

Article Overview

GPON provides asymmetric data transmission with downstream speeds up to 2.5 Gbps and upstream speeds up to 1.25 Gbps, using WDM and TDMA for efficient point-to-multipoint communication.

Downlink (Downstream) Transmission

In GPON, the downlink refers to data sent from the Optical Line Terminal (OLT) at the service provider to the end-user devices (ONT/ONU). GPON uses wavelength-division multiplexing (WDM) to separate upstream and downstream signals over the same optical fiber. The downstream wavelength typically ranges from 1480 nm to 1500 nm, and data is broadcast to all connected ONUs, allowing multiple users to receive data simultaneously. The maximum downstream bandwidth is 2.488-2.5 Gbps, shared among all users connected through optical splitters, with typical split ratios of 1:32, 1:64, or 1:128 depending on network design and distance constraints .

Uplink (Upstream) Transmission

The uplink carries data from ONUs back to the OLT. Unlike downstream, upstream traffic is time-division multiplexed (TDMA) to prevent collisions, as multiple ONUs share the same fiber. Each ONU is assigned a specific timeslot based on its distance from the OLT, which is determined through a process called ranging. The upstream wavelength typically ranges from 1290 nm to 1330 nm, and the maximum upstream speed is 1.244-1.25 Gbps. TDMA ensures that each ONU transmits only during its allocated slot, maintaining orderly and efficient data flow .

Key Mechanisms

- o Wavelength-Division Multiplexing (WDM): Separates upstream and downstream signals on the same fiber, enabling simultaneous bidirectional communication .
- o Time-Division Multiple Access (TDMA): Allocates precise timeslots for each ONU to transmit upstream data, avoiding collisions .
- o Optical Splitters: Passive devices that divide a single fiber signal to multiple ONUs, supporting point-to-multipoint architecture .
- o Ranging: Measures the distance of each ONU to the OLT to synchronize upstream transmissions and maintain proper timing .

Summary

GPON is an asymmetric, point-to-multipoint fiber network optimized for residential and business broadband. Its downstream bandwidth is higher than upstream, reflecting typical user traffic patterns, and it efficiently



GPON device uplink and downlink

manages multiple users through WDM and TDMA. This architecture allows service providers to deliver high-speed internet, VoIP, and IPTV services over a single optical fiber while minimizing infrastructure costs .

Learn how GPON OLT works, its features, and how to choose the right device for efficient fiber network deployment.

This document describes the Gigabit Passive Optical Network (GPON) technology and how

GPON is abbreviation for Gigabit Passive Optical Networks which is defined series G.984.1 through G.984.6 by ITU-T

How GPON Works A GPON network is capable of transmitting ethernet, TDM (Time Division Multiplexing) as well as ATM traffic. A

GPON vs EPON: Data Rate GPON: GPON supports a variety of data rate levels, which can support asymmetric uplink

What Is PON? Passive Optical Network (PON) is a point-to-multipoint optical access technology. It uses only optical

1. What is GPON ONU (ONT)? A GPON ONU, commonly called an ONT (Optical Network

OLT equipment is the same as ONU equipment, and is also an optical and optical integrated device. OLT uplink local

Note 3: GPON products support multiple speed levels, which means there are other

Q&A What's the difference between a GPON OLT SFP and a GPON OLT Stick SFP? Passive Optical Network (PON)

10G-PON (also known as XG-PON or G.987) is a 2010 computer networking standard for data links, capable of delivering shared

Visit your product's support page, select the correct hardware version for your device, and check either the Datasheet or the firmware

GPON exhibits a downlink bandwidth of 2.488 Gbps and an uplink bandwidth of 1.244 Gbps. In contrast, EPON offers

GPON device uplink and downlink

Uplink refers to transmissions from a ground-based device (like a mobile phone) to a cell tower, while downlink refers to

A Gigabit passive optical network (GPON) topology consists of an optical line termination (OLT) device that is

GPON network using fiber OLT, splitter and ONU connected on the downlink using different wavelength data bearing.

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