



Doc. No. 78-5012-03

Catalyst 5000 Series ATM Switching Modules Configuration Note

Product Numbers: WS-X5153(=), WS-X5154(=), WS-X5155(=), WS-X5156(=), WS-X5157(=), WS-X5158(=), WS-X5161(=), WS-X5162(=), WS-X5166(=), WS-X5167(=), WS-X5168(=)

This configuration note contains instructions on how to install and configure the Catalyst 5000 series ATM switching modules.

For a complete description of commands used to configure and maintain Catalyst 5000 series switches, refer to the *Catalyst 5000 Series Software Configuration Guide* and the *Catalyst 5000 Series Command Reference* publication. For complete switch hardware configuration and maintenance procedures, refer to the *Catalyst 5000 Series Installation Guide*. For information on Catalyst 5000 series switching modules, refer to the *Catalyst 5000 Series Module Installation Guide*. These documents are available on the Cisco Connection Documentation, Enterprise Series CD, or in print.

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Catalyst 5000 Series Switches

Catalyst 5000 series switches include the Catalyst 5002, the Catalyst 5000, the Catalyst 5505, and the Catalyst 5500. Throughout this configuration note, and all Catalyst 5000 series documents, *Catalyst 5000 series switches* refers to all of the Catalyst 5000 series switches, unless otherwise noted.

Table 1 lists and describes the Catalyst 5000 series switches. The Ethernet and Fast Ethernet, Copper Distributed Data Interface (CDDI), Fiber Distributed Data Interface (FDDI), ATM modules, and Token Ring Module are described in the *Catalyst 5000 Series Module Installation Guide*.

Note The Route Switch Module (RSM), a router module that runs standard Cisco IOS software, provides multiprotocol routing for Ethernet interfaces in Catalyst 5000 series switches. For more information on the RSM, see the *Catalyst 5000 Series Switch Route Switch Module Installation and Configuration Note*.

Table 1 Catalyst 5000 Series Switches

Switch	Description	Features
Catalyst 5002	2-slot switch	<ul style="list-style-type: none">• Supports Supervisor Engines I, II, and III• Supports 1 additional switching module (Ethernet, Fast Ethernet, CDDI/FDDI,¹ ATM,² or Token Ring)• Supports standard redundant AC- and DC-input power supplies
Catalyst 5000	5-slot switch	<ul style="list-style-type: none">• Supports Supervisor Engines I, II, and III• Supports up to 4 additional switching modules (Ethernet, Fast Ethernet, CDDI/FDDI, ATM, and Token Ring)• Supports the RSM³ and RSM/VIP2⁴ modules• Supports optional redundant AC- or DC-input power supplies

Table 1 Catalyst 5000 Series Switches (Continued)

Switch	Description	Features
Catalyst 5505	5-slot switch	<ul style="list-style-type: none"> • Supports Supervisor Engines II and III • Supports up to 4 additional modules (Ethernet, Fast Ethernet, CDDI/FDDI, ATM, and Token Ring) • Supports the RSM and RSM/VIP2 modules • Supports redundant supervisor engines (Supervisor Engines II and III), with like supervisor engines only • Supports optional redundant AC- or DC-input power supplies
Catalyst 5500	13-slot switch	<ul style="list-style-type: none"> • Supports Supervisor Engines II and III • Supports up to 11 additional switching modules (Ethernet, Fast Ethernet, CDDI/FDDI, ATM, Token Ring, and LightStream 1010 port adapters⁵) • Supports the RSM and RSM/VIP2 modules • Supports redundant supervisor engines (Supervisor Engines II and III), with like supervisor engines only • Supports optional redundant AC- or DC-input power supplies

1. CDDI/FDDI=Copper Distributed Data Interface/Fiber Distributed Data Interface

2. ATM=Asynchronous Transfer Mode

3. RSM=Route Switch Module

4. VIP2=Versatile Interface Processor 2

5. If LightStream 1010 port adapter are installed in the Catalyst 5500 switch, you must install an ATM Switch Processor (ASP) module in slot 13. Slot 13 does not support any other type of module.

Note Supervisor Engine II requires Catalyst 5000 series software release 2.2(1) or greater.
Supervisor Engine III requires software release 3.1(1) or greater.

ATM Switching Modules

Table 2 lists and describes the ATM switching modules.

Table 2 **ATM Switching Modules**

Model Number	Module Name	Description
WS-X5153	ATM LANE Single PHY Module (UTP)	Direct connection between the 155-Mbps ATM network, the Catalyst 5000 series switch, Category 5 UTP cables, and one RJ-45 connector
WS-X5155	ATM LANE Single PHY Module (MMF)	Direct connection between the 155-Mbps ATM network, the Catalyst 5000 series switch, and one multimode, SC fiber-optic connector
WS-X5154	ATM LANE Single PHY Module (SMF)	Direct connection between the 155-Mbps ATM network, the Catalyst 5000 series switch, and one single-mode, SC fiber-optic connector
WS-X5156	ATM LANE Dual PHY Module (UTP)	Two direct connections between the ATM network, the Catalyst 5000 series switch, Category 5 UTP cables, and two RJ-45 connectors
WS-X5158	ATM LANE Dual PHY Module (MMF)	Two direct connections between the ATM network, the Catalyst 5000 series switch, multimode fiber-optic cable, and two multimode, SC fiber-optic connectors
WS-X5157	ATM LANE Dual PHY Module (SMF)	Two direct connections between the ATM network, the Catalyst 5000 series switch, single-mode fiber-optic cable, and two single-mode SC fiber-optic connectors
WS-X5161	ATM Dual PHY OC-12 Module (MMF)	Two direct connections between the OC-12 (622-Mbps) ATM network, the Catalyst 5000 series switch, multimode fiber-optic cable, and two multimode, SC fiber-optic connectors
WS-X5162	ATM Dual PHY OC-12 Module (SMF)	Two direct connections between the OC-12 (622-Mbps) ATM network, the Catalyst 5000 series switch, single-mode fiber-optic cable, and two single-mode, SC fiber-optic connectors
WS-X5166	ATM Dual PHY DS3 Module	Two DS3 (45 Mbps) connections between the ATM network, the Catalyst 5000 series switch, 75-ohm RG-59 coaxial cable, and two bayonet-style twist-lock (BNC) connectors
WS-X5167	ATM Dual PHY OC-3 Module (MMF)	Two direct connections between the OC-3 (155-Mbps) ATM network, the Catalyst 5000 series switch, multimode fiber-optic cable, and two multimode, SC fiber-optic connectors
WS-X5168	ATM Dual PHY OC-3 Module (SMF)	Two direct connections between the OC-3 (155-Mbps) ATM network, the Catalyst 5000 series switch, single-mode fiber-optic cable, and two single-mode, SC fiber-optic connectors

ATM Switching Module LEDs

Table 3 lists and describes the ATM LANE, ATM dual PHY OC-12, ATM dual PHY OC-3, and ATM dual PHY DS3 module LEDs.

