



## 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.



**Note** This is not applicable for Cisco ASR 900 RSP3 Module.

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## 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.
- ATM N:1 and PVP modes cannot be configured on different subinterfaces that belong to a physical interface.
- You cannot change the ATM interface mode from point-to-point to multipoint or from multipoint to point-to-point.
- If you change a layer 2 ATM interface to a layer 3 ATM interface, traffic will not flow.

## 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

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> enable	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> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>interface atm slot/subslot/port</b> <b>Example:</b> Device(config)# interface atm 9/1/1	Enables the ATM interface and enters interface configuration mode.
<b>Step 4</b>	<b>atm mcpt-timers timer1 timer2 timer3</b> <b>Example:</b> Device(config-if)# atm mcpt-timers 100 200 300	Sets the Maximum Cell Packing Timeout (MCPT) values in microseconds. <ul style="list-style-type: none"><li>• 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.</li></ul>
<b>Step 5</b>	<b>exit</b> <b>Example:</b> Device(config-if)# exit	Exits interface configuration mode.
<b>Step 6</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 7</b>	<b>interface atm slot/subslot/port.subslot multipoint</b> <b>Example:</b> 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).
<b>Step 8</b>	<b>no ip address</b> <b>Example:</b>	Removes the interface IP address.

	Command or Action	Purpose
	Device(config-subif)# no ip address	
<b>Step 9</b>	<b>atm enable-ilmi-trap</b> <b>Example:</b> Device(config-subif)# atm enable-ilmi-trap	Generates an Integrated Local Management Interface (ILMI) atmVccChange trap when an ATM interface or subinterface is enabled or shut down.
<b>Step 10</b>	<b>cell-packing maxcells mcpt-timer timer-number</b> <b>Example:</b> 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.
<b>Step 11</b>	<b>xconnect peer-ipaddress vc-id encapsulation mpls</b> <b>Example:</b> 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.
<b>Step 12</b>	<b>pvc vpi/vci l2transport</b> <b>Example:</b> Device(config-subif)# pvc 10/100 l2transport	Assigns a VPI and virtual channel identifier (VCI).
<b>Step 13</b>	Repeat Step 12 for the number of PVCs that you want to configure.	—
<b>Step 14</b>	<b>end</b> <b>Example:</b> 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

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> enable	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> Device# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
<b>Step 3</b>	<b>interface atm</b> <i>slot/subslot/port</i> <b>Example:</b> Device(config)# interface atm 9/1/1	Enables the ATM interface and enters interface configuration mode.
<b>Step 4</b>	<b>atm mcpt-timers</b> <i>timer1 timer2 timer3</i> <b>Example:</b> Device(config-if)# atm mcpt-timers 100 200 300	Sets the Maximum Cell Packing Timeout (MCPT) values in microseconds. <ul style="list-style-type: none"> <li>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.</li> </ul>
<b>Step 5</b>	<b>exit</b> <b>Example:</b> Device(config-if)# exit	Exits interface configuration mode.
<b>Step 6</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 7</b>	<b>interface atm</b> <i>slot/subslot/port.subslot multipoint</i> <b>Example:</b> 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).
<b>Step 8</b>	<b>no ip address</b> <b>Example:</b> Device(config-subif)# no ip address	Removes the interface IP address.
<b>Step 9</b>	<b>atm enable-ilmi-trap</b> <b>Example:</b> Device(config-subif)# atm enable-ilmi-trap	Generates an Integrated Local Management Interface (ILMI) atmVccChange trap when an ATM interface or subinterface is enabled or shut down.
<b>Step 10</b>	<b>cell-packing</b> <i>maxcells mcpt-timer timer-number</i> <b>Example:</b> 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.
<b>Step 11</b>	<b>end</b> <b>Example:</b> Router(config-subif)# end	Exits to privileged EXEC mode.

