Hot Standby Pseudowire Support for ATM and TDM Access Circuits

The Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature is an enhancement to the L2VPN Pseudowire Redundancy feature in the following ways:

- Faster failover of to the backup pseudowire
- Less traffic loss during failover

The Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature allows the backup pseudowire to be in a "hot standby" state, so that it can immediately take over if the primary pseudowire fails. The following sections explain the concepts and configuration tasks for this feature.

- Prerequisites for Hot Standby Pseudowire Support for ATM and TDM Access Circuits, on page 1
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- Information About Hot Standby Pseudowire Support for ATM and TDM Access Circuits, on page 2
- How to Configure Hot Standby Pseudowire Support for ATM and TDM Access Circuits, on page 3
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Prerequisites for Hot Standby Pseudowire Support for ATM and TDM Access Circuits

- This feature requires that you understand how to configure Layer 2 virtual private networks (VPNs). You can find that information in the following documents:
  - Any Transport over MPLS
  - L2 VPN Interworking
  - L2VPN Pseudowire Redundancy
- For information on configuring this feature on the Cisco 7600 series routers, see the following:
  - Cisco 7600 Series Router SIP, SSC, and SPA Software Configuration Guide
  - Cisco 7600 IOS Software Configuration Guide, Release 15.1S
  - Configuring the CEoP and Channelized ATM SPAs

- The Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature recommends that the following mechanisms be in place to enable faster detection of a failure in the network:
  - Label-switched paths (LSP) Ping/Traceroute and Any Transport over MPLS Virtual Circuit Connection Verification (AToM VCCV)
  - Local Management Interface (LMI)
  - Operation, Administration, and Maintenance (OAM)

Restrictions for Hot Standby Pseudowire Support for ATM and TDM Access Circuits

- Hot Standby Pseudowire Support for ATM and TDM Access Circuits is *not* supported on L2TPv3. Only MPLS L2VPNs are supported.
- More than one backup pseudowire is *not* supported.
- Different pseudowire encapsulation types on the MPLS pseudowire are not supported.
- If you use Hot Standby Pseudowire Support for ATM and TDM Access Circuits with L2VPN Interworking, the interworking method must be the same for the primary and backup pseudowires. For TDM access circuits, interworking is *not* supported.
- Only dynamic pseudowires are supported.

Information About Hot Standby Pseudowire Support for ATM and TDM Access Circuits

How the Hot Standby Pseudowire Support for ATM and TDM Access Circuits Feature Works

The Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature improves the availability of L2VPN pseudowires by detecting failures and handling them with minimal disruption to the service.

The Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature allows the backup pseudowire to be in a “hot standby” state, so that it can immediately take over if the primary pseudowire fails. The L2VPN Pseudowire Redundancy feature allows you to configure a backup pseudowire too, but in a cold state. With the L2VPN Pseudowire Redundancy feature, if the primary pseudowire fails, it takes time for the backup pseudowire to take over, which causes a loss in traffic.

If you have configured L2VPN Pseudowire Redundancy on your network and upgrade to Cisco IOS Release 15.1(1)S, you do not need add any other commands to achieve Hot Standby Pseudowire Support for ATM and TDM Access Circuits. The backup pseudowire will automatically be in a hot standby state.

Supported Transport Types

The Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature supports the following transport types:

- ATM
  - ATM AAL5 in VC mode
  - ATM packed cell relay in VC Mode
  - ATM in VP mode
  - ATM packed cell relay in VP mode
  - ATM in port mode
  - ATM packed cell relay in port mode
- Time division multiplexing (TDM)
  - Structure-Agnostic TDM over Packet (SAToP)
  - Circuit Emulation Services over PSN (CESoPSN)

How to Configure Hot Standby Pseudowire Support for ATM and TDM Access Circuits

The Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature enables you to configure a backup pseudowire in case the primary pseudowire fails. When the primary pseudowire fails, the PE router can immediately switch to the backup pseudowire.

