

4 50G-PON

50G-PON is a next-generation high-speed passive optical network (PON) technology evolved from 10G PON. It is a key technology for implementing the 10G optical access network base, ensuring sustainable evolution of ultra-large 10G PON networks, and providing users with higher-speed broadband access capabilities.

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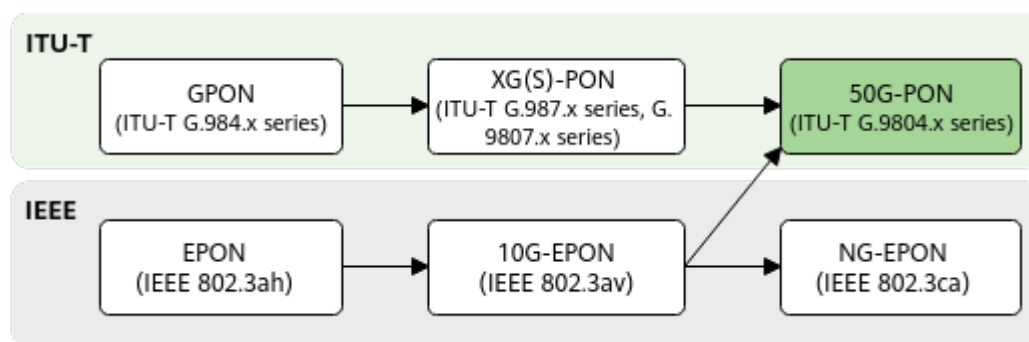
4.1 50G-PON Feature Updates

Product Version	Change Description
V100R023C10	First version to support this feature.

4.2 PON Technology Evolution

PON Technology Evolution Roadmap

Figure 4-1 shows the PON technology evolution roadmap.

Figure 4-1 PON technology evolution roadmap


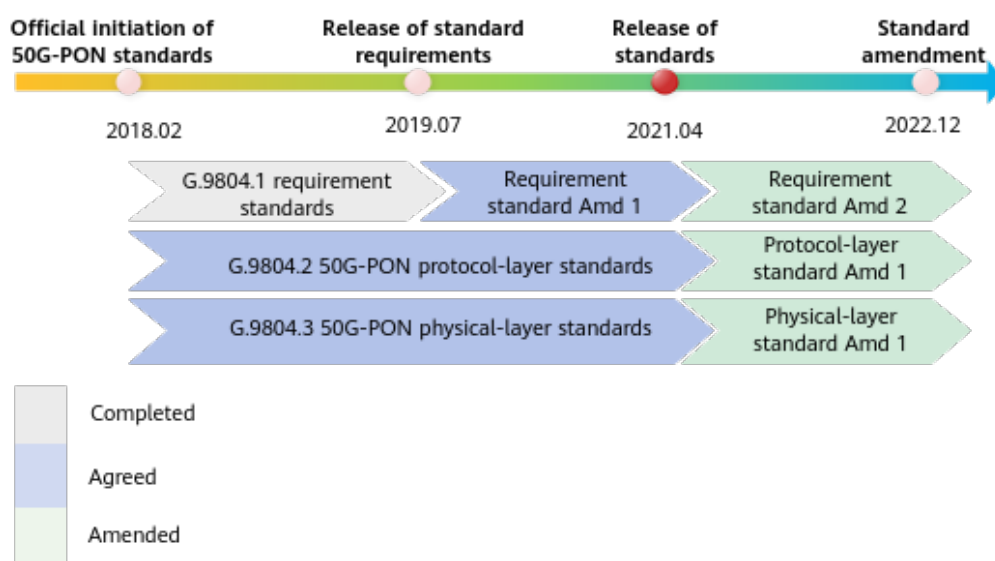
NOTE

XG(S)-PON includes two technologies: XG-PON and XGS-PON.

Progress of 50G-PON Standards

After formulating the XG-PON standard for 10G PON, standard organizations have started the research on the next-generation PON technology. Based on 10 Gbit/s wavelength superposition, standard organizations started NG-PON2 standard research in 2011 and completed standard formulation in 2015. However, because tunable optical components are costly and relevant systems are less mature, NG-PON2 was rarely used in commercial deployment and may be skipped in the future. At the same time, ITU-T started research on subsequent evolution technologies, released the next-generation high-speed PON technology white paper, and studied the technical possibilities of next-generation high-speed PON access. Compared with the multi-wavelength multiplexing solution, single-wavelength 50G-PON has more potential to become the mainstream industry standard for next-generation optical access networks after 10G PON.

Figure 4-2 shows the progress of 50G-PON standards.

Figure 4-2 Progress of 50G-PON standards


- In 2018, ITU/FSAN started the formulation of the single-wavelength 50G-PON standard named G.Higher Speed PON (G.HSP).
- In 2019, the general requirement of 50G-PON G.9804.1 was released, which specifies the single-wavelength time division multiplexing (TDM) PON architecture and upstream and downstream rate combinations. In addition, 50G-PON must support coexistence with and smooth evolution from existing 10G PON and optical distribution networks (ODNs).
- In 2021, ITU-T officially released the 50G-PON series standards, including general requirement amendment G.9804.1 AMD1, general protocol-layer standard G.9804.2, and physical-layer standard G.9804.3. This marks the standardization of basic 50G-PON functions, laying a foundation for the next-step product and solution R&D.
- In 2022, ITU-T amended the 50G-PON series standards, and released the general requirement standard G.9804.1 AMD2, general protocol-layer standard G.9804.2 AMD1, and physical-layer standard G.9804.3 AMD1.

4.3 Introduction to 50G-PON

Why Is 50G-PON Required?

As video becomes a popular broadband service and PON coverage expands from home broadband to industries such as telemedicine, smart manufacturing, and factory and mine communication, access networks need to provide a higher bandwidth, lower delay, with less packet loss and jitter to ensure service quality and user experience. For example, to achieve premium user experience, the VR service requires a bandwidth higher than 1 Gbit/s and a round-trip time (RTT) delay no more than 5 ms. For another example, telemedicine requires an end-to-end delay lower than 50 ms and jitter less than 200 μ s.

Compared with 10G PON, 50G-PON increases the bandwidth fivefold and features a low delay, low jitter, and high reliability. Based on the high bandwidth, low delay, and high computing power, 50G-PON can provide premium service experience and meet new application requirements in fields such as digital homes, industry digital transformation, and city digital infrastructure in the 10G era.

Differences in PON Technical Specifications

The following table lists the differences between PON technical specifications.

NOTE

This document describes only the PON technology specifications and does not represent the capabilities of a product. The specific capabilities of a product depend on the actual feature specifications.

