received from the network.
Actions	Click **Details** to Get More Information About an SR Policy, on page 24.

SR Policy Configuration Sources

SR Policies discovered and reported by Cisco Crosswork Optimization Engine may have been configured from the following sources:

- SR-PCE initiated—An SR policy that is configured directly on an SR-PCE device.
- PCC initiated—An SR policy that is configured directly on a device.
- Cisco Crosswork Optimization Engine PCE initiated—An SR policy that is configured using Cisco Crosswork Optimization Engine. This is the only type of SR policy that Cisco Crosswork Optimization Engine can modify or delete (see Create and Manage SR Policies, on page 13).

Visualize SR Policies

This section describes the visualization features provided in the topology map for SR policies that have been discovered during the onboard of devices or provisioned using Cisco Crosswork Optimization Engine. To create and manage SR policies using Cisco Crosswork Optimization Engine see Create and Manage SR Policies, on page 13.

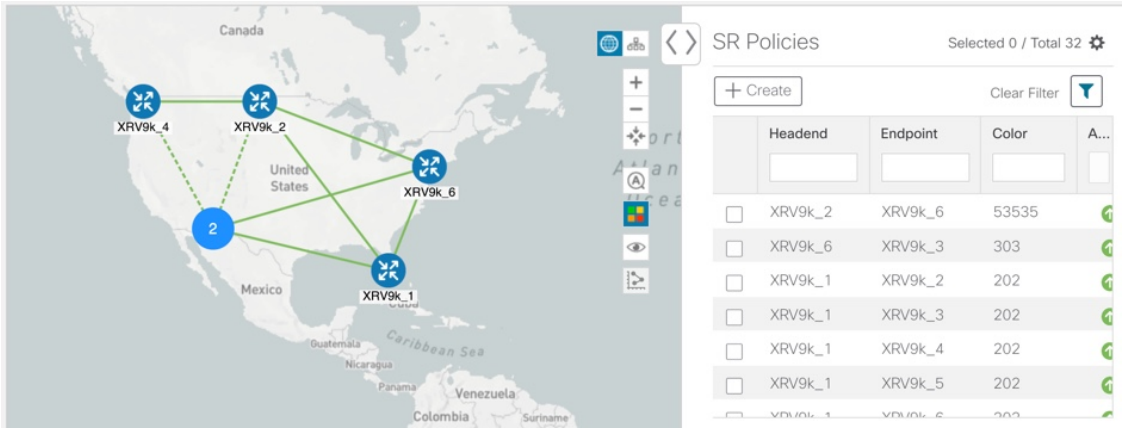
This section contains the following topics:

Visualize SR Policies Example

Follow the steps in this example to quickly familiarize yourself with a number of SR policy visualization features that are available from the topology map.

In this example, we are using the following geographical map with devices and links that have SR policies configured. SR policies are not yet highlighted in the map.

Figure 3: Topology Map Example

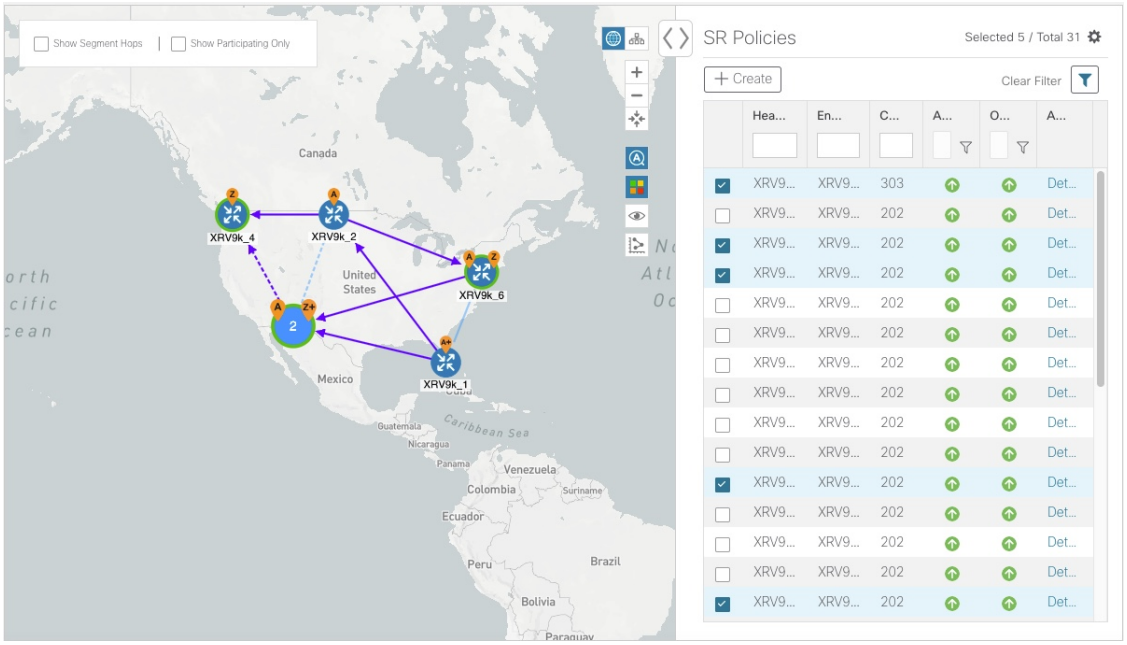


Before you begin

In this example, we assume that devices and SR policies have already been added to Crosswork Optimization Engine (see Get Started).

Step 1 From the **SR Policies** table, click the checkbox next to the SR policies you are interested in. In this example, there are four SR policies selected.

Figure 4: SR Policy Selection

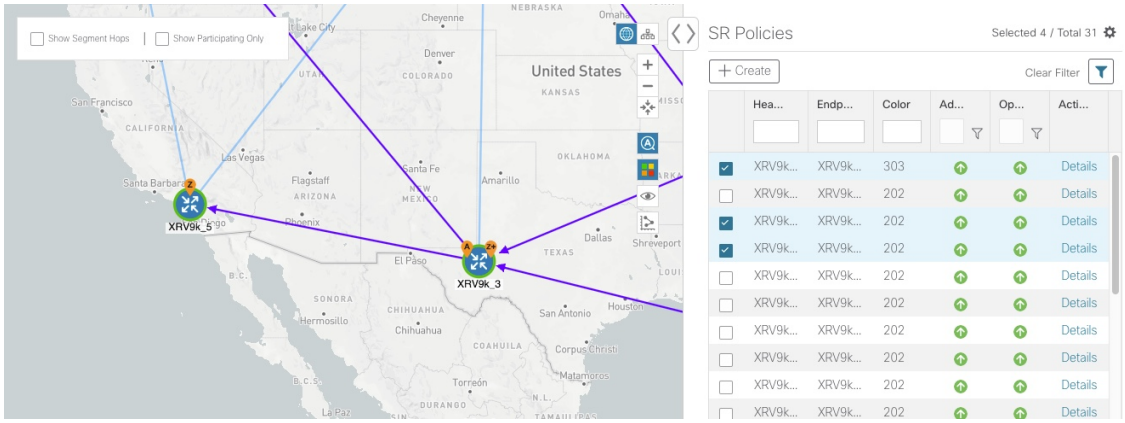


After SR selection, the map displays the following:

- SR policies appear as purple links with arrows that indicate the path direction. Dashed links represent aggregated links.
- XRV9k_1, XRV9k_2, and XRV9k_6 devices are origins for the selected policies. XRV9k_4, XRV9k_6, and devices in the device cluster are destinations for the selected policies. SR policy origin and destination are marked with **A** and **Z**, respectively. If both **A** and **Z** are displayed in a device cluster, at least one device in the cluster is a source and another is a destination. The **A+** denotes that there is more than one policy that originates from a device. The Z+ denotes that the device is a destination for more than one policy.
-  indicates a device cluster composed of 2 devices within the same general location. This particular device cluster also has a node SID which is indicated by the green outline.
-  indicates XRV9k_4 and XRV9k_6 have node SIDs.

