



## Information About AAL5 L3 Termination

*Table 1: Feature History*

Feature Name	Release Information	Description
AAL5 Layer 3 termination on OC-12 Interface Module	Cisco IOS XE Cupertino 17.7.1	Supports AAL5 Layer 3 termination on OC-12 interface of the A900-IMA40S interface module:  You can configure Layer 2 QoS and protocol IP broadcast on OC-12 ATM Layer 3 interface.  With the OC-12 support, you can use full bandwidth on one port. This enables you to create up to 252 connections on port 0.

When ATM feature is enabled, IMs can be deployed for ATM service that delivers high-performance interconnectivity, metro, and intra-point of presence (POP) applications between service POPs for IP/Multiprotocol Label Switching (IP/MPLS) transport (Figure 1).

AAL5 L3 termination can also be deployed at customer premises equipment (CPE) to provide the data component for the service provider networks. The ATM service allows service providers to effectively manage the bandwidth at the edges of the network while implementing value-added Layer 3 service.

Starting with Cisco IOS XE Cupertino 17.7.1, on RSP2 module, you can configure AAL5 L3 termination on the OC-12 interface for A900-IMA40S interface module.

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## Restrictions for AAL5 L3 Termination

- Main interface cannot be configured as layer 3 Asynchronous Transfer Mode (ATM) interface. Therefore you cannot create layer 3 Permanent Virtual Circuits (PVC) under main interface.
- Point-to-multipoint sub-interface is *not* supported.
- Quadrature Amplitude Modulation (QAM) is *not* supported on ATM L3 Interface.
- Operations, administration, and maintenance (OAM) is *not* supported on ATM L3 interface.
- You *cannot* swap from layer 2 transport ATM to layer 3 ATM interface without deleting ATM sub-interface.
- ATM layer 3 Permanent Virtual Path (PVP) is *not* supported.
- Inverse Multiplexing for ATM is *not* supported.
- ATM adaptation layer 5 Subnetwork Access Protocol SNAP (AAL5SNAP) protocol is supported. AAL0 is *not* supported.
- ATM L3 QoS is *not* supported.
- One port of an interface module (IM) supports only one interface configuration. For example, one OC-3 port can support one of the following configurations and not a combination of configurations:
  - CEM (CESoP or SAToP)
  - ATM
  - IMA
  - DS3

Different interface configurations can be configured on different ports of the same IM.

- Half-duplex VRF is *not* supported on this router.

## Scale Supported for AAL5 L3 Termination

- IMs:
  - A900-IMA16D: The 16 port T1/E1 card supports a maximum of 350 virtual circuits (VCs per port and on the T1/E1).
  - A900-IMA40S: Only 900 VCs can be configured per OC3 IM. 500 VCs are supported in per port on the OC-3 IM.
- Up to 4000 layer 3 interfaces, including Serial interfaces, can be configured.

## How to Configure AAL5 L3 Termination

### Configuring Layer 3 Terminated VCs

A VC is a point-to-point connection between two ATM devices. A VC is established for each ATM end node with which the router communicates. The characteristics of the VC are established when it is created and include the following for the time-division multiplexing (TDM) IMs:

- AAL mode

- Encapsulation type logical link controller (LLC)/SNAP

PVCs configured on the router remain active until the circuit is removed from the configuration. All virtual circuit characteristics apply to PVCs. When a PVC is configured, all configuration options are passed to the TDM IMs. These PVCs are written to the nonvolatile RAM (NVRAM) as part of the configuration and are used when the Cisco IOS image is reloaded.

When you create a PVC, you create a virtual circuit descriptor (VCD) and attach it to the VPI and VCI. The VCD tells the card which VPI/VCI to use for a particular packet. The TDM IM card requires this feature to manage the packets for transmission. The number chosen for the VCD is independent of the virtual path identifier/virtual channel identifier (VPI/VCI) used.

