Cisco ME 3600X Series Ethernet Access Switches

Product Overview

The Cisco® ME 3600X Series of Ethernet Access Switches is Cisco's first series of switches built specifically for the convergence of wireless and wire-line services. A natural evolution to Cisco's Carrier Ethernet portfolio, the Cisco ME 3600X Series extends the portfolio's transport speed to 10 Gbps in the access layer for business and mobile applications. It also enables service providers to initiate Multiprotocol Label Switching (MPLS) -based VPN services from within the access layer. Designed around key Carrier Ethernet features that simplify network operation, the Cisco ME 3600X Series enables premium services with enhanced service-level agreement (SLA) capabilities. An optional "pay-as-you-grow" feature and service activation model gives service providers a flexible, cost-effective solution.

The Cisco ME 3600X Series Ethernet Access Switches (Figure 1) are 1-rack-unit (1RU), fixed-form-factor platforms available in copper and fiber hardware-optimized configurations:

- Cisco ME 3600X-24TS (copper) with 24 10/100/1000 ports and two 10 Gigabit Ethernet SFP+ ports
- Cisco ME 3600X-24FS (fiber) with 24 Gigabit Ethernet SFP ports and two 10 Gigabit Ethernet SFP+ ports

Figure 1.   Cisco ME 3600X Series Ethernet Access Switches

Benefits

Created for the delivery of today and tomorrow's access services , the Cisco ME 3600X supports existing and next-generation features and technology while remaining operationally simple to deploy and manage. It offers the following key benefits.

Powered by the Cisco Carrier Ethernet ASIC

Powered by the Cisco Carrier Ethernet ASIC – designed specifically with service providers in mind, the Cisco ME 3600X series delivers essential Carrier Ethernet technologies including: H-QoS, MPLS and Virtual Private LAN Services (VPLS). This custom and advanced ASIC design provides un-interrupted line rate performance while delivering complex and taxing services such as ACL and H-QoS. The Carrier Ethernet ASIC integrates Cisco traffic management innovation to deliver intelligent packet switching and routing operations.

MPLS in the Access Layer

The Cisco ME 3600X Series extends MPLS into the access layer by enabling service providers to initiate MPLS-based Layer 2 and Layer 3 VPN services from within the access layer. The Cisco ME 3600X Series gives service providers the ability to expand MPLS toward their network edge to gain the advantages of a single unified MPLS control plane across their network. The Cisco ME3600X offers full VPLS support allowing multipoint services definition. For additional flexibility, VPLS can be deployed as a full mesh or with a hierarchy (H-VPLS).

"Pay-as-you-Grow" Investment Model

The use of licensing to activate features on the Cisco ME 3600X Series allows service providers to customize and schedule their investment in access features for a time when network growth and customer demand justify the investment. Unlike investments in the core and edge, where the physical location of network assets has minimal impact on their accessibility and usage, the ROI on an access element is heavily influenced by its location in the network and proximity to customers. The ability to deploy the Cisco ME 3600X Series and later activate features as demand and growth dictate, with little if any need for service calls, delivers highly measureable investment protection. This allows flexible timing for migrating from 1 Gbps to 10 Gbps, deploying MPLS services, and boosting service capacity.

Advanced Service-Level Agreements (SLA)

Service-aware quality of service (QoS) allows service providers to expand and differentiate their services portfolio with highly advanced and differentiating SLAs. The Hierarchical QoS capabilities of the Cisco ME 3600X Series scale to eight queues per service, three levels of scheduling, and buffer volumes capable of accommodating today's most demanding wireline and wireless applications.

Mobile Timing and Synchronization Services

The Cisco ME 3600X Series provides the timing services required in today's converged access network to support mobile solutions including Radio Access Network (RAN) applications and offers integrated support for Building Integrated Timing Supply (BITS) interface. The Cisco ME 3600X Series also supports synchronous Ethernet (SyncE) with Ethernet Synchronization Messaging Channel (ESMC) and Synchronization Status Messages (SSM) to allow best clock source traceability.