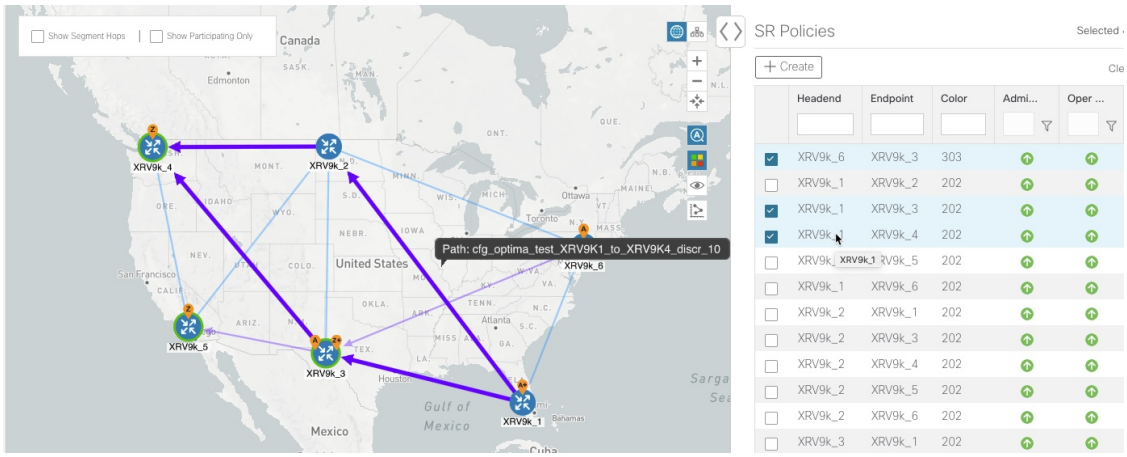
Step 2 Click on the device cluster to zoom in and see the individual devices (XRV9k_5 and XRV9k_1).

Figure 5: Device Cluster Zoom



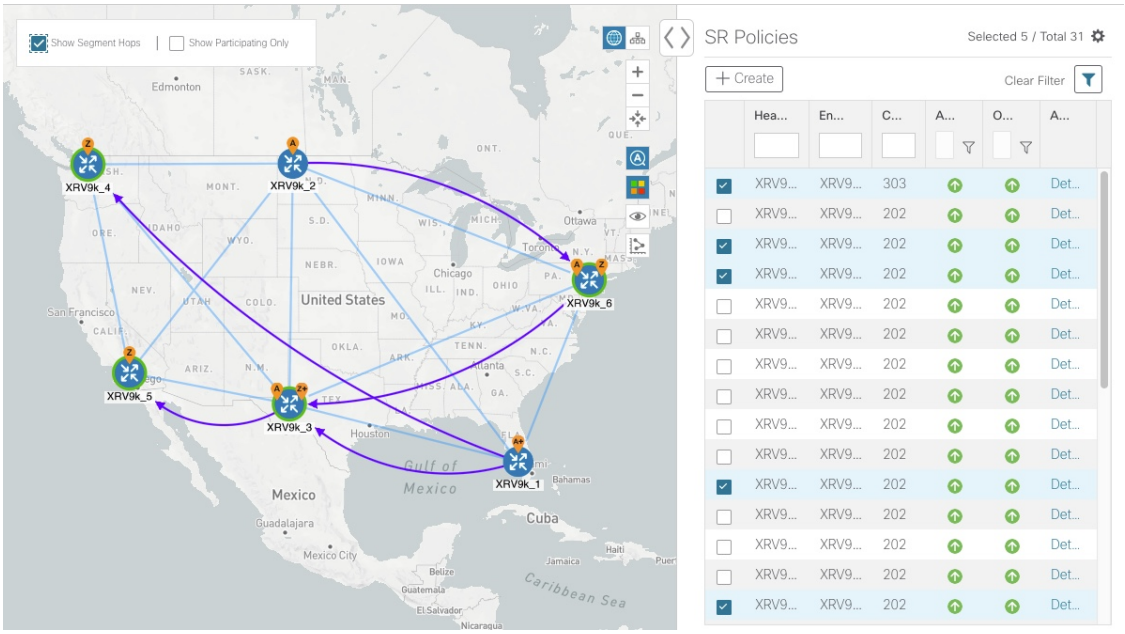
Step 3 From the **SR Policies** table, *hover* over one of the selected policy names. When you hover on one of the selected SR policy entries, the IGP path of that policy is highlighted on the topology view. In the case of ECMP (Equal Cost Multi-Path) all paths will be highlighted as shown in the example below.

Figure 6: Hover over an SR Policy



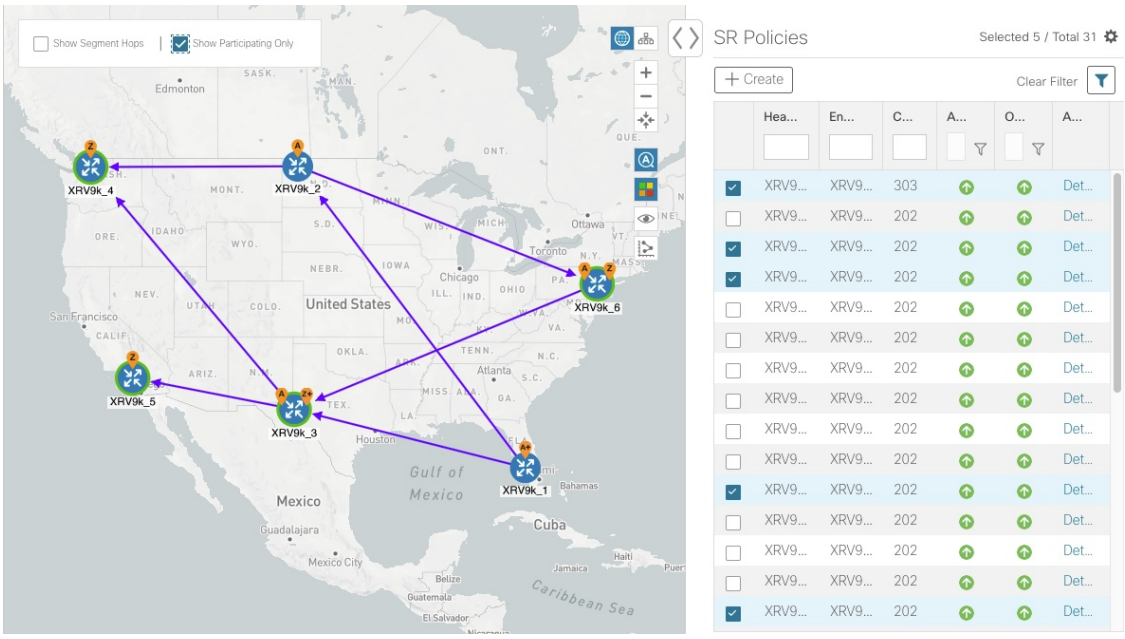
Step 4 Check the **Show Segment Hops** check box. The segment hops for the selected SR policies are displayed, with curved arrows, instead of the IGP paths.

Figure 7: Segment Hops



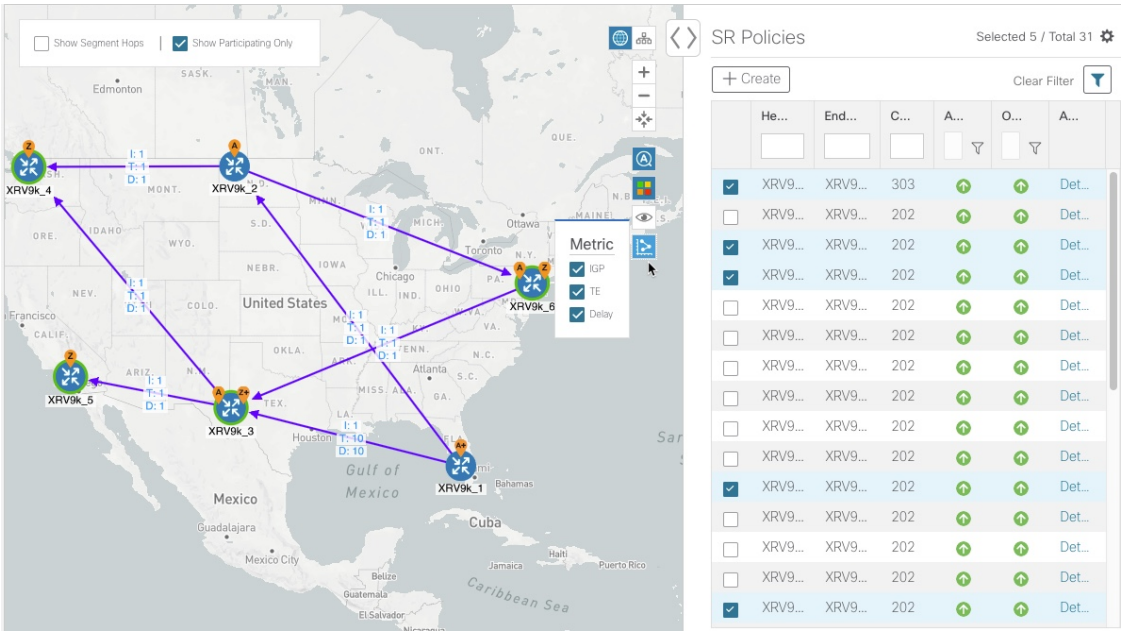
Step 5 Check the **Show Participating Only** check box. All non-participating links and devices disappear. Only participating policies are displayed.

