

# Specifications

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This appendix lists the specifications for the Catalyst 5000 family modules and consists of these sections:

- Module Specifications, page A-1
- Connector Output Signal and Cable Pinout Specifications, page A-21

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**Note** For specifications on Catalyst 5000 family switch chassis, refer to the *Catalyst 5000 Family Installation Guide*. For specifications on supervisor engines, refer to the *Catalyst 5000 Family Supervisor Engine Installation Guide*.

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## Module Specifications

This section provides specifications for the Ethernet, Fast Ethernet, Gigabit Ethernet, ATM, FDDI/CDDI, ATM, network analysis, and the Route Switch Module (RSM) used in Catalyst 5000 family switches. In addition, this section provides the optical specifications for the Catalyst 5000 family switching modules.

### Standards Compliance

Catalyst 5000 family modules, when installed in a system, comply with the standards listed in Table A-1.

**Table A-1 Standards Compliance**

Specification	Description
Compliance:	CE Marking
Safety	UL <sup>1</sup> 1950, CSA <sup>2</sup> -C22.2 No. 950, EN <sup>3</sup> 60950, IEC <sup>4</sup> 950, TS <sup>5</sup> 001, AS/NZS <sup>6</sup> 3260
EMI <sup>7</sup>	FCC <sup>8</sup> Part 15 Class A (CFR 47 , Part 15), CISPR 22 Class A, EN 55022 Class A, VCCI <sup>9</sup> Class A, and AS/NZS 3548 Class A with UTP <sup>10</sup> cables, EN 55022 Class B, CISPR 22 Class B, VCCI Class B, and AS/NZS 3590, Class B with FTP <sup>11</sup> cables
Network homologation <sup>12</sup>	Net 1, Net 2, Net 3, Net 5 <sup>13</sup>

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 VCCI = Voluntary Control Council for Information Technology Equipment

10 UTP = unshielded twisted-pair

11 FTP = foil twisted-pair

12 Applies to the Route Switch Module

13 For more information on network homologation standards, see the *Regulatory Compliance and Safety Information for Cisco 7000 Series Routers*, *Regulatory Compliance and Safety Information for Cisco 7200 Series Routers*, and *Regulatory Compliance and Safety Information for Cisco 7500 Series Routers* publications

## Group Switching Ethernet and Fast Ethernet Modules

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

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

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The FDDI single-mode fiber module (WS-X5104) meets Japan Approvals Institute for Telecommunications Equipment (JATE) approval:

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Applicant name:	Nihon Cisco Systems
Model number:	WS-X5104
Approval number:	N98-3003-0
Date of approval:	June 10, 1998

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## Group Switching Ethernet and Fast Ethernet Modules

Table A-2 describes the specifications of the following modules:

- Group Switching Ethernet Module (WS-X5020)
- Group Switching Fast Ethernet Module (WS-X5223)

## Module Specifications

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**Table A-2 Group Switching Ethernet, Group Switching Fast Ethernet, and Workgroup Fast Ethernet Switching Module 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	5.7 lb (2.53 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	10BaseT (WS-X5020): RJ-21, female, telco 100BaseTX (WS-X5223 and WS-X5224): RJ-45
RAM buffer memory	192 KB per group
Maximum station-to-station cabling distance	10BaseT Ethernet: Categories 3-5 UTP <sup>1</sup> : 328 feet (100 meters) 100-ohm FTP <sup>2</sup> : 328 feet (100 meters)
Frame Processing	Transparent Bridging (IEEE 802.1d)
Network Management	Cisco Discovery Protocol, Ethernet MIB <sup>3</sup> (RFC 1398), Interface Table (RFC 1573), Bridge MIB (RFC 1493), Ethernet Repeater MIB (RFC 1516), RMON <sup>4</sup> MIB (RFC 1757), Cisco Workgroup MIB, and Cisco VTP <sup>5</sup>

- 1 UTP=unshielded twisted-pair
- 2 FTP=foil twisted-pair
- 3 MIB=Management Information Base
- 4 RMON=Remote Monitoring
- 5 VTP=VLAN Trunk Protocol

## Ethernet and Fast Ethernet Switching Modules

Table A-3 describes the specifications for the following modules:

