Configuring Pseudowire

Cisco Pseudowire Emulation Edge-to-Edge (PWE3) allows you to transport traffic by using traditional services such as T1/E1 over a packet-based backhaul technology such as MPLS or IP. A pseudowire (PW) consists of a connection between two provider edge (PE) chassis that connects two attachment circuits (ACs), such as T1/E1 or T3/E3 links.

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- Additional References for Configuring Pseudowire, on page 6

Information About Pseudowire

The following sections describe how to configure pseudowire on the interface module of the chassis.

Overview of Pseudowire

Pseudowires manage encapsulation, timing, order, and other operations in order to make it transparent to users. The pseudowire tunnel acts as an unshared link or circuit of the emulated service.

Overview of Circuit Emulation

Circuit Emulation (CEM) is a technology that provides a protocol-independent transport over IP/MPLS networks. It enables proprietary or legacy applications to be carried transparently to the destination, similar to a leased line.

CEM provides a bridge between a Time-Division Multiplexing (TDM) network and Multiprotocol Label Switching (MPLS) network. The chassis encapsulates the TDM data in the MPLS packets and sends the data over a CEM pseudowire to the remote Provider Edge (PE) chassis. As a result, CEM functions as a physical communication link across the packet network.

The chassis supports the pseudowire type that utilizes CEM transport: Structure-Agnostic TDM over Packet (SAToP).

L2VPN over IP/MPLS is also supported on the interface modules.
Structure-Agnostic TDM over Packet

Structure-Agnostic TDM over Packet (SAToP) encapsulates Time Division Multiplexing (TDM) bit-streams as pseudowires over public switched networks. It disregards any structure that may be imposed on streams, in particular the structure imposed by the standard TDM framing.

The protocol used for emulation of these services does not depend on the method in which attachment circuits are delivered to the Provider Edge (PE) chassis. For example, a T1 attachment circuit is treated the same way for all delivery methods, including copper, multiplex in a T3 circuit, a virtual tributary of a SONET circuit, or unstructured Circuit Emulation Service (CES).

In SAToP mode, the interface is considered as a continuous framed bit stream. The packetization of the stream is done according to IETF RFC 4553. All signaling is carried out transparently as a part of a bit stream.

How to Configure Pseudowire

The following sections describe how to configure pseudowire.

Configuring CEM for SAToP

This section provides information about how to configure CEM. CEM provides a bridge between a Time Division Multiplexing (TDM) network and a packet network, MPLS. The chassis encapsulates the TDM data in the MPLS packets and sends the data over a CEM pseudowire to the remote Provider Edge (PE) chassis.

The following sections describe how to configure CEM.

Configuring CEM Restriction

- Not all combinations of payload size and dejitter buffer size are supported. If you apply an incompatible payload size or dejitter buffer size configuration, the chassis rejects it and reverts to the previous configuration.
- The dummy-pattern command is not supported.

Note

CEM interface does not support idle-cas parameter.

Configuring CEM Group for SAToP for T1 Interfaces

The following section describes how to configure a CEM group for SAToP.

```
enable
configure terminal
controller t1 0/4/0
cem-group 0 unframed
end
```

To configure a CEM group for Framed SAToP:

```
enable
configure terminal
```
configuring cem classes

configuring cem classes

A CEM class allows you to create a single configuration template for multiple CEM pseudowires. Follow these steps to configure a CEM class:

• The CEM parameters can be configured either by using CEM class or on CEM interface directly.
• The CEM parameters at the local and remote ends of a CEM circuit must match; otherwise, the pseudowire between the local and remote PE chassis does not come up.

enable
configure terminal
class cem mycemclass
  payload-size 512
  dejitter-buffer 12
exit
interface cem 0/0/1
cem 0
cem class mycemclass
  xconnect 10.10.10.10 200 encapsulation mpls
exit

configuring cem parameters

the following sections describe the parameters you can configure for CEM circuits.

configuring payload size

To specify the number of bytes encapsulated into a single IP packet, use the payload-size command. The size argument specifies the number of bytes in the payload of each packet. The range is from 32 to 1312 bytes.

