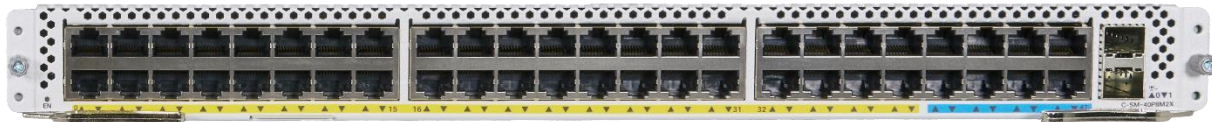


Cisco Catalyst 8000 SM-Based Switching Modules

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Built as a full-featured, integrated switching solution for today's branch office

The Cisco Catalyst™ 8000 SM-Based Switching Modules are crafted to reduce your company's Total Cost of Ownership (TCO) by integrating Multigigabit Ethernet ports within the Cisco Catalyst 8300 Series Edge Platforms. Extending the power of intent-based networking, this integration allows network administrators to configure a single box for all LAN and WAN needs, lowering network complexity and maintenance.

The Cisco Catalyst 8000 SM-Based Switching Modules provide for an enterprise-class line of features on the Cisco Catalyst 8300 Series Edge Platforms, greatly expanding the capabilities of the platform by integrating industry-leading Layer 2 switching with feature sets that resemble those found in the Cisco Catalyst 9000 switching family.

Product highlights

- Up to 48 ports of a combination of Power over Ethernet Plus (PoE+) and Cisco Universal Power over Ethernet (Cisco UPOE®) capability.
- Diverse downlink capabilities on a single module supporting data, PoE+, UPOE, or 2.5G Multigigabit Ethernet.
- Up to two 10G Enhanced Small Form-Factor Pluggable (SFP+) fiber uplinks with two 10G internal connections to the host router's forwarding plane.
- Cisco Unified Access® Data Plane (UADP) 2.0 mini compliant Application-Specific Integrated Circuit (ASIC) offers optimized scale with better cost structure.
- Enhanced security with AES-128 MACsec encryption and trustworthy systems.
- Support for SD-WAN configuration and setup through the Cisco Catalyst SD-WAN Manager.
- Device authentication through support for 802.1X capabilities.
- Support for local line-rate switching as well as high-speed throughput for traffic to and from the host router's forwarding plane through internal 10-Gbps links.
- Cisco IOS® XE:
 - Support for the Switching Module in the Cisco DNA Essentials subscription.
 - Simplified programming through NETCONF and YANG modeling.
- ASIC with programmable pipeline and micro-engine capabilities, supporting Layer 2 and Layer 3 forwarding (in conjunction with the router) and Quality of Service (QoS).

Platform details

The table and figure below describe the Cisco Catalyst 8000 SM-Based Switching Modules models and configurations.

Table 1. Product family configurations

Model	Slot form factor	1G ports (RJ-45)	2.5G (Multigigabit) ports (RJ-45)	10G ports (SFP+)
C-SM-16P4M2X	Single wide	16	4	2
C-SM-40P8M2X	Double wide	40	8	2

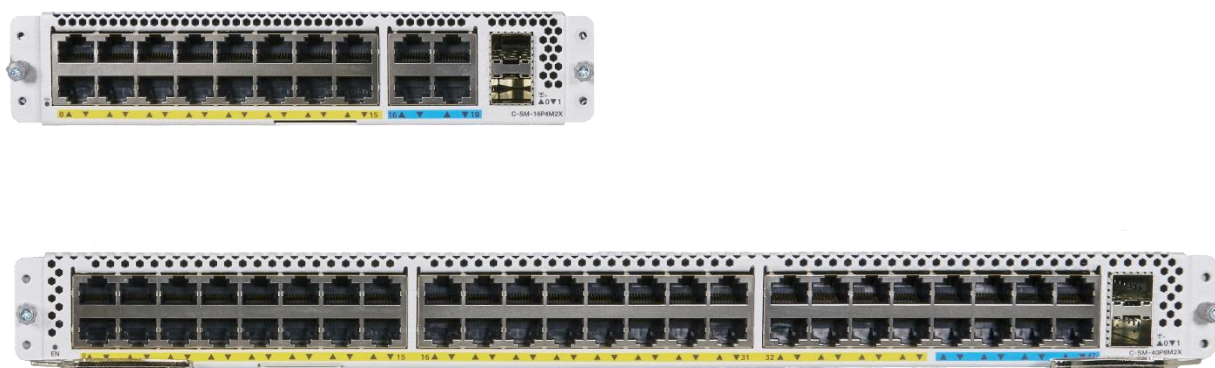


Figure 1. C-SM-16P4M2X – 22-port single wide (top) and C-SM-40P8M2X – 50-port double wide (bottom)