- Ethernet Switching Module (WS-X5011)
- Ethernet Switching Module (WS-X5012)
- Ethernet Switching Module (WS-X5012A)
- Ethernet Switching Module (WS-X5013)
- Ethernet Switching Module (WS-X5014)
- Ethernet Switching Module (WS-X5015-MT)
- Fast Ethernet Switching Module (WS-X5201)
- Fast Ethernet Switching Module (WS-X5113)
- Fast Ethernet Switching Module Single-Mode/Multimode Fiber (WS-X5114)
- Fast EtherChannel Backbone Switching Module (WS-X5201R)
- Fast Ethernet Switching Module (WS-X5236-FX-MT)
- Fast Ethernet Switching Module (WS-X5237-FX-MT)
- 10/100-Mbps Fast Ethernet Switching Modules (WS-X5213A and WS-X5203)
- 10/100-Mbps Workgroup Fast Ethernet Switching Module (WS-X5224)
- 10/100-Mbps Fast Ethernet Switching Module (WS-X5225R)
- 10/100-Mbps Fast Ethernet Switching Module (WS-X5234-RJ45)
- 10/100-Mbps Fast Ethernet Switching Module (WS-X5239-RJ21)
- Group Switching Ethernet Module (WS-X5020)

## Module Specifications

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**Table A-3 Ethernet and Fast Ethernet Switching Module Specifications**

Specification	Description
Dimensions (H x W x D)	1.18 x 15.51 x 16.34 in. (30 x 394 x 415 mm) 2.36 x 15.51 x 16.34 in. (60 x 394 x 415 mm) (WS-X5014 only)
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	10BaseT: RJ-21 (telco) and RJ-45 10BaseFL: ST and MT-RJ 10/100BaseTX and 100BaseTX: RJ-45 and RJ-21 (telco) 100BaseFX, MMF and SMF: SC and MT-RJ
Maximum station-to-station cabling distance	
10-Mbps (Categories 3-5 UTP <sup>1</sup> and 100-ohm FTP <sup>2</sup> )	328 feet (100 meters), half- or full-duplex
10-Mbps (MMF <sup>3</sup> )	1.2 miles (2 kilometers), half- or full-duplex
10/100-Mbps (Categories 3-5 UTP and 100-ohm FTP)	328 feet (100 meters), half- or full-duplex
10/100-Mbps (MMF)	1312 feet (400 meters), half-duplex 1.2 miles (2 kilometers), full-duplex
100-Mbps (SMF <sup>4</sup> )	1312 feet (400 meters), half-duplex 6.2 miles (10 kilometers), full-duplex

**Table A-3 Ethernet and Fast Ethernet Switching Module Specifications (continued)**

Specification	Description
Frame Processing	Transparent Bridging (802.1d)
Network Management	Cisco Discovery Protocol, Interface Table (RFC 1573), Bridge MIB <sup>5</sup> (RFC 1493), Cisco Workgroup MIB, and Cisco VTP <sup>6</sup>

- 1 UTP=unshielded twisted-pair
- 2 FTP=foil twisted-pair
- 3 62.5/125-micron multimode fiber-optic cable
- 4 8/125-micron single-mode fiber-optic cable
- 5 MIB=Management Information Base
- 6 VTP=VLAN Trunk Protocol

## Gigabit Ethernet Switching Modules

Table A-4 describes the specifications for the following modules:

- Gigabit Ethernet switching modules (WS-X5403)
- EtherChannel switching modules (WS-X5410)

The WS-X5403 and WS-X5410 modules use Gigabit Interface Converters (GBICs), which are hot-swappable input/output devices that plug into a Gigabit Ethernet module and link the module with the fiber-optic network. GBICs are available in the following styles: 1000BaseSX (WS-G5484), 1000BaseLX/LH (WS-G5486), and 1000BaseZX (WS-G5487).

**Table A-4 Gigabit Ethernet Switching Modules Specifications**

Specifications	Description
Dimensions (H x W x D)	1.18 x 15.51 x 16.34 in. (30 x 394 x 415 mm) (WS-X5403)
	2.36 x 15.51 x 16.34 in. (60 x 394 x 415 mm) (WS-X5410)
Weight	Minimum: 3 lb (1.36 kg)
	Maximum: 5 lb (2.27 kg)