Note Each ATM module contains a STATUS LED. When on, this LED indicates that the module is powered up and operational. It does not necessarily mean that the interface ports are functional or enabled.

Table 3 ATM LANE and ATM DS3 Module LEDs

LED	Description
STATUS	The switch performs a series of self-tests and diagnostic tests. If all the tests pass, the LED is green. If a test other than an individual port test fails, the LED is red. During system boot or if the module is disabled, the LED is orange. During self-test diagnostics, the LED is orange. If the module is disabled, the LED is orange.
TX (Transmit)	When a port is transmitting a packet, the LED is green; otherwise, it is off.
RX (Receive)	When a port is receiving a packet, the LED is green; otherwise, it is off.
ACTIVE ¹	When green, the port is active. If the LED is off, the port is the standby port.
SIGNAL ²	When on, the LED indicates that an OC-3 or OC-12 signal is being received on the optical port.
LINK	Displays the link integrity status of an ATM port. If the integrity is good, the LED is green. If the link integrity is bad, the LED is off.

1. Applies to dual PHY modules only

2. Applies to ATM dual PHY OC-3 and ATM dual PHY OC-12 modules only

ATM Switching Module Specifications

This section lists the specifications for the Catalyst 5000 series ATM LANE, ATM dual PHY OC-3, ATM dual PHY OC-12, and ATM dual PHY DS3 modules.

Standards Compliance

Catalyst 5000 series ATM switching modules, when installed in a Catalyst 5000 series system, comply with the standards listed in Table 4.

Table 4 Standards Compliance

Specification	Description	Module
Compliance:	CE Marking	WS-X5153, WS-X5155, WS-X5154, WS-X5156, WS-X5158, WS-X5157, WS-X5161, WS-X5162, WS-X5166, WS-X5167, WS-X5168
Safety	UL ¹ 1950, CSA ² -C22.2 No. 950, EN ³ 60950, IEC ⁴ 950, TS ⁵ 001, AS/NZS ⁶ 3260	WS-X5153, WS-X5155, WS-X5154, WS-X5156, WS-X5158, WS-X5157, WS-X5161, WS-X5162, WS-X5166, WS-X5167, WS-5168
EMI ⁷	FCC ⁸ Class A (47 CFR, Part 15), ICES ⁹ -003 Class A, EN 55022 Class A, CISPR22 Class A, AS/NZS 3548 Class A, and VCCI ¹⁰ Class A with UTP ¹¹ cables	WS-X5153, WS-X5155, WS-X5154, WS-X5156, WS-X5158, WS-X5157, WS-X5161, WS-X5162, WS-X5167, WS-X5168
	EN 55022 Class B; CISPR22 Class B, AS/NZS 3590 Class B, and VCCI Class B with STP ¹² cables	WS-X5153, WS-X5155, WS-X5154, WS-X5156, WS-X5158, WS-X5157, WS-X5161, WS-X5162, WS-X5167, WS-X5168

1. UL = Underwriters Laboratories
2. CSA = Canadian Standards Association
3. EN = Europäische Norm
4. IEC = International Electrotechnical Commission
5. TS = Technical Standard
6. AS/NZS = Australian/New Zealand Standard
7. EMI = electromagnetic interference
8. FCC = Federal Communications Commission
9. ICES = Interference-Causing Equipment Standard
10. VCCI = Voluntary Control Council for Information Technology Equipment
11. UTP = unshielded twisted-pair
12. STP = shielded twisted-pair

The ATM dual PHY DS3 module (WS-X5166) also meets Japan Approvals Institute for Telecommunications Equipment (JATE) approval:

Applicant name:	Nihon Cisco Systems
Model number:	WS-X5166
Approval number:	N98-N316-0
Date of approval:	March 18, 1998

Specifications for ATM LAN Emulation and DS3 Modules

Table 5 lists the specifications for the following ATM modules:

- ATM LANE module (multimode fiber)—single PHY and dual PHY—WS-X5155 and WS-X5158
- ATM LANE module (single-mode fiber)—single PHY and dual PHY—WS-X5154 and WS-5157
- ATM LANE module (UTP)—single PHY and dual PHY—WS-X5153 and WS-X5156
- ATM Dual PHY OC-12 module (multimode fiber)—WS-X5161
- ATM Dual PHY OC-12 module (single-mode fiber)—WS-X5162
- ATM Dual PHY DS3 module—WS-X5166
- ATM Dual PHY OC-3 module (multimode fiber)—WS-X5167
- ATM Dual PHY OC-3 module (single-mode fiber)—WS-X5168

Table 5 ATM LANE Modules Specifications

Specification	Description
Dimensions (H x W x D)	1.18 x 15.51 x 16.34 in. (30 x 394 x 415 mm)
Weight	Minimum: 3 lb (1.36 kg) Maximum: 5 lb (2.27 kg)
Environmental Conditions:	
Operating temperature	32 to 104°F (0 to 40°C)
Nonoperating temperature	-40 to 167°F (-40 to 75°C)
Humidity	10 to 90%, noncondensing
Connectors	Multimode fiber-optic: SC Single-mode fiber-optic: SC Category 5 UTP: ¹ RJ-45 BNC (bayonet style, twist lock) RJ-45 DIAG PORT ² (WS-X5161, WS-X5162, WS-X5167, and WS-X5168 only)

Table 5 ATM LANE Modules Specifications (Continued)