All Gigabit Ethernet ports support auto-negotiating 10G, 100G, and 1000 Mbps. Depending on the model, up to 8 ports of 2.5G Multigigabit support helps provide uplink connectivity to access points, uplink expansions, and cellular gateways for external Cat 18 LTE and 5G connections. Up to two 10G SFP+ based fiber ports provide for server connectivity or for high-speed aggregated connection to high-speed switches.

Both modules offer two SFP+ uplink ports, supporting both single-mode and multimode fiber. Each SFP+ port can be independently configured with a 1G SFP or a 10G SFP+ interface. The two fiber ports can be aggregated to provide a fault-tolerant Layer 2 port channel.

Ports with similar speed support aggregation leading to a port channel. Both Port Aggregation Protocol (PAgP) and Link Aggregation Control Protocol (LACP) configuration is supported on the module in addition to automatic port channel support. Up to 4 ports of 1G or 2.5G can be aggregated to form a single EtherChannel. Ports with unlike speeds may not be aggregated to form a port channel.

For the latest information on Cisco® transceiver module compatibility, refer to <https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html>.

Power over Ethernet (PoE) support

PoE removes the need for wall power to each PoE-enabled device and eliminates the cost for additional electrical cabling and circuits that would otherwise be necessary in IP phone and wireless LAN deployments, thereby providing a lower TCO for deployments that incorporate these devices or any IEEE 802.3af-compliant end device in general. The power requirements of endpoints vary based on their application, complexity, and function. For instance, basic IP phones might draw approximately 6W of power, whereas contemporary LED lighting fixtures can draw up to 50W for routine operation.

The Cisco Catalyst 8000 SM-Based Switching Modules can support PoE, PoE+, and UPOE on any of the RJ-45 copper ports (16x 1G + 4x Multigigabit or 40x 1G + 8x Multigigabit). All 20 or 48 copper ports support PoE at 15.4W and PoE+ up to 30W. The same ports support standardized 802.3af (15.4W) and 802.3at (25.5W). Up to 8 copper Ethernet Interfaces provide UPOE (60W) support per module.

The table below gives information about total PoE power output. Depending on the platform model, the available PoE power ranges from 250W to 1000W. The Catalyst 8000 Edge Platforms Family supports multiple PoE powering modes:

- **Normal mode:** Dual PoE power supplies in active/standby redundant mode.
- **Boost mode:** Two PoE power supplies in active/active mode, where both are actively supplying PoE power. Redundancy is not supported in PoE Boost mode.

Table 2. Maximum number of PoE ports supported per PoE class in active/standby mode

Active/standby redundancy mode	PoE	PoE+	UPOE
C8300-1N1S-6T (250W)	16	8	4
C8300-1N1S-4T2X (250W)	16	8	4
C8300-2N2S-6T (500W)	32	16	8
C8300-2N2S-6T (500W)	32	16	8

Table 3. Maximum number of PoE ports supported per PoE class in active/active mode

Active/active Boost mode	PoE	PoE+	UPOE
C8300-1N1S-6T (500W)	20	16	8
C8300-1N1S-4T2X (500W)	20	16	8
C8300-2N2S-6T (1000W)	48	32	16
C8300-2N2S-6T (1000W)	48	32	16

Additional PoE features include the following:

- Per-port power consumption control allows you to specify a maximum power setting on an individual port.
- The Cisco PoE MIBs provide proactive visibility into power usage and allow you to set different power-level thresholds.
- Cisco Discovery Protocol Version 2 allows the Cisco Catalyst 8000 SM-Based Switching Modules to negotiate a more granular power setting than IEEE classification provides when connecting to a Cisco powered device such as IP phones or access points.
- The Link Layer Discovery Protocol Media Endpoint Discovery (LLDP-MED) link layer discovery protocol and MIB enable interoperability in multivendor networks. Switches exchange speed, duplex, and power settings with end devices such as IP phones.

