

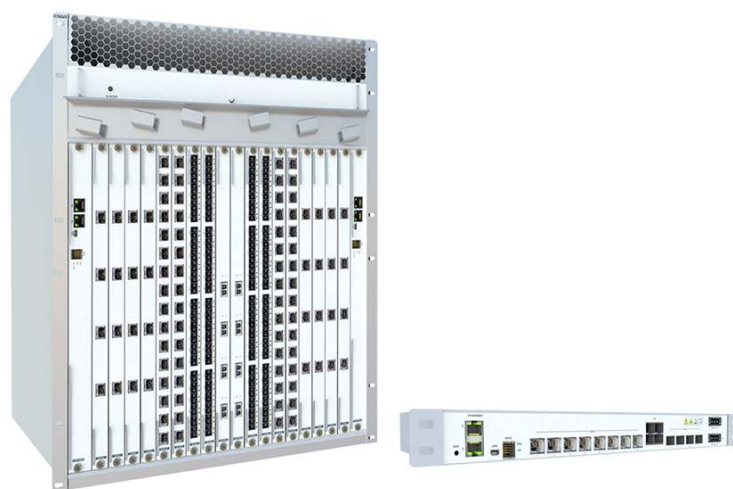
# Cisco ME 4600 Series Optical Line Terminal

Carrier Ethernet is a fundamental element of the Cisco® Evolved Programmable Network (EPN). This is a proven end-to-end network solution for video, mobile, and cloud, which can help customers increase revenue opportunities while reducing costs. It helps service providers develop a truly integrated, multidirectional network infrastructure in which all elements, from the core to the edge, access, aggregation, and data center, are intelligently linked and orchestrated to work together.

Over the years, fiber-based access has proven to be a cost-effective way to reach customer premises to deliver managed business and residential services. The Cisco ME 4600 Series Optical Line Terminal (OLT) portfolio offers an exceptionally broad and scalable solution that gives network service providers a flexible and cost-effective approach for optical fiber access solutions over active or passive optical network architectures.

The Cisco ME 4600 Series Multiservice Optical Access Platform includes reliable modular OLT devices specifically designed for optical fiber network infrastructures in either point-to-point (P2P) or point-to-multipoint (P2MP) topologies. Ethernet or passive optical network (PON) technologies like Gigabit PON (GPON) are supported. Next-generation PON technologies like XG-PON1 (10GPON) and NG-PON2 (TWDM PON) will also be supported by the same Cisco ME 4600 Series OLT. The Cisco ME 4600 Series OLT can support any FTTx scenario, covering fiber-to-the-home (FTTH), fiber-to-the-building (FTTB), fiber-to-the-curb (FTTC), fiber-to-the-cell (FTTc), and fiber-to-the-business (FTTb).

