Cisco ME 4600 Series Optical Network Terminal

Carrier Ethernet is a fundamental element of the Cisco® Evolved Programmable Network (EPN). This proven end-to-end network solution for video, mobile, and cloud 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 Network Terminal (ONT) portfolio offers an exceptionally broad and scalable solution. The Cisco ME 4600 series offers network service providers a flexible and cost-effective approach for optical fiber access solutions over active or passive optical network architectures.

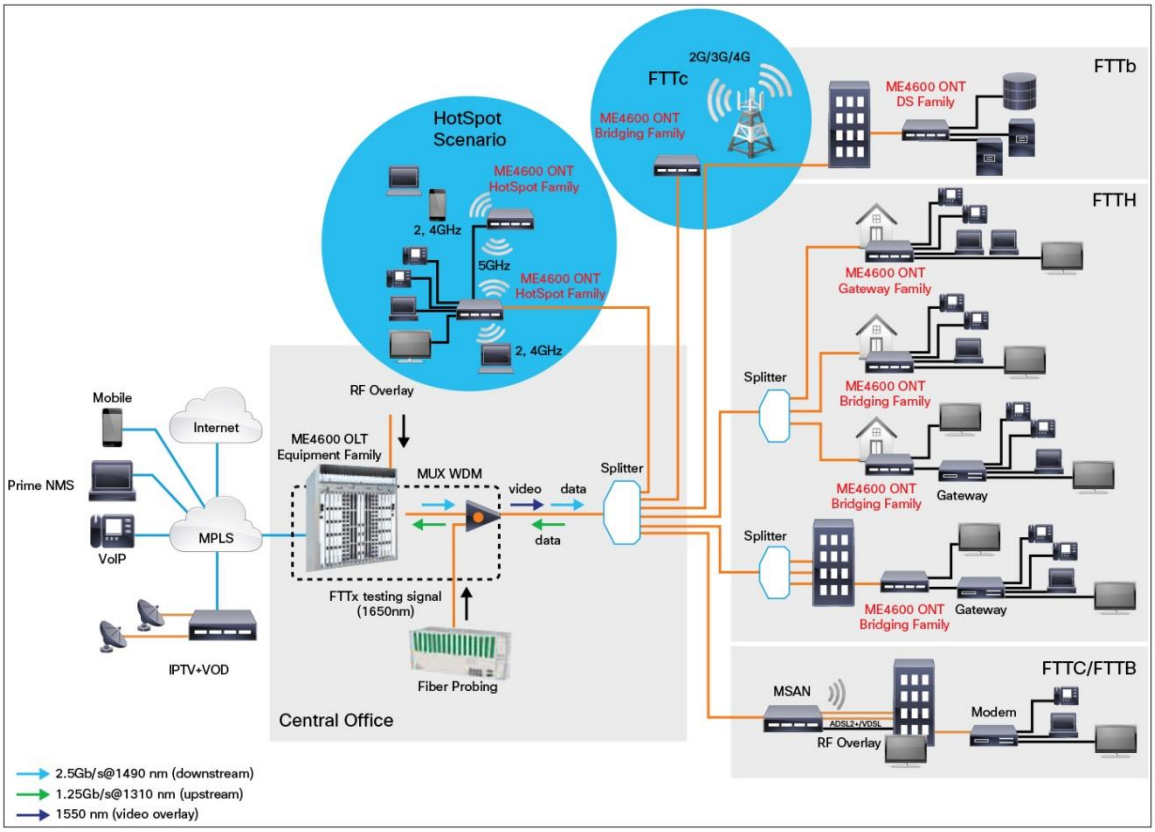
The Cisco ME 4600 Multiservice Optical Access Platform includes reliable ONT devices designed for optical fiber network infrastructures in either point-to-point (P2P) or point-to-multipoint (P2MP) topologies. Ethernet or passive optical network (PON) technologies like Gigabit PON (GPON) are supported by the Cisco ME 4600 Series. Cisco ME 4600 Series products (Figure 1) support any fiber-based (FTTx) access scenarios, including 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 ONTs

Cisco ME 4600 Series customer premises equipment solutions are the right choice for service providers implementing a GPON or Gigabit Ethernet optical access network termination. The access network architecture (Figure 2) supports multiplay service, allowing High Speed Internet (HSI), voice and video services through Ethernet, Wi-Fi, POTS (FXS), and RF overlay standard interfaces. Mobile backhaul and dedicated time-division multiplexing (TDM) based business services are also supported.

Cisco ME 4600 Series ONT equipment solutions are BBF.247 certified (multivendor optical line terminal [OLT] interoperability) and can be easily configured to differentiate an operator's business model, whether retail, wholesale, or mobile. FTTH, FTTB, FTTb, FTTC, and FTTc are typically the target FTTP deployment scenarios to be considered within our offer.

