MPLS TE—Tunnel-Based Admission Control

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The MPLS TE—Tunnel-Based Admission Control (TBAC) feature enables classic Resource Reservation Protocol (RSVP) unicast reservations that are traveling across a Multiprotocol Label Switching traffic engineering (MPLS TE) core to be aggregated over an MPLS TE tunnel.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for MPLS TE—Tunnel-Based Admission Control" section on page 17.

Use Cisco Feature Navigator to find information about platform support and Cisco IOS XE software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

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Prerequisites for MPLS TE—Tunnel-Based Admission Control

- You must configure an MPLS TE tunnel in the network.
- You must configure RSVP on one or more interfaces on at least two neighboring routers that share a link within the network.

Restrictions for MPLS TE—Tunnel-Based Admission Control

- Only IPv4 unicast RSVP flows are supported.
- Primary, one-hop tunnels are not supported. The TE tunnel cannot be a member of a class-based tunnel selection (CBTS) bundle.
- Multitopology Routing (MTR) is not supported.
- Only preestablished aggregates are supported. They can be configured statically or dynamically using command-line interface (CLI) commands.

Information About MPLS TE—Tunnel-Based Admission Control

To use the MPLS TE—TBAC feature, you should understand the following concepts:

- Feature Overview of MPLS TE—Tunnel-Based Admission Control, page 2
- Benefits of MPLS TE—Tunnel-Based Admission Control, page 3

Feature Overview of MPLS TE—Tunnel-Based Admission Control

TBAC aggregates reservations from multiple, classic RSVP sessions over different forms of tunneling technologies that include MPLS TE tunnels, which act as aggregate reservations in the core. Figure 1 gives an overview of TBAC.

Figure 1 TBAC Overview

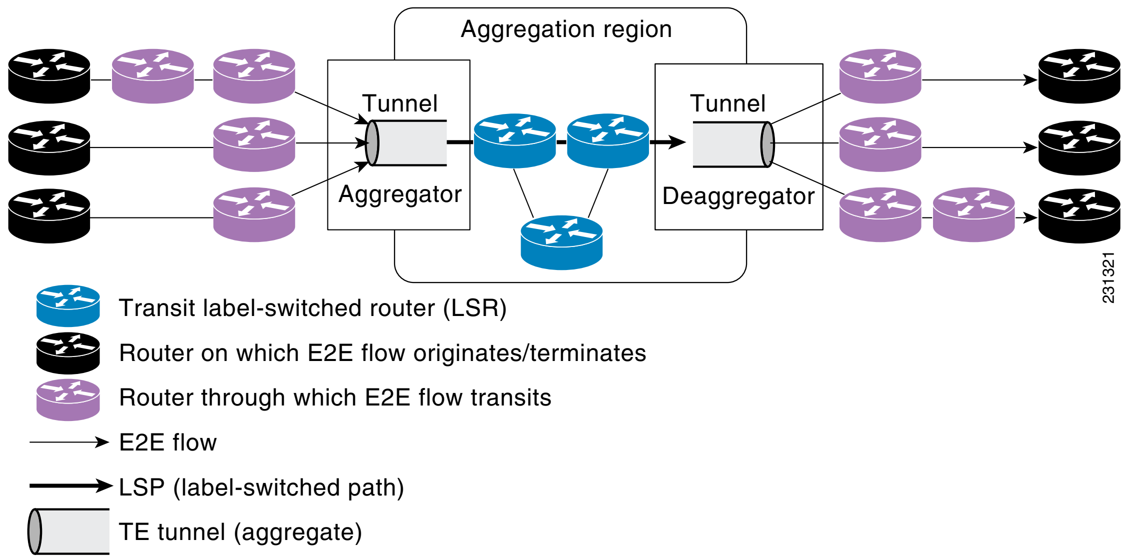


Figure 1 shows three RSVP end-to-end (E2E) flows that originate at routers on the far left, and terminate on routers at the far right. These flows are classic RSVP unicast flows, meaning that RSVP is maintaining a state for each flow. There is nothing special about these flows, except that along their path, these flows encounter an MPLS-TE core, where there is a desire to avoid creating a per-flow RSVP state.