Configuring a Pseudowire for Static VPLS

The configuration of pseudowires between provider edge (PE) devices helps in the successful transmission of the Layer 2 frames between PE devices.

Use the pseudowire template to configure the virtual circuit (VC) type for the virtual path identifier (VPI) pseudowire. In the following task, the pseudowire will go through a Multiprotocol Label Switching (MPLS)-Tunneling Protocol (TP) tunnel.

The pseudowire template configuration specifies the characteristics of the tunneling mechanism that is used by the pseudowires, which are:

- Encapsulation type
- Control protocol
- Payload-specific options
- Preferred path

Perform this task to configure a pseudowire template for static Virtual Private LAN Services (VPLS).

Note Ensure that you perform this task before configuring the virtual forwarding instance (VFI) peer. If the VFI peer is configured before the pseudowire class, the configuration is incomplete until the pseudowire class is configured. The **show running-config** command displays an error stating that configuration is incomplete.

```
Device# show running-config | sec vfi

l2 vfi config manual
 vpn id 1000
 ! Incomplete point-to-multipoint vfi config
```

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	**template type pseudowire** *name* **Example:** `Device(config)# template type pseudowire static-vpls`	Specifies the template type as pseudowire and enters template configuration mode.
Step 4	**encapsulation mpls** **Example:** `Device(config-template)# encapsulation mpls`	Specifies the tunneling encapsulation. • For Any Transport over MPLS (AToM), the encapsulation type is MPLS.
Step 5	**signaling protocol none** **Example:** `Device(config-template)# signaling protocol none`	Specifies that no signaling protocol is configured for the pseudowire class.
Step 6	**preferred-path interface Tunnel-tp** *interface-number* **Example:** `Device(config-template)# preferred-path interface Tunnel-tp 1`	(Optional) Specifies the path that traffic uses: an MPLS Traffic Engineering (TE) tunnel or destination IP address and Domain Name Server (DNS) name.

	Command or Action	Purpose
Step 7	**exit** **Example:** `Device(config-template)# exit`	Exits template configuration mode and returns to global configuration mode.
Step 8	**interface pseudowire** *number* **Example:** `Device(config)# interface pseudowire 1`	Establishes a pseudowire interface and enters interface configuration mode.
Step 9	**source template type pseudowire** *name* **Example:** `Device(config-if)# source template type pseudowire static-vpls`	Configures the source template type of the configured pseudowire.
Step 10	**neighbor** *peer-address vcid-value* **Example:** `Device(config-if)# neighbor 10.0.0.1 123`	Specifies the peer IP address and VC ID value of a Layer 2 VPN (L2VPN) pseudowire.
Step 11	**label** *local-pseudowire-label remote-pseudowire-label* **Example:** `Device(config-if)# label 301 17`	Configures an Any Transport over MPLS (AToM) static pseudowire connection by defining local and remote circuit labels.
Step 12	**end** **Example:** `Device(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.

Configuring Hot Standby Pseudowire Support for ATM and TDM Access Circuits

Use the following steps to configure the Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature.

Before you begin

For each transport type, the **xconnect**command is configured slightly differently.

- See *Any Transport over MPLS* to configure the **xconnect** command for other transport types.
- See Configuring the CEoP and Channelized ATM SPAs to configure circuit emulation (CEM) pseudowires.