Item	Wavelength Range	Center Wavelength	Maximum Line Rate	Frame Structure
GPON	- Downstream: 1480–1500 nm - Upstream: 1290–1330 nm	- Downstream: 1490 nm - Upstream: 1310 nm	- Downstream: 2.488 Gbit/s - Upstream: 1.244 Gbit/s	GEM
XG-PON	- Downstream: 1575–1580 nm - Upstream: 1260–1280 nm	- Downstream: 1577 nm - Upstream: 1270 nm	- Downstream: 9.953 Gbit/s - Upstream: 2.488 Gbit/s	XGEM
XGS-PON	- Downstream: 1575–1580 nm - Upstream: 1260–1280 nm	- Downstream: 1577 nm - Upstream: 1270 nm	- Downstream: 9.953 Gbit/s - Upstream: 9.953 Gbit/s	XGEM
Asymmetric 50G-PON	- Downstream: 1340–1344 nm - Upstream: 1284–1288 nm	- Downstream: 1342 nm - Upstream: 1286 nm	- Downstream: 49.7664 Gbit/s - Upstream: 24.8832 Gbit/s	XGEM
Symmetric 50G-PON	- Downstream: 1340–1344 nm - Upstream: 1284–1288 nm	- Downstream: 1342 nm - Upstream: 1286 nm	- Downstream: 49.7664 Gbit/s - Upstream: 49.7664 Gbit/s	XGEM

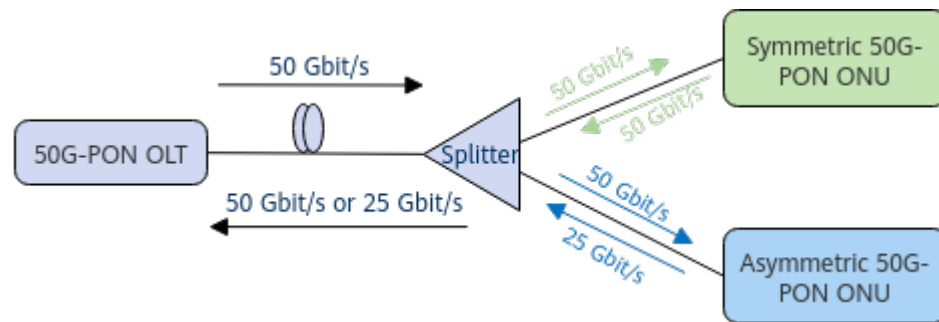
4.4 50G-PON System Architecture

The 50G-PON system architecture complies with the point-to-multipoint (P2MP) architecture of a standard PON network. The physical layer supports the following combinations of upstream and downstream rates:

- Symmetric 50G-PON: 50 Gbit/s downstream and 50 Gbit/s upstream
- Asymmetric 50G-PON: 50 Gbit/s downstream and 25 Gbit/s upstream

To protect customers' investment, 50G-PON devices can share the same ODN with existing PON devices, and allow installed-base PON users to be upgraded smoothly and seamlessly.

Figure 4-3 50G-PON system architecture



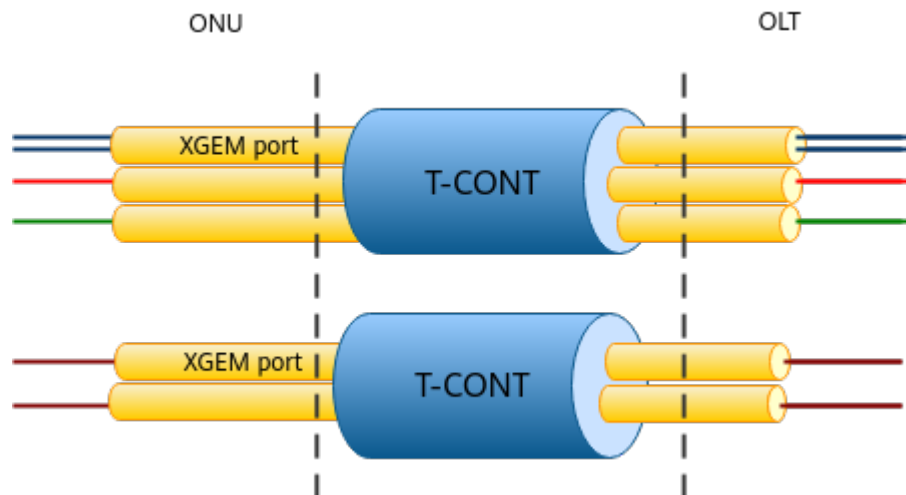
4.5 50G-PON Working Principles

4.5.1 Basic Concepts

Service Multiplexing

XGEM ports and T-CONTs divide a PON network into virtual connections to implement service multiplexing. [Figure 4-4](#) shows the service multiplexing principles of a 50G-PON system.

Figure 4-4 Service multiplexing principles of a 50G-PON system



XGEM Port

An XGEM port identifies a virtual service channel between an OLT and ONU in a 50G-PON system, that is, a channel that carries service flows. An XGEM port is similar to a virtual path identifier (VPI) or a virtual channel identifier (VCI) in a virtual connection in asynchronous transfer mode (ATM).

- Each XGEM port is identified by a unique XGEM port ID.
- XGEM port IDs are allocated by an OLT based on 50G-PON ports.
- One XGEM port can carry one or more types of services.

T-CONT

A T-CONT is the basic control unit of the upstream service flows in a 50G-PON system. It is the carrier for carrying services in the 50G-PON upstream direction. All XGEM ports must be mapped to T-CONTs to transmit data upstream based on dynamic bandwidth assignment (DBA) by the OLT.

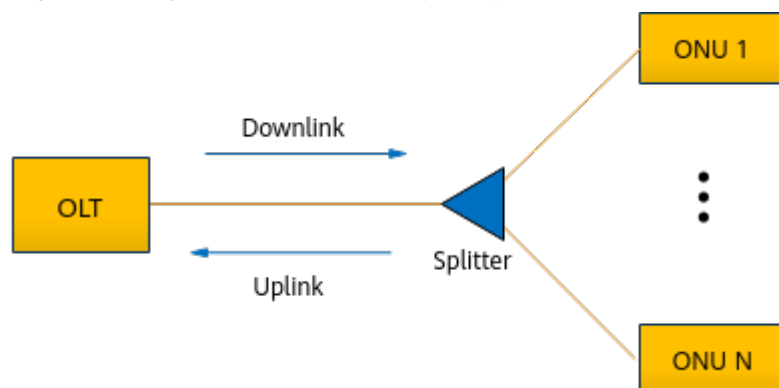
- A T-CONT can carry one or more XGEM ports based on user configurations.
- A T-CONT is identified uniquely by Alloc-ID.
- Alloc-IDs are allocated by an OLT based on 50G-PON ports.
- One ONU supports multiple T-CONTs configured for various service types.

4.5.2 System Transmission Principles

System Transmission Principles

50G-PON uses wavelength division multiplexing (WDM) to transmit bidirectional data over the same fiber but different wavelengths in the upstream and downstream directions on the same ODN, as shown in [Figure 4-5](#).

Figure 4-5 System transmission principles

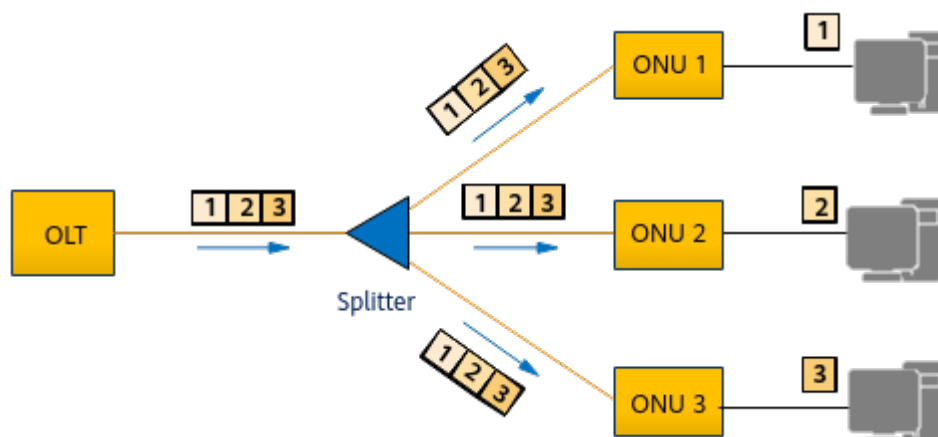


- Data is broadcast in the downstream direction.
- Data is transmitted in time division multiple access (TDMA) mode by ONUs in the upstream direction in different timeslots.

