

Catalyst 5000 Family Ethernet and Fast Ethernet Switching Modules

THE CISCO CATALYST® 5000 FAMILY PROVIDES COST-EFFECTIVE, HIGH PORT-DENSITY ETHERNET SWITCHING SOLUTIONS FOR THE WIRING CLOSET.

High-Performance Switched Ethernet and Fast Ethernet for Wiring Closets and Workgroups

A variety of switched Ethernet and Fast Ethernet modules enable high-performance desktop connectivity with support for value-added features including multicast, protocol filtering, and quality of service (QoS). With the Catalyst 5000 Family, Cisco provides a cost-effective, switched Ethernet and 10/100 alternative to shared hubs in the wiring closet.

Enhanced Multilayer Switching Performance Inline Rewrite

Used in conjunction with the NetFlow feature card (NFFC or NFFC2), Fast Ethernet switching modules have specialized hardware to enhance multilayer switching performance. These Fast Ethernet switching modules utilize dedicated hardware per port to support distributed multilayer switching functionality, thereby increasing the overall multilayer forwarding performance of the system. With NFFC technology and the Fast Ethernet switching modules, the Catalyst 5000 Family platforms support wire-speed multilayer switching, with the full support of Cisco IOS® routing protocols and the delivery of critical services such as access lists and class-of-service (CoS) differentiation. See Table 1 for modules supporting this feature.

Drop Threshold Management

Weighted Random Early Detection (WRED) provides four user-defined levels of Drop Threshold Management on egress ports of Fast Ethernet line cards when used with the NFFC II. This feature provides a proven mechanism to ensure that high priority traffic is given preference when a port transmit queue fills beyond a user defined level. See Table 1 for modules supporting this feature.

VLAN Integration, 802.1Q Support and ISL

Cisco Fast Ethernet switching modules support Inter-Switch Link (ISL) or 802.1Q Virtual LAN (VLAN) trunking on a port-by-port basis. Each port can either be assigned to a specific VLAN or act

as a VLAN trunk port for multiple VLANs. Network administrators can administer these VLAN assignments from centralized locations using CiscoWorks for Switched Internetworks (CWSI) management applications. See Table 1 for modules supporting this feature.

Flexible, Incremental Bandwidth

Catalyst 5000 Family Fast Ethernet switching modules support the Cisco Fast EtherChannel® switching technology, which provides bandwidth aggregation in multiples of 200 Mbps. For example, network managers can deploy Fast EtherChannel technology consisting of pairs of full-duplex Fast Ethernet ports to provide more than 400 Mbps between the wiring closet and the data center and up to 800 Mbps between servers and the network backbone in the data center for scalable, incremental bandwidth.

The unique Fast EtherChannel technology provides both true load balancing and failure recovery necessary for mission-critical applications. Unicast, broadcast, and multicast traffic are evenly distributed across the Fast EtherChannel links, providing high performance and redundant parallel paths. In the event of a link failure, Fast EtherChannel technology provides automatic recovery by redistributing loads across the remaining links without user intervention. The failure recovery time is subsecond, so no sessions or applications are dropped. Fast EtherChannel technology does not require the use of 802.1D Spanning-Tree Protocol (STP) to maintain topology state within the channel; rather it uses a Cisco value-added, peer-to-peer control protocol that provides autoconfiguration and subsecond, convergence times for parallel links, yet allows higher-level protocols such as the Spanning-Tree Protocol or existing routing protocols to maintain topology. This approach allows Fast EtherChannel technology to leverage the recovery features of the network without adding complexity or creating incompatibilities with third-party equipment or software. Since the STP operation is completely standards based, network managers can leverage their existing network topologies, augmenting bandwidth by installing

Fast EtherChannel technology where single Fast Ethernet links were previously installed. See Table 1 for modules supporting this feature.

Flexible Connectivity Options

The 48-port 10BaseT Ethernet switching modules use RJ-21 (telco) connectors to attach to Category 3 through Category 5 unshielded twisted pair (UTP) cable. The 24- and 48-port RJ-45 10BaseT Ethernet switching module supports Category 3 through Category 5 UTP cable. The 12- and 24-port 10/100BaseTX switching modules use RJ-45 connectors to attach to Category 5 UTP cable. The 36 port 10/100BaseTX switching modules utilize RJ-21 connectors and Category 5 UTP cable. Users can configure any interface on the Ethernet or Fast Ethernet switching modules to operate at half or full duplex. See Table 1 for modules supporting this feature.

