Provision SR-TE Policies

This section contains the following topics:

SR-TE Policy Support

Table 1: Supported Features

Capability	Notes
PCE-initiated policies (provisioned or discovered by Crosswork)	—
PCC-initiated polices (discovered by Crosswork)	—
SR-TE On-Demand Next Hop (ODN) policies discovered by Crosswork	—
Single consistent Segment Routing Global Block (SRGB) configured on routers throughout domain covered by Crosswork	If index SIDs are used and there are different SRGB bases along a path of a policy, the label can change along the path.
Prefix SID	—
Adjacency SID	—
EPE adjacency SID	—
Protected and Unprotected adjacency SIDs	—
Regular and Strict prefix SIDs	—

Capability	Notes
SR-TE policy optimization objective min-metric (IGP, TE, and Latency)	—
SR-TE policy path constraints (affinity and disjointness)	Only 2 SR-TE policies per disjoint group or sub-id are supported
Binding SID for explicit or dynamic policies	—
Profile ID	—

Table 2: Unsupported Features and Limitations

Description	Notes
Provisioning multiple candidate paths via Crosswork	These paths are not discovered if configured on PCC. Crosswork does not support configuration of these paths.
Weighted Equal-Cost Multipath (WECMP)	—
Multiple segment lists per candidate path	• This configuration is not supported • These segment lists will not be discovered if configured on a PCC.
Visualization of multiple candidate paths	Only the current active path can be seen in the UI.
Binding SIDs as Segment List Hops	—
SR IGP Flexible Algorithm (Flex Algo)	—
Anycast SIDs	—
Hop count metric type for policies	Cisco Crosswork does not support provisioning with this metric type and does not discover this metric type if configured on the PCC
Routers that are not SR-capable	The assumption is that all routers discovered by Cisco Crosswork are SR-capable
SR-TE policies with Loopback IPs other than TE router ID for headend/endpoint and prefix SIDs in segment list	
SR-TE policy provisioned with IPv6 endpoints/hops	—
SRv6	Only 2 SR-TE policies per disjoint group/sub-id

Description	Notes
SR-TE policy optimization objective min-metric with margin	Not supported for policies provisioned by Cisco Crosswork. Margin is not discovered for PCC-initiated policies.
SR-TE policy constraints (resource exclusion or metric bound)	Not supported for policies provisioned by Cisco Crosswork. Constraints are not discovered for PCC-initiated policies.

SR Policy Configuration Sources

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

- PCC initiated—Policies configured on a PCC (see PCC-Initiated SR Policy Example, on page 3).

- PCE initiated—Policies configured on a PCE or created dynamically by Crosswork Optimization Engine. An SR-TE policy that is configured using Crosswork Optimization Engine is the only type of SR-TE policy that Crosswork Optimization Engine can modify or delete.

PCC-Initiated SR Policy Example

The following example shows a configuration of an SR policy at the headend router. The policy has a dynamic path with affinity constraints computed by the headend router. See SR configuration documentation for your specific device to view descriptions and supported configuration commands (for example: *Segment Routing Configuration Guide for Cisco ASR 9000 Series Routers*).

```
segment-routing
 traffic-eng
  policy foo
   color 100 end-point ipv4 1.1.1.2
   candidate-paths
    preference 100
     dynamic
      metric
       type te
      !
     !
     constraints
      affinity
       exclude-any
        name RED
       !
      !
     !
    !
   !
```

Create Explicit SR-TE Policies

This task creates SR-TE policies using an explicit (fixed) path consisting of a list of prefix or adjacency Segment IDs (SID list), each representing a node or link along on the path.

Step 1 From the main menu, choose **Traffic Engineering** > **Traffic Engineering**.

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

Step 3 Enter the required SR-TE policy values. Hover the mouse pointer over ⑦ to view a description of each field.

Tip If you have set up device groups, you can select the device group from the **Device Groups** drop-down menu. Then navigate and zoom in on the topology map to click the device for headend or endpoint selection.

Step 4 Under Policy Path, click **Explicit Path** and enter a path name.

