



# AToM Static Pseudowire Provisioning

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**Last Updated: November 28, 2011**

The AToM Static Pseudowire Provisioning feature allows provisioning an Any Transport over Multiprotocol Label Switching (MPLS) (AToM) static pseudowire without the use of a directed control connection. In environments that do not or cannot use directed control protocols, this feature provides a means for provisioning the pseudowire parameters statically at the Cisco IOS command-line interface (CLI).

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## 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 Table at the end of this document.

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## Restrictions for AToM Static Pseudowire Provisioning

The following parameters are exchanged using directed control protocol messages on pseudowires, but cannot be changed using the AToM Static Pseudowire Provisioning feature introduced in Cisco IOS Release 12.33(SRB). Instead, the software has preconfigured defaults.

- The Virtual Circuit Connectivity Verification (VCCV) options used for fault detection, isolation, and verification at both ends of the connection are set as follows:



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- Control channel type 1 sets the control word.
- Control channel type 2 sets the MPLS router alert label.
- Connectivity verification type 2 sets the label switched path (LSP) **ping** command.

In Cisco IOS Release 12.2(33)SRE, support for cell packing for static pseudowires was added. This feature has the following restrictions:

- Both provider-edge routers (PEs) must run Cisco IOS Release 12.2(33)SRE, and the maximum number of cells that can be packed must be set to the same value on each PE router.
- Autosensing of the virtual circuit type for Ethernet over MPLS is not supported.

Additionally, the following functionality is not supported for static pseudowires:

- Sequence number resynchronization—configured by the sequencing function in the **pseudowire-class** command—is not supported because the sequence number resynchronization is done when the Label Distribution Protocol (LDP) software sends an LDP Label Release or Withdraw message followed by a Label Request or Mapping message, and static pseudowires do not use LDP.
- Tunnel stitching is not supported because it requires an extension of the **neighbor** command to start the mode that allows configuring static pseudowire parameters such as remote and local labels. Note that a tunnel switch point can be configured using a different static label command. The tunnel switch point will not process control words, but label swapping will occur.
- Pseudowire redundancy is not supported because it requires using a directed control protocol between the peer provider edge routers.

## Information About AToM Static Pseudowire Provisioning

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## Pseudowire Provisioning

The AToM Static Pseudowire Provisioning feature allows you to configure static pseudowires in cases where you cannot use directed control protocols. In most cases, pseudowires are dynamically provisioned using LDP or another directed control protocol, such as Resource Reservation Protocol over traffic-engineered tunnels (RSVP-TE), to exchange the various parameters required for these connections.

The AToM Static Pseudowire Provisioning feature is platform-independent, but has been tested on only the Cisco 7600 series routers.

## Benefits of Statically Provisioned Pseudowires

This feature allows provisioning an AToM label switching static pseudowire without the use of a directed control connection. This feature also includes static provisioning of the tunnel label and the pseudowire label.

## How to Provision an AToM Static Pseudowire

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## Provisioning an AToM Static Pseudowire

In this configuration task, you use options in the **xconnect** Ethernet interface configuration command to specify a static connection, and **mpls** commands in xconnect mode to statically set the following pseudowire parameters:

- Set the local and remote pseudowire labels
- Enable or disable sending the MPLS control word

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *ethernet-type interface-number*
4. **xconnect** *peer-ip-address vcid encapsulation mpls manual pw-class class-name*
5. **mpls label** *local-pseudowire-label remote-pseudowire-label*
6. **[no] mpls control-word**
7. **exit**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> <pre>Router&gt; enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> <pre>Router# configure terminal</pre>	Enters global configuration mode.
<b>Step 3</b>	<b>interface</b> <i>ethernet-type interface-number</i>  <b>Example:</b> <pre>Router(config)# interface Ethernet 1/0</pre>	Enters interface configuration mode for the specified interface.