Figure 2. FTTx Network Architecture



Major Applications

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, growth in video traffic at home and at work, along with increases in cloud-based computing delivered across multiple, varied devices, is pushing both fixed and mobile operators across developed and emerging markets to roll-out FTTP services.

Residential Services

The Cisco ME4600 Series ONT supports residential broadband access for delivering multiplay services over optical fiber access networks. Cisco ME 4600 Series ONTs offer 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 ONT supports a variety of broadband video applications, including RF overlay, IPTV, and video on demand (VoD). It also supports IP multicast (Internet Group Management Protocol Versions 2 and 3 [IGMPv2/v3] and Multicast Listener Discovery Version 2 [MLDv2]) and includes Dynamic Host Configuration Protocol (DHCP) features that enhance and extend the Cisco IP Next-Generation Network (NGN) architecture to the residential environment.

Business Services

The Cisco ME 4600 Series ONT is built to meet service provider requirements for Carrier Ethernet access and transparent LAN services. The Cisco ME 4600 Series ONT offers service flexibility, delivering Layer 2 transport for advanced Layer 2 and Layer 3 VPN and business services. These services include Circuit Emulation Services (CES) to transport TDM traffic over packet networks with appropriate clocking, synchronization, and timing features. VLAN translation and promotion features with QoS support the functions required to interconnect business branches over P2P or P2MP network topologies.

Mobile Backhaul Services

Due to greater demand for bitrate 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 an access platform for mobile backhaul, the Cisco ME 4600 Series ONT can aggregate cell sites and serve as a transport solution for Radio Access Network (RAN) backhaul traffic. The Cisco ME 4600 Series ONT provides the timing services required in today's converged access networks by offering integrated support for Synchronous Ethernet (SyncE) and IEEE-1588 functions.

Cisco ME 4600 Series ONT Solutions

Cisco ME 4600 Series ONT Bridging Devices

These simple Layer 2 bridging devices are highly suitable for low-cost GPON deployments offering the opportunity to deliver reliable service using a third-party gateway (FTTH scenario) or even delivering a suitable network termination point for mobile backhaul (FTTc scenario).

Cisco ME 4600 Series ONT Gateway Devices

This equipment, with Layer 2 and Layer 3 gateway features, is the choice for full in-house multiplay services, including voice, video, and data, and it is designed for FTTH applications. Deployment of Wi-Fi 802.11 b/g/n is also possible through this all-in-one ONT solution. The equipment supports both GPON and Gigabit Ethernet as uplink and has built-in routing features that avoid the need for an external third-party gateway.

Cisco ME 4600 Series ONT Primary Benefits

- Evolution of the broadband access paradigm from a few megabits per second up to gigabit-per-second downstream and upstream data rates
- Multiplay service is supported, including HSI, VoIP, and TV (IPTV and RF overlay)
- GPON and Gigabit Ethernet support (on ONT-RGW only)
- Cost-efficient Wi-Fi 802.11 (b/g/n) hotspot equipment
- BBF.247 (multivendor OLT interoperability) certified
- Mass remote management through OMCI (G.984.4 and G.988) and TR-069 standards, thus offering full zero-touch remote control without user intervention
- Reliable, durable equipment with several indoor and outdoor mounting options
- Easy-to-use ONT configuration providing significant operating expenses (OpEx) savings

Cisco ME 4600 Series ONT Hardware Components

The Cisco ME 4600 ONT and ONU platforms include the following models:

- Cisco ME 4600 Series ONT SFU (single-family unit)
- Cisco ME 4600 Series ONT RGW (residential gateway)

Table 1 lists the hardware components available for the Cisco ME 4600 Series ONT portfolio.

Table 1. Cisco ME 4600 ONT Hardware Parts

Part Number	Description
ONTs	
ME4601-ONT-SFU	Cisco ME4600 Indoor SFU ONT with 1xFE/GE
ME4601-ONT-SFU-RF	Cisco ME4600 Indoor SFU ONT with 1xFE/GE, 1xRF
ME4624-ONT-RGW	Cisco ME4600 Indoor RGW ONT with 2xPOTS FXS, 4xFE/GE, 2xUSB, Wi-Fi 802.11 b/g/n 2.4GHz (2x2)
ME4624-ONT-RGW-RF	Cisco ME4600 Indoor RGW ONT with 2xPOTS FXS, 4xFE/GE, 2xUSB, Wi-Fi 802.11 b/g/n 2.4GHz (2x2), 1xRF

Cisco ME 4600 Series ONT Features

Tables 2 through 5 list the features of Cisco ME 4600 Series products.