Cisco Catalyst 8000 SM-Based Switching Module software

The Cisco Catalyst 8000 SM-Based Switching Modules are supported by default on the Cisco IOS XE software running on the Cisco Catalyst 8300 Series Edge Platforms. All configurable Command-Line Interface (CLI) commands for the module are supported on the IOS that runs on the router, providing a single console for both the module and the router platform. The module is supported by all Cisco DNA subscriptions for the Cisco Catalyst 8300 Series. Where MACsec is configured, an HSEC license is required to accommodate LAN speeds. The use of MACsec is not charged against the Cisco DNA bandwidth tiers.

Cisco Catalyst 8000 SM-Based Switching Modules features overview

Table 4. Feature overview

Feature	C-SM-16P4M2X	C-SM-40P8M2X
Switch fundamentals Layer 2 fundamental switching, Spanning Tree, VLAN Trunk Protocol (VTP)	✓	✓
Maximum ports on modules	22	50
10G ports	2	2
2.5G Multigigabit ports	4	8
PoE support: PoE/PoE+/UPOE	✓	✓
Power supply redundancy	✓*	✓*
Network segmentation/Cisco TrustSec® (Security Group Tag ([SGT], Security Group Access Control List [SGACL], SGX)	✓	✓
MACsec Key Agreement Protocol, LAN MACsec (128-bit)	✓	✓

Feature	C-SM-16P4M2X	C-SM-40P8M2X
Layer 2 link control 802.1P, 802.1Q, LACP, PAgP, EtherChannel	✓	✓
Switched Port Analyzer (SPAN and RSPAN)	✓	✓

*Through host router dual power supplies.

Security feature support on Cisco Catalyst 8000 SM-Based Switching Modules

The Cisco Catalyst 8000 SM-Based Switching Modules support the following security features.

Support for 802.1X:

IEEE 802.1X port-based authentication is configured on a device to prevent unauthorized devices (supplicants) from gaining access to the network. When the switch module is installed on the router, the unit can combine the function of a router and a switch, depending on the configuration and chosen options. The Cisco Catalyst 8000 SM-Based Switching Modules support 802.1X configuration on all copper ports. The same ports support multidomain authentication, guest VLAN, and MAC Authentication Bypass (MAB).

Support for MACsec:

MACsec is the IEEE 802.1AE standard for authenticating and encrypting packets between two MACsec-capable devices. The Cisco Catalyst 8000 SM-Based Switching Modules support 128-bit (gcm-aes-128) LAN MACsec on the copper ports. In addition to MACsec, the ports support 802.1AE encryption MACsec Key

Agreement (MKA) on downlink ports for encryption between the switch and host device. The MKA Protocol provides the required session keys and manages the required encryption keys.

Port security:

Port security is used to restrict input to an interface by limiting and identifying the MAC addresses of the stations allowed to access the port. When specific MAC addresses are assigned to a secure port, the port does not forward packets with source addresses outside the group of defined addresses. If the number of secure MAC addresses is limited to a single secure MAC address, the workstation attached to that port is assured the full bandwidth of the port.

Table 5. Security features

Feature	Benefits
IEEE 802.1X	<ul style="list-style-type: none"> • IEEE 802.1X allows dynamic, port-based security, providing user authentication. • IEEE 802.1X with voice VLAN permits an IP phone to access the voice VLAN regardless of the authorized or unauthorized state of the port. • IEEE 802.1X and port security are provided to authenticate the port and manage network access for all MAC addresses, including that of the client. • IEEE 802.1X with an Access Control List (ACL) assignment allows for specific identity-based security policies regardless of where the user is connected. • IEEE 802.1X with guest VLAN allows guests without 802.1X clients to have limited network access on the guest VLAN.