Command or Action	Purpose
<p><b>Step 4</b> <code>xconnect peer-ip-address vcid encapsulation mpls manual pw-class class-name</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# xconnect 10.131.191.252 100 encapsulation mpls manual pw-class mpls</pre>	<p>Configures a static AToM pseudowire and enters xconnect configuration mode where the local and remote pseudowire labels are set.</p>
<p><b>Step 5</b> <code>mpls label local-pseudowire-label remote-pseudowire-label</code></p> <p><b>Example:</b></p> <pre>Router(config-if-xconn)# mpls label 100 150</pre>	<p>Sets the local and remote pseudowire labels.</p> <ul style="list-style-type: none"> <li>The label must be an unused static label within the static label range configured using the <b>mpls label range</b> command.</li> <li>The <b>mpls label</b> command checks the validity of the label entered and displays an error message if it is not valid. The label supplied for the <i>remote-pseudowire-label</i> argument must be the value of the peer PE's local pseudowire label.</li> </ul>
<p><b>Step 6</b> <code>[no] mpls control-word</code></p> <p><b>Example:</b></p> <pre>Router(config-if-xconn)# no mpls control-word</pre>	<p>Sets whether the MPLS control word is sent.</p> <ul style="list-style-type: none"> <li>This command must be set for Frame Relay data-link connection identifier (DLCI) and ATM adaptation layer 5 (AAL5) attachment circuits. For other attachment circuits, the control word is included by default.</li> <li>If you enable inclusion of the control word, it must be enabled on both ends of the connection for the circuit to work properly.</li> <li>Inclusion of the control word can be explicitly disabled using the <b>no mpls control-word</b> command.</li> </ul>
<p><b>Step 7</b> <code>exit</code></p> <p><b>Example:</b></p> <pre>Router(config-if-xconn)# exit</pre>	<p>Exits the configuration mode.</p> <ul style="list-style-type: none"> <li>Continue entering the <b>exit</b> command at the router prompt until you reach the desired configuration mode.</li> </ul>

## Verifying the AToM Static Pseudowire Configuration

To verify the AToM static pseudowire configuration, use the **show running-config EXEC** command. To verify that the AToM static pseudowire was provisioned correctly, use the **show mpls l2transport vc detail** and **ping mpls pseudowire EXEC** commands as described in the following steps.

### SUMMARY STEPS

- show mpls l2transport vc detail**
- ping mpls pseudowire ipv4-address vc-id vc-id**

## DETAILED STEPS

### Step 1 **show mpls l2transport vc detail**

For nonstatic pseudowire configurations, this command lists the type of protocol used to send the MPLS labels (such as LDP). For static pseudowire configuration, the value of the signaling protocol field should be Manual. Following is sample output:

#### Example:

```
Router# show mpls l2transport vc detail
Local interface: Et1/0 up, line protocol up, Ethernet up
  Destination address: 10.0.1.1, VC ID: 200, VC status: up
  Output interface: Et3/0, imposed label stack {17}
  Preferred path: not configured
  Default path:
  Next hop: 10.0.0.2
  Create time: 00:27:27, last status change time: 00:27:24
  Signaling protocol: Manual
  MPLS VC labels: local 17, remote 17
  Group ID: local 0, remote 0
  MTU: local 1500, remote 1500
  Sequencing: receive disabled, send disabled
  VC statistics:
    packet totals: receive 193, send 193
    byte totals:  receive 19728, send 23554
    packet drops:  receive 0, send 0
```

### Step 2 **ping mpls pseudowire ipv4-address vc-id vc-id**

Because there is no directed control protocol exchange of parameters on a static pseudowire, both ends of the connection must be correctly configured. One way to detect mismatch of labels or control word options is to send an MPLS pseudowire LSP **ping** command as part of configuration task, and then reconfigure the connection if problems are detected. An exclamation point (!) is displayed when the **ping** command is successfully sent to its destination. An example of command use and output follows:

