

FTTx System Overview

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Objectives

- Upon completion of this course, you will be able to:
 - ▣ Describe the components of the FTTx network.
 - ▣ Analyze the hardware structure and module functions of FTTx network devices.
 - ▣ Describe the application scenarios of the FTTx network.



Contents

1. FTTx Network Overview
2. Introduction to Auxiliary Devices of the FTTx Solution

FTTx Network Overview

- The FTTx solution is based on the T-bit optical access platform and is a unified access solution for the all-IP network architecture and full-service operation.
- The FTTx solution covers FTTH, FTTB, FTTC, and FTTO scenarios. It also provides high-bandwidth, high-reliability, and secure full-service access for scenarios including base station private line access.

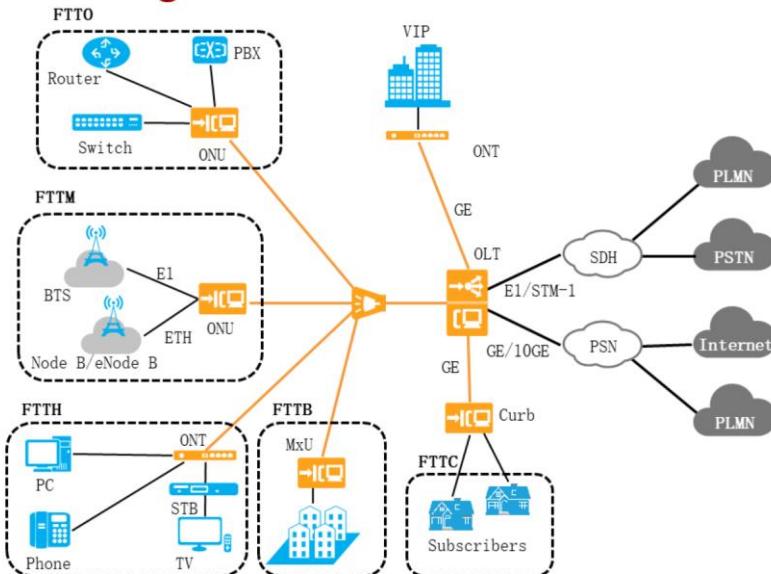
- FTTH: fiber to the home
- FTTB: fiber to the building/curb
- FTTC: fiber to the curb
- FTTO: fiber to the office
- FTTM: fiber to the mobility base station

FTTx Network - Main Services

- The FTTx solution provides multi-service access for different scenarios, including high-bandwidth IPTV services, access to open access networks in wholesale mode, high-speed Internet access, base station private line access, enterprise private line access, and enterprise self-owned service access.
- Main services provided by the FTTx solution
 - 50 M@HDTV service
 - Open access
 - Enterprise access service
 - Base station private line access
 - Enterprise self-owned service access

- 50 M@HDTV service
 - High definition television (HDTV) : The HDTV program resolution can reach 1920 x 1080. Generally, the MPEG2-TS, WMV-HD, and H.264 algorithms are used to compress and transmit data. Different encoding technologies vary greatly in compression ratio and image quality. HDTV services with high resolution and high bandwidth are the most important services for mainstream carriers in network construction and market promotion.
 - The optical access network based on GPON lays a foundation for high-bandwidth access of subscribers. In the FTTH network construction mode, the split ratio of 1:64 is usually adopted. The average downstream bandwidth of each subscriber can reach 40 Mbps. Therefore, the average downstream bandwidth can be increased from 2 Mbps to 30 Mbps or 50 Mbps. The OLT provides 20 Gbps bandwidth for each slot to ensure that services on the VDSL2 board and 8GPON service board are forwarded without converging. The MA5680T/MA5683T uses the Access Node Control Protocol (ANCP) to interwork with the policy server of a carrier to implement video bandwidth control for subscribers. In this way, subscriber video bandwidth can be adjusted in real time based on service requirements, improving the subscriber experience.

FTTx Network - Application Scenario Networking



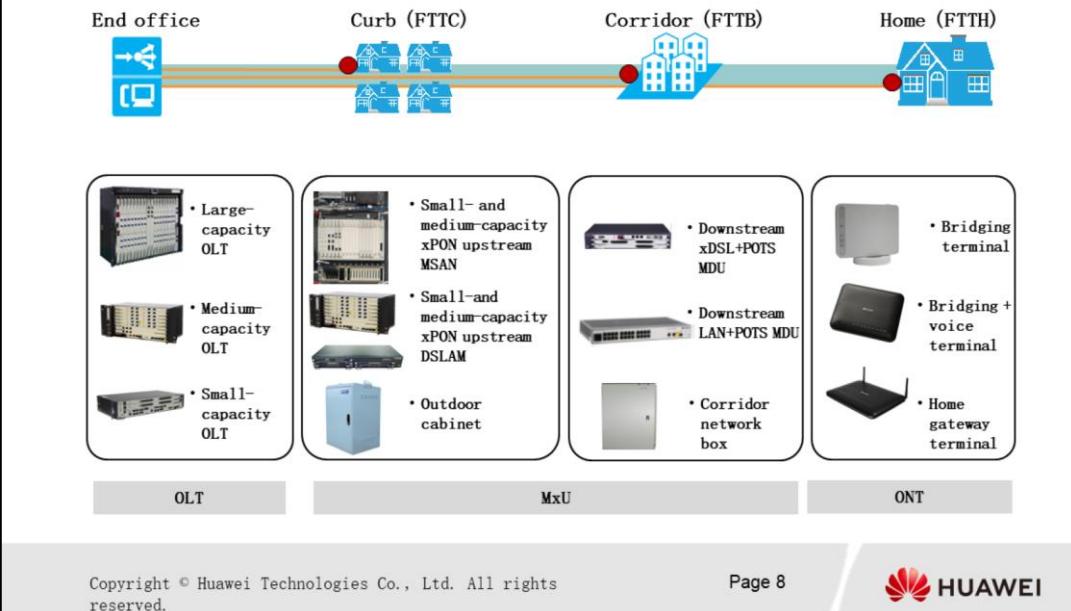
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- In the FTx network application scenarios, the access modes include FTTH, FTTB, FTTC, FTTM, and FTTO. In these access scenarios, ONUs/ONT are connected to optical splitters and then to the OLT through optical fibers. The optical fibers and optical splitters belong to the ODN. The OLT is connected upstream to the aggregation switch through the IP network for upstream transmission.
 - Fiber To The Home (FTTH):** Applicable to high-end individual subscribers in new or high-end residential buildings to provide high-speed access to video, voice, and data services. It breaks the bottleneck and contradiction of traditional access rate and distance.
 - Fiber To The Building/Curb (FTTB/C):** The former is applicable to apartments or office buildings with medium and high density population. The latter applies to scattered apartment buildings and industrial parks. In old urban area reconstruction projects, the MDU can be used to provide the ADSL2+ or VDSL2 access service to subscribers at a rate of 2 - 20 Mbps. In this scenario, optical fibers only need to reach buildings or FDTs at curbs. Existing copper cable resources can be reused at the subscriber access side to reduce the device investment.
 - Fiber To The Office (FTTO):** Applicable to commercial subscribers or government offices such as governments, banks, and hospitals. SBUs are used to provide E1/GE/FE/POTS interfaces to meet office requirements.
 - Fiber To The Mobility Base Station (FTTM):** Applicable to service backhaul scenarios of the 2G/3G/LTE mobile base stations. The CBU is used to provide FE/E1 interfaces to meet the mobile backhaul requirements in various scenarios.