When the E2E flows reach the edge of the MPLS-TE core, they are aggregated onto a TE tunnel. This means that when transiting through the MPLS-TE core, their state is represented by a single state; the TE tunnel is within the aggregation region, and their packets are forwarded (label-switched) by the TE tunnel. For example, if 100 E2E flows traverse the same aggregator and deaggregator, rather than creating 100 RSVP states (PATH and RESV messages) within the aggregation region, a single RSVP-TE state is created, that of the aggregate, which is the TE tunnel, to allocate and maintain the resources used by the 100 E2E flows. In particular, the bandwidth consumed by E2E flows within the core is allocated and maintained in aggregate by the TE tunnel. The bandwidth of each E2E flow is normally admitted into the TE tunnel at the headend, just as any E2E flow's bandwidth is admitted onto an outbound link in the absence of aggregation.

Benefits of MPLS TE—Tunnel-Based Admission Control

To understand the benefits of TBAC, you should be familiar with how Call Admission Control (CAC) works for RSVP and Quality of Service (QoS).

Cost Effective

Real-time traffic is very sensitive to loss and delay. CAC avoids QoS degradation for real-time traffic because CAC ensures that the accepted load always matches the current network capacity. As a result, you do not have to overprovision the network to compensate for absolute worst peak traffic or for reduced capacity in case of failure.

Improved Accuracy

CAC uses RSVP signaling, which follows the same path as the real-time flow, and routers make a CAC decision at every hop. This ensures that the CAC decision is very accurate and dynamically adjusts to the current conditions such as a reroute or an additional link. Also, RSVP provides an explicit CAC response (admitted or rejected) to the application, so that the application can react appropriately and fast; for example, sending a busy signal for a voice call, rerouting the voice call on an alternate VoIP route, or displaying a message for video on demand.

RSVP and MPLS TE Combined

TBAC allows you to combine the benefits of RSVP with those of MPLS TE. Specifically, you can use MPLS TE inside the network to ensure that the transported traffic can take advantage of Fast Reroute protection (50-millisecond restoration), Constraint Based Routing (CBR), and aggregate bandwidth reservation.

Seamless Deployment

TBAC allows you to deploy IPv4 RSVP without any impact on the MPLS part of the network because IPv4 RSVP is effectively tunneled inside MPLS TE tunnels that operate unchanged as per regular RSVP TE. No upgrade or additional protocol is needed in the MPLS core.

Enhanced Scaling Capability

TBAC aggregates multiple IPv4 RSVP reservations ingressing from the same MPLS TE headend router into a single MPLS TE tunnel and egressing from the same MPLS TE tailend router.

How to Configure MPLS TE—Tunnel-Based Admission Control

This section contains the following procedures:

- Enabling RSVP QoS, page 4 (required)
- Enabling MPLS TE, page 5 (required)
- Configuring an MPLS TE Tunnel Interface, page 6 (required)
- Configuring RSVP Bandwidth on an MPLS TE Tunnel Interface, page 7 (required)
- Verifying the TBAC Configuration, page 7 (optional)

Enabling RSVP QoS

Perform this task to enable RSVP QoS globally on a router.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip rsvp qos**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip rsvp qos** **Example:** `Router(config)# ip rsvp qos`	Enables RSVP QoS globally on a router.
Step 4	**end** **Example:** `Router(config)# end`	(Optional) Returns to privileged EXEC mode.

Enabling MPLS TE

Perform this task to enable MPLS TE. This task enables MPLS TE globally on a router that is running RSVP QoS.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mpls traffic-eng tunnels**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**mpls traffic-eng tunnels** **Example:** `Router(config)# mpls traffic-eng tunnels`	Enables MPLS TE globally on a router.
Step 4	**end** **Example:** `Router(config)# end`	(Optional) Returns to privileged EXEC mode.

Configuring an MPLS TE Tunnel Interface

Prerequisites

You must configure an MPLS-TE tunnel in your network before you can proceed. For detailed information, see the "MPLS Traffic Engineering (TE)—Automatic Bandwidth Adjustment for TE Tunnels" module.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface tunnel** *number*
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface tunnel** *number* **Example:** `Router(config)# interface tunnel 1`	Specifies a tunnel interface and enters interface configuration mode.
Step 4	**end** **Example:** `Router(config-if)# end`	(Optional) Returns to privileged EXEC mode.

