

N:1 PVC Mapping to PWE with Nonunique VPIs

The N:1 PVC Mapping to PseudoWire Emulation (PWE) with Nonunique virtual path identifiers (VPIs) feature maps one or more ATM permanent virtual circuits (PVCs) to a single pseudowire (PW). There are two modes of AAL0 encapsulation, N:1 and 1:1 mapping. In N:1 mapping, multiple unrelated virtual path identifier/virtual channel identifier (VPI/VCI) are carried over a single Multiprotocol Label Switching (MPLS) PW. This is an efficient mapping method because less resources are used from the MPLS network. In 1:1 mapping, a single VPI/VCI is carried over a single MPLS PW. Benefits of this feature include the following:

- Aggregate quality of service (QoS) can be applied to related PVCs.
- Bandwidth is conserved with the reduction in the number of pseudowires that are used.

- Restrictions for N:1 PVC Mapping to PWE with Nonunique VPIs, on page 1
- Information About N:1 PVC Mapping to PWE with Nonunique VPIs, on page 2
- How to Configure N:1 PVC Mapping to PWE with Nonunique VPIs, on page 2
- Configuration Examples for N:1 PVC Mapping to PWE with Nonunique VPIs, on page 7
- Additional References, on page 8
- Feature Information for N:1 PVC Mapping to PWE with Nonunique VPIs, on page 9

Restrictions for N:1 PVC Mapping to PWE with Nonunique VPIs

- N:1 permanent virtual circuits (PVC) mapping configuration is supported only on multipoint subinterfaces; it is not supported on main interfaces or point-to-point subinterfaces.
- N:1 PVC mapping mode is not supported on Access Circuit Redundancy subinterfaces.
- Preconfigured PVCs cannot exist on the multipoint subinterface on which you want to configure N:1 PVC mapping.
- An attachment circuit that has been bound to a pseudowire cannot be removed unless all Layer 2 virtual circuits (VCs) have been removed.
- Layer 3 PVCs cannot be configured on N:1 subinterfaces.
- Cell packing values configured under a VC class attached to the PVC, main interface, or subinterface will not be inherited by N:1 PVCs.
- Operation, Administration, and Maintenance (OAM) functionality is not supported on N:1 Layer 2 PVCs. OAM cells coming from the customer edge (CE) network will be treated as normal data traffic and will traverse through the pseudowire.

- Only ATM adaptation layer type 0 (AAL0) encapsulation is supported for N:1 PVCs.
- The service policy configuration can be configured only at the subinterface level for N:1 PVCs.

Information About N:1 PVC Mapping to PWE with Nonunique VPIs

N:1 PVC Mapping to PWE with Nonunique VPIs Feature Description

To transport ATM cells over Multiprotocol Label Switching (MPLS), a VC is established between the provider edge (PE) routers on both ends of the MPLS backbone. With the N:1 permanent virtual circuit (PVC) Mapping to PseudoWire Emulation (PWE) with Nonunique VPIs feature, multiple PVCs irrespective of their Virtual Path Identifiers (VPIs), are transported over a single pseudowire configured on a subinterface. ("N:1" refers to the number of PVCs transported over one pseudowire). ATM cells are packed together in a single frame and sent over the single pseudowire. The ATM cell header information is packed together with the cell payload on a per-cell basis in the packets so that packets received at the egress end are unpacked and the ATM cells are mapped to the respective PVCs.

In N:1 PVC mapping mode, the device can pack cells only from a single PVC in an MPLS packet to transmit over a pseudowire; cells from multiple PVCs cannot be packed in a single MPLS packet and mapped to a single pseudowire for transmission. However, if a device receives an MPLS packet that is packed with cells from multiple PVCs, then those cells will be unpacked and sent to the respective PVCs.

How to Configure N:1 PVC Mapping to PWE with Nonunique VPIs

Configuring N:1 PVC Mapping to PWE with Nonunique VPIs

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *slot/subslot/port*
4. **atm mcpt-timers** *timer1 timer2 timer3*
5. **exit**
6. **configure terminal**
7. **interface atm** *slot/subslot/port.subslot* **multipoint**
8. **no ip address**
9. **atm enable-ilmi-trap**
10. **cell-packing** *maxcells* **mcpt-timer** *timer-number*
11. **xconnect** *peer-ipaddress vc-id* **encapsulation mpls**
12. **pvc** *vpi/vci* **l2transport**