**Figure 1.** Cisco ME 4600 Series OLT

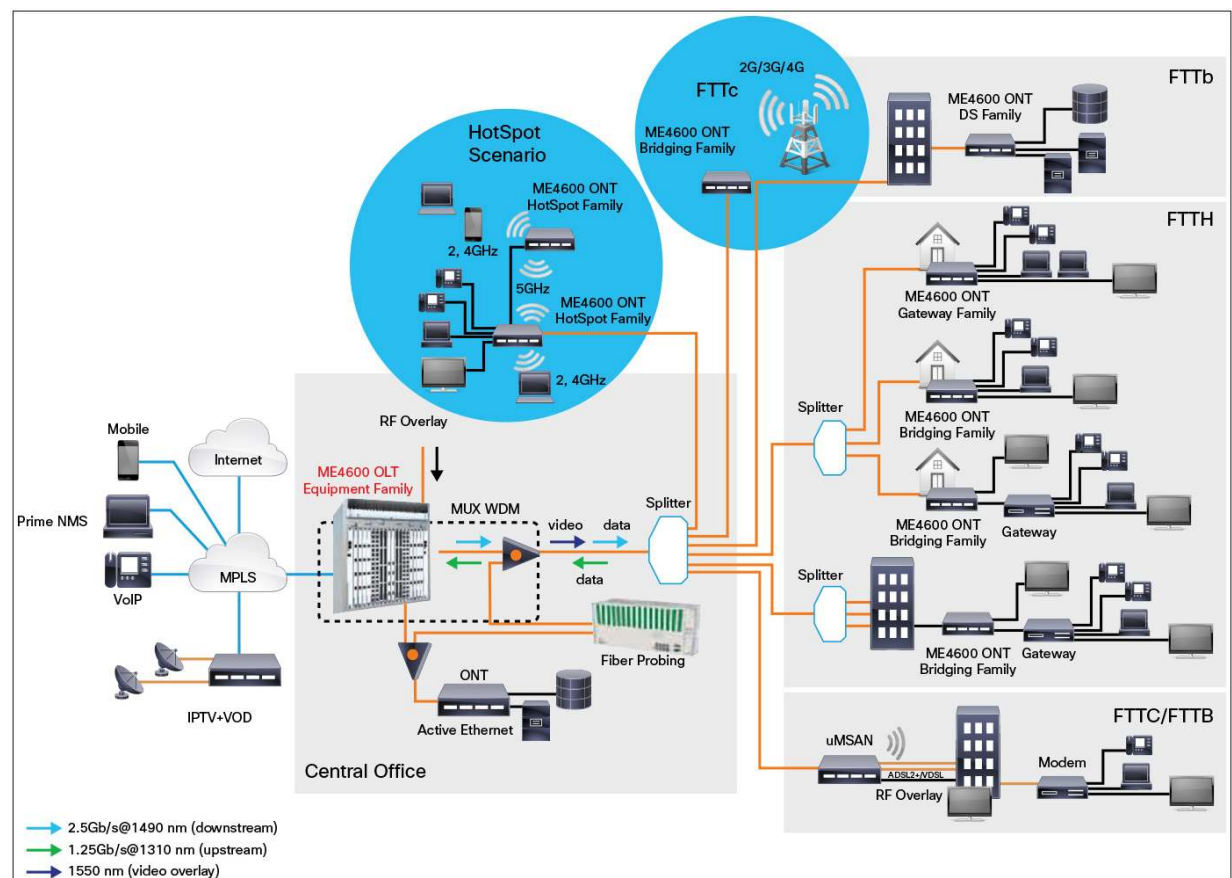


Cisco offers a comprehensive portfolio for passive optical fiber access networks. The Cisco ME 4600 Series OLT solution is based on ITU-T Recommendation G.984.x (GPON) and G.988.x (OMCI). The same network equipment solution allows service providers to evolve toward next-generation PON architectures as defined by the ITU-T Recommendations G.987.x (XG-PON1) and G.989.x (NG-PON2) for both central office and customer premises.

For the central office, the Cisco ME 4600 Series Multiservice Optical Access Platform portfolio is based on a flexible and scalable architecture. Cisco offers the best-of-class solutions in the market designed to evolve easily, from rural and low-density multidwelling unit (MDU) scenarios, using only 8 Gigabit Ethernet and 8 GPON port equipment (Cisco ME 4601 OLT, shown in Figure 1), up to urban and extremely high density, using 768 Gigabit Ethernet and 256 GPON port equipment (Cisco ME 4620 OLT, shown in Figure1). Cisco ME 4600 Series OLT equipment also implements the features required for residential, business, and enterprise services to be provisioned on an end-to-end basis, with appropriate service-level agreements (SLAs), thus allowing required bit rates to be reserved for each dedicated client's needs.

The Cisco ME 4600 Series OLT is a reliable high-availability system that uses common-element 1+1 protection for power, control, switching, and processing, with load balancing link aggregation groups (LAG) and Link Aggregation Control Protocol (LACP) at the uplink interfaces. Ethernet ring protection switching (ERPS) mechanisms based on ITU-T G.8032 are available for access-network upper-layer interconnection. For the client side, Type B protection for GPON ports is available according to ITU-T Recommendation G.984.x. From a security perspective, the Cisco ME 4600 Series OLT supports features that help prevent denial of service (DoS) attacks and fake customer Trojan mechanisms, including Access Control Lists (ACLs), MAC duplication prevention, MAC and IP spoofing prevention, broadcast rate control, and user isolation.

**Figure 2.** FTTx Network Architecture



## Major Applications

The massive growth in demand for high-bitrate connectivity to support the consumption of multimedia data is driving the need for new technologies in both business and consumer markets. Specifically, the growth in video traffic at home and at work, along with the growing trend towards cloud-based computing delivered across multiple, varied devices, is pushing both fixed and mobile operators in both developed and emerging markets to roll-out FTTP services.