	Command or Action	Purpose
<b>Step 12</b>	<b>interface pseudowire</b> <i>number</i> <b>Example:</b>  Router(config)# interface pseudowire 100	Specifies the pseudowire interface and enters interface configuration mode.
<b>Step 13</b>	<b>encapsulation mpls</b> <b>Example:</b>  Router(config-if)# encapsulation mpls	Specifies that Multiprotocol Label Switching (MPLS) is used as the data encapsulation method.
<b>Step 14</b>	<b>neighbor</b> <i>peer-address vcid-value</i> <b>Example:</b>  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.
<b>Step 15</b>	<b>exit</b> <b>Example:</b>  Router(config-if)# exit	Exits interface configuration mode.
<b>Step 16</b>	<b>l2vpn xconnect context</b> <i>context-name</i> <b>Example:</b>  Router(config)# l2vpn xconnect context con1	Creates a Layer 2 VPN (L2VPN) cross connect context and enters xconnect configuration mode.
<b>Step 17</b>	<b>member pseudowire</b> <i>interface-number</i> <b>Example:</b>  Router(config-xconnect)# member pseudowire 100	Specifies a member pseudowire to form a Layer 2 VPN (L2VPN) cross connect.
<b>Step 18</b>	<b>member gigabitethernet</b> <i>interface-number</i> <b>Example:</b>  Router(config-xconnect)# member GigabitEthernet0/0/0.1	Specifies the location of the Gigabit Ethernet member interface.
<b>Step 19</b>	<b>end</b> <b>Example:</b>  Router(config-xconnect)# end	Exits to privileged EXEC mode.
<b>Step 20</b>	<b>pvc</b> <i>vpi/vci l2transport</i> <b>Example:</b>	Assigns a VPI and virtual channel identifier (VCI).

	Command or Action	Purpose
	Device(config-subif)# pvc 10/100 l2transport	
<b>Step 21</b>	Repeat Step 12 for the number of PVCs that you want to configure.	—
<b>Step 22</b>	<b>end</b> <b>Example:</b> 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 0/1/0
Device(config-if)# atm mcpt-timers 500 5000 50000
Device(config-if)# exit
Device# configure terminal
Device(config)# interface atm 0/1/0.1 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):

```
Router> enable
Router# configure terminal
Router(config)# interface atm 0/1/1
Router(config-if)# atm mcpt-timers 500 5000 50000
Router(config-if)# exit
Router(config)# configure terminal
Router(config)# interface atm 0/1/1.1 multipoint
Router(config-subif)# no ip address
```

```

Router(config-subif)# atm enable-ilmi-trap
Router(config-subif)# cell packing 20 mcpt-timer 2
Router(config-subif)# exit
Router(config)#interface pseudowire 100
Router(config-if)# encapsulation mpls
Router(config-if)# neighbor 10.1.1.1 100
Router(config-if)# pvc 10/100 l2transport
Router(config-if)# pvc 11/122 l2transport
Router(config-if)# pvc 19/231 l2transport
Router(config-if)# exit
Router(config)# l2vpn xconnect context A
Router(config-xconnect)# member pseudowire 100
Router(config-xconnect)# member atm 9/1/1
Router(config-xconnect)# end

```

## Verifying the N:1 PVC Mapping to PWE with Nonunique VPIs Configuration

To verify the N:1 PVC Mapping to PWE with Nonunique VPIs Configuration, use the **show mpls l2transport vc** command in user EXEC or privileged EXEC mode.

```
Router# show mpls l2transport vc
```

```

-----
Local intf      Local circuit          Dest address          VC ID      Status
-----
ATM0/1/1.1     ATM CELL ATM0/1/1.1   2.2.2.2             100        UP

```

```

interface ATM0/0/0.1/1/1/1
atm mcpt-timers 20 30 40

```

```

interface ATM0/0/0.1/1/1/1.1 multipoint
no ip address
no atm enable-ilmi-trap
cell-packing 2 mcpt-timer 1
xconnect 2.2.2.2 100 encapsulation mpls
pvc 10/100 l2transport
pvc 20/200 l2transport
pvc 30/300 l2transport

```

## Additional References

### Related Documents

Related Topic	Document Title
ATM commands	<a href="#">Asynchronous Transfer Mode Command Reference</a>



**Technical Assistance**

<b>Description</b>	<b>Link</b>
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