



BRITISH COLUMBIA
INSTITUTE OF TECHNOLOGY

Blue Sky Mining Project

Bill of Material (BOM)

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Bill of Materials

Zone 1:

Equipment ID	Description	Equipment Price (bitcoin)	Number of Equipment	Cost (bitcoin)
05.01.001.1	IT Cisco Switch PoE PoE SF350-24p	0.0357	1	0.0357
05.01.003.1-2	OT Cisco Switch IE-4000-8GT4G-E	0.0429	2	0.0858
05.01.004.1-2	Redundant Controllers	0.4268	2	0.8536
05.01.011.1-8	Computers; IT, Eng. Workstation and HMIs(I included PLC into this list)	0.0214	6	0.1284
05.01.014.1-4	PoE CCTV	0.0100	4	0.0400
05.01.015.1-2	VoIP telephone	0.0010	2	0.0020

Zone 2:

Equipment ID	Description	Equipment Price	Number of Equipment	Cost (bitcoin)
05.02.001.1	IT Cisco Switch PoE PoE SF350-24p	0.0357	1	0.0357
05.2.003.1	OT Cisco Switch IE-4000-8GT4G-E	0.0429	1	0.0429
05.02.006.1	Non-redundant Controllers	0.2142	1	0.2142
05.02.011.1-3	Computers; IT, Eng. Workstation and HMIs	0.0214	3	0.0642
05.02.016.1-2	CCTV	0.0100	2	0.02
05.02.008.1	PLC	0.0714	1	0.0714

Zone 3:

Equipment ID	Description	Equipment Price	Number of Equipment	Cost (bitcoin)
05.03.001.1	IT Cisco Switch PoE PoE SF350-24p	0.0357	1	0.0357
05.03.003.1-2	OT Cisco Switch IE-4000-8GT4G-E	0.0429	2	0.0858
05.03.005.1-3	Redundant Controller with Device net	0.5000	3	1.500
05.03.007.1-3	Non-Redundant Controller with Devicenet	0.2857	3	0.8571
05.03.013.1	IT Wireless Access Point	0.0428	1	0.0428
05.03.015.1-10	VoIP telephone	0.0010	10	0.01
05.03.016.1-10	CCTV	0.0080	10	0.08
05.03.018.1-3	On-line x-ray florescent analyzer	0.0300	3	0.09
05.03.008.1-3	PLC	0.0714	3	0.2142

Zone 4:

Equipment ID	Description	Equipment Price	Number of Equipment	Cost (bitcoin)
05.04.001.1	IT Cisco Switch PoE PoE SF350-24p	0.0357	1	0.0357
05.04.003.1	OT Cisco Switch IE-4000-8GT4G-E	0.0429	1	0.0429
05.04.013.1	IT Wireless Access Point	0.0428	1	0.0428
05.04.011.1-2	Computers; IT, Eng. Workstation and HMIs	0.0214	2	0.0642
05.04.015.1-2	VoIP telephone	0.0010	2	0.002
05.04.008.1	PLC	0.0714	1	0.0714

Zone 5:

Equipment ID	Description	Equipment Price	Number of Equipment	Cost (bitcoin)
05.05.001.1	IT Cisco Switch PoE SF350-24p	0.0357	1	0.0357
05.05.003.1	OT Cisco Switch IE-4000-8GT4G-E	0.0429	1	0.0429
05.05.006.1	Non-Redundant Controllers	0.2142	1	0.2142
05.05.011.1	Computers; IT, Eng. Workstation and HMIs	0.0214	1	0.0214
05.05.019.1	Environmental Monitoring Analyzer	0.0150	1	0.015

05.05.015.1	VoIP telephone	0.0010	1	0.001
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Zone 6:

Equipment ID	Description	Equipment Price	Number of Equipment	Cost (bitcoin)
05.06.001.1	IT Cisco Switch PoE PoE SF350-24p	0.0357	1	0.0357
05.06.003.1	OT Cisco Switch IE-4000-8GT4G-E	0.0429	1	0.0429
05.06.006.1	Non-redundant Controllers	0.2142	1	0.2142
05.06.011.1-3	Computers; IT, Eng. Workstation and HMIs	0.0214	3	0.0214
05.06.015.1-2	VoIP telephone	0.0010	2	0.002
05.06.023.1	Control LAN	0.0120	1	0.012
05.06.008.1-7	PLC	0.0714	7	0.1428

Zone 7:

Equipment ID	Description	Equipment Price	Number of Equipment	Cost (bitcoin)
05.07.001.1-2	IT Cisco Switch PoE PoE SF350-24p	0.0357	2	0.0714
05.07.003.1-2	OT Cisco Switch IE-4000-8GT4G-E	0.0429	2	0.0858
05.07.002.1-2	OT Ciso Switch PoE IE-5000-12S12P-10G	0.0643	2	0.1286
05.07.013.1	IT wireless access point	0.0428	1	0.04280
05.07.011.1-13	Computers; IT, Eng. Workstation and HMIs	0.0214	13	0.02354
05.07.015.1-10	VoIP telephone	0.0010	10	0.0100
05.07.009.1-2	OT firewall	0.0714	2	0.1428
05.07.020.1	Data Historian Server	0.5100	1	0.5100
05.07.021.1	Redundant Data Historian Server	0.5500	1	0.5500
05.07.024.1	Control System Server	0.5000	1	0.5000
05.07.025.1	Redundant Control System Server	0.5300	1	0.5300

Zone 8:

Equipment ID	Description	Equipment Price	Number of Equipment	Cost (bitcoin)
05.08.001.1	IT Cisco Switch PoE PoE SF350-24p	0.0357	1	0.0357
05.08.003.1-2	OT Cisco Switch IE-4000-8GT4G-E	0.0429	2	0.0858
05.08.011.1-9	Computers; IT, Eng. Workstation and HMIs	0.0214	9	0.1926
05.08.022.1	Coffee Machine	0.0010	1	0.001
05.08.012.1	IT Industrial Wireless Access Point	0.1143	1	0.1143

Total Cost:

The total cost for the network based on all the equipment found in the eight zones totals to **8.88 bitcoin**.



TM
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Devices Datasheet

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Cisco 350 Series Managed Switches

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Easy-to-Use Managed Switches That Provide the Ideal Combination of Features and Affordability

To stay ahead in a competitive marketplace, businesses need to make every dollar count. That means getting the most value from your technology investments, but it also means making sure that employees have fast, reliable access to the business tools and information they need. Every minute an employee waits for an unresponsive application and every minute your network is down has an effect on your profits. The importance of maintaining a strong and dependable business network only grows as your business adds more employees, applications, and network complexity.

When your business needs advanced security and features but value is still a top consideration, you're ready for the new generation of Cisco® Small Business managed switches: the Cisco 350 Series (Figure 1).



Figure 1.
Cisco 350 Series Managed Switches

Cisco 350 Series Switches

The Cisco 350 Series, part of the Cisco Small Business line of network solutions, is a portfolio of affordable managed switches that provides a reliable foundation for your business network. These switches deliver the features you need to improve the availability of your critical business applications, protect your sensitive information, and optimize your network bandwidth to deliver information and applications more effectively. Easy to set up and use, the Cisco 350 Series provides the ideal combination of affordability and capabilities for small businesses and helps you create a more efficient, better-connected workforce.

The Cisco 350 Series is a broad portfolio of fixed-configuration managed Ethernet switches. Models are available with 8 to 48 ports of Fast Ethernet and 10 to 52 ports of Gigabit Ethernet connectivity, providing optimal flexibility to create exactly the right network foundation for your business. However, unlike other small business switching solutions that provide managed network capabilities only in the costliest models, all Cisco 350 Series Switches support the advanced security management capabilities and network features you need to support business-class data, voice, security, and wireless technologies. At the same time, these switches are simple to deploy and configure, allowing you to take advantage of the managed network services your business needs.

Business applications

Whether you need a basic high-performance network to connect employee computers or a solution to deliver data, voice, and video services, the Cisco 350 Series offers a solution to meet your needs. Possible deployment scenarios include:

- **Secure desktop connectivity:** Cisco 350 Series Switches can simply and securely connect employees working in small offices with each other and with all of the servers, printers, and other devices they use. High performance and reliable connectivity help speed file transfers and data processing, improve network uptime, and keep your employees connected and productive.
- **Secure wireless connectivity:** With its advanced security features, Power over Ethernet, Auto Smartports, QoS, VLAN, and access control features, the Cisco 350 Series Switches are the perfect foundation to add business-grade wireless to a business network.
- **Unified communications:** As a managed network solution, the Cisco 350 Series provides the performance and advanced traffic-handling intelligence you need to deliver all communications and data over a single network. Cisco offers a complete portfolio of IP telephony and other unified communications products designed for businesses. Cisco 350 Series Switches have been rigorously tested to help ensure easy integration and full compatibility with these and other products, providing a complete business solution.
- **Highly secure guest connectivity:** Cisco 350 Series Switches let you extend highly secure network connectivity to guests in a variety of settings, such as a hotel, an office waiting room, or any other area open to nonemployee users. Using powerful but easy-to-configure security and traffic segmentation capabilities, you can isolate your vital business traffic from guest services and keep guests' network sessions private from each other.

Features and benefits

Cisco 350 Series switches provide the advanced feature set that growing businesses require and that highbandwidth applications and technologies demand. These switches can improve the availability of your critical applications, protect your business information, and optimize your network bandwidth to more effectively deliver information and support applications. The switches provide the following benefits.

Ease of management and deployment

Cisco 350 Series switches are designed to be easy to use and manage by commercial customers or the partners that serve them. They feature:

- Cisco Smart Network Application (SNA) is an innovative network-level monitoring and management tool embedded in Cisco 100 to 500 Series switches. It can discover network topology, display link status, monitor events, apply configurations, and upgrade software images across multiple switches in the network.
- The FindIT Network Manager and Probe are designed to manage Cisco 100 to 500 Series switches, routers, and wireless access points. The Manager lets you proactively manage the network instead of just reacting to events. FindIT Network Management is the perfect addition to your business network. For more information, visit <https://www.cisco.com/go/findit>.
- The Cisco FindIT Network Discovery Utility works through a simple toolbar on your web browser to discover Cisco devices on the network and display basic device information, inventory, and new firmware updates to aid in the configuration and speed the deployment of Cisco Small Business products. For more information, visit <https://www.cisco.com/go/findit>.
- The USB port on the front panel of the switch enables easy image and configuration transfer for faster deployment or upgrade.
- Simple-to-use graphical interfaces reduce the time required to deploy, troubleshoot, and manage the network and allow you to support sophisticated capabilities without increasing IT head count.
- The switches also support Textview, a full Command-Line Interface (CLI) option for partners that prefer it.
- Using Auto Smartports intelligence, the switch can detect a network device connected to any port and automatically configure the optimal security, Quality of Service (QoS), and availability on that port.
- Cisco Discovery Protocol discovers Cisco devices and allows devices to share critical configuration information, simplifying network setup and integration.
- Support for Simple Network Management Protocol (SNMP) allows you to set up and manage your switches and other Cisco devices remotely from a network management station, improving IT workflow and mass configurations.

High reliability and resiliency

In a growing business where availability 24 hours a day, 7 days a week is critical, you need to assure that employees can always access the data and resources they need. The Cisco 350 Series supports dual images, allowing you to perform software upgrades without having to take the network offline or worry about the network going down during the upgrade.

Strong security

Cisco 350 Series switches provide the advanced security features you need to protect your business data and keep unauthorized users off the network:

- Embedded Secure Sockets Layer (SSL) encryption protects management data traveling to and from the switch.
- Extensive Access Control Lists (ACLs) restrict sensitive portions of the network to keep out unauthorized users and guard against network attacks.
- Guest VLANs let you provide Internet connectivity to nonemployee users while isolating critical business services from guest traffic.
- Support for advanced network security applications such as IEEE 802.1X port security tightly limits access to specific segments of your network. Web-based authentication provides a consistent interface to authenticate all types of host devices and operating systems, without the complexity of deploying IEEE 802.1X clients on each endpoint.
- Advanced defense mechanisms, including dynamic Address Resolution Protocol (ARP) inspection, IP Source Guard, and Dynamic Host Configuration Protocol (DHCP) snooping, detect and block deliberate network attacks. Combinations of these protocols are also referred to as IP-MAC port binding (IPMB).
- IPv6 First Hop Security extends the advanced threat protection to IPv6. This comprehensive security suite includes ND inspection, RA guard, DHCPv6 guard, and neighbor binding integrity check, providing unparalleled protection against a vast range of address spoofing and man-in-the-middle attacks on IPv6 networks.
- Time-based ACLs and port operation restrict access to the network during predesignated times such as business hours.
- Uniform MAC address-based security can be applied automatically to mobile users as they roam between wireless access points.
- Secure Core Technology (SCT) helps ensure that the switch is able to process management traffic in the face of a Denial-of-Service (DoS) attack.
- Private VLAN Edge (PVE) provides Layer 2 isolation between devices on the same VLAN.
- Storm control can be applied to broadcast, multicast, and unknown unicast traffic.
- Protection of management sessions occurs using RADIUS, TACACS+, and local database authentication as well as secure management sessions over SSL, SSH, and SNMPv3.
- DoS attack prevention maximizes network uptime in the presence of an attack.

Power over Ethernet

Cisco 350 Series Switches are available with up to 48 PoE ports. This capability simplifies advanced technology deployments such as IP telephony, wireless, and IP surveillance by allowing you to connect and power network endpoints over a single Ethernet cable. With no need to install separate power supplies for IP phones or wireless access points, you can take advantage of advanced communications technologies more quickly and at a lower cost. Models support 802.3af PoE, 802.3at PoE+, and 60 Watt PoE.

Multigigabit performance

Network needs are changing quickly. Thanks to evolving wireless standards and the rising number of wireless devices, keeping up with data rates and growing traffic can be a challenge. Your traditional Ethernet infrastructure can support speeds up to 1 Gigabit per second (Gbps), but competing today requires much more capacity. One option is completely replacing your older cabling infrastructure and upgrading your hardware. But wouldn't it be better to increase network speed and traffic capacity in a way that's quick, inexpensive, and efficient?

Cisco's new Multigigabit Ethernet switches offer just that: an easy-to-deploy, budget-friendly solution that allows you to increase network speed and bandwidth using your existing cables. By partnering with other industry leaders to form the NBASE-T Alliance, Cisco uses NBASE-T technology to help you get more out of your existing infrastructure. Save time and money by avoiding upgrades and extending the life of your installed cable plants. And discover the benefits of meeting consumer demand for increased bandwidth and speeds without a large initial investment.

Multigigabit Ethernet technology uses capabilities in your existing cabling infrastructure to meet bandwidth requirements and provide up to five times the performance. The technology enables intermediate data rates of 2.5 and 5 Gbps to ease the jump between traditional rates of 1 Gbps and 10 Gbps. These intermediate rates run on most installed cables and preserve older UTP wiring, which is good for 802.11ac wireless LAN applications.

The technology also supports Power over Ethernet (PoE) forms, including PoE+ and 60W PoE. Cisco

Multigigabit Ethernet switches help you avoid having to run multiple cables between switches and access points and let your networks welcome next-generation traffic speeds and data rates.

Networkwide automatic voice deployment

Using a combination of Cisco Discovery Protocol, LLDP-MED, Auto Smartports, and Voice Services Discovery Protocol (or VSDP, a unique Cisco protocol), customers can deploy an end-to-end voice network dynamically. The switches in the network automatically converge around a single voice VLAN and QoS parameters and then propagate them out to the phones on the ports, where they are discovered. For example, automated voice VLAN capabilities let you plug any IP phone (including third-party phones) into your IP telephony network and receive an immediate dial tone. The switch automatically configures the device with the right VLAN and QoS parameters to prioritize voice traffic.

IPv6 support

As the IP address scheme evolves to accommodate a growing number of network devices, the Cisco 350

Series can support the transition to the next generation of networking and operating systems such as Windows 8, Vista, and Linux. These switches continue to support previous-generation IPv4, allowing you to evolve to the new IPv6 standard at your own pace and helping ensure that your current network will continue to support your business applications in the future. Cisco 350 Series switches have successfully completed rigorous IPv6 testing and have received the USGv6 and IPv6 Gold certification.

Advanced layer 3 traffic management

The Cisco 350 Series enables a more advanced set of traffic management capabilities to help growing businesses organize their networks more effectively and efficiently. For example, the switches provide static LAN Layer 3 routing, allowing you to segment your network into workgroups and communicate across VLANs without degrading application performance.

With these capabilities, you can boost the efficiency of your network by offloading internal traffic-handling tasks from your router and allowing it to manage primarily external traffic and security.

Power efficiency

The Cisco 350 Series integrates a variety of power-saving features across all models, providing the industry's most extensive energy-efficient switching portfolio. These switches are designed to conserve energy by optimizing power use, which helps protect the environment and reduce your energy costs. They provide an eco-friendly network solution without compromising performance. Cisco 350 Series switches feature:

- Support for the Energy Efficient Ethernet (IEEE 802.3az) standard, which reduces energy consumption by monitoring the amount of traffic on an active link and putting the link into a sleep state during quiet periods
- The latest Application-Specific Integrated Circuits (ASICs)
- Automatic power shutoff on ports when a link is down
- LEDs that can be turned off to save power
- Embedded intelligence to adjust signal strength based on the length of the connecting cable

Expansion ports

The Cisco 350 Series provides more ports per Gigabit Ethernet switch than traditional switch models, giving you more flexibility to connect and empower your business. Gigabit Ethernet models offer 28 to 52 ports to give you more value, versus the 24-port or 48-port varieties with four shared ports that's common in the market. The Cisco 350 Series also offers small form-factor pluggable (SFP) expansion slots that give you the option to add fiber-optic or Gigabit Ethernet uplink connectivity to the switch. With the ability to increase the connectivity range of the switches, you have more flexibility to design your network around your unique business environment and to easily connect switches on different floors or across the business.

Peace of mind and investment protection

Cisco 350 Series switches offer the reliable performance and peace of mind you expect from a Cisco switch. When you invest in the Cisco 350 Series, you gain the benefits of:

- Limited lifetime warranty with Next-Business-Day (NBD) advance replacement (where available; otherwise same day ship).
- A solution that has been rigorously tested to help ensure optimal network uptime to keep employees connected to primary resources and productive.
- A solution designed and tested to easily and fully integrate with other Cisco voice, unified communications, security, and networking products as part of a comprehensive technology platform for your business.
- Complimentary software updates for bug fixes for the warranty term. To download software updates, go to <https://software.cisco.com/download/home>.
- Telephone technical support at no charge for the first 12 months following the date of purchase.
- Product warranty terms and other information applicable to Cisco products are available at <https://www.cisco.com/go/warranty>.
- Cisco Small Business products are supported by professionals in Cisco Small Business Support Center locations worldwide who are specifically trained to understand your needs. The Cisco Small Business Support Community, an online forum, enables you to collaborate with your peers and reach Cisco technical experts for support information.

Cisco limited lifetime hardware warranty

Cisco 350 Series switches offer a limited lifetime hardware warranty with NBD advance replacement (where available; otherwise same day ship) and a limited lifetime warranty for fans and power supplies.

In addition, Cisco offers software application updates for bug fixes for the warranty term and telephone technical support at no charge for the first 12 months following the date of purchase. To download software updates, go to <https://software.cisco.com/download/home>.

Product warranty terms and other information applicable to Cisco products are available at <https://www.cisco.com/go/warranty>.

World-class service and support

Your time is valuable, especially when you have a problem affecting your business. Cisco 350 Series switches are backed by Cisco SMARTnet[®] Total Care[™] which provides affordable peace-of-mind coverage. Delivered by Cisco and backed by your trusted partner, this comprehensive service includes software updates and access to the Cisco Support Center, and it extends technical service to three years.

Cisco SMB products are supported by professionals in the Cisco Support Center, a dedicated resource for small business customers and networks, with locations worldwide that are specifically trained to understand your needs. You also have access to extensive technical and product information through the Cisco Support Community, an online forum that enables you to collaborate with your peers and reach Cisco technical experts for support information.

Product specifications

Table 1 gives the product specifications for the Cisco 350 Series Switches.

