Configuring MPLS Traffic Engineering—Verbatim Path Support

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Prerequisites for MPLS Traffic Engineering--Verbatim Path Support

- A Multiprotocol Label Switching (MPLS) TE tunnel must be configured globally.
- MPLS TE must be enabled on all links.

Restrictions for MPLS Traffic Engineering--Verbatim Path Support

- The **verbatim** keyword can be used only on a label-switched path (LSP) that is configured with the explicit path option.
- Reoptimization on the verbatim LSP is not supported.
- You cannot configure MPLS Traffic Engineering over the logical GRE tunnel interface.

Information About MPLS Traffic Engineering--Verbatim Path Support

MPLS TE LSPs usually require that all the nodes in the network are TE aware, meaning they have IGP extensions to TE in place. However, some network administrators want the ability to build TE LSPs to traverse nodes that do not support IGP extensions to TE, but that do support RSVP extensions to TE.

Verbatim LSPs are helpful when all or some of the intermediate nodes in a network do not support IGP extensions for TE.

When this feature is enabled, the IP explicit path is not checked against the TE topology database. Because the TE topology database is not verified, a Path message with IP explicit path information is routed using the shortest path first (SPF) algorithm for IP routing.

MPLS Traffic Engineering—Verbatim Path Support

The MPLS Traffic Engineering—Verbatim Path Support feature allows network nodes to support Resource Reservation Protocol (RSVP) extensions without supporting Interior Gateway Protocol (IGP) extensions for traffic engineering (TE), thereby bypassing the topology database verification process.

How to Configure MPLS Traffic Engineering—Verbatim Path Support

This section describes how to configure MPLS Traffic Engineering—Verbatim Path Support.

Configuring MPLS Traffic Engineering--Verbatim Path Support

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface tunnel** *number* **Example:**	Configures a tunnel interface and enters interface configuration mode.

	Command or Action	Purpose
	`Device(config)# interface tunnel 1`	• The *number* argument identifies the tunnel number to be configured.
Step 4	**ip unnumbered loopback** *number* **Example:** `Device(config-if)# ip unnumbered loopback 1`	Configures an unnumbered IP interface, which enables IP processing without an explicit address. A loopback interface is usually configured with the Device ID. **Note** An MPLS traffic engineering tunnel interface should be unnumbered because it represents a unidirectional link.
Step 5	**tunnel destination** {*host-name*| *ip-address*} **Example:** `Device(config-if)# tunnel destination 10.100.100.100`	Specifies the destination for a tunnel. • The *host-name* argument is the name of the host destination. • The *ip-address* argument is the IP Version 4 address of the host destination expressed in decimal in four-part, dotted notation.
Step 6	**tunnel mode mpls traffic-eng** **Example:** `Device(config-if)# tunnel mode mpls traffic-eng`	Sets the tunnel encapsulation mode to MPLS traffic engineering.
Step 7	**tunnel mpls traffic-eng bandwidth** {**sub-pool** *kbps* | *kbps}* **Example:** `Device(config-if)# tunnel mpls traffic-eng bandwidth 1000`	Configures the bandwidth required for an MPLS TE tunnel and assigns it either to the sub-pool or the global pool. • The **sub-pool** keyword indicates a subpool tunnel. • The *kbps* argument is the bandwidth, in kilobits per second, set aside for the MPLS TE tunnel. The range is from 1 to 4294967295.
Step 8	**tunnel mpls traffic-eng autoroute announce** **Example:** `Device(config-if)# tunnel mpls traffic-eng autoroute announce`	Specifies that IGP should use the tunnel (if the tunnel is up) in its enhanced SPF calculation.
Step 9	**tunnel mpls traffic-eng priority** *setup-priority* [*hold-priority*] **Example:**	Configures setup and reservation priority for a tunnel.

	Command or Action	Purpose
	`Device(config-if)# tunnel mpls traffic-eng priority 1 1`	• The *setup-priority* argument is the priority used when signaling an LSP for this tunnel to determine which existing tunnels can be preempted. Valid values are from 0 to 7. A lower number indicates a higher priority. An LSP with a setup priority of 0 can preempt any LSP with a non-0 priority. • The *hold-priority* argument is the priority associated with an LSP for this tunnel to determine if it should be preempted by other LSPs that are being signaled. Valid values are from 0 to 7, where a lower number indicates a higher priority.
Step 10	**tunnel mpls traffic-eng path-option** *preference-number* {**dynamic** [**attributes** *string* | **bandwidth** {**sub-pool** *kbps* | *kbps*} | **lockdown | verbatim**] | **explicit**{**name** *path-name* | **identifier** *path-number* **}}** **Example:** `Device(config-if)# tunnel mpls traffic-eng path-option 1 explicit name test verbatim` **Example:**	Specifies LSP-related parameters, including the **verbatim** keyword used with an explicit path option, for an MPLS TE tunnel. • The *preference-number* argument identifies the path option. • The **protect** keyword and *preference-number argument identify the path option with protection.* • The **dynamic** keyword indicates that the path option is dynamically calculated. (The Device figures out the best path.) • The **explicit** keyword indicates that the path option is specified. The IP addresses are specified for the path. • The **name** *path-name*keyword argument combination identifies the name of the explicit path option. • The *path-number* argument identifies the number of the explicit path option. • The **verbatim** keyword bypasses the topology database verification. **Note** You can use the **verbatim** keyword only with the explicit path option.

	Command or Action	Purpose
		• The **attributes** *string* keyword argument combination names an attribute list to specify path options for the LSP. • The **bandwidth** keyword specifies the LSP bandwidth. • The **sub-pool** keyword indicates a subpool path option. • The *kbps* argument is the number of kilobits per second set aside for the path option. The range is from 1 to 4294967295. • The **lockdown** keyword disables reoptimization of the LSP.
Step 11	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 12	**exit** **Example:** `Device(config)# exit`	Exits global configuration mode and returns to privileged EXEC mode.

Verifying Verbatim LSPs for MPLS TE Tunnels

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**show mpls traffic-eng tunnels** *tunnel-interface* [**brief**] **Example:** `Device# show mpls traffic-eng tunnels tunnel1`	Displays information about tunnels including those configured with an explicit path option using verbatim.
Step 3	**disable** **Example:**	(Optional) Exits to user EXEC mode.

	Command or Action	Purpose
	`Device# disable`	

Configuration Examples for MPLS Traffic Engineering—Verbatim Path Support

The following section provides configuration examples for MPLS Traffic Engineering—Verbatim Path Support.

Example: Configuring MPLS Traffic Engineering: Verbatim Path Support

The following example shows a tunnel that has been configured with an explicit path option using verbatim:

```
interface tunnel 1
 ip unnumbered loopback 1
 tunnel destination 10.10.100.100
 tunnel mode mpls traffic-eng
 tunnel mpls traffic-eng bandwidth 1000
 tunnel mpls traffic-eng autoroute announce
 tunnel mpls traffic-eng priority 1 1
 tunnel mpls traffic-eng path-option 1 explicit name path1 verbatim
```

Additional References

Related Documents

Related Topic	Document Title
MPLS Label Distribution Protocol	MPLS Label Distribution Protocol (LDP) feature 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
No new or modified RFCs are supported by this release.	--

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Feature History for MPLS Traffic Engineering Verbatim Path Support

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Cupertino 17.7.1	MPLS Traffic Engineering—Verbatim Path Support	The MPLS Traffic Engineering—Verbatim Path Support feature allows network nodes to support Resource Reservation Protocol (RSVP) extensions without supporting Interior Gateway Protocol (IGP) extensions for traffic engineering (TE), thereby bypassing the topology database verification process.

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