### Residential Services

The Cisco ME 4600 Series OLT supports residential broadband aggregation for delivering multiplay services over optical fiber access networks. Designed to support thousands of subscribers from a single OLT, the Cisco ME 4600 Series OLT offers multiple deployment and provisioning models, including 1:1 and N:1 VLAN configurations with quality of service (QoS), resulting in a greatly enhanced broadband user experience. The feature-rich Cisco ME 4600 Series OLT supports a variety of broadband video applications, including RF overlay, IPTV, and video on demand (VoD), with support for IP multicast (IGMPv2/v3 and MLDv2) and Dynamic Host Configuration Protocol (DHCP) Relay Agent (DHCP Option 82 for IPv4 and DHCP Options 18/37 for IPv6). These features enhance and extend the Cisco IP Next-Generation Network (NGN) architecture to the residential environment.

### Business Services

The Cisco ME 4600 Series OLT is built to meet service provider requirements for Carrier Ethernet aggregation and transparent LAN services. The Cisco ME 4600 Series OLT offers service flexibility and delivers Layer 2 transport for advanced Layer 2 and Layer 3 VPN and business services, including circuit emulation services (CES) to transport time-division multiplexing (TDM) traffic over packet networks with appropriate clocking, synchronization, and timing features. VLAN translation and promotion features with the required QoS complement the comprehensive functions needed to interconnect business branches over a P2P or P2MP network topology.

### Mobile Backhaul Services

With the growing demand on mobile backhaul networks to support third-generation (3G) and fourth-generation (4G) services, PON and Gigabit Ethernet have become the most common options for backhaul. Deployed as a pre-aggregation platform for mobile backhaul, the Cisco ME 4600 Series OLT can aggregate cell sites and serve as a transport solution for Radio Access Network (RAN) backhaul traffic. The Cisco ME 4600 Series OLT provides the timing services required in today's converged access networks by offering integrated support for the Building Integrated Timing Supply (BITS), 10 MHz, 1 pulse per second (1PPS), and time of day (TOD) interfaces. The Cisco ME Series 4600 OLT also supports synchronous Ethernet (SyncE) and IEEE-1588 functionalities, and it can act as the source for network clocking for TDM, SDH and SONET, SyncE, and GPS interfaces. In addition to the timing services, the Cisco ME 4600 Series OLT offers a compact option that can also be deployed in small and harsh environments, due to its shallow depth and qualification for extended temperature ranges.

**Table 1.** Cisco ME 4600 Series OLT Port Density

Features	Cisco ME4620 OLT	Cisco ME4601 OLT
Chassis	14 RU	1 RU
Number of line card slots	18	-
Backplane: Physical bitrate per slot	12 x 10 Gbps	48 Gbps
GPON ports (maximum)	256	8
Fast and Gigabit Ethernet ports (maximum)	768	Up to 8
GPON and RF overlay	128	-

Features	Cisco ME4620 OLT	Cisco ME4601 OLT
10 Gigabit Ethernet ports	4 to 72	Up to 4

## Cisco ME 4600 Series OLT Features

To meet the growing demand for higher bitrate, service providers require an FTTP solution that is cost effective, easy to deploy and manage, scales well from an aggregation standpoint, and provides the means to offer both end-user and wholesale service models. The explosion in data traffic on both fixed and mobile networks is creating new challenges for all service providers, and Cisco can offer competitive advantages through the adoption of the latest in FTTP solutions.

The Cisco ME 4600 Series OLT helps service providers deploy next-generation optical access networks with improved margins, by reducing costs, increasing revenue streams, and supporting new, higher-value business and residential multimedia services. These improvements can be achieved with the following product features:

- **Higher maximum switching capacity (8.6 Tbps) and switching capacity per slot (up to 120 Gbps):** This saves service providers' capital expenditures (CapEx), because the chassis will not need to be replaced when they deploy next-generation PON technologies (XG-PON1 and NG-PON2).
- **Higher port density per rack unit (up to 256 GPON ports or 768 Gigabit Ethernet ports per 13 RU):** This supports more ONTs per chassis, with more competitive and effective CapEx per port.
- **Service-focused provisioning:** This provides an easy-to-use management interface and helps reduce operating expenses (OpEx). The Cisco ME 4600 Series portfolio makes it very simple and easy to provision High-speed Internet, voice, video, and TV services through all types of management interfaces (CLI, web user interface, and EMS Agora-NG). The fact that the system abstracts lower level access technology capabilities from the operator is an important advantage for reducing management costs and implementation time.
- **Cisco end-to-end solution:** This helps reduce OpEx, and service providers can benefit from interoperability with other Cisco aggregation, edge, and core products.
- **Cisco Prime™ Carrier Management integration:** Service providers who already use or are planning to use Cisco Prime Carrier and its management components (Prime Central, Prime Network, and Prime Performance) for other Cisco aggregation, edge, or core products can also benefit from it for managing the Cisco ME 4600 Series products as part of the same unified management solution.

## Cisco ME 4600 Series OLT Family Hardware Components

Table 2 lists the hardware parts available for the Cisco ME 4600 Series OLT.

**Table 2.** Hardware Parts List

Part Number	Description
<b>Chassis</b>	
ME4620-OLT	Cisco ME4600 OLT 14RU Chassis with 20 slots (Complete Assembly)
ME4601-OLT	Cisco ME4600 OLT 1RU Chassis with 8 x GPON, 4 x GE and 4 x 10GE (SFPs/SFP+s not included)
<b>Switch Modules</b>	
ME4600-XCO-640	Cisco ME4600 XCO 640Gbps Switch Fabric Card
<b>Uplink Modules</b>	
ME4600-UMX-4x10GE	Cisco ME4600 UMX Uplink Card with 4 x 10GE (XFPs not included)
<b>Access Modules</b>	

Part Number	Description
<b>ME4600-AMX-16GPON</b>	Cisco ME4600 AMX Access Card with 16 x GPON (SFPs not included)
<b>ME4600-AMX-48GE</b>	Cisco ME4600 AMX Access Card with 48 x GE (SFPs/CSFPs not included)
<b>Accessories</b>	
<b>ME4600-XCO-BP</b>	Cisco ME4600 XCO Switch Fabric Blank Panel
<b>ME4600-UMX/AMX-BP</b>	Cisco ME4600 UMX/AMX Uplink/Access Blank Panel
<b>ME-4620-OLT-FAN</b>	Cisco ME4600 OLT 14RU Chassis Fan Tray Assembly

## Cisco ME 4600 Series OLT Chassis Features and Product Specifications

The features and product specifications for the Cisco ME 4600 Series OLT are listed in Tables 3 through 8.

**Table 3.** Cisco ME 4600 Series OLT Chassis Features

Chassis Feature	Cisco ME 4600 Series OLT Models	
	Cisco ME4620	Cisco ME4601
ETSI 19" rack size	14U	1U
Total number of slots	20	— <sup>(3)</sup>
Number of slots reserved for switching matrix cards	2	— <sup>(3)</sup>
Number of usable slots for uplink line cards	18 <sup>(1)</sup>	— <sup>(3)</sup>
Number of usable slots for GPON line cards	18 <sup>(1)</sup>	— <sup>(3)</sup>
Number of usable slots for XG-PON1 line cards	18 <sup>(1)</sup>	— <sup>(3)</sup>
Number of usable slots for NG-PON2 line cards	18 <sup>(1)</sup>	— <sup>(3)</sup>
Number of usable slots for FE and GE Line cards	18 <sup>(1)</sup>	— <sup>(3)</sup>
Number of usable slots for RF overlay EDFA card	17 <sup>(1,2)</sup>	— <sup>(3)</sup>

<sup>(1)</sup> Shared with the other line cards and RF Overlay EDFA cards

<sup>(2)</sup> RF Overlay EDFA is a duplex card.

<sup>(3)</sup> Standalone system

## Cisco ME 4600 Series OLT Power Supply

Cisco ME 4600 Series OLT systems use -48 VDC input voltage for their dual power supply inputs. It works properly within -40.50 to -57 VDC voltage range, in compliance with the ETSI EN 300 132-2 V2.1.1 (2003-01) recommendation. The earth connections comply with the ETSI ETS 300 253: January 1995 recommendation.