Table 1. Product specifications

Feature	Description		
Performance			
Switching capacity and forwarding rate All switches are wire speed and nonblocking	Model Name	Capacity in Millions of Packets per Second (mpps) (64-byte packets)	Switching Capacity in Gigabits per Second (Gbps)
	SF350-08	1.19	1.6
	SF352-08	4.17	5.6
	SF352-08P	4.17	5.6
	SF352-08MP	4.17	5.6
	SF350-24	9.52	12.8
	SF350-24P	9.52	12.8
	SF350-24MP	9.52	12.8
	SF350-48	13.09	17.6
	SF350-48P	13.09	17.6
	SF350-48MP	13.09	17.6
	SG350-8PD	46.13	62.0
	SG350-10	14.88	20.0
	SG350-10P	14.88	20.0
	SG350-10MP	14.88	20.0
	SG355-10MP	14.88	20.0

Feature	Description
	SG350-10SFP 14.88 20.0
	SG350-20 29.76 40.0
	SG350-28 41.66 56.0
	SG350-28P 41.66 56.0
	SG350-28MP 41.66 56.0
	SG350-28SFP 41.66 56.0
	SG350-52 77.38 104.0
	SG350-52P 77.38 104.0
	SG350-52MP 77.38 104.0
Layer 2 Switching	
Spanning Tree Protocol	<p>Standard 802.1d Spanning Tree support</p> <p>Fast convergence using 802.1w (Rapid Spanning Tree [RSTP]), enabled by default</p> <p>Multiple Spanning Tree instances using 802.1s (MSTP); 8 instances are supported</p> <p>Per-VLAN Spanning Tree Plus (PVST+) and Rapid PVST+ (RPVST+); 126 instances are supported</p>
Port grouping/link aggregation	<p>Support for IEEE 802.3ad Link Aggregation Control Protocol (LACP)</p> <ul style="list-style-type: none"> • Up to 8 groups • Up to 8 ports per group with 16 candidate ports for each (dynamic) 802.3ad link aggregation
VLAN	<p>Support for up to 4,094 VLANs simultaneously</p> <p>Port-based and 802.1Q tag-based VLANs; MAC-based VLAN; protocol-based VLAN; IP subnet-based VLAN,</p> <p>Management VLAN</p> <p>Private VLAN with promiscuous, isolated, and community port</p> <p>Private VLAN Edge (PVE), also known as protected ports, with multiple uplinks</p> <p>Guest VLAN; unauthenticated VLAN</p> <p>Dynamic VLAN assignment via RADIUS server along with 802.1x client authentication</p> <p>CPE VLAN</p>

Voice VLAN	Voice traffic is automatically assigned to a voice-specific VLAN and treated with appropriate levels of QoS Auto voice capabilities deliver networkwide zero-touch deployment of voice endpoints and call control devices
Multicast TV VLAN	Multicast TV VLAN allows the single multicast VLAN to be shared in the network while subscribers remain in separate VLANs. This feature is also known as Multicast VLAN Registration (MVR)

Feature	Description
VLAN Translation	Support for VLAN One-to-One Mapping. In VLAN One-to-One Mapping, on an edge interface C-VLANs are mapped to S-VLANs and the original C-VLAN tags are replaced by the specified S-VLAN
Q-in-Q	VLANs transparently cross a service provider network while isolating traffic among customers
Selective Q-in-Q	Selective Q-in-Q is an enhancement to the basic Q-in-Q feature and provides, per edge interface, multiple mappings of different C-VLANs to separate S-VLANs Selective Q-in-Q also allows configuring of Ethertype (TPID) of the S-VLAN tag Layer 2 protocol tunneling over Q-in-Q is also supported
Generic VLAN Registration Protocol (GVRP)/Generic Attribute Registration Protocol (GARP)	Generic VLAN Registration Protocol (GVRP) and Generic Attribute Registration Protocol (GARP) enable automatic propagation and configuration of VLANs in a bridged domain
Unidirectional Link Detection (UDLD)	UDLD monitors physical connection to detect unidirectional links caused by incorrect wiring or cable/port faults to prevent forwarding loops and blackholing of traffic in switched networks
Dynamic Host Configuration Protocol (DHCP) Relay at Layer 2	Relay of DHCP traffic to DHCP server in different VLAN; works with DHCP Option 82
Internet Group Management Protocol (IGMP) versions 1, 2, and 3 snooping	IGMP limits bandwidth-intensive multicast traffic to only the requesters; supports 2K multicast groups (source-specific multicasting is also supported)
IGMP Querier	IGMP querier is used to support a Layer 2 multicast domain of snooping switches in the absence of a multicast router
Head-Of-Line (HOL) blocking	HOL blocking prevention

Loopback Detection	Loopback detection provides protection against loops by transmitting loop protocol packets out of ports on which loop protection has been enabled. It operates independently of STP
Layer 3	
IPv4 routing	Wirespeed routing of IPv4 packets Up to 990 static routes and up to 128 IP interfaces
IPv6 routing	Wirespeed routing of IPv6 packets
Layer 3 Interface	Configuration of Layer 3 interface on physical port, LAG, VLAN interface, or loopback interface
Classless Interdomain Routing (CIDR)	Support for classless interdomain routing
Policy-Based Routing (PBR)	Flexible routing control to direct packets to different next hop based on IPv4 or IPv6 ACL

Feature	Description
DHCP Server	Switch functions as an IPv4 DHCP server serving IP addresses for multiple DHCP pools/scopes Support for DHCP options
DHCP relay at Layer 3	Relay of DHCP traffic across IP domains
User Datagram Protocol (UDP) relay	Relay of broadcast information across Layer 3 domains for application discovery or relaying of bootP/DHCP packets
Security	
Secure Shell (SSH) Protocol	SSH is a secure replacement for Telnet traffic. SCP also uses SSH. SSH v1 and v2 are supported
Secure Sockets Layer (SSL)	SSL support: Encrypts all HTTPS traffic, allowing highly secure access to the browserbased management GUI in the switch
IEEE 802.1X (Authenticator role)	802.1X: RADIUS authentication and accounting, MD5 hash; guest VLAN; unauthenticated VLAN, single/multiple host mode and single/multiple sessions Supports time-based 802.1X Dynamic VLAN assignment

Web-based authentication	Web based authentication provides network admission control through web browser to any host devices and operating systems
STP Bridge Protocol Data Unit (BPDU) Guard	A security mechanism to protect the network from invalid configurations. A port enabled for BPDU Guard is shut down if a BPDU message is received on that port
STP Root Guard	This prevents edge devices not in the network administrator's control from becoming Spanning Tree Protocol root nodes
STP loopback guard	Provides additional protection against Layer 2 forwarding loops (STP loops)
DHCP snooping	Filters out DHCP messages with unregistered IP addresses and/or from unexpected or untrusted interfaces. This prevents rogue devices from behaving as DHCP Servers
IP Source Guard (IPSG)	When IP Source Guard is enabled at a port, the switch filters out IP packets received from the port if the source IP addresses of the packets have not been statically configured or dynamically learned from DHCP snooping. This prevents IP Address Spoofing
Dynamic ARP Inspection (DAI)	The switch discards ARP packets from a port if there are no static or dynamic IP/MAC bindings or if there is a discrepancy between the source or destination addresses in the ARP packet. This prevents man-in-the-middle attacks
IP/MAC/Port Binding (IPMB)	The preceding features (DHCP Snooping, IP Source Guard, and Dynamic ARP Inspection) work together to prevent DOS attacks in the network, thereby increasing network availability
Secure Core Technology (SCT)	Makes sure that the switch will receive and process management and protocol traffic no matter how much traffic is received
Secure Sensitive Data (SSD)	A mechanism to manage sensitive data (such as passwords, keys, and so on) securely on the switch, populating this data to other devices, and secure autoconfig. Access to view the sensitive data as plaintext or encrypted is provided according to the user-configured access level and the access method of the user

Feature	Description
Trustworthy systems	Trustworthy systems provide a highly secure foundation for Cisco products Run-time defenses (Executable Space Protection [X-Space], Address Space Layout Randomization [ASLR], Built-In Object Size Checking [BOSC])
Private VLAN	Private VLAN provides security and isolation between switch ports, which helps ensure that users cannot snoop on other users' traffic; supports multiple uplinks
Layer 2 isolation Private VLAN Edge (PVE) with community VLAN	PVE (also known as protected ports) provides Layer 2 isolation between devices in the same VLAN, supports multiple uplinks

Port security	Ability to lock source MAC addresses to ports and limits the number of learned MAC addresses
RADIUS/TACACS+	Supports RADIUS and TACACS authentication. Switch functions as a client
RADIUS accounting	The RADIUS accounting functions allow data to be sent at the start and end of services, indicating the amount of resources (such as time, packets, bytes, and so on) used during the session
Storm control	Broadcast, multicast, and unknown unicast
DoS prevention	Denial-Of-Service (DOS) attack prevention
Multiple user privilege levels in CLI	Level 1, 7, and 15 privilege levels
ACLs	<p>Support for up to 1K rules</p> <p>Drop or rate limit based on source and destination MAC, VLAN ID or IPv4 or IPv6 address, IPv6 flow label, protocol, port, Differentiated Services Code Point (DSCP)/IP precedence, TCP/UDP source and destination ports, 802.1p priority, Ethernet type, Internet Control Message Protocol (ICMP) packets, IGMP packets, TCP flag; ACL can be applied on both ingress and egress sides</p> <p>Time-based ACLs supported</p>
Quality of Service	
Priority levels	8 hardware queues
Scheduling	<p>Strict priority and Weighted Round-Robin (WRR)</p> <p>Queue assignment based on DSCP and class of service (802.1p/CoS)</p>
Class of service	<p>Port based; 802.1p VLAN priority based; IPv4/v6 IP precedence/Type of Service (ToS)/DSCP based; Differentiated Services (DiffServ); classification and remarking ACLs, trusted QoS</p> <p>Queue assignment based on DSCP and class of service (802.1p/CoS)</p>
Rate limiting	Ingress policer; egress shaping and rate control; per VLAN, per port, and flow based; 2R3C policing
Congestion avoidance	A TCP congestion avoidance algorithm is required to minimize and prevent global TCP loss synchronization

Feature	Description
Standards	

Standards	IEEE 802.3 10BASE-T Ethernet, IEEE 802.3u 100BASE-TX Fast Ethernet, IEEE 802.3ab 1000BASE-T Gigabit Ethernet, IEEE 802.3ad Link Aggregation Control Protocol, IEEE 802.3z Gigabit Ethernet, IEEE 802.3x Flow Control, IEEE 802.1D (STP, GARP, and GVRP), IEEE 802.1Q/p VLAN, IEEE 802.1w Rapid STP, IEEE 802.1s Multiple STP, IEEE 802.1X Port Access Authentication, IEEE 802.3af, IEEE 802.3at, IEEE 802.1AB Link Layer Discovery Protocol, IEEE 802.3az Energy Efficient Ethernet, RFC 768, RFC 783, RFC 791, RFC 792, RFC 793, RFC 813, RFC 826, RFC 879, RFC 896, RFC 854, RFC 855, RFC 856, RFC 858, RFC 894, RFC 919, RFC 920, RFC 922, RFC 950, RFC 951, RFC 1042, RFC 1071, RFC 1123, RFC 1141, RFC 1155, RFC 1157, RFC 1213, RFC 1215, RFC 1286, RFC 1350, RFC 1442, RFC 1451, RFC 1493, RFC 1533, RFC 1541, RFC 1542, RFC 1573, RFC 1624, RFC 1643, RFC 1700, RFC 1757, RFC 1867, RFC 1907, RFC 2011, RFC 2012, RFC 2013, RFC 2030, RFC 2131, RFC 2132, RFC 2233, RFC 2576, RFC 2616, RFC 2618, RFC 2665, RFC 2666, RFC 2674, RFC 2737, RFC 2819, RFC 2863, RFC 3164, RFC 3176, RFC 3411, RFC 3412, RFC 3413, RFC 3414, RFC 3415, RFC 3416, RFC 4330
IPv6	
IPv6	<p>IPv6 host mode; IPv6 over Ethernet; Dual IPv6/IPv4 stack</p> <p>IPv6 neighbor and router discovery (ND); IPv6 stateless address autoconfiguration; Path Maximum Transmission Unit (MTU) discovery</p> <p>Duplicate Address Detection (DAD); ICMP version 6</p> <p>DHCPv6 stateful client</p> <p>IPv6 over IPv4 network with Intrasite Automatic Tunnel Addressing Protocol (ISATAP) tunnel support</p> <p>USGv6 and IPv6 Gold Logo certified</p>
IPv6 QoS	Prioritize IPv6 packets in hardware
IPv6 ACL	Drop or rate limit IPv6 packets in hardware
IPv6 First Hop Security	<p>RA guard</p> <p>ND inspection</p> <p>DHCPv6 guard</p> <p>Neighbor binding table (snooping and static entries)</p> <p>Neighbor binding integrity check</p>
Multicast Listener Discovery (MLD v1/2) snooping	Deliver IPv6 multicast packets only to the required receivers
IPv6 applications	Web/SSL, Telnet server/SSH, ping, traceroute, Simple Network Time Protocol (SNTP), Trivial File Transfer Protocol (TFTP), SNMP, RADIUS, syslog, DNS client, Telnet Client, DHCP Client, DHCP Autoconfig, IPv6 DHCP Relay, TACACS+

IPv6 RFCs supported	<p>RFC 4443 (which obsoletes RFC2463): ICMP version 6</p> <p>RFC 4291 (which obsoletes RFC 3513): IPv6 address architecture</p> <p>RFC 4291: IPv6 addressing architecture</p> <p>RFC 2460: IPv6 specification</p> <p>RFC 4861 (which obsoletes RFC 2461): neighbor discovery for IPv6</p>
Feature	Description
	<p>RFC 4862 (which obsoletes RFC 2462): IPv6 stateless address autoconfiguration</p> <p>RFC 1981: path MTU discovery</p> <p>RFC 4007: IPv6 scoped address architecture</p> <p>RFC 3484: default address selection mechanism</p> <p>RFC 5214 (which obsoletes RFC 4214): ISATAP tunneling</p> <p>RFC 4293: MIB IPv6: textual conventions and general group</p> <p>RFC 3595: textual conventions for IPv6 flow label</p>
Management	
Web user interface	<p>Built-in switch configuration utility for easy browser-based device configuration (HTTP/HTTPS)</p> <p>Supports simple and advanced mode, configuration, wizards, customizable dashboard, system maintenance, monitoring, online help, and universal search</p>
Smart Network Application	<p>Smart Network Application (SNA) is an innovative network-level monitoring and management tool embedded in Cisco 100 to 500 Series switches. It can discover network topology, display link status, monitor events, apply configurations, and upgrade software images across multiple switches in the network</p> <p>(Note: Management of your network using Smart Network Application requires the use of either a 350, 350X, or 550X Series switch model as a part of your network)</p>
SNMP	<p>SNMP versions 1, 2c, and 3 with support for traps, and SNMP version 3 User-based Security Model (USM)</p>

Standard MIBs	lldp-MIB lldpextdot1-MIB lldpextdot3-MIB lldpextmed-MIB rfc2674-MIB rfc2575-MIB rfc2573-MIB rfc2233-MIB rfc2013-MIB rfc2012-MIB rfc2011-MIB RFC-1212 RFC-1215 SNMPv2-CONF SNMPv2-TC p-bridge-MIB q-bridge-MIB rfc1389-MIB rfc1493-MIB	rfc2668-MIB rfc2737-MIB rfc2925-MIB rfc3621-MIB rfc4668-MIB rfc4670-MIB trunk-MIB tunnel-MIB udp-MIB draft-ietf-bridge-8021x-MIB draft-ietf-bridge-rstpmib-04-MIB draft-ietf-hubmib-etherif-mib-v3-00-MIB draft-ietf-syslog-device-MIB ianaaddrfamnumbers-MIB ianaifity-MIB ianaprot-MIB inet-address-MIB ip-forward-MIB ip-MIB
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Feature	Description	
	rfc1611-MIB rfc1612-MIB rfc1850-MIB rfc1907-MIB rfc2571-MIB rfc2572-MIB rfc2574-MIB rfc2576-MIB rfc2613-MIB rfc2665-MIB	RFC1155-SMI RFC1213-MIB SNMPv2-MIB SNMPv2-SMI SNMPv2-TM RMON-MIB rfc1724-MIB dcb-raj-DCBX-MIB-1108-MIB rfc1213-MIB rfc1757-MIB

Private MIBs	CISCOB-ldp-MIB CISCOB- brgmulticast-MIB CISCOB- bridgemibobjects-MIB CISCOB-bonjour-MIB CISCOB-dhcpcl-MIB CISCOB-MIB CISCOB-wrandomtaildrop-MIB CISCOB-traceroute-MIB CISCOB-telnet-MIB CISCOB-stormctrl-MIB CISCOB-ssh-MIB CISCOB-socket-MIB CISCOB-sntp-MIB CISCOB-smon-MIB CISCOB-phy-MIB CISCOB-multisessionterminal-MIB CISCOB-mri-MIB CISCOB-jumboframes-MIB CISCOB-gvrp-MIB CISCOB-endofmib-MIB CISCOB-dot1x-MIB CISCOB-deviceparams-MIB CISCOB-cli-MIB CISCOB-cdb-MIB CISCOB-brgmacswitch-MIB CISCOB-3sw2swtables-MIB CISCOB-smartPorts-MIB	CISCOB-ip-MIB CISCOB-iprouter-MIB CISCOB-ipv6-MIB CISCOB-mnginf-MIB CISCOB-lcli-MIB CISCOB-localization-MIB CISCOB-mcmngr-MIB CISCOB-mng-MIB CISCOB-physdescription-MIB CISCOB-Poe-MIB CISCOB-protectedport-MIB CISCOB-rmon-MIB CISCOB-rs232-MIB CISCOB-SecuritySuite-MIB CISCOB-snmp-MIB CISCOB-specialbpdu-MIB CISCOB-banner-MIB CISCOB-syslog-MIB CISCOB-TcpSession-MIB CISCOB-traps-MIB CISCOB-trunk-MIB CISCOB-tuning-MIB CISCOB-tunnel-MIB CISCOB-udp-MIB CISCOB-vlan-MIB CISCOB-ipstdacl-MIB CISCOB-eee-MIB
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Feature	Description
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	CISCOB-tbi-MIB CISCOB-macbaseprio-MIB CISCOB-policy-MIB CISCOB-env_mib CISCOB-sensor-MIB CISCOB-aaa-MIB CISCOB-application-MIB CISCOB-bridgesecurity-MIB CISCOB-copy-MIB CISCOB-CpuCounters-MIB CISCOB-Custom1BonjourService-MIB CISCOB-dhcp-MIB CISCOB-dlf-MIB CISCOB-dnscl-MIB CISCOB-embweb-MIB CISCOB-fft-MIB CISCOB-file-MIB CISCOB-greeneth-MIB CISCOB-interfaces-MIB CISCOB-interfaces_recovery-MIB	CISCOB-ssl-MIB CISCOB-qosclimib-MIB CISCOB-digitalkeymanage-MIB CISCOB-tbp-MIB CISCOB-MIB CISCOB-secsd-MIB CISCOB-draft-ietf-entmib-sensor-MIB CISCOB-draft-ietf-syslog-device-MIB CISCOB-rfc2925-MIB CISCO-SMI-MIB CISCOB-DebugCapabilities-MIB CISCOB-CDP-MIB CISCOB-vlanVoice-MIB CISCOB-EVENTS-MIB CISCOB-sysmng-MIB CISCOB-sct-MIB CISCO-TC-MIB CISCO-VTP-MIB CISCO-CDP-MIB
Remote Monitoring (RMON)	Embedded RMON software agent supports 4 RMON groups (history, statistics, alarms, and events) for enhanced traffic management, monitoring, and analysis	
IPv4 and IPv6 dual stack	Coexistence of both protocol stacks to ease migration	
Firmware upgrade	<ul style="list-style-type: none"> • Web browser upgrade (HTTP/HTTPS) and TFTP and upgrade over SCP running over SSH • Upgrade can be initiated through console port as well • Dual images for resilient firmware upgrades 	
Port mirroring	Traffic on a port can be mirrored to another port for analysis with a network analyzer or RMON probe. Up to 8 source ports can be mirrored to one destination port. A single session is supported	
VLAN mirroring	Traffic from a VLAN can be mirrored to a port for analysis with a network analyzer or RMON probe. Up to 8 source VLANs can be mirrored to one destination port. A single session is supported	
DHCP (options 12, 66, 67, 82, 129, and 150)	DHCP options facilitate tighter control from a central point (DHCP server) to obtain IP address, autoconfiguration (with configuration file download), DHCP relay, and hostname	
Secure Copy (SCP)	Securely transfer files to and from the switch	
Autoconfiguration with Secure Copy (SCP) file download	Enables secure mass deployment with protection of sensitive data	