FTTx Network - Device Type



- FTTx networking solutions include FTTC, FTTB, FTTH, FTTO, and FTTM. There are various types of devices, including optical line terminals (OLTs) and optical network units (ONUs). ONUs can be further classified into different types according to the application scenarios.
- The figure shows 3 access scenarios: FTTC, FTTB, FTTH, and various devices at the CO side. Huawei provides a complete product family to meet carriers' requirements for FTTx network construction.
- The full series of xPON products include ONTs, MxUs, ONTs, MSANs, DSLAMs, and complete auxiliary products, meeting carriers' diversified requirements for fiber-in and copper-out construction. In addition, all xPON products can be centrally managed by the iManager U2000.
 - OLT: optical line terminal
 - ONT: optical network terminal
 - ONU: optical network unit
 - MSAN: multi-service access node
 - DSLAM: digital subscriber line access multiplexer
 - PON: passive optical network



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1. FTTx Network Overview
2. Introduction to Auxiliary Devices of the FTTx Solution
 - OLT
 - MxU
 - ONT

Device Composition

- The FTTx solution mainly consists of the OLT, MxU,

Type	Device	Application Scenario
OLT	EA5800/MA5800/MA5680T/MA5683T/MA5608T	All scenarios
MxU	MA5620/MA5626, MA5622A/MA5623, MA5623A, MA5612A, MA5616, MA5652	FTTB/FTTC
	MA5612, MA5628	FTTO/FTTM
	MA5631/MA5632	Broadcasting and TV access (CO)
	HG7022/HG7042/HG7042T	Broadcasting and TV access (terminal)
ONT	MA5621/MA5621A, MA5626	Power network
	Bridging ONT	FTTH
	Bridging + voice ONT	
ONT	Gateway ONT	FTTH
	HG8010	
	HG8110, HG8240, HG8242, HG8240B	
	HG8240R, HG8245, HG8247, HG8447, HG8245T, HG8247T	

MA5800/EA5800 Product Family



- 21/19 inch subrack, 300 mm deep, 11 U high
- 2 main control slots, 17/15 service slots, and 2 DC power inputs



- 19-inch subrack, 300 mm deep, 6 U high
- 2 main control slots, 7 service slots, and 2 DC power inputs



- 19-inch subrack, 300 mm deep, 2 U high
- 2 main control slots and 2 service slots
- 2 DC power inputs/1 AC input

Large bandwidth

- Slot bandwidth: 200 Gbps; 4K ready
- Upstream bandwidth: 100GE/10GE/GE
- Service board: PON, 10G PON, 40G PON, WDM-PON, P2P

Large capacity

- 17 K FTTH subscribers, 64 K D-CMTS subscribers, expandable
- 256 K MAC, 64 K routing table, expandable

High reliability

- Redundancy design for control boards, power modules, and fans
- Separate forwarding and control design, supporting hitless upgrade

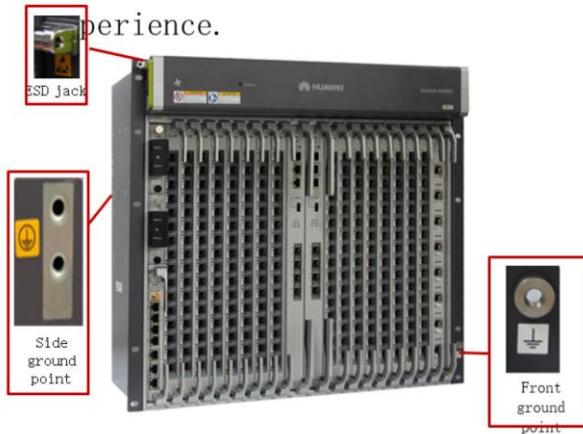
Intelligent

- Distributed programmable NP architecture, fast deployment of new services
- Virtual AN, multi-service/multi-RSP differentiated operation
- Massive ONU aggregation management, improving QoS efficiency

- There are 3 types of MA5800/EA5800 products: MA5800/EA5800-X17/X15, MA5800/EA5800-X7, and X2.
- The products feature large broadband, large capacity, high reliability, and intelligent operations, and can provide high-density ultra-broadband access.
- The same service board can be used on 3 different types of OLTs. The same control board can be used only on the X17 and X7.
- The EA5800 series products are dedicated enterprise OLTs which work with enterprise ONUs/ONTs.

Introduction to the MA5800/EA5800-X17 Service Subrack (1)

- Provides subscribers with a larger broadband, wider coverage, and more intelligent access service



- One fan tray at the top
- 22 slots in total
- Physical dimensions with mounting ears: 535 mm x 287 mm x 486 mm
- Physical dimensions without mounting ears: 493 mm x 287 mm x 486 mm

- An MA5800/EA5800-X17 subrack can be fixed in a cabinet by mounting ears. It provides 22 slots and has a fan on the top.
- The ESD jack of the MA5800/EA5800-X17 service subrack is located on the left side of the fan tray. It is used to connect the ESD wrist strap to prevent the ESD from damaging devices.
- There are 2 ground points on the MA5800/EA5800-X17 service subrack, one on the side of the subrack and the other under the right mounting ear.
- The power input end of the MA5800/EA5800-X17 service subrack is connected with a noise filter. The central ground point is directly connected to the service subrack, which is called the enclosure ground point (that is, the protection ground). The enclosure must be grounded properly so that induction and leakage can safely flow into the ground to improve the anti-electromagnetic interference capability of the entire system.
- Use a ground cable to connect the ground point of the service subrack to the ground bar of the equipment room or ground. It is recommended that the ground resistance of the equipment room be less than 10 ohms. In addition, refer to the related national and local regulations.