#### Example:

```
Router# ping mpls pseudowire 10.7.1.2 vc-id 1001
Sending 5, 100-byte MPLS Echos to 10.7.1.2,
  timeout is 2 seconds, send interval is 0 msec:
Codes: '.' - success, 'Q' - request not sent, '.' - timeout,
'L' - labeled output interface, 'B' - unlabeled output interface,
'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
'M' - malformed request, 'm' - unsupported tlvs, 'N' - no label entry,
'P' - no rx intf label prot, 'p' - premature termination of LSP,
'R' - transit router, 'I' - unknown upstream index,
'X' - unknown return code, 'x' - return code 0
Type escape sequence to abort.
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

# Configuration Examples for AToM Static Pseudowire Provisioning

- [Provisioning an AToM Pseudowire Example, page 6](#)

## Provisioning an AToM Pseudowire Example

The following examples show the configuration commands for an AToM static pseudowire connection between two PEs, PE1 and PE2.

The **mpls label range static** command must be used to configure the static label range prior to provisioning the AToM static pseudowire.

```
Router# configure terminal
Router(config)# mpls label range 200 16000 static 16 199
% Label range changes will take effect at the next reload.
```

The **mpls ip** command must also be configured on the core-facing interface of both PE1 and PE2 (which is also done for directed control protocol signaled pseudowires). Following is a configuration example:

```
Router(config)# interface Ethernet 0/0
Router(config-if)# description Backbone interface
Router(config-if)# ip address 10.0.0.1 255.255.255.0
Router(config-if)# mpls ip
Router(config-if)# exit
```

Following is an example AToM static pseudowire configuration for PE1:

```
Router(config)# interface Ethernet 1/0
Router(config-if)# no ip address
Router(config-if)# xconnect 10.131.191.251 100 encapsulation mpls manual pw-class mpls
Router(config-if-xconn)# mpls label 100 150
Router(config-if-xconn)# exit
```

Following is an example AToM static pseudowire configuration for PE2:

```
Router(config)# interface Ethernet 1/0
Router(config-if)# no ip address
Router(config-if)# xconnect 10.132.192.252 100 encapsulation mpls manual pw-class mpls
Router(config-if-xconn)# mpls label 150 100
Router(config-if-xconn)# exit
```

This feature also allows tunnel labels to be statically configured using the **mpls static binding ipv4 vrf** command. See the MPLS Static Labels feature module and the Cisco IOS Multiprotocol Label Switching Command Reference for information about static labels and the **mpls static binding ipv4 vrf** command.

## Additional References

The following sections provide references related to the AToM Static Pseudowire Provisioning feature.

**Related Documents**

<b>Related Topic</b>	<b>Document Title</b>
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>
MPLS commands	<i>Cisco IOS Multiprotocol Label Switching Command Reference</i>
Configuring the pseudowire class	Any Transport over MPLS
MPLS and xconnect commands	<i>Cisco IOS Multiprotocol Label Switching Command Reference</i>
Static labels and the <b>mpls static binding ipv4 vrf</b> command	" MPLS Static Labels " section of the <i>Cisco IOS Multiprotocol Label Switching Configuration Guide</i>

**Standards**

<b>Standard</b>	<b>Title</b>
IETF draft-ietf-pwe3-vcv-12.txt	<a href="#">Pseudo Wire Virtual Circuit Connectivity Verification (VCCV)</a>

**MIBs**

<b>MIB</b>	<b>MIBs Link</b>
None	To locate and download 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>

**RFCs**

<b>RFC</b>	<b>Title</b>
RFC 3036	<a href="#">LDP Specification</a>

### Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>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.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<p><a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a></p>

## Feature Information for AToM Static Pseudowire Provisioning

The following table provides release information about the feature or features described in this module. This table 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.

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**Table 1**      **Feature Information for AToM Static Pseudowire Provisioning**

Feature Name	Releases	Feature Information
AToM Static Pseudowire Provisioning	12.2(33)SRB 12.2(33)SRE	<p>This feature allows provisioning an AToM static pseudowire without the use of a directed control protocol connection.</p> <p>The AToM Static Pseudowire feature is platform-independent, but has been tested on only the Cisco 7600 series routers for Cisco IOS Release 12.33(SRB).</p> <p>In Cisco IOS Release 12.2(33)SRE, the L2VPN Support for Cell Packing on Static PW feature was added.</p> <p>The following commands were introduced or modified by this feature: <b>cell-packing, mpls control-word, mpls label, show mpls l2transport vc, xconnect.</b></p>

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