4.5.3 Downstream Working Principles

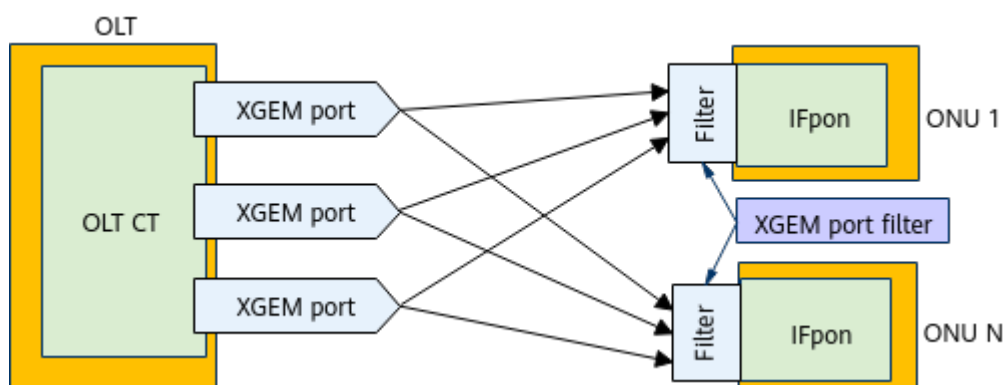
Downstream Transmission Principles

[Figure 4-6](#) shows the downstream transmission principles.

Figure 4-6 Downstream transmission principles

In the downstream direction, data is broadcast by an OLT to all ONUs. Each ONU accepts only data intended for it and discards other data.

Service Flow Forwarding Process

Figure 4-7 Service flow forwarding process in the downstream direction

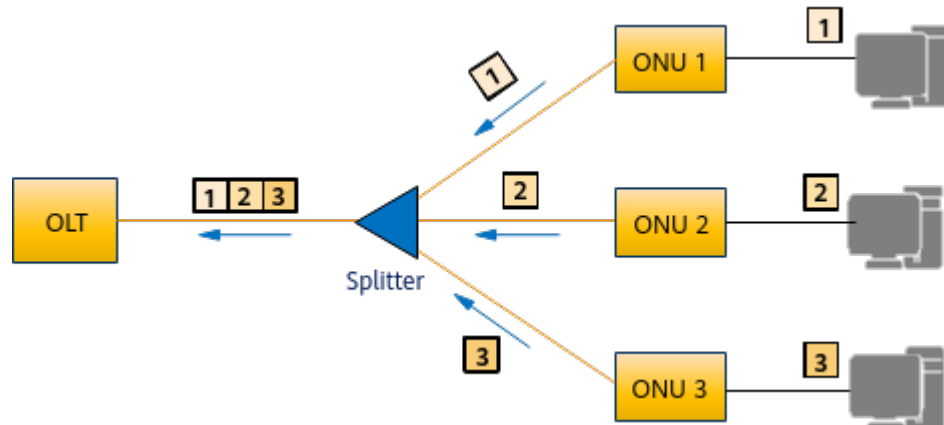
- An OLT channel termination (CT) multiplexes XGEM frames on a transmission medium by using XGEM port IDs as keys, so as to identify XGEM frames belonging to different downstream logical connections.
- Each ONU filters the downstream XGEM frames by its XGEM port ID and processes only the XGEM frames intended for it.
- One XGEM port can be used to carry XGEM frames to more than one ONU.

4.5.4 Upstream Working Principles

Upstream Transmission Principles

Figure 4-8 shows the upstream transmission principles.

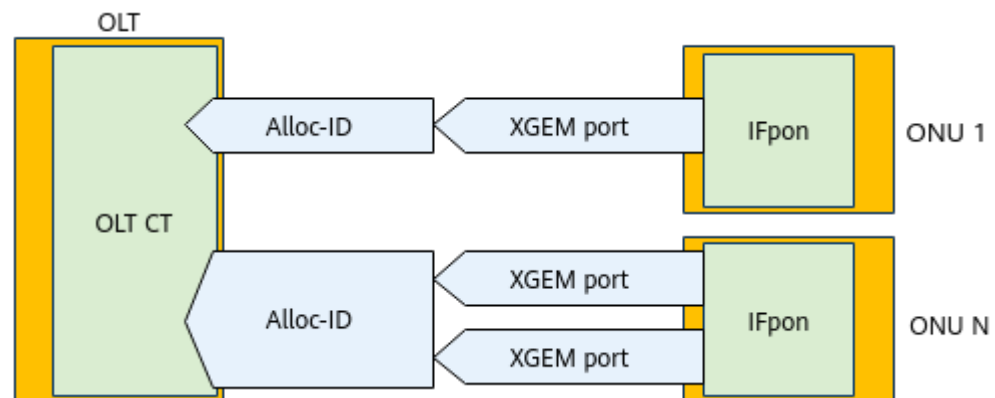
Figure 4-8 Upstream transmission principles



In the upstream direction, an ONU sends data to an OLT in an allocated timeslot in TDMA mode. Such transmission ensures that all ONUs send data in a permitted sequence, and prevents upstream data conflict.

Service Flow Forwarding Process

Figure 4-9 Service flow forwarding process in the upstream direction



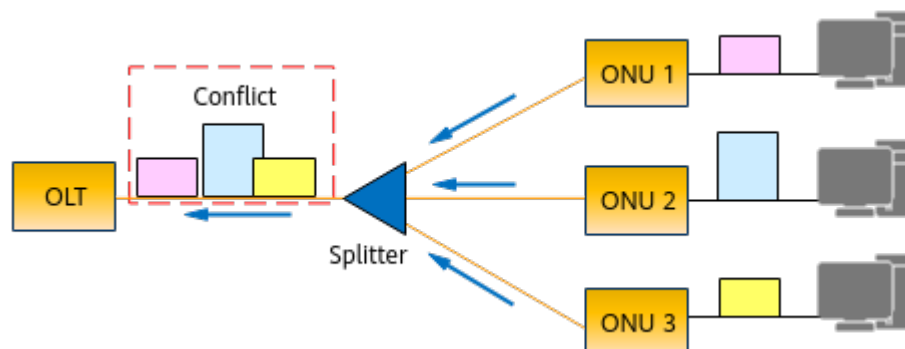
- The OLT CT grants upstream transmission opportunities or upstream bandwidth allocations to the traffic-bearing entities within subtending ONUs.
- Within an ONU, the traffic-bearing entity that receives the upstream bandwidth allocations is identified by its allocation ID (Alloc-ID).
- The bandwidth assigned to different Alloc-IDs is multiplexed in the time specified by the OLT CT in the bandwidth mapping for downstream transmission.
- In each bandwidth assignment, an ONU uses the XGEM port ID as the multiplexing key to identify XGEM frames belonging to different upstream logical connections.