Traffic Management and Buffering

All Catalyst 5000 Family Ethernet and Fast Ethernet switching modules have superior traffic management with large interface buffers and trilevel priority queues on the switching backplane. These features allow users to configure a higher priority for video servers or e-mail servers on any switched interface. The Catalyst 5000 Family switches maintain up to 16,000 active Media Access Control (MAC) addresses in the bridge lookup table. The standard 802.1d spanning-tree algorithm is supported on a VLAN basis for fault-tolerant connectivity. The Catalyst 5000 Family supports the formation of workgroups within and between other Catalyst switches and will extend VLANs across platforms through backbone Fast Ethernet, Gigabit, or ATM connections.

Figure 1 The Ethernet and Fast Ethernet Switching Modules Offer Connectivity for UTP, STP, and Fiber-Optic Cable



Network Management

All Catalyst 5000 Family switching modules have extensive interface-level statistics, including four Remote Monitoring (RMON) groups. For in-depth network analysis, users can utilize the Enhanced Switched Port Analyzer (Enhanced SPAN) feature of the Catalyst 5000 Family to redirect traffic from each switched port to a Catalyst 5000 Family network analysis module or a Cisco SwitchProbe® device.

Port Densities and Chassis Compatibility

All desktop Ethernet and Fast Ethernet switching modules are compatible with all Catalyst 5000 and 5500 Family switches. The entry-level Catalyst 5000 Series includes the five-slot Catalyst 5000 and two-slot Catalyst 5002. The Catalyst 5500 Series includes the Catalyst 5505, 5509, and 5500, with five-, nine-, and 13- module slots, respectively.

Table 1 Key Feature Summary

Model Number	Number of Ports	Number of Slots	Connector Type	Broadcast Suppression	ISL	802.IQ/P	Ether-Channel	Inline Rewrite	802.3x Flow Control	WRED
10/100 Modules										
WS-X5213A	12	1	RJ-45	Yes	Yes					
WS-X5203	12	1	RJ-45	Yes	Yes		Yes			
WS-X5224	24	1	RJ-45	Yes						
WS-X5225R	24	1	RJ-45	Yes	Yes	Yes	Yes	Yes	Yes	
WS-X5234-RJ45	24		RJ-45	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WS-X5239-RJ21	36	1	RJ-21	Yes	Yes	Yes	Yes	Yes	Yes	Yes
100BaseFX Modules										
WS-X5114	12	1	SC	Yes	Yes					

Table 1 Key Feature Summary (Continued)

Model Number	Number of Ports	Number of Slots	Connector Type	Broadcast Suppression	ISL	802.IQ/P	Ether-Channel	Inline Rewrite	802.3x Flow Control	WRED
WS-X5201	12	1	SC	Yes	Yes		Yes			
WS-X5201R	12	1	SC	Yes	Yes	Yes	Yes	Yes	Yes	
WS-X5236-FX-MT	24	1	MT-RJ	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WS-X5237-FX-MT	24	1	MT-RJ	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group-Switched 100BaseTX Modules										
WS-X5223	24	1	RJ-45	Yes						
10BaseT Modules										
WS-X5012	48	1	RJ-21	Yes						
WS-X5012A	48	1	RJ-21	Yes						
WS-X5013	24	1	RJ-45	Yes						
WS-X5014	48	2	RJ-45	Yes						
10BaseFL Modules										
WS-X5011	12	1	ST	Yes						

Table 1 Key Feature Summary (Continued)

- Supports multiple active MAC addresses (up to 16,000) per

Model Number	Number of Ports	Number of Slots	Connector Type	Broadcast Suppression	ISL	802.IQ/P	Ether-Channel	Inline Rewrite	802.3x Flow Control	WRED
WS-X5015-MT	24	1	MT-RJ	Yes						

- Capability for any backbone Fast Ethernet interface to support up to 1000 VLANs between Catalyst 5000 Family switching platforms and Cisco routers
- Supports broadcast, multicast, and unicast suppression

Features (All Ethernet Modules)