Specification	Description
Memory:	
RAM buffer	192 KB per interface (512 KB for WS-X5161, WS-X5162, WS-X5167, and WS-X5168)
Flash	4 MB
DRAM ³	16 MB (16 or 32 MB for WS-X5161, WS-X5162, WS-X5167, and WS-X5168)
EPROM ⁴	512 KB
NVRAM ⁵	128 KB (512 KB for WS-X5161, WS-X5162, WS-X5167, and WS-X5168)
Maximum station-to-station cabling distance	Multimode fiber: 1.2 miles (2 km) Single-mode fiber: 6.2 miles (10 km) Category 5 UTP: ⁶ 328 ft (100 m) Coaxial cable (DS3): 450 ft (137 m)
Frame-to-cell conversion	AAL ⁷ ₅ , 4096 virtual circuits, 255 concurrent reassembly
DS3 Module only:	
Data Rate	44,736 Mbps
Line Encoding	B3ZS
Framing	C-bit parity, optionally PLCP ⁸ with M23, otherwise ADM (ATM framing)
Timing	Primary and secondary 8-kHz reference from internal (default) or network
Loopbacks	Transmit and receive
Impedance	75 ohms nominal

Table 5 ATM LANE Modules Specifications (Continued)

Specification	Description
ATM standards	RFC 1483 LLC ⁹ SNAP ¹⁰ Bridging Encapsulation (PVC ¹¹); ATM Forum LANE v1.0 LEC ¹² , LECS ¹³ , LES ¹⁴ , BUS ¹⁵ ; UNI ¹⁶ 3.0/3.1, Q.2931 signaling protocols; ILMI ¹⁷
Network management	Cisco Discovery Protocol; SNMP ¹⁸ MIB ¹⁹ II (RFC 1213); AToM MIB (RFC 1695); LEC MIB (ATM Forum LANE v1.0); Cisco Workgroup Stack MIB; Cisco VTP ²⁰ MIB; Cisco LECS; LES/BUS MIB; ILMI MIB

1. UTP=unshielded twisted-pair
2. DIAG PORT connector is for manufacturing use only
3. DRAM=dynamic random-access memory
4. RPROM=erasable programmable read-only memory
5. NVRAM=nonvolatile random-access memory
6. UTP=unshielded twisted-pair
7. AAL = ATM adaptation layer
8. PLCP = physical layer convergence procedure
9. LLC = Logical Link Control
10. SNAP = Subnetwork Access Protocol
11. PVC = permanent virtual connection
12. LEC = LAN Emulation Client
13. LECS = LAN Emulation Configuration Server
14. LES = LAN Emulation Server
15. BUS = broadcast and unknown server
16. UNI=user-network interface
17. ILMI=Interim Local Management Interface
18. SNMP = Simple Network Management Protocol
19. MIB = Management Information Base
20. VTP = VLAN Trunk Protocol

Safety Guidelines

Safety warnings appear throughout this configuration note in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement.

Example Warning Definition

This section describes the warning symbol used in this note.



Warning This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the appendix “Translated Safety Warnings” in the *Catalyst 5000 Series Module Installation Guide*.

Waarschuwing Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. (Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het aanhangsel “Translated Safety Warnings” (Vertalingen van veiligheidsvoorschriften) in de installatiegids die bij dit toestel is ingesloten, raadplegen.

Varoitus Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. (Tässä julkaisussa esiintyvien varoitusten käännökset löydät tämän laitteen mukana olevan asennusoppaan liitteestä "Translated Safety Warnings" (käännetyt turvallisuutta koskevat varoitukset).)

Attention Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures. Avant d'accéder à cet équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures courantes de prévention des accidents. Pour obtenir les traductions des mises en garde figurant dans cette publication, veuillez consulter l'annexe intitulée « Translated Safety Warnings » (Traduction des avis de sécurité) dans le guide d'installation qui accompagne cet appareil.

Warnung Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. (Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Anhang mit dem Titel “Translated Safety Warnings” (Übersetzung der Warnhinweise) in der diesem Gerät beiliegenden Installationsanleitung.)

Avvertenza Questo simbolo di avvertenza indica un pericolo. Si è in una situazione che può causare infortuni. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nell'appendice, "Translated Safety Warnings" (Traduzione delle avvertenze di sicurezza), del manuale d'installazione che accompagna questo dispositivo.

Advarsel Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. (Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i vedlegget "Translated Safety Warnings" [Oversatte sikkerhetsadvarsler] i installasjonsveiledningen som ble levert med denne enheten.)

Aviso Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. (Para ver as traduções dos avisos que constam desta publicação, consulte o apêndice "Translated Safety Warnings" - "Traduções dos Avisos de Segurança", no guia de instalação que acompanha este dispositivo).

Advertencia Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. (Para ver traducciones de las advertencias que aparecen en esta publicación, consultar el apéndice titulado "Translated Safety Warnings," en la guía de instalación que se acompaña con este dispositivo.)

Varning! Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. (Se förklaringar av de varningar som förekommer i denna publikation i appendix "Translated Safety Warnings" [Översatta säkerhetsvarningar] i den installationshandbok som medföljer denna anordning.)

Ensuring Safety

Use the following guidelines to ensure your safety and protect the equipment. This list does not include all potentially hazardous situations during installation, so *be alert*.

Note Power supplies in the Catalyst 5002 switch do not have on/off switches.



Warning Only trained and qualified personnel should install or replace this equipment.

- Always turn all power supplies off (the position marker zero), and unplug all power cords before installing or removing a chassis.
- Keep the chassis area clear and free of dust during and after installation.
- Keep tools and chassis components off the floor and away from foot traffic.
- Avoid wearing jewelry and securely fasten any loose clothing that could get caught in the chassis.



Warning Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.



Warning Ultimate disposal of this product should be handled according to all national laws and regulations.

Following Basic Electrical Safety Guidelines

When working with electrical equipment, exercise these basic safety guidelines:

- Never install equipment that appears to be damaged.
- Locate the emergency power-off switch for the room in which you are working before beginning any procedures that require access to the chassis interior.
- Disconnect all power and external cables before installing or removing a chassis.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Examine your work area carefully for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.



Warning Do not work on the system or connect or disconnect cables during periods of lightning activity.

Following Telephone Wiring and Network Cabling Safety Rules

Use the following safety rules when working with any equipment that is disconnected from a power source but still connected to telephone wiring or other network cabling:

- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage occurs when electronic boards or components are improperly handled. ESD can result in complete or intermittent failures of electronic components. Guidelines for preventing ESD damage are as follows:

- Always use an antistatic wrist or ankle strap and ensure that it makes good skin contact. For the Catalyst 5002 switch, use the type shown in Figure 1. For the Catalyst 5000 switch, use one of the two types of antistatic wrist straps shown in Figure 2. For the Catalyst 5500 switch, use the type shown in Figure 3.
- If you use the wrist strap with an alligator clip, connect the alligator clip to one of the captive installation screws on the chassis, an installed module, or a power supply. If you use the wrist strap with a banana-plug connector, insert the banana-plug connector into the grounding receptacle on the rear of the chassis. See Figure 1, Figure 2, and Figure 3.