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **controller {t1 | e1} slot/bay/port**
4. **atm**
5. **interface atm interface-number [subinterface-number point-to-point]**
6. **ip address ip-addressip-address-mask**
7. **pvc [name] vpi | vci**
8. **encapsulation aal5snap**
9. **end**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b> <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b> <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.
Step 3	<b>controller {t1   e1} slot/bay/port</b> <b>Example:</b> Router(config)# <b>controller t1 0/1/0</b>	Specifies the controller that you want to configure. <ul style="list-style-type: none"> <li>• <b>t1</b>—Specifies the T1 controller.</li> <li>• <b>e1</b>—Specifies the E1 controller.</li> <li>• <b>slot</b>—Chassis slot number, which is always 0.</li> <li>• <b>bay</b>—Card interface bay number in a slot. The range is from 0 to 5.</li> <li>• <b>port</b>—Port or interface number. The range is from 0 to 7 for Gigabit Ethernet.</li> </ul>

	Command or Action	Purpose
<b>Step 4</b>	<b>atm</b> <b>Example:</b> <pre>Router(config-controller)# atm</pre>	Provisions an interface to function with ATM capabilities.
<b>Step 5</b>	<b>interface atm interface-number [.subinterface-number point-to-point]</b> <b>Example:</b> OC-3 interface <pre>Router(config-controller)# interface atm0/1/0.10 point-to-point</pre> <b>Example:</b> OC-12 interface <pre>Router(config-controller)# interface atm0/1/0.1/1/1.1 point-to-point</pre>	Specifies an ATM point-to-point sub-interface. <ul style="list-style-type: none"> <li>• <i>interface-number</i>—Specifies a (physical) ATM interface.</li> <li>• <i>subinterface-number</i>—(Optional) Specifies a subinterface number for OC-3 interface. A dot (.) must be used to separate the interface-number from the subinterface-number (for example 2/0.1).  <i>subinterface-number</i>—(Optional) Specifies a subinterface number for OC-12 interface. A dot (.) must be used to separate the interface-number from the subinterface-number (For OC-12 STM4, the subinterface is 0/1/0.1/1/1.1.).</li> <li>• <b>point-to-point</b>—(Optional) Specifies point-to-point as the interface type for which a subinterface is to be created.</li> </ul>
<b>Step 6</b>	<b>ip address ip-addressip-address-mask</b> <b>Example:</b> <pre>Router(config-subif)# ip-address 192.168.0.1 255.255.255.0</pre>	Configures an IP address on the sub-interface. <ul style="list-style-type: none"> <li>• <i>ip-address</i>—Specifies a the IP address.</li> <li>• <i>ip-address-mask</i>— Specifies a the IP address mask.</li> </ul>
<b>Step 7</b>	<b>pvc [name] vpi   vci</b> <b>Example:</b> <pre>Router(config-subif)# pvc 10/100</pre>	Configures the PVC. <ul style="list-style-type: none"> <li>• <b>name</b>—(Optional) The name of the PVC or map. The name can be up to 15 characters long.</li> <li>• <i>vpi</i>—ATM network virtual path identifier (VPI) for this PVC. The absence of the "/" and a vpi value defaults the vpi value to 0. A value that is out of range is interpreted as a string and is treated as the connection ID.</li> <li>• <i>vci</i>—ATM network virtual channel identifier (VCI) for this PVC. This value ranges from 0 to 1 less than the maximum value set for this interface by the atm vc-per-vp. command. Typically, lower values 0 to 31 are reserved for specific traffic (for example, F4 OAM, SVC signalling, ILMI, and so on) and should <i>not</i> be used. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single link, not throughout the ATM network, because it has</li> </ul>

	Command or Action	Purpose
		<p>local significance only. A value that is out of range causes an unrecognized command error message.</p> <p>The arguments vpi and vci cannot both be set to 0; if one is 0, the other cannot be 0.</p>
<b>Step 8</b>	<p><b>encapsulation aal5snap</b></p> <p><b>Example:</b></p> <pre>Router(config-if-atm-vc) # encapsulation aal5snap</pre>	Specifies AAL5 SNAP for ATM encapsulation on the PVC.
<b>Step 9</b>	<p><b>end</b></p> <p><b>Example:</b></p> <pre>Router(config-if-atm-vc) # end</pre>	Returns to privileged EXEC mode.