Table 2. Cisco ME 4600 Series ONT Generic Features

Features	ONT-SFU	ONT-RGW
GPON **Single-mode optical fiber cable (SC/APC connector)**	1x	1x
Ethernet 10/100/1000Base-T **Direct or crossover AUTO-MDIX UTP CAT5E cable (RJ45)**	1x	4x
FXS ports **Voice or fax RJ11 connector**	-	2x
Video RF connector F type	1x (optional)	1x (optional)
USB ports	No	2 x USB 2.0
Wi-Fi (802.11b/g/n)	No	Yes
On and off button	No	Yes
Reset button	No	Yes
Primary power connection (VDC)	12 (± 15%)	12 (± 15%)
Primary power connection (VAC)	90-230 (50/60Hz)	90-230 (50/60Hz)
Power supply (W)	8.4 (model B) 7 (model D/E)	15
MTBF (h)	200000	190000
Size	210 x 210 x 40 mm	210 x 210 x 40 mm
Temperature	-5 to 45°C	-5 to 45°C
Humidity	5 to 95%	5 to 95%

Table 3. Cisco ME 4600 Series ONT Voice Features

Items	State	Description
Pulse dialing	Pulse frequency: 10 Hz (8 Hz to 12 Hz) Pulse relation: 66,6% (33% to 75%) Interdigital pause and predialing: 400 ms (min)	-
DTMF	-	According to ETSI CTR 21 [1]
Clip	-	According to ETSI 300 659-1
Clip on call waiting	-	According to ETSI 300 659-2
DC voltage	-48V (-46 to -54)	-
Loop current characteristics	20mA (min) to 60mA (max)	-
Ifeed maximum	45mA	-
Impedance and transmission requirements (Ω)	Q.552 [4] (11/96) of ITU-T 220Ω+820Ω//115nF	A telephone that complies with transmission requirements defined in CTR 38, should comply with SLR, RLR, and STMR (4.2.2.1, 4.2.2.2 and 4.2.3) standard requirements, when connected to an FXS interface.
ILA	20 - 45 mA	5-bit parameter that sets the current limit for DC feed (DC feed and battery switch are programmed and calibrated to ILA=26mA, VOC=48V, VAS=3V, bshv=5V).
Ringer voltage	DC offset: 48V AC voltage: 75Vrms +/- 0.5% Frequency: 25Hz +/- 3%	-
Ringing signal	Normal ringing	1 sec ring, 5 sec pause (interval = 6 sec)

Items	State	Description	
Hook flash	On-hook - register recall/hook Flash	100 msec	Minimum time of recognition of “On-hook” when hook-flash feature does not exist
	On-hook - register recall/hook flash	1000 msec	Minimum time “on-hook” recognition when hook-flash feature does exist
	Off-hook	40 msec	Minimum time “off-hook” recognition
	Interval	160msec - 400msec	Time calibrated break pulse duration for register recall recognition

Table 4. Cisco ME 4600 Series ONT Wi-Fi Features

Items	Compliance	Description
	IEEE 802.11 b/g/n	-
Bit rates	802.11 b/g	1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps
	802.11 n	Up to 300 Mbps over two spatial streams
SSID	-	Up to 8
Frequencies of operation	-	2.4GHz (ISM)
Channels	-	20 MHz and 40 MHz channels
MIMO	-	2 x 2
MCS	-	Supported values: 0-15 and 32
Wireless security	WEP	40-bit secure key and 24-bit as defined in 802.11-2007
	WPA	
	WPA2	
	AES	Encryption and de-encryption coupled to TKIP (as defined in 802.11-2007 and 802.1X)
Short guard interval	SGI support	-
Space-time block coding	STBC support	-
Transmit power	-	Up to +18dBm
Receive sensitivity	Mode b (8% PER)	1 Mbps: -96dBm 11 Mbps: -88dBm
	Mode g (10% PER)	6 Mbps: -90dBm 12 Mbps: -89dBm 54 Mbps: -75dBm
	Mode n/2.4GHz (10% PER)	1 Mbps: -96dBm 54 Mbps: -75dBm M0/20 MHz: -86 dBm M0/40 MHz: -83 dBm M15/20 MHz: -69 dBm M15/40 MHz: -69 dBm

Cisco ME 4600 Series ONT Standards, Protocols, and Compliance

Table 5 lists the standards and protocols that apply to the Cisco ME 4600 Series ONT portfolio.