4.6 Key 50G-PON Technologies

4.6.1 Ranging

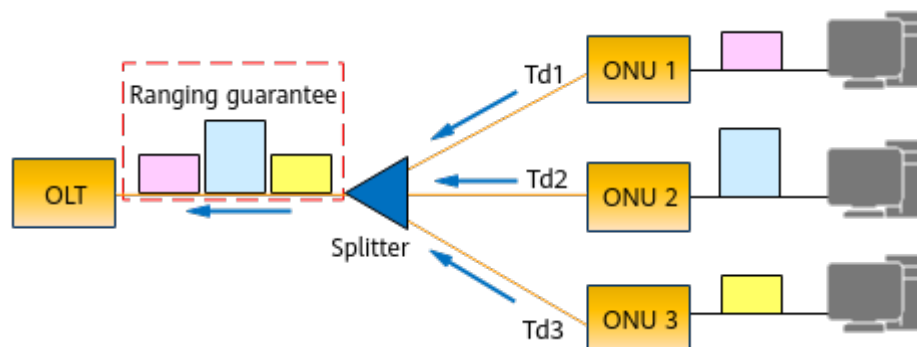
The physical distances from optical network units (ONUs) to an optical line terminal (OLT) differ from case to case. The round trip delays (RTDs) between an OLT and ONUs also vary as time goes by and the environment changes. Therefore, collisions may occur when ONUs send data in TDMA mode (in this mode, only one of the ONUs connected to an OLT PON port sends data at a moment), as shown in [Figure 4-10](#).

Figure 4-10 Cell transmission without ranging



To avoid collisions, ranging is triggered when an ONU is registered for the first time. The OLT measures the RTD of each ONU in the ranging process and adds an equalization delay (EqD, represented by the parameter T_d) for each ONU to ensure that the logical transmission distances of all ONUs connected to the same OLT PON port are the same. This prevents collisions during upstream transmission.

Figure 4-11 Cell transmission with ranging



NOTE

In the ranging process, the OLT must open a window and pause upstream transmission channels of other ONUs.

4.6.2 Burst Optical/Electrical Technology

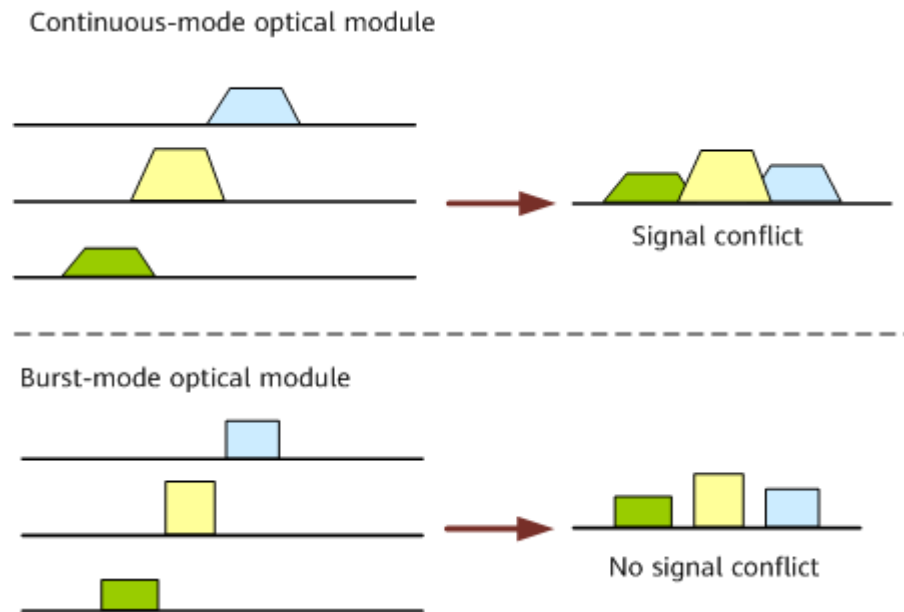
Working Principles of Burst Optical/Electrical Technology

In the upstream direction, 50G-PON works in TDM mode. Each ONU can send data only in the permitted timeslot. In the timeslot that does not belong to an

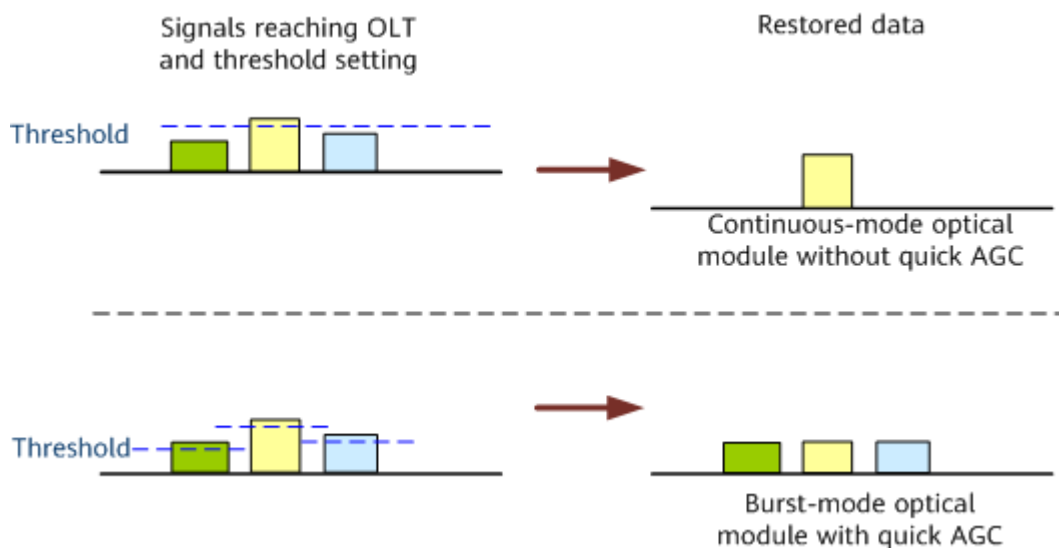
ONU, the optical module of the ONU must be disabled from sending signals. In this way, other ONUs can work properly. An OLT receives signals sent upstream from each ONU in burst mode by timeslot. To ensure the normal operation of the system:

- The optical module of an ONU must support burst transmission (as shown in [Figure 4-12](#)).
- The optical module of an OLT must support burst receiving (as shown in [Figure 4-13](#)).

Figure 4-12 Burst transmission by an ONU



Ranging can be implemented to prevent cells transmitted by different ONUs from conflicting with each other on the OLT. However, the ranging accuracy is ± 1 bit and the cells transmitted by different ONUs have a protection time of several bits (not a multiple of 1 bit). If the ONU optical modules do not support the burst receive and transmit function, the transmitted signals overlap and distortion occurs.

Figure 4-13 Burst receiving by an OLT

- The distance from each ONU to an OLT varies and therefore the optical signal attenuation varies for each ONU. As a result, the power and level of packets received by an OLT vary with time slots.
- If the optical module of an OLT does not support quick processing of burst optical power changes, signals may be incorrectly restored. (The signals are considered valid only when the level is higher than the threshold. If the level is lower than the threshold, the signals cannot be restored correctly.) The automatic gain control (AGC) function enables an OLT to dynamically adjust the threshold of the receive optical power according to the strength of the received optical signals to ensure that the signals of all ONUs can be correctly restored.

NOTE

In the 50G-PON downstream direction, an OLT broadcasts data to all ONUs. Therefore, the optical module of an OLT must support continuous transmission, and that of an ONU must support continuous receiving. The burst transmission and receiving functions are not required for the optical modules in the downstream direction.