Operational Efficiency for Carrier Ethernet Access Deployments

The Cisco ME 3600X Series features key enhancements that help service providers simplify and facilitate the management of their network, resulting in diminishing operational costs. This unique feature set enables the Cisco ME 3600X Series to be deployed in a variety of applications including business service with 10 Gigabit Ethernet User Network Interface (UNI) and Ethernet mobile backhaul. These features enhance performance awareness, facilitate troubleshooting, and simplify service turn-up and restoration, ultimately reducing operational cost. "Dying gasp" for power indicators and four external alarm inputs to detect changes in remote sites further help service providers manage the health of network elements.

High-Performance Hardware

Based on the Cisco Carrier Ethernet ASIC, the Cisco ME 3600X Series is a non-blocking switching system providing line-rate Carrier Ethernet performance. The custom Cisco Carrier Ethernet ASIC technology enables next-generation Carrier Ethernet service integration without impacting line-rate performance. The 1RU switch holds two slots for hot-swappable and redundant power supplies. Three fans are integrated into each power supply, providing fan redundancy.

High Availability is also achieved on the Cisco ME 3600X Series through proactive diagnostic tools including Generic On-Line Diagnostics (GOLD) and Onboard Failure Logging (OBFL). These tools help service providers avoid potential problems before they occur and troubleshoot and diagnose once identified.

Table 1 lists the hardware part available for the Cisco ME 3600X Series.

Table 1.   Cisco ME 3600X Series Ethernet Access Switch Hardware Options

Part Number	Product Name
ME-3600X-24TS-M	Cisco ME 3600X-24TS Ethernet Access Switch
ME-3600X-24FS-M	Cisco ME 3600X-24FS Ethernet Access Switch
PWR-ME3KX-AC	Cisco ME 3600X/ME 3800X Series field- replaceable AC power supply and fan module
PWR-ME3KX-DC	Cisco ME 3600X/ME 3800X Series field- replaceable DC power supply and fan module
PWR-ME3KX-AC=	Cisco ME 3600X/ME 3800X Series spare field-replaceable AC power supply and fan module
PWR-ME3KX-DC=	Cisco ME 3600X/ME 3800X Series spare field-replaceable DC power supply and fan module
ME-FANTRAY=	Cisco ME 3600X/ME 3800X Series spare fan tray
RCKMNT-ME3KX-ETSI	ETSI Rack mount Option for the Cisco ME 3600X/ME 3800X Series
RCKMNT-ME3KX-23IN	23" Rack mount Option for Cisco ME 3600X//ME 3800X Series
RCKMNT-ME3KX-ANG	Angled Rack mount for Cisco ME 3600X/ME 3800X Series
RCKMNT-ME3KX-ETSI=	Spare ETSI Rack mount Option for the Cisco ME 3600X/ME 3800X Series
RCKMNT-ME3KX-23IN=	Spare 23" Rack mount Option for Cisco ME 3600X//ME 3800X Series
RCKMNT-ME3KX-ANG=	Spare Angled Rack mount for Cisco ME 3600X/ME 3800X Series
RCKMNT-ME3KX-19IN=	Spare 19" Rack mount Option for Cisco ME 3600X//ME 3800X Series
ME-3600X-24TS-M=	Spare Cisco ME 3600X-24TS Ethernet Access Switch
ME-3600X-24FS-M=	Spare Cisco ME 3600X-24FS Ethernet Access Switch
MEM-ME3K-2GB	Cisco ME 3600X and ME3800X SD Memory Card 2GB
MEM-ME3K-2GB=	Cisco ME 3600X and ME3800X SD Memory Card 2GB Spare
MEM-ME3K-4GB	Cisco ME 3600X and ME3800X SD Memory Card 4GB
MEM-ME3K-4GB=	Cisco ME 3600X and ME3800X SD Memory Card 4GB Spare

The Cisco ME 3600X Series supports a wide range of SFP and SPF+ optic modules. Table 2 lists their part numbers.