Feature	Benefits
MACsec	<ul style="list-style-type: none"> • Exceptional security with integrated hardware support for MACsec is defined in IEEE 802.1AE. MACsec provides MAC layer encryption over wired networks using out-of-band methods for encryption keying. • The MKA Protocol provides the required session keys and manages the keys required for encryption when configured. MKA and MACsec are implemented following successful authentication using the 802.1X Extensible Authentication Protocol (EAP) framework. • Both the user and downlink ports (links between the switch and endpoint devices such as a PC or IP phone), as well as the network and uplink ports, can be secured using MACsec. • With MACsec you can encrypt switch-to-switch links such as access to distribution or encrypt dark fiber links within a building or between buildings.
Multidomain authentication	<ul style="list-style-type: none"> • Multidomain authentication allows an IP phone and a PC to authenticate on the same switch port while placing them on the appropriate voice and data VLAN.
MAC Authentication Bypass (MAB)	<ul style="list-style-type: none"> • MAB for voice allows third-party IP phones without an 802.1X supplicant to get authenticated using the MAC address.
Switched Port Analyzer (SPAN and RSPAN)	<ul style="list-style-type: none"> • Bidirectional data support on the SPAN port allows the any intrusion detection system to take action when an intruder is detected.
Centralized authentication	<ul style="list-style-type: none"> • TACACS+ and RADIUS authentication facilitates centralized control of the switch and restricts unauthorized users from altering the configuration.
MAC address notification	<ul style="list-style-type: none"> • MAC address notification allows administrators to be notified of users added to or removed from the network.
Port security	<ul style="list-style-type: none"> • Port security secures the access to an access or trunk port based on MAC address.

Table 6. How the Cisco Catalyst 8000 SM-Based Switching Modules address customer needs

Customer need	How addressed by the switching modules
Scalability with high-performance LAN traffic	<ul style="list-style-type: none"> • Layer 2 traffic is switched locally on board the module.
High-speed LAN connections	<ul style="list-style-type: none"> • Maintain switch-to-access point reach at Multigigabit (2.5G) speeds: Support for access extensions and uplinks. • 10G fiber connections provide for high-speed server or LAN backbone connections.
Layer 2 security for protecting the integrity and confidentiality of all traffic on the LAN	<ul style="list-style-type: none"> • 1G Ethernet copper ports support LAN MACsec to LAN endpoints. • 2.5G (Multigigabit) LAN MACsec protects traffic to access points, cellular gateways, or high-speed servers.
Applying Layer 3 services to switched traffic	<ul style="list-style-type: none"> • Since the switch module is Layer 2 capable only, the host router's Switch Virtual Interface (SVI) is used for applying Layer 3 services to traffic traversing the switch. • An SVI service provides a limited set of Layer 3 features and is fully software operated. As such, throughput when using the SVI will depend on the types and combination of services applied to traffic.
Scaling network infrastructure across multiple sites	<ul style="list-style-type: none"> • An integrated switch solution lowers operating costs, simplifies troubleshooting, and enables businesses to scale.

Customer need	How addressed by the switching modules
Lowering costs of operating multiple devices at the branch office	<ul style="list-style-type: none"> The modules offer a lower Mean Time To Repair (MTTR). One vendor means one support center to decrease troubleshooting time and eliminate finger pointing among vendors. Cisco Smart Net Total Care® support covers both 8300 Series and Cisco switch module devices.
Maximizing IT resources	<ul style="list-style-type: none"> Single host router-based unified IOS software helps ensure that the IT team has to install and certify only one operating system.
Investment protection by helping ensure compatibility with future networks to deliver leading technology	<ul style="list-style-type: none"> Cisco Catalyst 8000 SM-Based Switching Modules and Cisco Catalyst 9000 switches both run the same Cisco IOS XE software base, helping ensure a consistent user experience. Cisco Catalyst 9000 switches and Cisco Catalyst 8000 SM-Based Switching Modules both support the latest UADP 2.0 ASIC, helping ensure cross-platform support for the latest innovations.
High availability that minimizes downtime that affects business operations	<ul style="list-style-type: none"> A single-box and single IOS solution simplifies remote management and improves services interoperability to help ensure the highest reliability. End-to-end testing for standards-based and innovative Cisco proprietary features provides superior services interoperability and excellent value. The modules use the redundant power supplies of the host Cisco Catalyst 8300 Series platforms. Fewer components (for example, power supplies and fans) means fewer failures and less downtime.
Sustainability	<ul style="list-style-type: none"> The modules offer lower power consumption than previous generation of switch modules. Because no additional rack space or power supply is needed, there is less to rack, stack, and cool.

Product specifications

Performance and scalability

Performance and scalability metrics for the Cisco Catalyst 8000 SM-Based Switching Modules are provided in the table below.

