Configuring MPLS TE Verbatim Paths

This chapter describes how to configure a Multiprotocol Label Switching (MPLS) traffic engineering (TE) verbatim path on Cisco NX-OS devices.

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Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at https://tools.cisco.com/bugsearch/ and the release notes for your 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 “New and Changed Information” chapter or the Feature History table below.

Information About MPLS TE Verbatim Paths

Verbatim paths allow network nodes to support Resource Reservation Protocol (RSVP) extensions without supporting Interior Gateway Protocol (IGP) extensions for TE, thereby bypassing the topology database verification process.

MPLS TE label switched paths (LSPs) usually require that all the nodes in the network are TE aware, which means that they have IGP extensions to TE in place. However, some network administrators want to be able 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 you enable a verbatim path, the IP explicit path is not checked against the TE topology database. Because the TE topology database is not verified, a message with IP explicit path information is routed using the shortest path first (SPF) algorithm for IP routing.

Licensing Requirements for MPLS TE Verbatim Paths

<table>
<thead>
<tr>
<th>Product</th>
<th>License Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco NX-OS</td>
<td>Verbatim paths require an MPLS license. For a complete explanation of the Cisco NX-OS licensing scheme and how to obtain and apply licenses, see the Cisco NX-OS Licensing Guide.</td>
</tr>
</tbody>
</table>

Prerequisites for MPLS TE Verbatim Paths

Verbatim paths have the following prerequisites:

- You must enable the MPLS TE feature. See the “Configuring MPLS TE” section on page 11-145.
- You must globally configure an MPLS TE tunnel.
- You must enable MPLS TE on all links that will be used for LSPs.

Guidelines and Limitations for MPLS TE Verbatim Paths

Verbatim paths have the following configuration guidelines and limitations:

- You can only use verbatim paths on an LSP that is configured with the explicit path option.
- Verbatim LSPs do not support reoptimization.
- You cannot configure MPLS TE over the logical generic routing encapsulation (GRE) tunnel interface.

Configuring MPLS TE Verbatim Paths

You can configure verbatim paths on MPLS TE tunnels by using the verbatim path option.

Prerequisites

You must have the MPLS TE feature enabled (see the “Configuring MPLS TE” section on page 11-145). Ensure that you are in the correct VDC (or use the switchto vdc command).

SUMMARY STEPS

1. configure terminal
2. interface tunnel-te number
3. **path-option number** \{**dynamic** | **explicit** \{**name** path-name \| **path-number**\} \{**verbatim**\}\} \\
   \{**attributes** string\} \{**bandwidth** kbps\} \{**lockdown**\}\}  

4. (Optional) **show interface tunnel-te number**  

5. (Optional) **copy running-config startup-config**  

**DETAILED STEPS**  

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| **Step 1**
  
  configure terminal
  
  Example:
  
  switch# configure terminal
  
  switch(config)# |
| Enters global configuration mode. |
| **Step 2**
  
  interface tunnel-te number
  
  Example:
  
  switch(config)# interface tunnel-te 1 |
| Enters TE interface configuration mode. The *number* argument identifies the tunnel number to be configured. |
| **Step 3**
  
  path-option number \{**dynamic** | **explicit** \{**name** path-name \| **path-number**\} \{**verbatim**\}\} \\
  \{**attributes** string\} \{**bandwidth** kbps\} \{**lockdown**\}\}  
  
  Example:
  
  switch(config-if-te)# path-option 1
  
  dynamic attributes 1 |
| Adds an LSP attribute list to specify LSP-related parameters for path options for an MPLS TE tunnel. The arguments are as follows:

- The *number* argument identifies the path option.
- The *dynamic* keyword indicates that the path option is dynamically calculated (the switch figures out the best path).
- The *explicit* keyword indicates that the path option is specified. You specify the IP addresses of 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.

- The *attributes string* keyword argument combination names an attribute list to specify path options for the LSP.
- The *bandwidth* keyword specifies LSP bandwidth.
- 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. |
Verifying the MPLS TE Verbatim Path Configuration

To display the MPLS TE verbatim path configuration, perform the following task:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>show interface tunnel-te number</code></td>
<td>(Optional) Displays information about the TE tunnel.</td>
</tr>
<tr>
<td><code>copy running-config startup-config</code></td>
<td>(Optional) Copies the running configuration to the startup configuration.</td>
</tr>
</tbody>
</table>

Example:

```
switch(config-if-te)# show interface tunnel-te 1
```

Additional References for MPLS TE Verbatim Paths

The following sections provide references related to the verbatim path feature.

Example: Verbatim Path

The following example shows how to configure a tunnel with an explicit path option using verbatim paths:

```
configuration terminal
feature mpls traffic-engineering
interface tunnel-te 1
ip unnumbered loopback 1
destination 10.10.100.100
 bandwidth 1000
path-option 1 explicit name path1 verbatim
no shutdown
```
Related Documents

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLI commands</td>
<td>Cisco Nexus 7000 Series NX-OS MPLS Command Reference</td>
</tr>
</tbody>
</table>

MIBs

<table>
<thead>
<tr>
<th>MIB</th>
<th>MIBs Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISCO-IETF-FRR-MIB</td>
<td>To locate and download Cisco MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a></td>
</tr>
<tr>
<td>MPLS TE-STD-MIB</td>
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</table>

Feature History for MPLS TE Verbatim Paths

Table 16-1 lists the release history for this feature.

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbatim path</td>
<td>5.2(1)</td>
<td>This feature was introduced.</td>
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</tbody>
</table>