Table 2.   SFP and SFP+ Modules Supported with Cisco ME 3600X Series

	Part number
SFP	GLC-FE-100FX, GLC-FE-100EX, GLC-FE-100ZX, GLC-FE-100LX, GLC-FE-100BX-U, GLC-FE-100BX-D, GLC-LH-SM, GLC-SX-MM, GLC-SX-MMD, GLC-LH-SMD, GLC-ZX-SM, GLC-ZX-SMD, GLC-EX-SMD, GLC-T, GLC-BX-U (CPN 10-2094-02), GLC-BX-D (CPN 10-2093-02), SFP-GE-L, SFP-GE-S, SFP-GE-T, SFP-GE-Z, CAB-SFP-50CM, CWDM-SFP-1470, CWDM-SFP-1490, CWDM-SFP-1510, CWDM-SFP-1530, CWDM-SFP-1550, CWDM-SFP-1570, CWDM-SFP-1590, CWDM-SFP-1610, DWDM-SFP-6061, DWDM-SFP-5979, DWDM-SFP-5898, DWDM-SFP-5817, DWDM-SFP-5736, DWDM-SFP-5655, DWDM-SFP-5575, DWDM-SFP-5413, DWDM-SFP-5494, DWDM-SFP-5332, DWDM-SFP-5252, DWDM-SFP-5172, DWDM-SFP-5092, DWDM-SFP-5012, DWDM-SFP-4931, DWDM-SFP-4851, DWDM-SFP-4772, DWDM-SFP-4692, DWDM-SFP-4612, DWDM-SFP-4532, DWDM-SFP-4453, DWDM-SFP-4373, DWDM-SFP-4294, DWDM-SFP-4214, DWDM-SFP-4134, DWDM-SFP-4056, DWDM-SFP-3977, DWDM-SFP-3898, DWDM-SFP-3819, DWDM-SFP-3739, DWDM-SFP-3661, DWDM-SFP-3582, DWDM-SFP-3504, DWDM-SFP-3425, DWDM-SFP-3346, DWDM-SFP-3268, DWDM-SFP-3190, DWDM-SFP-3112, DWDM-SFP-3033, DWDM-SFP-6141
SFP+	SFP-10G-SR, SFP-10G-LR, SFP-10G-ER, SFP-10G-ZR, SFP-10G-LRM, SFP-H10GB-CUxM, DWDM-SFP10G-61.41, DWDM-SFP10G-60.61, DWDM-SFP10G-59.79, DWDM-SFP10G-58.98, DWDM-SFP10G-58.17, DWDM-SFP10G-57.36, DWDM-SFP10G-56.55, DWDM-SFP10G-55.75, DWDM-SFP10G-54.94, DWDM-SFP10G-54.13, DWDM-SFP10G-53.33, DWDM-SFP10G-52.52, DWDM-SFP10G-51.72, DWDM-SFP10G-50.92, DWDM-SFP10G-50.12, DWDM-SFP10G-49.32, DWDM-SFP10G-48.51, DWDM-SFP10G-47.72, DWDM-SFP10G-46.92, DWDM-SFP10G-46.12, DWDM-SFP10G-45.32, DWDM-SFP10G-44.53, DWDM-SFP10G-43.73, DWDM-SFP10G-42.94, DWDM-SFP10G-42.14, DWDM-SFP10G-41.35, DWDM-SFP10G-40.56, DWDM-SFP10G-39.77, DWDM-SFP10G-38.98, DWDM-SFP10G-38.19, DWDM-SFP10G-37.40, DWDM-SFP10G-36.61, DWDM-SFP10G-35.82, DWDM-SFP10G-35.04, DWDM-SFP10G-34.25, DWDM-SFP10G-33.47, DWDM-SFP10G-32.68, DWDM-SFP10G-31.90, DWDM-SFP10G-31.12, DWDM-SFP10G-30.33

Flexible Software Options

The Cisco ME 3600X Series supports the Cisco IOS® Software Activation feature. With this feature Cisco IOS Software feature sets can be activated by Cisco software licenses, enabling a "pay-as-services-grow" model. This flexibility allows service providers to invest in software resources only when their business needs it. The Cisco ME 3600X Series offers three different Cisco IOS Software licenses:

- The **10GE Upgrade** license allows service providers to enable 10 Gigabit Ethernet on the uplink only when required, supporting a pay-as-you-grow strategy.
- The **Metro IP Access** license offers advanced QoS, Carrier Ethernet Layer 2 features, Ethernet OAM, Layer 3 features for advanced IP routing protocols, multi-VPN routing, and Forwarding Customer Edge (multi-VRF CE) capabilities.
- The **Advanced Metro IP Access** license adds the following capabilities to the METRO IP ACCESS image: MPLS, EoMPLS pseudowires, Virtual Private Lan Services (VPLS), MPLS traffic engineering, Fast Reroute (FRR) and MPLS VPN support.

