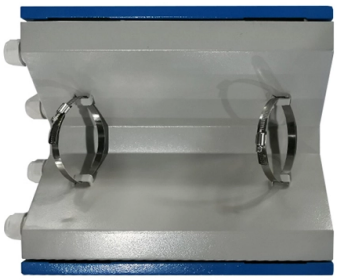
The Development History of Passive Optical Networks



Overview

Passive optical networks (PONs) are a highly developed and promising technology that offers low cost design, high bandwidth, and information rate for both residential and commercial use.

Key Takeaways

Passive Optical Networks (PONs) were first proposed by British Telecommunications in 1987 as a cost-effective fiber-optic solution for the last mile of telecommunications networks.

Early Development

The concept of PON emerged to address the limitations of traditional copper-based networks, which suffered from signal degradation, limited bandwidth, and high maintenance costs over long distances. British Telecommunications proposed the use of unpowered optical splitters to distribute signals from a single source to multiple endpoints, creating a point-to-multipoint topology that reduced the need for active equipment in the network. This approach allowed service providers to deliver high-speed data efficiently to multiple users while minimizing infrastructure costs.

Standardization and Early Implementations

Following the initial proposal, the Full Service Access Network (FSAN) group in the early 1990s began developing standards for PON technology. The first ITU-T standard, Asynchronous PON (APON), utilized Asynchronous Transfer Mode (ATM) to provide a cost-effective alternative to existing PDH and SDH networks.

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APO

N was soon succeeded by Broadband PON (BPON), which offered higher speeds and additional services such as Ethernet access and video transmission. Parallel to ITU-T efforts, the IEEE developed Ethernet-based PON standards, including EPON and GEPON, which combined PON physical layers with Ethernet protocols to support data-centric services. These early standards laid the foundation for modern PON technologies like GPON, XG-PON, and NG-PON2, which support higher bandwidths and multiple service types.

Technological Motivation

The primary motivation behind PON development was to overcome the "last mile" bottleneck in broadband deployment. Copper networks were limited in speed and distance, while active optical networks required power and complex maintenance at multiple points.

PO

Ns, by contrast, use passive optical components such as splitters and couplers, requiring power only at the central office and end-user terminals, which significantly reduces operational costs and improves reliability.

Summary

In summary, PONs originated in the late 1980s as a solution to the limitations of copper-based access networks. British Telecommunications first proposed the concept in 1987, and subsequent standardization by ITU-T and IEEE in the 1990s enabled widespread adoption. The technology's passive design, cost efficiency, and scalability have made it the backbone of modern fiber-to-the-home (FTTH) and fiber-to-the-premises (FTTP) deployments.

Article Content

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This paper reviews the standardization process of PON that led to the development of the NG-PON. The detail literature review of various technologies related to PON and NG-PON has been conducted.

Passive optical network

A passive optical network (PON) is a fiber-optic telecommunications network that uses only unpowered devices to carry signals, as opposed to electronic equipment.

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Abstract Passive Optical Networks (PONs) have become a popular fiber access network solution because of its service transparency, cost effectiveness, energy savings, and higher security

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