13. Repeat Step 12 for the number of PVCs that you want to configure.
14. **end**

DETAILED STEPS

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 atm** *slot/subslot/port* **Example:** `Device(config)# interface atm 9/1/1`	Enables the ATM interface and enters interface configuration mode.
Step 4	**atm mcpt-timers** *timer1 timer2 timer3* **Example:** `Device(config-if)# atm mcpt-timers 100 200 300`	Sets the Maximum Cell Packing Timeout (MCPT) values in microseconds. • The MCPT timer sets the time for which the device waits for the raw cells (AAL0 encapsulation) to be packed into a single packet for punting to the pseudowire.
Step 5	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode.
Step 6	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 7	**interface atm** *slot/subslot/port.subslot* **multipoint** **Example:** `Device(config)# interface atm 9/1/1.1 multipoint`	Enters subinterface configuration mode and creates a multipoint subinterface on the given port on the specified ATM Shared Port Adapter (SPA).
Step 8	**no ip address** **Example:** `Device(config-subif)# no ip address`	Removes the interface IP address.

	Command or Action	Purpose
Step 9	**atm enable-ilmi-trap** **Example:** `Device(config-subif)# atm enable-ilmi-trap`	Generates an Integrated Local Management Interface (ILMI) atmfVccChange trap when an ATM interface or subinterface is enabled or shut down.
Step 10	**cell-packing** *maxcells* **mcpt-timer** *timer-number* **Example:** `Device(config-subif)# cell-packing 20 mcpt-timer 2`	Enables ATM over MPLS to pack multiple ATM cells into each MPLS packet within the MCPT timing.
Step 11	**xconnect** *peer-ipaddress vc-id* **encapsulation mpls** **Example:** `Device(config-subif)# xconnect 10.1.1.1 100 encapsulation mpls`	(Optional) Enables the attachment circuit and specifies the IP address of the peer, a VC ID, and the data encapsulation method.
Step 12	**pvc** *vpi/vci* **l2transport** **Example:** `Device(config-subif)# pvc 10/100 l2transport`	Assigns a VPI and virtual channel identifier (VCI).
Step 13	Repeat Step 12 for the number of PVCs that you want to configure.	—
Step 14	**end** **Example:** `Device(config-subif)# end`	Exits subinterface configuration mode and returns to privileged EXEC mode.

Configuring N:1 PVC Mapping to PWE with Nonunique VPIs using the commands associated with the L2VPN Protocol-Based CLIs feature

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *slot/subslot/port*
4. **atm mcpt-timers** *timer1 timer2 timer3*
5. **exit**
6. **configure terminal**
7. **interface atm** *slot/subslot/portt.subslot* **multipoint**
8. **no ip address**
9. **atm enable-ilmi-trap**
10. **cell-packing** *maxcells* **mcpt-timer** *timer-number*
11. **end**
12. **interface pseudowire** *number*
13. **encapsulation mpls**

14. **neighbor** *peer-address vcid-value*
15. **exit**
16. **l2vpn xconnect context** *context-name*
17. **member pseudowire** *interface-number*
18. **member gigabitethernet** *interface-number*
19. **end**
20. **pvc** *vpi*/*vci* **l2transport**
21. Repeat Step 12 for the number of PVCs that you want to configure.
22. **end**

DETAILED STEPS

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 atm** *slot*/*subslot*/*port* **Example:** `Device(config)# interface atm 9/1/1`	Enables the ATM interface and enters interface configuration mode.
Step 4	**atm mcpt-timers** *timer1 timer2 timer3* **Example:** `Device(config-if)# atm mcpt-timers 100 200 300`	Sets the Maximum Cell Packing Timeout (MCPT) values in microseconds. • The MCPT timer sets the time for which the device waits for the raw cells (AAL0 encapsulation) to be packed into a single packet for punting to the pseudowire.
Step 5	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode.
Step 6	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 7	**interface atm** *slot*/*subslot*/*portt.subslot* **multipoint** **Example:** `Device(config)# interface atm 9/1/1.1 multipoint`	Enters subinterface configuration mode and creates a multipoint subinterface on the given port on the specified ATM Shared Port Adapter (SPA).