Feature	Description
Text-editable config files	Config files can be edited with a text editor and downloaded to another switch, facilitating easier mass deployment
Smartports	Simplified configuration of QoS and security capabilities
Auto Smartports	Applies the intelligence delivered through the Smartport roles and applies it automatically to the port based on the devices discovered over Cisco Discovery Protocol or LLDP-MED. This facilitates zero-touch deployments
Textview CLI	Scriptable command-line interface. A full CLI as well as a menu-based CLI is supported. User privilege levels 1, 7, and 15 are supported for the CLI
Cloud services	Support for Cisco FindIT Network Manager and Cisco Active Advisor
Embedded Probe for FindIT Network Manager	Support for embedded FindIT Network Probe running on the switch. Eliminates the need to set up a separate hardware or virtual machine for the FindIT Network Probe on site
Cisco Network Plug and Play (PnP) agent	<p>The Cisco Network Plug and Play solution provides a simple, secure, unified, and integrated offering to ease new branch or campus device rollouts or for provisioning updates to an existing network. The solution provides a unified approach to provision Cisco routers, switches, and wireless devices with a near-zero-touch deployment experience</p> <p>Supports Cisco PnP Connect</p>
Localization	Localization of GUI and documentation into multiple languages
Login banner	Configurable multiple banners for web as well as CLI
Other management	Traceroute; single IP management; HTTP/HTTPS; SSH; RADIUS; port mirroring; TFTP upgrade; DHCP client; BOOTP; SNTP; Xmodem upgrade; cable diagnostics; ping; syslog; Telnet client (SSH secure support); automatic time settings from Management Station
Time-based port operation	Link up or down based on user-defined schedule (when the port is administratively up)
Time-based PoE	Capability for power to be on or off based on a user-defined schedule to save energy
Power Efficiency	
Energy Detect	Automatically turns power off on Gigabit Ethernet and 10/100 RJ-45 port when detecting link down. Active mode is resumed without loss of any packets when the switch detects the link up
Cable length detection	Adjusts the signal strength based on the cable length for Gigabit Ethernet models. Reduces the power consumption for shorter cables

EEE Compliant (802.3az)	Supports IEEE 802.3az on all copper Gigabit Ethernet ports
Disable port LEDs	LEDs can be manually turned off to save on energy
Time-based port operation	Link up or down based on user-defined schedule (when the port is administratively up)
Time-based PoE	Capability for power to be on or off based on a user-defined schedule to save energy

Feature	Description		
General			
Jumbo frames	Frame sizes up to 9K bytes. The default MTU is 2K bytes		
MAC table	16K addresses		
Discovery			
Bonjour	The switch advertises itself using the Bonjour protocol		
Link Layer Discovery Protocol (LLDP) (802.1ab) with LLDP-MED extensions	LLDP allows the switch to advertise its identification, configuration, and capabilities to neighboring devices that store the data in a MIB. LLDP-MED is an enhancement to LLDP that adds the extensions needed for IP phones		
Cisco Discovery Protocol	The switch advertises itself using the Cisco Discovery Protocol. It also learns the connected device and its characteristics via Cisco Discovery Protocol		
Power over Ethernet (PoE)			
802.3af PoE, 802.3at PoE+, or 60W PoE are delivered over the RJ-45 ports within the listed power budgets	The following switches support 802.3at PoE+, 802.3af PoE, and Cisco prestandard (legacy) PoE on any of the RJ45 network ports. 60W PoE is also supported on selected RJ-45 network ports Maximum power of 60W is delivered to any of the 60W PoE ports, and maximum power of 30W is delivered to any of the other RJ45 network ports, until the PoE budget for the switch is reached The total power available for PoE per switch is as follows		
	Model Name	Power Dedicated to PoE	Number of Ports That Support PoE
	SF352-08P	62W	8
	SF352-08MP	128W	8
	SF350-24P	185W	24 (4 support 60W PoE)
	SF350-24MP	375W	24 (4 support 60W PoE)
	SF350-48P	382W	48 (8 support 60W PoE)
	SF350-48MP	740W	48 (8 support 60W PoE)

SG350-8PD	124W	8
SG350-10P	62W	8
SG355-10P	62W	8
SG350-10MP	124W	8
SG350-28P	195W	24 (4 support 60W PoE)
SG350-28MP	382W	24 (4 support 60W PoE)
SG350-52P	375W	48 (8 support 60W PoE)
SG350-52MP	740W	48 (8 support 60W PoE)

Feature	Description			
PoE powered device and PoE passthrough	<p>In addition to AC power, compact switch models can work as PoE powered devices and be powered by PoE switches connected to the uplink ports. The switch can also pass through the power to downstream PoE end devices if required</p> <p>Maximum of 60W can be drawn per uplink port if the peer PoE switch supports 60W PoE. When multiple uplink ports are connected to PoE switches, the power drawn from these ports is combined</p> <p>When AC power is connected and functioning properly, it will have priority over the PoE powered device function. The PoE powered device function will then act as a backup power source to the AC power. The PoE powered device function will be the primary power source for the switch if AC power is not connected</p>			
	Model	Power Option	Available PoE Power (W)	Can Switch Be Powered with Uplinks?
	SG350-10P	1 PoE uplink	0W	Yes
		2 PoE uplink	0W	Yes
		1 PoE+ uplink	0W	Yes
		2 PoE+ uplink	22W	Yes
		1 60W PoE uplink	22W	Yes
		2 60W PoE uplink	50W	Yes
		AC power	62W	Yes

	SG350-10MP	1 PoE uplink	0W	Yes
		2 PoE uplink	0W	Yes
		1 PoE+ uplink	0W	Yes
		2 PoE+ uplink	22W	Yes
		1 60W PoE uplink	22W	Yes
		2 60W PoE uplink	50W	Yes
		AC power	128W	Yes
	SG355-10P	1 PoE uplink	0W	Yes
		2 PoE uplink	0W	Yes
		1 PoE+ uplink	0W	Yes
		2 PoE+ uplink	22W	Yes

Feature	Description				
		1 60W PoE uplink	22W	Yes	
		2 60W PoE uplink	50W	Yes	
		AC power	62W	Yes	
Power consumption (worst case)	Model	Green Power (mode)	System Power Consumption	Power Consumption (with PoE)	Heat Dissipation (BTU/hr)
	SF350-08	Energy Detect	110V=5.6W 220V=5.8W	N/A	30.0
	SF352-08	Energy Detect	110V=6.9W 220V=6.9W	N/A	23.5

SF352-08P	Energy Detect	110V=10.4W 220V=11.2W	110V=78.7W 220V=79.3W	207.4
SF352-08MP	Energy Detect	110V=10.4W 220V=11.2W	110V=157.2W 220V=156.2W	536.1
SF350-24	Energy Detect	110V=10.6W 220V=10.9W	110V=240W 220V=230W	43.3
SF350-24P	Energy Detect	110V=10.6W 220V=10.9W	110V=240W 220V=230W	684.1
SF350-24MP	Energy Detect	110V=29.2W 220V=28.3W	110V=238W 220V=233W	1333.0
SF350-48	Energy Detect	110V=23.4W 220V=24.2W	N/A	82.6
SF350-48P	Energy Detect	110V=50.8W 220V=52.1W	110V=464.3W 220V=453.1W	1584.3
SF350-48MP	Energy Detect	110V=58.4W 220V=58.5W	110V=866.7W 220V=843.5W	2957.3
SG350-8PD	EEE, Energy Detect, Short Reach	110V=29.8W 220V=31.3W	110V=167W 220V=165.2W	569.5
SG350-10	EEE, Energy Detect, Short Reach	110V=9.0W 220V=9.8W	N/A	33.4
SG350-10P	EEE, Energy Detect, Short Reach	110V=13.0W 220V=13.5W	110V=84.7W 220V=83.5W	289.0

Feature	Description				
	SG355-10P	EEE, Energy Detect, Short Reach	110V=12.4W 220V=12.6W	110V=83.5W 220V=83.4W	284.8

SG350-10MP	EEE, Energy Detect, Short Reach	110V=13.2W 220V=13.5W	110V=152.8W 220V=151.6W	521.5
SG350-10SFP	EEE, Energy Detect, Short Reach	110V=11.1W 220V=11.9W	N/A	40.6
SG350-20	EEE, Energy Detect, Short Reach	110V=14.5W 220V=15.2W	N/A	51.8
SG350-28	EEE, Energy Detect, Short Reach	110V=19.7W 220V=19.9W	N/A	67.9
SG350-28P	EEE, Energy Detect, Short Reach	110V=35.7W 220V=36.9W	110V=263W 220V=255.1W	897.4
SG350-28MP	EEE, Energy Detect, Short Reach	110V=41.3W 220V=42.1W	110V=261.1W 220V=451.2W	1573.3
SG350-28SFP	EEE, Energy Detect, Short Reach	110V=32.0W 220V=34.3W	N/A	117.0
SG350-52	EEE, Energy Detect, Short Reach	110V=40.4W 220V=40.6.8W	N/A	136.4
SG350-52P	EEE, Energy Detect, Short Reach	110V=62.4W 220V=61.8W	110V=440.0W 220V=431.0W	1429.4
SG350-52MP	EEE, Energy Detect, Short Reach	110V=72.5W 220V=73.6W	110V=858.0W 220V=833.0W	2674.8

Ports	Model Name	Total System Ports	RJ-45 Ports	Combo Ports (RJ-45 + SFP)
	SF350-08	8 Fast Ethernet	8 Fast Ethernet	N/A
	SF352-08	8 Fast Ethernet + 2 Gigabit Ethernet	8 Fast Ethernet	2 Gigabit Ethernet combo
	SF352-08P	8 Fast Ethernet + 2 Gigabit Ethernet	8 Fast Ethernet	2 Gigabit Ethernet combo

	SF352-08MP	8 Fast Ethernet + 2 Gigabit Ethernet	8 Fast Ethernet	2 Gigabit Ethernet combo
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Feature	Description			
	SF350-24	24 Fast Ethernet + 4 Gigabit Ethernet	24 Fast Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SF350-24P	24 Fast Ethernet + 4 Gigabit Ethernet	24 Fast Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SF350-24MP	24 Fast Ethernet + 4 Gigabit Ethernet	24 Fast Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SF350-48	48 Fast Ethernet + 4 Gigabit Ethernet	48 Fast Ethernet 2 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SF350-48P	48 Fast Ethernet + 4 Gigabit Ethernet	48 Fast Ethernet 2 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SF350-48MP	48 Fast Ethernet + 4 Gigabit Ethernet	48 Fast Ethernet 2 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SG350-8PD	6 Gigabit Ethernet + 2 2.5G + 2 Multigigabit	6 Gigabit Ethernet + 2 2.5G	2 Multigigabit/SFP+ combo
	SG350-10	10 Gigabit Ethernet	8 Gigabit Ethernet	2 Gigabit Ethernet combo
	SG350-10P	10 Gigabit Ethernet	8 Gigabit Ethernet	2 Gigabit Ethernet combo
	SG355-10P	10 Gigabit Ethernet	8 Gigabit Ethernet	2 Gigabit Ethernet combo
	SG350-10MP	10 Gigabit Ethernet	8 Gigabit Ethernet	2 Gigabit Ethernet combo
	SG350-10SFP	10 Gigabit Ethernet	8 Gigabit SFP Slots	2 Gigabit Ethernet combo
	SG350-20	20 Gigabit Ethernet	16 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP

	SG350-28	28 Gigabit Ethernet	24 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SG350-28P	28 Gigabit Ethernet	24 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SG350-28MP	28 Gigabit Ethernet	24 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SG350-28SFP	28 Gigabit Ethernet	24 Gigabit SFP slots	2 Gigabit Ethernet combo + 2 SFP
	SG350-52	52 Gigabit Ethernet	48 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP

Feature	Description			
	SG350-52P	52 Gigabit Ethernet	48 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP
	SG350-52MP	52 Gigabit Ethernet	48 Gigabit Ethernet	2 Gigabit Ethernet combo + 2 SFP
Console port	Cisco Standard RJ45 console port			
USB slot	USB Type-A slot on the front panel of the switch for easy file and image management			
Buttons	Reset button			
Cabling type	Unshielded Twisted Pair (UTP) Category 5 or better for 10BASE-T/100BASE-TX; UTP Category 5e or better for 1000BASE-T			
LEDs	System, Link/Act, PoE, Speed			
Flash	256 MB			
CPU	800 MHz ARM			
CPU memory	512 MB			
Packet buffer	All numbers are aggregate across all ports as the buffers are dynamically shared:			
	Model Name		Packet Buffer	

SF350-08	1.5 MB
SF352-08	1.5 MB
SF352-08P	1.5 MB
SF352-08MP	1.5 MB
SF350-24	1.5 MB
SF350-24P	1.5 MB
SF350-24MP	1.5 MB
SF350-48	3 MB
SF350-48P	3 MB
SF350-48MP	3 MB
SG350-8PD	1.5 MB
SG350-10	1.5 MB
SG350-10P	1.5 MB
SG355-10P	1.5 MB

Feature	Description
SG350-10MP	1.5 MB
SG350-10SFP	1.5 MB
SG350-20	1.5 MB
SG350-28	1.5 MB
SG350-28P	1.5 MB
SG350-28MP	1.5 MB
SG350-28SFP	1.5 MB
SG350-52	3 MB

	SG350-52P		3 MB	
	SG350-52MP		3 MB	
Supported SFP modules	SKU	Media	Speed	Maximum Distance
	MGBSX1	Multimode fiber	1000 Mbps	500 m
	MGBLX1	Single-mode fiber	1000 Mbps	10 km
	MGBLH1	Single-mode fiber	1000 Mbps	40 km
	MGBT1	UTP cat 5e	1000 Mbps	100 m
	GLC-LH-SMD	Single-mode fiber	1000 Mbps	10 km
	GLC-BX-U	Single-mode fiber	1000 Mbps	10 km
Environmental				
Unit dimensions (W x H x D)	Model Name		Unit Dimensions	
	SF350-08		279.4 x 44 x 170 mm (11.0 x 1.73 x 6.69 in)	
	SF352-08		279.4 x 44 x 170 mm (11.0 x 1.73 x 6.69 in)	
	SF352-08P		279.4 x 44 x 170 mm (11.0 x 1.73 x 6.69 in)	
	SF352-08MP		279.4 x 44 x 170 mm (11.0 x 1.73 x 6.69 in)	
	SF350-24		440 x 44 x 202 mm (17.3 x 1.73 x 7.95 in)	
	SF350-24P		440 x 44 x 257 mm (17.3 x 1.73 x 10.12 in)	
	SF350-24MP		440 x 44 x 257 mm (17.3 x 1.73 x 10.12 in)	
	SF350-48		440 x 44 x 257 mm (17.3 x 1.73 x 10.12 in)	
Feature	Description			
	SF350-48P		440 x 44 x 350 mm (17.3 x 1.73 x 13.78 in)	
	SF350-48MP		440 x 44 x 350 mm (17.3 x 1.73 x 13.78 in)	
	SG350-8PD		344.4 x 44 x 252.5 (13.6 x 1.73 x 9.94 in)	
	SG350-10		280 x 44 x 170 mm (11.0 x 1.73 x 6.69 in)	
	SG350-10P		280 x 44 x 170 mm (11.0 x 1.73 x 6.69 in)	
	SG355-10P		440 x 44 x 203 mm (17.3 x 1.73 x 7.99 in)	
	SG350-10MP		280 x 44 x 170 mm (11.0 x 1.73 x 6.69 in)	
	SG350-10SFP		279.4 x 44 x 170 mm (11.0 x 1.73 x 6.69 in)	

	SG350-20	440 x 44 x 203 mm (17.3 x 1.73 x 7.99 in)
	SG350-28	440 x 44 x 202 mm (17.3 x 1.73 x 7.95 in)
	SG350-28P	440 x 44 x 257 mm (17.3 x 1.73 x 10.12 in)
	SG350-28MP	440 x 44 x 257 mm (17.3 x 1.73 x 10.12 in)
	SG350-28SFP	440 x 44 x 203 mm (17.3 x 1.73 x 7.99 in)
	SG350-52	440 x 44 x 257 mm (17.3 x 1.73 x 10.12 in)
	SG350-52P	440 x 44 x 350 mm (17.3 x 1.73 x 13.78 in)
	SG350-52MP	440 x 44 x 350 mm (17.3 x 1.73 x 13.78 in)

Unit weight	Model Name	Unit Weight
	SF350-08	1.18 kg (2.60 lb)
	SF352-08	1.06 kg (2.34 lb)
	SF352-08P	1.16 kg (2.56 lb)
	SF352-08MP	1.16 kg (2.56 lb)
	SF350-24	2.72 kg (6.0 lb)
	SF350-24P	4.08 kg (8.99 lb)
	SF350-24MP	4.12 kg (9.08 lb)
	SF350-48	3.58 kg (7.89 lb)
	SF350-48P	5.59 kg (12.32 lb)
	SF350-48MP	5.61 kg (12.37 lb)

Feature	Description	
	SG350-8PD	2.5 kg (5.51 lb)
	SG350-10	1.09 kg (2.40 lb)
	SG350-10P	1.19 kg (2.62 lb)
	SG355-10P	2.36 kg (5.20 lb)
	SG350-10MP	1.19 kg (2.62 lb)

	SG350-10SFP	2.08 kg (4.59 lb)
	SG350-20	2.12 kg (4.67 lb)
	SG350-28	2.75 kg (6.06 lb)
	SG350-28P	3.83 kg (8.44 lb)
	SG350-28MP	3.37 kg (7.43 lb)
	SG350-28SFP	2.7 kg (5.95 lb)
	SG350-52	2.75 kg (6.06 lb)
	SG350-52P	3.81 kg (8.40 lb)
	SG350-52MP	3.83 kg (8.44 lb)
Power	100-240V 50-60 Hz, internal, universal: SF350-24, SF350-24P, SF350-24MP, SF350-48, SF350-48P, SF350-48MP, SG350-8PD, SG350-10P, SG350-20, SG350-28, SG350-28P, SG350-28MP, SG350-28SFP, SG350-52, SG350-52P, SG350-52MP 100-240V 50-60 Hz, external: SF350-08, SF352-08, SF352-08P, SF352-08MP, SG35010, SG350-10P, SG350-10MP, SG350-10SFP	
Certification	UL (UL 60950), CSA (CSA 22.2), CE mark, FCC Part 15 (CFR 47) Class A	
Operating temperature	32° to 122°F (0° to 50°C): SF350-08, SF352-08, SF352-08P, SF352-08MP, SF350-24, SF350-24P, SF350-24MP, SF350-48, SF350-48P, SF350-48MP, SG350-10, SG350-10P, SG350-10MP, SG35010MP, SG350-10SFP, SG350-20, SG350-28, SG350-28P, SG350-28MP, SG350-28SFP, SG350-52, SG350-52P, SG350-52MP 32° to 113°F (0° to 45°C): SG350-08PD	
Storage temperature	–4° to 158°F (–20° to 70°C)	
Operating humidity	10% to 90%, relative, noncondensing	
Storage humidity	10% to 90%, relative, noncondensing	

Feature	Description			
Acoustic noise and MTBF	Model Name	FAN (Number)	Acoustic Noise	MTBF @40C (hr)

SF350-08	Fanless	N/A	644,573
SF352-08	Fanless	N/A	532,704
SF352-08P	Fanless	N/A	530,716
SF352-08MP	Fanless	N/A	478,335
SF350-24	Fanless	N/A	562,313
SF350-24P	2	0°C - 25°C: 39.7dB 50°C: 52.2dB	293,029
SF350-24MP	2	0°C - 25°C: 39.7dB 50°C: 52.2dB	272,127
SF350-48	Fanless	N/A	277,653
SF350-48P	3	0°C - 25°C: 42.5dB 50°C: 55.0dB	182,270
SF350-48MP	4	0°C - 25°C: 42.0dB 50°C: 54.1dB	191,951
SG350-8PD	Fanless	N/A	562,664
SG350-10	Fanless	N/A	308,196
SG350-10P	Fanless	N/A	205,647
SG355-10P	Fanless	N/A	296,426
SG350-10MP	Fanless	N/A	80,093
SG350-10SFP	Fanless	N/A	851,827
SG350-20	Fanless	N/A	1,400,007
SG350-28	Fanless	N/A	367,209
SG350-28P	2	0°C - 25°C: 37.2dB 50°C: 53.7dB	396,687

	SG350-28MP	2	0°C - 25°C: 37.2dB 50°C: 51.8dB	213,373
	SG350-28SFP	1	0°C - 30°C: 40.3dB 50°C: 43.6dB	101,523
Feature	Description			
	SG350-52	1	0°C - 25°C: 36.6dB 50°C: 52.6dB	301,297
	SG350-52P	3	0°C - 25°C: 41.2dB 50°C: 54.2dB	195,746
	SG350-52MP	4	0°C - 25°C: 43.7dB 50°C: 55.5dB	163,704
Warranty	Limited lifetime with next business day advance replacement (where available)			
Package Contents				
<ul style="list-style-type: none">• Cisco 350 Series Managed Switch• Power Cord (Power Adapter for select SKUs)• Mounting Kit• Console Cable• Quick Start Guide				
Minimum Requirements				
<ul style="list-style-type: none">• Web browser: Chrome, Firefox, Edge, Safari• Category 5 Ethernet network cable• TCP/IP, network adapter, and network operating system (such as Microsoft Windows, Linux, or Mac OS X) installed on each computer in the network				

Ordering information

Table 2 provides ordering information for the Cisco 350 Series Switches. Table 3 gives region- and countryspecific information, and Table 4 provides MGE transceiver ordering information.

