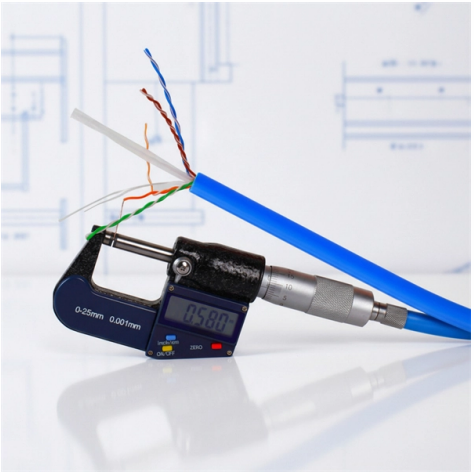
GPON Network Diagram and Device Switching Terminal



Overview

GPON NETWORK INFRASTRUCTURE This network type is totally passive deploying fibre optic cables and splitters to directly connect the users to the main node.

Key Takeaways

A GPON network uses a point-to-multipoint fiber topology with an Optical Line Terminal (OLT) at the central office, passive optical splitters in the distribution network, and Optical Network Terminals (ONTs) at subscriber premises.

GPO

N Architecture OverviewGPON (Gigabit Passive Optical Network) is a high-bandwidth, shared fiber access technology designed to replace traditional Ethernet switching in campus or FTTP networks. It uses a two-tier optical network instead of the three-tier Ethernet design, reducing the need for multiple active switches and simplifying infrastructure management.

Key Components

Optical Line Terminal (OLT): Located at the central office, the OLT aggregates all optical signals from ONTs and converts them into electrical signals for Ethernet forwarding. It has PON ports to connect to the optical distribution network and LAN/SFP ports for uplinks to network switches. Optical Splitters: Passive devices that divide a single optical signal from the OLT into multiple outputs, enabling a point-to-multipoint (P2MP) topology.

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Typical split ratios range from 1: 16 to 1: 128, depending on network design and optical attenuation. Optical Network Terminals (ONTs) / Optical Network Units (ONUs): Installed at subscriber premises, ONTs convert optical signals to electrical signals for end-user devices. They may provide LAN ports, Wi-Fi, and AES encryption for secure communication.

Wavelength-

Division Multiplexing (WDM): GPON uses WDM to transmit upstream (1290–1330 nm) and downstream (1480–1500 nm) data over the same fiber, with downstream data broadcasted and upstream data sent in TDMA timeslots.

Device Switching Terminals

While GPO

N reduces the need for multiple Ethernet switches, network switches may still be deployed downstream of ONTs to extend connectivity within offices, schools, or buildings. These switches connect to ONTs via copper cables (Cat 6/6A) and provide additional ports for end devices. Network TopologyOLT at Central Office: Aggregates and manages all optical signals.

Single Fiber to Splitter: A single fiber from the OLT connects to a passive optical splitter.

Splitter to ON

Ts: The splitter distributes the signal to multiple ONTs at subscriber locations.

ON

T to End Devices: ONTs provide LAN or Wi-Fi connectivity to desktops, phones, or other devices. Optional switches can expand the number of available ports.

Bandwidth and Data Rates

Downstream: 2. 488 Gbps (shared among users)Upstream: 1. 244 Gbps (shared via TDMA)Encryption: Ensures data privacy for each subscriber.

Diagram Representation

A simplified GPON network diagram can be visualized as: CodeCopyCentral Office (OLT) | | Single Fiber | Passive Optical Splitter / | ONT1 ONT2 ONT3 | | |Switch Switch Switch (optional) | | |End Devices (PCs, Phones, Wi-Fi) This diagram illustrates the point-to-multipoint architecture, where one OLT serves multiple ONTs through a passive splitter, and optional switches extend connectivity to multiple end devices. SummaryGPON networks provide efficient, high-speed fiber access with reduced active equipment in the distribution network.

