

Passive Optical Network Structure Composition



Overview

The Definitive Guide to Passive Optical Network (PON): Architecture. Comprehensive guide to Passive Optical Network (PON) technology, covering GPON, EPON.

Key Takeaways

A Passive Optical Network (PON) uses a point-to-multipoint fiber-optic architecture with an Optical Line Terminal (OLT), passive splitters, and Optical Network Units (ONUs) or Terminals (ONTs) to deliver high-speed data from a single source to multiple endpoints without powered devices in the distribution network. Core Components

Optical Line Terminal (OLT): Located at the service provider's central office, the OLT serves as the interface between the provider's network and the PON. It aggregates data streams, manages bandwidth allocation, and coordinates communication with multiple ONUs/ONTs . **Optical Network Unit (ONU) / Optical Network Terminal (ONT):** These devices are located near the end users. They convert optical signals from the fiber into electrical signals for customer equipment. The distinction between ONU and ONT often depends on whether the device serves multiple users (ONU) or a single user (ONT), . **Optical Distribution Network (ODN):** This is the physical fiber infrastructure connecting the OLT to the ONUs/ONTs. It includes feeder fibers, distribution fibers, drop fibers, and passive optical splitters . **Optical Splitters:** Passive, unpowered devices that divide a single optical signal from the OLT into multiple paths to serve many users. They also combine upstream signals from multiple ONUs into a single fiber back to the OLT .

Network Topology

PONs use a point-to-multipoint topology, where a single fiber from the OLT branches through splitters to reach multiple end users. Downstream signals are broadcast to all connected premises, while upstream signals are combined using time-division multiple access (TDMA) protocols. This structure reduces the amount of fiber and central office equipment compared to point-to-point architectures.

Standards and Variants

- GPON (Gigabit-capable PON): Provides 2.488 Gbit/s downstream and 1.244 Gbit/s upstream, using GEM encapsulation for efficient traffic packaging.
- 10G-PON: Offers 10 Gbit/s downstream and 2.5 Gbit/s upstream, designed to coexist with GPON devices.
- XGS-PON: Delivers symmetrical 10 Gbit/s speeds for both upstream and downstream.
- Coherent PON: Uses advanced modulation and local oscillator lasers at the ONU for higher data rates and flexible channel selection.

Advantages

PONs provide high bandwidth, efficient fiber usage, and reduced operational costs by eliminating powered devices in the distribution network. They are widely deployed for fiber-to-the-home (FTTH), fiber-to-the-office (FTTO), and fiber-to-the-cell (FTTC) applications, supporting residential, commercial, and mobile users. This architecture allows ISPs to deliver triple-play services (voice, data, video) efficiently while maintaining scalability for future bandwidth demands.

Article Content

The Definitive Guide to Passive Optical Network (PON): Architecture ...

Comprehensive guide to Passive Optical Network (PON) technology, covering GPON, EPON, XGS-PON, NG-PON2,

Passive Optical Networks (PON): Components and Applications

Dive deep into the world of Passive Optical Networks (PON). Explore its key components, understand its structure, and

Passive Optical Network Architecture

PON architecture, or Passive Optical Network architecture, is defined as a passive optical network deployed in a point-to-multipoint

What Is Passive Optical Networking (PON)?

Passive optical networking (PON) provides Ethernet connectivity from a main data source to endpoints, using a technique called

Introduction to Passive Optical Network

The network path between the terminals is known as Optical Device Network (ODN), which comprises passive optical components,

The Core Passive Optical Network Components Explained

The components of a Passive Optical Network—the intelligent OLT, the user-facing ONU/ONT, and the simple yet

Passive Optical Networks Progress: A Tutorial

PONs are assembled from passive devices, such as optical fibers, connectors and power splitters, with active elements

Passive Optical Network (PON) design and managing 101

A passive optical network is a fiber-based network architecture that uses unpowered (passive) splitters to enable a

Introduction To PON (Passive Optical Network) And Its Network ...

PON features a point-to-multipoint (P2MP) structure, consisting of three core components: Optical Line Terminal

Passive Optical Networks: Review and Road Ahead

This paper presents a realistic description on various Passive optical network (PON) technologies. A brief comparison between

Passive optical network

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

Passive optical network (PON) supported networking

Passive optical network (PON) research and technology have matured in recent years and firmly established PONs as

Passive Optical Network

The PON (Passive Optical Network) is a passive optical network that is typically deployed in a point-to-multipoint fashion similar to a

Passive Optical Access Networks: State of the Art and Future ...

A complete and systematic overview of passive optical access networks is presented in this paper, concerning both

Transceivers_for_Passive_Optical_Networks [Compatibility

Preface Overview of Passive Optical Networks (PON) Overview of the structure of a PON Transceiver (TRX) Transmitter (TX) design

(PDF) Passive Optical Networks

Passive Optical Networks a broadband network access using the fiber-optics telecommunication technology and is a point-to

Coherent passive optical network: applications, technologies, and ...

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(PDF) Passive optical networks: Principles and practice

We propose and demonstrate a star-ring network architecture and wavelength assignment scheme for multi

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