Figure 8: Participating SR Policies



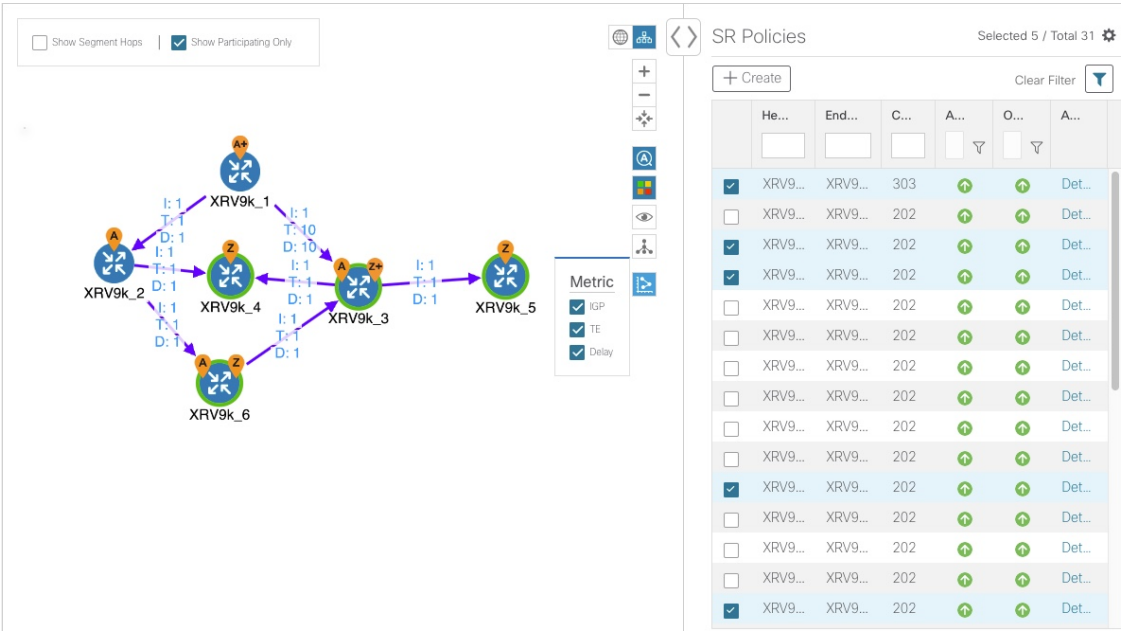
Step 6 To view the IGP, TE or Delay metrics for each link along a policy's IGP path, select the Metric icon and click the applicable check boxes. The metric details are displayed for each policy on the map.

Figure 9: IGP, Delay, and TE Metrics



Step 7 Click the logical map icon ( ).

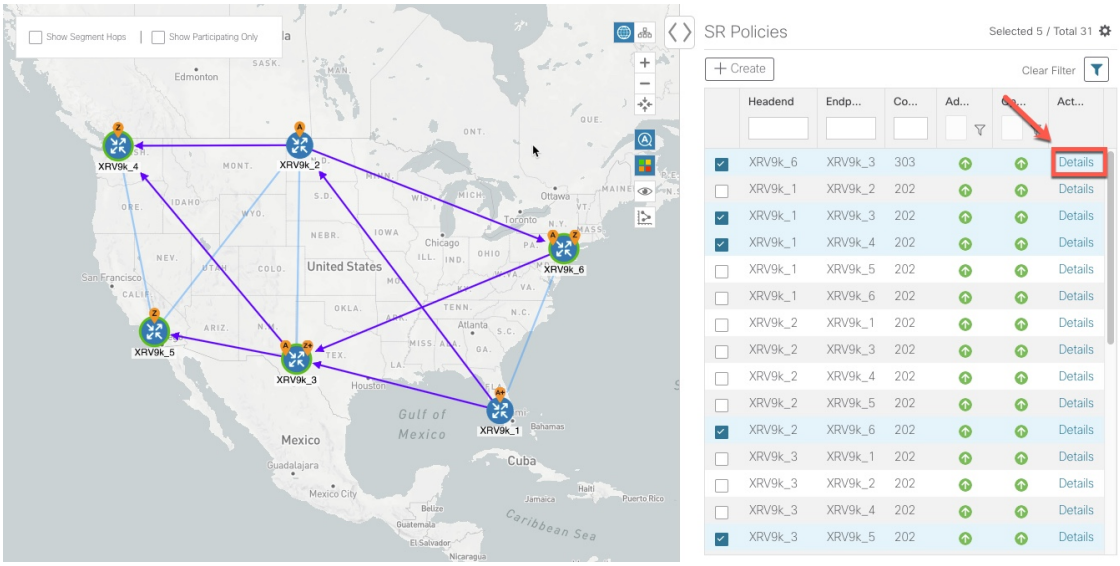
Figure 10: Logical Map



You are able to see the same information (aside from geographical location) that is available on the geographical topology map. You also have the ability to move devices and links on the map to make it easier to view.

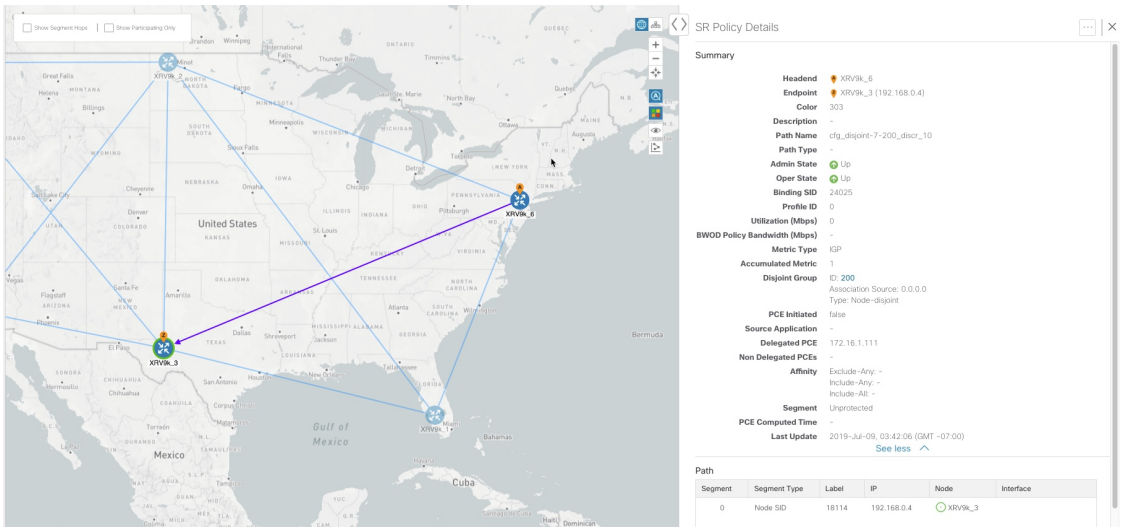
Step 8 To view SR policy details such as disjoint groups, metric type, segment hop information, and so on, click **Details...** from the table.

Figure 11: SR Policy Detail Link



The **SR Policy Details** page is displayed in the side panel (see Get More Information About an SR Policy, on page 24). Note that only the selected policy is now highlighted on the topology map.