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The OL

T, splitters, and ONTs form the core of the network, while switching terminals downstream of ONTs allow flexible connectivity for multiple devices within subscriber premises. This architecture supports voice, video, and data services over a single fiber infrastructure, making it ideal for FTTP deployments.

Article Content

GPON NETWORK INFRASTRUCTURE

This network type is totally passive deploying fibre optic cables and splitters to directly connect the users to the main node of the network through a point-multipoint design, with a single optical fibre shared

Getting Started With OLT Network Configuration, Cisco Catalyst PON ...

A Gigabit passive optical network (GPON) topology consists of an optical line termination (OLT) device that is connected to multiple optical network terminals (ONTs) through an optical

What''s the OLT (Optical Line Terminal)?

Learn how OLT works in GPON and FTTH networks. Covers OLT architecture, upstream/downstream process, wavelengths, and 2025 technology trends.

What is GPON and How It Works? A Complete Guide to GPON OLT

Learn what is GPON technology and how it works. This guide breaks down standard GPON network diagrams, topologies, the core role of GPON OLT, and applications in residential GPON home

Gigabit Passive Optical Networks (GPON) | Electronics Tutorial

The interaction between the Optical Line Terminal (OLT) and Optical Network Unit (ONU) in a Gigabit Passive Optical Network (GPON) is governed by a strict hierarchical protocol that ensures efficient

The FOA Reference For Fiber Optics

FTTH Active Star Network The simplest way to connect homes with fiber is to have a fiber link connecting every home to the phone company switches, either in the nearest central office (CO) or to

GPON ONU/ONT and OLT: PON Architecture | Elfcam

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GPON (Gigabit Passive Optical Network) is the standard defined by ITU-T G.984 and is now the dominant technology in FTTH deployments in Europe and France. It offers 2.5 Gbps

Gpon Network Architecture Diagram

The following diagram shows the architecture of a basic two wavelength GPON network architecture, which is probably the most common implementation. The downstream wavelength is

Passive optical network

Passive optical network A fiber optic cable assembly with SC APC connectors, as commonly used to link optical network terminals to passive optical networks A

Gpon Network Architecture Diagram

And a GPON Optical Network Terminal (ONT) is installed at each subscriber''s home. Voice, video, and data traffic must all be delivered across the single GPON downstream wavelength.

Cisco Catalyst PON Series Switches Hardware Installation Guide

A passive optical network (PON) or Gigabit Passive Optical Network (GPON) is a point-to-multipoint (P2MP) network that uses a combination of active transmission equipments and

Understanding GPON ONU: A Comprehensive Guide – VCELINK

GPON ONU is a terminal device that converts optical signals into electrical signals, providing high-speed broadband connections with multiple service interfaces.

PON Architecture

PON Architecture: PON technology has its own terminology the CO head-end is called an OLT.ONUs are the CPE devices (sometimes called ONTs in ITU).

Design, implementation and evaluation of a Fiber To The Home

Many technologies have been adopted to meet the need for high bandwidth but they are not taken into account because longer-term growth is expected for access networks. Gigabit Passive

Simplified functional block diagram of the GPON ONU US-TX and its ...

Simplified functional block diagram of the GPON ONU US-TX and its interfaces to the network termination (NT) digital application-specified integrated circuit (ASIC).

Gigabyte Passive Optical Network (GPON)

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How GPON Works A GPON network is capable of transmitting ethernet, TDM (Time Division Multiplexing) as well as ATM traffic. A GPON network consists of OLT (Optical Line Terminals), ONU

GPON Technology Tutorial: A Beginner''s Guide (2026)

How does GPON Work? With a grasp of GPON''s fundamentals, delving into its functioning is a logical step. Central to GPON''s operation is its point-to-multipoint access fiber optic

What is GPON ONU(ONT) and GPON OLT?

1. What is GPON ONU (ONT)? A GPON ONU, commonly called an ONT (Optical Network Terminal), is the device installed at the user''s premises. It serves as the final access point of

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