Introduction to the MA5800/EA5800-X17 Service Subrack (2)

- One MA5800/EA5800-X17 service subrack provides 22 slots, including 2 control board slots, 2 power board slots, 1 universal interface board slot, and 17 service board slots.

		Fan tray																		
20 Power board	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
21 Power board	Service board	Control board	Control board	Service board																
0 Universa l interfac e board	Service board	Control board	Control board	Service board																

- Control boards:
 - Slots 9 and 10 must be configured with control boards of the same type.
- Service boards:
 - Slots 1 - 8 and 11 - 19
 - Supports mixed configuration of different service boards.
 - Supports mixed configuration of upstream interface boards, but it is recommended that upstream interface boards of the same type be used.
 - Both control boards and the upstream interface boards can be used for upstream data transmission. It is recommended that control boards be used for upstream transmission.
- Universal interface board (GPIO slot):
 - Slot 0
- Power board:
 - Slots 21 and 22

Introduction to the MA5800/EA5800-X15 Service Subrack

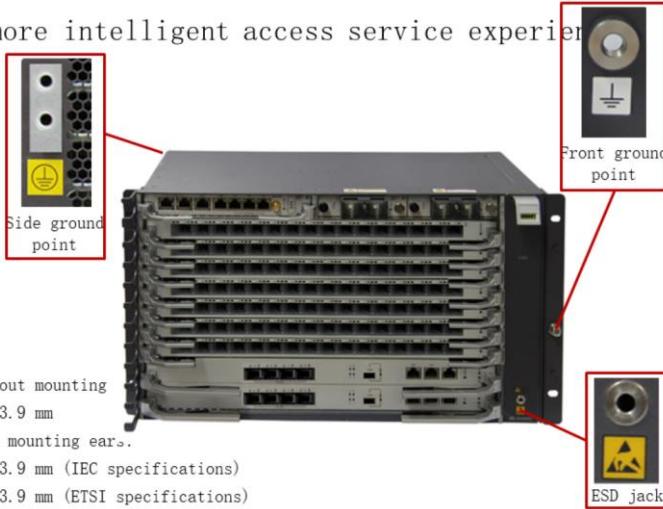
- One MA5800/EA5800-X15 service subrack provides 20 slots, including 2 control board slots, 2 power board slots, 1 universal interface board slot, and 15 service board slots.

Fan tray																		
18 Power board	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
19 Power board	Service board	Service board	Service board	Service board	Service board	Service board	Control board	Control board	Service board									
0 Universal interface board																		

- Control boards:
 - Slots 8 and 9 must be configured with control boards of the same type.
- Service boards:
 - Slots 1 - 7 and 10 - 17
 - Supports mixed configuration of different service boards.
 - Supports mixed configuration of upstream interface boards, but it is recommended that upstream interface boards of the same type be used.
 - Both control boards and the upstream interface boards can be used for upstream data transmission. It is recommended that control boards be used for upstream transmission.
- Universal interface board (GPIO slot):
 - Slot 0
- Power board:
 - Slots 18 and 19

Introduction to the MA5800/EA5800-X7 Service Subrack (1)

- Provides subscribers with a larger broadband, wider coverage, and more intelligent access service experience.



- The ESD jack of the MA5800/EA5800-X7 service subrack is located at the bottom of the fan tray. It is used to connect the ESD wrist strap to prevent the ESD from damaging devices.
- There are 2 ground points on the MA5800/EA5800-X7 service subrack, one on the left side of the subrack and the other in the middle of the right mounting ear. The power input end of the MA5800/EA5800-X7 service subrack is connected with a noise filter. The central ground point is directly connected to the service subrack, which is called the enclosure ground point (that is, the protection ground). The enclosure must be grounded properly so that induction and leakage can safely flow into the ground to improve the anti-electromagnetic interference capability of the entire system. Use a ground cable to connect the ground point of the service subrack to the ground bar of the equipment room or ground. It is recommended that the ground resistance of the equipment room be less than 10 ohms. In addition, refer to the related national and local regulations.

Introduction to the MA5800/EA5800-X7 Service Subrack (2)

- One MA5800/EA5800-X7 service subrack provides 12 slots, including 2 control board slots, 2 power board slots, 1 universal interface board slot (GPIO), and 7 service board

slots.	0 Universal interface board	10 Power board	11 Power board	
1			Service board	
2			Service board	
3			Service board	
4			Service board	
5			Service board	
6			Service board	
7			Service board	
8			Control board	
9			Control board	

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- Control boards:
 - Slots 8 and 9 must be configured with control boards of the same type.
- Service boards:
 - Slot 1 - 7
 - Supports mixed configuration of different service boards.
- Universal interface board (GPIO slot):
 - Slot 0
- Power board:
 - Slots 10 and 11

Introduction to the MA5800/EA5800-X2 Service Subrack (1)

- MA5800/EA5800-X2 is a small-capacity service subrack.



- The MA5800/EA5800-X2 service subrack is 2 U high and 19-inch wide. The fan tray is located on the right side of the service subrack and is fixed in the cabinet by mounting ears.

Introduction to the MA5800/EA5800-X2 Service Subrack (2)

- One MA5800/EA5800-X2 service subrack provides 5 slots, including 2 control board slots, 1 power board slot, and 2 service board slots.

3 Control board	4 Control board	0 Power board	Fan board
1		Service board	
2		Service board	

Slot Classification	Slot No.	Configurable Board	Remarks
Control board slot	3, 4	Control board	The 2 slots must be configured with the same control board in backup mode.
Power board slot	0	Power board	-
Service board slot	1, 2	<ul style="list-style-type: none">Upstream interface boardService board	Supports mixed configuration of different service boards.

OLT Product Specifications

MA5680T



Large specifications (maximum number of ports supported by 1 subrack) :

- EPON access: 128
- GPON access: 256
- 10G GPON access: 64
- P2P FE/GE access: 768

MA5683T



Medium specifications (maximum number of ports supported by 1 subrack) :

- EPON access: 48
- GPON access: 96
- 10G GPON access: 24
- P2P FE/GE access: 288

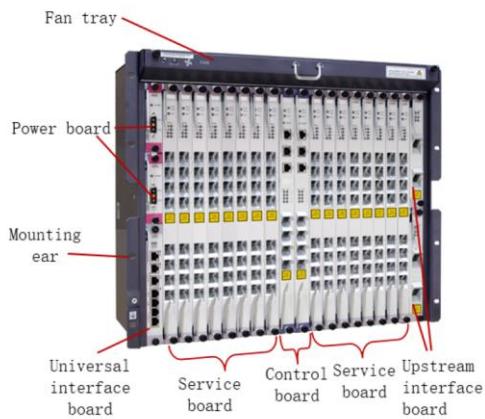
The MA5680T and MA5683T use the same software and hardware platform, reducing O&M costs.