## Configuring Layer2 QoS on the ATM Interface

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **controller {t1 | e1slot/bay/port}**
4. **atm**
5. **interfaceinterface-number atm [.subinterface-number point-to-point]**
6. **ip address ip-address ip-address-mask**
7. **pvc [name] vpi | vci**
8. Do one of the following:
  - **ubroutput-pcr [input-pcr]**
  - **cbrrate**
  - **vbr-rt peak-rate average-rate burst**
  - **vbr-nrt output-pcr output-scr output-maxburstsize**
  - **ubr+output-pcr output-mcr [input-pcr] [input-mcr]**
9. **encapsulation aal5snap**
10. **end**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<p><b>enable</b></p> <p><b>Example:</b></p> <pre>Router&gt; enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>

	Command or Action	Purpose
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>controller {t1   e1slot/bay/port}</b> <b>Example:</b> Router (config)# <b>controller t1 0/1/0</b>	Specifies the controller that you want to configure. <ul style="list-style-type: none"> <li>• <b>t1</b>—Specifies the T1 controller.</li> <li>• <b>e1</b>—Specifies the E1 controller.</li> <li>• <i>slot</i>—Chassis slot number, which is always 0.</li> <li>• <i>bay</i>—Card interface bay number in a slot. The range is from 0 to 5.</li> <li>• <i>port</i>—Port or interface number. The range is from 0 to 7 for Gigabit Ethernet.</li> </ul>
<b>Step 4</b>	<b>atm</b> <b>Example:</b> Router (config-controller)# <b>atm</b>	Provisions an interface to function with ATM capabilities.
<b>Step 5</b>	<b>interfaceinterface-number atm [.subinterface-number point-to-point]</b> <b>Example:</b> Router (config-controller)# <b>interface atm0/1/0.10 point-to-point</b> <b>Example:</b> OC-12 interface Router (config-controller)# <b>interface atm 0/1/0.1/1/1/1.1 point-to-point</b>	Specifies an ATM point-to-point sub-interface. <ul style="list-style-type: none"> <li>• <i>interface-number</i>—Specifies a (physical) ATM interface.</li> <li>• <i>subinterface-number</i>—(Optional) Specifies a subinterface number. A dot (.) must be used to separate the interface-number from the subinterface-number (for example 2/0.1).</li> <li>• <i>subinterface-number</i>—(Optional) Specifies a subinterface number for OC-12 interface. A dot (.) must be used to separate the interface-number from the subinterface-number (For OC-12 STM4, the subinterface is 0/1/0.1/1/1/1.1).</li> <li>• <b>point-to-point</b>—(Optional) Specifies point-to-point as the interface type for which a subinterface is to be created.</li> </ul>
<b>Step 6</b>	<b>ip address ip-address ip-address-mask</b> <b>Example:</b> Router (config-subif)# <b>ip-address 192.168.0.1 255.255.255.0</b>	Configures an IP address on the sub-interface.
<b>Step 7</b>	<b>pvc [name] vpi   vci</b>	Configures the PVC.

