RSVP—Previous Hop Overwrite

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The RSVP—Previous Hop Overwrite feature allows you to configure a Resource Reservation Protocol (RSVP) router, on a per interface basis, to populate an address other than the native interface address in the previous hop (PHOP) address field of the PHOP object when forwarding a PATH message onto that interface. You can configure the actual address for the router to use or an interface, including a loopback, from which to borrow the address.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the "Feature Information for RSVP—Previous Hop Overwrite" section on page 11.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

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

Contents

Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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Prerequisites for RSVP—Previous Hop Overwrite

You must configure RSVP on one or more interfaces on at least two neighboring routers that share a link within the network.

Restrictions for RSVP—Previous Hop Overwrite

- This feature is supported only on integrated services routers (ISRs).
- Unnumbered IP addresses are not allowed.

Information About RSVP—Previous Hop Overwrite

To use the RSVP—Previous Hop Overwrite feature, you should understand the following concepts:

Feature Overview of RSVP—Previous Hop Overwrite

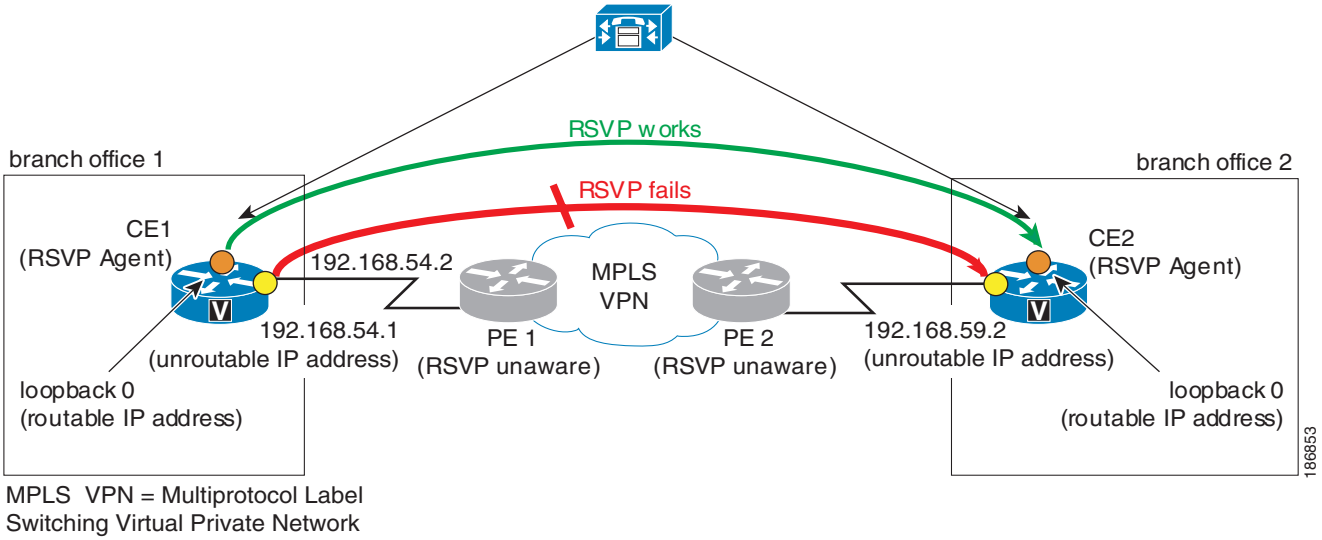
An RSVP PATH message contains a PHOP object that is rewritten at every RSVP hop. The object's purpose is to enable an RSVP router (R1) sending a PATH message to convey to the next RSVP router (R2) downstream that the previous RSVP hop is R1. R2 uses this information to forward the corresponding RESV message upstream hop-by-hop towards the sender.

The current behavior in Cisco IOS software is that an RSVP router always sets the PHOP address to the IP address of the egress interface onto which the router transmits the PATH message.

There are situations where, although some IP addresses of R1 are reachable, the IP address of its egress interface is not reachable from a remote RSVP router R2. This results in the corresponding RESV message generated by R2 never reaching R1 and the reservation never being established.

Figure 1 shows a sample network in which the preceding scenario occurs and no reservation is established.

Figure 1 Sample PHOP Network with Unified Communcations Manager (CM)



In Figure 1, when a call is made from branch office 1 to branch office 2, the RSVP Agent on customer edge (CE)1 tries to set up a session with CE2 and sends a PATH message. CE1 stamps its outgoing interface IP address (192.168.54.1), which is an unroutable IP address, in the PHOP object of the PATH message. This PATH message is tunneled across the service provider network and processed by CE2. CE2 records this IP address in the PHOP object of the received PATH message in the PSB (Path State Block).

