

Article Overview

ONU (Optical Network Unit) converts optical signals to electrical signals for end users, while optical splitters passively divide a single optical signal from the OLT to multiple ONUs in a PON.

ONU Equipment Overview

An ONU (or ONT, Optical Network Terminal) is the user-side device in a PON system that interfaces with the subscriber's premises. It performs the following functions:

- o **Signal Conversion:** Converts downstream optical signals from the OLT into electrical signals for devices like computers, phones, or set-top boxes, and converts upstream electrical signals back into optical signals for transmission to the OLT .
- o **Data Aggregation:** Collects and organizes upstream data from multiple end-user devices before sending it to the OLT.
- o **Network Management:** Supports functions such as bandwidth allocation, ranging, and signaling control, ensuring each ONU communicates efficiently with the OLT .
- o **Deployment:** ONUs can connect via fiber directly to homes (FTTH), buildings (FTTB), or other access points, and may use additional media like copper or Wi-Fi for internal distribution . The ONU is a powered device, unlike the passive components in the network, and works in a master-slave relationship with the OLT, which manages signaling and monitors ONU status .

Optical Splitter Working Principle

An optical splitter is a passive device in the Optical Distribution Network (ODN) that allows a single optical signal from the OLT to be shared among multiple ONUs . Its key principles include:

- o **Signal Division:** The splitter has one upstream input and multiple downstream outputs. Light from the input fiber is distributed to all output fibers, enabling one OLT port to serve multiple subscribers .
- o **Passive Operation:** No power is required; the splitter relies on optical physics to divide the signal, reducing operational costs and maintenance.
- o **Signal Coupling:** In FBT (Fused Biconical Taper) splitters, light energy partially transfers between closely aligned fiber cores during the tapering process. In PLC (Planar Lightwave Circuit) splitters, the splitting occurs on a semiconductor chip using integrated optical waveguides .
- o **Architectures:**
 - o **Centralized Splitting:** A single-stage splitter connects the OLT directly to multiple ONUs, suitable for dense user areas .
 - o **Cascaded Splitting:** Multiple splitters in series allow flexible distribution over larger areas, balancing cost

and signal loss .

- o Signal Loss: Each split reduces optical power (e.g., ~3.5 dB for a 1:2 split), which affects transmission distance and bandwidth per user .

Integration in PON

In a typical PON:

- o The OLT at the central office sends downstream optical signals.
- o The optical splitter divides the signal to multiple ONUs.
- o Each ONU converts the optical signal to electrical signals for end-user devices and sends upstream data back through the same splitter to the OLT . This combination of active ONU devices and passive optical splitters enables cost-effective, scalable, and efficient fiber-to-the-home networks.

One component makes PON deployment scalable and efficient: the fiber optic splitter. It

This post provides a introduction to how does a fiber optic splitter work, and optical fiber splitter application in FTTH.

Since data is broadcast to all ONUs (Optical Network Units), each ONU receives the same data. However, using a

Explore the essential roles and functions of Optical Network Unit (ONU) in fiber optic networks. Learn how ONU works

Fiber-optic splitter A fiber-optic splitter, also known as a beam splitter, is based on a quartz substrate of an integrated waveguide

By dividing a single optical signal into multiple outputs, optical splitters allow one Optical Line Terminal (OLT) to serve

PON (Passive Optical Network) is a passive optical access network based on optical fibers. Its core feature is that no

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

What's an optical splitter? How does the fiber optic splitter work? How many fiber splitter

ONU equipment and optical splitter working principle

Varied distance between each ONU/ONT and OLT results in optical signal attenuation. As a result, power and level of

The Optical Distribution Network (ODN) is the physical infrastructure that interconnects the various

The optical splitter is an optical power distribution device that splits one optical signal into multiple optical fiber signals

This guide focuses on two critical aspects of optical splitters that define FTTH performance: split ratios (how signals

Determine the splitting ratio, accurate to one decimal place. In summary, fiber splitters are key equipment for building

This article will introduce passive optical networks (PON), in which we will introduce everything about OLTs, ONTs,

Fiber Broadband Association Technology Committee February 2025 The choice of splitter architecture for a passive optical network

Web: <https://www.kremgroup.co.za>