- In the FTTx solution:
 - The MA5680T/MA5683T can function as the OLT in the GPON/EPON system to work with ONTs (ONUs) to bear multiple services.
 - The MA5680T/MA5683T supports broadband access services such as P2P FE/GE optical access. It works with the ONTs to provide point-to-point FTTH access for subscribers.
- As an OLT, the MA5680T/MA5683T is the core component of the FTTx solution and has the following features:
 - Provides excellent management, maintenance, and monitoring functions to facilitate routine management and fault diagnosis.
 - Provides carrier-class reliability. The product reliability is considered in the system design, hardware design, and software design to ensure the normal operation of the product.
 - Provides various types upstream interfaces, service interfaces, and maintenance interfaces to adapt to different networking environments.
 - Provides powerful QoS capability to facilitate the management of various services.
 - Provides comprehensive security solutions for system security, subscriber security, and operation and maintenance (O&M) security.
 - Supports flexible networking. As a multi-service access platform, the product provides multiple access modes and supports multiple networking modes to meet the networking requirements of different environments and services.

Introduction to the MA5680T Service Subrack (1)

- The 21-inch ETSI service subrack is the mainstream application.
 - 23 slots
 - One fan tray at the top
 - Service subracks fixed in a cabinet by mounting ears

Project	Value
W x D x H	530 mm x 275.8 mm x 447.2 mm
W x D x H (Without mounting ears)	490 mm x 275.8 mm x 447.2 mm
Weight	33 kg



- ETSI: European Telecommunications Standards Institute

Introduction to the MA5680T Service Subrack (2)

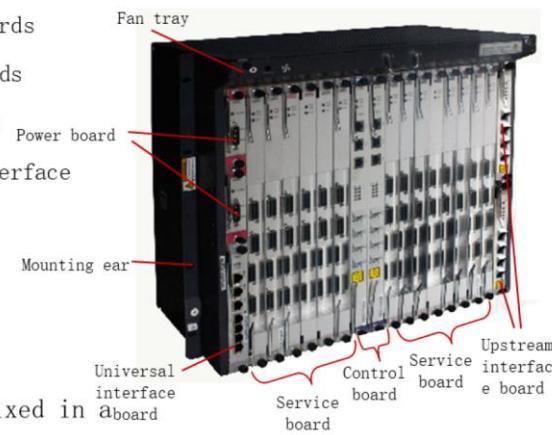
- The ETSI service subrack provides 23 slots, including 16 service board slots, 2 control board slots, 2 power board slots, 1 universal interface board slot, and 2 upstream

Fan tray																		
interface board slots.																		
21 Power board	1 Service board	2 Service board	3 Service board	4 Service board	5 Service board	6 Service board	7 Service board	8 Service board	9 Control board	10 Control board	11 Service board	12 Service board	13 Service board	14 Service board	15 Service board	16 Service board	17 Service board	18 Service board
22 Power board																		GIU
0 GPIO																		20 GIU

- Control board slots: Slots 9, 10 must be configured with control boards of the same type.
- Upstream interface board slots (GIU): Slots 19 and 20 support mixed configuration of different upstream interface boards. It is recommended that upstream interface boards of the same type be configured.
- Power board slots: It is recommended that slots 21 and 22 be configured with power boards of the same type.
- Universal interface board slot (GPIO): 0
- Service board slots: Slots 1 - 8 and 11 - 18 support mixed configuration of different service boards. It is recommended that xPON boards be configured from left to right and other types of boards be configured from right to left.

Introduction to the MA5680T Service Subrack (3)

- Compared with the ETSI service subrack, the 19-inch IEC service subrack has 2 fewer service slots. There are 21 slots in total.
 - 14 slots for service boards
 - 2 slots for control boards
 - 2 slots for power boards
 - 1 slot for universal interface board
 - 2 slots for upstream interface boards
- One fan tray at the top.
- The service subrack is fixed in a cabinet by mounting ears.



- IEC: International Electrotechnical Commission

Introduction to the MA5683T Service Subrack (1)

- The MA5683T service subrack provides an integrated GPON/EPON/10GPON optical access platform to support high-speed and high-bandwidth voice, data, and video services.
- The MA5683T service subrack is 6 U high and has a fan tray and an air filter on the left.



- The MA5683T supports the H801MAB0 and H802MAB0 backplanes.
- Chassis ventilation process: Cold air enters from the left side of the chassis, is blown towards the boards to the right side, and exhausts from the right side of the chassis.
- The air filter is installed in the left part of the MA5683T chassis and inserted into a slot on the left of the fan tray. When cold air is sucked in from the left side of the chassis by the fan tray, the air filter can effectively filter out dust particles in the air.

Introduction to the MA5683T Service Subrack (2)

- The MA5683T service subrack provides 13 slots:

- 6 slots for service boards
- 2 slots for control boards
- 2 slots for power boards
- 1 slot for universal interface board
- 2 slots for upstream interface boards

Fan tray	0	Service board	
	1	Service board	
	2	Service board	
	3	Service board	
	4	Service board	
	5	Service board	
	6	Control board	
	7	Control board	
	8	GIU	9 GIU
	10 Power supply	11 Power supply	12 GPIO

- Control board slots: Slots 6 and 7 must be configured with control boards of the same type.
- Upstream interface board slots (GIU): Slots 8 and 9 support mixed configuration of different upstream interface boards. It is recommended that upstream interface boards of the same type be configured.
- Power board slots: It is recommended that slots 10 and 11 be configured with power boards of the same type.
- Universal interface board slot (GPIO): 12
- Service board slots: Slots 0 - 5 supports mixed configuration of different service boards.

Introduction to the MA5608T Service Subrack (1)

- The MA5608T service subrack provides an integrated GPON/EPON/10GPON optical access platform to support high-speed and high-bandwidth voice, data, and video services.
- The MA5608T service subrack is 2 U high and has a fan tray and an air filter on the left.