## Module Specifications

**Table A-4 Gigabit Ethernet Switching Modules Specifications (continued)**

Specifications	Description
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	SC
Maximum station-to-station cabling distance	
1000BaseSX GBIC (850 nm laser device over MMF <sup>1</sup> )	62.5-micron MMF: 902 feet (275 meters)
	50-micron MMF: 1804 feet (550 meters)
1000BaseLX/LH GBIC (1300-nm laser device over MMF <sup>2</sup> /SMF <sup>3</sup> )	62.5-micron MMF: 1804 feet (550 meters)
	50-micron MMF: 1804 feet (550 meters)
	9/10-micron SMF: 6.2 miles (10 kilometers)
1000BaseZX GBIC (1550-nm laser device over SMF)	9/10-micron SMF: 43.5 miles (70 kilometers)
	8-micron dispersion-shifted SMF: 62.1 miles (100 kilometers)
Frame Processing	Transparent Bridging (802.1d)
Network Management	Cisco Discovery Protocol, Interface Table (RFC 1573), Bridge MIB <sup>4</sup> (RFC 1493), Cisco Workgroup MIB, and Cisco VTP <sup>5</sup>

1 MMF=multimode fiber

2 Mode-conditioning patch cord (CAB-GELX-625 or equivalent) is required. Using an ordinary patch cord with MMF, 1000BaseLX/LH GBICs, and a short link distance (less than 50 m) can cause transceiver saturation resulting in an elevated bit error rate (BER). In addition, when using the LX/LH GBIC with 62.5-micron diameter MMF, you must install a mode-conditioning patch cord between the GBIC and the MMF cable on both the transmit and receive ends of the link. The mode-conditioning patch cord is required for link distances greater than 984 ft (300 m).

3 SMF=single-mode fiber

4 MIB=Management Information Base

5 VTP=VLAN Trunk Protocol

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**Note** The mode-conditioning patch cord (CAB-GELX-625 or equivalent) is required to comply with IEEE standards. The IEEE found that link distances could not be met with certain types of fiber-optic cable cores. The solution is to launch light from the laser at a precise offset from the center by using the mode-conditioning patch cord. At the output of the patch cord, the LX/LH GBIC is compliant with the IEEE 802.3z standard for 1000BaseLX.

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## FDDI and CDDI Modules

Table A-5 describes the specifications for the following modules:

- CDDI Module (WS-X5103)
- FDDI Module Multimode Fiber (WS-X5101)
- FDDI Module Single-Mode Fiber (WS-X5104)

**Table A-5 FDDI and CDDI 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: MIC <sup>1</sup> Single-mode fiber-optic: ST <sup>2</sup> Category 5 UTP <sup>3</sup> : RJ-45
RAM buffer memory	192 KB per interface

## Module Specifications

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**Table A-5 FDDI and CDDI Modules Specifications (continued)**

Specification	Description
Maximum station-to-station cabling distance	Category 5 UTP: 328 feet (100 meters)
MMF, 62.5/125-micron	1.2 miles (2 kilometers)
SMF	18 miles (30 kilometers)
Frame Processing	Fragmentation (RFC 791), Translation (802.1h, 802.li), APaRT <sup>4</sup>
Network Management	Cisco Discovery Protocol, SNMP <sup>5</sup> MIB <sup>6</sup> II (RFC 1213), FDDI <sup>7</sup> MIB (RFC 1512), Interface Extensions MIB (RFC 1573), 802.1D Spanning-Tree MIB, Bridging MIB (RFC 1493), FDDI SMT <sup>8</sup> 7.3, Cisco Workgroup MIB, CiscoView application

- 1 MIC=media interface connector
- 2 ST=straight through
- 3 UTP=unshielded twisted-pair
- 4 APaRT=automated packet recognition/translation
- 5 SNMP=Simple Network Management Protocol
- 6 MIB=Management Information Base
- 7 FDDI=Fiber Distributed Data Interface
- 8 SMT=station management

## ATM LANE Modules

Table A-6 describes the specifications for the following modules:

- ATM LANE Dual PHY Module (UTP) (WS-X5156)
- ATM LANE Dual PHY OC-3 Module (MMF) (WS-X5158)
- ATM LANE Dual PHY OC-3 Module (SMF) (WS-X5157)

