

## 1. What is PON?

A passive optical network (PON) is a system that brings optical fiber cabling and signals all or most of the way to the end user. Depending on where the PON terminates, the system can be described as fiber-to-the-curb (FTTC), fiber-to-the-building (FTTB), or fiber-to-the-home (FTTH).

Downstream signal coming from the central office is broadcast to each customer premises sharing a fiber. Encryption is used to prevent eavesdropping. Upstream signals are combined using a multiple-access protocol, usually time division multiple access (TDMA).

A PON consists of an optical line terminal (OLT) at the service provider's central office (hub) and a number of optical network units (ONUs) or Optical Network Terminals (ONTs), near end users.

## 2. What is FTTH?

Since its promotion in 2003, FTTH has gone through 14 years. Since its launch in 2013, "Broadband China" has experienced another four years. FTTH has evolved from the dream of optical communications people to reality and has become a place where people work, study and live Indispensable infrastructure.

FTTH is an abbreviation for fiber optic directly to the home, abbreviated as FTTH in Chinese. Specifically, FTTH refers to installing an ONU at a home user or an enterprise user, and is an optical access network application type closest to a user except an FTTD (fiber to the desktop) in the optical access family. The significant technical feature of FTTH is that it not only provides more bandwidth, but also enhances the transparency of the network to data formats, rates, wavelengths and protocols, relaxes the requirements for environmental conditions and power supply, and simplifies maintenance and installation. When it comes to FTTH, you first have to talk about fiber access. Optical fiber access refers to the central office and users entirely between the optical fiber as a transmission medium. Optical access can be divided into active optical access and passive optical access. The main technology of optical subscriber network is optical transmission technology. At present, the multiplexing technology of optical fiber transmission develops quite fast, and most of them are in practical use. According to the depth of fiber users, can be divided into FTTC, FTTZ, FTTO, FTTF, FTTH and so on.

## 3. What is ODN?

ODN is an FTTH optical fiber network based on PON equipment, which provides optical transmission channel between OLT and ONU. From the perspective of function, ODN can be divided into four parts: feeder cable subsystem, distribution cable subsystem, inbound cable subsystem and fiber terminal subsystem.

#### **4. What is ONU?**

ONU consists of active Optical Network Unit and passive Optical Network Unit. It has two functions: selective reception of the broadcast sent by OLT, and receiving response to OLT if the data is needed; The Ethernet data that the user needs to send is collected and cached, and the cached data is sent to the OLT side according to the assigned send window.

#### **5. What is the function of the switch**

Switch is a general term for the technology that sends the information to the corresponding route that meets the requirements by means of manual or automatic. A Switch means a network device used to transmit electrical and optical signals.

#### **6. What is the difference between HGU and SFU?**

The most essential difference of SFU can be understood as Layer2 device, usually no routing function; HGU is a Layer3 device with routing function and compared with SFU, it has home gateway function.

#### **7. How many kinds of ONU products you have?**

For both GPON and EPON, we have data type ONU, voice type ONU and catv type ONU. We have many products for each type. You can get more detailed information about our products from our official website.

#### **8. Does your ONU can connect to the phone and TV?**

Yes. Our products have these functions. In particular, most of our ONU products also have WiFi capabilities.

#### **9. What is MAC address?**

MAC Address is the media access control address, also known as the LAN Address, Ethernet Address, or Physical Address. It is an address used to confirm the location of a network device. In the OSI model, the third network layer is responsible for IP address, while the second data link layer is responsible for MAC address. MAC address is used to uniquely identify a network card in the network. If a device has one or more network cards, each network card needs and will have a unique MAC address.

#### **10. What is FTTO?**

FTTO means Fiber To The Office. FTTO mode of operation, the operators pull cable relative concentration areas, to the customer after the right branch connection to the user's computer room or equipment, for a user large commercial office buildings, such as

CBD EPON OLT equipment can directly be placed into the building room, after vertical cable wiring, again through the appropriate branch, connect the optical fiber to the end user.