- The MA5608T supports the H801MABR backplane. When the MA5608T is configured in a cabinet, a cable manager must be configured under the MA5608T.
- There is a fan tray on the left side of the MA5608T, which dissipates heat through air blowing.
- Chassis ventilation process: Cold air enters from the left side of the chassis, is blown towards the boards to the right side, and exhausts from the right side of the chassis.

Introduction to the MA5608T Service Subrack (2)

- The MA5608T service subrack provides 5 slots:
 - 2 slots for service boards
 - 2 slots for control boards
 - 1 slot for power board

Fan tray	0	Service board		
	1	Service board		
	2 Control board	3 Control board	4 Power board	

- Main control board (SCU):
 - Slots 2 and 3 must be configured with control boards of the same type.
- Power board:
 - Slot 4
- Service boards:
 - Slot 0 - 1 support mixed configuration of different service boards



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Typical MxU Models

FTTC/B+DSL	 MA5818 <ul style="list-style-type: none">• 192VD+Vectoring• Supports 10G PON.	 MA5616 <ul style="list-style-type: none">• 256POTS/256AD/192V D/64SHDSL/32ISDN	 MA5622A 24/16VD+24/16POTS COMBO <ul style="list-style-type: none">• Supports Vectoring.	
FTTB+LAN	 MA5620/5626 <ul style="list-style-type: none">• 8/16/24FE (MA5626)• 8/16/24FE+8/16/24POTS (MA5620)	 EA5821 forward PoE <ul style="list-style-type: none">• 24GE+PoE• 10G GPON	 MA5626 forward PoE <ul style="list-style-type: none">• 8/16/24 FE• 4GE+4FE AC/DC	 MA5820 series 10G PON <ul style="list-style-type: none">• 16/24FE and 24GE (MA5821)• 16/24FE+8/16/24POTS (MA5822)
Cable and power grid access	 MA5633 (D-CMTS) <ul style="list-style-type: none">• Downstream: 1 - 16 frequency points• Upstream 1 - 4 frequency points	 MA5632 (EOC) <ul style="list-style-type: none">• 64 - 128 EOC	 MA5621 (power distribution network) <ul style="list-style-type: none">• 4*GE+4 serial ports• Operating temperature: -40°C to +85°C	 MA5621A (centralized meter reading) <ul style="list-style-type: none">• 4*FE+2 serial ports

Introduction to the MA5818 (1)

- The SmartAX MA5818 multi-service access device (MA5818 for short) is a 2 U high and 19-inch wide product that supports flexible card plug-in. It has 4 service slots and can be flexibly configured.
- The MA5818 can be used in FTTC/FTTB, mini DSLAM, or mini MSAN construction scenarios. It can be installed in corridors or cabinets in indoor and outdoor application scenarios.
- The MA5818 provides UNI interfaces such as ADSL2+, VDSL2, SHDSL, POTS, FE, P2P, ISDN, and Combo, and provides dual GPON/EPON/GE auto-sensing NNI interfaces.

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- The MA5818 provides UNI interfaces such as ADSL2+, VDSL2, SHDSL, POTS, FE, P2P, ISDN, and Combo, and provides dual GPON/EPON/GE auto-sensing NNI interfaces.

Introduction to the MA5818 (2)



Control board	CCUE
Broadband service	16/24/32/48/64VDSL2
Narrowband service	8/32/64 POTS ports
Ethernet service	16FE
Power supply mode	AC power supply/DC power supply/AC power supply + battery

- The MA5818 provides the vectoring feature to support VDSL2 acceleration. Subscribers can access the network at a higher speed and enjoy richer services and better subscriber experience through VDSL2 lines.
- IPv6: Compared with IPv4, IPv6 has a simplified packet header format, sufficient address space, hierarchical address structure, flexible extension header, and enhanced neighbor discovery mechanism.
- Combo card design: This feature helps carriers reduce construction costs, save deployment space, reduce cable connection time and MDF occupation, and reduce maintenance costs.
- Comprehensive QoS capabilities:
- Supports bidirectional rate limiting based on subscriber ports and traffic shaping for queue groups at the port level.
- Supports WRED profiles and the binding of queues and WRED profiles.
- Supports priority marking based on the access control list (ACL).
- Upstream and downstream services can be mapped to different priority queues based on priority tags and scheduled accordingly.
- Supports 3 scheduling modes: priority queuing (PQ), weighted round robin (WRR), and PQ+WRR.
- Excellent maintenance and management functions:
- Supports service pre-deployment and plug-and-play.
- Supports remote fault locating, troubleshooting, and batch upgrade.

Introduction to the MA5821/MA5822

MA5822



8 FE+8 POTS ports



16 FE+16 POTS ports



24 FE+24 POTS ports

MA5821



8 FE ports



16 FE ports



24 FE ports



24 GE ports

- The SmartAX MA5821/MA5822 (MA5821/MA5822 for short) is a remote ONU launched by Huawei.
- The MA5821/MA5822 is mainly used in the FTTB or FTTC construction scenario. The MA5821 can also be used in video surveillance scenarios.
- The MA5821/MA5822 provides 1 SFP upstream optical port which supports 10G GPON, 10G EPON, GPON, or EPON upstream transmission. Users can select the upstream mode as required. The product supports 8/16/24 FE electrical ports or 24 GE electrical ports in the downstream direction. The MA5822 also supports POTS access.

Specifications of the MA5821/MA5822

Item	MA5822	MA5821
Dimensions (W x D x H)	• 442 mm x 220 mm x 43.6 mm	• 442 mm x 220 mm x 43.6 mm • 250 mm x 180 mm x 43 mm (8FE)
Network-side interface	1*SFP 10G PON/GPON/EPON	
User-side interface	• 1: 24 FE+24 POTS • 2: 16 FE+16 POTS • 3: 8 FE + 8 POTS	• 1: 24 FE • 2: 16 FE • 3: 8 FE • 4: 24GE (R313C10)
Voice	H.248 and SIP	N/A
Operating temperature	• -40°C to +55°C	
Operating humidity	5% to 95% RH	
Heat dissipation mode	Natural heat dissipation	
Power supply mode	220 V AC	
Surge protection	• GE/FE and power port: 6 kV • POTS port: 4 kV	

- The MA5821/MA5822 is classified into products with 8/16/24 FE or 24 GE electrical interfaces based on the number of subscribers that can be connected. The MA5822 supports POTS access.
- The MA5821/MA5822 provides 1 SFP upstream optical port which supports 10G GPON, 10G EPON, GPON, or EPON upstream transmission.
- The MA5822 has the voice function, but the MA5821 does not support voice services.