**Table A-6 ATM LANE Module Specifications**

<b>Specification</b>	<b>Description</b>
Dimensions (H x W x D)	1.18 x 15.51 x 16.34 inches (30 x 394 x 415 millimeters)
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	MMF/SMF: SC: Category 5 UTP: RJ-45
Memory:	
RAM buffer	192 KB per interface
Flash	4 MB
DRAM <sup>1</sup>	16 MB
EPROM <sup>2</sup>	512 KB
NVRAM <sup>3</sup>	128 KB
Maximum station-to-station cabling distance	
MMF	1.2 miles (2 kilometers)
SMF	6.2 miles (10 kilometers)
Category 5 UTP	328 feet (100 meters)
Frame-to-cell conversion	AAL <sup>4</sup> 5, 4096 virtual circuits, 255 concurrent reassembly

## Module Specifications

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**Table A-6 ATM LANE Module Specifications (continued)**

Specification	Description
Indicators:	
Module status	Green (operational)
Port active status	Green (operational)
RX	Green flashing (receive activity)
TX	Green flashing (transmit activity)
ATM standards	RFC 1483 LLC <sup>5</sup> , SNAP <sup>6</sup> Bridging Encapsulation (PVC <sup>7</sup> ); ATM Forum LANE <sup>8</sup> v1.0 LEC <sup>9</sup> , LECS <sup>10</sup> , LES <sup>11</sup> , BUS <sup>12</sup> , UNI <sup>13</sup> 3.0/3.1, Q.2931 signaling protocols; ILMI <sup>14</sup>
Network management	Cisco Discovery Protocol; SNMP <sup>15</sup> MIB <sup>16</sup> II (RFC 1213); AToM MIB (RFC 1695); LEC MIB (ATM Forum LANE v1.0); Cisco Workgroup Stack MIB; Cisco VLAN Trunk Protocol MIB; Cisco LECS; LES/BUS MIB; ILMI MIB

- 1 DRAM=dynamic random-access memory
- 2 EPROM=erasable programmable read-only memory
- 3 NVRAM=nonvolatile random-access memory
- 4 AAL=ATM adaptation layer
- 5 LLC=Logical Link Control
- 6 SNAP=Subnetwork Access Protocol
- 7 PVC=permanent virtual connection
- 8 LANE=LAN Emulation
- 9 LEC=LAN Emulation Client
- 10 LECS=LAN Emulation Configuration Server
- 11 LES=LAN Emulation Server
- 12 BUS=broadcast and unknown server
- 13 UNI=User-Network Interface
- 14 ILMI=Integrated Local Management Interface
- 15 SNMP=Simple Network Management Protocol
- 16 MIB=Management Information Base

## ATM Dual PHY OC-3 and OC-12 LANE/MPOA Modules

Table A-7 describes the specifications for the following modules:

- ATM Dual PHY OC-3 LANE/MPOA Module (MMF) (WS-X5167)
- ATM Dual PHY OC-3 LANE/MPOA Module (SMF) (WS-X5168)
- ATM Dual PHY OC-12 LANE/MPOA Module (MMF) (WS-X5161)
- ATM Dual PHY OC-12 LANE/MPOA Module (SMF) (WS-X5162)

**Table A-7 ATM Dual PHY OC-3 and OC-12 LANE/MPOA Module 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	MMF: SC SMF: SC Diagnostics port: RJ-45 <sup>1</sup>
Memory:	
RAM buffer	512 KB
Flash	4 or 8 MB
DRAM <sup>2</sup>	16 or 32 MB
EPROM <sup>3</sup>	512 KB
NVRAM <sup>4</sup>	512 KB

## Module Specifications

**Table A-7 ATM Dual PHY OC-3 and OC-12 LANE/MPOA Module Specifications (continued)**

Specification	Description
OC-3 (MMF) optical specifications	Transmitter output power: -19 to -14 dBm Receiver sensitivity: -32.5 to -14 dBm Wavelength: 1270 to 1380 nm Optical source: LED Maximum station-to-station cabling distance: 1.2 miles (2 kilometers)
OC-3 (SMF) optical specifications	Transmitter output power: -14 to -8 dBm Receiver sensitivity: -32.5 to -8 dBm Wavelength: 1261 to 1360 nm Optical source: laser Maximum station-to-station cabling distance: 6.2 miles (10 kilometers)
OC-12 (MMF) optical specifications	Transmitter output power: -19 to -14 dBm Receiver sensitivity: -28 to -8 dBm Wavelength: 1300 nm Optical source: laser Maximum station-to-station cabling distance: 9.3 miles (15 kilometers)
OC-12 (SMF) optical specifications	Transmitter output power: -15 to -8 dBm Receiver sensitivity: -32.5 to -14 dBm Wavelength: 1270 to 1380 nm Optical source: LED Maximum station-to-station cabling distance: 1.2 miles (2 kilometers)
Frame-to-cell conversion	AAL <sup>5</sup> , 4096 virtual circuits, 255 concurrent reassembly
Indicators:	
Module status	The switch performs a series of self-tests and diagnostic tests. If all the tests pass, the LED is green.
TX (Transmit)	When a port is transmitting a packet, the LED is green; otherwise, it is off.