### **11. What is VLAN?**

A virtual local area network (VLAN) is a group of logical devices and users that are not limited by their physical location , but can be organized according to functional , departments and applications, and communicate with each other as if they were in the same network segment.VLAN is a relatively new technology that works in layer 2 and layer 3 of the OSI reference model. A VLAN is a broadcast domain, and communication between VLAN is accomplished through layer 3 routers.Compared with the traditional LAN technology, VLAN technology is more flexible, it has the following advantages: network equipment to move, add and modify the management overhead reduced, can control broadcast activities, can improve network security.

### **12. What is PPPOE?**

PPPOE is a point-to-point protocol (PPP) encapsulated in Ethernet in the framework of a tunnel network protocol due to integrate the PPP protocol, so the traditional Ethernet is unable to provide authentication encryption and compression, and other functions, can also be used for cable modem and digital subscriber line to Ethernet protocol to provide user access system.

### **13. What is multicast?**

Multicast technology is designed in the IP network, in the form of a “best” to send information to a particular target group, the target group is called a multicast group. When active host send information demand to the target host, the source host just send a copy of the data, the data of the destination address is a multicast group address.In this way, all belong to the group members can receive a copy of the original host data, the multicast mode members who really need information will receive information,while others can't receive it.Therefore, multicast method solves the duplication of data and bandwidth in unicast, and also solves the waste of bandwidth in multicast method.

### **14. What is SNMP?**

SNMP means simple network management protocol, which is a standard protocol specially designed for IP network management network nodes, such as servers, workstations, routers, switches, etc. It is an application layer protocol.SNMP protocol enables network administrators to manage network performance, discover and solve network problems, and plan network growth. SNMP consists of three key components: network management system, managed device, and agent.

### 15. What is DHCP?

DHCP(Dynamic host configuration protocol), is a LAN network protocol that works using the UDP protocol.DHCP can help us assign IP addresses and related IP information to computers in the network.DHCP can also configure the correct subnet mask, default gateway, and DNS server information on the device.

### 16. What is the difference between GPON and EPON?

The main difference between GPON and EPON is the use of completely different standards.GPON was defined by ITU-TG.984 and EPON was defined by IEEE802.3ah.In application,GPON has a bigger bandwidth than EPON, its business carrying more efficient, spectral ability stronger, can transmit more bandwidth business, achieve more users access, pay more attention to business and QoS guarantee, but more complex, so cost is higher than its relative EPON , but with the large-scale deployment of GPON technology, EPON and GPON is diminishing cost differences.

### 17. What's the normal range of optical receiving power of ONU made by your company?

For epon it's normal optical receiving power between -3dbm to -27dbm

For gpon it's normal optical receiving power between -8dbm to -28dbm

### 18. The difference between HGU, SFU, MDU, MTU and SUB?

#### **SFU (Single Family Unit) single-family unit ONU**

It is mainly used for single home users in FTTH scenarios and ordinary terminals that only support broadband access. Generally, it has 1 to 4 Ethernet interfaces and provides Ethernet / IP services. The built-in optical equipment or IAD equipment can support CATV services or VoIP business. Now often used in conjunction with home routers to provide greater business capabilities.

#### **HGU (Home Gateway Unit) Home gateway unit type ONU**

It is mainly used for single home users in FTTH occasions. Compared with SFU, which has the function of home gateway, it is equivalent to a home gateway with PON uplink interface. It generally has 2 ~ 4 Ethernet interfaces, 1 WLAN interface and 1 USB interface. Provide Ethernet / IP services, through the built-in optical or IAD devices can support CATV business or VoIP services, support TR-069 remote management.