Table 2. Cisco 350 Series Switches ordering information

Model Name	Order Product ID Number	Description
Fast Ethernet		

SF350-08	SF350-08-K9-xx	<ul style="list-style-type: none"> • 8 10/100 ports
SF352-08	SF352-08-K9-xx	<ul style="list-style-type: none"> • 8 10/100 ports • 2 Gigabit copper/SFP combo
SF352-08P	SF352-08P-K9-xx	<ul style="list-style-type: none"> • 8 10/100 PoE+ ports • 2 Gigabit copper/SFP combo • 62W PoE power budget
SF352-08MP	SF352-08MP-K9-xx	<ul style="list-style-type: none"> • 8 10/100 PoE+ ports • 2 Gigabit copper/SFP combo • 128W PoE power budget

Model Name	Order Product ID Number	Description
SF350-24	SF350-24-K9-xx	<ul style="list-style-type: none"> • 24 10/100 ports • 2 Gigabit copper/SFP combo + 2 SFP ports
SF350-24P	SF350-24P-K9-xx	<ul style="list-style-type: none"> • 24 10/100 PoE+ ports (4 support 60W PoE) • 2 Gigabit copper/SFP combo + 2 SFP ports • 185W PoE power budget
SF350-24MP	SF350-24MP-K9-xx	<ul style="list-style-type: none"> • 24 10/100 PoE+ ports (4 support 60W PoE) • 2 Gigabit copper/SFP combo + 2 SFP ports • 375W PoE power budget
SF350-48	SF350-48-K9-xx	<ul style="list-style-type: none"> • 48 10/100 ports • 2 Gigabit copper/SFP combo + 2 SFP ports
SF350-48P	SF350-48P-K9-xx	<ul style="list-style-type: none"> • 48 10/100 PoE+ ports (8 support 60W PoE) • 2 Gigabit copper/SFP combo + 2 SFP ports • 382W PoE power budget
SF350-48MP	SF350-48MP-K9-xx	<ul style="list-style-type: none"> • 48 10/100 PoE+ ports (8 support 60W PoE) • 2 Gigabit copper/SFP combo + 2 SFP ports • 740W PoE power budget
Gigabit Ethernet		
SG350-10	SG350-10-K9-xx	<ul style="list-style-type: none"> • 8 10/100/1000 ports • 2 Gigabit copper/SFP combo
SG350-10P	SG350-10P-K9-xx	<ul style="list-style-type: none"> • 8 10/100/1000 PoE+ ports • 2 Gigabit copper/SFP combo • 62W PoE power budget

SG355-10P	SG355-10P-K9-xx	<ul style="list-style-type: none"> • 8 10/100/1000 PoE+ ports • 2 Gigabit copper/SFP combo • 62W PoE power budget
SG350-10MP	SG350-10MP-K9-xx	<ul style="list-style-type: none"> • 8 10/100/1000 PoE+ ports • 2 Gigabit copper/SFP combo • 124W PoE power budget
SG350-10SFP	SG350-10SFP-K9-xx	<ul style="list-style-type: none"> • 8 SFP Gigabit slots • 2 Gigabit copper/SFP combo
SG350-20	SG350-20-K9-xx	<ul style="list-style-type: none"> • 16 10/100/1000 ports • 2 Gigabit copper/SFP combo + 2 SFP ports
SG350-28	SG350-28-K9-xx	<ul style="list-style-type: none"> • 24 10/100/1000 ports • 2 Gigabit copper/SFP combo + 2 SFP ports
SG350-28P	SG350-28P-K9-xx	<ul style="list-style-type: none"> • 24 10/100/1000 PoE+ ports (4 support 60W PoE) • 2 Gigabit copper/SFP combo + 2 SFP ports • 195W PoE power budget
SG350-28MP	SG350-28MP-K9-xx	<ul style="list-style-type: none"> • 24 10/100/1000 PoE+ ports (4 support 60W PoE) • 2 Gigabit copper/SFP combo + 2 SFP ports • 382W PoE power budget
Model Name	Order Product ID Number	Description
SG350-28SFP	SG350-28SFP-K9-xx	<ul style="list-style-type: none"> • 24 SFP Gigabit slots • 2 Gigabit copper/SFP combo + 2 SFP ports
SG350-52	SG350-52-K9-xx	<ul style="list-style-type: none"> • 48 10/100/1000 ports • 2 Gigabit copper/SFP combo + 2 SFP ports
SG350-52P	SG350-52P-K9-xx	<ul style="list-style-type: none"> • 48 10/100/1000 PoE+ ports (8 support 60W PoE) • 2 Gigabit copper/SFP combo + 2 SFP ports • 375W PoE power budget
SG350-52MP	SG350-52MP-K9-xx	<ul style="list-style-type: none"> • 48 10/100/1000 PoE+ ports (8 support 60W PoE) • 2 Gigabit copper/SFP combo + 2 SFP ports • 740W PoE power budget
Multi-Gigabit Ethernet		
SG350-8PD	SG350-8PD-K9-xx	<ul style="list-style-type: none"> • 6 10/100/1000 PoE+ ports • 2 2.5G PoE+ ports • 2 Multigigabit/SFP+ combo • 124W PoE power budget

* Each combo port has one 10/100/1000 Ethernet port and one SFP Gigabit Ethernet slot, with one port active at a time.

The -xx in the Product Order ID Number is a country-/region-specific suffix. For example, the complete PID of SG350-28P for the United States is SG350-28P-K9-NA. Please refer to Table 3 for the correct suffix to use for your country/region.

Table 3. Country/region suffix for product order ID number

Suffix	Country/Region
-NA	USA, Canada, Mexico, Colombia, Chile and rest of Latin America
-BR	Brazil
-AR	Argentina
-EU	EU, Russia, Ukraine, Israel, United Arab Emirates, Turkey, Egypt, South Africa, Indonesia, Philippines, Vietnam, Thailand, Korea
-UK	United Kingdom, Saudi Arabia, Qatar, Kuwait, Singapore, Hong Kong, Malaysia
-AU	Australia, New Zealand
-CN	China
-IN	India
-JP	Japan
-KR	Korea

The products may also be available in a country/region not listed in Table 3. Not all product models are offered in all countries/regions. For Korea, either -EU or -KR suffix will be used depending on product models. Please consult with your local Cisco sales representative or Cisco partners for more details.

Table 4. MGE transceiver ordering information

MGE Transceivers	
MGBSX1	1000BASE-SX SFP transceiver, for multimode fiber, 850 nm wavelength, support up to 500 m
MGBLX1	1000BASE-LX SFP transceiver for single-mode fiber, 1310 nm wavelength, supports up to 10 km
MGBLH1	1000BASE-LH SFP transceiver, for single-mode fiber, 1310 nm wavelength, support up to 40 km
MGBT1	1000BASE-T SFP transceiver for Category 5 copper wire, supports up to 100 m

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For more information

To find out more about the Cisco 350 Series, visit <https://www.cisco.com/go/350switches>.

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Cisco Industrial Ethernet 4000 Series Switches

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Developed specifically to withstand the harshest industrial environments, these switches offer the most flexible and resilient industrial ethernet products with secure connectivity, simple management and edge application execution.

Product overview

The Cisco® Industrial Ethernet (IE) 4000 Series delivers Gigabit connectivity to Cisco ruggedized switching portfolio with superior high-bandwidth switching capacity and proven Cisco IOS® Software. The IE 4000 Series provides highly secure access and industry-leading convergence ring protocols to support resilient and scalable networks while adhering to industry compliance requirements.

The IE 4000 Series is ideal for industrial Ethernet applications where hardened products are required, including manufacturing, energy, transportation, smart cities. The IE4000 has built-in SW image verification to ensure authenticity of the Cisco Software. With improved overall performance, greater bandwidth, advanced security features, and enhanced hardware, the Cisco IE 4000 Series complements the current industrial Ethernet portfolio of related Cisco industrial switches, such as the Cisco IE 2000, IE 3200, IE 3300 and IE 3400.

The IE 4000 Series can be used to easily and securely extend the enterprise network to harsh environments with a software-defined access extension for the Internet of Things (IoT) enabling connectivity in outdoor areas, warehouses, distribution centers, roadways, etc., using powerful enterprise-grade intent-based network management platform such as Cisco DNA Center.

The Cisco IE 4000 can easily be installed with a GUI based Device Manager and it also offers out-of-the-box industrial usage configuration and simplified manageability to deliver advanced security, data, video, and voice services over industrial networks.

Features and benefits

Table 1 lists the features and benefits of Cisco IE 4000 Series Switches.

Table 1. Features and benefits of Cisco IE 4000 switches

Feature	Benefit
---------	---------

Robust industrial design	<ul style="list-style-type: none"> • Built for harsh environment and temperature range (-40 to 70 C). • Hardened for vibration, shock and surge, and noise immunity. • Resilient dual ring design via 4x Gigabit Ethernet uplink ports. • Complies with multi-industry specifications for automation, ITS, and substation environments. • Improves uptime, performance, and safety of industrial systems and equipment. • Fitted with compact, DIN rail compliant form factor ideal for industrial deployment. • Covers a wide range of Power over Ethernet (PoE) application requirements.
User-friendly GUI device manager	<ul style="list-style-type: none"> • Allows easy configuration and monitoring via a web based device manager. • Eliminates the need for more complex terminal emulation programs. • Reduces the cost of deployment. • Multiple Language Support - English, Chinese (Traditional), Chinese (Simplified), French, German, Japanese, Spanish (LATAM)
Feature	Benefit
SwapDrive: “zero-config” replacement	<ul style="list-style-type: none"> • Simple switch replacement in case of a failure. • No networking expertise required. • Helps ensure fast recovery.
High-density industrial Power over Ethernet (PoE)	<ul style="list-style-type: none"> • Reduces complexity with one cable for both connectivity and power. • Controls costs by limiting wiring, distribution panels, and circuit breakers. • Creates space and reduces heat dissipation. • Enables ready-to-use PoE devices like IP phones and wireless access points. • Supports (on select models) maximum HD camera deployments. • Designed to support PoE power budget up to 240W (Refer Table 2 for details)
Full Gigabit Ethernet switch	<ul style="list-style-type: none"> • Connects new wireless access point (802.11n and 802.11ac). • Enables new HD IP Cameras and new PLC (Programmable Logic Control). • Allows SCADA (Supervisory Control And Data Acquisition) connectivity. • Provides introduction of new bandwidth-hungry applications in the industrial space. • Supports very-delay-sensitive applications and time-sensitive networks. • Delivers multiple rings, redundant ring topology for new network configurations. • Extends geographical scalability where longer distance connectivity is required.

The Cisco Industrial Ethernet (IE) 4000 Series offers:

- Bandwidth and capacity to grow with your networking needs: 20-Gbps nonblocking switching capacity with up to 20 Gigabit Ethernet ports per switch
- High-density industrial PoE/PoE+ support providing in-line power to up to 8 power devices, including IP cameras and phones, badge readers, wireless access points, etc.
- Cisco IOS Software features for smooth IT integration and policy consistency
- Robust resiliency enabled by dual ring design via 4x Gigabit Ethernet uplink ports, Resilient Ethernet Protocol (REP), Parallel Redundancy Protocol (PRP), PROFINET– Media Redundancy Protocol (MRP) ring, High Availability Seamless Redundancy (HSR) ring, EtherChannel and Flex Links support, redundant power input, dying gasp, etc.
- True zero-touch replacement for middle-of-the-night or middle-of-nowhere failure
- Line-rate, low-latency forwarding with advanced hardware assist features (such as NAT, IEEE1588)
- Simplified software upgrade path with universal images
- Support of Industrial automation protocols EtherNet/IP (CIP), PROFINET, and Modbus TCP

Cisco ONE Software

Cisco ONE Software offers a simplified consumption model, centered on common customer scenarios in the industrial automation and extended enterprise environments. Cisco ONE Software and services provide customers with four primary benefits:

- Software suites that address typical customer use scenarios at an attractive price
- Investment protection for their software purchase through software services-enabled license portability
- Access to ongoing innovation and new technology with Cisco Software Support Service (SWSS)
- Flexible licensing models to smoothly distribute customers' software spending over time

Figure 1 shows the switch models, Table 2 lists all the available Cisco IE 4000 Series models, Table 3 lists the power supplies for Cisco IE 4000 Series Switches.



Figure 1.
IE 4000 models

Table 2. Cisco IE 4000 Series Switches

Product number	Total ports	GE combo (SFP or RJ45) uplinks (4G) ¹	Additional combo (SFP or RJ45) ports	RJ45 copper ports (T)	SFP fiber ports (S)	PoE/PoE+ ports (P, GP), Maximum PoE power budget	Default software License
IE-4000-4TC4G-E	8	All models have 4 GE combo uplink ports	4 FE				All models ship with LAN Base feature set ²
IE-4000-8T4G-E	12			8 FE			
IE-4000-8S4G-E	12				8 FE		
IE-4000-4T4P4G-E	12			4 FE		4 FE, 125W	
IE-4000-16T4G-E	20			16 FE			
IE-4000-4S8P4G-E	16				4 FE	8 FE, 125W	
IE-4000-8GT4G-E	12			8 GE			
IE-4000-8GS4G-E	12				8 GE		
IE-4000-4GC4GP4G-E	12		4 GE			4 GE, 125W	
Product number	Total ports	GE combo (SFP or RJ45) uplinks (4G) ¹	Additional combo (SFP or RJ45) ports	RJ45 copper ports (T)	SFP fiber ports (S)	PoE/PoE+ ports (P, GP), Maximum PoE power budget	Default software License

IE-4000-16GT4G-E	20			16 GE			
IE-4000-8GT8GP4G-E	20			8 GE		8 GE, 240W	
IE-4000-4GS8GP4G-E	16				4 GE	8 GE, 125W	

¹ Combo ports provide one copper and one fiber physical port and only one can be activated at a time.

² Can be upgraded to IP Services at a fee.

All copper Gigabit Ethernet interfaces support speed negotiation to 10/100/1000 mbps and duplex negotiation. All copper Fast Ethernet interfaces support speed negotiation to 10/100 mbps and duplex negotiation.

Table 3. Power supplies for Cisco IE 4000 Series Switches

Product Number	Wattage	Rated nominal input operating range	PoE/PoE+ support ¹	More Details
PWR-IE50W-AC=	50W	AC 100-240V/1.25A 50-60Hz or DC 125-250V/1.25A	No	Click here for more details on these DIN Rail power supplies ³
PWR-IE50W-AC-L= ²³	50W	AC 100-240V/1.2A 50-60Hz	No	
PWR-IE65W-PC-AC=	65W	AC 100-240V/1.4A 50-60Hz or DC 125-250V/1.0A	Yes	
PWR-IE65W-PC-DC=	65W	DC 24-48VDC/4.5A	Yes	
PWR-IE170W-PC-AC=	170W	AC 100-240V/2.3A 50-60Hz or DC 125-250V/2.1A	Yes	
PWR-IE170W-PC-DC=	170W	DC 12-54VDC/2.3A	Yes	
PWR-IE240W-PCAC-L= ²	240W	AC 100-240V/3.5A 50-60Hz	Yes	
PWR-IE480W-PCAC-L= ²	480W	AC 100-240V/6.0A 50-60Hz	Yes	

The diagram in Figure 2 can help you select a Cisco IE 4000 model.

¹ The entire power budget for the switch and PoE ports needs to stay within the power supply.

² The power supplies are not certified for smart grid and hazardous locations. These power supplies are IP20 rated.

³ Power Supplies Datasheet Link: <https://www.cisco.com/c/en/us/products/collateral/switches/industrial-ethernet-switches/datasheetc78-742180.html>

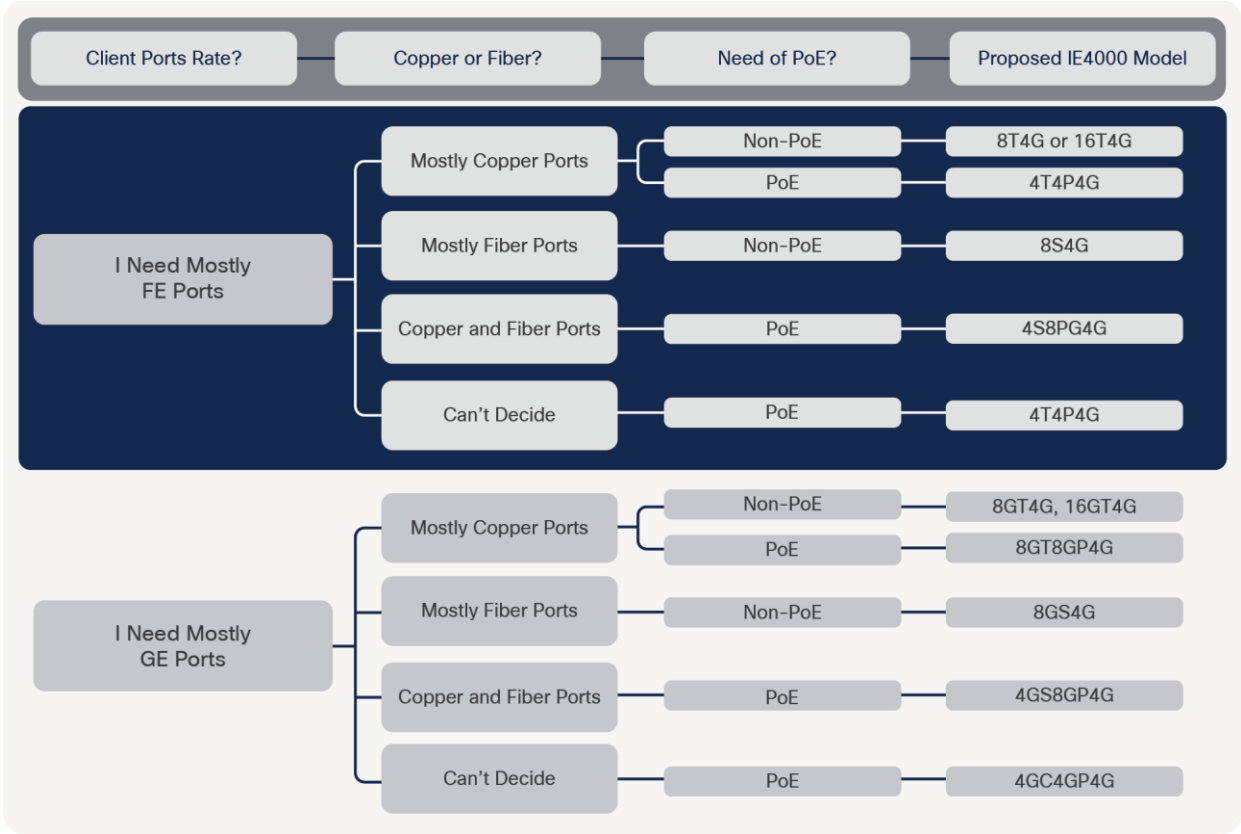


Figure 2.
Cisco IE 4000 model selection guide

Product specifications

Table 4 lists specifications, Table 5 gives information about switch power specifications, Table 6 provides physical specifications, Table 7 provides switch performance and scalability, Tables 8 and 9 list important software features according to corresponding licensing schemes. Table 10 and 11 provide Cisco DNA Center license information. Table 12 lists compliance specifications. Table 13 gives information about management and standards of the Cisco IE 4000 Series Switches, and Table 14 shows the list of supported SFPs.