	Command or Action	Purpose
	<p><b>Example:</b></p> <pre>Router(config-subif)# pvc 10/100</pre>	<ul style="list-style-type: none"> <li>• <b>name</b>—(Optional) The name of the PVC or map. The name can be up to 15 characters long.</li> <li>• <b>vpi</b>—ATM network virtual path identifier (VPI) for this PVC. The absence of the "/" and a vpi value defaults the vpi value to 0. A value that is out of range is interpreted as a string and is treated as the connection ID.</li> <li>• <b>vci</b>—ATM network virtual channel identifier (VCI) for this PVC. This value ranges from 0 to 1 less than the maximum value set for this interface by the atm vc-per-vp command. Typically, lower values 0 to 31 are reserved for specific traffic (for example, F4 OAM, SVC signalling, ILMI, and so on) and should not be used. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single link, not throughout the ATM network, because it has local significance only. A value that is out of range causes an unrecognized command error message.</li> </ul> <p>The arguments vpi and vci cannot both be set to 0; if one is 0, the other cannot be 0.</p>
<p><b>Step 8</b></p>	<p>Do one of the following:</p> <ul style="list-style-type: none"> <li>• <b>ubr</b><i>output-pcr</i> [<i>input-pcr</i>]</li> <li>• <b>cbr</b><i>rate</i></li> <li>• <b>vbr-rt</b> <i>peak-rate average-rate burst</i></li> <li>• <b>vbr-nrt</b> <i>output-pcr output-scr output-maxburstsize</i></li> <li>• <b>ubr+</b><i>output-pcr output-mcr</i> [<i>input-pcr</i>] [<i>input-mcr</i>]</li> </ul> <p><b>Example:</b></p> <pre>Router(config-subif)# ubr 100</pre> <p><b>Example:</b></p> <pre>Router(config-subif)# cbr 1000</pre> <p><b>Example:</b></p> <pre>Router(config-subif)# vbr-rt 1000 600 20</pre> <p><b>Example:</b></p> <pre>Router(config-subif)# vbr-rt 1500 1000 10</pre> <p><b>Example:</b></p> <pre>Router(config-subif)# ubr+ 1000 100</pre>	<ul style="list-style-type: none"> <li>• Configure unspecified bit rate (UBR) quality of service (QoS) and specify the output peak cell rate (PCR) for an ATM permanent virtual circuit (PVC), PVC range. <ul style="list-style-type: none"> <li>• <i>output-pcr</i>—Output peak cell rate (PCR) in kilobytes per second (kbps).</li> <li>• <i>input-pcr</i>—(Optional for SVCs only) The input PCR in kbps. If this value is omitted, the value of <i>input-pcr</i> argument will equal the value of <i>output-pcr</i> argument.</li> </ul> </li> <li>• Configure the constant bit rate (CBR) for the ATM circuit emulation service (CES) for an ATM permanent virtual circuit (PVC). <ul style="list-style-type: none"> <li>• <i>rate</i>—Constant bit rate (also known as the average cell rate) for ATM CES.</li> </ul> </li> <li>• Configures the real-time variable bit rate (VBR) for VoATM voice connections. <ul style="list-style-type: none"> <li>• <i>peak-rate</i>—Peak information rate (PIR) for the voice connection, in kilobytes per second (kbps). If it does not exceed your carrier's line rate, set it to the line rate. Range is from 56 to 10000.</li> </ul> </li> </ul>

	Command or Action	Purpose
		<ul style="list-style-type: none"> <li>• <i>average-rate</i>—Average information rate (AIR) for the voice connection, in kbps.</li> <li>• <i>burst</i>—Burst size, in number of cells.</li> <li>• Configures the variable bit rate-nonreal time (VBR-NRT) quality of service (QoS) for an ATM permanent virtual circuit (PVC). <ul style="list-style-type: none"> <li>• <i>output-pcr</i>—output PCR, in kilobytes per second (kbps).</li> <li>• <i>output-scr</i>—Output SCR, in kbps.</li> <li>• <i>output-maxburstsize</i>—The output maximum burst cell size, expressed in number of cells.</li> </ul> </li> <li>• Configures unspecified bit rate (UBR) quality of service (QoS) for an ATM permanent virtual circuit (PVC). <ul style="list-style-type: none"> <li>• <i>output-pcr</i>—Output peak cell rate (PCR) in kbps.</li> <li>• <i>output-mcr</i>—Output minimum guaranteed cell rate in kbps.</li> <li>• <i>input-pcr</i>—(Optional for SVCs only) The input PCR in kbps.</li> <li>• <i>input-mcr</i>—(Optional for SVCs only) The input minimum guaranteed cell rate in kbps.</li> </ul> </li> </ul>
<b>Step 9</b>	<b>encapsulation aal5snap</b> <b>Example:</b> <pre>Router(config-if-atm-vc)# encapsulation aal5snap</pre>	Specifies AAL5 SNAP for ATM encapsulation on the PVC.
<b>Step 10</b>	<b>end</b> <b>Example:</b> <pre>Router(config-if-atm-vc)# end</pre>	Returns to privileged EXEC mode.