Table 3 lists the key feature in the Cisco IOS Software licenses for the Cisco ME 3600X Series and Table 4 lists the software options.

Table 3. Feature Set in Cisco ME 3600X Series Licenses

Metro IP Access	Advanced Metro IP Access
Layer 2 (EVC, 802.1Q)	All features in METROIPACCESS plus
IP Routing (RIP, OSPF, EIGRP, IS-IS, BGP) and BFD	MPLS
PIM (SM, DM, SSM), SSM mapping	MPLS traffic engineering (TE) and Fast Reroute (FRR)
Ethernet OAM (802.1ag, 802.3ah, E-LMI, 1731 PM)	MPLS OAM
MST, REP, Flexlink, G.8032	MPLS VPN Multicast VPN (MVPN)
Synchronous Ethernet, Ethernet Synchronization messaging Channel (ESMC), Synchronization Status Messages	Ethernet Over MPLS (EoMPLS)
Switch Database Management (SDM) templates	Virtual Private LAN services (VPLS), Hierarchical VPLS (H-VPLS)
Multi-VRF CE (VRF-lite) with service awareness (ARP, ping, SNMP, syslog, traceroute, FTP, TFTP)	Pseudowire redundancy

Table 4. Cisco ME 3600X Series Ethernet Access Switch Software Options

Part Number	Product Name
License Options	
ME3600X-I	Cisco ME 3600X Series METRO IP ACCESS Software Paper License
ME3600X-A	Cisco ME 3600X Series ADVANCED METRO IP ACCESS Software Paper License
ME3600X-10G	Cisco ME 3600X Series 10GE UPGRADE Software Paper License
Product Activation Keys	
ME3600X-LIC=	Product activation key for ME3600X Series (Paper Delivery)
L-ME3600X-LIC=	Product activation key for ME3600X Series (E-Delivery)
License Upgrade Options	
L-ME3600X-A	Cisco ME 3600X Series ADVANCED METRO IP ACCESS Software E License
L-ME3600X-10G	Cisco ME 3600X Series 10GE UPGRADE Software E License
Software Options	
S360XVT-12252EY	Cisco ME 360X SERIES IOS UNI. W/O CRYPTO – Release 12.2(52)EY

Part Number	Product Name
S360XVK9T-12252EY	Cisco ME 360X SERIES IOS UNIVERSAL – Release 12.2(52)EY
S360XVT-15102EY	Cisco ME 360X SERIES IOS UNIVERSAL W/O CRYPTO TAR – Release 15.1(2)EY
S360XVK9T-15102EY	Cisco ME 360X SERIES IOS UNIVERSAL TAR – Release 15.1(2)EY
S360XVT-15202S	Cisco ME 360X SERIES IOS UNIVERSAL W/O CRYPTO TAR – Release 15.2(2)S
S360XVK9T-15202S	Cisco ME 360X SERIES IOS UNIVERSAL TAR – Release 15.2(2)S
S360XVT-15204S	Cisco ME 360X SERIES IOS UNIVERSAL W/O CRYPTO TAR – Release 15.2(4)S
S360XVK9T-15204S	Cisco ME 360X SERIES IOS UNIVERSAL TAR – Release 15.2(4)S
S360XVT-15301S	Cisco ME 360X SERIES IOS UNIVERSAL W/O CRYPTO TAR – Release 15.3(1)S
S360XVK9T-15301S	Cisco ME 360X SERIES IOS UNIVERSAL TAR – Release 15.3(1)S
S360XVT-15302S	Cisco ME 360X SERIES IOS UNIVERSAL W/O CRYPTO TAR – Release 15.3(2)S
S360XVK9T-15302S	Cisco ME 360X SERIES IOS UNIVERSAL TAR – Release 15.3(2)S
S360XVT-15303S	Cisco ME 360X SERIES IOS UNIVERSAL W/O CRYPTO TAR – Release 15.3(3)S
S360XVK9T-15303S	Cisco ME 360X SERIES IOS UNIVERSAL TAR – Release 15.3(3)S

Key Features

Table 5 lists the features of the Cisco ME 3600X Series.