Figure 12: SR Policy Details



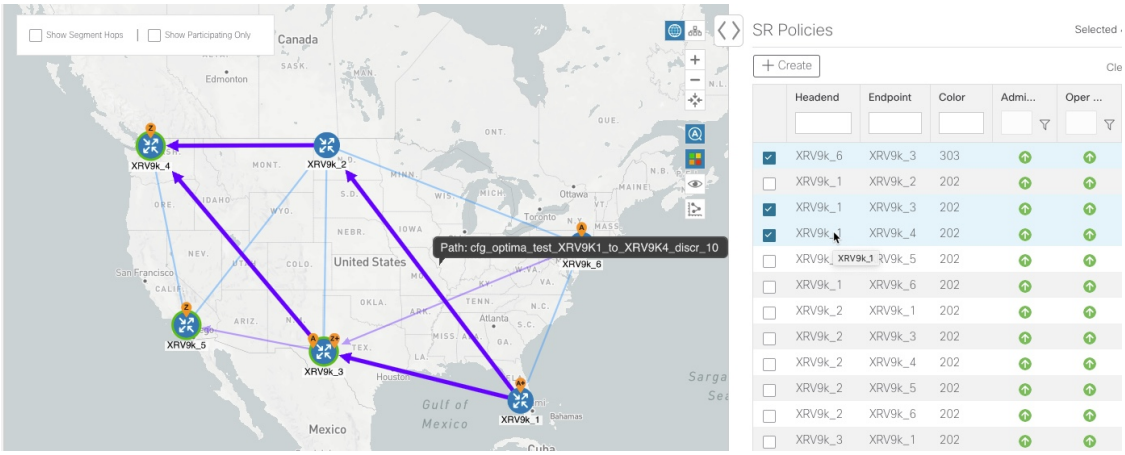
Note To return to the **SR Policies** table, close (✕) the current view.

What to do next

Provision and manage SR policies. See Visualize and Manage SR Policies, on page 1.

Highlight an SR Policy on the Map

When many SR policies are displayed on the map, it may be difficult to view a particular SR policy path. To highlight a particular SR policy path on the map, navigate to **Optimization Engine** > **SR Policies** > **SR Policies** table, and hover over the SR policy.



Identify Segment Hops

To view segment hops for selected policies, do the following:

Step 1 From the **SR Policies** table, select the SR policies you are interested in.

Step 2 From the top left box in the topology map, check the **Show Segment Hops** check box. The segment hops for the selected SR policies are displayed, with curved arrows, instead of the IGP paths.

Show Participating Nodes and Links

To view only the nodes and links that are part of selected SR policies, do the following:

Step 1 From the **SR Policies** window, select the SR policies you are interested in.

Step 2 From the top left box in the topology map, check the **Show Participating Only** check box.

Show IGP, Delay, and Traffic Engineering Metrics

Each link is assigned a metric value. The distance between two nodes is the sum of all the metric values of links along a path. To view IGP, Delay, or Traffic Engineering (TE) metrics on the topology map:

Step 1 From the **SR Policies** table, check the checkboxes next to the SR policies you are interested in. The SR policies are highlighted in the topology map.

Step 2 From the topology map, select the Metric icon and click the applicable check boxes. The metric details are displayed for each policy on the map.

What to do next

To configure a dynamic SR policy based on one of these metrics, see Create Dynamic Path SR Policies, on page 17.

Create and Manage SR Policies

This section describes how to provision and manage SR policies using the Cisco Crosswork Optimization Engine UI. The Cisco Crosswork Optimization Engine UI gives you the capability of provisioning SR policies in a variety of methods (explicit, dynamic, and bandwidth constraint driven). As you provision an SR policy, you can select nodes on the topology map and also preview the path before deployment. This greatly reduces the complexity of SR policy management. Before provisioning SR policies, you should understand some basic segment routing configuration concepts (see Segment Routing).

Configure Affinity Mapping

Affinity of an SR policy is used to specify the link attributes for which the policy has affinity for. It determines which links are suitable to form a path for the policy. It is a 32-bit value, with each bit position (0 - 31) representing a link attribute. Affinity mapping is used to map each bit position or attribute to a color. This makes it easier to refer to link attributes.

Note The affinity mapping name is only used for visualization in Cisco Crosswork Optimization Engine. Affinities defined on devices are not collected by Cisco Crosswork Optimization Engine. Define affinity mapping in Cisco Crosswork Optimization Engine with the same name and bits that are used on the device interface. Cisco Crosswork Optimization Enginewill only send bit information to SR-PCE during provisioning.

Step 1 From the main menu choose **Optimization Engine** > **Affinity Mapping**. You can also define affinities while creating a policy (Create Dynamic Path SR Policies, on page 17) by clicking **Manage Mapping**.

Step 2 To add a new affinity mapping, click **Create Mapping**.

a) Enter the name (color) and the bit it will be assigned to.

b) Click to save the mapping.

Step 3 To edit an affinity mapping, click .

a) Make the necessary changes. If you want to cancel your changes, click .

b) Click to save the changes.

Step 4 To delete an affinity mapping, click

Note You should remove the policy before removing the affinity to avoid orphan policies. If you have removed an affinity associated to an SR policy, the affinity is shown as "UNKNOWN" in the **SR Policy Details** window.

What to do next

After defining affinities, you can Create Dynamic Path SR Policies, on page 17.

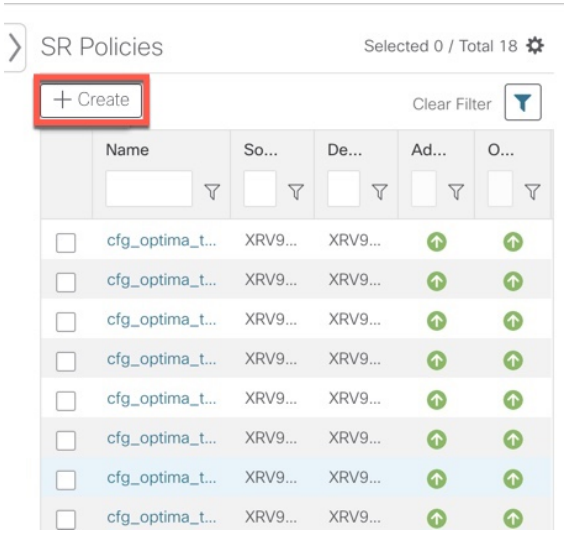
Create Explicit Path SR Policies

This task creates an SR policy using an explicit path (segments) that you define.

Step 1 From the main menu, choose **Optimization Engine** > **SR Policies**.

Step 2 From the **SR Policies** table, click **+ Create**.

Figure 13: Create SR Policy



Step 3 Enter the following SR policy values:

a) Required fields:

- **Headend**—Where the SR policy is instantiated. Note: You can either select a node (from the map or drop-down list) or enter part of the node name to filter the headend and endpoint node entries.
- **Endpoint**—The destination of the SR policy.
- **IP Address**—After the endpoint is selected, the SID list is populated and you can select the loopback IP address.
- **Color**—A numerical value that distinguishes between two or more policies to the same node pairs (Headend – Endpoint). Every SR policy between a given headed and endpoint must have a unique color. The bit value must match the value that is configured on the device.
- **Path Name**—Enter a name for this SR policy path. SR policy paths from the same headend must be unique. Policy path names are not case sensitive.

b) Optional values:

- **Description**—Enter details or a description of this policy.
- **Explicit Binding SID**—The binding segment is a local segment identifying an SR policy. Each SR policy is associated with a binding segment ID (BSID). The BSID is a local label that is automatically allocated for each SR policy when the policy is instantiated. If you wish to use a specific segment ID, rather than the default one that is automatically assigned, then enter it here.
- **Profile ID**—Identification used to associate an SR policy with a set of features applied to the policy by the headend. It should correspond with a profile configured on the headend.

Step 4 Under Policy Path, click **Explicit Path**.

Step 5 Add segments that are part of the SR policy path.

a) You can either select a node from the drop-down list or enter part of the node name to filter the node list. After a node is selected, the **Select SID** drop-down list is populated with associated prefix and adjacency segment IDs.