Table 7. Performance specifications

Description	C-SM-16P4M2X	C-SM-40P8M2X
Total number of MAC addresses	32,000	32,000
VLAN IDs	1000	1000
Jumbo frames	9216 bytes	9216 bytes

Physical and environmental specifications

Table 8. Physical and environmental specifications

Description	Dimensions: W x D x H	Weight	Operational temperature	Non- operational temperature	Operational humidity	Non- operational humidity
C-SM-16P4M2X	17.25 x 18.5 x 3.5 in. (43.82 x 46.99 x 8.9 mm)	19.4 lb (8.8 kg)	40° C (104° F)	-20° to 65° C (-4° to 149° F)	85%	95%
C-SM-40P8M2X	41.2 x 20.7 x 4.0 in. (104.64 x 52.57 x 42.54 mm)	40 lb (18.1 kg)	40° C (104° F)	-20° to 65° C (-4° to 149° F)	85%	95%

Product summary

In summary, the Cisco Catalyst 8000 SM-Based Switching Modules enable a higher level of control and security through the support of per-port 802.1X and MACsec capabilities. The switching modules also offer enhanced PoE power levels with the introduction of IEEE 802.3bt UPOE, broadening the span of network equipment powered from the switch. By minimizing operating expenses without sacrificing any advanced switching features, the Cisco Catalyst 8000 SM-Based Switching Modules can help you maximize your return on investment for the network infrastructure and accelerate the deployment of productivity-enhancing services to your enterprise branch offices or small to midsize business offices.

Regulatory compliance, safety, EMC, telecommunications, and network homologation

When installed in a Cisco Catalyst 8300 Series Edge Platform, the Cisco Catalyst 8000 SM-Based Switching Modules do not change the standards (regulatory compliance, safety, EMC, telecom, or network homologation) of the router itself. For more information about these routers, please visit:

<https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8300-series-edge-platforms/datasheet-c78-744088.html>.

Ordering information

The Cisco Catalyst 8000 SM-Based Switching Modules can be ordered with Cisco Catalyst 8300 Series Edge Platforms. To place an order, refer to the table, Cisco Catalyst 8200/8300 Edge Platforms [Ordering Guide](#) and visit the [Cisco Ordering homepage](#).

Warranty information

The Cisco Catalyst 8000 SM-Based Switching Modules have a 90-day limited liability warranty.

Cisco environmental sustainability

Information about Cisco’s environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the “Environment Sustainability” section of Cisco’s [Corporate Social Responsibility](#) (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the “Environment Sustainability” section of the CSR Report) are provided in the following table.

Table 9. Links to sustainability topics

Sustainability topic	Reference
Information on product material content laws and regulations	Materials
Information on electronic waste laws and regulations, including products, batteries, and packaging	WEEE compliance

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

Cisco and partner services

Services from Cisco and our certified partners help you transform your network and data center, helping you accelerate business innovation and growth. We have the expertise to create a clear, replicable, optimized footprint across technologies. Planning and design services align technology with your business goals and can increase deployment efficiency. Technical services help you improve operational efficiency, save money, and mitigate risk. Optimization services help you continuously improve performance and succeed with new technologies. For more information, please visit <https://www.cisco.com/go/services>.

Cisco Smart Net Total Care technical support for the Cisco Catalyst 8000 SM-Based Switching Modules is available on a one-time or annual contract basis. Support options range from help-desk assistance to proactive, onsite consultation. All support contracts include:

- Major Cisco IOS Software updates for protocol, security, bandwidth, and feature improvements.
- Full access rights to Cisco.com technical libraries for technical assistance, electronic commerce, and product information.
- Access 24 hours a day to the industry’s largest dedicated technical support staff.

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Flexible payment solutions to help you achieve your objectives

Cisco Capital® makes it easier to get the right technology to achieve your objectives, enable business transformation, and stay competitive. We can help you reduce the total cost of ownership, conserve capital, and accelerate growth. In more than 100 countries, our flexible payment solutions can help you acquire hardware, software, services, and complementary third-party equipment in easy, predictable payments. [Learn more.](#)

For more information

For more information about the Cisco Catalyst 8000 SM-Based Switching Modules, visit <https://www.cisco.com/> or contact your local Cisco account representative.

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