Step 5 Add segments that will be part of the SR-TE policy path.

Step 6 Click **Preview**.

Step 7 If you want to commit the policy path, click **Provision**.

Step 8 Validate the SR-TE policy creation:

   a. Confirm that the new SR-TE policy appears in the SR-TE Policy table. You can also click the check box next to the policy to see it highlighted in the map.

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

   b. View and confirm the new SR-TE policy details. From the **SR Policy** table, click ⋯ and select **View**.

   Note On a scaled setup with high node, policy, or interface counts, a timeout may occur during policy deployment. To configure timeout options, see the <admin guide link>

Configure Link Affinities

Affinities defined on devices are not collected by Crosswork Optimization Engine. The affinity mapping name is only used for visualization in Crosswork Optimization Engine. For this reason, you should manually collect affinities on the device interface, then define affinity mapping in Crosswork Optimization Engine with the same name and bits that are used on the device interface. Crosswork Optimization Engine will only send bit information to SR-PCE during provisioning.

Affinity of an SR-TE policy or RSVP-TE tunnel is used to specify the link attributes for which the SR-TE policy or RSVP-TE tunnel has affinity for. It determines which links are suitable to form a path for the SR-TE policy or RSVP-TE tunnel. 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.

Step 1   From the main menu choose **Traffic Engineering** > **TE Link Affinities**. You can also define affinities while creating an SR-TE policy or RSVP-TE tunnel 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 TE tunnel before removing the affinity to avoid orphan TE tunnels. If you have removed an affinity associated to a TE tunnel, the affinity is shown as "UNKNOWN" in the **SR Policy / RSVP-TE Tunnel Details** window.

Create Dynamic SR-TE Policies Based on Optimization Intent

This task creates an SR-TE 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 latency. The SR-PCE will automatically re-optimize the path as necessary based on topology changes.

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> **Tip**   If you plan to use affinities, collect affinity information from your devices and then map them in Cisco Crosswork before creating a dynamic SR-TE policy. For more information, see Configure Link Affinities, on page 4.

Step 1   From the main menu, choose **Traffic Engineering** > **Traffic Engineering**.

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

Step 3   Enter the required SR-TE policy values. Hover the mouse pointer over ⑦ to view a description of each field.

> **Tip**   If you have set up device groups, you can select the device group from the **Device Groups** drop-down menu. Then navigate and zoom in on the topology map to click the device for headend or endpoint selection.

Step 4   Under **Policy Path**, click **Dynamic Path** and enter a path name.

Step 5   Under **Optimization Objective**, select the metric you want to minimize.

Step 6   Define any applicable constraints and disjointness.

Note	Affinity constraints and disjointness cannot be configured on the same SR-TE policy. Also, there cannot be more than two SR-TE policies in the same disjoint group or subgroup. If there are existing SR-TE policies belonging to a disjoint group that you define here, all SR-TE policies that belong to that same disjoint group are shown during Preview.

Step 7   Under **Segments**, select whether or not public segments should be used when available.

Step 8   Click **Preview**. The path is highlighted on the map.

Step 9   If you want to commit the policy path, click **Provision**.

Step 10   Validate the SR-TE policy creation:

        a. Confirm that the new SR policy appears in the SR Policy table. You can also click the check box next to the policy to see it highlighted in the map.

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

        b. View and confirm the new SR policy details. From the **SR Policy** table, click ⋯ and select **View**.

Note	On a scaled setup with high node, policy, or interface counts, a timeout may occur during policy deployment. To configure timeout options, see the <admin guide link>

Modify SR-TE Policies

To view, edit, or delete a policy, do the following:

Step 1   From the main menu, choose **Traffic Engineering** > **Traffic Engineering**.

Step 2   From the **Traffic Engineering** window select the **SR-TE** tab.

Step 3   Locate the SR policy you are interested in and click ⋯.

Step 4   Choose **View** or **Edit/Delete**.

Note	• You can only delete SR-TE policies that have been created with the UI.
	• After updating the SR-TE policy details, you can preview the changes on the map before saving it.