## Configuring Protocol IP Broadcast on ATM L3 Interface

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **controller {t1 | e1} slot/bay/port**



4. **atm**
5. **interface** *interface-number atm* [*.subinterface-number point-to-point*]
6. **ip address** *ip-address ip-address-mask*
7. **pvc** [*name*] *vpi | vci*
8. **protocol ip** *protocol-address broadcast*
9. **encapsulation aal5snap**
10. **end**

## 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>controller</b> { <b>t1</b>   <b>e1</b> } <i>slot/bay/port</i> <b>Example:</b> <pre>Router(config)# controller t1 0/1/0</pre>	Specifies the controller that you want to configure. <ul style="list-style-type: none"> <li>• <b>t1</b>—Specifies the T1 controller.</li> <li>• <b>e1</b>—Specifies the E1 controller.</li> <li>• <i>slot</i>—Chassis slot number, which is always 0.</li> <li>• <i>bay</i>—Card interface bay number in a slot. The range is from 0 to 5.</li> <li>• <i>port</i>—Port or interface number. The range is from 0 to 7 for Gigabit Ethernet.</li> </ul>
<b>Step 4</b>	<b>atm</b> <b>Example:</b> <pre>Router(config-controller)# atm</pre>	Provisions an interface to function with ATM capabilities.
<b>Step 5</b>	<b>interface</b> <i>interface-number atm</i> [ <i>.subinterface-number point-to-point</i> ] <b>Example:</b> <pre>Router(config-controller)# interface atm 0/1/0.10 point-to-point</pre> <b>Example:</b> OC-12 interface	Specifies an ATM point-to-point sub-interface. <ul style="list-style-type: none"> <li>• <i>interface-number</i>—Specifies a (physical) ATM interface.</li> <li>• <i>subinterface-number</i>—(Optional) Specifies a subinterface number. A dot (.) must be used to separate the interface-number from the subinterface-number (for example 2/0.1).</li> </ul>

	Command or Action	Purpose
	<pre>Router(config-controller) # interface atm 0/1/0.1/1/1/1.1 point-to-point</pre>	<ul style="list-style-type: none"> <li>• <b>subinterface-number</b>—(Optional) Specifies a subinterface number for OC-12 interface. A dot (.) must be used to separate the interface-number from the subinterface-number (For OC-12 STM4, the subinterface is 0/1/0.1/1/1/1.1).</li> <li>• <b>point-to-point</b>—(Optional) Specifies point-to-point as the interface type for which a subinterface is to be created.</li> </ul>
<b>Step 6</b>	<p><b>ip address</b> <i>ip-address ip-address-mask</i></p> <p><b>Example:</b></p> <pre>Router(config-subif) # ip-address 192.168.0.1 255.255.255.0</pre>	Configures an IP address on the sub-interface.
<b>Step 7</b>	<p><b>pvc</b> [<i>name</i>] <i>vpi</i>   <i>vci</i></p> <p><b>Example:</b></p> <pre>Router(config-subif) # pvc 10/100</pre>	<p>Configures the PVC.</p> <ul style="list-style-type: none"> <li>• <b>name</b>—(Optional) The name of the PVC or map. The name can be up to 15 characters long.</li> <li>• <b>vpi</b>—ATM network virtual path identifier (VPI) for this PVC. The absence of the "/" and a vpi value defaults the vpi value to 0. A value that is out of range is interpreted as a string and is treated as the connection ID.</li> <li>• <b>vci</b>—ATM network virtual channel identifier (VCI) for this PVC. This value ranges from 0 to 1 less than the maximum value set for this interface by the atm vc-per-vp command. Typically, lower values 0 to 31 are reserved for specific traffic (for example, F4 OAM, SVC signalling, ILMI, and so on) and should not be used. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single link, not throughout the ATM network, because it has local significance only. A value that is out of range causes an "unrecognized command" error message.</li> </ul> <p>The arguments vpi and vci cannot both be set to 0; if one is 0, the other cannot be 0.</p>
<b>Step 8</b>	<p><b>protocol ip</b> <i>protocol-address</i> <b>broadcast</b></p> <p><b>Example:</b></p> <pre>Router(config-subif) # protocol ip 192.168.0.2 broadcast</pre>	<p>Configures a static map for an ATM permanent virtual circuit (PVC), switched virtual circuit (SVC), or virtual circuit (VC) class.</p> <ul style="list-style-type: none"> <li>• <b>protocol-address</b>—remote end circuit IP being mapped to same PVC.</li> </ul>

	Command or Action	Purpose
<b>Step 9</b>	<b>encapsulation aal5snap</b> <b>Example:</b> Router(config-if-atm-vc)# <b>encapsulation aal5snap</b>	Specifies AAL5 SNAP for ATM encapsulation on the PVC.
<b>Step 10</b>	<b>end</b> <b>Example:</b> Router(config-if-atm-vc)# <b>end</b>	Returns to privileged EXEC mode.