- IGMP snooping for fast joins and leaves on multicast groups
- Protocol filtering to minimize unnecessary traffic by protocol type (such as block IPX and SAP and RIP broadcasts for IP-only clients)
- Port security to control access and keep unauthorized users off the network
- Dynamic VLANs for automatic VLAN assignment based on user login identity or host MAC address
- QoS with trilevel priority queues on the switching backplane
- Supports any combination of switching modules; modules can be hot-swapped or added as needed without resetting the switch
- Connectivity from switched Ethernet and Fast Ethernet to Fiber Distributed Data Interface (FDDI), Gigabit Ethernet, and ATM backbones
- Wire-speed performance on the Ethernet and Fast Ethernet interfaces
- Superior traffic management with large interface buffers to accommodate bursty traffic
- Four groups of RMON on each port

Features (10/100BaseTX Modules only)

- Supports IEEE 802.3u autonegotiation process that allows the switch to negotiate speed (10 or 100 Mbps) or duplex mode (half or full duplex) with an attached device
- Autosenses speed and duplex mode if the attached device does not negotiate with the switch
- Uplink fast convergence for rapid STP convergence on wiring closet uplinks
- Backbone fast convergence for optimum STP convergence in backbone

Ethernet Switching Module Specifications

Standard Network Protocols

- Ethernet: IEEE 802.3, 10BaseT, and 10BaseFL
- Fast Ethernet IEEE 802.3u, 100BaseTX

Physical Specifications

- Occupies one slot in the Catalyst 5000 Family switch
- Dimensions (H x W x D): 1.2 x 14.4 x 16 in.
- (3 x 35.6 x 40.6 cm)
- Minimum weight: 3 lb (0.65 kg)
- Maximum weight: 5 lb (2.22 kg)

Environmental Conditions

- Operating temperature: 32 to 104°F (0 to 40°C)
- Storage temperature: -40 to 167°F (-40 to 75°C)
- Relative humidity: 10% to 90%, noncondensing

Regulator Compliance Safety Certifications

- UL 1950
- EN 60950
- CSA-C22.2 No. 950
- IEC 950
- TS 001
- AS/NZS 3260

Electromagnetic Emissions Certifications (with UTP)

- FCC Class A
- VCCI Class A (47 CFR, Part 15)
- EN 55022 Class A
- CISPR 22 Class A
- AS/NZS 3548 Class A
- ICES-003 Class A

Electromagnetic Emissions Certifications (with FTP/Fiber)

- VCCI Class B
- EN 55022 Class B
- CISPR 22 Class B
- AS/NZS 3548 Class B
- 21 CFR, Ch 1, Subchapter J (Fiber Modules)

Buffer Memory

- RAM: 192 KB per interface (WS-X5013, WS-X5014, WS-X5114, WS-X5224)
- RAM: 1.5-MB shared memory per card (WS-X5012A)
- RAM: 256 KB per interface (WS-X5201R, WS-X5225R)
- RAM: 192 KB per interface (WS-X5234-RJ45, WS-X5239-RJ21, WS-X5236-FX-MT, WS-X5237-FX-MT)

Frame Processing

- Transparent bridging (802.1d)

Network Management

- Ethernet Management Information Bases (MIBs) (RFC 1643)
- Interface table (RFC 1573)
- Bridge MIB (RFC 1493)
- Cisco WorkGroup MIB
- VLAN Trunking Protocol
- Cisco Discovery Protocol
- RMON MIB (RFC 1757)

Maximum Station-to-Station Cabling Distance

- 10BaseT Ethernet: Category 3 through Category 5 UTP: 328 ft (100m), 100-ohm STP: 328 ft (100m) half or full-duplex
- 10BaseFL Ethernet, 62.5/125-micron multimode fiber: 1.24 miles (2 km) half or full-duplex
- 10/100BaseTX and 100BaseTX Fast Ethernet: Category 5 UTP: 328 ft (100m), 100-ohm STP: 328 ft (100m) half- or full-duplex
- 100BaseFX Fast Ethernet, 62.5/125-micron multimode fiber: 1312 ft (400 m) half-duplex, 1.24 miles (2 km) full-duplex
- 100BaseFX Fast Ethernet, 8/125-micron singlemode fiber: 6.2 miles (10 km) half- or full-duplex

Indicators and Interfaces

- Status: green (operational)/red (faulty)
- Link good: green (good)/orange (disabled)/off (not connected)
- 100-Mbps Fast Ethernet: green (100 Mbps)/off (10 Mbps)
- 10BaseT: RJ-21 (female, telco) or RJ-45 (female)
- 10BaseT: RJ-45 (female) or MT-RJ (female)
- 10/100Base TX and 100BaseTX: RJ-45 (female)
- 100BaseFX: SC (female) or MT-RJ (female)

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