Single-Frame Multi-Burst Technology

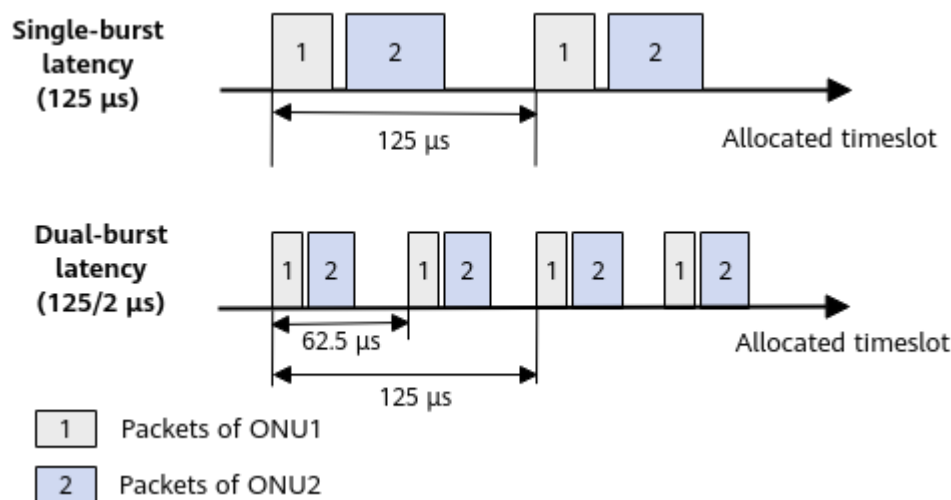
Because a PON system uses P2MP physical connections, the OLT needs to properly allocate receiving timeslots to all ONUs. For a specific ONU, the upstream timeslots are limited. The period after the end of an upstream timeslot to the start of the next upstream timeslot belongs to other ONUs. In this period, the ONU cannot send any data upstream, and caches data locally to transmit data at the next timeslot. Therefore, the upstream timeslot interval has a great impact on the upstream delay of ONUs.

In an ITU TDM PON system, the upstream timeslot allocation packet of an ONU is located in the bandwidth (BW) map with a fixed overhead in the frame header of each downstream frame, and each BW map corresponds to a 125 μ s upstream timeslot allocation for a downstream frame.

Figure 4-14 shows the mapping between the number of burst timeslots obtained by an ONU in each frame and the maximum delay of the upstream data. If ONU1

has only one upstream transmission timeslot in every 125 μs , the transmission interval can reach 125 μs , and the maximum upstream delay is 125 μs . If ONU1 has two upstream transmission timeslots in every 125 μs , the interval between the timeslots is 62.5 μs (125/2), and the upstream delay is reduced by 1/2. By analogy, if ONU1 has N upstream transmission timeslots in every 125 μs , the interval between the timeslots is 125/N μs , and the upstream delay is reduced to 1/N.

Figure 4-14 Principle of the single-frame multi-burst technology (using the single-frame dual-burst technology as an example)



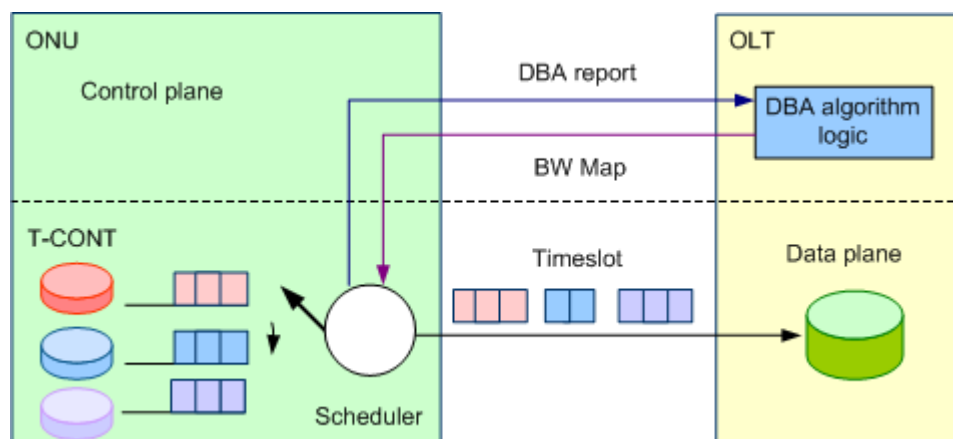
4.6.3 DBA

DBA Principles

DBA is short for dynamic bandwidth assignment. An OLT uses DBA to dynamically adjust the upstream bandwidth assigned to different ONUs to process the burst traffic from ONUs, meeting the ONU upstream bandwidth requirements and improving the utilization of the PON upstream bandwidth.

Figure 4-15 shows the DBA principles.

Figure 4-15 DBA principles



DBA implementation process:

- The DBA module in an OLT consistently collects DBA reports and uses a DBA algorithm to calculate the upstream bandwidth assigned to each ONU.
- The OLT sends the calculated result to each ONU using a bandwidth (BW) map.
- Each ONU transmits upstream data in burst mode in permitted timeslots defined in the BW map.

Highlights and Applications

DBA offers the following features:

- Based on ONUs' burst upstream service traffic, the OLT dynamically allocates an upstream bandwidth to each ONU in real time, improving upstream bandwidth utilization on PON ports.
- More users are supported on a PON port.
- Higher service bandwidths with burst requirements are supported than those before DBA is applied.

4.6.4 FEC

50G-PON increases the line rate, but the receiver sensitivity decreases, and transceiver performance needs to be improved to reuse massive existing ODNs. To lower the specification requirements for high-speed optical components, 50G-PON uses the low density parity check (LDPC) (17280, 14592) encoding and decoding solution to perform forward error correction (FEC), with an encoding efficiency about 84.44%.

Principles

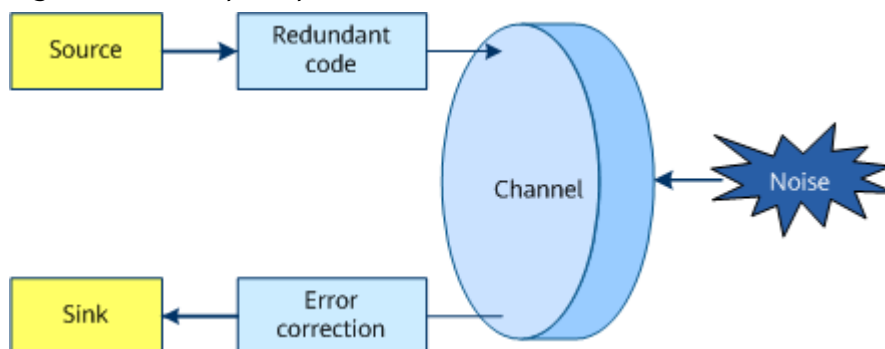
FEC is a data encoding technology that enables a data receiver to check for bit errors during transmission based on the encoding scheme.

Redundant codes are added to signals on the transmitter as error-correction codes (ECCs). Then, the receiver checks the signals for errors based on the ECCs and corrects an error if there is any.

Common FEC technologies include the Hamming code, RS code, LDPC code, convolutional code, and the like.

Figure 4-16 shows FEC principles.

Figure 4-16 FEC principles



The FEC algorithms used by 10G PON and 50G-PON comply with ITU-T standards, as shown in [Table 4-1](#).

Table 4-1 FEC algorithms used by 10G PON and 50G-PON

PON Technology	Upstream	Downstream
XG-PON	RS (248, 232)	RS (248, 216)
XGS-PON	RS (248, 216)	RS (248, 216)
50G-PON	LDPC (17280, 14592)	LDPC (17280, 14592)

 NOTE

The LDPC algorithm is classified into hard value input and soft value input based on whether the output data is decided. The hard value data is a 0 and 1 bit sequence of the signals after equalization decision and is input to the LDPC decoder for decoding. The soft value data is the original data that is not decided, and the log-likelihood ratio (LLR) of the input signals can be obtained, thereby improving the error correction performance.

Features and Applications

- Does not require retransmission and provides a high real-time performance.
- Requires an additional bandwidth. Users must balance the transmission quality and bandwidth.
- Checks and corrects errors after data is transmitted to the peer end, and does not apply to services for which retransmission is enabled.
- Applies to data transmission when the network quality is poor.
- Applies to services that have a low requirement on delay (The delay is large if retransmission is configured for services.).