Figure 1 Placement of ESD Wrist Strap on the Catalyst 5002 Switch

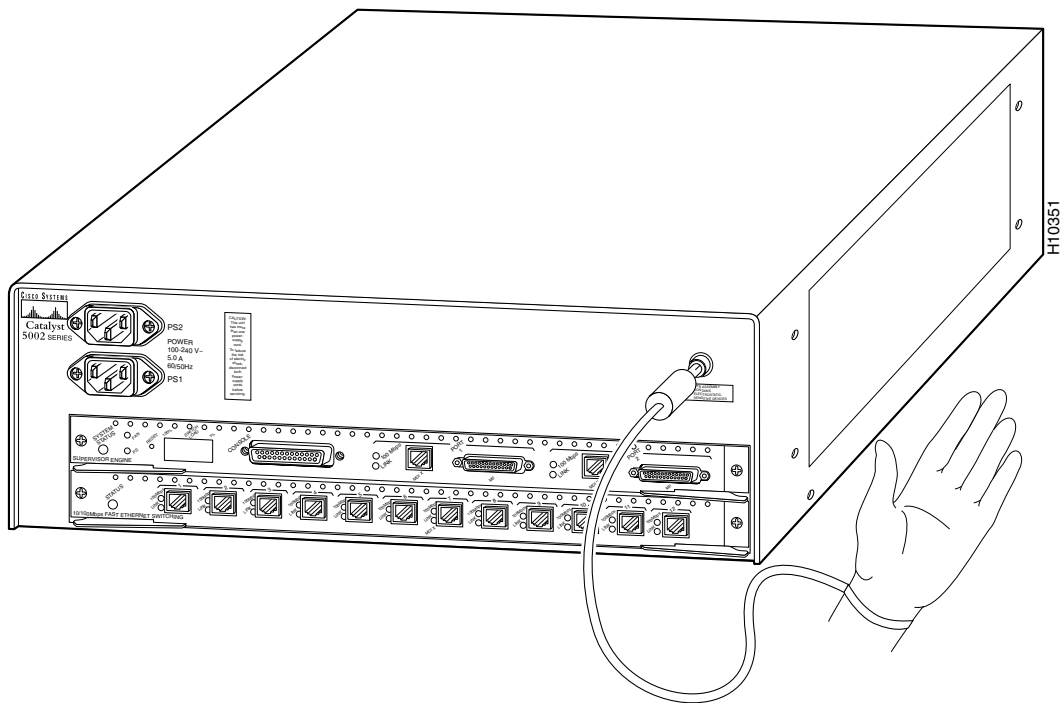


Figure 2 Types and Placement of ESD Wrist Straps on the Catalyst 5000 Switch

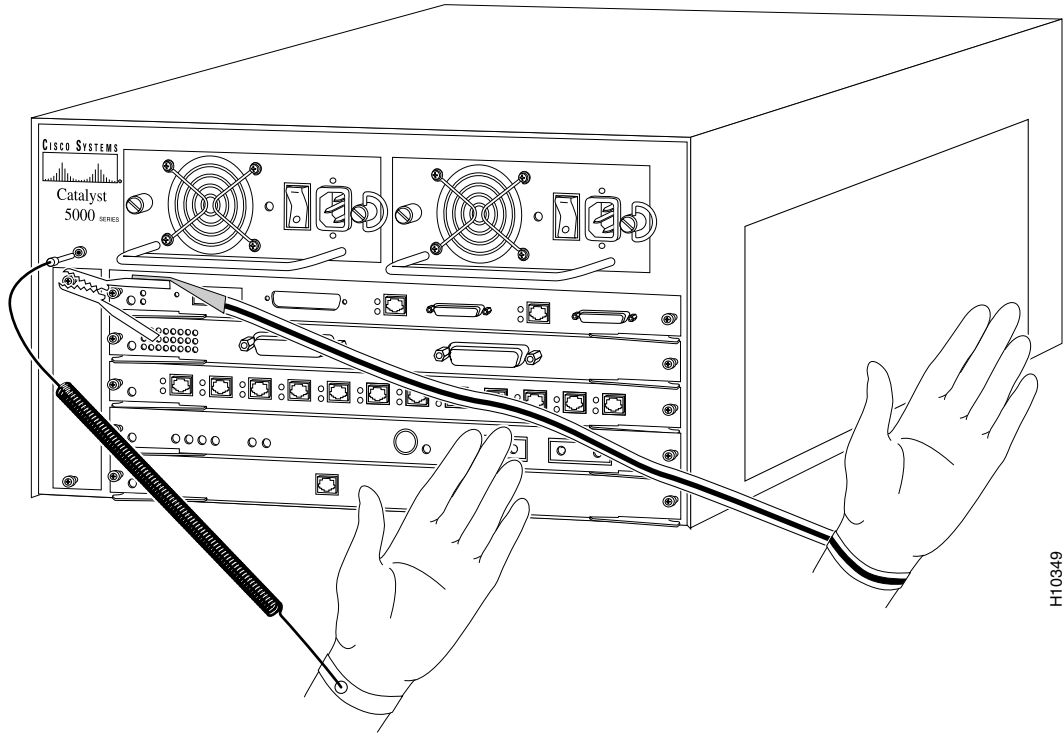
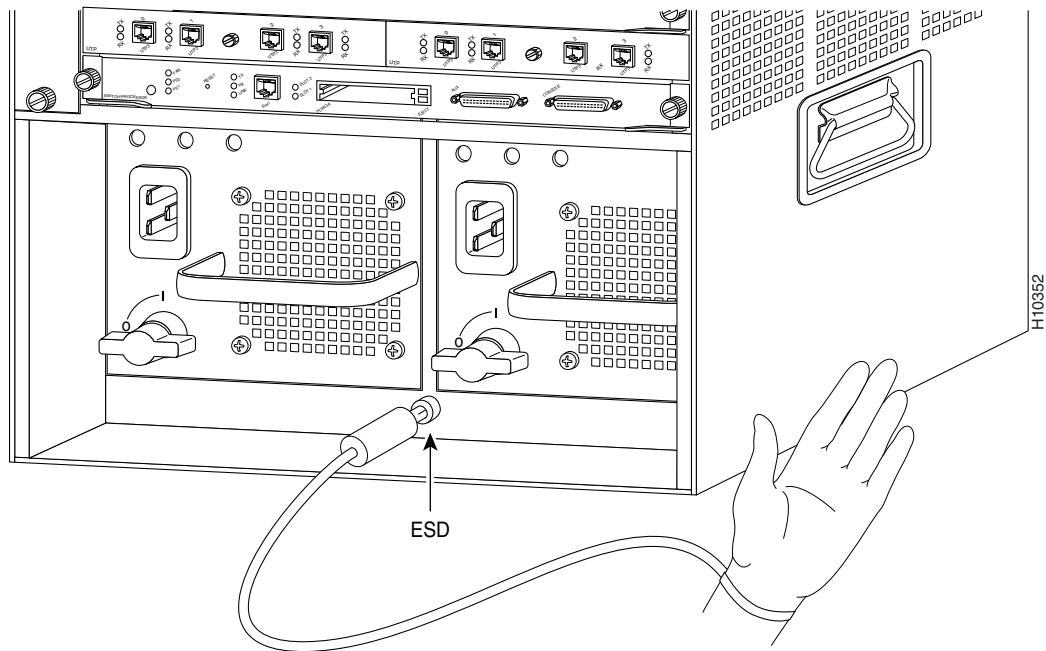