Table 5.   Cisco ME 3600X Series Features

Features
Ethernet Services
- Ethernet Virtual Connections (EVCs) for: - QinQ   - Selective QinQ   - Inner and outer VLAN classification   - EVC Push and Pop rewrite   - EVC local Connect   - Layer 2 Protocol Tunneling (L2PT)   - Hierarchical VPLS (H-VPLS), Virtual Private LAN Services (VPLS), VPLS Border Gateway Protocol [BGP] Signaling   - Virtual Private Wire Service (VPWS), Ethernet over MPLS (EoMPLS), pseudowire redundancy   - VPLS over remote Loop Free Alternate (LFA)   - Ethernet Data Plane loopback (Terminal and Facility)   - IEEE 802.1ad Provider Bridge
Layer 3 Services
- Layer 3 Routing   - IPv4 Routing (Border Gateway Protocol [BGP], Intermediate System-to-Intermediate System [IS-IS], and Open Shortest Path First [OSPF]), Hot Standby Router Protocol (HSRP), Virtual Router Redundancy Protocol (VRRP)   - IPv6 Unicast Routing (Border Gateway Protocol [BGP], Intermediate System-to-Intermediate System [IS-IS], and Open Shortest Path First [OSPF])   - IPv6 Provider Edge (6PE)   - IPv6 VPN over MPLS (6VPE)   - MPLS   - Label Distribution Protocol (LDP), Targeted LDP (T-LDP), Resource Reservation Protocol (RSVP), Differentiated Services (DiffServ)-aware traffic engineering, MPLS L3VPN   - MPLS Traffic Engineering (including TE-FRR)   - MPLS TE on Bundle interfaces (Port Channels)   - Carrier Supporting Carrier (CsC) with BGP as CE-PE routing protocol   - BGP with label distribution (RFC3107)   - Border Gateway Protocol Prefix-Independent Convergence (BGP PIC) Edge for IP and MPLS   - Routed Pseudowire   - Integrated Routing and Bridging (IRB)   - Policy Based Routing (PBR)   - Auto-IP

Features

QoS

- Up to 4000 egress queues per system
- Class-Based Weighted Fair Queuing (CBWFQ)
- Priority Queuing
- 2-rate 3-color (2R3C) ingress Policing, Egress Policing (1R2C) for LLQ
- Hierarchical Color Aware policing
- Ingress and Egress marking (CoS, DSCP, MPLS Experimental Bits)
- Egress shaping per port and per queue
- Modular QoS CLI (MQC)
- 3-level H-QoS
- Classification based on inner and outer class of service (CoS) or VLAN ID
- Classification based on Ethernet Flow Point (EFP)
- Copy inner to outer CoS
- WRED
- IPV6 QoS
- Table Map

Multicast

- IPv4 Multicast
- Protocol Independent Multicast sparse mode (PIM-SM), PIM Source-Specific Multicast (PIM SSM), PIM SSM mapping
- Internet Group Management Protocol Versions 1, 2, and 3 (IGMPv1, v2, and v3)
- IGMPv1, v2, and v3 snooping on Switchport, EVC interfaces and Pseudowires
- PIM Snooping
- IPv4 multicast per VRF Lite
- Multicast VPN (MVPN)