## Configuring VRF Enabled ATM L3 Interface

Virtual Routing and Forwarding (VRF) is an IP technology that allows multiple instances of a routing table to exist in the same router at the same time. VRF can be enabled on ATM L3 interface.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **controller {t1 | e1} slot/bay/port**
4. **atm**
5. **interface interface-numberatm [.subinterface-number point-to-point]**
6. **ip vrf forwarding vrf-name**
7. **ip addressip-address ip-address-mask**
8. **no atm enable-ilmi-trap**
9. **pvc [name]vpi | vci**
10. **encapsulation aal5snap**
11. **end**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• E Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>controller {t1   e1} slot/bay/port</b> <b>Example:</b>	Specifies the controller that you want to configure. <ul style="list-style-type: none"> <li>• <b>t1</b>—Specifies the T1 controller.</li> </ul>

	Command or Action	Purpose
	<pre>Router(config)# controller t1 0/1/0</pre>	<ul style="list-style-type: none"> <li>• <b>e1</b>—Specifies the E1 controller.</li> <li>• <i>slot</i>—Chassis slot number, which is always 0.</li> <li>• <i>bay</i>—Card interface bay number in a slot. The range is from 0 to 5.</li> <li>• <i>port</i>—Port or interface number. The range is from 0 to 7 for Gigabit Ethernet.</li> </ul>
<b>Step 4</b>	<p><b>atm</b></p> <p><b>Example:</b></p> <pre>Router(config-controller)# atm</pre>	Provisions an interface to function with ATM capabilities.
<b>Step 5</b>	<p><b>interface interface-number atm [.subinterface-number point-to-point]</b></p> <p><b>Example:</b></p> <pre>Router(config-controller)# interface atm0/1/0.10 point-to-point</pre> <p>OC-12 interface</p> <pre>Router(config-controller)# interface atm 0/1/0.1/1/1.1 point-to-point</pre>	<p>Specifies an ATM point-to-point sub-interface.</p> <ul style="list-style-type: none"> <li>• <i>interface-number</i>—Specifies a (physical) ATM interface.</li> <li>• <i>subinterface-number</i>—(Optional) Specifies a subinterface number. A dot (.) must be used to separate the interface-number from the subinterface-number (for example 2/0.1).</li> <li>• <i>subinterface-number</i>—(Optional) Specifies a subinterface number for OC-12 interface. A dot (.) must be used to separate the interface-number from the subinterface-number (For OC-12 STM4, the subinterface is 0/1/0.1/1/1.1).</li> <li>• <b>point-to-point</b>—(Optional) Specifies point-to-point as the interface type for which a subinterface is to be created.</li> </ul>
<b>Step 6</b>	<p><b>ip vrf forwarding vrf-name</b></p> <p><b>Example:</b></p> <pre>Router(config-controller)# ip vrf forwarding VPN_A</pre>	<p>Associates a Virtual Private Network (VPN) routing and forwarding (VRF) instance with an interface or subinterface</p> <ul style="list-style-type: none"> <li>• <i>vrf-name</i>—Associates the interface with the specified VRF.</li> </ul>
<b>Step 7</b>	<p><b>ip address ip-address ip-address-mask</b></p> <p><b>Example:</b></p> <pre>Router(config-subif)# ip-address 192.168.0.1 255.255.255.0</pre>	Configures an IP address on the sub-interface.
<b>Step 8</b>	<p><b>no atm enable-ilmi-trap</b></p> <p><b>Example:</b></p>	Disables the ILMI traps.