Figure 3 Placement of ESD Wrist Strap on the Catalyst 5500 Switch



- Handle supervisor engine modules and switching modules by the metal carrier edges and handles only; the metal carriers have electromagnetic interference (EMI) shielding. Never touch the printed circuit boards or connector pins.
- After removing a module, place it component-side up on an antistatic surface or in a static-shielding bag. If you plan to return the module to the factory, immediately place it in a static-shielding bag.
- Avoid contact between the modules and clothing; the wrist strap protects the module from ESD voltages on the body, but ESD voltages on clothing can still cause damage.
- Handle modules without metal carriers by the edges only.



Caution For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohms (Mohms).

ATM Switching Modules Installation and Configuration

All Catalyst 5000 series switches support hot swapping, which lets you install, remove, replace, and rearrange switching modules without turning off the system power. When the system detects that a switching module has been installed or removed, it automatically runs diagnostic and discovery routines, acknowledges the presence or absence of the module, and resumes system operation with no operator intervention.



Warning Only trained and qualified personnel should install or replace this equipment.



Warning Invisible laser radiation can be emitted from the aperture ports of the single-mode ATM products when no fiber-optic cable is connected. *Avoid exposure and do not stare into open apertures.* This product meets the Class 1 Laser Emission Requirement.

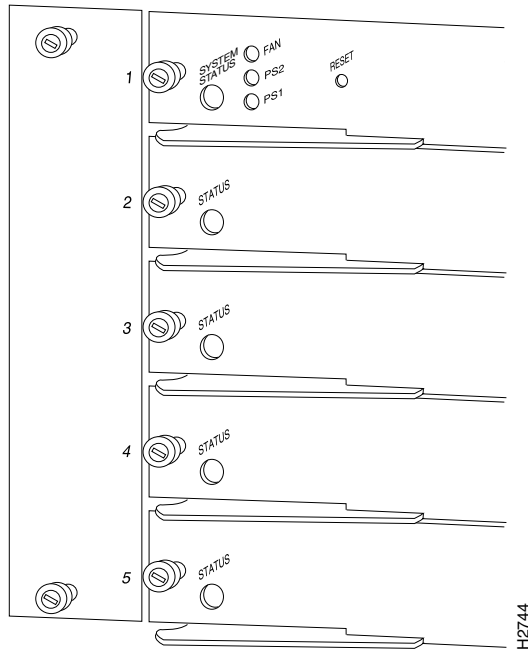
Tools Required

You need a flat-blade screwdriver to remove any filler (blank) switching modules and to tighten the captive installation screws that secure the modules in their slots. Whenever you handle switching modules, you should use a wrist strap or other grounding device to prevent ESD damage. See the section “Preventing Electrostatic Discharge Damage.”

Installing Switching Modules

All Catalyst 5000 series switching modules are installed in horizontal slots that are numbered from top to bottom. Figure 5 shows an example of how slots are numbered on the chassis; in this case using the Catalyst 5000 switch. The slot numbering for the Catalyst 5002 switch and the Catalyst 5500 switch is similar to that shown in Figure 5.

Figure 5 Module Slot Numbers



To install a switching module in a Catalyst 5000 series switch, perform these steps:



Caution To prevent ESD damage, handle switching modules by the carrier edges only.

Step 1 Make sure you take the necessary precautions to prevent ESD damage, as described in the section “Preventing Electrostatic Discharge Damage.”

Step 2 Choose a slot for the new switching module. Ensure you have enough clearance to accommodate any interface equipment that you will connect directly to the switching module ports. If possible, place switching modules between empty slots.

Note Empty slots have switching module filler plates installed.

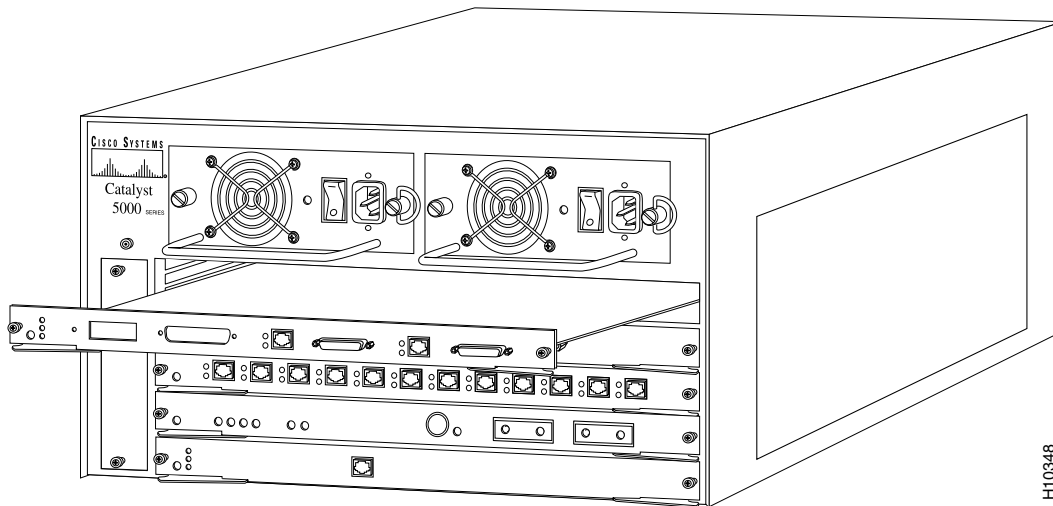
Step 3 Use a flat-blade screwdriver to loosen the captive installation screws securing the switching-module filler plate (or the existing switching module) from the desired slot.