4.7 50G-PON Security Policies

4.7.1 Line Encryption

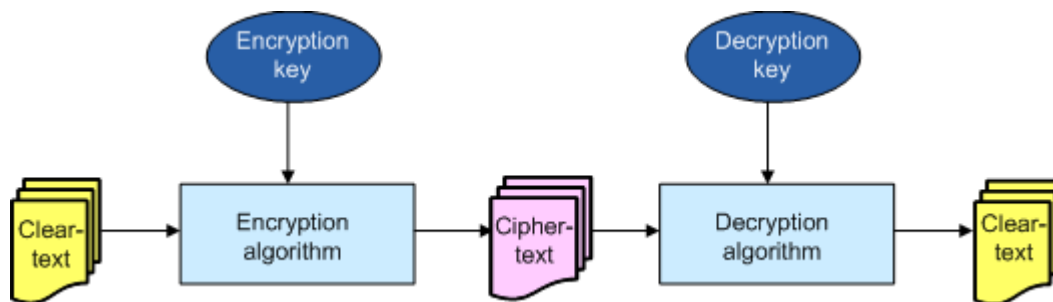
Context

Line encryption technologies are required to prevent the data theft risk.

50G-PON line encryption supports bidirectional encryption in the upstream and downstream directions to ensure secure bidirectional data transmission.

Working Principles

[Figure 4-17](#) shows the working principles of 50G-PON line encryption, in which clear-text packets are encrypted into cipher-text packets using encryption algorithms (AES-128, AES-256) to improve transmission security.

Figure 4-17 Line encryption process

To prevent the risks caused by the cracking of the encryption key, the key update technology is used to periodically update the encryption key to improve the security.

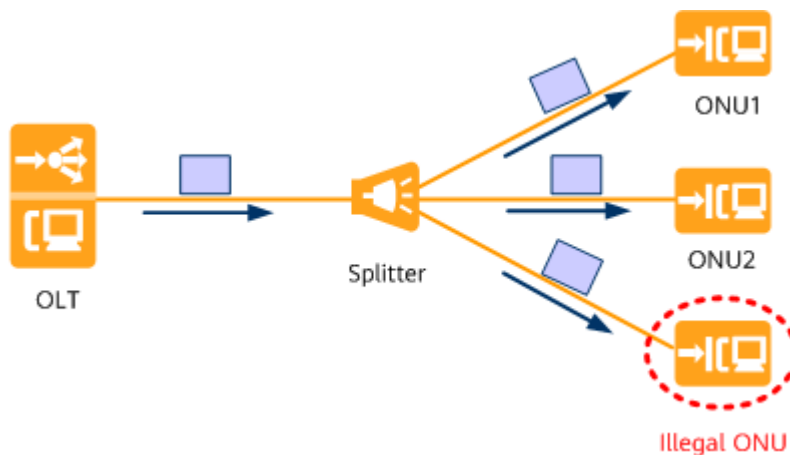
Features and Applications

- The line encryption algorithms neither increase the overhead nor require additional bandwidth.
- The line encryption algorithms do not increase the transmission delay.
- It is recommended that you enable the line encryption function in scenarios that have high requirements on line security.

4.7.2 ONU Authentication

Context

In the P2MP PON system architecture, downstream data is broadcast to all ONUs, as shown in [Figure 4-18](#). As a result, illegal ONUs may also have the opportunity to receive data.

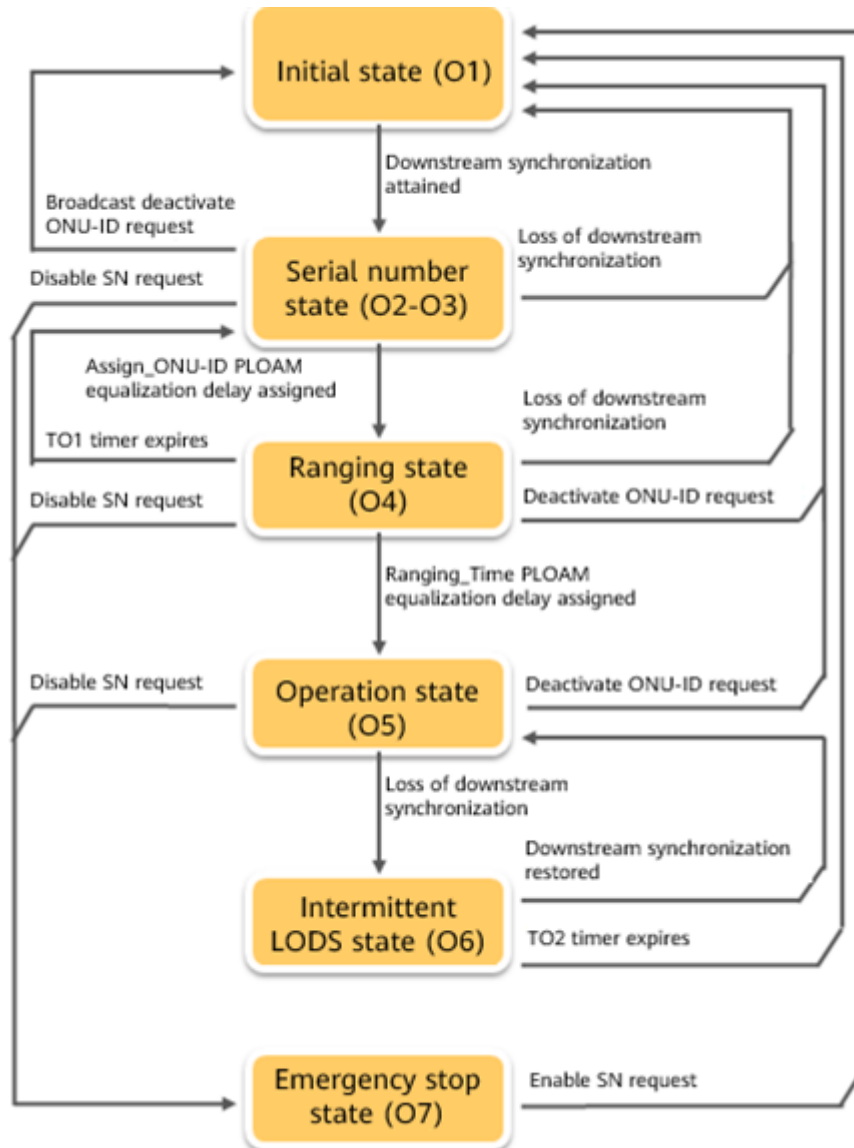
Figure 4-18 Downstream data transmission process

To solve this problem, a PON system uses authentication technology to ensure the validity of connected ONUs.

Authentication Process

Figure 4-19 shows the 50G-PON authentication process, involving six states and two timers.