**Table A-7 ATM Dual PHY OC-3 and OC-12 LANE/MPOA Module Specifications (continued)**

Specification	Description
RX (Receive)	When a port is receiving a packet, the LED is green; otherwise it is off.
Link	Status of the link integrity of an ATM port. If the integrity is good, the LED is green. If the link integrity is bad, the LED is off.
Active	When green, the port is active. If the LED is off, the port is the standby port.
Signal	When green, the LED indicates that a signal is being received on the optical port.
Network management	Cisco Discovery Protocol; SNMP <sup>6</sup> MIB <sup>7</sup> II (RFC 1213); AToM MIB (RFC 1695); LEC <sup>8</sup> MIB (ATM Forum LANE <sup>9</sup> v1.0); Cisco Workgroup Stack MIB; VTP <sup>10</sup> MIB; Cisco LECS <sup>11</sup> ; LES <sup>12</sup> /BUS <sup>13</sup> MIB; ILMI <sup>14</sup> MIB
ATM standards	RFC 1483 LLC <sup>15</sup> SNAP <sup>16</sup> Bridging Encapsulation (PVC <sup>17</sup> ); ATM Forum LANE v1.0 LEC, LECS, LES, BUS; UNI <sup>18</sup> 3.0/3.1, Q.2931 signaling protocols; ILMI; MPOA <sup>19</sup>

- 1 The diagnostics port is for manufacturing use only
- 2 DRAM=dynamic random-access memory
- 3 EPROM=erasable programmable read-only memory
- 4 NVRAM=nonvolatile random-access memory
- 5 AAL=ATM adaptation layer
- 6 SNMP=Simple Network Management Protocol
- 7 MIB=Management Information Base
- 8 LEC=LAN Emulation Client
- 9 LANE=LAN Emulation
- 10 VTP=VLAN Trunk Protocol
- 11 LECS=LAN Emulation Configuration Server
- 12 LES=LAN Emulation Server
- 13 BUS=broadcast and unknown server
- 14 ILMI=Integrated Local Management Interface
- 15 LLC=Logical Link Control
- 16 SNAP=Subnetwork Access Protocol
- 17 PVC=permanent virtual connection
- 18 UNI=User-Network Interface
- 19 MPOA=Multiprotocol over ATM

## Module Specifications

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### ATM Dual PHY DS3 Module

Table A-8 lists the ATM Dual PHY DS3 Module (WS-X5166) specifications.

**Table A-8 ATM Dual PHY DS3 Module 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
Cable	Coaxial (75-ohm RG-59)
Connectors	BNC (bayonet style, twist lock)
Memory:	
RAM buffer	192 KB per interface
Flash	4 MB
DRAM <sup>1</sup>	16 MB
EPROM <sup>2</sup>	512 KB
NVRAM <sup>3</sup>	128 KB
Maximum station-to-station cabling distance	Coaxial cable (DS3): 450 feet (137 meters)
Frame-to-cell conversion	AAL5, 4096 virtual circuits, 255 concurrent reassembly
Data Rate	44,736 Mbps
Line Encoding	B3ZS
Framing	C-bit parity, optionally PLCP <sup>4</sup> with M23, otherwise ADM (ATM Framing)

**Table A-8 ATM Dual PHY DS3 Module Specifications (continued)**

Specification	Description
Timing	Primary and secondary 8-kHz reference from internal (default) or network
Loopbacks	Transmit and receive
Impedance	75 ohms nominal
Indicators:	
Module status	Green (operational)
Port active status	Green (operational)
RX	Green flashing (receive activity)
TX	Green flashing (transmit activity)
ATM standards	RFC 1483 LLC <sup>5</sup> SNAP <sup>6</sup> Bridging Encapsulation (PVC <sup>7</sup> ); UNI <sup>8</sup> 3.0/3.1, Q.2931 signaling protocols; ILMI <sup>9</sup>
Network management	Cisco Discovery Protocol; SNMP <sup>10</sup> MIB <sup>11</sup> II (RFC 1213); AToM MIB (RFC 1695); Cisco Workgroup Stack MIB; Cisco VTP <sup>12</sup> MIB; ILMI MIB