	Command or Action	Purpose
	<code>Router(config-subif)# no atm enable-ilmi-trap</code>	
<b>Step 9</b>	<p><b>pvc</b> [<b>name</b>]<i>vpi</i>   <i>vci</i></p> <p><b>Example:</b></p> <pre>Router(config-subif)# pvc 10/100</pre>	<p>Configures the PVC.</p> <ul style="list-style-type: none"> <li>• <b>name</b>—(Optional) The name of the PVC or map. The name can be up to 15 characters long.</li> <li>• <i>vpi</i>—ATM network virtual path identifier (VPI) for this PVC. The absence of the "/" and a vpi value defaults the vpi value to 0. A value that is out of range is interpreted as a string and is treated as the connection ID.</li> <li>• <i>vci</i>—ATM network virtual channel identifier (VCI) for this PVC. This value ranges from 0 to 1 less than the maximum value set for this interface by the <code>atm vc-per-vp</code> command. Typically, lower values 0 to 31 are reserved for specific traffic (for example, F4 OAM, SVC signalling, ILMI, and so on) and should not be used. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single link, not throughout the ATM network, because it has local significance only. A value that is out of range causes an unrecognized command error message.</li> </ul> <p>The arguments <code>vpi</code> and <code>vci</code> cannot both be set to 0; if one is 0, the other cannot be 0.</p>
<b>Step 10</b>	<p><b>encapsulation aal5snap</b></p> <p><b>Example:</b></p> <pre>Router(config-if-atm-vc)# encapsulation aal5snap</pre>	Specifies AAL5 SNAP for ATM encapsulation on the PVC.
<b>Step 11</b>	<p><b>end</b></p> <p><b>Example:</b></p> <pre>Router(config-if-atm-vc)# end</pre>	Returns to privileged EXEC mode.

## Configuration Examples for AAL5 L3 Termination

### Example: Configuring SONET mode on OC-3 IM

```
Router(config)# controller sonet 3/1/0
Router(config-controller)# framing sonet
Router(config-controller)# sts-1 1
Router(config-ctrlr-sts)# vtg 1 t1 1 atm
```

**Example: Configuring SDH mode on OC-3 IM**

```

Router(config)# interface ATM3/1/0.1/1/1.1 point-to-point
Router(config-subif)# ip address 192.0.1.5 255.255.255.0
Router(config-subif)# pvc 10/100
Router(cfg-if-atm-vc)# encapsulation aal5snap
Router(cfg-if-atm-vc)#

```

**Example: Configuring SDH mode on OC-3 IM**

```

Router(config)# controller sdh 0/1/0
Router(config-controller)# framing sdh
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 1
Router(config-ctrlr-tug3)# tug-2 1 e1 1 atm
Router(config)# interface ATM0/0/0.1/1/1.2 point-to-point
Router(config-subif)# ip address 192.0.2.3 255.255.255.0
Router(config-subif)# pvc 10/100
Router(cfg-if-atm-vc)# encapsulation aal5snap
Router(cfg-if-atm-vc)#

```

**Example: Configuring Layer2 QoS**

```

interface ATM0/3/2.1/1/1.101 point-to-point

pvc 20/101
ubr 100
encapsulation aal5snap
!
End
interface ATM1/1/0.1/1/1.102 point-to-point
ip address 192.0.2.1 255.255.255.0

pvc 20/102
cbr 1000
encapsulation aal5snap
interface ATM1/1/0.1/1/1.102 point-to-point
ip address 192.0.2.1 255.255.255.0

pvc 20/102
vbr-rt 1000 600 20
encapsulation aal5snap
interface ATM1/1/0.1/1/1.102 point-to-point
ip address 192.0.2.1 255.255.255.0

pvc 20/102
vbr-nrt 1500 1000 10
encapsulation aal5snap
interface ATM1/1/0.1/1/1.102 point-to-point
ip address 192.0.2.1 255.255.255.0

pvc 20/102
ubr+ 1000 100
encapsulation aal5snap

```

**Example: Configuring Protocol IP Broadcast in the Layer3 ATM Interface**

```

interface ATM0/3/2.1/1/1.200 point-to-point
ip address 192.168.1.2 255.255.255.0

```

```

no atm enable-ilmi-trap
pvc 200/10
    protocol ip 192.168.1.2 broadcast -----(remote end IP)
!
End

```

## Example: Configuring VRF Enabled ATM L3 Interface

```

ip vrf VPN_A
rd 100:1
route-target export 100:1
route-target import 100:1
interface ATM0/3/2.1/1/1.200 point-to-point
ip vrf forwarding VPN_A
ip address 10.0.0.1 255.255.255.0
no atm enable-ilmi-trap
pvc 200/10
!
End
Router# ping vrf VPN_A 11.12.13.14 -----(Remote end IP)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.1, timeout is 2 seconds:
!!!!