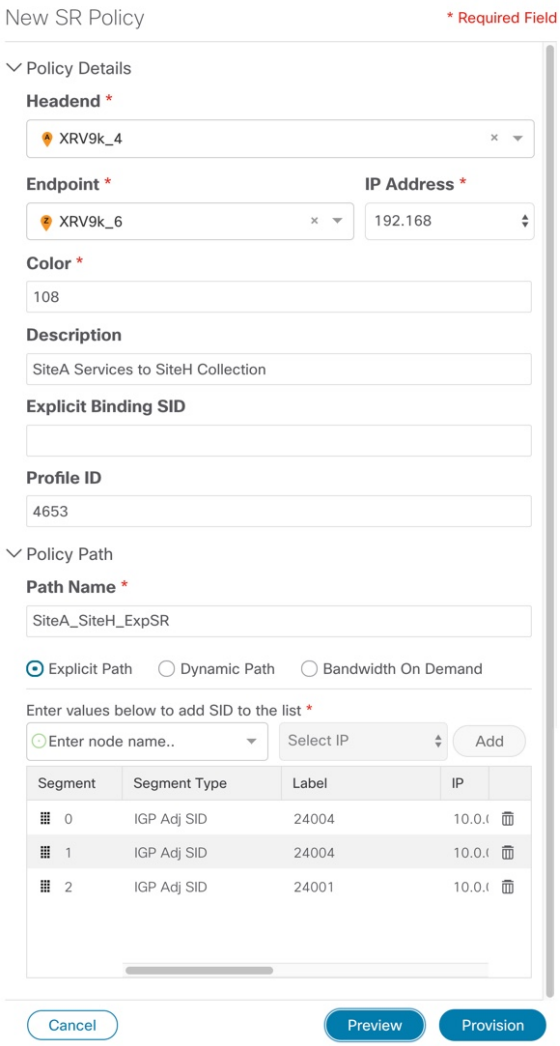
b) Select a segment ID from the **Select SID** drop-down list. The drop-down list contains all available segments. The segment names indicate the associated node and whether it is a prefix or an adjacency segment. The name also includes whether the segment is protected (P) or unprotected (U).

c) Click **Add**. The segment appears in the table with segment values.

d) Repeat for each segment you want to add to the SR policy path. To reorder the segment hops, click and drag next to the segment hop you want to move.

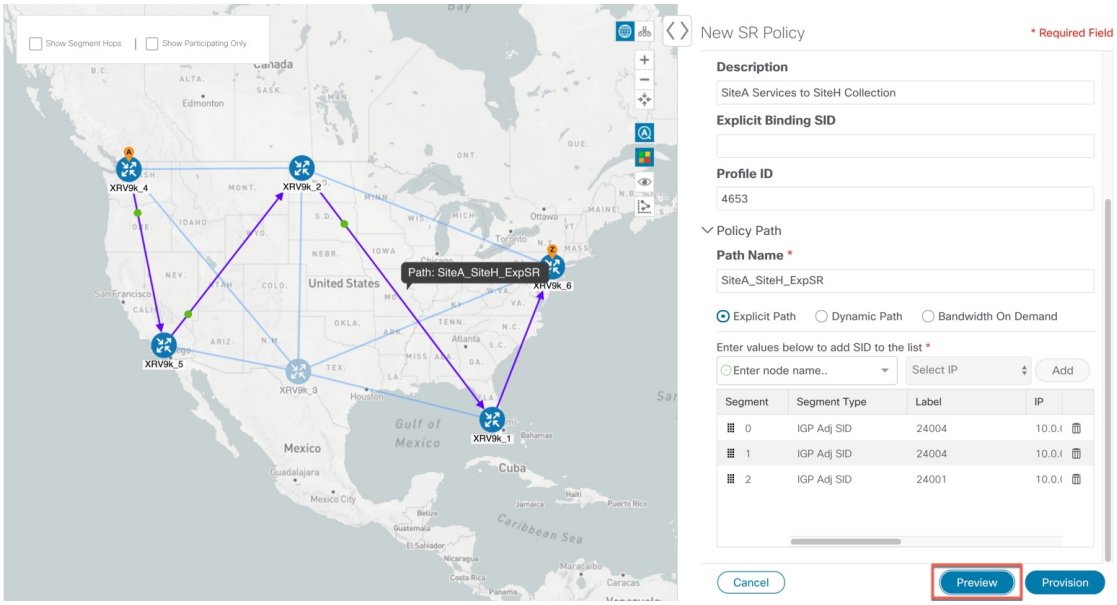
Note The segments must be in order or the path will not be created.

Figure 14: Explicit SR Policy Example



Step 6 Click **Preview**. The path is highlighted on the map and policy details are displayed on the right.

Figure 15: Explicit SR Policy Example



Step 7 If you are satisfied with the policy path, click **Provision**.

Step 8 When the policy is provisioned successfully, a window appears with the following options:

- **View SR Policy List**—Displays the **SR Policies** table that lists all SR policies including the one that was just created.
- **Create New**—Allows you to create another SR policy.

Note The newly provisioned SR policy may take some time, depending on network size and performance, to appear in the **SR Policies** table. The **SR Policies** table is refreshed every 30 seconds.

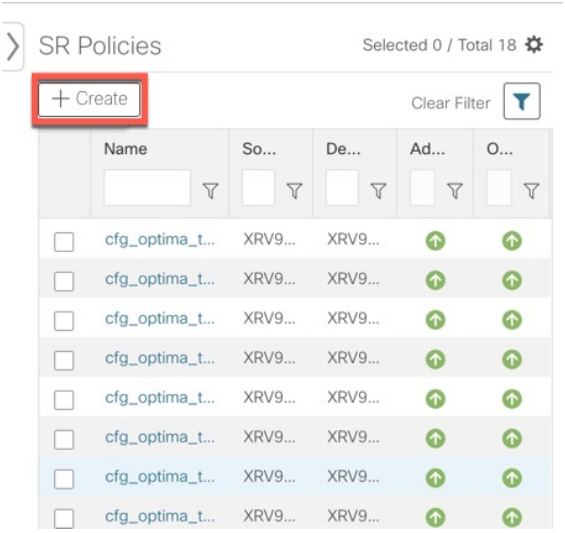
Create Dynamic Path SR Policies

This task creates an SR policy with a dynamic path. SR-PCE computes a path for the policy based on metrics and path constraints (affinity or disjointness) defined by the user. A user can select from three available metrics to minimize in path computation: IGP, TE, or delay. SR-PCE may also automatically re-optimize the path as necessary based on topology changes.

Step 1 From the main menu, choose **Optimization Engine** > **SR Policies**.

Step 2 From the **SR Policies** table, click **+ Create**.

Figure 16: Create SR Policy



Step 3 Enter the following SR policy values:

a) Required fields:

- **Headend**—Where the SR policy is instantiated. Note: You can either select a node (from the map or drop-down list) or enter part of the node name to filter the headend and endpoint node entries.
- **Endpoint**—The destination of the SR policy.
- **IP Address**—After the endpoint is selected, the SID list is populated and you can select the loopback IP address.
- **Color**—A numerical value that distinguishes between two or more policies to the same node pairs (Headend – Endpoint). Every SR policy between a given headed and endpoint must have a unique color.
- **Path Name**—Enter a name for this SR policy path. SR policy paths from the same headend must be unique. Policy path names are not case sensitive.

b) Optional values:

- **Description**—Enter details or a description of this policy.
- **Explicit Binding SID**—The binding segment is a local segment identifying an SR policy. Each SR policy is associated with a binding segment ID (BSID). The BSID is a local label that is automatically allocated for each SR policy when the policy is instantiated. If you wish to use a specific segment ID, rather than the default one that is automatically assigned, then enter it here.
- **Profile ID**—Identification used to associate an SR policy with a set of features applied to the policy by the headend. It should correspond with a profile configured on the headend.

Step 4 Under Policy Path, click **Dynamic Path**.

Step 5 Under Optimization Objective, select one of the following:

- **Interior Gateway Protocol (IGP) Metric**—Minimizes total path IGP metric.
- **Traffic Engineering (TE) Metric**—Minimize total path TE metric.

- **Latency**—Minimize total path latency.

Step 6 Define affinities:

Note Affinity constraints and disjointness cannot be configured on the same SR policy.