Step 4 Remove the switching-module filler plate (or the existing switching module).

Step 5 Hold the switching-module handle with one hand and place your other hand under the carrier to support the switching module and guide it into the slot. Avoid touching the printed circuit boards or connector pins.

- Step 6** Place the switching module in the slot. Align the notch on the sides of the switching-module carrier with the groove in the slot, as shown in Figure 6 for the Catalyst 5000 switch. Use the same procedure for the Catalyst 5002 and Catalyst 5500 switches.

Figure 6 Module Installation



- Step 7** Maintain the switching module at a 90-degree orientation to the backplane and carefully slide the switching module into the slot until the switching-module faceplate contacts the ejector levers.
- Step 8** Use the thumb and forefinger of each hand and simultaneously push in the left and the right levers to seat the switching module in the backplane connector.



Caution Always use the ejector levers when installing or removing switching modules. A module that is partially seated in the backplane will cause the system to halt and subsequently crash.

- Step 9** Use a flat-blade screwdriver to tighten the captive installation screws on the left and right ends of the switching module.
- Step 10** Attach network interface cables or other devices to the interface ports.
- Step 11** Check the status of the interfaces as follows:
 - If this installation is a replacement switching module, use the **show module** or **show port [mod_num/port_num]** command to verify that the system has acknowledged the new interfaces and brought them up.
 - If the interfaces are new, use the **set module** command and the **set module name** command to configure the new interface(s). You do not have to do this immediately, but the interfaces will not be available until you configure them. See the *Catalyst 5000 Series Software Configuration Guide* for information on how to configure new interfaces.

The following example shows partial output of the **show module** command, with the ATM LANE single PHY module (MMF) (WS-X5155) in slot 4:

Console> **show module**

Mod	Module-Name	Ports	Module-Type	Model	Serial-Num	Status
2		2	100BaseTX Supervisor	WS-X5509	002261212	ok
3		24	3 Segment 100BaseTX E	ws-x5223	000000021	ok
4		1	MM OC-3 ATM	WS-X5155	003125674	ok
5		2	MM MIC FDDI	WS-X5101	002774545	ok
6			Route Switch Ext Port			
7		1	Route Switch	WS-X5302	002274941	ok

Mod	MAC-Address (es)	Hw	Fw	Sw
2	00-e0-a3-a5-00-00 thru 00-e0-a3-a5-03-ff	1.2	2.2(1)	3.1(1)
3	00-60-83-42-e4-4b thru 00-60-83-42-e4-4d	0.1	2.2(4)	3.1(1)
4	00-40-0b-43-02-64	1.0	1.3	2.2
5	00-60-3e-cd-42-95	1.0	1.1	2.1(2)
7	00-40-0b-91-42-16 thru 00-40-0b-91-42-17	1.0	20.2	11.2

Mod	Sub-Type	Sub-Model	Sub-Serial	Sub-Hw
2	EARL 1+	WS-F5511	0002278010	1.0

Mod	SMT User-Data	T-Notify	CF-St	ECM-St	Bypass
5	WorkGroup Stack	30	isolated	in	absent

Console>

The following example shows the output of the **show port** command, with the ATM LAN Emulation (LANE) single PHY module (MMF) (WS-X5155) in slot 4:

```
Console> show port
```

Port	Name	Status	Vlan	Level	Duplex	Speed	Type
2/1		notconnect	1	normal	half	100	100BaseTX
2/2		notconnect	1	normal	half	100	100BaseTX
3/1		connected	1	normal	half	100	100BaseTX
3/2		notconnect	1	normal	half	100	100BaseTX
3/3		notconnect	1	normal	half	100	100BaseTX
.							
.							
3/23		notconnect	1	normal	half	100	100BaseTX
3/24		notconnect	1	normal	half	100	100BaseTX
4/1		standby	trunk	normal	full	155	OC3 MMF ATM
5/1		notconnect	1	normal	half	100	FDDI
5/2		notconnect	1	normal	half	100	FDDI
7/1		connected	trunk	normal	half	400	Route Switch
.							
.							
.							

Use 'session' command to see ATM counters.

Use 'session' command to see router counters.

```
Last-Time-Cleared  
-----  
Wed Mar 11 1998, 13:30:15
```

```
Console> (enable)
```

The following example shows the output of the **show atm interface atm0** command.

Note You must configure the ATM module before running the **show atm interface atm0** command.

```
console> show atm interface atm0  
ATM interface ATM0:  
AAL enabled: AAL5 , Maximum VCs: 4096, Current VCCs: 12  
Tx buffers 32, Rx buffers 32, Exception Queue: 32, Raw Queue: 32  
VP Filter: 0x0, VCIs per VPI: 1024, Max. Datagram Size:1580  
PLIM Type:SONET - 155Mbps, TX clocking: LINE  
1323970 input, 1135820 output, 0 IN fast, 0 OUT fast  
Config. is ACTIVE  
console>
```

Configuring ATM Switching Modules

This section lists the default configurations of the ATM switching modules and provides a summary of the commands that you can use to customize the configuration.

Default Configuration

The ATM module configuration default settings are listed in Table 6.

Table 6 ATM Module Default Configuration Settings

Feature	Default Setting
PVCs ¹	ILMI ² and signaling PVCs are set up
LANE ³	LANE is not configured
Configuration in NVRAM ⁴	NVRAM contains no configuration information

1. PVC=permanent virtual circuit
2. ILMI=Interim Local Management Interface
3. LANE=LAN Emulation
4. NVRAM=Nonvolatile RAM

Note The ATM dual PHY DS3 module (WS-X5166) does not support LANE.

Customizing the Configuration

This section describes the major features available on the ATM modules and the commands needed to configure them.

The following sections describe how to customize the ATM module configuration:

- Basic Commands
- Implementing LANE
- Configuring Specialized LANE Features
- Configuring PVCs Using ATM PVC Traffic-Shaping Software

Basic Commands

Table 7 shows the basic commands you can use to customize the ATM module.