Figure 4-19 Authentication process



Six states:

- O1: Initial state
- O2-3: Serial number state
- O4: Ranging state
- O5: Operation state
- O6: Intermittent LODS state
- O7: Emergency stop state

Two timers:

- TO1 timer
- TO2 timer

4.7.3 Continuous-Mode ONU Detection

Overview

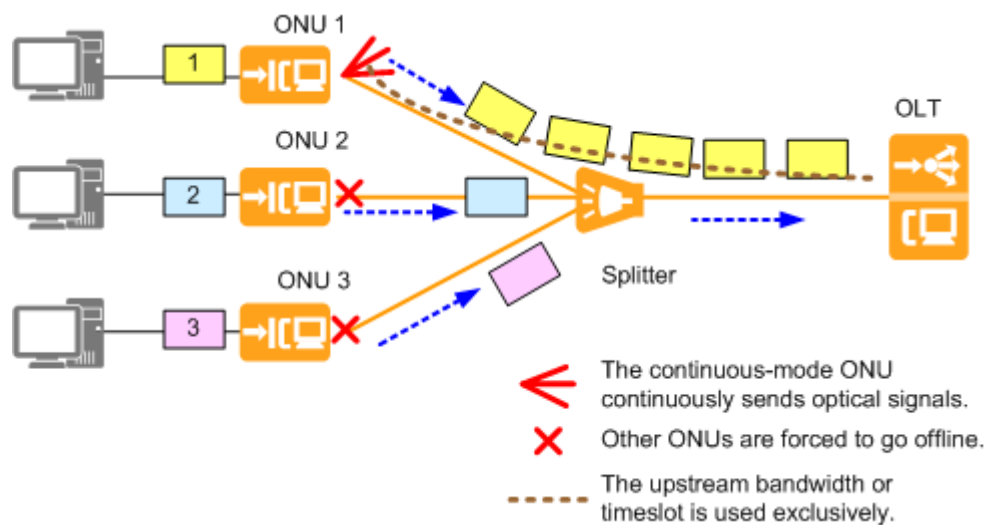
PON networks use the P2MP network architecture. They use TDMA in the upstream direction. ONUs must send optical signals upstream at the timeslots allocated by an OLT to prevent data conflict.

A continuous-mode ONU is also called a continuous-mode rogue ONU. It continuously sends optical signals to the upstream direction.

A continuous-mode ONU adversely affects the system as follows:

- If this ONU is online, some or all ONUs connected to the same PON port may go offline or frequently go offline and online.
- If this ONU has not been configured, other ONUs connected to but not configured on the same PON port will not be discovered by the OLT.

Figure 4-20 Rogue ONU



Prerequisites for Rogue ONU Detection

- By checking and analyzing the optical signals in the upstream direction, an OLT can identify and isolate rogue ONUs from non-malicious users, but cannot identify ONUs that are intentionally damaged or that are incompliant with standard requirements. How to handle these types of ONUs is not within the scope of this document.
- A continuous-mode ONU can be detected only when it can parse downstream PLOAM messages and correctly respond to the messages.

- An OLT can quickly locate a continuous-mode ONU connected to a PON port only when the ONU supports standard PLOAM messages and the optical module of the ONU is correctly controlled.

Continuous-Mode ONU Detection

Continuous-mode ONU detection, also called rogue ONU detection, is used to detect continuous-mode ONUs and isolate them to ensure proper system running. The continuous-mode ONU detection process involves three stages, checking, detection, and isolation.

- **Checking:** The OLT periodically checks whether a continuous-mode ONU is connected to a PON port. The checking process determines whether there is a continuous-mode ONU, but cannot locate any continuous-mode ONU.

The OLT opens an empty window in the upstream direction to detect whether any ONU sends optical signals upstream in this empty window. If the OLT receives any optical signals, it then goes to the detection stage to locate the ONU that sends the optical signals.

- **Detection:** The OLT locates a continuous-mode ONU.

The OLT issues commands to ONUs in turn to instruct the optical module of each ONU to send optical signals upstream, and checks whether any ONU sends optical signals at a time not within the authorized timeslot. If an ONU sends optical signals at a time not within the authorized timeslot and causes other online ONUs to go offline, this ONU is a continuous-mode ONU. In the detection process, the OLT checks all ONUs connected to a PON port to detect all continuous-mode ONUs.

- **Isolation:** The OLT issues a command to power off the optical module of a continuous-mode ONU, preventing this ONU from adversely affecting other ONUs connected to the same PON port.

Once the optical module of an ONU is disabled from sending optical signals upstream by the OLT, the effect is permanent unless the OLT issues another command to enable the upstream optical signal transmission. That is, the upstream optical signal transmission will not be enabled again even after the ONU is reset or powered off and restarted. This mechanism ensures that a continuous-mode ONU is completely isolated.

NOTE

By default, an OLT only checks for rogue ONUs and does not automatically detect or isolate rogue ONUs.

4.8 50G-PON Evolution Solution

4.8.1 50G-PON Network Evolution Overview

PON networks that have been deployed by operators can smoothly evolve to 50G-PON networks.

Why Smooth Evolution Is Required?

During network evolution, operators attach much importance to reusing live network resources and reducing upgrade and evolution costs. To enable smooth

evolution from deployed PON networks to 50G-PON networks and meet networking requirements of different services, deployed PON networks and 50G-PON networks may coexist for a certain period of time. To save the deployment space in equipment rooms, reduce the power consumption of optical access equipment, effectively reuse ODN resources on the live network, and reduce the network construction costs of operators, a proven best practice is to use multi-mode optical transceiver modules in CO equipment. Therefore, during the evolution to 50G-PON, two-step migration can be adopted for PON technology coexistence. First, evolution from PON to 10G PON, and then evolution from 10G PON to 50G-PON. Continuous bandwidth upgrade is achieved while network evolution and costs are considered.

Prerequisites for Smooth Evolution from PON to 50G-PON

50G-PON provides the following features to support smooth evolution from existing PON to 50G-PON:

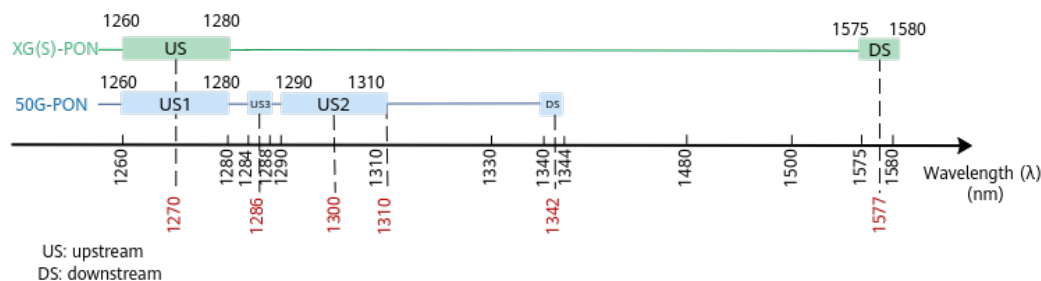
- In the upstream direction, 50G-PON uses the US3 (1284–1288 nm) wavelength option, which does not overlap with the wavelength planning for XG(S)-PON. Therefore, 50G-PON can share an ODN with XG(S)-PON in WDM mode.
- The service provisioning and deployment operations for 50G-PON and existing PON networks are largely the same. Therefore, the network management system and service provisioning system can be reused.

50G-PON Wavelength Option for Coexisting with XG(S)-PON

In the G.9804.1 standard for 50G-PON, a third upstream wavelength frequency band US3 (1284–1288 nm) is added between the existing upstream wavelength frequency bands US1 (1260–1280 nm) and US2 (1290–1310 nm). 50G-PON can use the US3 (1284–1288 nm) wavelength option which does not overlap with the wavelength planning for XG(S)-PON to coexist with XG(S)-PON on the live network in WDM mode.

Figure 4-21 Shows the wavelength distribution of XG(S)-PON and 50G-PON.

Figure 4-21 Wavelength distribution of XG(S)-PON and 50G-PON



4.8.2 Working Principles of 50G-PON Combo PON

The dual-mode Combo PON technology enables PON systems complying with ITU-T and IEEE standards to coexist with and evolve to 50G-PON.