Table 4. Product specifications

Description	Specification
Hardware	<ul style="list-style-type: none">• 1GB DRAM• 128-MB onboard flash memory• 1-GB removable SD flash memory card (Included)• Mini-USB connector• RJ-45 connector
Alarm	<ul style="list-style-type: none">• Alarm I/O: two alarm inputs to detect dry contact open or closed, one alarm output relay

Table 5. Power specifications

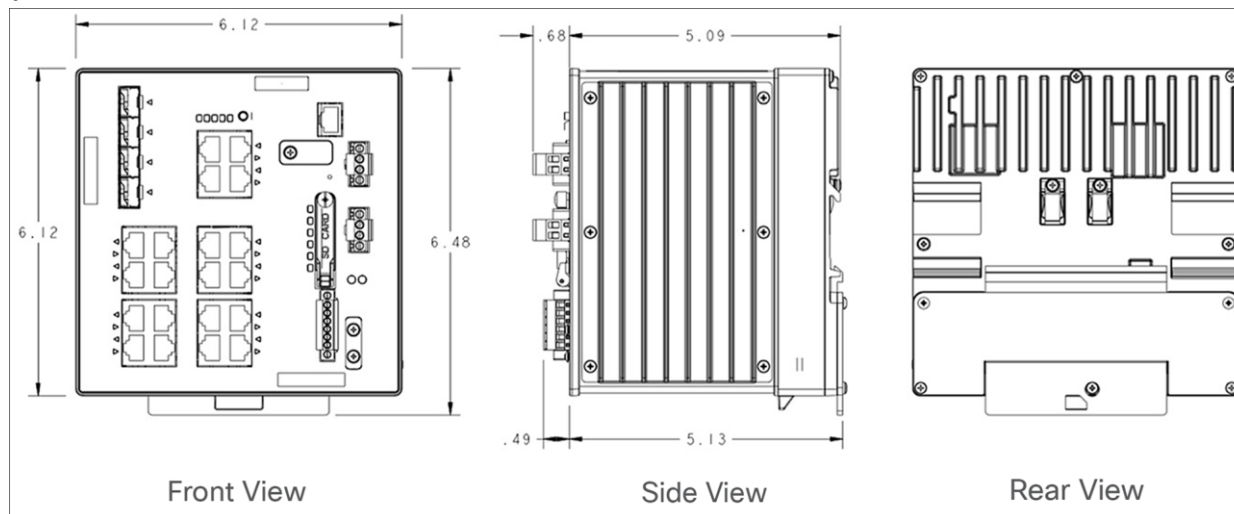
Features	IE-4000-4T4P4G-E IE-4000-8T4G-E IE-4000-8GT4G-E IE-4000-16T4G-E	IE-4000-4GC4GP4G-E IE-4000-4TC4G-E IE-4000-4S8P4G-E IE-4000-4GS8GP4G-E IE-4000-16GT4G-E IE-4000-8GT8GP4G-E	IE-4000-8S4G-E IE-4000-8GS4G-E
Input voltage range	Redundant DC input voltage: nominal 9.6 to 60VDC	Redundant DC input voltage: nominal 9.6 to 60VDC	Redundant DC input voltage: nominal 9.6 to 60VDC
Maximum Input current	3.7A	4.3A	5.0A
Power consumption¹	35W	40W	42W

¹These numbers are measured at 9.6V and do not include PoE power consumption.

Table 6. Physical specifications

Features	IE-4000-4T4P4G-E IE-4000-8T4G-E IE-4000-8GT4G-E IE-4000-16T4G-E	IE-4000-4GC4GP4G-E IE-4000-4TC4G-E IE-4000-4S8P4G-E IE-4000-4GS8GP4G-E IE-4000-16GT4G-E IE-4000-8GT8GP4G-E	IE-4000-8S4G-E IE-4000-8GS4G-E
Dimensions (H x W x D)	6.12 x 6.12 x 5.09 in. (155.4 x 155.4 x 129.2 mm)		
Weight	6.35 pounds (2.88 kg)		

Figure 3 shows the IE4000 mechanical dimensions.



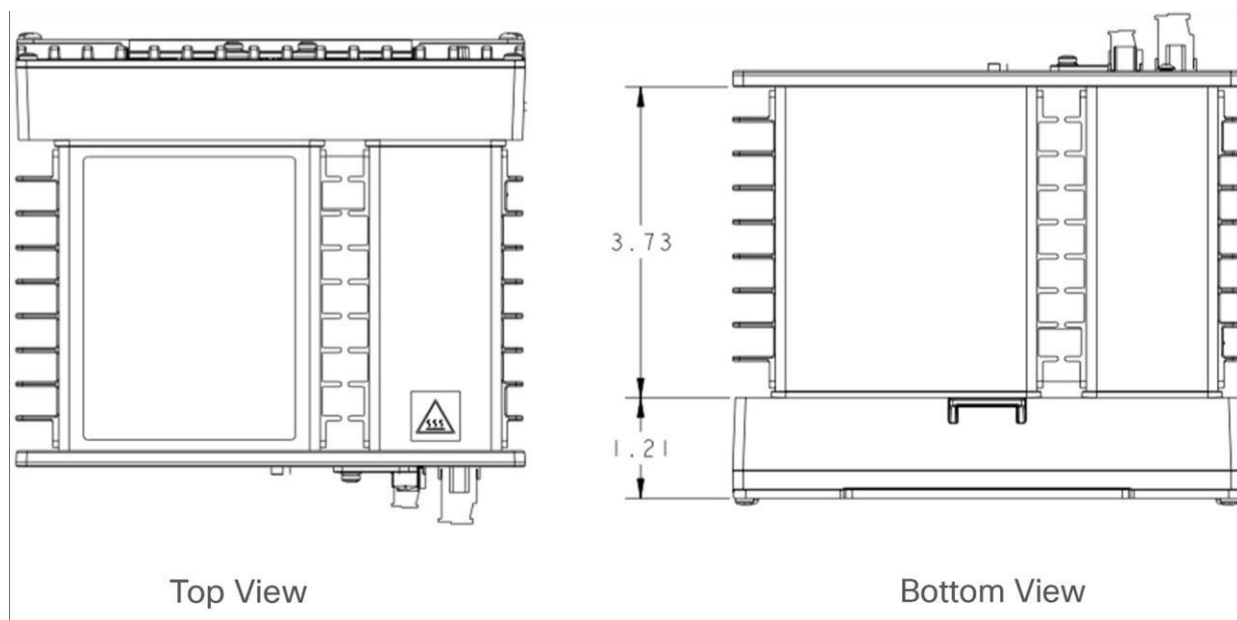


Figure 3.
IE-4000 dimensions

Table 7. Switch performance and scalability

Description	Specification
Forwarding rate	Line rate for all ports and all packet sizes
Number of queues	4 egress
Unicast MAC addresses	16,000
IGMP multicast groups	1,000
Number of VLANs	1,000
IPv4 MAC security ACEs	1,000 with default TCAM Template
NAT translation	Bidirectional, 128 unique subnet NAT translation entries, which can expand to tens of thousands of translated entries if designed properly

Table 8. Cisco IE 4000 LAN Base: Key software features

LAN Base license (default)	Features
Layer 2 switching	IEEE 802.1, 802.3, 802.3at, 802.3af standard, VTPv2, NTP, UDLD, CDP, LLDP, Unicast Mac filter, Flexlink, Resilient Ethernet Protocol (REP), VTPv3, EtherChannel, Voice VLAN, QinQ tunneling, Industrial macro configuration
Security	SCP, SSH, SNMPv3, TACACS+, RADIUS Server/Client, MAC Address Notification, BPDU Guard, Port-Security, Private VLAN, DHCP Snooping, Dynamic ARP Inspection, IP Source Guard, 802.1x, Guest VLAN, MAC Authentication Bypass, 802.1x Multi-Domain Authentication, Storm Control, Trust Boundary, FIPS 140-2, ACT2, Secure boot, Full flexible Netflow ¹
Layer 2 multicast	IGMPv1, v2, v3 Snooping, IGMP filtering, IGMP Querier
Management	Fast Boot, Express setup, Web Device Manager, Industrial Network Director (IND), MIB, Smartport, SNMP, syslog, storm control, unicast, multicast, broadcast, SPAN sessions, RSPAN, DHCP server, customized DOM (digital optical management), Embedded Event Manager (EEM), Plug-n-Play Agent, Port-based DHCP
Industrial Ethernet	CIP Ethernet/IP, Profinet v2, IEEE 1588 PTP v2, NTP to PTP translation, CIP Time Sync
Quality of service	Ingress Policing, Rate-Limit, Egress Queueing/shaping, AutoQoS, QoS, PROFINET QoS
Layer 2 IPv6	IPv6 Host support, HTTP over IPv6, SNMP over IPv6
Layer 3 routing	IPv4 Static Routing
Industrial management	Layer 2 switching with 1:1 static Network Address Translation (NAT)
Redundancy	Redundancy Ethernet Protocol ring (REP) Parallel Redundancy Protocol (PRP) Media Redundancy Protocol (MRP) ring, MRP Auto Manager (MAM) High Availability Seamless Redundancy (HSR), PTP over HSR HSR-PRP (Dual RedBox mode) HSR-HSR (Quadbox)
Utility	Power Profile 2011 and 2017, dying gasp, GOOSE messaging, SCADA protocol classification, MODBUS TCP/IP, utility SmartPort macro, BFD, Ethernet OAM, IEEE 802.3ah, CFM (IEEE 802.1ag)

¹ Full flexible NetFlow is included on all IE-4000 Switches and requires either one of the following licenses per switch:

- Cisco ONE™ Foundation Perpetual license
- Cisco DNA Essentials license
- Cisco IP Services license

Table 9. Cisco IE 4000 IP Services: Key software features

IP Services license	Additional features
IP multicast	PIM sparse mode (PIM-SM), PIM dense mode (PIM-DM), and PIM sparse-dense mode
IP unicast routing protocols	OSPF, EIGRP, BGPv4, IS-IS, RIPv2, Policy-Based Routing (PBR), HSRP
IPv6 routing	RIPng, OSPFv6, and EIGRPv6 support
Security	IEEE 802.1AE MACsec (including PSK based MKA support), Cisco TrustSec®, SGT inline tagging and SGACL, Full flexible Netflow
Virtualization	VRF-lite

Table 10. Cisco IE 4000 DNA Essentials license features

Feature	Description
Element Management	Discovery, topology, inventory, software image management
Basic Assurance	Health Dashboards – Network, Client Basic Switch & Wired Client Health Monitoring
Basic automation	Cisco Network Plug-and-Play application

Table 11. Cisco IE 4000 DNA Advantage license features

Feature	Description
Cisco DNA Essentials	All Cisco DNA Essentials features
Advanced Automation	SDA- IE 4000 can function as an SDA extended node REP ring Workflow
Assurance & Analytics	Compliance, Custom Reports, Device 360 & Wired Client 360

Table 12. Compliance specifications

Type	Standards
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Electromagnetic emissions	FCC 47 CFR Part 15 Class A EN 55022A Class A EN 300 386 VCCI Class A AS/NZS CISPR 22 Class A CISPR 11 Class A CISPR 22 Class A ICES 003 Class A CNS13438 Class A KN22
Electromagnetic immunity	EN55024 CISPR 24 AS/NZS CISPR 24 KN24 EN 61000-4-2 Electro Static Discharge EN 61000-4-3 Radiated RF EN 61000-4-4 Electromagnetic Fast Transients EN 61000-4-5 Surge EN 61000-4-6 Conducted RF EN 61000-4-8 Power Frequency Magnetic Field EN 61000-4-9 Pulse Magnetic Field EN 61000-4-10 Damped Oscillatory Magnetic Field (100 A/m) EN 61000-4-11 AC Power Voltage EN 61000-4-18 Damped Oscillatory Wave EN-61000-4-29 DC Voltage Dips
Industry standards	EN 61000-6-1 Light Industrial EN 61000-6-2 Industrial EN 61000-6-4 Industrial EN 61326 Industrial Control EN 61131-2 Programmable Controllers Substation KEMA (IEEE 1613, IEC 61850-3) Marine DNV GL – (Ships; High speed and light craft)* NEMA TS-2 (EMC, environmental, mechanical) IEEE 1613 Electric Power Stations Communications Networking IEC 61850-3 Electric Substations Communications Networking EN50155 Railway - Electronic Equipment on Rolling Stock (EMC, ENV, Mech)

Type	Standards
	EN50121-4 Railway - Signaling and Telecommunications Apparatus EN50121-3-2 Railway - Apparatus for Rolling Stock ODVA Industrial EtherNet/IP PROFINET conformance B IP30 (per EN60529)
Safety standards and certifications	Information Technology Equipment: UL/CSA 60950-1 EN 60950-1 CB to IEC 60950-1 with all country deviations NOM to NOM-019-SCFI (through partners and distributor) Industrial Floor (Control Equipment): UL 508 CSA C22.2, No 142 Hazardous Locations: ANSI/ISA 12.12.01 CSA C22.2 No 213 IEC 60079-0, -15 IECEx test report EN 60079-0, -15 ATEX certification (Class I Zone 2) Cabinet enclosure required
Operating environment	Operating Temperature: -40C to +75C <ul style="list-style-type: none"> -40C to +70C (Vented Enclosure Operating) -40C to +60C (Sealed Enclosure Operating) -34C to +75C (Fan or Blower equipped Enclosure Operating) EN 60068-2-1 EN 60068-2-2 EN 61163 Altitude: up to 15,000 feet
Storage environment	Temperature: -40 to +85 degrees C Altitude: 15,000 feet IEC 60068-2-14
Humidity	Relative humidity of 5% to 95% non-condensing IEC 60068-2-3 IEC 60068-2-30
Shock and vibration	IEC 60068-2-27 (operational shock, 50G, 11ms, Half Sine) IEC 60068-2-27 (Non-Operational Shock, 65-80G, 9ms, Trapezoidal) IEC 60068-2-6, IEC 60068-2-64, EN 61373 (Operational Vibration) IEC 60068-2-6, IEC 60068-2-64, EN 61373 (Non-operational Vibration)
Type	Standards

Corrosion	ISO 9223: Corrosion class C3-Medium class C4-High EN 60068-2-52 (Salt Fog) EN 60068-2-60 (Flowing Mixed Gas)
Others	RoHS Compliance China RoHS Compliance TAA (Government) CE (Europe)
Warranty	Five-year limited HW warranty on all IE-4000 PIDs and all IE Power Supplies (see table 3 above). See link below for more details on warranty
Mean Time Between Failures (MTBF)	IE-4000-4TC4G-E: 578, 730 Hours IE-4000-8T4G-E: 591, 070 Hours IE-4000-8S4G-E: 583, 700 Hours IE-4000-4T4P4G-E: 562, 300 Hours IE-4000-16T4G-E: 558, 310 Hours IE-4000-4S8P4G-E: 535, 880 Hours IE-4000-8GT4G-E: 591, 240 Hours IE-4000-8GS4G-E: 583, 700 Hours IE-4000-4GC4GP4G-E: 550, 940 Hours IE-4000-16GT4G-E: 558, 630 Hours IE-4000-8GT8GP4G-E: 519, 190 Hours IE-4000-4GS8GP4G-E: 536, 220 Hours

* Renewal in progress

Table 13. Management and standards

Description	Specification	
IEEE standards	<ul style="list-style-type: none"> • IEEE 802.1D MAC Bridges, STP • IEEE 802.1p Layer2 COS prioritization • IEEE 802.1q VLAN • IEEE 802.1s Multiple Spanning-Trees • IEEE 802.1w Rapid Spanning-Tree • IEEE 802.1x Port Access Authentication • IEEE 802.1AB LLDP • IEEE 802.3ad Link Aggregation (LACP) • IEEE 802.3af Power over Ethernet provides up to 15.4W DC power to each end device • IEEE 802.3at Power over Ethernet provides up to 25.5W DC power to each end device 	<ul style="list-style-type: none"> • IEEE 802.3af Power over Ethernet • IEEE 802.3at Power over Ethernet Plus • IEEE 802.3ah 100BASE-X SMF/MMF only • IEEE 802.3x full duplex on 10BASE-T • IEEE 802.3 10BASE-T specification • IEEE 802.3u 100BASE-TX specification • IEEE 802.3ab 1000BASE-T specification • IEEE 802.3z 1000BASE-X specification • IEEE 1588v2 PTP Precision Time Protocol • IEEE 802.1AS PTP • IEEE 802.1Qbv TSN

RFC compliance	<ul style="list-style-type: none"> • RFC 768: UDP • RFC 783: TFTP • RFC 791: IPv4 protocol • RFC 792: ICMP • RFC 793: TCP • RFC 826: ARP • RFC 854: Telnet • RFC 951: BOOTP • RFC 959: FTP • RFC 1157: SNMPv1 • RFC 1901,1902-1907 SNMPv2 • RFC 2273-2275: SNMPv3 • RFC 2571: SNMP Management • RFC 1166: IP Addresses • RFC 1256: ICMP Router Discovery 	<ul style="list-style-type: none"> • RFC 1305: NTP • RFC 1492: TACACS+ • RFC 1493: Bridge MIB Objects • RFC 1534: DHCP and BOOTP interoperation • RFC 1542: Bootstrap Protocol • RFC 1643: Ethernet Interface MIB • RFC 1757: RMON • RFC 2068: HTTP • RFC 2131, 2132: DHCP • RFC 2236: IGMP v2 • RFC 3376: IGMP v3 • RFC 2474: DiffServ Precedence • RFC 3046: DHCP Relay Agent Information Option • RFC 3580: 802.1x RADIUS • RFC 4250-4252 SSH Protocol
SNMP MIB objects	<ul style="list-style-type: none"> • BRIDGE-MIB • CALISTA-DPA-MIB • CISCO-ACCESS-ENVMON-MIB • CISCO-ADMISSION-POLICY-MIB • CISCO-AUTH-FRAMEWORK-MIB • CISCO-BRIDGE-EXT-MIB • CISCO-BULK-FILE-MIB • CISCO-CABLE-DIAG-MIB • CISCO-CALLHOME-MIB • CISCO-CAR-MIB • CISCO-CDP-MIB • CISCO-CIRCUIT-INTERFACE-MIB • CISCO-CLUSTER-MIB • CISCO-CONFIG-COPY-MIB • CISCO-CONFIG-MAN-MIB • CISCO-DATA-COLLECTION-MIB 	<ul style="list-style-type: none"> • CISCO-RTTMON-RTP-MIB • CISCO-SNMP-TARGET-EXT-MIB • CISCO-STACK-MIB • CISCO-STACKMAKER-MIB • CISCO-STP-EXTENSIONS-MIB • CISCO-SYSLOG-MIB • CISCO-TCP-MIB • CISCO-UDLD-MIB • CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB • CISCO-VLAN-MEMBERSHIP-MIB • CISCO-VTP-MIB • ENTITY-MIB • ETHERLIKE-MIB • HC-RMON-MIB • IEEE8021-PAE-MIB • IEEE8023-LAG-MIB

Description	Specification	
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	<ul style="list-style-type: none"> • CISCO-DHCP-SNOOPING-MIB • CISCO-EMBEDDED-EVENT-MGR-MIB • CISCO-ENTITY-ALARM-MIB • CISCO-ENTITY-SENSOR-MIB • CISCO-ENTITY-VENDORTYPE-OID-MIB • CISCO-ENVMON-MIB • CISCO-ERR-DISABLE-MIB • CISCO-FLASH-MIB • CISCO-FTP-CLIENT-MIB • CISCO-IF-EXTENSION-MIB • CISCO-IGMP-FILTER-MIB • CISCO-IMAGE-MIB • CISCO-IP-STAT-MIB • CISCO-LAG-MIB • CISCO-LICENSE-MGMT-MIB • CISCO-MAC-AUTH-BYPASS-MIB • CISCO-MAC-NOTIFICATION-MIB • CISCO-MEMORY-POOL-MIB • CISCO-PAE-MIB • CISCO-PAGP-MIB • CISCO-PING-MIB • CISCO-PORT-QOS-MIB • CISCO-PORT-SECURITY-MIB • CISCO-PORT-STORM-CONTROL-MIB • CISCO-PRIVATE-VLAN-MIB • CISCO-PROCESS-MIB • CISCO-PRODUCTS-MIB • CISCO-RESILIENT-ETHERNET-PROTOCOL-MIB • CISCO-RTTMON-ICMP-MIB • CISCO-RTTMON-IP-EXT-MIB • CISCO-RTTMON-MIB • CISCO RTTMON-RTP-MIB 	<ul style="list-style-type: none"> • IF-MIB • IP-FORWARD-MIB • LLDP-EXT-MED-MIB • LLDP-EXT-PNO-MIB • LLDP-MIB • NETRANGER • NOTIFICATION-LOG-MIB • OLD-CISCO-CHASSIS-MIB • OLD-CISCO-CPU-MIB • OLD-CISCO-FLASH-MIB • OLD-CISCO-INTERFACES-MIB • OLD-CISCO-IP-MIB • OLD-CISCO-MEMORY-MIB • OLD-CISCO-SYS-MIB< • OLD-CISCO-SYSTEM-MIB • OLD-CISCO-TCP-MIB • OLD-CISCO-TS-MIB • RMON-MIB • RMON2-MIB • SMON-MIB • SNMP-COMMUNITY-MIB • SNMP-FRAMEWORK-MIB • SNMP-MPD-MIB • SNMP-NOTIFICATION-MIB • SNMP-PROXY-MIB • SNMP-TARGET-MIB • SNMP-USM-MIB • SNMP-VIEW-BASED-ACM-MIB • SNMPv2-MIB • TCP-MIB • UDP-MIB
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Table 14. SFP support

