



## Provision RSVP-TE Tunnels



**Note** When using the Crosswork Network Controller solution, the navigation is **Traffic Engineering & Services > Traffic Engineering**.

For a list of known limitations, important notes, and what networking technologies are supported, see the [Cisco Crosswork Optimization Engine Release Notes](#).

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## RSVP-TE Tunnel Configuration Sources

RSVP-TE tunnels discovered and reported by Crosswork Optimization Engine may have been configured from the following sources:

- PCC initiated—RSVP-TE tunnels configured on a PCC (see [PCC-Initiated RSVP-TE Tunnel Example, on page 1](#)).
- PCE or PCC initiated Dynamically.

## PCC-Initiated RSVP-TE Tunnel Example


The following is a sample device configuration for a PCC-initiated RSVP-TE tunnel. See the appropriate documentation to view descriptions and supported RSVP-TE tunnel configuration commands for your particular device (for example: [MPLS Command Reference for Cisco NCS 5500 Series, Cisco NCS 540 Series, and Cisco NCS 560 Series Routers](#)).

```
interface tunnel-te777
  ipv4 unnumbered Loopback0
  destination 192.168.0.8
  path-option 10 dynamic
  pce
```

```
delegation
!
```

## Create Explicit RSVP-TE Tunnels

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

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- Step 1** From the main menu, choose **Traffic Engineering > Traffic Engineering**.
- Step 2** From the right window, click **RSVP-TE**.
- Step 3** Under **RSVP-TE Tunnels**, click **+ Create**.
- Step 4** If you are using Crosswork Optimization Engine within Crosswork Network Controller, select either **PCE Initor** or **PCC Initor**.
- Step 5** Enter the required RSVP-TE Tunnel values. Hover the mouse pointer over  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 6** Under Policy Path, click **Explicit Path** and enter a path name.
- Step 7** Add segments that will be part of the RSVP-TE path.
- Step 8** Click **Preview**. The path is highlighted on the map.
- Step 9** If you want to commit the tunnel path, click **Provision**.
- Step 10** Validate the RSVP-TE tunnel creation:
- Confirm that the new RSVP-TE tunnel appears in the RSVP-TE Tunnels table. You can also click the check box next to the policy to see it highlighted in the map.
 

**Note** The newly provisioned RSVP-TE tunnel may take some time, depending on the network size and performance, to appear in the **RSVP-TE Tunnels** table. The **RSVP-TE Tunnels** table is refreshed every 30 seconds.
  - View and confirm the new RSVP-TE tunnel details. From the **RSVP-TE** table, click **\*\*\*** (in the same row as the RSVP-TE tunnel), and select **View**.
- Note** On a scaled setup with high node, policy, or interface counts, a timeout may occur during policy deployment. Please contact a Cisco representative to fine tune the timers involved.
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## Configure Link Affinities

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

provisioning. If an affinity mapping is not defined in the UI, then the affinity name is displayed as "UNKNOWN".

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.

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 Router](#))

The following example shows the affinity configuration (`affinity-map`) on a device:

```
RP/0/RP0/CPU0:c12#sh running-config segment-routing traffic-eng affinity-map
Wed Jul 27 12:14:50.027 PDT
segment-routing
 traffic-eng
  affinity-map
   name red bit-position 1
   name blue bit-position 5
   name green bit-position 4
  !
 !
 !
```

- Step 1** From the main menu choose **Administration > Settings > System Settings > Traffic Engineering > Affinity > 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**.
- Step 3** Enter the name and the bit it will be assigned. For example (using the above configuration):

**Example:**

Name ?	Bit Position (0-31) ?	Actions
<input type="text"/>	<input type="text"/>	
red	1	<a href="#">Edit</a> <a href="#">Delete</a>
blue	5	<a href="#">Edit</a> <a href="#">Delete</a>
green	4	<a href="#">Edit</a> <a href="#">Delete</a>

- Step 4** Click **Save** to save the mapping.

**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 RSVP-TE Tunnels Based on Optimization Intent

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




**Tip** If you plan to use affinities, collect affinity information from your devices and then map them in Cisco Crosswork before creating a dynamic RSVP-TE tunnel. For more information, see [Configure Link Affinities](#).

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

**Step 2** From the right window, click **RSVP-TE**.

**Step 3** Under **RSVP-TE Tunnels**, click **+ Create**.

**Step 4** Enter the required RSVP-TE Tunnel values. Hover the mouse pointer over  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 5** Under **Tunnel Path**, click **Dynamic Path** and enter the Path Name.

**Step 6** Under **Optimization Objective**, select the metric you want to minimize.

**Step 7** Define any applicable constraints and disjointness.

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


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

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

**Step 10** Validate the RSVP-TE tunnel creation:

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

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

- b. View and confirm the new RSVP-TE tunnel details. From the **RSVP-TE** table, click  and select **View**.

**Note** On a scaled setup with high node, policy, or interface counts, a timeout may occur during policy deployment. Please contact a Cisco representative to fine tune the timers involved.


# Modify RSVP-TE Tunnels

To view, modify, or delete an RSVP-TE tunnel, do the following:

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

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

**Step 3** Locate the RSVP-TE tunnel you are interested in and click .

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

- Note**
- You can only modify or delete RSVP-TE tunnels that have been created with the UI or API.
  - After updating the RSVP-TE tunnel details, you can preview the changes on the map before saving it.
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