- 1 DRAM=dynamic random-access memory
- 2 EPROM=erasable programmable read-only memory
- 3 NVRAM=nonvolatile RAM
- 4 PLCP = physical layer convergence procedure
- 5 LLC=Logical Link Control
- 6 SNAP=Subnet Access Protocol
- 7 PVC=permanent virtual connection
- 8 User-Network Interface
- 9 ILMI=Integrated Local Management Interface
- 10 SNMP=Simple Network Management Protocol
- 11 MIB=Management Information Base
- 12 VTP=VLAN Trunk Protocol

## Module Specifications

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### Token Ring Modules

Table A-9 describes the specifications for the following modules:

- Token Ring Module (WS-X5030)
- Fiber Token Ring Module (WS-X5031)

**Table A-9 Token Ring 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	3.9 lb (1.45 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	16 RJ-45 IEEE 802.5 Token Ring (UTP <sup>1</sup> /FTP <sup>2</sup> ) (Token Ring module) 16 Volition VF-45 MMF <sup>3</sup> connectors (fiber Token Ring module)
Frame Processing	Source-route, source-route transparent, source-route switching
Network Management	SNMP <sup>4</sup>

1 UTP=unshielded twisted-pair

2 FTP=foil twisted-pair

3 MMF=multimode fiber

4 SNMP = Simple Network Management Protocol

## Route Switch Module

Table A-10 lists the Route Switch Module (WS-X5302) specifications.

**Table A-10 Route Switch Module Specifications**

Specification	Description
Processors	2 R4700 RISC <sup>1</sup> processors running at external clock speeds of 50 MHz and internal clock speeds of 100 MHz
Memory:	
DRAM <sup>2</sup>	32-MB (minimum), 64-MB, or 128-MB main and shared memory; available in 8-MB (8 x 4), 16-MB (16 x 2 or 16 x 4), or 32-MB (32 x 4) SIMMs <sup>3</sup>
NVRAM <sup>4</sup>	128-KB nonvolatile EPROM <sup>5</sup> for the system configuration file
Flash SIMM	8-MB or 16-MB onboard Flash SIMMs for the IOS images
Flash Card	16-MB or 20-MB PC card for the IOS images; the RSM has two Flash PC card slots providing a maximum of 40-MB Flash card memory
Boot ROM	256-KB EPROM for the ROM monitor program
Interfaces	1 serial console port 1 serial auxiliary port Backplane interface: 2 SAGE ASICs <sup>6</sup>

1 RISC = Reduced Instruction Set Computing

2 DRAM = dynamic random-access memory

3 SIMMs=single in-line memory modules

4 NVRAM=nonvolatile RAM

5 EPROM=erasable programmable read-only memory

6 ASICs=application-specific integrated circuits

## Module Specifications

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### Network Analysis Module

Table A-11 lists the Network Analysis Module (WS-X5380) specifications.

**Table A-11 Network Analysis Module 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

### Fabric Integration Modules

Table A-12 describes the specifications for the following modules:

- Layer 3-Fabric Integration module (WS-X5305)
- ATM-Fabric Integration Module (WS-X5165)

**Table A-12 Fabric Integration Modules Specifications**

Specifications	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)

**Table A-12 Fabric Integration Modules Specifications (continued)**

Specifications	Description
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	Layer 3-Fabric Integration Module—8 SC-type connectors ATM-Fabric Integration Module—1 SC-type connector

## Optical Specifications

Table A-13 lists the optical specifications for the Catalyst 5000 family switching modules.

**Table A-13 Optical Specifications**

Specification	Multimode <sup>1</sup>	Single-Mode <sup>2</sup>	Single-Mode <sup>3</sup>
Transmitter output power	-19 to -14 dBm <sup>4</sup>	-14 to -8 dBm	-4.0 to -7.0 dBm
Receiver sensitivity	-32.5 to -14 dBm	32.5 to -8 dBm	N/A
Wavelength	850 to 1360 nm	1261 to 1360 nm	1261 to 1360 nm
Optical source	LED	Laser	Laser
Maximum span	1.2 miles (2 km)	6.2 miles (10 km)	18 miles (30 km)

1 Applies to modules WS-X5005, WS-X5011, WS-X5155, WS-X5114, WS-X5101, WS-X5201, WS-X5158, WS-X5161, WS-X5305, WS-X5165, WS-X5201R, and WS-X5167.