Configuring RSVP Bandwidth on an MPLS TE Tunnel Interface

Perform this task to configure RSVP bandwidth on the MPLS TE tunnel interface that you are using for the aggregation.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface tunnel** *number*
4. **ip rsvp bandwidth** [*interface-kbps*] [*single-flow-kbps*]
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface tunnel** *number* **Example:** `Router(config)# interface tunnel 1`	Specifies a tunnel interface and enters interface configuration mode.
Step 4	**ip rsvp bandwidth** [*interface-kbps*] [*single-flow-kbps*] **Example:** `Router(config-if)# ip rsvp bandwidth 7500`	Enables RSVP bandwidth on an interface. • The optional *interface-kbps* and *single-flow-kbps* arguments specify the amount of bandwidth that can be allocated by RSVP flows or to a single flow, respectively. Values are from 1 to 10000000. **Note** You must enter a value for the *interface-kbps* argument on a tunnel interface.
Step 5	**end** **Example:** `Router(config-if)# end`	(Optional) Returns to privileged EXEC mode.

Verifying the TBAC Configuration

Note You can use the following **show** commands in user EXEC or privileged EXEC mode, in any order.

SUMMARY STEPS

1. **enable**
2. **show ip rsvp**
3. **show ip rsvp reservation** [**detail**] [**filter** [**destination** {*ip-address* | *hostname*}] [**dst-port** *port-number*] [**source** {*ip-address* | *hostname*}] [**src-port** *port-number*]]
4. **show ip rsvp sender** [**detail**] [**filter** [**destination** *ip-address* | *hostname*] [**dst-port** *port-number*] [**source** *ip-address* | *hostname*] [**src-port** *port-number*]]
5. **show mpls traffic-eng link-management bandwidth-allocation** [**summary**] [*interface-type interface-number*]
6. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	(Optional) Enables privileged EXEC mode. • Enter your password if prompted. **Note** Omit this step if you are using the **show** commands in user EXEC mode.
Step 2	**show ip rsvp** **Example:** `Router# show ip rsvp`	Displays specific information for RSVP categories.
Step 3	**show ip rsvp reservation** [**detail**] [**filter** [**destination** {*ip-address* | *hostname*}] [**dst-port** *port-number*] [**source** {*ip-address* | *hostname*}] [**src-port** *port-number*]] **Example:** `Router# show ip rsvp reservation detail`	Displays RSVP-related receiver information currently in the database.
Step 4	**show ip rsvp sender** [**detail**] [**filter** [**destination** *ip-address* | *hostname*] [**dst-port** *port-number*] [**source** *ip-address* | *hostname*] [**src-port** *port-number*]] **Example:** `Router# show ip rsvp sender detail`	Displays RSVP PATH-related sender information currently in the database.
Step 5	**show mpls traffic-eng link-management bandwidth-allocation** [**summary**] [*interface-type interface-number*] **Example:** `Router# show mpls traffic-eng link-management bandwidth-allocation`	Displays current local link information.
Step 6	**exit** **Example:** `Router# exit`	(Optional) Exits privileged EXEC mode and returns to user EXEC mode.

Configuration Examples for MPLS TE—Tunnel-Based Admission Control

This section provides the following configuration examples for TBAC:

- Example: Configuring TBAC, page 9
- Example: Configuring RSVP Local Policy on a Tunnel Interface, page 9
- Example: Verifying the TBAC Configuration, page 9

Example: Configuring TBAC

Note You must have an MPLS TE tunnel already configured in your network. For detailed information, see the "MPLS Traffic Engineering (TE)—Automatic Bandwidth Adjustment for TE Tunnels" module.