- **Exclude Any**—Does not traverse interfaces that have any of the specified affinities.
- **Include Any**—Includes only interfaces that have any of the specified affinities.
- **Include All**—Include only interfaces that have all of the specified affinities.
- **Select or Create Mapping**
  - If affinity mappings have been defined, select the applicable value.
  - To create an affinity mapping, click **Create Mapping**.

Note For more information, see Configure Affinity Mapping, on page 13.

- **Add Another**—Click this link to add more affinity rules.

Step 7 (Optional) Define disjointness. For more information on how Cisco Crosswork Optimization Engine handles disjoint policies and what options are supported, see the "Disjointness" section in Segment Routing). Enter the disjoint group ID and subgroup ID. If there are existing SR policies belonging to a disjoint group that you define here, all SR policies that belong to that same disjoint group are shown during Preview.

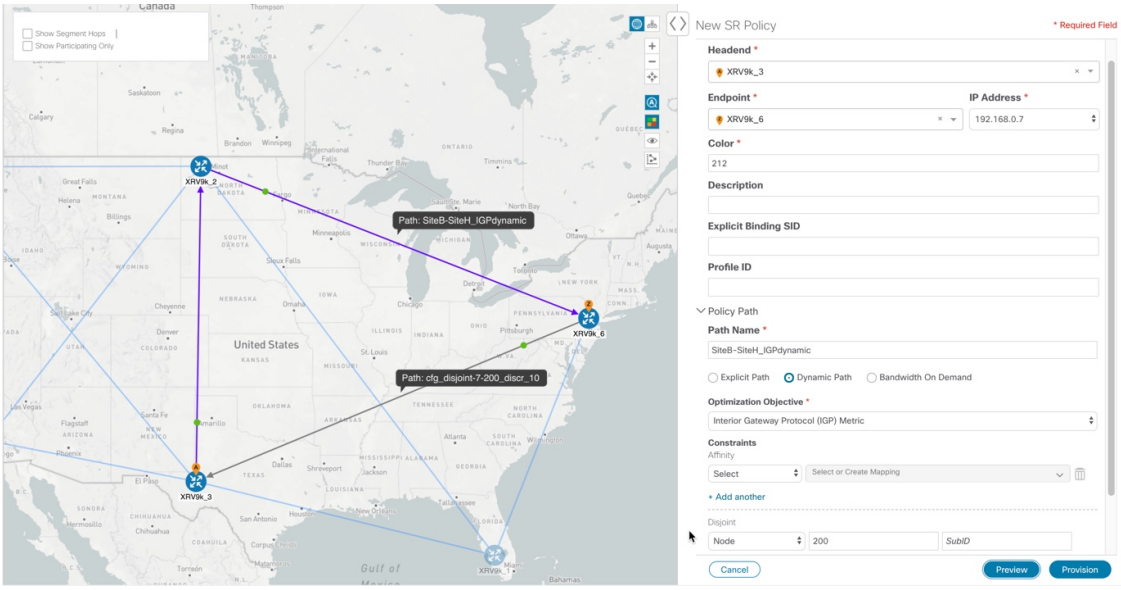
Note There cannot be more than two SR policies in the same disjoint group or subgroup.

Step 8 Under Segments, select one of the following:

- **Protected (Preference)**—Creates an SR policy that will use protected segments (provides a backup path) when available.
- **Unprotected Only**—Creates an SR policy that will only use unprotected segments. This option cannot be used when affinity constraints are defined.

Step 9 Click **Preview**. The path is highlighted on the map. Note in the following example that all policies belonging to the same disjoint group are displayed.

Figure 17: Dynamic SR Policy and Disjoint Group Policy Preview



Step 10 If you are satisfied with the policy path, click **Provision**.

Step 11 When the policy is provisioned successfully, a window appears with the following options:

- **View SR Policy List**—Displays the **SR Policies** table that lists all SR policies including the one that was just created.
- **Create New**—Allows you to create another SR policy.

See the following topics:

- Configure Affinity Mapping, on page 13
- Preview Disjoint Policies, on page 20
- View SR Policies Belonging to a Disjoint Group, on page 23

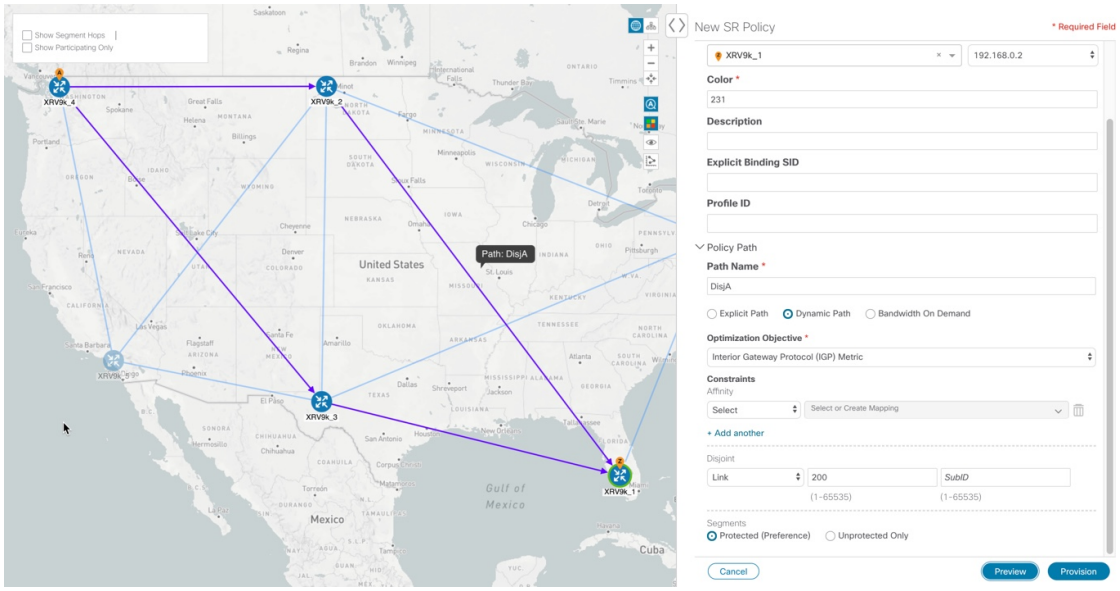
Preview Disjoint Policies

The following example shows how the SR policy provisioning preview feature can be used for disjoint SR policies. Two SR policies will be provisioned with link disjointness. After the first one is provisioned, the preview of the second will show both policies in the map view and how the path of the first would be re-optimized by SR-PCE to make them link disjoint from each other.

Note There cannot be more than 2 disjoint policies in the same disjoint group or subgroup

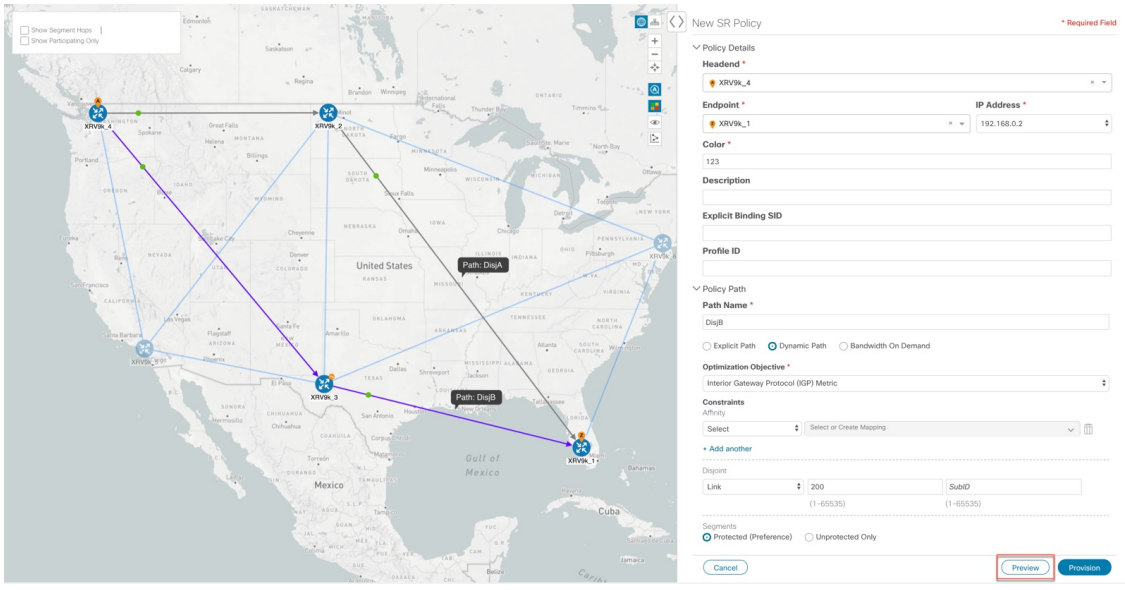
Below is a provisioned dynamic policy (DisjA) belonging to disjoint link group 200. The SR policy has a path that ECMP splits between XRV9k_4 and XRV9k_1 as shown in the following figure.