Security

- Authentication, authorization and accounting (AAA); TACACS+; Secure Shell (SSH) Protocol; MAC limiting per Ethernet flow point (EFP) or bridge domain; unicast, multicast, and broadcast storm control blocking on any interface or port
- Layer 2 ACLs
- Layer 3 ACLs for IPv4 and IPv6
- ACL on switchport, EVC and routed interfaces
- Mac limit per Bridge Domain or VPLS instance
- Control Plane Policing
- DHCP Snooping with option 82
- Dynamic Arp Inspection (DAI)
- SPAN
- 802.1x Authenticator

Availability

- Resilient Ethernet Protocol (REP)
- ITU-T G.8032 Ethernet Ring Protection Switching
- IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- IEEE 802.1s Multiple Spanning Tree Protocol (MST)
- Per-VLAN Rapid Spanning Tree (PVRST+)
- MPLS TE Fast Reroute (FRR)
- Flexlink
- BFD for Static, ISIS, OSPF, BGP
- BFD over Switched Virtual Interface (SVI)
- BFD triggered FRR
- 802.3ad Link Aggregation Bundles
- MPLS IGP-LDP Synchronization
- LACP 1-1 redundancy with Fast Switchover
- EoMPLS Link Path Through

Features
Operations, Administration, and Maintenance (OAM)

- CFM (802.1ag)
- Link OAM (802.3ah)
- MPLS OAM
- E-LMI (CE and PE)
- 1731 Performance Monitoring (ETH-DM and ETH-SLM) with concurrent and on demand operations
- Policy Based Routing (PBR)

Manageability

- Simple Network Management Protocol (SNMP)
- MIBs
- RMON
- Cisco Active Network Abstraction (ANA) Version 3.7.1: Physical and logical inventory, service-level views with support for the following technologies: OSPF, BGP, EtherChannel, routing, LAG, ACL, Cisco Discovery Protocol, ARP
- CiscoWorks Lan Management Solution (LMS) 3.2
- Embedded Event Manager (EEM 4.0)
- Switch Database Management (SDM)
- 60 days build-in evaluation licenses
- External SD Flash Cards support
- Autonomic Networking (AN)

Timing

- ITU-T Synchronous Ethernet (syncE) with Ethernet Synchronization Messaging Channel (ESMC)
- Synchronization Status Messages (SSM)

Product Specifications

Tables 6 through 8 list product, power, and environmental specifications for the Cisco ME 3600X Series. Table 9 lists standards and protocols, and Table 10 gives safety and compliance information.

Table 6. Product Specifications

Description	Cisco ME 3600X-24TS	Cisco ME 3600X-24FS
Performance	Forwarding bandwidth full duplex: Cisco ME 3600X-24TS AC or DC: 44 Gbps Forwarding rate: Cisco ME 3600X-24TS AC or DC: 65 Mpps Configurable maximum transmission unit (MTU) of up to 9,800 bytes, for bridging on Gigabit and 10 Gigabit	Forwarding bandwidth full duplex: Cisco ME 3600X-24FS AC or DC: 44 Gbps Forwarding rate: Cisco ME 3600X-24FS AC or DC: 65 Mpps Configurable maximum transmission unit (MTU) of up to 9,800 bytes, for bridging on Gigabit and 10 Gigabit
Memory	DRAM: 1GB Flash: 64MB Packet buffer: 44MB External SD Flash: 2GB and 4GB SD Flash cards (optional)	DRAM: 1GB Flash: 64MB Packet buffer: 44MB External SD Flash: 2GB and 4GB SD Flash cards (optional)
Connectors and cabling	**10/100/1000 ports:** 10/100/1000 BASE-T ports: RJ-45 connectors, 4-pair Category 5 unshielded twisted pair (UTP) cabling	**SFP ports:** - 10/100/1000BASE-T SFP-based ports: RJ-45 connectors, 4-pair Category 5 UTP cabling - 100BASE-FX and -LX: Duplex LC receptacle fiber connectors (multimode and single-mode) - 100BASE-BX: Single-fiber LC receptacle connector (single-mode fiber) - 100BASE-EX: SFP module for 100 Mb port, 1310 nm wavelength, 40 km over single-mode fiber - 100BASE-ZX: SFP module for 100 Mb port, 1550 nm wavelength, 80 km over single-mode fiber - 1000BASE-BX: Single-fiber LC receptacle connector (single-mode fiber) - 1000BASE-SX, -LX/LH, -EX and -ZX and CWDM and DWDM: Duplex LC receptacle fiber connectors (multimode and single-mode fiber)