Introduction to the EA5821



Item	Description
Dimensions (H x W x D)	442 mm x 220 mm x 43.6 mm (without mounting ears) 482.6 mm x 220 mm x 43.6 mm (with mounting ears)
Operating temperature	-40°C to +55°C -40°C to +65°C (24GE+PoE model)
Operating humidity	5% - 95% RH
Power adapter input	100 - 240 V AC, 50 Hz/60 Hz
Maximum input current	0.5 A/1.0 A/5.5 A
User-side interface	8GE 24GE 24GE, PoE
Network-side interface	10G GPON /GPON
Maximum power consumption	14.2 W/23 W/434 W
Maximum PoE output power	370 W. Each GE port supports a maximum of 30 W.

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- There are 3 types of EA5821: 8GE, 24GE, 24GE+PoE.
- Supports 10G GPON upstream transmission.
- Intelligent PoE power supply
 - The EA5821 provides the PoE function which simplifies power supply. When transmitting data through Ethernet cables, the EA5821 can provide power supply for terminals such as indoor APs, eliminating power cable routing requirements.
- Abundant service types
 - The EA5821 can implement multiple services such as data and multicast services with solutions. It supports high-performance multicast service.
 - Supports IPv6.
 - Provides comprehensive QoS capabilities.
- Excellent maintenance and management functions:
 - Supports various maintenance and management functions, such as on-site software commissioning, remote acceptance, remote upgrade and patching, and remote fault locating. Supports one-stop offline deployment and plug-and-play. Configurations can be automatically obtained from the NMS and take effect automatically. When the EA5821 goes online, it sends a report message to NMS automatically.
 - Remote batch upgrade: Supports automatic batch upgrade and version and data rollback in case of an upgrade failure, thereby ensuring upgrade security.
 - Zero touch routine maintenance: Supports accurate fault locating and remote troubleshooting. Supports comprehensive information collection,

device self-check, and diagnosis.

- ▣ Network performance monitoring: Supports network optimization and subscriber QoS monitoring.

MA5616 Specifications

- The MA5616 is a 2 U high and 19-inch wide product that supports flexible card plug-in. It supports ultra-high bandwidth access and flexible capacity expansion.

		0	Control board	1 Service board 2 Service board
	Fan tray	5	Power board	3 Service board 4 Service board
Control Board	CCUB			
Upstream port (configured with different daughter boards)	GE / xPON	GE / xPON	GE / xPON / 10G GPON	
		256 ADSL2+	256 ADSL2+	256 ADSL2+
	Broadband service	128 VDSL2	192 VDSL2	192 VDSL2 (Vectoring)
		64 SHDSL	64 SHDSL	64 SHDSL
User interface	Narrowband service		256 POTS / 32 ISDN	
	Combo		128 ADSL2+ & 128 POTS	
	Ethernet	N/A	64 FE / 8 FE + 8 GE	N/A
Power supply mode		AC power supply/AC power supply + backup power/branch power supply		

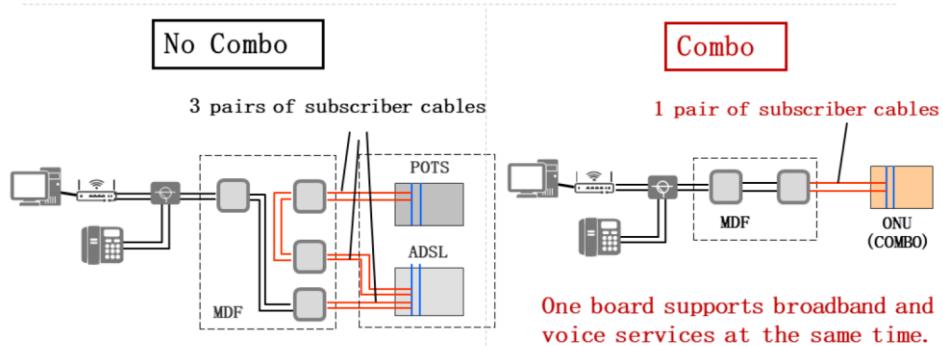
- The MA5616 can be configured with different service boards to provide ADSL2+, VDSL2, SHDSL, POTS, and ISDN subscriber interfaces, meeting requirements of various FTTB and FTTC private line access services. In addition, the MA5616 can be used as a mini DSLAM or MSAN to provide traditional voice, data, and video services.
 - In the MA5616 subrack, slot 0 is configured with a control board, slots 1 - 4 are configured with service boards, and slot 5 is configured with a power board.
 - A P2P Ethernet access board EIUD can be configured only in slot 1 or slot 2.
- The MA5616 has the following features:
 - Supports 3 types (CCUB/CCUC/CCUE) of control boards.
 - The CCUB/CCUE supports the xDSL, ISDN, POTS, ADSL2+, and POTS combo service boards. In addition to the aforesaid service boards, the CCUC also supports FE and GE service boards.
 - Supports xPON and GE upstream ports when configured with different daughter boards. The CCUE control board can be configured with an XP1A daughter board to provide 10G GPON upstream ports.
 - Can be installed without onsite software commissioning, accelerating the deployment.
 - Supports remote fault locating, commissioning, information collection, and fault recovery.
 - Supports intelligent fan speed adjustment which effectively reduces

power consumption during off-peak hours. The power consumption of a single device can be reduced by a maximum of 6 w.

- ▣ The MA5616 supports AC and DC input. The AC input mode supports battery backup.

MA5616 Features - Combo Board

- The MA5616 innovatively supports combo board design, which provides high-density user access, saves construction costs, saves deployment space, saves cable connection time, reduces MDF occupation, and reduces maintenance costs.



Introduction to the MA5620/MA5626

- The MA5620/MA5626 remote optical access unit is mainly used in FTTB construction scenarios.
- The MA5620/MA5626 is a 1 U case-shaped device that supports multiple types of devices.



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- The MA5620/MA5626 is a remote ONU launched by Huawei to meet customers' requirements for the multi dwelling unit (MDU) in an FTTB network. It works with the OLT to provide high-speed and high-quality data, voice, and video services for FTTB access.
- The MA5620/MA5626 has the following features:
 - The MA5620/MA5626 supports EPON, GPON, and GE upstream transmission.
 - The MA5620 supports VoIP-based plain old telephone service (POTS) access and Ethernet-based LAN access.
 - The MA5626 supports Ethernet-based LAN access.
 - The MA5620/MA5626 provides 3 specifications with 8, 16, and 24 ports. The AC power supply mode is adopted.
 - The MA5620 supports basic services such as voice service, fax service, and modem service, as well as value-added services such as 3-party conversation, call waiting, call transfer, calling line identification presentation (CLIP), and calling number restriction.
 - The MA5620/MA5626 supports plug-and-play and remote management without onsite configuration. It provides excellent management, maintenance, and monitoring functions, facilitating routine operation management and fault diagnosis.