The following example enables RSVP and MPLS TE globally on a router and then configures a tunnel interface and bandwidth of 7500 kbps on the tunnel interface traversed by the RSVP flows:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# ip rsvp qos
Router(config)# mpls traffic-eng tunnels
Router(config)# interface tunnel 1
Router(config-if)# ip rsvp bandwidth 7500
Router(config-if)# end
```

Example: Configuring RSVP Local Policy on a Tunnel Interface

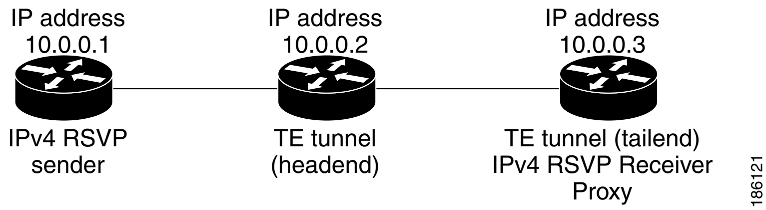
The following example configures an RSVP default local policy on a tunnel interface:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface tunnel 1
Router(config-if)# ip rsvp policy local default
Router(config-rsvp-local-if-policy)# max bandwidth single 10
Router(config-rsvp-local-if-policy)# forward all
Router(config-rsvp-local-if-policy)# end
```

Example: Verifying the TBAC Configuration

Figure 2 shows a network in which TBAC is configured.

Figure 2 Sample TBAC Network



The following example verifies that RSVP and MPLS TE are enabled and coexist on the headend router (10.0.0.2 in Figure 2):

```
Router# show ip rsvp

RSVP: enabled (on 3 interface(s))
  RSVP QoS enabled <-------
  MPLS/TE signalling enabled <------

Signalling:
   Refresh interval (msec): 30000
   Refresh misses: 4
.
.
.
```

The following example verifies that RSVP and MPLS TE are enabled and coexist on the tailend router (10.0.0.3 in Figure 2):

```
Router# show ip rsvp

RSVP: enabled (on 3 interface(s))
  RSVP QoS enabled <-------
  MPLS/TE signalling enabled <------

Signalling:
   Refresh interval (msec): 30000
   Refresh misses: 4
.
.
.
```

The following examples verify that an IPv4 flow is traveling through a TE tunnel (a label-switched path [LSP]) on the headend router (10.0.0.2 in Figure 2):

```
Router# show ip rsvp sender

To              From           Pro DPort Sport Prev Hop       I/F      BPS
10.0.0.3        10.0.0.1       UDP 2     2     10.0.0.1       Et0/0    10K <-- IPv4 flow
10.0.0.3        10.0.0.2       0   1     11    none           none     100K <-- TE tunnel


Router# show ip rsvp reservation

To            From         Pro DPort Sport Next Hop     I/F    Fi Serv BPS
10.0.0.3      10.0.0.1     UDP 2     2     10.0.0.3     Tu1    SE RATE 10K <-- IPv4 flow
10.0.0.3      10.0.0.2     0   1     11    10.1.0.2     Et1/0  SE LOAD 100K <-- TE tunnel
```

The following examples verify that an IPv4 flow is traveling through a TE tunnel (LSP) on the tailend router (10.0.0.3 in Figure 2):

```
Router# show ip rsvp sender
```

```
To              From           Pro DPort Sport Prev Hop        I/F      BPS
10.0.0.3        10.0.0.1       UDP 2     2     10.0.0.2        Et1/0    10K <-- IPv4 flow
10.0.0.3        10.0.0.2       0   1     11    10.1.0.1        Et1/0    100K <-- TE tunnel

Router# show ip rsvp reservation

To            From          Pro DPort Sport Next Hop    I/F    Fi Serv BPS
10.0.0.3      10.0.0.1      UDP 2     2     none        none   SE RATE 10K <-- IPv4 flow
10.0.0.3      10.0.0.2      0   1     11    none        none   SE LOAD 100K <-- TE tunnel
```