Table 7 ATM Quick Configuration—Basic Commands

Task	Commands
Configuring from the Terminal	
Step 1 Enter global configuration mode.	configure terminal
Step 2 Enter the necessary configuration commands. ¹	
Step 3 Quit configuration mode.	Ctrl-Z
Step 4 Save the configuration file modifications to NVRAM.	write memory
Configuring from Nonvolatile Memory	
Configure the ATM module from NVRAM.	configure memory

1. For specific configuration commands, refer to the *Catalyst 5000 Series Command Reference* publication.

Implementing LANE

Table 8 shows how to implement LANE on the ATM module.

Note The ATM dual PHY DS3 module (WS-X5166) does not support LANE.

Table 8 ATM Quick Configuration—Implementing LANE

Task	Commands
Displaying ATM Addresses	
Display dual PHYs connected to the same switch.	show lane default-atm-addresses
Displaying Dual PHYs Connected to Different Switches	
Step 1 Change the preferred PHY to the one not currently in use.	atm preferred phy {A B}
Step 2 Display the default ATM addresses.	show lane default-atm-addresses
Step 3 Determine the active PHY.	show interface
Configuring the LECS ATM Address on a LightStream 1010 Switch	
Step 1 Enter configuration mode.	configure terminal
Step 2 Enter the address of the LECS. ¹	atm lecs-address atm-address
Step 3 Verify the address entered.	show atm ilmi-configuration

Table 8 ATM Quick Configuration—Implementing LANE (Continued)

Task	Commands
Setting Up the LES/BUS	
Step 1 Enter configuration mode.	configure terminal
Step 2 Specify the subinterface for the first ELAN. ²	interface atm0.subinterface_num
Step 3 Enable the LES/BUS ³ on the ELAN.	lane server-bus ethernet elan_name
Step 4 Repeat Steps 2 and 3 for all other ELANs on this card.	
Setting Up the LECS Database for the Default ELAN	
Step 1 Enter configuration mode.	configure terminal
Step 2 Create a named database for the LECS.	lane database database-name
Step 3 In the configuration database, bind the ELAN to the ATM address of the LES.	name elan_name server-atm-address atm-address
Step 4 In the configuration database, provide a default name for the ELAN.	default-name elan_name
Step 5 Exit database configuration mode and go to global configuration mode.	exit
Setting Up the LECS Database for Unrestricted-Membership ELANs	
Step 1 Enter configuration mode.	configure terminal
Step 2 Create a named database for the LECS.	lane database database_name
Step 3 In the configuration database, bind the name of the first ELAN to the ATM address of the LES for that ELAN.	name elan_name_1 server-atm-address atm_address
Step 4 In the configuration database, bind the name of the second ELAN to the ATM address of the LES.	name elan_name_2 server-atm-address atm_address
Step 5 Repeat Steps 3 and 4, providing a different ELAN name and ATM address for each additional ELAN in this switch cloud.	
Step 6 (Optional) Specify a default ELAN for LECs ⁴ not explicitly bound to an ELAN.	default-name elan_name
Step 7 Exit database configuration mode and go to global configuration mode.	exit

Table 8 ATM Quick Configuration—Implementing LANE (Continued)

Task	Commands
Setting Up the LECS Database for Restricted-Membership ELANs	
Step 1 Enter configuration mode.	configure terminal
Step 2 Create a named database for the LECS.	lane database <i>database_name</i>
Step 3 In the configuration database, bind the name of the first ELAN to the ATM address of the LES for that ELAN.	name <i>elan_name_1</i> server-atm-address <i>atm_address</i> restricted
Step 4 Repeat Steps 3 and 4, providing a different name and a different ATM address for each additional ELAN.	
Step 5 (Optional) Specify a default ELAN for LECs not explicitly bound to an ELAN.	name <i>elan_name_2</i> server-atm-address <i>atm_address</i> restricted
Step 6 Add a database entry associating a specific LEC ATM address with a specific restricted-membership ELAN.	default-name <i>elan_name</i>
Step 7 Repeat Step 7 for every LEC in each restricted-membership ELAN on this switch cloud, specifying the ATM address of the LEC and the name of the ELAN with which it is linked.	client-atm-address <i>atm-address-template</i> name <i>elan-name</i>
Step 8 Exit database configuration mode and go to global configuration mode.	exit
Starting and Binding the LECS	
Step 1 Enter configuration mode.	configure terminal
Step 2 Select the ATM interface.	interface atm0
Step 3 Specify the name of the LECS.	lane config <i>database</i>
Step 4 Specify the address of the LECS.	lane config-atm-address <i>atm-address-template</i>
Step 5 Bind the interface.	lane config database <i>database-name</i>
Step 6 Exit configuration mode.	end
Setting up the LECs	
Step 1 Specify the subinterface for a VLAN ⁵ on this switch.	interface atm0.subinterface_num
Step 2 Enable a LANE ⁶ client for the first ELAN.	lane client ethernet <i>vlan_num</i> <i>elan-name</i>

Table 8 ATM Quick Configuration—Implementing LANE (Continued)

Task	Commands
Monitoring and Maintaining LANE Components	
• Display global and per-VCC ⁷ LANE information for all the LANE components and ELANs configured on an interface or any of its subinterfaces.	show lane [interface atm0 [, <i>subinterface</i>] name elan-name] [brief]
• Display the global and per-VC ⁸ LANE information for the BUS configured on any subinterface or ELAN.	show lane bus [interface atm0 [, <i>subinterface</i>] name elan-name] [brief]
• Display the global and per-VC LANE information for all LECs configured on any subinterface or ELAN.	show lane client [interface atm0 [, <i>subinterface</i>] name elan-name] [brief]
• Display the global and per-VC LANE information for the LECS configured on any interface.	show lane config [interface atm0] [brief]
• Display the LANE LECS database.	show lane database [<i>database_name</i>] [brief]
• Display the LANE ARP ⁹ table of the LECs configured on the specified subinterface or ELAN.	show lane le-arp [interface atm0 [, <i>subinterface</i>] name elan-name]
• Display the global and per-VC LANE information for the LES configured on a specified subinterface or ELAN.	show lane server [interface atm0 [, <i>subinterface</i>] name elan-name] [brief]

1. LECS=LAN Emulation Configuration Server
2. ELAN=emulated LAN
3. LES/BUS=LAN Emulation Server/broadcast and unknown server
4. LEC=LAN Emulation Client
5. VLAN=virtual LAN
6. LANE=LAN emulation
7. VCC=virtual circuit connection
8. VC=virtual circuit
9. ARP=Address Resolution Protocol

Configuring Specialized LANE Features

Table 9 shows how to configure specialized LANE features on the ATM module.