CE2 has a receiver proxy configured for the destination address of the session. As a result, when CE2 replies back with a RESV message, CE2 tries to send the RESV message to the IP address that CE2 had recorded in its PSB. Because this IP address (192.168.54.1) is unroutable from CE2, the RESV message will fail.

Note Once you configure a source address on an interface, RSVP always uses the RSVP-overwritten address rather than the native interface address.

Benefits of RSVP—Previous Hop Overwrite

Flexibility and Customization

You can configure a CE to populate the PHOP object in a PATH message with an address that is reachable in the customer VPN. This enables the RESV message to find its way back towards the sender so that reservations can be established.

How to Configure RSVP—Previous Hop Overwrite

- Configuring a Source Address or a Source Interface, page 4 (required)
- Verifying the PHOP Configuration, page 5 (optional)

Configuring a Source Address or a Source Interface

Perform this task to configure a source address or a source interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip rsvp bandwidth** [*interface-kbps*] [*single-flow-kbps*]
5. **ip rsvp source** {**address** *ip-address* | **interface** *type number*}
6. **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** *type number* **Example:** `Router(config)# interface Ethernet0/0`	Configures the interface type and enters interface configuration mode.
Step 4	**ip rsvp bandwidth** [*interface-kbps*] [*single-flow-kbps*] **Example:** `Router(config-if)# ip rsvp bandwidth`	Enables RSVP 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** Repeat this command for each interface on which you want to enable RSVP.
Step 5	**ip rsvp source** {**address** *ip-address*	**interface** *type number*} **Example:** `Router(config-if)# ip rsvp source address 10.1.3.13`	Configures an RSVP router to populate an address other than the native interface address in the PHOP address field of the hop object when forwarding a PATH message onto that interface. **Note** The source IP address that you configure should be a valid local IP address.
Step 6	**end** **Example:** `Router(config-if)# end`	(Optional) Returns to privileged EXEC mode.

Verifying the PHOP Configuration

Note You can use the following **show** command in user EXEC or privileged EXEC mode.

SUMMARY STEPS

1. **enable**
2. **show ip rsvp interface** [**detail**] [*interface-type interface-number*]
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	(Optional) Enables privileged EXEC mode. • Enter your password if prompted. **Note** Skip this step if you are using the **show** command in user EXEC mode.
Step 2	**show ip rsvp interface** [**detail**] [*interface-type interface-number*] **Example:** `Router# show ip rsvp interface detail ethernet0/1`	(Optional) Displays RSVP-related interface information. • The optional keywords and arguments display additional information.
Step 3	**exit** **Example:** `Router# exit`	(Optional) Exits privileged EXEC mode and returns to user EXEC mode.

Configuration Examples for RSVP—Previous Hop Overwrite

This section provides the following configuration examples for RSVP—Previous Hop Overwrite:

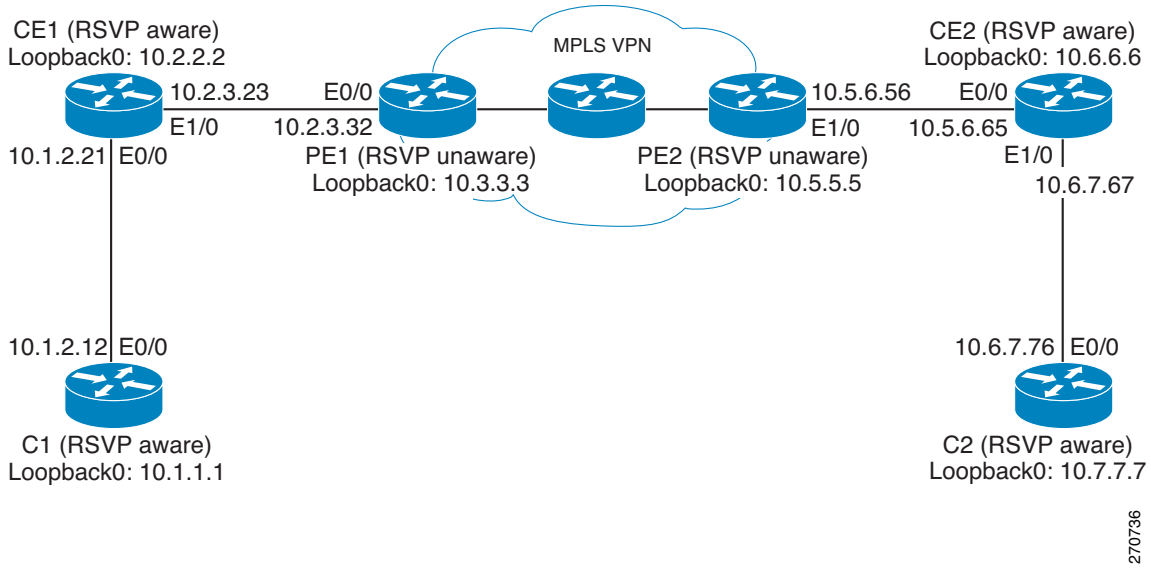
- Examples: Configuring RSVP—Previous Hop Overwrite, page 5
- Examples: Verifying RSVP—Previous Hop Overwrite Configuration, page 7