**Table 4.** Cisco ME 4600 Series OLT Power Consumption

Type of Unit	Unit Name	Power Consumption (W @ -48VDC)
<b>Chassis</b>	Cisco ME4620 OLT	< 60 (fan module)
	Cisco ME4601 OLT	< 55
<b>Switching matrix</b>	Cisco XCO-640	< 180
<b>Uplink line cards</b>	Cisco UMX-10G4	< 40
<b>GPON line cards</b>	Cisco AMX-16G	< 90
<b>Ethernet line card</b>	Cisco AMX-48GE	< 120

**Table 5.** Weight and Physical Dimensions

Dimension	Height (mm)/RU	Width (mm)/(inch)	Depth (mm)	Weight (max Kg)
Cisco ME 4620 OLT	620/14U	482.6/19	240	47
Cisco ME 4601 OLT	44.5/1U	482.6/19	240	6

The Cisco ME 4620 OLT chassis can be mounted on an ETSI ETS 300 119-2 type rack, with a depth of 300 mm.

**Table 6.** Environmental Specifications

<b>Operating environment</b>	<b>Normal operating temperature and altitudes:</b> <ul style="list-style-type: none"> <li>• -5 to 45°C: Cisco ME 4620</li> <li>• -40 to 65 °C: Cisco ME 4601</li> </ul>
<b>Relative humidity<sup>3</sup></b>	5 to 95%, noncondensing

## Cisco ME 4600 Series Standards and Protocols

**Table 7.** Safety and Compliance

Type	Standards
<b>PON layer</b>	<ul style="list-style-type: none"> <li>• ITU-T Recommendation G.984.x (GPON)</li> <li>• ITU-T Recommendation G.988 (OMCI)</li> <li>• BBF.247 - GPON certification program OLT interoperability</li> <li>• BBF TR.156 - Using GPON in the context of TR.101</li> <li>• Advanced Encryption Standard (AES)</li> <li>• Forward Error Correction (FEC)</li> <li>• Up to 128 ONT or ONUs per PON</li> <li>• T-CONTs: 512 per PON</li> <li>• GEM port-IDs: 4096 per PON</li> <li>• Logical range: 60 km</li> <li>• Maximum differential distance: 20 km</li> </ul>
<b>L2 layer</b>	<ul style="list-style-type: none"> <li>• Services: 1:1, N:1 (TR-156i3)</li> <li>• VLAN-ID conversion to GEM port-ID</li> <li>• VLAN promotion</li> <li>• VLAN translation</li> <li>• Ethernet Ring Protection Switching (ERPS G.8032)</li> <li>• IEEE 802.1Q VLAN tagging</li> <li>• IEEE 802.1P (VLAN QoS 4096 VLAN)</li> <li>• Per-port QoS and CoS mapping according to IEEE 802.1q and IEEE 802.1p</li> <li>• IEEE 802.1ad Provider Bridges</li> <li>• IEEE 802.1 x Authentication</li> <li>• IEEE 802.1 ad Q-in-Q y VLAN stacking</li> <li>• IEEE 802.1v VLAN by protocol or by port</li> <li>• IEEE 802.3x Flow Control</li> <li>• IEEE 802.3ad Link Aggregation - LAG or LACP</li> <li>• IGMP v2 (RFC2236), IGMP V3 (RFC 3376)</li> <li>• MLDv2 for IPv6 (RFC 3810),</li> <li>• RFC1350 TFTP protocol</li> <li>• RFC0959 FTP protocol</li> <li>• RFC1305 NTP protocol</li> <li>• SFF-8472 Specification for Diagnostic Monitoring Interface for XCVRs</li> <li>• RFC2131 DHCP</li> <li>• RFC3046 DHCP Relay Agent Info (Option 82)</li> <li>• RFC3315 Dynamic Host Configuration Protocol for IPv6 (DHCPv6)</li> <li>• RFC6221 Lightweight DHCPv6 Relay Agent</li> </ul>