#### **MDU (Multi.Dwelling Unit) multi-family unit ONU**

Mainly used in FTTB / FTTC / FTTCab mode for multiple residential users occasions, with broadband access terminal functions, usually with at least 4 user-side interfaces in the telecom operators equipment selection, often including Ethernet interfaces, ADSL2 +

Interface or VDSL2 interface to provide Ethernet / IP services. In the radio and television operators of the network applications, due to differences in business content, generally only contains the Ethernet interface for PON + LAN access.

### **MTU (Multi-tenant Unit) Multi-tenant unit type ONU**

It is mainly used for multiple enterprise users in the FTTB scenario or multiple individual users in the same enterprise. It has the function of broadband access terminal and has multiple Ethernet interfaces (usually at least eight), E1 interfaces and POTS interfaces, and provides Ethernet Network / IP services, TDM services and VoIP services (built-in IAD).

### **SBU (Single Business Unit) single-business unit ONU**

Mainly used in the case of FTTO, separate business users and businesses in a single office access. Support broadband access terminal functions, in the telecom operation network, generally with Ethernet interface, E1 interface, VOIP interface, etc., to provide Ethernet / IP services and TDM services.

### **19. What's the different between ONT and ONU?**

ONU and ONT are both users' devices, and there is no difference in essence. But ONT means optical network terminal used by end users. ONU means optical network unit, and there may be other networks between it and the end users. You could also say that ont is part of the onu.

### **20. What is the purpose of the LLID in EPON?**

If the OLT (the central node of the EPON) were to be implemented as a PHY with a single MAC attached to it, this would cause serious trouble for any bridge (=switch) to which the MAC were connected. Consider a MAC frame coming into the bridge from an ONU (a subscriber node) via an EPON port. The bridge associates the source address of the frame with the port on which it came in, i.e. the EPON port. When at a later time another MAC frame comes in from an ONU, this time destined for the MAC address previously learned, it will not be transmitted back to the EPON port, because the bridge assumes that the frame was already received by all the stations on the attached "broadcast" LAN. However, this is not the case; upstream transmissions are not received by other ONUs. Standard bridging has no way of accommodating an attached LAN that behaves as a broadcast LAN in downstream and as a point-to-point LAN in upstream.

The solution to this problem was designed in close cooperation with Working Group 802.1. Instead of one single MAC, the OLT would have a different dedicated MAC for every ONU attached to the EPON. As a result, higher layers can consider the EPON as a collection of logical point-to-point links. From the individual MACs down to the OLT PHY, the logical point-to-point links share a common GMII; hence, a way to identify data frames for/from

the different ONUs is required. The Logical Link identifier (LLID) was created for this purpose. The LLID is carried along by the frame in the bytes of its preamble.

## 21. How the data transfer in an EPON system?

An EPON system uses the single-fiber wavelength division multiplexing (WDM) technology (with downlink central wavelength of 1490 nm and uplink central wavelength of 1310 nm) to implement single-fiber bidirectional transmission, supporting a transmission distance of up to 20 km (12.43 miles).

## 22. What's the ONU optical TX power and RX sensitivity?

Wavelength: Tx 1310nm, Rx1490nm

Tx Optical Power: 0~5dBm

Rx Sensitivity: -27dBm

Saturation Optical Power: -8dBm

## 23. What is your ONT Tx power level and RX sensitivity?

The OLT support Class B+.

Transmission Distance: 20KM

PON port speed: symmetrical 1.25Gbps

Waves: 1310nm TX,1490nm RX

TX Optical power : 0~5dBm

RX Sensitivity: -27dBm

## 24. How many ONU and your OLT connect?

The ONU quantity connected to the OLT depend on the OLT PON ports quantity and optical splitter ratio.

For example, 2PON port OLT can connect 64pcs EPON ONU in 1:32 splitter ratio; If in 1:64 ratio, it can manage 128pcs ONU.