Table 5. Standards and Protocols

Type	Standards
PON layer	• ITU-T Recommendation G.984.x (GPON) • ITU-T Recommendation G.988 (OMCI) • BBF.247 - GPON certification program OLT interoperability • BBF TR.156 - Using GPON in the context of TR.101 • Advanced Encryption Standard (AES) • Forward Error Correction (FEC) • Class B+ optics (28dB)

Type	Standards
	• T-CONTs: 32 • GEM Port-IDs: 255; • Logical Range: 60 km • Maximum Differential Distance: 20 km
Layer 2 and Layer 3	• Services: 1:1, N:1 (TR-156i3) • Transparent LAN services • Classification: DSCP/TOS, 802.1p TCI, VLAN-ID, MAC address • Traffic management: ◦ Up to 8 queues per T-CONT in priority-controlled mode ◦ Up to 16 queues per T-CONT in rate-controlled scheduling mode • IEEE 802.1Q VLAN tagging, removing tag, replacing tag or transparent forwarding • Network Access Translation (NAT) • Network Access Port Translation (NAPT) • Firewall • VPN • DHCP client and server • PPPoE client • Performance: 1000 Mbps bidirectional • Per-port QoS and CoS mapping according to IEEE 802.1q and IEEE 802.1p • IEEE 802.1 x authentication • IEEE 802.1 ad Q-in-Q y VLAN stacking • IEEE 802.1v VLAN by protocol/by port • IEEE 802.3x flow control • IGMP v2 (RFC2236), IGMP v3 (RFC 3376) • MLDv2 for IPv6 (RFC 3810), • IGMP v1/v2/v3 snooping and proxy • IGMP processing per VLAN ID to support group of channels • IPTV streams forwarding simultaneous: 128 • IPTV prioritization with QoS using 802.1p
Voice over IP	• Call control: SIPv1/v2 • T.38 fax relay • Fax or data bypass • Echo canceller • Jitter buffer • Caller ID generation • G.711 PCMU; G.711 PCMA; G.723.1; G.726; G.729; • VAD and CNG • Caller ID and call waiting • RTP/RTCP packet encapsulation • RFC 2833 support • In-band signaling detection and generation (DTMF, call progress tones) • Automatic tone generation (dial, busy, ring back, stutter, distinctive ring) • 3-way conferencing
RF video overlay	• 1 port on an F connector • 75 ohms impedance (nominal) • RF overlay: 1550nm, -8dBm < Pin < +2dBm • Analog bandwidth: minimum 47 MHz and maximum 862 MHz
Management	• Command-line interface (CLI) • Web GUI • Remote management over the OMCI, PLOAM, OAM, and TR-069, TR-104, TR-111, and TR-142 • Secure software download upgrade using OMCI or TR-069 • Embedded Telnet server for remote management

Table 6 lists the safety and compliance standards that apply to the Cisco ME 4600 Series ONT portfolio.

Table 6. Safety and Compliance

EMC	**Standards**	EMC Directive 89/336/EEC, EMC Addendum Directive 92/31/EEC, EMC Addendum Directive 91/263/EEC (Telecommunications Terminal Equipment Directive)
	Emissions	EN50081-1, EN55022
	Immunity	EN50082-1, EN61000-4-2, EN61000-4-3, EN61000-4-4
Operating limits	**Temperature**	EN300019
	Relative humidity, maximum	EN300019
Environmental standards	**Acoustic noise**	ISO 3743 (<45dBa)
Power and grounding		ETSI EN 300 132-2 V2.1.1 (2003-01)
		ETSI ETS 300 253: January 1995
Energy consumption		European Code of Conduct on Energy Consumption of Broadband Equipment V3
Safety and protection		EN/IEC 60950-1
Mechanical resistance		EN300019
Quality		CE - Conformité Européenne
		RoHS 2002/95/EC Directive Compliance
Certification		BBF.247 G-PON

Service and Support

Cisco offers a wide range of services programs to help accelerate customer success. These innovative services 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 7 are available as part of the Cisco Carrier Ethernet Switching Service and Support solution directly from Cisco and through resellers.

Table 7. Service and Support

Advanced Services	Features	Benefits
Cisco Total Implementation Solutions (TIS), available directly from Cisco **Cisco Packaged TIS, available through resellers**	• Project management • Design Documentation creation • Site survey and product staging • Node and network configuration, and deployment • Installation, test, and cutover • Training • Major moves, adds, and changes	• Supplement existing staff • Implementation by trained Cisco resources, Cisco partner resources, or both • Faster time to market • Help ensure functions meet needs • Mitigate risk
Cisco Network Optimization Service (NOS)	Provides lifecycle support for ongoing network planning and growth • Remote change support • Design support • Software strategy • Network health checks • Continuous learning	• Provide ongoing support for your network operations from Cisco consulting engineers • Supplement existing staff

Advanced Services	Features	Benefits
Cisco Service Provider 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 • Reduce total cost of ownership by taking advantage of Cisco expertise and knowledge • Decrease network downtime

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