Figure 18: Example: DisjA SR Policy



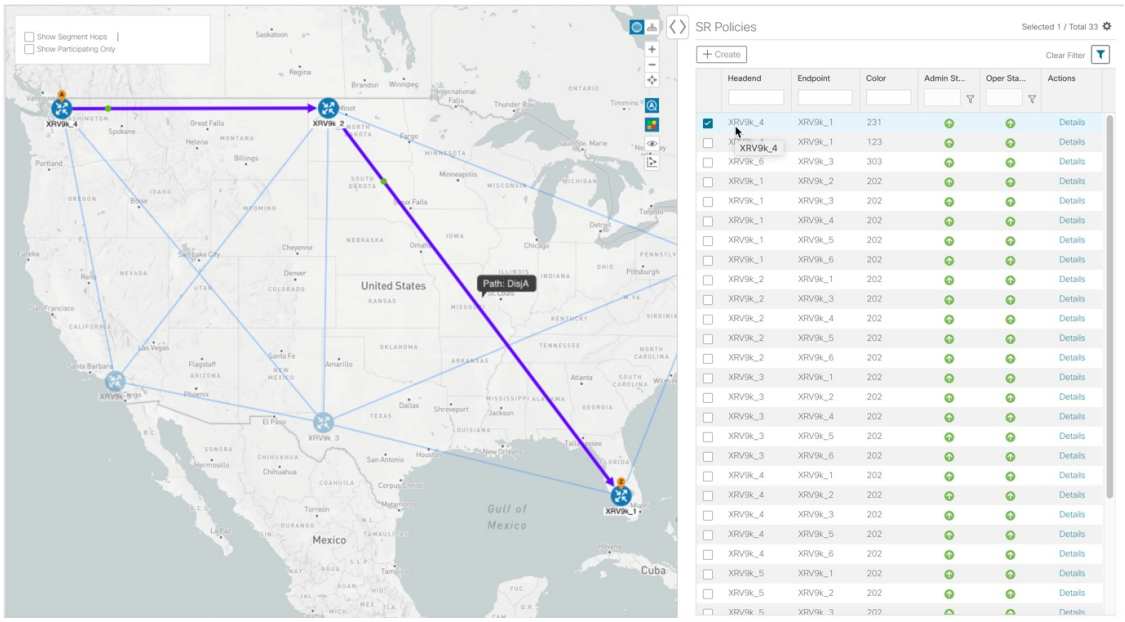
A second policy (DisjB) is now configured in the same disjoint group as the first. When we preview this policy you see both DisjA and DisjB are displayed. You also see the path of DisjA has been reoptimized to ensure both policies are link disjoint. This path change to the existing policy DisjA will be made by SR-PCE if DisjB is provisioned.

Figure 19: Example: Preview Disjoint SR Policies



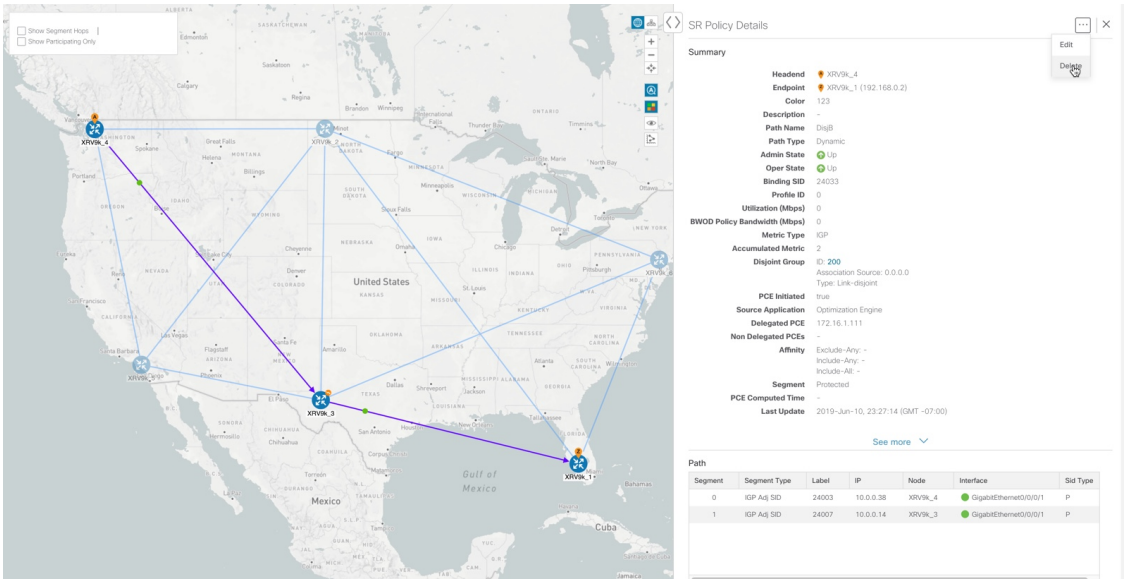
After DisjB is provisioned, we select **View SR Policy List** and check the checkbox next to the DisjA policy to confirm that the path for DisjA has been rerouted.

Figure 20: Example: DisjA SR Policy Rerouted



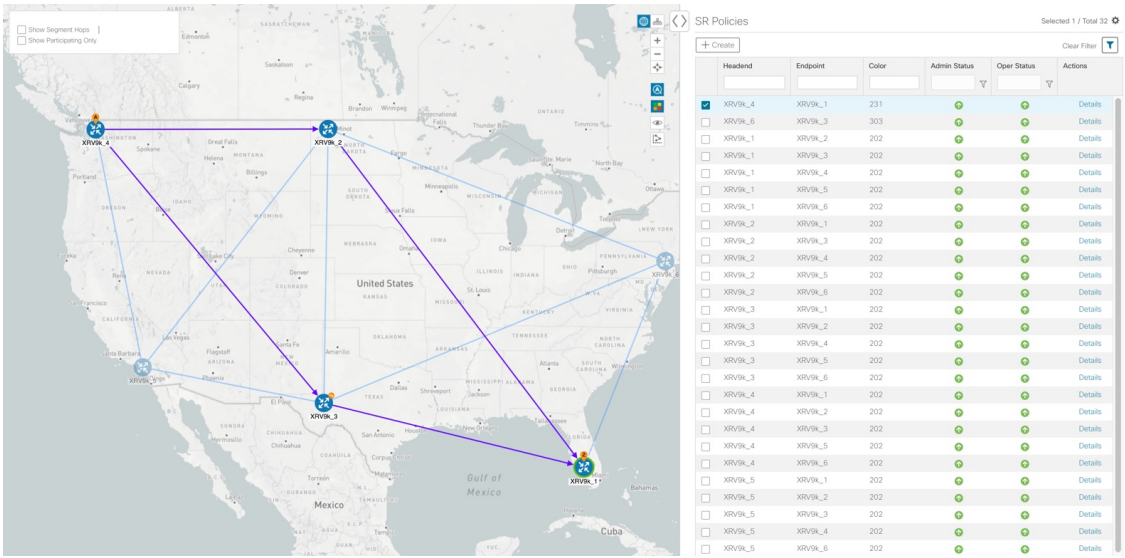
From the SR Policies table, check the checkbox next to DisjB, and delete it.

Figure 21: Example: Delete DisjB SR Policy



After a few seconds, display DisjA again. You will see that it has reset itself and shows two paths from XR.