Examples: Configuring RSVP—Previous Hop Overwrite

- Configuring a Source Address on Router CE1 for the CE1-to-PE1 Interface, page 6
- Configuring a Source Address on Router CE2 for the CE2-to-PE2 Interface, page 6
- Creating a Listener Proxy on Router C2, page 6
- Creating a Session from Router C1 to Router C2, page 7

Figure 2 shows a sample network in which PHOP is configured.

Figure 2 Sample PHOP Network



Configuring a Source Address on Router CE1 for the CE1-to-PE1 Interface

The following example configures a source address on the CE1-to-PE1 (Ethernet 1/0) interface in Figure 2:

```
Router(CE1)# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(CE1)(config)# interface ethernet 1/0
Router(CE1)(config-if)# ip rsvp source address 10.2.2.2 <--------------------
Router(CE1)(config-if)# end
```

Configuring a Source Address on Router CE2 for the CE2-to-PE2 Interface

The following example configures a source address on the CE2-to-PE2 (Ethernet 0/0) interface in Figure 2:

```
Router(CE2)# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(CE2)(config)# interface ethernet 0/0
Router(CE2)(config-if)# ip rsvp source address 10.6.6.6 <----------------------
Router(CE2)(config-if)# end
```

Creating a Listener Proxy on Router C2

The following example creates a listener proxy on Router C2 and requests that the receiver reply with a RESV message for the flow if the PATH message destination is 10.7.7.7 in Figure 2:

```
Router(C2)# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(C2)(config)# ip rsvp listener 10.7.7.7 any any reply <--------------------
Router(C2)(config)# end
```

Creating a Session from Router C1 to Router C2

The following example creates an RSVP session from Router C1 to Router C2:

```
Router(C1)# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(C1)(config)# ip rsvp sender-host 10.7.7.7 10.1.1.1 UDP 100 200 1 1 <-------------
Router(C1)(config)# end
```

Examples: Verifying RSVP—Previous Hop Overwrite Configuration

Verifying the Source Address on Router CE1 for the CE1-to-PE1 Interface

The following example verifies the source address (10.2.2.2) configured on the CE1-to-PE1 (Ethernet 1/0) interface in Figure 2:

```
Router(CE1)# show ip rsvp interface detail ethernet 1/0

 Et1/0:
   RSVP: Enabled
   Interface State: Up
   Bandwidth:
     Curr allocated: 1K bits/sec
     Max. allowed (total): 100K bits/sec
     Max. allowed (per flow): 100K bits/sec
     Max. allowed for LSP tunnels using sub-pools: 0 bits/sec
     Set aside by policy (total): 0 bits/sec
   Admission Control:
     Header Compression methods supported:
       rtp (36 bytes-saved), udp (20 bytes-saved)
   Traffic Control:
     RSVP Data Packet Classification is ON via CEF callbacks
   Signalling:
     DSCP value used in RSVP msgs: 0x3F
     Number of refresh intervals to enforce blockade state: 4
     Ip address used in RSVP objects: 10.2.2.2 <-----------------------------------
   Authentication: disabled
     Key chain:   <none>
     Type:        md5
     Window size: 1
     Challenge:   disabled
   Hello Extension:
     State: Disabled
```

Verifying the Source Address on Router CE2 for the CE2-to-PE2 Interface

The following example verifies the source address configured on the CE2-to-PE2 (Ethernet 0/0) interface in Figure 2:

```
Router(CE2)# show ip rsvp interface detail ethernet 0/0

 Et0/0:
```

```
  RSVP: Enabled
  Interface State: Up
  Bandwidth:
    Curr allocated: 0 bits/sec
    Max. allowed (total): 100K bits/sec
    Max. allowed (per flow): 100K bits/sec
    Max. allowed for LSP tunnels using sub-pools: 0 bits/sec
    Set aside by policy (total): 0 bits/sec
  Admission Control:
    Header Compression methods supported:
      rtp (36 bytes-saved), udp (20 bytes-saved)
  Traffic Control:
    RSVP Data Packet Classification is ON via CEF callbacks
  Signalling:
    DSCP value used in RSVP msgs: 0x3F
    Number of refresh intervals to enforce blockade state: 4
    Ip address used in RSVP objects: 10.6.6.6 <-----------------------------------
  Authentication: disabled
    Key chain:   <none>
    Type:        md5
    Window size: 1
    Challenge:   disabled
  Hello Extension:
    State: Disabled
```