Table 9 ATM Quick Configuration—Specialized LANE Features

Task	Commands
Configuring LES/BUS/LECS¹ Redundancy	
Step 1 On the ATM switch, enter all the multiple LECS addresses.	set configserver <i>index_address_mask</i> (for the LightStream 1010 switch) atm lecs-address <i>address</i> (for the LightStream 1010 switch)
Step 2 On the ATM module, specify redundant LES/BUSs. Enter the command for each LES address on the ELAN ² .	name <i>elan_name</i> server-atm-address <i>atm-address</i>
Configuring VTP³	
To set up an LEC ⁴ using VTP:	
Step 1 Enable VTP.	vtp enable
Step 2 From the supervisor module, create an LEC on each ATM module of all Catalyst 5000 series switches on a specified VTP domain.	set vlan <i>vlan_num</i> default
To set up VTP:	
Step 1 Enable VTP.	vtp enable
Step 2 Exit configuration mode.	Ctrl-Z
Step 3 Write the current configuration to NVRAM. ⁵	write memory
Step 4 Return to the supervisor console.	exit
Setting Up a VLAN⁶ over PVCs	
Step 1 Assign an Ethernet port to the specified VLAN.	set vlan <i>vlan_num</i>
Step 2 Session to the ATM module.	session <i>mod_num</i>
Step 3 Activate privileged mode on the ATM module.	enable
Step 4 Enter configuration mode.	configure terminal
Step 5 Select the ATM interface.	interface atm0
Step 6 Set up the PVCs. ⁷	atm pvc <i>vcd vpi vci aal5snap</i>
Step 7 Bind the PVCs to the VLAN.	atm bind pvc vlan <i>vcd vlan_num</i>
Step 8 Set up other PVCs for the same VLAN if needed by repeating Steps 6 and 7.	
Step 9 Exit configuration mode.	Ctrl-Z
Step 10 Verify the setup.	show atm vlan show atm vc
Step 11 Write the configuration to NVRAM.	write memory

Table 9 ATM Quick Configuration—Specialized LANE Features (Continued)

Task	Commands
Removing Previously Assigned PVCs from a VLAN	
To remove a previously assigned PVC from a VLAN:	
Step 1 Enter configuration mode.	configure terminal
Step 2 Select the ATM interface.	interface atm0
Step 3 Remove the PVC from the VLAN.	no atm pvc vcd
Step 4 End the session.	Ctrl-Z
To unbind a previously assigned PVC from a VLAN without removing the PVC itself:	
Step 1 Enter configuration mode.	configure terminal
Step 2 Select the ATM interface.	interface atm0
Step 3 Unbind the PVC from the VLAN.	no atm bind pvc vlan vcd vlan_num
Step 4 End the session.	Ctrl-Z
Configuring Output Throttling	
To throttle the output of the entire interface:	
Step 1 Enter configuration mode.	configure terminal
Step 2 Select the ATM interface.	interface atm0
Step 3 Apply output throttling.	atm traffic-shape rate rate
Step 4 End the session.	Ctrl-Z
To place the output-rate to the default of 155 Mbps:	
Step 1 Enter configuration mode.	configure terminal
Step 2 Select the ATM interface.	interface atm0
Step 3 Disable output throttling.	no atm traffic-shape rate
Step 4 End the session.	Ctrl-Z
Selecting UNI 3.1 Signaling Support	
Specify the UNI ⁸ Version	atm uni-version version_number
<ol style="list-style-type: none"> 1. LES/BUS/LECS=LAN Emulation Server/broadcast and unknown server/LAN Emulation Configuration Server 2. ELAN=emulated LAN 3. VTP = VLAN Trunk Protocol 4. LEC=LAN Emulation Client 5. NVRAM=nonvolatile random-access memory 6. VLAN=virtual LAN 7. PVC=permanent virtual circuit 8. UNI=User-Network Interface 	

Configuring PVCs Using ATM PVC Traffic-Shaping Software

Table 10 shows how to configure traffic shaping. Traffic shaping requires software release 50.1 or 51.1.

Table 10 ATM Quick Configuration—Configuring ATM PVC Traffic Shaping

Task	Commands
Step 1 Activate privileged mode on the supervisor module.	enable
Step 2 Enter your password.	<i><password></i>
Step 3 Assign an Ethernet port to the specified VLAN. ¹	set vlan <i>vlan_num mod_num/port_num</i>
Step 4 Establish a connection to the ATM module.	session <i>mod_num</i>
Step 5 Activate privileged mode on the ATM module.	enable
Step 6 Enter configuration mode.	configure terminal
Step 7 Select the ATM interface.	interface atm0
Note This step is optional; if you wish to change the default configurations, ² perform this step; otherwise, proceed to Step 9.	atm clock internal atm framing [m23adm cbitplcp m23plcp] atm lbo {short long} atm ds3-scrumble
Step 8 Configure the interface.	
Step 9 Set up the PVCs. ³	atm pvc <i>vcd vpi vci</i> [aal-encap] aal5snap ⁴ <i>peak</i> ⁵ [oam seconds]
Step 10 Bind the PVCs to the VLAN.	atm bind pvc vlan <i>vcd vlan_num</i> ⁶
Step 11 Set up other PVCs for the same VLAN if needed by repeating Step 8 through Step 10.	
Step 12 Exit configuration mode.	Ctrl-Z
Step 13 Verify the setup.	show atm vlan show atm vc
Step 14 Write the configuration to NVRAM. ⁷	write memory

1. VLAN=virtual LAN.
2. The default configurations are as follows: clock internal=transmit clock is generated internally; ATM framing=C-bit with ADM; line buildout=short; DS3-scrumble=disabled.
3. PVCs=permanent virtual circuits.
4. To configure traffic shaping, the **aal5snap** options must be used.
5. The *peak* argument must not exceed 45,000 kbps for DS3 modules or 155,000 kbps for OC-3 modules.
6. The **atm bind pvc vlan vcd vlan_num** command is valid only for the current software release; this command may change in future releases.
7. NVRAM=nonvolatile random-access memory.

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