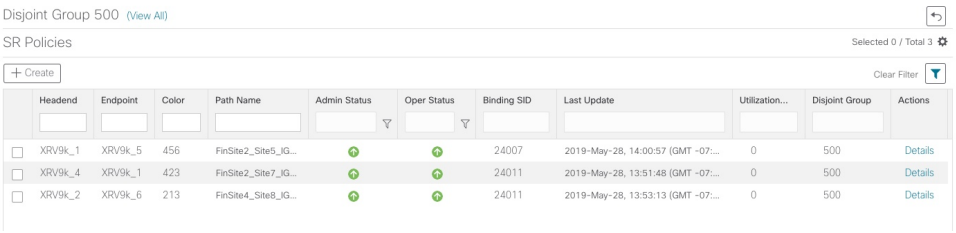
Figure 22: Example: DisjA SR Policy Reset



View SR Policies Belonging to a Disjoint Group

From the **SR Policy Details** window, click the **Disjoint Group** ID number to view all SR policies that use that disjoint group.

Figure 23: Disjoint Group



To go back to the **SR Policy Details** window, click  .

Modify SR Policies

To modify an SR policy:

Step 1 From the main menu, choose **Optimization Engine** > **SR Policies**.

Step 2 Expand the **SR Policies** table. You will see a list of SR policies and various information such as source, destination, Admin status, operating status, and so on.

Step 3 Locate the SR policy you are interested in and click the **Details...** link (under the **Actions** column). You may need to expand the SR Policies table to view the **Actions** column.

Step 4 From the top-right corner of the **SR Policy Details** window, click  .

Note If the icon is grayed out, the policy cannot be modified for one of the following reasons:

- The policy was not created using the Crosswork Optimization Engine (**SR Policies** table **> Create**).
- The policy was created using the Bandwidth Optimization function pack.

Step 5 Click **Edit**.

Step 6 In the **Policy Path** area, modify the values you want to change.

Step 7 (Optional) Click **Preview** to view visible updates on the topology map.

Step 8 Click **Update**.

Step 9 When the policy is updated successfully, a window appears with the following options:

- **View SR Policy List**—Displays the **SR Policies** table that lists all SR policies including the one that was just updated.
- **Create New**—Allows you to create a new SR policy.

Get More Information About an SR Policy

From the **SR Policies** table, locate the SR policy you are interested in and click the **Details...** link (under the **Actions** column). You may need to expand the **SR Policies** table to view the **Actions** column. The SR Policy Details window appears, where you can view more detailed information about the policy and its associated paths. See the following table for field descriptions.

Figure 24: SR Policy Details

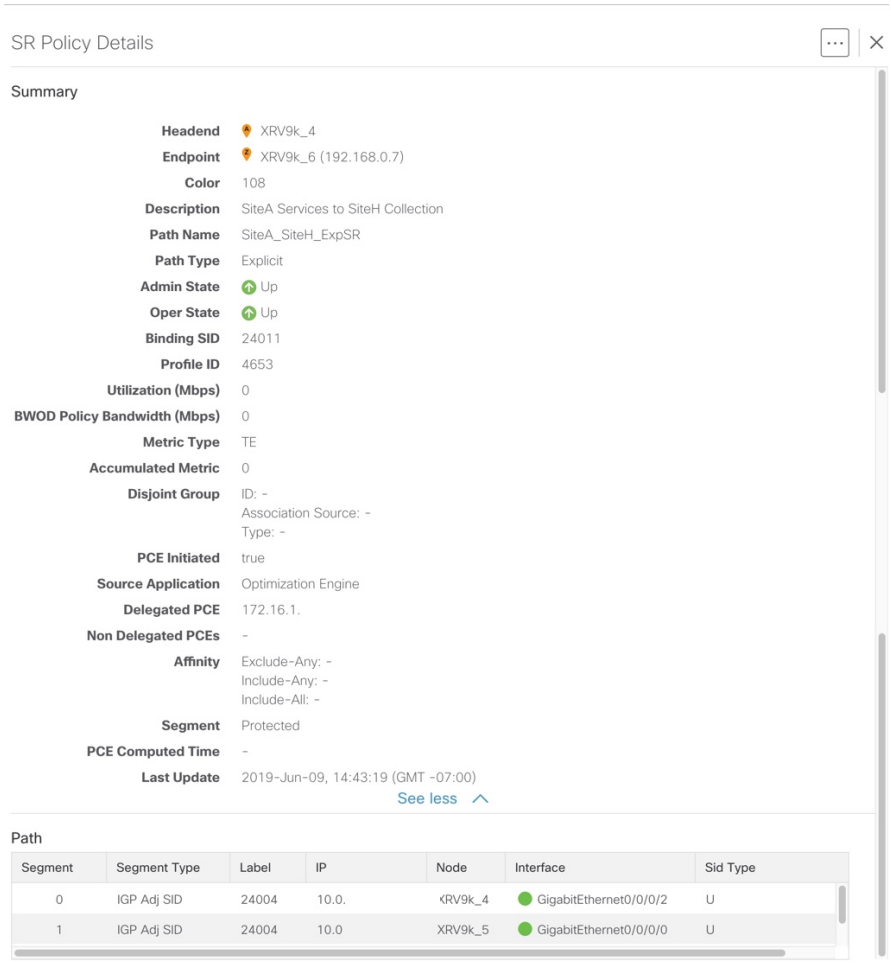


Table 2: SR Policy Details Fields

Field	Description
Headend	Where the SR policy is instantiated (source).
Endpoint	The destination of the SR policy.
Color	A numerical value that distinguishes between two or more policies to the same node pairs (Headend – Endpoint). Every SR policy between a given headed and endpoint must have a unique color.
Description	(Optional) If provisioned using the Cisco Crosswork Optimization Engine UI, it is the description entered by the user. This may be blank if the user did not enter a description.
Path Name	The name of the current active candidate path of the SR policy. For SR policies created using the Cisco Crosswork Optimization Engine UI, it will be the name provided by the user during configuration. For SR policies created through configuration on the headend router, the Path Name will be the base name configured for the policy on the CLI with "cfg_" appended to the beginning and the candidate path preference appended to the end.

Field	Description
Path Type	Indicates whether an SR policy created through Cisco Crosswork Optimization Engine is explicit or dynamic.
Admin State	Administrative state is dictated by the user. For example, the user creates an SR policy and does not intentionally shut it down. The Admin State will be UP.
Oper State	Operational state received by the system. For example, the user has configured a policy and so the Admin State is UP. However, due to network issues it is operationally down. In this case, Oper State will display DOWN and Admin State will remain as UP.
Binding SID	The binding segment is a local segment identifying an SR policy. Each SR policy is associated with a binding segment ID (BSID). The BSID is a local label that is automatically allocated (or explicitly entered during manual provisioning) for each SR policy when the policy is instantiated.
Profile ID	Identification used to associate an SR policy with a set of features applied to the policy by the headend. It should correspond with a profile configured on the headend.
Utilization (Mbps)	The measured traffic on the SR policy.
BWOD Policy Bandwidth (Mbps)	The bandwidth constraint associated with a policy created through the Bandwidth on Demand function pack.
Metric Type	The metric type can be of type TE, IGP, or latency.
Accumulated Metric	Total metric calculation of the SR policy.
Disjoint Group	If applicable, displays disjointness information.
PCE Initiated	If the policy was initiated and provisioned by a PCE, the value is **True**.
Source Application	Indicates which application created this SR policy. It can be one of the following: • **Optimization Engine**—The policy was provisioned using the Cisco Crosswork Optimization Engine UI. • **Bandwidth Optimization**—This is a tactical SR policy that was created by the Bandwidth Optimization function pack to remediate traffic congestion. It will be removed when the congestion goes below the configured threshold. If it is blank, the SR policy was PCC instantiated.
Delegated PCE	The SR policy is delegated to this PCE IP address.
Non Delegated PCEs	PCEs reporting the policy, but not currently delegated.
Affinity	Lists any affinity constraints belonging to this policy.
Segment	Lists whether a dynamic path policy should prefer protected or require unprotected SIDSs
PCE Computed Time	Time when PCE computed the path currently in effect.

Field	Description
Last Update	The last time the policy was updated.
Path	Lists segments that are part of the policy. It gives the following segment information: segment type, label, IP address, associated node, interface, and SID type (Protected or Unprotected).