## 25. What is EPON?

Ethernet Passive Optical Network (EPON), defined by IEEE 802.3ah, is a point to multipoint (Pt-MPt) network topology implemented with passive optical splitters, along with optical fiber PMDs that support this topology. EPON is based upon a mechanism named MPCP (Multi-Point Control Protocol), which uses messages, state machines, and timers, to control access to a P2MP topology. Each ONU in the P2MP topology contains an instance of the MPCP protocol, which communicates with an instance of MPCP in the

OLT. On the basis of the EPON/MPCP protocol lies the P2P Emulation Sublayer, which makes an underlying P2MP network appear as a collection of point-to-point links to the higher protocol layers (at and above the MAC Client). It achieves this by prepending a Logical Link Identification (LLID) to the beginning of each packet, replacing two octets of the preamble. In addition, a mechanism for network Operations, Administration and Maintenance (OAM) is included to facilitate network operation and troubleshooting.

## **26. Is the wireless AP meet 802.11ac?**

Yes, C-Data Wireless Ap Ceiling type CW8837AP and outdoor type CW9833AP both meet 802.11ac standard.

## **27. What is EOC?**

Ethernet Over Coax also called EOC for short. It is an equipment which used for triple play service in a new generation broadcasting network. Widely used by consumers and telecommunications operators in existing 75 ohm coaxial cable installations (from cable television or CATV), to carry broadband data into and through the home, and into multiple dwelling unit (MDU) installations.

C-Data EOC network is built with EOC Master and EOC Slave.

## **28. What is HFC?**

Hybrid fiber-coaxial (HFC) is a telecommunications industry term for a broadband network that combines optical fiber and coaxial cable.

In a hybrid fiber-coaxial cable system, the television channels are sent from the cable system's distribution facility, the headend, to local communities through optical fiber trunk lines. At the local community, a box called an optical node translates the signal from a light beam to electrical signal, and sends it over coaxial cable lines for distribution to subscriber residences. The fiberoptic trunk lines provide adequate bandwidth to allow future expansion and new bandwidth-intensive services.

## **29. What is MC?**

A fiber media converter (MC for short) is a simple networking device that makes it possible to connect two dissimilar media types such as twisted pair with fiber optic cabling. They were introduced to the industry in the 1990s, and are important in interconnecting fiber optic cabling-based systems with existing copper-based, structured cabling systems. They are also used in metropolitan area network (MAN) access and data transport services to enterprise customers.

### 30. What is GPON?

GPON (Gigabit-Capable PON) technology is based on the latest generation of broadband passive optical integrated access standard based on the ITU-TG.984.x standard. It has many advantages such as high bandwidth, high efficiency, large coverage and rich user interface. Most operators regard the access network as a broadband technology, integrated transformation of the ideal technology. GPON was originally proposed by the FSN in September 2002. On this basis, ITU-T completed the formulation of ITU-T G.984.1 and G.984.2 in March 2003 and completed G in February and June 2004. 984.3 standardization. Which eventually formed a GPON standard family.

### 31. EPON and GPON which is better?

EPON compatible with the current Ethernet technology for the purpose of the 802.3 protocol in the optical access network continuation of the full inheritance of the Ethernet low prices, flexible protocol, mature technology and other advantages, with a wide range of markets and good compatibility.

The GPON is positioned in the telecommunications industry for multi-service, full-service access with QoS guarantees, and strive to find the best and most business-friendly solution with the highest efficiency. It proposes that “all agreements be openly and completely thoroughly Reconsider “.

Overall, EPON and GPON have their own strengths and weaknesses, from the performance indicators GPON is better than EPON, but EPON has the advantage of time and cost, GPON is catching up, looking forward to the future of broadband access market who may not be replaced, it should be Co-existence and complementarity. GPON will be more suitable for customers with high bandwidth, multi-service, QoS and security requirements and ATM technology as the backbone. For cost-sensitive, QoS, security, less demanding customer base, EPON has become the dominant.