Part number	Specification	SFP type	Max distance	Cable type	Temp range*	DOM support
GLC-FE-100FX-RGD=	100BASE-FX	FE	2km	MMF	IND	Yes
GLC-FE-100LX-RGD=	100BASE-LX10	FE	10km	SMF	IND	Yes
GLC-FE-100FX=	100BASE-FX	FE	2km	MMF	COM	No
GLC-FE-100LX=	100BASE-LX10	FE	10km	SMF	COM	No
GLC-FE-100EX=	100BASE-EX	FE	40km	SMF	COM	No

GLC-FE-100ZX=	100BASE-ZX	FE	80km	SMF	COM	No
GLC-FE-100BX-D=	100BASE-BX10	FE	10km	SMF	COM	No
GLC-FE-100BX-U=	100BASE-BX10	FE	10km	SMF	COM	Yes
GLC-SX-MM-RGD=	1000BASE-SX	GE	550m	MMF	IND	Yes
GLC-LX-SM-RGD=	1000BASE-LX/LH	GE	550m/10km	MMF/SMF	IND	Yes
GLC-ZX-SM-RGD=	1000BASE-ZX	GE	70km	SMF	IND	Yes
GLC-BX40-U-I=	1000BASE-BX40	GE	40km	SMF	IND	Yes
GLC-BX40-D-I=	1000BASE-BX40	GE	40km	SMF	IND	Yes
GLC-BX40-DA-I=	1000BASE-BX40	GE	40km	SMF	IND	Yes
GLC-BX80-U-I=	1000BASE-BX80	GE	80km	SMF	IND	Yes
GLC-BX80-D-I=	1000BASE-BX80	GE	80km	SMF	IND	Yes
GLC-SX-MMD=	1000BASE-SX	GE	550m	MMF	EXT	Yes
GLC-LH-SMD=	1000BASE-LX/LH	GE	550m/10km	MMF/SMF	EXT	Yes
GLC-EX-SMD=	1000BASE-EX	GE	40km	SMF	EXT	Yes
GLC-ZX-SMD=	1000BASE-ZX	GE	70km	SMF	EXT	Yes
GLC-BX-D=	1000BASE-BX10	GE	10km	SMF	COM	Yes
GLC-BX-U=	1000BASE-BX10	GE	10km	SMF	COM	Yes
CWDM-SFP-xxxx= (8 freq)	CWDM 1000BASE-X	GE		SMF	COM	Yes
DWDM-SFP-xxxx= (40 freq)	DWDM 1000BASE-X	GE		SMF	COM	Yes
SFP-GE-S=	1000BASE-SX	GE	550m	MMF	EXT	Yes

Part number	Specification	SFP type	Max distance	Cable type	Temp range*	DOM support
SFP-GE-L=	1000BASE-LX/LH	GE	550m/10km	MMF/SMF	EXT	Yes
SFP-GE-Z=	1000BASE-ZX	GE	70km	SMF	EXT	Yes
GLC-SX-MM=	1000BASE-SX	GE	550m	MMF	COM	No
GLC-LH-SM=	1000BASE-LX/LH	GE	550m/10km	MMF/SMF	COM	No
GLC-ZX-SM=	1000BASE-ZX	GE	70km	SMF	COM	Yes
GLC-TE=	1000BASE-T	GE	100m	Copper	EXT	NA
GLC-T-RGD=	1000BASE-T	GE	100m	Copper	IND	NA
GLC-BX-U-I=	1000BASE-BX	GE	10km	SMF	IND	Yes
GLC-BX-D-I=	1000BASE-BX	GE	10km	SMF	IND	Yes

Note:

Not all SFPs are supported in all software versions. For first software release supporting SFP, refer to https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html.

Not all SFPs are supported in PROFINET GSD, SIMATIC STEP7/TIA Portal. Please visit https://www.cisco.com/c/en/us/td/docs/switches/lan/industrial/software/configuration/guide/b_sfp_TIA.html.

* If nonindustrial (EXT, COM) SFPs are used, the switch operating temperature must be derated.

MMF = multimode fiber

SMF = single-mode fiber

Ordering information

Table 15 lists the ordering information for Cisco IE 4000 system.

Table 15. Ordering information

Product ID	Description
Cisco IE 4000 Hardware PIDs	
IE-4000-16GT4G-E	IE4000 switch with 16 GE Copper and 4 GE combo uplink ports
IE-4000-16T4G-E	IE4000 switch with 16 FE Copper and 4 GE combo uplink ports

IE-4000-4GC4GP4G-E	IE4000 switch with 4 GE combo, 4 GE PoE+ and 4 GE combo uplink ports
IE-4000-4GS8GP4G-E	IE4000 switch with 4 GE SFP, 8 GE PoE+ and 4 GE combo uplink ports
IE-4000-4S8P4G-E	IE4000 switch with 4 FE SFP, 8 FE PoE+ and 4 GE combo uplink ports
IE-4000-4T4P4G-E	IE4000 switch with 4 FE Copper, 4 FE PoE+ and 4 GE combo uplink ports

Product ID	Description
IE-4000-4TC4G-E	IE4000 switch with 4 FE Copper combo ports and 4 GE combo uplink ports
IE-4000-8GS4G-E	IE4000 switch with 8 GE SFP and 4 GE combo uplink ports
IE-4000-8GT4G-E	IE4000 switch with 8 GE Copper and 4 GE combo uplink ports
IE-4000-8GT8GP4G-E	IE4000 switch with 8 GE Copper, 8 GE PoE+ and 4 GE combo uplink ports
IE-4000-8S4G-E	IE4000 switch with 8 FE SFP and 4 GE combo uplink ports
IE-4000-8T4G-E	IE4000 switch with 8 FE copper and 4 GE combo uplink ports

Cisco IE 4000 software licenses and accessories PIDs

IE-LICENSE-SPARE	Spare license for software upgrade (L2 to L3 features or MRP protocols)
L-IE4000-RTU=	IE4000 Electronic software license upgrade from LAN base L2 to IP Services L3 features
LIC-MRP-Manager=	MRP ring manager license
LIC-MRP-Client=	MRP ring client license
STK-RACK-DINRAIL=	19" DIN Rail mount kit
SD-IE-1GB=	IE 1GB SD Memory Card - Spare

Cisco ONE™ Licenses

C1F1PIE4K5K1K9	Cisco ONE Foundation Lite Perpetual Includes Prime Infrastructure (LF and AS), Identity Services Engine - Base
C1F1PIE40001K9	Cisco ONE Foundation Perpetual Includes Full flexible Netflow, Stealthwatch, Prime Infrastructure, and Identity Services Engineer - Base
C1A1PIE40001K9	Cisco ONE Advanced Perpetual Includes IP Services
C1-FLOW-IE4K	Cisco ONE Netflow IE4000
C1A1AIE40001K9	Cisco ONE Advanced Perpetual - IE 4000
C1F1AIE40001K9	Cisco ONE Foundation Perpetual - IE 4000, BROWNFIELD

C1F1AIE4K5K1K9	Cisco ONE Foundation Lite Perpetual - IE 4000/5000
C1F1PIE40001K9	Cisco ONE Foundation Perpetual - IE 4000
Product ID	Description
Cisco IE 4000 DNA licenses	
IE4000-DNA-E-L	Cisco DNA Essentials license (up to 12 ports)
IE4000-DNA-E-L-3Y	Cisco DNA Essentials 3 year term license (up to 12 ports) option
IE4000-DNA-E-L-5Y	Cisco DNA Essentials 5 year term license (up to 12 ports) option
IE4000-DNA-A-L	Cisco DNA Advantage license (up to 12 ports)
IE4000-DNA-A-L-3Y	Cisco DNA Advantage 3 year term license (up to 12 ports) option
IE4000-DNA-A-L-5Y	Cisco DNA Advantage 5 year term license (up to 12 ports) option
IE4000-DNA-E-M	Cisco DNA Essentials license (up to 24 ports)
IE4000-DNA-E-M-3Y	Cisco DNA Essentials 3 year term license (up to 24 ports) option
IE4000-DNA-E-M-5Y	Cisco DNA Essentials 5 year term license (up to 24 ports) option
IE4000-DNA-A-M	Cisco DNA Advantage license (up to 24 ports)
IE4000-DNA-A-M-3Y	Cisco DNA Advantage 3 year term license (up to 24 ports) option
IE4000-DNA-A-M-5Y	Cisco DNA Advantage 5 year term license (up to 24 ports) option
IE4000-DNA-E-L-7Y	Cisco DNA Essentials 7 year term license (up to 12 ports) option
IE4000-DNA-E-M-7Y	Cisco DNA Essentials 7 year term license (up to 24 ports) option
IE4000-DNA-A-L-7Y	Cisco DNA Advantage 7 year term license (up to 12 ports) option
IE4000-DNA-A-M-7Y	Cisco DNA Advantage 7 year term license (up to 24 ports) option

Warranty information

Warranty information for the IE 4000 is available on <https://connectthedots.cisco.com/connectdots/serviceWarrantyFinderRequest?fl=sf#>.

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:

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

Reference links to product-specific environmental sustainability information that is mentioned in relevant sections of this data sheet are provided in the following table:

Sustainability Topic	Reference
Power	
Power specifications and consumption	Table 5. Power specifications
Environmental Characteristics	
Operating temperature, industry standards, EMC emissions	Table 12. Compliance specifications
Material	
Unit Weight	Table 6. Physical specifications

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

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Document history

New or Revised Topic	Described In	Date
Updated Power Profile, footnote to Marine DNV Certification, Cisco ONE Licenses, Cisco environmental sustainability information	Table 8, 12, 15, Cisco environmental sustainability	29/10/2021
Added EN 61000-4-10 Damped Oscillatory Magnetic Field (100 A/m)	Table 12	10/06/2020

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04/

Cisco Industrial Ethernet 5000 Series Switches

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Developed specifically to withstand the harshest industrial environments, these switches offer the most flexible and scalable industrial Ethernet platform that grows with your network.

Product overview

The Cisco® Industrial Ethernet (IE) 5000 Series Switches with four 10 Gigabit or four 1 Gigabit Ethernet uplinks and 24 Gigabit Ethernet downlinks is a rack mount, ruggedized switch that provides Layer 2 and Layer 3 line rate aggregation and copper Power over Ethernet (PoE) connectivity in the harshest of industrial environments.

The IE 5000 Series uses superior high-bandwidth hardware switching and proven Cisco IOS® Software. The IE 5000 is highly secure and scalable for access and aggregation layer deployments. It also provides Cisco stackable technologies for advanced network reliability. The switch is built to withstand extreme environments while adhering to overall IT network design, compliance, and performance requirements. The IE5000 has builtin SW image verification to ensure authenticity of the Cisco Software.

The IE 5000 Series can be used to easily and securely extend the enterprise network to harsh environments with a software-defined access extension for the Internet of Things (IoT) enabling connectivity in outdoor areas, warehouses, distribution centers, roadways, etc., using powerful enterprise-grade intent-based network management platform such as Cisco DNA Center.

The IE 5000 Series is ideal for industrial Ethernet applications where hardened products are required. This includes utility industries, manufacturing, energy and process control, Intelligent Transportation Systems (ITS), oil and gas field sites, city surveillance programs, and mining. With improved overall performance, greater bandwidth with available 10 Gigabit Ethernet interfaces, a richer feature set, and enhanced hardware, the Cisco IE 5000 Series Switches complement the current Industrial Ethernet portfolio of products. This portfolio includes Cisco industrial Ethernet switches, such as the Cisco IE 2000, IE 3200, IE 3300, IE 3400, IE 4000 and IE 4010 Series Switches, as well as utility - focused products, such as the Cisco IE 2000U Industrial Ethernet switches and Cisco 2500 Series Connected Grid Switches.

Through a user-friendly web device manager, the IE 5000 provides easy out-of-the-box configuration and simplified operational manageability to deliver advanced security, data, video, and voice services over industrial networks.

Features and benefits

Table 1 lists the features and benefits of Cisco IE 5000 Series Switches.

Table 1. Features and benefits of Cisco IE 5000 Series Switches

Feature	Benefit
---------	---------

Robust industrial design	<ul style="list-style-type: none"> • Built for harsh environment and temperature range (-40° to 75°C). • Every IE-5000-12S12P-10G is conformal coated. • Hardened for vibration, shock, surge, and electrical noise immunity • Four 10 Gigabit or four 1 Gigabit Ethernet uplink ports provide multiple resilient design options • Complies with multi-industry specifications for industrial automation, ITS, and electrical substation environments. • Improves uptime, performance, and safety of industrial systems and equipment. • Compact 1 rack unit design with dual LED feature allowing easy monitoring and troubleshooting even when reverse mounting based on cabling requirements. • Fanless, convection cooled with no moving parts for extended durability. • IEEE 1588v2 PTP (both power profile and default profile are supported). • Alarm I/O for monitoring and signaling to external equipment.
User-friendly GUI device manager	<ul style="list-style-type: none"> • Allows easy configuration and monitoring with a web-based Device Manager. • Eliminates the need for more complex terminal emulation programs. • Reduces the cost of deployment. • Multiple Language Support - English, Chinese (Traditional), Chinese (Simplified), French, German, Japanese, Spanish (LATAM)
SwapDrive: “zero-config” replacement	<ul style="list-style-type: none"> • True zero-configuration replacement for easy middle-of-the-night or middle-of-nowhere failure recovery. • Simple switch replacement in case of a failure. • No networking expertise required. • Helps ensure fast recovery.
High-density industrial Power over Ethernet (PoE)	<ul style="list-style-type: none"> • Support for up to 12 PoE or PoE+ ports. • Controls costs by limiting wiring, distribution panels, and circuit breakers. • Reduces equipment needs, thus requiring less space and reducing heat dissipation. • Enables ready-to-use PoE devices, such as IP phones, cameras, and wireless access points. • Supports maximum High-Definition (HD) camera deployments. • Power budget up to 165W for PoE or PoE+ with one power supply and up to 360W with two power supplies.
High-performance Ethernet switch with 4x10 GE or 4x1GE uplinks and 24x1 GE downlinks	<ul style="list-style-type: none"> • Connects new wireless access point (802.11n and 802.11ac). • Enables new HD IP cameras. • Provide high-speed, low-latency connectivity for PLCs, controllers and associated I/O devices. • Allows Supervisory Control and Data Acquisition (SCADA) connectivity. • Provides introduction of new bandwidth-hungry applications in the industrial space. • Line-rate, low-latency forwarding with advanced hardware assisted features (such as NAT, IEEE1588v2). • Supports very-delay-sensitive applications and time-sensitive networks. • Delivers multiple rings and redundant ring topology for new network configurations. • Extends geographical scalability where longer distance connectivity is required.

The Cisco Industrial Ethernet 5000 Series Switches offer:

- Bandwidth and capacity to grow with your networking needs: High-performance non-blocking switch capacity with up to 24 Gigabit Ethernet downlink ports and four 10 Gigabit or four 1 Gigabit Ethernet uplink ports per switch
- SFP+ heater to allow standard SFP+ optics to operate to -40C (10GE SKU only)
- Cisco IOS Software features for smooth IT integration and policy consistency
- Robust resiliency enabled by features, such as dual-ring design through four 10 Gigabit Ethernet uplink ports, Resilient Ethernet Protocol (REP), Parallel Redundancy Protocol (PRP), PROFINET– Media Redundancy Protocol (MRP) ring, High Availability Seamless Redundancy (HSR) ring, EtherChannel, Flex Links, redundant power input, and dying gasp
- Oven-controlled crystal oscillator (OCXO) to provide superior frequency stability needed for precise synchronization applications
- Simplified software upgrade path with universal images
- Integrated support for features such as GPS receiver and IRIG

- Cisco DNA Center management and support for software-defined access extension for IoT

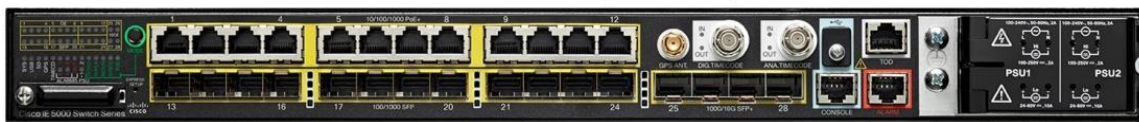
Cisco ONE Software

Cisco ONE Software offers a simplified consumption model, centered on common customer scenarios in the industrial automation and extended enterprise environments. Cisco ONE Software and services provide customers with four primary benefits:

- Software suites that address typical customer use scenarios at an attractive price
- Investment protection for their software purchase through software services-enabled license portability
- Access to ongoing innovation and new technology with Cisco Software Support Service (SWSS)
- Flexible licensing models to smoothly distribute customers' software spending over time

Figure 1 shows switch models, Table 2 shows all the available IE 5000 models, Table 3 lists the power supplies and Table 4 shows the available power budget for PoE/PoE+ for Cisco IE 5000 Series Switches.

IE 5000 Switch (Front View)



IE 5000 Switch (Rear View)



Figure 1.
IE 5000 switch

Table 2. Cisco Industrial Ethernet 5000 Series models

Product number	Total ports	SFP Uplinks	SFP fiber ports (S)	Copper PoE/PoE+ ports (P)	Default software
IE-5000-12S12P-10G	28	4 1GE/10G ¹	12 FE/GE	12 FE/GE	LAN Base ²
IE-5000-16S12P	28	4 1GE	12 FE/GE	12 FE/GE	LAN Base ²

¹ Uplink ports can run at 1 Gigabit Ethernet or 10 Gigabit Ethernet mode depending on the SFP or SFP+ inserted.

² Can be upgraded to IP Services license with the PID in Table 15.