```

## Verifying AAL5 L3 Termination

- Use the **show atm pvc** command to display all ATM PVCs and traffic information:

### OC-3 Interface

```

Router# show atm pvc
Keys: C = ATM0/4/0.1/1/1, B = ATM0/4/2.1/1/1,
      VCD /
Interface Name          VPI  VCI  Type  Encaps  SC    Kbps  Av/Min  Burst  St
C.1       1             180  181  PVC   SNAP    UBR   1536             UP
B.1       1             180  181  PVC   AAL5    UBR   1536             UP

```

### OC-12 Interface

```

Router# show atm pvc
Keys: C = ATM0/5/0.1/1/2/3, B = ATM0/5/0.1/1/2/2, D = ATM0/5/0.1/1/2/1,
      VCD /
Interface Name          VPI  VCI  Type  Encaps  SC    Kbps  Av/Min  Burst  St
C.1       1             180  181  PVC   SNAP    UBR   1536             UP
B.1       1             180  181  PVC   AAL5    UBR   1536             UP
D.1       1             1     4    PVC   SNAP    UBR   1984             UP

```

- Use the **show interfaces ATM** command to display information about the ATM interface:

### OC-3 Interface

```

Router# show interfaces ATM0/4/0.1/1/1.1
ATM0/4/0.1/1/1.1 is up, line protocol is up
Hardware is A900-IMA40S, address is 0022.bddd.d4c0 (bia 0022.bddd.d4c0)
Internet address is 192.168.0.1/24
MTU 4470 bytes, BW 1536 Kbit/sec, DLY 100 usec,
    reliability 255/255, txload 129/255, rxload 129/255

```

```

Encapsulation ATM
Keepalive not supported
 13551261 packets input, 731768094 bytes
 13551227 packets output, 731766258 bytes
  0 OAM cells input, 0 OAM cells output
AAL5 CRC errors : 0
AAL5 SAR Timeouts : 0
AAL5 Oversized SDUs : 0
AAL5 length violation : 0
Last clearing of "show interface" counters never

```

## OC-12 Interface

```

PE1#sh int ATM0/5/0.1/1/1/1.1
ATM0/5/0.1/1/1/1.1 is up, line protocol is up
  Hardware is A900-IMA40S, address is f41f.c2ad.2d2d (bia f41f.c2ad.2d2d)
  Internet address is 192.68.1.2/24
  MTU 4470 bytes, BW 1984 Kbit/sec, DLY 100 usec,
    reliability 255/255, txload 201/255, rxload 201/255
  Encapsulation ATM
  Keepalive not supported
    200405982 packets input, 100603802489 bytes
    200416938 packets output, 100609302401 bytes
    0 OAM cells input, 0 OAM cells output
  AAL5 CRC errors : 0
  AAL5 SAR Timeouts : 0
  AAL5 Oversized SDUs : 0
  AAL5 length violation : 0
  Last clearing of "show interface" counters never

```

- Use the **show atm pvc interface atm interface-number** command to display all PVCs on the specified interface or sub-interface:

```

Router# show atm pvc interface atm 0/4/0.1/1/1.1
Key:  C = ATM0/4/0.1/1/1
      VCD /
Interface Name          VPI  VCI Type  Encaps  SC    Peak Av/Min Burst
C.1         1           180  181 PVC   SNAP    UBR   1536  Kbps Kbps Cells St

```

- Use the **show atm map** command to display the protocol IP broadcast on the ATM interface:

```

Router# show atm map
Map list ATM0/3/2.1/1/1.200pvcC8000A : PERMANENT
ip 191.168.1.14 maps to VC 5, VPI 200, VCI 10, ATM0/3/2.1/1/1.200
, broadcast

```

# Additional References

## Related Documents

Related Topic	Document Title
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>
ATM commands	Cisco IOS Asynchronous Transfer Mode Command Reference



**MIBs**

<b>MIB</b>	<b>MIBs Link</b>
<ul style="list-style-type: none"><li>• Cisco PVC trap MIB - CISCO-IETF-ATM2-PVCTRAP-MIB</li></ul>	To locate and download MIBs for selected platforms, Cisco software 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>