Type	Standards
<b>Timing and synchronism</b>	<ul style="list-style-type: none"> <li>• Synchronous Ethernet (SyncE)</li> <li>• ITU-T Recommendation G.8261</li> <li>• ITU-T Recommendation G.8262</li> <li>• IEEE1588v2/PTP</li> </ul>
<b>Management</b>	<ul style="list-style-type: none"> <li>• Local management by CLI and HTTP or HTTPS web browser</li> <li>• Remote management using Telnet or SSH and SNMPv1/v2/v3</li> <li>• CPE remote management over OMC1 and TR-69</li> <li>• In-band and out-of-band management</li> <li>• Receive power monitoring per ONT</li> <li>• Per-user accounting and logging</li> <li>• Local alarm storage and Syslog</li> <li>• Automated backup, restore, and rollback</li> </ul>
<b>Redundancy</b>	<ul style="list-style-type: none"> <li>• GPON Type B redundancy</li> <li>• Active/standby GPON card and GPON port redundancy</li> <li>• Active-active, active/standby network Interfaces</li> <li>• Active-standby switching fabric redundancy</li> <li>• Hot-swappable modules</li> </ul>

**Table 8.** Safety and Compliance

Type	Standards
<b>Electromagnetic</b>	<ul style="list-style-type: none"> <li>• FCC Part 15 Class</li> </ul>
<b>Emissions compliance</b>	<ul style="list-style-type: none"> <li>• EN 55022 Class A (CISPR22 Class A)</li> <li>• EN 55024</li> <li>• EN 50082</li> <li>• EN61000-3-2/3</li> <li>• EN61000-4-2/3/4/5/6/8/11</li> </ul>
<b>Safety</b>	<ul style="list-style-type: none"> <li>• UL 60950-1</li> <li>• CAN/CSA 22.2 No.60950-1</li> <li>• EN 60950-1</li> <li>• IEC 60950-1</li> <li>• NOM-019-SCFI</li> </ul>
<b>NEBS</b>	<ul style="list-style-type: none"> <li>• GR-63-CORE, GR-1089-CORE - Level 3, Type 2</li> </ul>
<b>ETSI</b>	<ul style="list-style-type: none"> <li>• EN 300 019 - Storage: Class 1.2</li> <li>• EN 300 019 - Transportation: Class 2.3</li> <li>• EN 300 019 - In-Use: Class 3.1</li> </ul>

## Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners to promote high levels of customer satisfaction. Cisco services help 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. For more information about Cisco services, refer to Cisco Technical Support Services or Cisco Advanced Services.

Cisco is committed to reducing your total cost of ownership. Cisco offers a portfolio of technical support services to help ensure that Cisco products operate efficiently, remain highly available, and benefit from the most up-to-date system software. The services and support programs described in Table 9 are available as part of the Cisco Carrier Ethernet Switching Service and Support solution directly from Cisco and through resellers.



**Table 9.** Service and Support

Advanced Services	Features	Benefits
<b>Cisco Total Implementation Solutions (TIS), available directly from Cisco</b> <b>Cisco Packaged TIS, available through resellers</b>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Design documentation creation</li> <li>• Site survey and product staging</li> <li>• Node and network configuration and deployment                             <ul style="list-style-type: none"> <li>• Installation, test, and cutover</li> </ul> </li> <li>• Training</li> <li>• Major moves, adds, and changes</li> </ul>	<ul style="list-style-type: none"> <li>• Supplement existing staff</li> <li>• Implementation by trained Cisco resources, Cisco partner resources, or both</li> <li>• Faster time to market</li> <li>• Help ensuring that functions meet needs</li> <li>• Mitigate risk</li> </ul>
<b>Cisco Network Optimization Service (NOS)</b>	Lifecycle support for ongoing network planning and growth <ul style="list-style-type: none"> <li>• Remote change support</li> <li>• Design support</li> <li>• Software strategy</li> <li>• Network health checks</li> <li>• Continuous learning</li> </ul>	<ul style="list-style-type: none"> <li>• Provide ongoing support for your network operations from Cisco consulting engineers</li> <li>• Supplement existing staff</li> </ul>
<b>Cisco Service Provider Base Support and Service Provider-Based Onsite Support, available directly from Cisco</b> <b>Cisco Packaged Service Provider-Based Support, available through resellers</b>	<ul style="list-style-type: none"> <li>• 24-hour access to software updates</li> <li>• Web access to technical repositories</li> <li>• Telephone support through the Cisco Technical Assistance Center (TAC)</li> <li>• Advance replacement of hardware parts</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate proactive or expedited problem resolution</li> <li>• Reduce total cost of ownership by taking advantage of Cisco expertise and knowledge</li> <li>• Minimize network downtime</li> </ul>

## For More Information

<http://www.cisco.com/en/US/products/hw/switches/index.html>



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