Table 3. Power supplies for Cisco IE 5000 Series Switches

Product number	Wattage	Rated nominal input operating range	Supported input voltage operating range	PoE/PoE+ support	Use case scenario
PWR-RGD-AC-DC-H	150W	AC 100-240V/2.0A 50-60Hz or DC 100-250V/2.0A	AC 85-264V or DC 88-300V	Yes	High voltage AC or DC power source, for hazardous locations ^{1, 2, 3} PoE power application

PWR-RGD-LOW-DC-H	150W	DC 24-60V/10A	DC 18-75V	Yes	Low voltage DC power source, for hazardous locations ^{1, 2, 3} PoE power application
PWR-RGD-AC-DC-250	250W	AC 100-240V 3.3A 50-60Hz or DC 100-250V 3.3A.	AC 85-264V or DC 88-300V	Yes	High voltage AC or DC power source, for hazardous locations ^{2, 3, 4} PoE power application

Table 4. Available power budget for PoE/PoE+ with different power supply wattage

Product number	150W	150W (dual)	250W	250W + 150W	250W (dual)
IE-5000-12S12P-10G	65	185	165	270	360
IE-5000-16S12P	65	185	165	270	360

Product specifications

Table 5 lists specifications, Table 6 lists information about Physical specifications, Table 7 lists information about switch performance and scalability, Tables 8 and 9 list important software license features, Tables 10-11 list the Cisco DNA Essentials and Advantage features. Table 12 lists compliance specifications, and Table 13 lists information about management and standards and Table 14 lists the supported SFPs on Cisco IE 5000 Series Switches

Table 5. Product specifications

Description	Specification
Hardware	<ul style="list-style-type: none"> • 1-GB DRAM • 256-MB onboard flash memory • 1-GB removable SD flash memory card (included) • Mini-USB connector • RJ-45 traditional console connector • GPS antenna interface - GPS antenna input • Analog Timing I/O interface - For analog IRIG support • Digital Timing I/O interface - For digital timing such as IRIG-B TTL
Alarm	<ul style="list-style-type: none"> • Alarm I/O: four alarm inputs to detect dry contact open or closed, one Form C alarm output relay
Accessories	<ul style="list-style-type: none"> • SD-IE-1GB= - Spare SD card

Table 6. Physical specifications

Description	IE-5000-12S12P-10G	IE-5000-16S12P
Dimensions, (H x W x D)	<ul style="list-style-type: none"> • 1.75 x 17.5 x 14.0 in. (4.45 x 44.5 x 35.6 cm) with PWR-RGD-AC-DC-H / PWR-RGD-LOW-DC-H • 1.75 x 17.5 x 15.18 in. (4.45 x 44.5 x 38.56 cm) with PWR-RGD-AC-DC-250 	
System Weight	Without power supply: 13.7 lb (6.21 kg)	

Power Supply Weight	<ul style="list-style-type: none"> • PWR-RGD-AC-DC-H: 2.55 lb (1.16 kg) • PWR-RGD-LOW-DC-H: 2.5 lb (1.13 kg) • PWR-RGD-AC-DC-250: 3.1 lb (1.4 kg)
Power consumption	Maximum of 90W not including PoE consumption

Table 7. Switch performance and scalability

Description	Specification
Forwarding bandwidth	28Gbps (IE-5000-16S12P) or 64Gbps (IE-5000-12S12P-10G) - Line rate/Non-blocking
Switching bandwidth	56Gbps (IE-5000-16S12P) or 128Gbps (IE-5000-12S12P-10G)
Forwarding rate	41.67Mpps (IE-5000-16S12P) or 95.238Mpps (IE-5000-12S12P-10G) with 64 byte packets (Line rate)
Number of queues	4 egress
Unicast MAC addresses	16,000
IGMP multicast groups	1,000
Number of VLANs	1,005
IPv4 MAC security ACEs	1,000 with default TCAM Template
NAT translation	Bidirectional, 256 unique subnet NAT translation entries, which can expand to tens of thousands of translated entries if designed properly

Table 8. Cisco IE 5000 Key LAN Base Software features

LAN Base license (default)	Features
Layer 2 switching	IEEE 802.1, 802.3, 802.3at, 802.3af standard, VTPv2, NTP, UDLD, CDP, LLDP, Unicast Mac filter, Flex links, VTPv3, EtherChannel, Voice VLAN, QinQ tunneling
Security	SCP, SSH, SNMPv3, TACACS+, RADIUS Server/Client, MAC Address Notification, BPDU Guard, Port -Security, Private VLAN, DHCP Snooping, Dynamic ARP Inspection, IP Source Guard, 802.1x, Guest VLAN, MAC Authentication Bypass, 802.1x Multi-Domain Authentication, Storm Control, ACT2, Secure boot, Full flexible Netflow ¹
Layer 2 multicast	IGMPv1, v2, v3 Snooping, IGMP filtering, IGMP Querier
Management	Fast Boot, Express Setup, Web Device Manager, Cisco Network Assistant, Cisco Prime™ Infrastructure, MIB, SmartPort, SNMP, syslog, Storm Control - Unicast, Multicast, Broadcast, SPAN Sessions, RSPAN, DHCP Server, Customized TCAM/SDM size configuration, DOM (digital optical management), Hardware Watchdog, Port-based DHCP

Industrial Ethernet	CIP Ethernet/IP, PROFINET v2, IEEE1588 PTP v2 Modbus TCP, Default Profile, CIP Time Sync, NTP to PTP Translation, SPAN Traffic Time Stamping
Quality of service	Ingress Policing, Rate-Limit, Egress Queuing/shaping, AutoQoS, QoS, PROFINET QoS
Layer 2 IPv6	IPv6 Host support, HTTP over IPv6, SNMP over IPv6
Layer 3 routing	IPv4 Static Routing
Industrial management	Layer 2 switching with 1:1 static Network Address Translation (NAT)
Utility	IEEE 1588 v2 PTP Power Profile 2011 & 2017, dying gasp, GOOSE messaging, SCADA protocol classification, MODBUS TCP/IP, utility SmartPort macro, BFD, Ethernet OAM, IEEE 802.3ah, CFM (IEEE 802.1ag), PTP over Port Channel
LAN Base license (default)	Features
Horizontal stacking	Horizontal Stacking supports Layer 2 switching, ARP, Spanning Tree, port channel (up to 48), Power over Ethernet, static routing, L3 host routing (via two 10GE uplink stack ports), BGP, EIGRP, OSPF, VRF, PBR, PIM, PTP
Timing interface	IRIG-B Input and Output interface (B002, B003, B006, B007, B122, B123, B126, B127 timecode), GNSS/GPS Support
Redundancy	Resilient Ethernet Protocol (REP), Parallel Redundancy Protocol (PRP), Media Redundancy Protocol (MRP) Ring, High Availability Seamless Redundancy (HSR), PTP over HSR

¹ Full flexible Netflow is included on all IE-5000 Switches and requires either one of the following licenses per switch:

- Cisco ONE™ Foundation Perpetual license
- Cisco DNA Essentials license
- Cisco IP Services license

Table 9. Cisco IE 5000 IP services license: Key software features

IP Services Base license	Additional features
Industrial management	Embedded Event Manager (EEM)
IP unicast routing protocols	OSPF, EIGRP, BGPv4, IS-IS, RIPv2, Policy-Based Routing (PBR), HSRP
IP multicast	PIM Sparse Mode (PIM-SM), PIM Dense Mode (PIM-DM), and PIM sparse-dense mode
IPv6 routing	RIPng, OSPFv6, and EIGRPv6 support
Virtualization	VRF-lite

Security	IEEE 802.1AE MACsec (15.2(5)EA onwards supports both uplink and downlink, including PSK based MKA support), Cisco TrustSec® supports inline tagging SGT and SGACL, Full flexible Netflow
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Table 10. Cisco IE 5000 DNA Essentials license features

Feature	Description
Element Management	Discovery, topology, inventory, software image management
Basic Assurance	Health Dashboards – Network, Client Basic Switch & Wired Client Health Monitoring
Basic automation	Cisco Network Plug-and-Play application

Table 11. Cisco IE 5000 DNA Advantage license features

Feature	Description
Cisco DNA Essentials	All Cisco DNA Essentials features
Advanced Automation	SDA- IE 5000 can function as an SDA extended node REP ring Workflow
Assurance & Analytics	Compliance, Custom Reports, Device 360 & Wired Client 360

Table 12. Compliance specifications

Type	Standards
Electromagnetic emissions	FCC 47 CFR Part 15 Class A EN 55032 Class A VCCI Class A AS/NZS CISPR 22 Class A CISPR 11 Class A CISPR 32 Class A ICES 003 Class A CNS13438 Class A KN22 EN 300 386
Electromagnetic immunity	EN 55024 CISPR 24 AS/NZS CISPR 24 KN24 EN 61000-4-2 Electro Static Discharge EN 61000-4-3 Radiated RF EN 61000-4-4 Electromagnetic Fast Transients EN 61000-4-5 Surge EN 61000-4-6 Conducted RF EN 61000-4-8 Power Frequency Magnetic Field EN 61000-4-9 Pulse Magnetic Field EN 61000-4-10 Damped Oscillatory Magnetic Field (100 A/m) EN 61000-4-11 AC Voltage Dips and Interruptions EN 61000-4-18 Damped Oscillatory Wave EN-61000-4-29 DC Voltage Dips and Interruptions

Type	Standards
Industry standards	<p>EN 61000-6-1 Immunity for Light Industrial Environments</p> <p>EN 61000-6-2 Immunity for Industrial Environments</p> <p>EN 61000-6-4 Emission Standard for Industrial Environments</p> <p>EN 61326 Industrial Control</p> <p>EN 61131-2 Programmable Controllers</p> <p>IEEE 1613 Class 2 Electric Power Stations Communications Networking</p> <p>IEC 61850-3 Electric Substations Communications Networking</p> <p>EN 50155 Railway - Electronic Equipment on Rolling Stock (EMC, ENV, Mech)</p> <p>EN 50121-4 Railway - Signaling and Telecommunications Apparatus</p> <p>EN 50121-3-2 Railway - Apparatus for Rolling Stock</p> <p>ODVA Industrial EtherNet/IP</p> <p>PROFINET conformance B</p> <p>IP30 (per EN60529)</p> <p>Marine DNV GL – Ships*</p> <p>NEMA TS-2 (EMC, environmental, mechanical)</p>
Safety standards and certifications	<p>Information technology equipment:</p> <p>UL/CSA 60950-1</p> <p>UL/CSA 62368-1</p> <p>IEC 62368-1 CB with all country deviations</p> <p>EN 60950-1</p> <p>IEC 60950-1 CB with all country deviations</p> <p>NOM to NOM-019-SCFI (through partners and distributor) Industrial floor (control equipment):</p> <p>UL 508</p> <p>CSA C22.2, No 142</p> <p>Hazardous Locations, Class I, Div/Zone 2, gas groups IIC:</p> <p>ANSI/ISA 12.12.01</p> <p>CSA 213</p> <p>UL/CSA 60079-0, -15</p> <p>IEC 60079-0, -15 IECEx test report</p> <p>EN 60079-0, -15 ATEX certification (Cabinet enclosure required)</p>
Type	Standards

Operating environment	<p>Operating Temperature: -40°C to +75°C</p> <ul style="list-style-type: none"> -40°C to +70°C (vented enclosure – 40 LFM Air Flow) -40°C to +60°C (sealed enclosure – 0 LFM Air Flow) -34°C to +75°C (fan or blower equipped enclosure – 200 LFM air flow) <p>-40°C to +85°C (IEC 60068-2-2 Environmental Type Testing 16 hours)</p> <p>Operating altitude Up to 13,800 feet</p> <p>EN 60068-2-21</p> <p>EN 61163</p>
Storage environment	<p>Temperature: -40 to +85 degrees C</p> <p>Altitude: 0-15,000 feet</p> <p>IEC 60068-2-14</p>
Humidity	<p>Relative humidity of 0% to 95% non-condensing. IEC 60068-2-3</p> <p>IEC 60068-2-30</p>
Shock and vibration	<p>IEC 60068-2-27 (operational shock, 50G, 11ms, half sine)</p> <p>IEC 60068-2-27 (nonoperational shock, 65-80G, 9ms, trapezoidal) IEC 60068-2-32 (nonoperational shock)</p> <p>IEC 60068-2-6, IEC 60068-2-64, EN 61373 (operational vibration)</p> <p>IEC 60068-2-6, IEC 60068-2-64, EN 61373 (non-operational vibration)</p>
Corrosion	<p>ISO 9223: Corrosion class C3-Medium class C4-High</p> <p>IEC 60068-2-52 (Salt Fog)</p> <p>IEC 60068-2-60 (Flowing Mixed Gas)</p>
Others	<p>RoHS Compliance</p> <p>China RoHS Compliance</p> <p>TAA (Government)</p> <p>CE (Europe)</p>
Warranty	<p>5-year limited hardware warranty on all IE 5000 PIDS including the power supplies in Table 4. See link at end of this datasheet for more details on warranty</p>
Mean Time Between Failures (MTBF)	<p>390,190 hours</p>

* Renewal in progress

Table 13. Management and standards

Description	Specification	
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IEEE standards	<ul style="list-style-type: none"> • IEEE 802.1D MAC Bridges, STP • IEEE 802.1p Layer2 COS prioritization • IEEE 802.1q VLAN • IEEE 802.1s Multiple Spanning-Trees • IEEE 802.1w Rapid Spanning-Tree • IEEE 802.1x Port Access Authentication • IEEE 802.1AB LLDP • IEEE 802.3ad Link Aggregation (LACP) • IEEE 802.3af Power over Ethernet provides up to 15.4W DC power to each end device • IEEE 802.3at Power over Ethernet provides up to 25.5W DC power to each end device 	<ul style="list-style-type: none"> • IEEE 802.3af Power over Ethernet • IEEE 802.3at Power over Ethernet Plus • IEEE 802.3ah 100BASE-X SMF/MMF only • IEEE 802.3x full duplex on 10BASE-T • IEEE 802.3 10BASE-T specification • IEEE 802.3u 100BASE-TX specification • IEEE 802.3ab 1000BASE-T specification • IEEE 802.3z 1000BASE-X specification • IEEE 1588v2 PTP Precision Time Protocol
RFC compliance	<ul style="list-style-type: none"> • RFC 768: UDP • RFC 783: TFTP • RFC 791: IPv4 protocol • RFC 792: ICMP • RFC 793: TCP • RFC 826: ARP • RFC 854: Telnet • RFC 951: BOOTP • RFC 959: FTP • RFC 1157: SNMPv1 • RFC 1901,1902-1907 SNMPv2 • RFC 2273-2275: SNMPv3 • RFC 2571: SNMP Management • RFC 1166: IP Addresses • RFC 1256: ICMP Router Discovery 	<ul style="list-style-type: none"> • RFC 1305: NTP • RFC 1492: TACACS+ • RFC 1493: Bridge MIB Objects • RFC 1534: DHCP and BOOTP interoperation • RFC 1542: Bootstrap Protocol • RFC 1643: Ethernet Interface MIB • RFC 1757: RMON • RFC 2068: HTTP • RFC 2131, 2132: DHCP • RFC 2236: IGMP v2 • RFC 3376: IGMP v3 • RFC 2474: DiffServ Precedence • RFC 3046: DHCP Relay Agent Information Option • RFC 3580: 802.1x RADIUS • RFC 4250-4252 SSH Protocol
SNMP MIB objects	<ul style="list-style-type: none"> • BRIDGE-MIB • CALISTA-DPA-MIB • CISCO-ACCESS-ENVMON-MIB • CISCO-ADMISSION-POLICY-MIB • CISCO-AUTH-FRAMEWORK-MIB • CISCO-BRIDGE-EXT-MIB • CISCO-BULK-FILE-MIB • CISCO-CABLE-DIAG-MIB • CISCO-CALLHOME-MIB • CISCO-CAR-MIB • CISCO-CDP-MIB • CISCO-CIRCUIT-INTERFACE-MIB • CISCO-CLUSTER-MIB • CISCO-CONFIG-COPY-MIB • CISCO-CONFIG-MAN-MIB • CISCO-DATA-COLLECTION-MIB • IF-MIB 	<ul style="list-style-type: none"> • CISCO-SNMP-TARGET-EXT-MIB • CISCO-STACK-MIB • CISCO-STACKMAKER-MIB • CISCO-STP-EXTENSIONS-MIB • CISCO-SYSLOG-MIB • CISCO-TCP-MIB • CISCO-UDLD-MIB • CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB • CISCO-VLAN-MEMBERSHIP-MIB • CISCO-VTP-MIB • ENTITY-MIB • ETHERLIKE-MIB • HC-RMON-MIB • IEEE8021-PAE-MIB • IEEE8023-LAG-MIB • IF-MIB • IP-FORWARD-MIB

Description	Specification	
	<ul style="list-style-type: none"> • CISCO-DHCP-SNOOPING-MIB • CISCO-EMBEDDED-EVENT-MGR-MIB • IP-MIB • CISCO-ENTITY-ALARM-MIB • CISCO-ENTITY-SENSOR-MIB • CISCO-ENTITY-VENDORTYPE-OID-MIB • LLDP-MIB • CISCO-ENVMON-MIB • CISCO-ERR-DISABLE-MIB • CISCO-FLASH-MIB • CISCO-FTP-CLIENT-MIB • CISCO-IF-EXTENSION-MIB • CISCO-IGMP-FILTER-MIB • CISCO-IMAGE-MIB • CISCO-IP-STAT-MIB • CISCO-LAG-MIB • CISCO-LICENSE-MGMT-MIB • CISCO-MAC-AUTH-BYPASS-MIB • OLD-CISCO-TCP-MIB • CISCO-MAC-NOTIFICATION-MIB • OLD-CISCO-TS-MIB • CISCO-MEMORY-POOL-MIB • CISCO-PAE-MIB • CISCO-PAGP-MIB • CISCO-PING-MIB • CISCO-PORT-QOS-MIB • CISCO-PORT-SECURITY-MIB • CISCO-PORT-STORM-CONTROL-MIB • SNMP-NOTIFICATION-MIB • CISCO-PRIVATE-VLAN-MIB • CISCO-PROCESS-MIB • CISCO-PRODUCTS-MIB • CISCO-RESILIENT-ETHERNET-PROTOCOL-MIB • SNMP-VIEW-BASED-ACM-MIB • CISCO-RTTMON-ICMP-MIB • CISCO-RTTMON-IP-EXT-MIB • CISCO-RTTMON-MIB • CISCO-RTTMON-RTP-MIB 	<ul style="list-style-type: none"> • IP-MIB • LLDP-EXT-MED-MIB • LLDP-MIB • NETRANGER • NOTIFICATION-LOG-MIB • OLD-CISCO-CHASSIS-MIB • OLD-CISCO-CPU-MIB • OLD-CISCO-FLASH-MIB • OLD-CISCO-INTERFACES-MIB • OLD-CISCO-IP-MIB • OLD-CISCO-MEMORY-MIB • OLD-CISCO-SYS-MIB • OLD-CISCO-SYSTEM-MIB • OLD-CISCO-TCP-MIB • OLD-CISCO-TS-MIB • RMON-MIB • RMON2-MIB • SMON-MIB • SNMP-COMMUNITY-MIB • SNMP-FRAMEWORK-MIB • SNMP-MPD-MIB • SNMP-NOTIFICATION-MIB • SNMP-PROXY-MIB • SNMP-TARGET-MIB • SNMP-USM-MIB • SNMP-VIEW-BASED-ACM-MIB • SNMPv2-MIB • TCP-MIB • UDP-MIB

Table 14. SFP support

Part Number	Specification	SFP Type	Max Distance	Cable Type	Temp Range*	DOM Support
GLC-FE-100FX-RGD=	100BASE-FX	FE	2km	MMF	IND	Yes

GLC-FE-100LX-RGD	100BASE-LX10	FE	10km	SMF	IND	Yes
GLC-FE-100FX=	100BASE-FX	FE	2km	MMF	COM	No
GLC-FE-100LX=	100BASE-LX10	FE	10km	SMF	COM	No
GLC-FE-100EX=	100BASE-EX	FE	40km	SMF	COM	No
GLC-FE-100ZX=	100BASE-ZX	FE	80km	SMF	COM	No
GLC-FE-100BX-D=	100BASE-BX10	FE	10km	SMF	COM	No
GLC-FE-100BX-U=	100BASE-BX10	FE	10km	SMF	COM	Yes
GLC-SX-MM-RGD=	1000BASE-SX	GE	550m	MMF	IND	Yes
GLC-LX-SM-RGD=	1000BASE-LX/LH	GE	550m/10km	MMF/SMF	IND	Yes
GLC-ZX-SM-RGD=	1000BASE-ZX	GE	70km	SMF	IND	Yes
GLC-BX-U-I=	1000BASE-BX	GE	10km	SMF	IND	Yes
GLC-BX-D-I=	1000BASE-BX	GE	10km	SMF	IND	Yes
GLC-BX40-U-I=	1000BASE-BX40	GE	40km	SMF	IND	Yes
GLC-BX40-D-I=	1000BASE-BX40	GE	40km	SMF	IND	Yes
GLC-BX40-DA-I=	1000BASE-BX40	GE	40km	SMF	IND	Yes
GLC-BX80-U-I=	1000BASE-BX80	GE	80km	SMF	IND	Yes
GLC-BX80-D-I=	1000BASE-BX80	GE	80km	SMF	IND	Yes
GLC-SX-MMD=	1000BASE-SX	GE	550m	MMF	EXT	Yes
GLC-LH-SMD=	1000BASE-LX/LH	GE	550m/10km	MMF/SMF	EXT	Yes
GLC-EX-SMD=	1000BASE-EX	GE	40km	SMF	EXT	Yes
GLC-ZX-SMD=	1000BASE-ZX	GE	70km	SMF	EXT	Yes

GLC-BX-D=	1000BASE-BX10	GE	10km	SMF	COM	Yes
GLC-BX-U=	1000BASE-BX10	GE	10km	SMF	COM	Yes
CWDM-SFP-xxxx= (8 freq)	CWDM 1000BASE-X	GE		SMF	COM	Yes

Part Number	Specification	SFP Type	Max Distance	Cable Type	Temp Range*	DOM Support
DWDM-SFP-xxxx= (40 freq)	DWDM 1000BASE-X	GE		SMF	COM	Yes
SFP-GE-S=	1000BASE-SX	GE	550m	MMF	EXT	Yes
SFP-GE-L=	1000BASE-LX/LH	GE	550m/10km	MMF/SMF	EXT	Yes
SFP-GE-Z=	1000BASE-ZX	GE	70km	SMF	EXT	Yes
GLC-SX-MM=	1000BASE-SX	GE	550m	MMF	COM	No
GLC-LH-SM=	1000BASE-LX/LH	GE	550m/10km	MMF/SMF	COM	No
GLC-ZX-SM=	1000BASE-ZX	GE	70km	SMF	COM	Yes
GLC-TE=	1000BASE-T	GE	100m	Copper	EXT	NA
GLC-T=	1000BASE-T	GE	100m	Copper	COM	NA
SFP-10G-BXD-I=	10GBASE-BX10	10GE	10km	SMF	IND	Yes
SFP-10G-BXU-I=	10GBASE-BX10	10GE	10km	SMF	IND	Yes
SFP-10G-BX40D-I=	10GBASE-BX40	10GE	40km	SMF	IND	Yes
SFP-10G-BX40U-I=	10GBASE-BX40	10GE	40km	SMF	INS	Yes
SFP-10G-SR-X=	10GBASE-SR	10GE	400m	MMF	EXT	Yes
SFP-10G-LR-X=	10GBASE-LR	10GE	10km	SMF	EXT	Yes
SFP-10G-SR=	10GBASE-SR	10GE	400m	MMF	COM	Yes

SFP-10G-LRM=	10GBASE-LRM	10GE	200m/300m	MMF/SMF	COM	Yes
SFP-10G-LR=	10GBASE-LR	10GE	10km	SMF	COM	Yes
SFP-10G-ER=	10GBASE-ER	10GE	40km	SMF	COM	Yes
GLC-T-RGD=	1000BASE-T	GE	100m	Copper	IND	NA
SFP-10G-ZR=	10GBASE-ZR	10GE	80km	SMF	COM	Yes
SFP-H10GB-CUxM=	10G Passive Twinax	10GE	1m/3m/5m	Twinax	COM	NA
SFP-H10GB-ACUxM=	10G Active Twinax	10GE	7m/10m	Twinax	COM	NA
Part Number	Specification	SFP Type	Max Distance	Cable Type	Temp Range*	DOM Support
SFP-10G-ER-I=	10GBASE-ER	10GE	40km	SMF	IND	Yes
SFP-10G-ZR-I=	10GBASE-ZR	10GE	80km	SMF	IND	Yes

Note:

For DOM support and for first software release supporting SFP, refer to https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html.