Default payload sizes for an unstructured CEM channel are as follows:

• T1 = 192 bytes
• E1 = 256 bytes
• DS0 = 32 bytes

Default payload sizes for a structured CEM channel depend on the number of time slots that constitute the channel. Payload size (L in bytes), number of time slots (N), and packetization delay (D in milliseconds) have the following relationship: L = 8*N*D. The default payload size is selected in such a way that the packetization delay is always 1 millisecond. For example, a structured CEM channel of 16xDS0 has a default payload size of 128 bytes.
Both payload-size and dejitter-buffer must be configured simultaneously.

**Setting the Dejitter Buffer Size**

To specify the size of the dejitter-buffer used to compensate for the network filter, use the `dejitter-buffer` command. The configured dejitter-buffer size is converted from milliseconds to packets and rounded up to the next integral number of packets. Use the size argument to specify the size of the buffer, in milliseconds. The range is from 1 to 32; the default is 5.

**Shutting Down a CEM Channel**

To shut down a CEM channel, use the `shutdown` command in CEM configuration mode. The `shutdown` command is supported only under CEM mode and not under the CEM class.

**Configuring CEM Parameter on CEM Interface**

The CEM parameters can be configured directly on CEM interface. Follow these steps to configure CEM parameters:

```
enable
cfg terminal
interface cem 0/0/1
cem 0
payload-size 512 dejitter-buffer 12
xconnect 10.10.10.10 200 encapsulation mpls
exit
```

**Verifying CEM Statistics for SAToP**

Use the following commands to verify the pseudowire configuration for SAToP:

- **show cem circuit**—Displays information about the circuit state, administrative state, the CEM ID of the circuit, and the interface on which it is configured. If cross connect is configured under the circuit, the command output also includes information about the attachment circuit status.

```
Router# show cem circuit
<0-32000> CEM ID
detail Detailed information of cem ckt(s)
interface CEM Interface
summary Display summary of CEM ckts
| Output modifiers
Router# show cem circuit
CEM Int. ID Line Admin Circuit AC
-------------------------------------------------------------------------------------------
CEM0/1/0 1 UP UP ACTIVE --/--
CEM0/1/0 2 UP UP ACTIVE --/--
CEM0/1/0 3 UP UP ACTIVE --/--
CEM0/1/0 4 UP UP ACTIVE --/--
CEM0/1/0 5 UP UP ACTIVE --/--
```

- **show cem circuit cem-id** — Displays the detailed information about that particular circuit.

```
Router# show cem circuit 0
```
CEM0/1/2, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Controller state: up, T1/E1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x0
Dejitter: 5 (In use: 0)
Payload Size: 192
Framing: Unframed
CEM Defects Set
None

Signalling: No CAS
RTP: No RTP

Ingress Pkts: 11060  Dropped: 0
Egress Pkts: 11061  Dropped: 0

CEM Counter Details
Input Errors: 0  Output Errors: 0
Pkts Missing: 0  Pkts Reordered: 0
Misorder Drops: 0  JitterBuf Underrun: 0
Error Sec: 0  Sevly Errored Sec: 0
Unavailable Sec: 0  Failure Counts: 0
Pkt Malformed: 0  JitterBuf Overrun: 0

* show cem circuit summary — Displays the number of circuits which are up or down per interface basis.

Router# show cem circuit summary

<table>
<thead>
<tr>
<th>CEM Int.</th>
<th>Total Active</th>
<th>Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM0/1/0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Associated Commands**

The following commands are used to configure pseudowire:

<table>
<thead>
<tr>
<th>Commands</th>
<th>URL</th>
</tr>
</thead>
</table>
Additional References for Configuring Pseudowire

Related Documents

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco IOS commands</td>
<td>Cisco IOS Master Commands List, All Releases</td>
</tr>
</tbody>
</table>

Standards and RFCs

<table>
<thead>
<tr>
<th>Standard/RFC</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>—</td>
<td>There are no standards and RFCs for this feature.</td>
</tr>
</tbody>
</table>

MIBs

<table>
<thead>
<tr>
<th>MIB</th>
<th>MIBs Link</th>
</tr>
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<tbody>
<tr>
<td>—</td>
<td>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></td>
</tr>
</tbody>
</table>

Technical Assistance

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<tr>
<th>Description</th>
<th>Link</th>
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<tbody>
<tr>
<td>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.</td>
<td><a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a></td>
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