	Command or Action	Purpose
Step 8	**no ip address** **Example:** `Device(config-subif)# no ip address`	Removes the interface IP address.
Step 9	**atm enable-ilmi-trap** **Example:** `Device(config-subif)# atm enable-ilmi-trap`	Generates an Integrated Local Management Interface (ILMI) atmfVccChange trap when an ATM interface or subinterface is enabled or shut down.
Step 10	**cell-packing** *maxcells* **mcpt-timer** *timer-number* **Example:** `Device(config-subif)# cell-packing 20 mcpt-timer 2`	Enables ATM over MPLS to pack multiple ATM cells into each MPLS packet within the MCPT timing.
Step 11	**end** **Example:** `Router(config-subif)# end`	Exits to privileged EXEC mode.
Step 12	**interface pseudowire** *number* **Example:** `Router(config)# interface pseudowire 100`	Specifies the pseudowire interface and enters interface configuration mode.
Step 13	**encapsulation mpls** **Example:** `Router(config-if)# encapsulation mpls`	Specifies that Multiprotocol Label Switching (MPLS) is used as the data encapsulation method.
Step 14	**neighbor** *peer-address vcid-value* **Example:** `Router(config-if)# neighbor 10.1.1.1 100`	Specifies the peer IP address and virtual circuit (VC) ID value of the Layer 2 VPN (L2VPN) pseudowire.
Step 15	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode.
Step 16	**l2vpn xconnect context** *context-name* **Example:** `Router(config)# l2vpn xconnect context con1`	Creates a Layer 2 VPN (L2VPN) cross connect context and enters xconnect configuration mode.
Step 17	**member pseudowire** *interface-number* **Example:** `Router(config-xconnect)# member pseudowire 100`	Specifies a member pseudowire to form a Layer 2 VPN (L2VPN) cross connect.

	Command or Action	Purpose
Step 18	**member gigabitethernet** *interface-number* **Example:** `Router(config-xconnect)# member GigabitEthernet0/0/0.1`	Specifies the location of the Gigabit Ethernet member interface.
Step 19	**end** **Example:** `Router(config-xconnect)# end`	Exits to privileged EXEC mode.
Step 20	**pvc** *vpi*/*vci* **l2transport** **Example:** `Device(config-subif)# pvc 10/100 l2transport`	Assigns a VPI and virtual channel identifier (VCI).
Step 21	Repeat Step 12 for the number of PVCs that you want to configure.	—
Step 22	**end** **Example:** `Device(config-subif)# end`	Exits subinterface configuration mode and returns to privileged EXEC mode.

Configuration Examples for N:1 PVC Mapping to PWE with Nonunique VPIs

Example: Configuring N:1 PVC Mapping to PWE with Nonunique VPIs

The following example shows how to configure the N:1 ATM permanent virtual circuit (PVC) mapping to pseudowires with non unique virtual path identifiers (VPIs):

```
Device> enable
Device# configure terminal
Device(config)# interface atm 9/1/1
Device(config-if)# atm mcpt-timers 500 5000 50000
Device(config-if)# exit
Device# configure terminal
Device(config)# interface atm 9/1/1.1 multipoint
Device(config-subif)# no ip address
Device(config-subif)# atm enable-ilmi-trap
Device(config-subif)# cell packing 20 mcpt-timer 2
Device(config-subif)# xconnect 10.1.1.1 100 encapsulation mpls
Device(config-subif)# pvc 10/100 l2transport
Device(config-subif)# pvc 11/122 l2transport
Device(config-subif)# pvc 19/231 l2transport
Device(config-subif)# end
```

Example: Configuring N:1 PVC Mapping to PWE with Nonunique VPIs using the commands associated with the L2VPN Protocol-Based CLIs feature

The following example shows how to configure the N:1 ATM permanent virtual circuit (PVC) mapping to pseudowires with non unique virtual path identifiers (VPIs):

```
Device> enable
Device# configure terminal
Device(config)# interface atm 9/1/1
Device(config-if)# atm mcpt-timers 500 5000 50000
Device(config-if)# exit
Device(config)# configure terminal
Device(config)# interface atm 9/1/1.1 multipoint
Device(config-subif)# no ip address
Device(config-subif)# atm enable-ilmi-trap
Device(config-subif)# cell packing 20 mcpt-timer 2
Device(config-subif)# exit
Device(config)#interface pseudowire 100
Device(config-if)#encapsulation mpls
Device(config-if)#neighbor 10.1.1.1 100
Device(config-if)# pvc 10/100 l2transport
Device(config-if)# pvc 11/122 l2transport
Device(config-if)# pvc 19/231 l2transport
Device(config-if)# exit
Device(config)#l2vpn xconnect context A
Router(config-xconnect)#member pseudowire 100
Device(config-xconnect)#member atm 9/1/1
Device(config-xconnect)# end
```

Additional References

Related Documents

Related Topic	Document Title
ATM commands	Asynchronous Transfer Mode Command Reference

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for N:1 PVC Mapping to PWE with Nonunique VPIs

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.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for N:1 PVC Mapping to PWE with Nonunique VPIs

Feature Name	Releases	Feature Information
N:1 PVC Mapping to PWE with Nonunique VPIs	Cisco IOS XE Release 3.7S	The N:1 PVC Mapping to PWE with Nonunique VPIs feature maps one or more ATM PVCs to a single pseudowire. In Cisco IOS XE Release 3.7S, support was added for Cisco ASR 903 Routers. The following command was introduced by this feature: **show atm cell-packaging** .