Not all SFPs are supported in PROFINET GSD for SIMATIC STEP7/TIA Portal. Please visit https://www.cisco.com/c/en/us/td/docs/switches/lan/industrial/software/configuration/guide/b_sfp_TIA.html.

Ordering information

Table 15 lists the ordering information for Cisco IE 5000 system.

Table 15. Ordering information

Product ID	Description
Cisco IE 5000 Hardware PIDs	
IE-5000-16S12P	IE5000 with 12GE Copper PoE+, 12FE/GE SFP and 4 1G SFP uplinks
IE-5000-12S12P-10G	IE5000 with 12GE Copper PoE+, 12FE/GE SFP and 4 1G/10G SFP uplinks
Cisco IE 5000 software licenses and accessories PIDs	
L-IE5000-RTU=	IE5000 electronic software license upgrade from LAN base to IP service Layer 3 features
LIC-MRP Manager=	MRP ring manager license

LIC-MRP-Client=	MRP ring client license
SD-IE-1GB=	IE 1GB SD Memory Card - Spare
Cisco ONE™ Licenses	
C1F1PIE4K5K1K9	Cisco ONE Foundation Lite Perpetual Includes Prime Infrastructure (LF and AS), Identity Services Engine - Base
C1F1PIE40001K9	Cisco ONE Foundation Perpetual Includes Full flexible Netflow, Stealthwatch, Prime Infrastructure, and Identity Services Engine - Base
C1A1PIE40001K9	Cisco ONE Advanced Perpetual Includes IP Services
C1-FLOW-IE5K	Cisco ONE Netflow IE 5000
C1A1AIE50001K9	Cisco ONE Advanced Perpetual - IE 5000
Product ID	Description
C1F1AIE4K5K1K9	Cisco ONE Foundation Lite Perpetual - IE 4000/5000
C1F1AIE50001K9	Cisco ONE Foundation Perpetual - IE 5000, Brown field
C1F1PIE50001K9	Cisco ONE Foundation Perpetual - IE 5000
Cisco IE 5000 DNA licenses	
IE5000-DNA-E-H	DNA Essentials license
IE5000-DNA-E-H-3Y	DNA Essentials 3-year term license option
IE5000-DNA-E-H-5Y	DNA Essentials 5-year term license option
IE5000-DNA-A-H	DNA Advantage license
IE5000-DNA-A-H-3Y	DNA Advantage 3-year term license option
IE5000-DNA-A-H-5Y	DNA Advantage 5-year term license option
IE5000-DNA-E-H-7Y	DNA Essentials 7-year term license option
IE5000-DNA-A-H-7Y	DNA Advantage 7-year term license option

Warranty information

Warranty information for the IE 5000 switch is available at <http://www.cisco-servicefinder.com/warrantyfinder.aspx>.

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:

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

Reference links to product-specific environmental sustainability information that is mentioned in relevant sections of this data sheet are provided in the following table:

Sustainability Topic	Reference
Power	
Power specifications and consumption	Table 6. Physical specifications
Environmental Characteristics	
Operating temperature, industry standards, EMC emissions	Table 12. Compliance specifications
Material	
Unit Weight	Table 6. Physical specifications

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Cisco and Partner Services

At Cisco, we're committed to minimizing our customers' TCO, and we offer a wide range of services programs to accelerate customer success. Our innovative programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco Services helps you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. Some of the key benefits our customers can get from Cisco Services follow:

- Mitigating risks by enabling proactive or expedited problem resolution
- Lowering TCO by taking advantage of Cisco expertise and knowledge
- Minimizing network downtime
- Supplementing your existing support staff so they can focus on additional productive activities

For more information about Cisco Services, refer to Cisco Technical Support Services or Cisco Advanced Services at <https://www.cisco.com/web/services/>

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For more information

For more information about the Cisco IE 5000 Series, visit <https://www.cisco.com/go/ie5000> or contact your local account representative.

Document history

New or Revised Topic	Described In	Date
Updated Power Profile & PTP over Horizontal Stacking, footnote to Marine DNV Certification, updated standards, SFP Support, Cisco ONE Licenses, Cisco environmental sustainability information	Table 8, 12, 14, 15, Cisco environmental sustainability	29/10/2021
Added EN 61000-4-10 Damped Oscillatory Magnetic Field (100 A/m)	Table 12	10/06/2020

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Product: [TU-SLG-144-RT2](#) 

Tray, In+Outdoor, MLT, OS2, 144f, Gel Tubes 2.8mm, CST, Dbl Jkt, Blk, CPE,

OFCR, Oil Res 1/2

Product Description
DataTuff Tray, Indoor/Outdoor, Multi-Loose-Tube, OS2, 144 Fibers, Gel Filled Tubes 2.8mm, Corrugated Steel Tape, Double Jacket, Black, CPE, OFCR, Oil Res 1 & 2

Technical Specifications

Product Overview

Product Category:	Fiber Multi-Loose Tube Cable
Suitable Applications:	Extended Distance Horizontal & Backbone Data/Telco Network, Noisy Environment, Indoor/Outdoor & Wet Locations, Rodent Proof

Wavelength	1310 nm	1550 nm
Max. Attenuation	0.40 dB/km	0.30 dB/km
Mode Field Diameter	9.2 μm	10.4 μm
1 Gigabit Ethernet Performance	5,000 m	-

10 Gigabit Ethernet Performance	10,000 m	40,000 m	Fiber Specifications
Fiber Type:		OS2	
Fiber Core Diameter:		8.2/125 µm	
Fiber Diameter:		250 µm	
Fiber Count:		144	
Fiber Color Coding:		TIA-598-D	
Cable Construction			
Number of Active Subunits:		12	
Fibers Per Subunit:		12	
Subunit Waterblocking:		Gel Filled	
Subunit Diameter:		0.110 in (2.8 mm)	
Central Strength Member:		Upjacketed GRP	
Core Wrap:		Waterblocking tape	
Inner Jacket Specifications			
Strength Member:		Waterblocking Aramid Yarns	
Material:		PVC - Polyvinyl Chloride	
Color:		Black	
Armor Specifications			
Armor Type and Material:		CST - Corrugated Steel Tape	
Outer Jacket Specifications			
Material:		CPE - Chlorinated Polyethylene	
Nom. Diameter:		0.880 in (22.4 mm)	
Number of Ripcords:		2	
Optical Characteristics			
Mechanical Characteristics			
Min. Bend Radius During Installation:		20x Cable OD	
Min. Bend Radius During Operation:		10x Cable OD	
Max. Tensile Strength During Installation:		2670 N (600 lbf)	
Max. Tensile Strength During Operation:		800 N (180 lbf)	
Crush Resistance:		220 N/cm	
Bulk Cable Weight:		295 lbs/kft (439 kg/km)	
Temperature Range			
Installation Temp Range:		-10°C to +60°C	
Operating Temp Range:		-50°C to +70°C	
Storage Temp Range:		-50°C to +70°C	
Standards and Compliance			
Environmental Suitability:		Indoor/Outdoor, Sunlight Resistance, Oil Resistance, Burial	
Flammability / Reaction to Fire:		OFCR, FT4	
ICEA Compliance:		S-104-696	
History			
Update and Revision:		Revision Number: 0.8 Revision Date: 04-08-2022	

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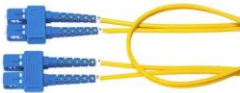
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Product: [FPSSDSD002M](#) 



FXPC OS2 SC_DX SC_DX 2M OFNR DX_3.0 A-B YL_JKT

Product Description

FX PATCH CORD, OS2, SC DUPLEX - SC DUPLEX, 2 M, OFNR, DUPLEX ZIP 3.0 MM, A-TO-B, YELLOW JACKET

Technical Specifications

Product Overview

Suitable Applications:	Data Center, LAN, Equipment Room, Telecommunication room, Workstation Area
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Fiber Specifications

Fiber Type:	OS2
Fiber Core Diameter:	8.2/125 µm
Fiber Count:	2
Fiber Color Coding:	TIA-598-D

Physical Specifications

Description	Connector Type	Max. Insertion Loss	Min. Return Loss
Connector A (Inside End)	SC Duplex	0.35 dB	55 dB

Connector B (Outside End)	SC Duplex	0.35 dB	55 dB	Connectors		
Description	Type	Housing Material	Housing Color	Ferrule	Boot Material	Boot Color
Connector A (Inside End)	SC Duplex	Plastic	Blue	Zirconia Ceramic	Rubber	Blue
Connector B (Outside End)	SC Duplex	Plastic	Blue	Zirconia Ceramic	Rubber	Blue

Assembly Cable

Cable Nominal OD	Jacket Color
3.0 mm x 6.0 mm	Yellow

Measurement

Overall Assembly Length	Packaging
2 m (6.6 ft)	Individually packaged in a plastic bag

Overall Length Tolerances

Range	Tolerance
0 to 2 meters	+0.2 / -0 meter
2.1 to 5 meters	+0.3 / -0 meter
5.1 to 40 meters	+0.4 / -0 meter
over 40.1 meters	

Armor Specifications

Armor Type and Material:	No Armor
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Optical Characteristics

Polarity Identification:	A-to-B / B-to-A
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Fiber Connector Performance

Mechanical Characteristics

Min. Bend Radius During Installation:	15x Cable OD
Min. Bend Radius During Operation:	10x Cable OD

Temperature Range

Operating Temp Range:	-40C to +75C
Storage Temp Range:	-40C to +75C

Standards and Compliance

Environmental Suitability:	Indoor
Flammability / Reaction to Fire:	OFNR, FT4
UL Rating:	Riser
TIA/EIA Compliance:	TIA/EIA 568.3
European Directive Compliance:	EU Directive 2011/65/EU (RoHS 2)
MII Order #39 (China RoHS):	EUP 50
Other Standard Compliance(s):	ACMA

Product Notes

Related Parts:	DCX system, FX UHD Patch Panels, ECX Patch Panels, FX Patch cords, FX MPO Trunks, FX Multi-fiber Trunks
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History

Update and Revision:	Revision Number: 0.21 Revision Date: 04-08-2022
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Product: [2424DC](#) 

DataTwist 2400 Category 6+ Cable, 4 Pair, U/UTP, LSZH, Indoor CPR
Cca

Product Description

Category 6 Enhanced Premise Horizontal Cable (350MHz), 4-Pair, 24 AWG Solid Bare Copper Conductors, U/UTP, Polyethylene Insulation, LSZH Jacket

Technical Specifications

Product Overview

Suitable Applications:	Horizontal and building backbone cable; Support current and future Category 6 and 5e applications, such as: 1000Base - T (Gigabit Ethernet), 100 Base - T, 10 Base - T, FDDI, ATM
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Construction Details

Conductor

Element	Size	Stranding	Material	Number of Pairs	Number of Element
Individual Pair	24 AWG	Solid	BC - Bare Copper	4	8

Insulation

Element	Material	Nom. Insulation Diameter	Color Code
Individual Pair	PE - Polyethylene	1 mm (0.039 in)	White/Blue & Blue, White/Orange & Orange, White/Green & Green, White/Brown & Brown

Cable Core

Description
4 pairs twisted together

Outer Jacket

Material	Nom. Diameter	Ripcord
LSZH - Low Smoke Zero Halogen (Flame Retardant)	6.1 mm (0.24 in)	Yes

Overall Cable Diameter (Nominal):	6.1 mm (0.24 in)
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Electrical Characteristics

Electricals

Max. Conductor DCR	Max. Mutual Capacitance	Max. Capacitance Unbalance	Nom. Characteristic Impedance
93.8 Ohm/km	56 pF/m (17 pF/ft)	160 pF/100m	100 Ohm

Delay

Max. Delay Skew	Nom. Velocity of Prop.
35 ns/100m	70%

High Frequency

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACR [dB]	Min. PSACR [dB]	Min. ACRF (ELFEXT) [dB]	Min. PSACRF (PSELFEXT) [dB]	Min. RL (Return Loss) [dB]	Min. TCL [dB]	Min. ELTCTL [dB]
1	2 dB/100m	75.3	73.3	73.3	71.3	70.8	67.8	20	40	35
4	3.7 dB/100m	66.3	64.3	62.6	60.6	58.8	55.8	23	40	23
10	5.8 dB/100m	61.8	59.8	56	54	50.8	47.8	25	40	15
16	7.4 dB/100m	58.6	56.6	51.2	49.2	46.7	43.7	25	38	10.9

20	8.3 dB/100m	57.1	55.1	48.8	46.8	44.8	41.8	25	37	9
31.2	10.4 dB/100m	54	52	43.6	41.6	40.9	37.9	23.6	35.1	5.1
62.5	15 dB/100m	49.1	47.1	34.1	32.1	34.9	31.9	21.5	32.6	
100	19.3 dB/100m	45.8	43.8	26.5	24.5	30.8	27.8	20.8	30	
200	28.3 dB/100m	40.9	38.9	12.6	10.6	22.8	21.8	19.5	27	
250	32.1 dB/100m	39.3	37.3	7.2	5.2	22.8	19.8	18	26.0	
300	35.6 dB/100m	38.1	36.1	2.5	0.5	21.3	18.3	17.5	25.2	
350	38.8 dB/100m	37.1	35.1			19.9	16.9	17.0	24.6	
Table Notes: Limits below 4MHz are for information only.										

Voltage
Voltage Rating
72 V DC

Mechanical Characteristics

Temperature	
Operating	Installation
-20°C to +75°C	0°C To +50°C

Bend Radius	
Stationary Min.	Installation Min.
26 mm (1.0 in)	52 mm
Max. Pull Tension:	80 N (18 lbf)
Bulk Cable Weight:	52 kg/km

Standards and Compliance

Environmental Suitability:	Indoor - Euroclass Cca
Flammability / Reaction to Fire:	IEC 60332-1-2
CPR Compliance:	CPR Euroclass: Cca-s1a,d1,a1; CPR UKCA Class: Cca-s1a,d1,a1
IEEE Compliance:	PoE: IEEE 802.3bt Type 1, Type 2, Type 3, Type 4
Data Category:	Category 6
TIA/EIA Compliance:	ANSI/TIA 568.2-D
ISO/IEC Compliance:	ISO/IEC 11801-1, IEC 61034-2 - Smoke Density Min Transmittance = 80%
CENELEC Compliance:	EN 50173-1, Segregation class according EN50174-2 = a
European Halogen Free Standards:	IEC 62821-1 Halogen Free Compliance = Yes, IEC 60754-1 - Halogen Amount = Zero, IEC 60754-2 - Halogen Acid Gas Amount - Max. Conductivity = 2.5 µS/mm, IEC 60754-2 - Halogen Acid Gas Amount - Min. pH = 4.3
European Directive Compliance:	EU CE Mark
UK Regulation Compliance:	UKCA Mark

Product Notes

Notes:	Electrical values are expected performance based on cable testing and representative performance within a typical Belden system.
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History

Update and Revision:	Revision Number: 0.151 Revision Date: 04-12-2022
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Part Numbers

Item #	Color	Putup Type	Length	EAN
2424DC.06305	Blue	Reel	305 m	8719605133953
2424DC.06500	Blue	Reel	500 m	8719605142924

2424DC.08A250	Gray	Reel-in-Box	250 m	8719605167262
2424DC.08305	Gray	Reel	305 m	8719605142931
2424DC.08500	Gray	Reel	500 m	8719605142948
2424DC.09305	White	Reel	305 m	8719605194572

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Product: [129463](#)

AIA Armor, PVC Jkt, CM

Request Sample

Blue Hose®, 1 Pr #20 Str TC, PE Ins Blu,
Clr, Foil+TC Braid Shld, PVC Jkt,

Product Description

Blue Hose® for Data Highway Plus, 1 Pair 20AWG (7x28) Tinned Copper, PE Insulation Blue & Clear, Overall Beldfoil®+Tinned Copper Braid(55%) Shield, PVC Inner Jacket, Aluminum Interlock Armor, Blue PVC Outer Jacket, CM

Technical Specifications

Product Overview

Suitable Applications:

exposure to rodent, crush, or cut through force, harsh environment, Allen Bradley Data Highway communication interface between PLC processors, I/O devices, operator interfaces, computers and other intelligent devices, PLC processor interlocking, peer-to-peer messaging, remote programming, troubleshooting, I/O updates, etc.

Construction Details

Conductor

Element	Number of Element	Size	Stranding	Material
Pair(s)	1	20 AWG	7x28	TC - Tinned Copper

Insulation

Element	Material	Nom. Thickness	Nom. Insulation Diameter	Color Code	Notes
Pair(s)	PE - Polyethylene	0.019 in (0.48 mm)	0.076 in (1.9 mm)	Clear & Blue	Twinax with rod fillers

Outer Shield

Shield Type	Material	Coverage	Drainwire Type
Tape	Bi-Laminate (Alum+Poly)	100%	20 AWG (7x28) TC
Braid	Tinned Copper (TC)	55%	

Inner Jacket

Material	Nom. Diameter
PVC - Polyvinyl Chloride	0.238 in (6.05 mm)

Armor

Armor Type & Material
AIA - Aluminum Interlock Armor

Outer Jacket

Material	Nom. Thickness	Nom. Diameter
PVC Polyvinyl Chloride	0.050 in (1.3 mm)	0.550 in (14.0 mm)

Element	Frequency [MHz]	Nom. Insertion Loss (Attenuation)
Pair(s)	1	0.6 dB/100ft
	10	2.1 dB/100ft
	50	dB/100ft
	100	7.5 dB/100ft
	200	dB/100ft
	400	dB/100ft
Overall Cable Diameter (Nominal):	0.550 in (14.0 mm)	

Electrical Characteristics

Electricals

Element	Nom. Conductor DCR	Nom. Capacitance Cond-to-Cond	Nom. Capacitance Cond-to-Shield	Nom. Capacitance Cond-to-Other (Conds + Shield)	Nom. Characteristic Impedance	Nom. Velocity of Prop.
Pair(s)	9.5 Ohm/1000ft (31 Ohm/km)	19.7 pF/ft (64.6 pF/m)	37 pF/ft	36 pF/ft	78 Ohm	66%
Nom. Outer Shield DCR: 4.1 Ohm/1000ft (13 Ohm/km)						

High Frequency (Nominal/Typical)

Voltage

UL Voltage Rating
300 V (CM, C12)

Mechanical Characteristics

Temperature

UL Temperature	Operating
60°C	-40°C to +60°C

Bend Radius

Stationary Min.	Installation Min.
6.5 in (170 mm)	6.5 in
Max. Pull Tension:	200 lbs (91 kg)
Bulk Cable Weight:	133 lbs/1000ft (198 kg/km)

Environmental Suitability:	Indoor, Sunlight Resistance
Flammability / Reaction to Fire:	UL1685 UL Loading, FT4
NEC / UL Compliance:	Article 725, Article 800, CM, CL2
CEC / C(UL) Compliance:	CM, CMG, HLBCD
European Directive Compliance:	EU CE Mark, EU Directive 2015/863/EU (RoHS 2 amendment), EU Directive 2011/65/EU (RoHS 2), EU Directive 2012/19/EU (WEEE)
Other Standard Compliance(s):	Allen Bradley Part No. 1770-CD

History

Update and Revision:	Revision Number: 0.409 Revision Date: 04-08-2022
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Part Numbers

Variants

Item #	Color	Putup Type	Length	UPC
129463 J221000	Blue, Strong	Reel	1,000 ft	612825110934

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