Verifying the Listener Proxy on Router C2

The following example verifies the listener proxy configured on Router C2 in Figure 2:

```
Router(C2)# show ip rsvp listeners

To                Protocol   DPort   Description                Action
10.7.7.7 <-------- any        any     RSVP Proxy                  reply
```

Verifying the Session from Router C1 to Router C2

The following example verifies that the session configured between Router C1 and Router C2 in Figure 2 is up:

```
Router(C1)# show ip rsvp reservation

To              From          Pro DPort Sport Next Hop      I/F      Fi Serv BPS
10.7.7.7        10.1.1.1      UDP 100   200   10.1.2.21     Et0/0    FF RATE 1K
```

Verifying the PHOP Address

The following example on Router CE2 verifies the source address configured on the CE1-to-PE1 interface in Figure 2 as the PHOP address:

```
Router(CE2)# show ip rsvp sender detail

PATH:
  Destination 10.7.7.7, Protocol_Id 17, Don't Police , DstPort 100
  Sender address: 10.1.1.1, port: 200
  Path refreshes:
    arriving: from PHOP 10.2.2.2 on Et0/0 every 30000 msecs <-------------------
  Traffic params - Rate: 1K bits/sec, Max. burst: 1K bytes
    Min Policed Unit: 0 bytes, Max Pkt Size 2147483647 bytes
  Path ID handle: CA000406.
  Incoming policy: Accepted. Policy source(s): Default
  Status:
  Output on Ethernet1/0. Policy status: Forwarding. Handle: 0E000402
    Policy source(s): Default
```

Verifying the Next-Hop Address

The following example on Router CE1 verifies the source address configured on the CE2-to-PE2 interface in Figure 2 as the next-hop address:

```
Router(CE1)# show ip rsvp reservation detail

RSVP Reservation. Destination is 10.7.7.7, Source is 10.1.1.1,
  Protocol is UDP, Destination port is 100, Source port is 200
  Next Hop: 10.6.6.6 on Ethernet1/0 <-------------------------------------------
  Reservation Style is Fixed-Filter, QoS Service is Guaranteed-Rate
  Resv ID handle: 03000400.
  Created: 07:01:40 IST Tue Mar 25 2008
  Average Bitrate is 1K bits/sec, Maximum Burst is 1K bytes
  Min Policed Unit: 0 bytes, Max Pkt Size: 0 bytes
  Status:
  Policy: Forwarding. Policy source(s): Default
```

Additional References

The following sections provide references related to the RSVP—Previous Hop Overwrite feature.

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
QoS 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

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, Cisco IOS 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 3209	*RSVP-TE: Extensions to RSVP for LSP 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

Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS Quality of Service Solutions Command Reference* at http://www.cisco.com/en/US/docs/ios/qos/command/reference/qos_book.html. For information about all Cisco IOS commands, use the Command Lookup Tool at http://tools.cisco.com/Support/CLILookup or the *Cisco IOS Master Command List, All Releases*, at http://www.cisco.com/en/US/docs/ios/mcl/allreleasemcl/all_book.html.

- **debug ip rsvp**
- **ip rsvp source**
- **show ip rsvp interface**

Feature Information for RSVP—Previous Hop Overwrite

Table 1 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS 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 Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for RSVP—Previous Hop Overwrite

Feature Name	Releases	Feature Information
RSVP—Previous Hop Overwrite	12.4(20)T	The RSVP—Previous Hop Overwrite feature allows you to configure a Resource Reservation Protocol (RSVP) router, on a per interface basis, to populate an address other than the native interface address in the previous hop (PHOP) address field of the PHOP object when forwarding a PATH message onto that interface. You can configure the actual address for the router to use, or an interface, including a loopback, from which to borrow the address. The following commands were introduced or modified: **debug ip rsvp, ip rsvp source, show ip rsvp interface.**

Glossary

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 running 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.

RSVP Agent—Implements a Resource Reservation Protocol (RSVP) agent on Cisco IOS voice gateways that support Unified CM.

Unified Communcations Manager (CM)—The software-based, call-processing component of the Cisco IP telephony solution. The software extends enterprise telephony features and functions to packet telephony network devices such as IP phones, media processing devices, voice-over-IP (VoIP) gateways, and multimedia applications.

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