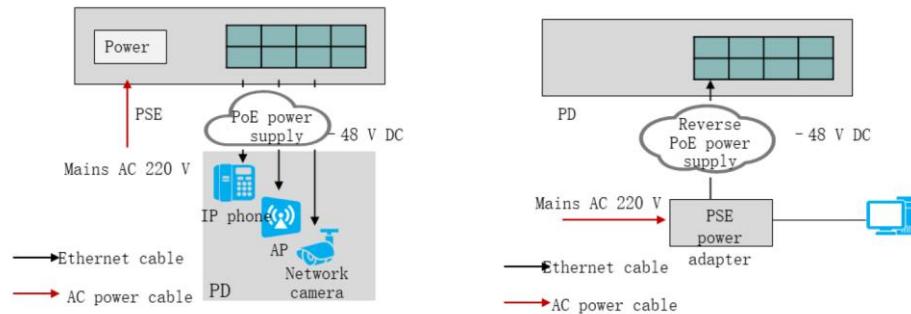
MA5620/MA5626 Product Specifications

- The MA5620/MA5626 provides various specifications to adapt to different user densities.

Device Name	User Interface	Upstream Interface	Power Supply
MA5620	8/16/24POTS interface and FE electrical interface		
MA5626	8/16/24 FE electrical ports 4 FE electrical interfaces +4 GE electrical interfaces (PoE power supply) 8 FE electrical interfaces (reverse PoE)	Two upstream ports support the following modes: <ul style="list-style-type: none">EPONGPONGE	220 V AC
Device Name	Dimensions (Without Mounting Ears)	Dimensions (with Mounting Ears)	
MA5620	442 mm x 220 mm x 43.6 mm	482.6 mm x 220 mm x 43.6 mm	
MA5626	8 FE: 250 mm x 180 mm x 43.6 mm Others: 442 mm x 220 mm x 43.6 mm	11-inch mounting ears: 290.6 mm x 180 mm x 43.6 mm 19-inch mounting ears: 482.6 mm x 220 mm x 43.6 mm	

MA5626 Product Features - PoE Power Supply

- Power over Ethernet (PoE): A technology that enables MDU devices to transmit data signals for terminal devices as well as DC power on existing Ethernet cables.



- Power over Ethernet (PoE): A technology that enables MDU devices to transmit data signals for terminal devices as well as DC power on existing Ethernet cables.
- With the rapid development of new services such as WLAN, VoIP, and network video surveillance, wireless access points (APs), IP phones, and network cameras are widely used. Many such terminals need to be installed in places where the AC power supply is difficult to acquire. The PoE power supply solution solves this problem and enables terminal devices to obtain power when accessing the network.
- PoE has the following features:
 - In PoE mode, an Ethernet cable has a voltage only when it is connected to a device that requires power supply. If connected devices do not require power supply, there is no voltage on the Ethernet cable, eliminating the risk of electricity leakage.
 - Subscribers can safely use the existing devices and PoE devices on the network.
- Forward PoE power supply
 - As shown in the figure on the left, the PoE power supply system of the MxU has the following typical applications: connecting to the IP phone, wireless APs in a WLAN, and network cameras in the video surveillance scenario.
 - The MA5626 PoE device functions as a power sourcing equipment (PSE) to connect to an AC 220 V power supply. Due to the difficulty in centralized power supply, some terminals are connected to the MA5626 through Ethernet ports to transmit data and obtain PoE power supply.

- Reverse PoE power supply
 - ▣ As shown in the figure on the right, the MA5626 reverse PoE device functions as a powered device (PD) and connects to a PSE power adapter in a subscriber's home through an Ethernet port to transmit data and obtain PoE power.

Introduction to the MA5612

- The MA5612 is a multi-service ONU launched by Huawei. It supports various services, such as data, multicast, and voice services.
- The MA5612 supports GE/FE, POTS, and E1/T1 access modes and RF interfaces. It is mainly used in FTTB construction scenarios as well as certain private line access scenarios



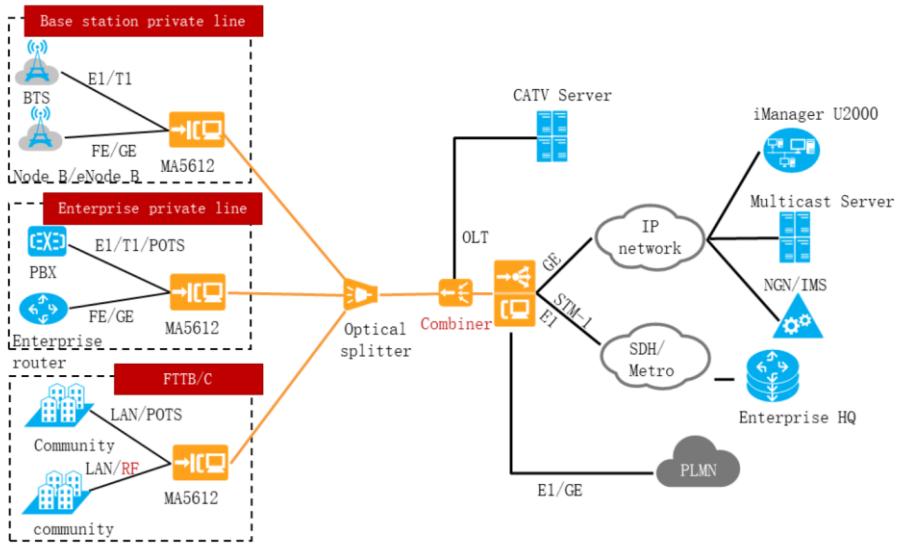
Specifications of the MA5612

- The MA5612 is a 1 U case-shaped device with some mountable service boards. It supports 2 service boards and provides various specifications. The main difference lies in the power supply mode

Control board	1 FE/POTS/E1/filler panel	2 FE/POTS/E1/filler panel
0	4	3 POTS/filler panel
Upstream interface	<ul style="list-style-type: none">Dual upstream ports, supporting GPON/EPON/GE triple mode auto sensingSingle 10G-GPON port	
User interface (without the RF interface)	<ul style="list-style-type: none">Fully configured with 2 ASNB boards: 2GF+6FE+48POTSFully configured with 2 EIUC boards: 2GE+22FE+16POTSFully configured with 2 E81A boards: 2GE+6FE+16E1/T1+16POTS	
User interface (with RF interface)	One more RF interface. Other interfaces are the same.	
Power supply mode	<ul style="list-style-type: none">AC + batteryDC	