### 32. What is 10G PON?

Broadband access Gigabit access era, 10G PON PON has become the mainstream technology, the traditional PON is to 10G PON upgrade, broadband will increase 10 times. 10G PON scale commercial launch, will directly help FTTH to Gigabit access rate evolution. The company is located in:

10G PON has many advantages, based on the existing hardware architecture to upgrade the network, greatly reducing costs, and shorten the transformation cycle, more crucially, PON upgrade to 10G PON, the bandwidth can be increased 10 times. Only through the upgrading of key components, you can enter the “Gigabit era” from the “Fast trillion times.”

Gigabit bandwidth is not the limit, with the rapid development of 8K ultra-high definition video and Internet of Things technology, especially the advent of the 5G era, will bring

greater bandwidth demand for the network growth, in this context, 10G PON will continue Development, will be 100G PON evolution.

From the standard progress, 100G PON has been in IEEE / FSAN / ITU-T and other standardization organizations. IEEE set up the NG EPON research group, the standard named P802.3ca, mainly for 25G PON, 50G PON, 100G PON standardization is scheduled to be released in May 2019 standards; ITU-T also set up a 25G PON research group, Research on single wavelength rate improvement.

### 33. What is FTTB?

FTTB (Fiber To The Building): FTTX + LAN is a network connection mode, the optical signal is mainly connected to the office building or apartment building within the main distribution box to achieve optical fiber signal access, and in the office building or The interior of the apartment building is still the use of coaxial cable, twisted pair or fiber optic distribution signal to achieve the realization of high-speed data applications. We call FTTX + LAN broadband access network (referred to as FTTB), this is one of the most reasonable, most practical, most cost-effective broadband access methods.

#### advantage

Fast: Fiber to the floor, cable home, the user uplink and downlink rates generally up to 10Mbps-50Mbps, up to 100Mbps.

Large capacity: each household can enjoy the two-way balanced 10M-50Mbps bandwidth.

Investment Province: FTTB is mainly used for transformation of old residential areas. Residential areas that already have network cables, telephone lines and coaxial cables do not need to deploy optical fibers and save a large amount of wiring expenses.

Low price: Unit bandwidth is cheaper than FTTH and CMTS

Wide range of applications: High-speed Internet access, VOD, SOHO, distance education, video conferencing, ROBO, telemedicine and Internet connectivity.

### 34. What is wireless AP?

A wireless AP (AP, Access Point, Wireless Access Point, Conversation Point, or Access Bridge) is a well-known name that includes not only simple wireless access points (wireless APs), but also wireless routers Gateway, wireless bridge) and other types of equipment collectively. It mainly provides wireless workstations for wired LAN and wired LAN access to wireless workstations, wireless access point within the coverage of wireless workstations can communicate with each other.

Simple wireless AP is a wireless switch that provides wireless signal transmission and reception functions. Simple wireless AP's working principle is the network signal transmitted over twisted pair, after AP product compilation, the electrical signal is converted into a wireless signal sent out to form a wireless network coverage. According to different power, it can achieve different degrees and different ranges of network coverage, the maximum wireless AP coverage of up to 500 meters. Most simple wireless AP itself does not have the routing function, including DNS, DHCP, Firewall, server functions must have independent routing or computer to complete.

### 35. What is ARP?

The Address Resolution Protocol, or ARP(Address Resolution Protocol), is a TCP/IP Protocol that obtains physical addresses based on IP addresses. When sending information, the host will broadcast the ARP request containing the target IP address to all hosts on the local area network, and receive the return message to determine the physical address of the target; After receiving the return message, the IP address and physical address will be stored in the local ARP cache and reserved for a certain time. The next request will directly query the ARP cache to save resources.

### 36. What is OLT?

OLT device is an important terminal device, which can be connected with the front-end switch by network wire and converted into optical signals. And like ONU device, it is a photoelectric integrated device. It has three functions:

- Broadcast Ethernet data to ONU
- Initiate and control the ranging process and record the ranging information
- Allocate bandwidth for ONU; That is to control the start time of sending data by ONU and the size of the sending window