2 Applies to modules WS-X5006, WS-X5157, WS-X5114, WS-X5154, WS-X5162, and WS-X5168.

3 Applies to module WS-X5104.

4 dBm = decibels per milliwatt

## Connector Output Signal and Cable Pinout Specifications

This section lists and defines the output signals for ports on the supervisor engine module, switching modules, and the RSM. This section also defines the cable pinouts for certain interface cable connectors that connect modules to the external network. Pins that are not specifically listed are not connected.

The following is a list of the signal summaries contained in this appendix:

- Fast Ethernet MII Connector Output Signals, page A-22
- Fast Ethernet TX MDI X Port Output Signals, page A-23
- Ethernet 10BaseT RJ-21 Telco Connector Output Signals, page A-24
- ATM LANE Module (UTP) Connector Output Signals, page A-26
- FDDI Optical Bypass Connector Output Signals, page A-26
- CDDI Transmit and Receive Connector Pinouts, page A-27
- RSM Console and Auxiliary Port Pinouts, page A-28

### Fast Ethernet MII Connector Output Signals

Most Ethernet transceivers require a transceiver cable to connect an Ethernet transceiver to the supervisor engine module and Ethernet switching module Ethernet ports. Some unshielded twisted-pair (10BaseT) transceivers are compact enough to connect directly to the Ethernet module ports without impeding other connections. For descriptions of Ethernet transceivers, connectors, and cables, see Chapter 2, “Installation Preparation.”

Table A-14 lists the output signals for the 40-pin media-independent interface (MII) Fast Ethernet connector on the supervisor engine module.

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**Note** Table A-14 lists the *output signals* from the MII connector on the supervisor engine module, not the *pinouts* of the cable connecting to the module.

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**Table A-14 Supervisor Engine Module 40-Pin MII Fast Ethernet Connector Output Signals**

Pin	Signal
1, 20, 21, 40	+5V
2	MDIO
3	MDC
4	RxD<3>
5	RxD<2>
6	RxD<1>
7	RxD<0>
8	Rx_DV
9	Rx_Clk
10	Rx_Er
11	Tx_Er
12	Tx_Clk
13	Tx_En
14	TxD<0>
15	TxD<1>
16	TxD<2>
17	TxD<3>
18	Col
19	CRS
22 through 39	Common

## Fast Ethernet TX MDI X Port Output Signals

Table A-15 lists the output signals for the RJ-45 Fast Ethernet 100BaseTX MDI X connector and Fast Ethernet 100BaseTX module connectors on the supervisor engine module. The receive and transmit signals are polarized. One pin of each signal pair carries the positive (+) signal, and the other pin carries the negative (-) signal.

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**Note** Table A-15 lists the *output signals* for the RJ-45 Fast Ethernet 100BaseTX MDI X connector and Fast Ethernet 100BaseTX module connectors on the supervisor engine module, not the *pinouts* of the cable connecting to the modules.

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**Table A-15** Fast Ethernet 100BaseTX MDI X Port Output Signals

Pin	Signal	Description
1	RxD (+)	Receive Data (+)
2	RxD (-)	Receive Data (-)
3	TxD (+)	Transmit Data (+)
4	NC	No Connection
5	NC	No Connection
6	TxD (-)	Transmit Data (-)
7	NC	No Connection
8	NC	No Connection

## Ethernet 10BaseT RJ-21 Telco Connector Output Signals

Table A-16 lists the output signals for the RJ-21 telco connector on the Ethernet switching module (10BaseT 24 port) and the Ethernet switching module (10BaseT 48 port). The receive and transmit signals are polarized. One pin of each signal pair carries the positive (+) signal, and the other pin carries the negative (-) signal.

---

**Note** Table A-16 lists the *output signals* for the RJ-21 telco connector, not the *pinouts* of the cable connecting to the module.