4.8.3 Evolution Solution for XGS-PON Networks

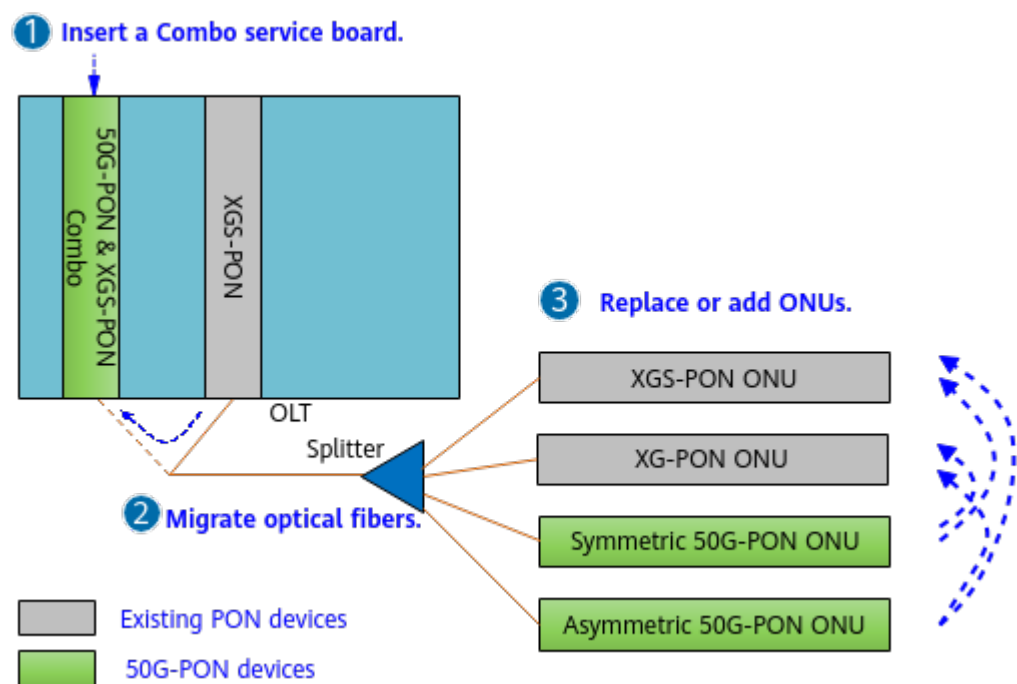
This topic describes how to smoothly upgrade XGS-PON to 50G-PON using the symmetric 50G-PON & XGS-PON dual-mode Combo solution.

50G-PON uses upstream and downstream wavelengths different from those used by XGS-PON. With the WDM technology, 50G-PON and XGS-PON services can be carried over the same optical fiber. Customers only need to replace the boards in OLT service subracks with symmetric 50G-PON & XGS-PON dual-mode Combo boards. In this way, XGS-PON can be smoothly upgraded to symmetric 50G-PON by reusing live ODNs without adding external devices or facilities. This saves equipment room space and construction costs, and improves deployment and O&M efficiency.

Evolution Solution

Add symmetric 50G-PON & XGS-PON dual-mode Combo service boards to implement smooth evolution from XGS-PON to symmetric 50G-PON, as shown in [Figure 4-22](#).

Figure 4-22 Evolution from XGS-PON to symmetric 50G-PON



Procedure

1. Add symmetric 50G-PON & XGS-PON dual-mode Combo service boards to an OLT.
2. Migrate the feeder optical fibers from XGS-PON ports to symmetric 50G-PON & XGS-PON dual-mode Combo ports.
3. Add symmetric 50G-PON ONUs or replace existing XG-PON or XGS-PON ONUs on the live network.

NOTE

- An XGS-PON port can connect XG-PON and XGS-PON ONUs.
 - The planned logical distances from XG(S)-PON, symmetric 50G-PON, and asymmetric ONUs to symmetric 50G-PON & XGS-PON dual-mode Combo ports must be the same after ranging and compensation.
4. Configure services. For details, see [4.9 50G-PON Service Configuration](#).

4.9 50G-PON Service Configuration

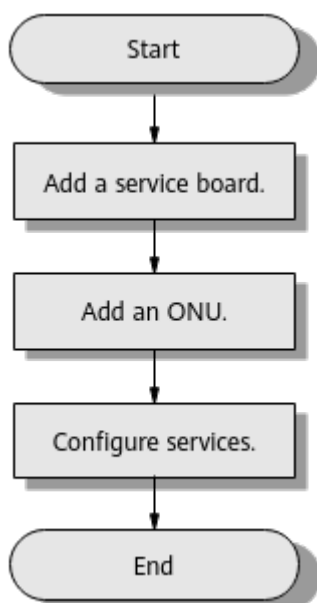
Context

[Figure 4-23](#) shows the process of configuring 50G-PON services. After the 50G-PON Combo mode is configured, you can configure the services according to the configuration cases for the corresponding scenarios.

NOTE

This document uses the 50G-PON Combo service board as an example.

Figure 4-23 50G-PON service configuration



Procedure

Step 1 Add a service board.

In global config mode, run the **board add** *frameid/slotid board-type* command to add a service board.

You can add a service board to an OLT in either of the following ways:

- Manually insert the service board. This method is applicable to the scenario where a service board already exists. You can directly insert the service board into a subrack.

- Add a service board offline. This method is applicable to the scenario where a service board is not inserted into a subrack and services need to be pre-configured for the board.

 NOTE

- After a service board is added successfully, it is in the Failed state. You can still configure and query the data of the service board.
- After you manually insert a service board into the corresponding slot, the service board status is switched to **Normal** and the configuration data takes effect. The type of the manually inserted service board must be the same as that of the service board added offline; otherwise, the service board cannot run normally.

Step 2 Add an ONU.

You can add an ONU to an OLT in either of the following ways:

- Add an ONU offline. In this scenario, before an ONU is installed, run the **ont add** command on the OLT to manually add the ONU and configure it. After the ONU goes online, the OLT authenticates the ONU and issues configurations to it.
- Add an ONU online. In this scenario, after an ONU is installed, run the **port ont-auto-find** command to enable the ONU auto-find function. The ONU auto-find function is used to periodically check whether a new ONU goes online. After an online ONU is found, the ONU is added and configured.

 NOTE

- By default, the ONU auto-find function is disabled for an OLT PON port.
- You can run the **display ont autofind** command to query the ONUs that have been automatically found by a port.

Step 3 Configure the services according to the corresponding configuration guide.

- For a 50G-PON FTTH network, configure services according to the FTTH configuration guide.
 - For carrier customers, visit: [FTTH Configuration Guide](#)
 - For enterprise customers, visit: [FTTH Configuration Guide](#)
- For a 50G-PON FTTB/FTTC network, configure services according to the FTTB/FTTC configuration guide.
 - For carrier customers, visit: [FTTB and FTTC Configuration Guide](#)
 - For enterprise customers, visit: [FTTB and FTTC Configuration Guide](#)

----End

4.10 50G-PON Standards and Protocols

50G-PON standards are as follows:

- ITU-T G.9804.1 (11/2019): Higher speed passive optical networks – Requirements
- ITU-T G.9804.2 (09/2021): Higher speed passive optical networks – Common transmission convergence layer specification
- ITU-T G.9804.3 (09/2021): 50-Gigabit-capable passive optical networks (50G-PON): Physical media dependent (PMD) layer specification

- ITU-T G.9805 (02/2022): Coexistence of passive optical network systems
- ITU-T G.988 (11/2022): ONU management and control interface (OMCI) specification