The following examples display detailed information about the IPv4 flow and the TE tunnel (LSP) on the headend router (10.0.0.2 in Figure 2):

```
Router# show ip rsvp sender detail

PATH: <------------------------------------------------ IPv4 flow information begins here.
  Destination 10.0.0.3, Protocol_Id 17, Don't Police , DstPort 2
  Sender address: 10.0.0.1, port: 2
  Path refreshes:
    arriving: from PHOP 10.0.0.10 on Et0/0 every 30000 msecs. Timeout in 189 sec
  Traffic params - Rate: 10K bits/sec, Max. burst: 10K bytes
    Min Policed Unit: 0 bytes, Max Pkt Size 2147483647 bytes
  Path ID handle: 02000412.
  Incoming policy: Accepted. Policy source(s): Default
  Status:
  Output on Tunnel1, out of band. Policy status: Forwarding. Handle: 0800040E <--- TE
tunnel verified
    Policy source(s): Default
  Path FLR: Never repaired

PATH: <------------------------------------------------- TE tunnel information begins here.
  Tun Dest:   10.0.0.3  Tun ID: 1  Ext Tun ID: 10.0.0.2
  Tun Sender: 10.0.0.2  LSP ID: 11
  Path refreshes:
    sent:     to   NHOP 10.1.0.2 on GigabitEthernet1/0/0
   .
   .
   .

Router# show ip rsvp reservation detail

RSVP Reservation. Destination is 10.0.0.3, Source is 10.0.0.1,<--- IPv4 flow information
begins here.
  Protocol is UDP, Destination port is 2, Source port is 2
  Next Hop: 10.0.0.3 on Tunnel1, out of band <-------------------- TE tunnel verified
  Reservation Style is Shared-Explicit, QoS Service is Guaranteed-Rate
   .
   .
   .

Reservation: <---------------------------------------- TE Tunnel information begins here.
  Tun Dest:   10.0.0.3  Tun ID: 1  Ext Tun ID: 10.0.0.2
  Tun Sender: 10.0.0.2  LSP ID: 11
  Next Hop: 10.1.0.2 on GigabitEthernet1/0/0
  Label: 0 (outgoing)
  Reservation Style is Shared-Explicit, QoS Service is Controlled-Load
   .
   .
   .

Router# show ip rsvp installed detail
```

```
RSVP: GigabitEthernet0/0/0 has no installed reservations

RSVP: GigabitEthernet1/0/0 has the following installed reservations
RSVP Reservation. Destination is 10.0.0.3. Source is 10.0.0.2,
  Protocol is 0  , Destination port is 1, Source port is 11
  Traffic Control ID handle: 03000405
  Created: 04:46:55 EST Fri Oct 26 2007 <------ IPv4 flow information
  Admitted flowspec:
    Reserved bandwidth: 100K bits/sec, Maximum burst: 1K bytes, Peak rate: 100K bits/sec
    Min Policed Unit: 0 bytes, Max Pkt Size: 1500 bytes
  Resource provider for this flow: None
   .
   .
   .

RSVP: Tunnel1 has the following installed reservations <------ TE tunnel verified
RSVP Reservation. Destination is 10.0.0.3. Source is 10.0.0.1,
  Protocol is UDP, Destination port is 2, Source port is 2
  Traffic Control ID handle: 01000415
  Created: 04:57:07 EST Fri Oct 26 2007 <----- IPv4 flow information
  Admitted flowspec:
    Reserved bandwidth: 10K bits/sec, Maximum burst: 10K bytes, Peak rate: 10K bits/sec
    Min Policed Unit: 0 bytes, Max Pkt Size: 0 bytes
  Resource provider for this flow: None
   .
   .
   .


Router# show ip rsvp interface detail

 Et0/0:
   RSVP: Enabled
   Interface State: Up
   Bandwidth:
     Curr allocated: 0 bits/sec
     Max. allowed (total): 3M bits/sec
     Max. allowed (per flow): 3M bits/sec
   .
   .
   .

 Et1/0:
   RSVP: Enabled
   Interface State: Up
   Bandwidth:
     Curr allocated: 0 bits/sec
     Max. allowed (total): 3M bits/sec
     Max. allowed (per flow): 3M bits/sec
   .
   .
   .

Tu1: <--------------------------------- TE tunnel information begins here.
   RSVP: Enabled
   RSVP aggregation over MPLS TE: Enabled
   Interface State: Up
   Bandwidth:
     Curr allocated: 20K bits/sec
     Max. allowed (total): 3M bits/sec
     Max. allowed (per flow): 3M bits/sec
   .
   .
```

```
 .
```