- The MA5612 has the following features:
 - The MA5612 supports card plugging. It provides two service card slots with natural heat dissipation and no noise.
 - The MA5612 provides GPON, EPON, and GE interfaces on the network side to meet different modes and bandwidth requirements. The upstream ports support triple mode autonegotiation.
 - The MA5612 supports FE, POTS, and radio frequency (RF) interfaces, which can be used for home subscriber access.
 - The MA5612 supports GE, FE, and E1 interfaces, which can be used for enterprise user access and mobile bearing.
 - The MA5612 supports AC and DC power supplies.
 - The MA5612 features an energy-saving backup technology: The POTS short loop is used to reduce the power consumption by 5%. Supports 12 V AC power backup, reducing power backup cost by more than 50%.

Typical Networking of the MA5612





Contents

1. FTTx Network Overview
2. Introduction to Auxiliary Devices of the FTTx Solution
 - OLT
 - MxU
 - ONT

ONT Product Introduction - Enterprise Market

Terminal Type	Product Name	User Interface (UNI)
Bridging type	EG8010H	1GE
Bridging + voice	HG8110H	1POTS + 1GE
	EG8240H	2POTS + GE
	EG8242H	2POTS + 4GE + 1RF
	HG8240H	2POTS + 4GE
	EG8040F	1GE + 3FE
Gateway	HG8546M	1POTS + 1GE+3FE + USB + Wi-Fi
	EG8120	1GE+1FE
	HG8247H	2POTS + 4GE + USB + RF + Wi-Fi
	HN8245Q	2POTS + 4GE + USB +2.4G&5GWi-Fi

- Bridging device:
 - A bridging ONT only transparently transmits packets, and the LAN-side device obtains the public IP address.
 - A bridging ONT cannot be used as the home control center and needs to be connected to a router. Therefore, the carrier loses the control of the ingress.
 - Internet services: A PC obtains the public IP address through PPPoE dialup to access the Internet. The ONT only transparently transmits data.
 - IPTV service: The STB directly obtains the public IP address from the DHCP to order programs. The ONT only transparently transmits data.
 - VoIP service: The ONT functions as a DHCP client to obtain an IP address through DHCP. Multiple POTS ports share one IP address.
- Gateway device:
 - A gateway ONT obtains the public IPv4 address and assigns a private IPv4 address to each LAN-side device. NAT is performed to save the public IP addresses.
 - A gateway ONT functions as the home interconnection center and connects home devices through network cables and Wi-Fi. It can be used as the entrance to smart homes.

ONT Product Introduction - Carrier Market

Terminal Type	Product Name	User Interface (UNI)
Bridging type	HG8010	1GE
Bridging + voice	HG8110	1POTS + 1GE
	HG8240	2POTS + 4FE/GE
	HG8242	2POTS + 4GE + 1RF
	HG8240B	2POTS + 4GE
	HG8240R	2POTS + 4FE
Gateway	HG8245	2POTS + 4FE/GE + USB + Wi-Fi
	HG8247	2POTS + 4GE + USB + RF + Wi-Fi
	HG8447	4POTS + 4GE + USB + RF + Wi-Fi
	HG8245T	2POTS + 4GE + USB + Wi-Fi
	HG8247T	2POTS + 4GE + USB + RF + Wi-Fi

Bridging ONT - EG8010H



Interface	Quantity	Function
OPTICAL	1	Optical fiber interface with rubber plugs; used to connect optical fibers for upstream access using SC/UPC connectors
LAN	1	Adaptive 10/100/1000M Base-T Ethernet interface (RJ-45); used to connect to the Ethernet interface of a computer or IP STB
POWER	1	Power port; used to connect to a power adapter

Bridging + Voice ONT - EG8240H



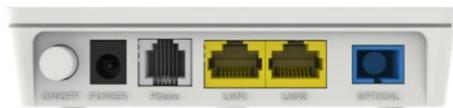
Interface	Quantity	Function
OPTICAL	1	Optical fiber interface with rubber plugs; used to connect optical fibers for upstream access using SC/UPC connectors
LAN	4	Adaptive 10/100/1000M Base-T Ethernet interface (RJ-45); used to connect to the Ethernet interface of a computer or IP STB
POTS	2	RJ-11 port; used to connect to a telephone device
POWER	1	Power port; used to connect to a power adapter

Gateway-type ONT - EG8040F



Interface	Quantity	Function
OPTICAL	1	Optical fiber interface with rubber plugs; used to connect optical fibers for upstream access using SC/UPC connectors
LAN	4	1GE+3FE; used to connect to the Ethernet interface of a computer or IP STB
POWER	1	Power port; used to connect to a power adapter

Gateway ONT - EG8120



Interface	Quantity	Function
OPTICAL	1	Optical fiber interface with rubber plugs; used to connect optical fibers for upstream access using SC/UPC connectors
LAN	2	1FE+1GE; used to connect to the Ethernet interface of a computer or IP STB
POTS	1	RJ-11 port; used to connect to a telephone device
POWER	1	Power port; used to connect to a power adapter

Gateway ONT - HG8245H/HG8247H



HG8245H



HG8247H

Port	Quantity	Function	Remarks
CATV	1	Connecting to a cable TV	Supported in HG8247
OPTICAL	1	Upstream port	
LAN	4	RJ-45 port, providing broadband Internet access services	
TEL	2	RJ-11 port, connected to a telephone device	
USB	1	Home network storage and file sharing	
WLAN	1	Providing a secure and high-speed wireless network	

Quiz

1. What are the application scenarios of the FTTx network?
2. What types of MxUs are available? Which scenarios are they applicable to?
3. What typical service access does the HG8247H support?

- Reference answers:
 1. FTTH, FTTB, FTTC, FTTO, FTTM
 2. There are single and modular MxUs, applicable to scenarios such as FTTH/B/C.
 3. Internet access (data), VoIP, IPTV, CATV, and Wi-Fi



Summary

- In this course, we have learned:
 - FTTx hardware devices, such as OLTs, MxUs, and ONTs
 - FTTx application scenarios, such as FTTH, FTTB/C, FTTO, and FTTM
 - Services provided by the FTTx network, such as Internet access, voice, and IPTV services

Thank You

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