Procedure

	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 atm** *number* **Example:** `Router(config)# interface atm4/1/0`	Specifies the ATM interface and enters interface configuration mode.
Step 4	**pvc** [*name*] *vpi/vci* **l2transport** **Example:** `Router(config-if)# pvc 1/100 l2transport`	Creates or assigns a name to an ATM PVC and enters L2transport PVC configuration mode.
Step 5	**xconnect** *peer-router-id vcid* {**encapsulation mpls**| **pw-class** *pw-class-name}* **Example:** `Router(config-if-atm-l2trans-pvc)# xconnect 10.0.0.1 123 pw-class atom`	Binds the attachment circuit to a pseudowire VC.
Step 6	**backup peer** *peer-router-ip-addr vcid* [**pw-class** *pw-class-name*] **Example:** `Router(config-if-atm-l2trans-pvc)# backup peer 10.0.0.3 125 pw-class atom`	Specifies a redundant peer for the pseudowire VC. The pseudowire class name must match the name you specified when you created the pseudowire class, but you can use a different pw-class in the **backup peer** command than the name that you used in the primary **xconnect** command.
Step 7	**backup delay** *enable-delay* {*disable-delay* | **never**} **Example:** `Router(config-if-atm-l2trans-pvc)# backup delay 5 never`	Specifies how long (in seconds) the backup pseudowire VC should wait to take over after the primary pseudowire VC goes down. The range is 0 to 180. Specifies how long the primary pseudowire should wait after it becomes active to take over for the backup pseudowire VC. The range is 0 to 180 seconds. If you specify the **never**

	Command or Action	Purpose
		keyword, the primary pseudowire VC never takes over for the backup.

Verifying the Hot Standby Pseudowire Support for ATM and TDM Access Circuits Configuration

Use the following commands to verify that the backup pseudowire is provisioned for hot standby support.

Procedure

Step 1 **show atm acircuit**

If the output of the **show atm acircuit**command shows two entries for the same vpi/vci, then the backup pseudowire has been correctly provisioned, as shown in the following example:

Example:

```
Router# show atm acircuit

Interface          VPI  VCI    AC    Id      Switch   Segment  St  Flg  Prov
---------          ---  ---    --    --      -------  -------- --  ---  ----
ATM2/1/0.2         11   111    ATA5  1        2003    4007     2    0    Y
ATM2/1/0.2         11   111    ATA5  1        1002    3006     2    0    Y
```

Step 2 **show atm pvc**

If the output of the **show atm pvc command includes "Red Prov: Yes," then the backup p**seudowire has been correctly provisioned, as shown in bold in the following example:

Example:

```
Router# show atm pvc 1/1010
Interworking Method: like to like
AC Type: ATM AAL5,  Circuit Id: 2,  AC State: UP,  Prov: YES
Switch Hdl: 0x1005,  Segment hdl: 0x4011
Red Switch Hdl: 0x3007, Red Segment hdl: 0x6010, Red Prov: YES
AC Hdl: 0x7200000F,  AC Peer Hdl: 0x5D000012,  Flg:0,  Platform Idx:10
Status: UP
```

Step 3 **show cem acircuit**

If the output of the **show cem acircuit command includes "Redundancy Member Prov: Yes," then the backup p**seudowire has been correctly provisioned, as shown in bold in the following example:

Example:

```
Router# show cem acircuit
CEM Int.   ID  Flags  Swhdl    Seghdl    Ckttype  Provisioned
---------------------------------------------------------------
CEM3/0/0   1    0    B00E       201E       19        Yes
Redundancy Switch hdl: 0xC00F Redundancy Segment hdl: 0x401F   Redundancy Member Prov: Yes
```

Step 4 **show cem acircuit detail**

If the output of the **show cem acircuit detail command includes "Redundancy Member Prov: Yes," then the backup p**seudowire has been correctly provisioned, as shown in bold in the following example:

Example:

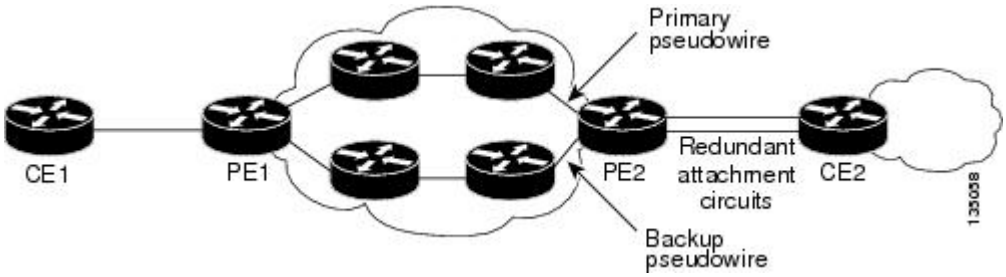
```
Router# show cem acircuit detail

CEM3/0/0    Cemid 1
PW Ckt_type: 19  Aie hdl: EE00000B Peer aie hdl: 0x2000000C
Switch hdl: 0xB00E     Segment hdl: 0x201E     Redundancy Switch hdl: 0x1000     Redundancy
 Segment hdl: 0x4002     Redundancy Member Prov: Yes
```

Configuration Examples for Hot Standby Pseudowire Support for ATM and TDM Access Circuits

Configuring Hot Standby Pseudowire Support for ATM and TDM Access Circuits on CEM Circuits Example

The figure below shows the configuration of Hot Standby Pseudowire Support for ATM and TDM Access Circuits, where the backup pseudowire is on the same PE router.

Figure 1: Hot Standby Pseudowire Topology



The configuration shown in the figure above is used in the following examples:

Table 1: Configuring Hot Standby Pseudowire Support for ATM and TDM Access Circuits on CEM Circuits: Example

Table 2: Configuring Hot Standby Pseudowire Support for ATM and TDM Access Circuits on ATM Circuits: Example

PE1	PE2
interface Loopback0 ip address 10.44.44.44 255.255.255.255 ! interface POS3/3/0 ip address 10.4.4.4 255.255.255.0 mpls ip ! interface ATM4/1/0 no ip address no atm enable-ilmi-trap pvc 1/100 l2transport xconnect 10.22.22.22 1 encapsulation mpls backup peer 10.22.22.22 2	interface Loopback0 ip address 10.22.22.22 255.255.255.255 ! interface POS3/3/0 ip address 10.4.4.1 255.255.255.0 mpls ip ! interface ATM4/1/0 no ip address no atm enable-ilmi-trap pvc 1/100 l2transport xconnect 10.44.44.44 1 encapsulation mpls ! pvc 1/200 l2transport xconnect 10.44.44.44 2 encapsulation mpls

Additional References

The following sections provide references related to the Hot Standby Pseudowire Support for ATM and TDM Access Circuits feature.

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
MPLS commands	*Cisco IOS Multiprotocol Label Switching Command Reference*
L2VPNs on 7600 series router	• Cisco 7600 Series Router SIP, SSC, and SPA Software Configuration Guide • *Cisco 7600 IOS Software Configuration Guide*, Release 15.1S • Configuring the CEoP and Channelized ATM SPAs
Circuit Emulation Services over Packet Switched Network (CESoPSN) mode and Structure-Agnostic TDM over Packet (SAToP) mode	Overview of the CEoP and Channelized ATM SPAs
Configuring a CEM Pseudowire	Configuring the CEoP and Channelized ATM SPAs
Configuring Pseudowire Redundancy on circuit emulation (CEM) pseudowires	Configuring the CEoP and Channelized ATM SPAs

Related Topic	Document Title
L2VPN pseudowires	• Any Transport over MPLS • L2 VPN Interworking • L2VPN Pseudowire Redundancy
NSF/SSO for L2VPNs	NSF/SSO—Any Transport over MPLS and AToM Graceful Restart
Ping and traceroute for L2VPNs	MPLS LSP Ping/Traceroute for LDP/TE, and LSP Ping for VCCV

Standards

Standard	Title
draft-muley-pwe3-redundancy	Pseudowire Redundancy
draft-ietf-pwe3-iccp-*xx*.txt	Inter-Chassis Communication Protocol for L2VPN PE Redundancy

MIBs

MIB	MIBs Link
• CISCO-IETF-PW-ATM-MIB	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 5085	Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires

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/cisco/web/support/index.html