The following examples display detailed information about the IPv4 flow and the TE tunnel (LSP) on the tailend router (10.0.0.3 in Figure 2):

```
Router# show ip rsvp sender detail

PATH: <----------------------------------------------- IPv4 flow information begins here.
  Destination 10.0.0.3, Protocol_Id 17, Don't Police , DstPort 2
  Sender address: 10.0.0.1, port: 2
  Path refreshes:
    arriving: from PHOP 10.0.0.2 on Et1/0 every 30000 msecs, out of band. Timeout in 188
sec
  Traffic params - Rate: 10K bits/sec, Max. burst: 10K bytes
    Min Policed Unit: 0 bytes, Max Pkt Size 2147483647 bytes
   .
   .
   .

PATH: <------------------------------------------------ TE tunnel information begins here.
  Tun Dest:   10.0.0.3  Tun ID: 1  Ext Tun ID: 10.0.0.2
  Tun Sender: 10.0.0.2  LSP ID: 11
  Path refreshes:
    arriving: from PHOP 10.1.0.1 on Et1/0 every 30000 msecs. Timeout in 202 sec
   .
   .
   .


Router# show ip rsvp reservation detail

RSVP Reservation. Destination is 10.0.0.3, Source is 10.0.0.1, <--- IPv4 flow information
begins here.
  Protocol is UDP, Destination port is 2, Source port is 2
  Next Hop: none
  Reservation Style is Shared-Explicit, QoS Service is Guaranteed-Rate
   .
   .
   .

Reservation: <--------------------------------------- TE tunnel information begins here.
  Tun Dest:   10.0.0.3  Tun ID: 1  Ext Tun ID: 10.0.0.2
  Tun Sender: 10.0.0.2  LSP ID: 11
  Next Hop: none
  Label: 1 (outgoing)
  Reservation Style is Shared-Explicit, QoS Service is Controlled-Load
   .
   .
   .


Router# show ip rsvp request detail

RSVP Reservation. Destination is 10.0.0.3, Source is 10.0.0.1,
  Protocol is UDP, Destination port is 2, Source port is 2
  Prev Hop: 10.0.0.2 on GigabitEthernet1/0/0, out of band <-------------- TE tunnel
verified
  Reservation Style is Shared-Explicit, QoS Service is Guaranteed-Rate
  Average Bitrate is 10K bits/sec, Maximum Burst is 10K bytes
   .
   .
   .

Request: <------------------------------------- TE tunnel information begins here.
```

```
  Tun Dest:   10.0.0.3  Tun ID: 1  Ext Tun ID: 10.0.0.2
  Tun Sender: 10.0.0.2  LSP ID: 11
  Prev Hop: 10.1.0.1 on GigabitEthernet1/0/0
  Label: 0 (incoming)
  Reservation Style is Shared-Explicit, QoS Service is Controlled-Load
   .
   .
   .
```

Example: Verifying the RSVP Local Policy Configuration

The following example verifies that a default local policy has been configured on tunnel interface 1:

```
Router# show run interface tunnnel 1

Building configuration...

Current configuration : 419 bytes
!
interface Tunnel1
 bandwidth 3000
 ip unnumbered Loopback0
 tunnel destination 10.0.0.3
 tunnel mode mpls traffic-eng
 tunnel mpls traffic-eng autoroute announce
 tunnel mpls traffic-eng priority 1 1
 tunnel mpls traffic-eng bandwidth 100
 tunnel mpls traffic-eng path-option 1 dynamic
 tunnel mpls traffic-eng fast-reroute
 ip rsvp policy local default <---------------- Local policy information begins here.
  max bandwidth single 10
  forward all
 ip rsvp bandwidth 3000
end
```

The following example provides additional information about the default local policy configured on tunnel interface 1:

```
Router# show ip rsvp policy local detail

Tunnel1:
  Default policy:

    Preemption Scope: Unrestricted.
    Local Override:   Disabled.
    Fast ReRoute:     Accept.
    Handle:           BC000413.

                           Accept               Forward
    Path:                  Yes                  Yes
    Resv:                  Yes                  Yes
    PathError:             Yes                  Yes
    ResvError:             Yes                  Yes

                           Setup Priority       Hold Priority
    TE:                    N/A                  N/A
    Non-TE:                N/A                  N/A

                           Current              Limit
    Senders:               0                    N/A
    Receivers:             1                    N/A
```

```
        Conversations:          1                   N/A
        Group bandwidth (bps): 10K                  N/A
        Per-flow b/w (bps):    N/A                  10K

    Generic policy settings:
        Default policy: Accept all
        Preemption:     Disabled
```

Additional References

The following sections provide references related to the MPLS TE Tunnel-Based Admission Control feature.