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## Ethernet 10BaseT RJ-21 Telco Connector Output Signals

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**Table A-16 Ethernet 10BaseT RJ-21 Telco Connector Output Signals**

<b>Ethernet Port No.</b>	<b>Connector Pin No.</b>	<b>Signal</b>	<b>Connector Pin No.</b>	<b>Signal</b>
1	1	RxD (-)	26	RxD (+)
	2	TxD (-)	27	TxD (+)
2	3	RxD (-)	28	RxD (+)
	4	TxD (-)	29	TxD (+)
3	5	RxD (-)	30	RxD (+)
	6	TxD (-)	31	TxD (+)
4	7	RxD (-)	32	RxD (+)
	8	TxD (-)	33	TxD (+)
5	9	RxD (-)	34	RxD (+)
	10	TxD (-)	35	TxD (+)
6	11	RxD (-)	36	RxD (+)
	12	TxD (-)	37	TxD (+)
7	13	RxD (-)	38	RxD (+)
	14	TxD (-)	39	TxD (+)
8	15	RxD (-)	40	RxD (+)
	16	TxD (-)	41	TxD (+)
9	17	RxD (-)	42	RxD (+)
	18	TxD (-)	43	TxD (+)
10	19	RxD (-)	44	RxD (+)
	20	TxD (-)	45	TxD (+)
11	21	RxD (-)	46	RxD (+)
	22	TxD (-)	47	TxD (+)
12	23	RxD (-)	48	RxD (+)
	24	TxD (-)	49	TxD (+)
gnd	25	gnd	50	gnd

## ATM LANE Module (UTP) Connector Output Signals

Table A-17 lists the output signals for the RJ-45 connector on the ATM LANE module (UTP). The receive and transmit signals are polarized. One pin of each signal pair carries the positive (+) signal, and the other pin carries the negative (–) signal.

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**Note** Table A-17 lists the *output signals* for the RJ-45 connector on the ATM LANE module (UTP), not the *pinouts* of the cable connecting to the module.

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**Table A-17** ATM LANE Module (UTP) RJ-45 Connector Output Signals

Pin	Signal	Description
1	TxD (+)	Transmit Data +
2	TxD (–)	Transmit Data –
3	NC	No Connection
4	NC	No Connection
5	NC	No Connection
6	NC	No Connection
7	RxD (+)	Receive Data +
8	RxD (–)	Receive Data –

## FDDI Optical Bypass Connector Output Signals

Table A-18 lists the output signal descriptions for the mini-DIN connector on the optical bypass switch that is available on FDDI modules. A mini-DIN-to-DIN adapter cable connector allows connection to an optical bypass switch that uses a DIN connector.

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**Note** Table A-18 lists the *output signals* for the mini-DIN connector on the optical bypass switch, not the *pinouts* of the cable connecting to the optical bypass switch.

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**Table A-18**      **Optical Bypass Switch Mini-DIN Connector Output Signals**

Pin	Description
1	+5V to secondary switch
2	+5V to primary switch
3	Ground to enable primary switch
4	Ground to enable secondary switch
5	Sense circuit—1 kohm to +5V
6	Ground—Sense circuit return

## CDDI Transmit and Receive Connector Pinouts

Table A-19 lists the pinouts of straight-through cable connectors used with CDDI modules.

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**Note** Table A-19 lists the *pinouts* for the straight-through cable connectors used with CDDI modules, not the *output signals* of the connector on the CDDI modules.

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**Table A-19**      **CDDI Straight-Through Connector Pinouts**

Pin	Signal	Signal	Pin
1	TxD	RxD	1
2	TxD	RxD	2
3	Not Connected	Not Connected	3
4	Not Connected	Not Connected	4
5	Not Connected	Not Connected	5
6	Not Connected	Not Connected	6
7	RxD	TxD	7
8	RxD	TxD	8

## Connector Output Signal and Cable Pinout Specifications

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Table A-20 lists the pinouts for cross-connect connectors used with CDDI modules.



**Caution** Table A-20 lists the *pinouts* for the cross-connect cable connectors used with CDDI modules, not the *output signals* of the connector on the CDDI modules.

**Table A-20 CDDI Cross-Connect Connector Pinouts**

Pin	Signal	Signal	Pin
1	RxD	TxD	8
2	RxD	TxD	7
3	Not Connected	Not Connected	6
4	Not Connected	Not Connected	5
5	Not Connected	Not Connected	4
6	Not Connected	Not Connected	3
7	TxD	RxD	2
8	TxD	RxD	1

## RSM Console and Auxiliary Port Pinouts

For information on the RSM console and auxiliary port pinouts, refer to the *Catalyst 5000 Family Route Switch Module Installation and Configuration Note*.