Description	Cisco ME 3600X-24TS	Cisco ME 3600X-24FS
	SFP+ ports: • SFP-10G-SR • SFP-10G-LR • SFP-10G-ER • SFP-10G-ZR • SFP-10G-LRM • DWDM SFP-10GE • SFP-H10GB-CUxM where x = 1, 3, 5 meters SFP+ port supports 1000BASE-X except 1000BASE-T Management console port: RJ-45-to-DB9 cable for PC connections Management 10/100/1000 Ethernet: RJ-45 connector BITS and alarm ports: RJ-45 connector	
Indicators	Per-port status LEDs: Link integrity, port disabled, and activity indications Power input/output status LED Alarm status LED SynchE status LED System-status LED	
Dimensions	All SKUs 1.72-in. x 17.50-in. x 20.33-in. (H x W x D)	
Weight	ME-3600X-24TS-M 14.15 lb (6.41 kg) PWR-ME3KX-AC 2.90 lb (1.31 kg) PWR-ME3KX-DC 3.10 lb (1.40 kg) ME-FANTRAY 1.65 lb (0.74 kg)	ME-3600X-24FS-M 14.50 lb (6.57 kg) PWR-ME3KX-AC 2.90 lb (1.31 kg) PWR-ME3KX-DC 3.10 lb (1.40 kg) ME-FANTRAY 1.65 lb (0.74 kg)
Mean time between failure (MTBF)	ME3600X-24TS-M: 525,870 hours PWR-ME3KX-DC: 307,487 hours (48V input at 25ºC) PWR-ME3KX-AC: 342,664 hours (120V at 25ºC) 342,000 hours (230V at 40ºC) ME-FANTRAY: 2,177,000 hours (12V input at 40ºC) System MTBF (ME3600X-24TS-M with dual AC PS: 499,598 hours System MTBF (ME3600X-24TS-M with dual DC PS: 499,598 hours	ME3600X-24FS-M: 188,372 hours PWR-ME3KX-DC: 319,000 hours (48V at 40ºC) PWR-ME3KX-AC: 328,000 hours (120V at 40ºC), 342,000 hours (230V at 40ºC) ME-FANTRAY: 2,177,000 hours (12V input at 40ºC)

Table 7. Power Specifications

Description	Cisco ME 3600X-24TS	Cisco ME 3600X-24FS
Power consumption	Cisco ME 3600X-24TS, one AC and one fan tray: 150W (typical), 192W (maximum), 512 Btus per hour (typical), 656 Btus per hour (maximum) Cisco ME 3600X-24TS, two AC: 158W (typical), 198W (maximum), 540 Btus per hour (typical), 677 Btus per hour (maximum) Cisco ME 3600X-24TS, one DC and one FT: 151W (typical), 208W (maximum), 516 Btus per hour (typical), 711 Btus per hour (maximum) Cisco ME 3600X-24TS, two DC: 157W (typical), 204W (maximum), 537 Btus per hour (typical), 697 Btus per hour (maximum)	Cisco ME 3600X-24FS, one AC and one fan tray: 155W (typical), 223W (maximum), 530 Btus per hour (typical), 762 Btus per hour (maximum) Cisco ME 3600X-24FS, two AC: 163W (typical), 228W (maximum), 557 Btus per hour (typical), 778 Btus per hour (maximum) Cisco ME 3600X-24FS, one DC and one FT: 156W (typical), 241W (maximum), 533 Btus per hour (typical), 823 Btus per hour (maximum) Cisco ME 3600X-24FS, two DC: 161W (typical), 233W (maximum), 550 Btus per hour (typical), 796 Btus per hour (maximum)
AC input voltage and frequency	100 to 240VAC, 50 to 60Hz	
DC input voltages	18V to 32VDC, 36V to 72VDC	