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
RSVP commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS Quality of Service Solutions Command Reference*
QoS features including signaling, classification, and congestion management	"Quality of Service Overview" module
MPLS tunnels	"MPLS Traffic Engineering (TE)—Automatic Bandwidth Adjustment for TE Tunnels" module

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 2205	*Resource ReSerVation Protocol (RSVP)—Version 1 Functional Specification*
RFC 2209	*Resource ReSerVation Protocol (RSVP)—Version 1 Message Processing Rules*
RFC 3175	*Aggregation of RSVP for IPv4 and IPv6 Reservations*
RFC 3209	*RSVP-TE: Extensions to RSVP for LSP Tunnels*
RFC 4804	*Aggregation of Resource ReSerVation Protocol (RSVP) Reservations over MPLS TE/DS-TE Tunnels*

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for MPLS TE—Tunnel-Based Admission Control

Table 1 lists the release history for this feature.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 1 Feature Information for MPLS TE—Tunnel-Based Admission Control (TBAC)

Feature Name	Releases	Feature Information
MPLS TE Tunnel-Based Admission Control	Cisco IOS XE Release 2.6	The MPLS TE—Tunnel-Based Admission Control feature enables classic Resource Reservation Protocol (RSVP) unicast reservations that are traveling across an MPLS TE core to be aggregated over an MPLS TE tunnel. The following commands were introduced or modified: **ip rsvp qos**, **show ip rsvp**, **show ip rsvp reservation**, **show ip rsvp sender**, **show mpls traffic-eng link-management bandwidth-allocation**.

Glossary

admission control—The process by which an RSVP reservation is accepted or rejected on the basis of end-to-end available network resources.

aggregate—An RSVP flow that represents multiple E2E flows; for example, an MPLS-TE tunnel may be an aggregate for many E2E flows.

aggregation region—An area where E2E flows are represented by aggregate flows, with aggregators and deaggregators at the edge; for example, an MPLS-TE core, where TE tunnels are aggregates for E2E flows. An aggregation region contains a connected set of nodes that are capable of performing RSVP aggregation.

aggregator—The router that processes the E2E PATH message as it enters the aggregation region. This router is also called the TE tunnel headend router; it forwards the message from an exterior interface to an interior interface.

bandwidth—The difference between the highest and lowest frequencies available for network signals. The term is also used to describe the rated throughput capacity of a given network medium or protocol.

deaggregator—The router that processes the E2E PATH message as it leaves the aggregation region. This router is also called the TE tunnel tailend router; it forwards the message from an interior interface to an exterior interface.

E2E—end-to-end. An RSVP flow that crosses an aggregation region and whose state is represented in aggregate within this region; for example, a classic RSVP unicast flow that crosses an MPLS-TE core.

LSP—label switched path. A configured connection between two routers in which label switching is used to carry the packets. The purpose of an LSP is to carry data packets.

MPLS—Multiprotocol Label Switching. Packet-forwarding technology, used in the network core, that applies data link layer labels to tell switching nodes how to forward data, resulting in faster and more scalable forwarding than network layer routing normally can do.

QoS—quality of service. A measure of performance for a transmission system that reflects its transmission quality and service availability.

RSVP—Resource Reservation Protocol. A protocol that supports the reservation of resources across an IP network. Applications that run on IP end systems can use RSVP to indicate to other nodes the nature (bandwidth, jitter, maximum burst, and so on) of the packet streams that they want to receive.

state—Information that a router must maintain about each LSP. The information is used for rerouting tunnels.

TE—traffic engineering. The techniques and processes that are used to cause routed traffic to travel through the network on a path other than the one that would have been chosen if standard routing methods had been used.

tunnel—Secure communications path between two peers, such as two routers.