Table 8. Environmental Specifications

Cisco ME 3600X Series Environment Specification (NEBS)	
Operating environment and altitude[1]	Normal operating temperature and altitudes: 0 to +50ºC, up to 1000 feet (300m) 0 to +45ºC, up to 6000 feet (1800m) 0 to +40ºC, up to 10,000 feet (3000m)
	Short-term[2] exceptional conditions: 0 to +60ºC, up to 1000 feet (300m) 0 to +55ºC, up to 6000 feet (1800m) 0 to +50ºC, up to 10,000 feet (3000m)
	0 to +45ºC, at sea level with single fan failure
Relative humidity[3]	5% to 95%, non-condensing
Acoustic noise[4]	LpA: 43 dB typical, 46 dB maximum LwA: 5.4 Bel typical, 5.6 Bel maximum
Storage environment:	Temperature: –25 to +70ºC altitude: 15,000 ft

1. Switch supports -5oC operation provided that it powers up at ambient equal to or greater than 0oC. SFP-10G-LRM SFP+ module may only be used from 0oC. GLC-T SFP may only be used from 0 to +50ºC, up to 1000 feet (300m) environment, for normal operating and short-term conditions

2. Not more than the following in a one-year period: 96 consecutive hours, or 360 hours total, or 15 occurrences

3. This may be limited by specification of optical modules

4. Acoustic noise is measured per ISO 7779 and declared per ISO 9296

Table 9. Standards and Protocols

Standards and Protocols	
• IEEE 802.1s • IEEE 802.1w • IEEE 802.3ad • IEEE 802.3ah • IEEE 802.1ag • IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports • IEEE 802.1D Spanning Tree Protocol • IEEE 802.1p CoS classification	• IEEE 802.1Q VLAN • IEEE 802.3 10BASE-T • IEEE 802.3u 100BASE-T • IEEE 802.3ab 1000BASE-T • IEEE 802.3z 1000BASE-X • BFD for OSPF, IS-IS, BGP, HSRP, EIGRP • IP routing: Static, RIP versions 1 and 2, EIGRP, OSPF, BGPv4, PIM-SM, and PIM-DM (metro IP access only) • Management: SNMP versions 1, 2, and 3 • MEF 9 & 14 certified • MEF CE 2.0 certified (E-LINE, E-LAN, E-TREE)

Table 10. Safety and Compliance

Type	Standards
Electromagnetic	FCC Part 15 Class
Emissions Compliance	• EN 55022 Class A (CISPR22 Class A) • EN 55024 • EN 300 386 • VCCI Class A • AS/NZS 3548 Class A or AS/NZS CISPR22 Class A • KCC • CE Marking
Safety	• UL 60950-1 • UL to CAN/CSA 22.2 No.60950-1 • TUV/GS to EN 60950-1 with all Amendments • CB to IEC 60950-1 with all country deviations • NOM to NOM-019-SCFI (through distributors) • CE Marking

Type	Standards
	• CCC
NEBS	GR-63-CORE, GR-1089-CORE – Level 3, Type 2 Verizon's FOC Certification on optical SFPs
ETSI	EN 300 019 – Storage: Class 1.2, Transportation: Class 2.3, In-Use: Class 3.2

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, resulting in 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 minimizing 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 11 are available as part of the Cisco Carrier Ethernet Switching Service and Support solution, and are available directly from Cisco and through resellers.

Table 11. Service and Support

Service and Support	Features	Benefits
Advanced Services		
Cisco Total Implementation Solutions (TIS), available directly from Cisco Cisco Packaged TIS, available through resellers	• Project management • Site survey, configuration, and deployment • Installation, text, and cutover • Training • Major moves, adds, and changes • Design review and product staging	• Supplement existing staff • Help ensure functions meet needs • Mitigate risk
Cisco SP Base Support and Service Provider-Based Onsite Support, available directly from Cisco Cisco Packaged Service Provider- Based Support, available through resellers	• 24-hour access to software updates • Web access to technical repositories • Telephone support through the Cisco Technical Assistance Center (TAC) • Advance replacement of hardware parts	• Facilitate proactive or expedited problem resolution • Lower total cost of ownership by taking advantage of Cisco expertise and knowledge • Minimize network downtime

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