

Benefits of Fiber Networking

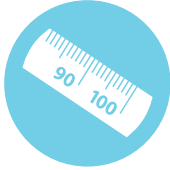


What is Fiber?

Fiber-optic networking delivers data using light via an optical fiber. It is often used in long distance applications; however, fiber is more than just your networking extension cord. Fiber provides the foundation for both your inter-building and intra-building networking solutions. Fiber solutions were once extremely expensive, but they have become much more affordable over the last few years; companies such as TRENDnet offer a robust line of cost-effective and reliable fiber solutions.

Fiber Benefits

Fiber has many advantages over copper wire communications, especially in core networks. You'll often hear that distance and security are the key benefits to fiber networking, but fiber offers many other benefits.



Longer Distances

Ranges from 220 m to more than 80 km. Distance is dependent on type of cable, wavelength, and network



Better Reliability

Ideal for industrial environments with heavy amounts of electromagnetic interference (EMI). Fiber is impervious to EMI and radio-frequency interference (RFI). Minimal signal loss since fiber optic signal is made of light. No crosstalk, impedance problems.



Simple Scalability

Fiber offers higher bandwidth for future expansion.



Improved Protection

Doesn't radiate signals. Extremely difficult to tap. Fiber networks enable you to put all your electronics and hardware in one central location, instead of having wiring closets with equipment throughout the building.



Installation Flexibility

Cables are less susceptible to temperature fluctuations and can be submerged in water

Fiber Limitations

Fiber is not without some limitations. Fiber requires a higher upfront investment cost and there is a possibility you will need special equipment for testing. Unlike with PoE, fiber cannot carry electrical power; data and power cannot be delivered simultaneously over a single cable. Advanced networking skills and previous fiber experience is helpful; fiber networking can be very difficult to understand, even for tech-savvy individuals.

Media Converters



Fiber media converter, Fiber converter, Fiber transceiver

Media converters allow for easy conversion from copper networks. Many business networks utilize a combination of copper and fiber. Create seamless links and enable the use of existing hardware. Also, a useful alternative to add fiber capabilities to a copper device without fiber ports or SFP slots built-in.



Media converter chassis

A fiber chassis is an enclosure that is designed to combine several media converters into a single location. The chassis will be equipped to power all media converters; additional features may include cooling fans, optional redundant power supplies, or an SNMP management module.



Terms You Need to Know

One of the most confusing parts about fiber-optics networking is all the different terminology used to express the same component or process.



Single-mode fiber

SMF, LX, long haul

- Fiber cabling has a core diameter between 8/125 and 10.5/125 μm
- Long distance networking, more than 80 km
- Commonly used for inter-building networking



Multi-mode fiber

MMF, SX, short haul

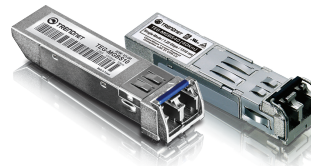
- Fiber cabling has a core diameter between 50/125 and 62.5/125 μm
- Short distance networking, 1000Base-SX up to 550 m, 100Base-SX up to 2 km
- Gigabit MMF cable limitations:
 - 50/125 μm = 550m max. distance
 - 62.5/125 μm = 220m max. distance
- Commonly used for intra-building networking



Bidirectional fiber

Bidirectional (BiDi), Dual wavelength, Wavelength-division multiplexing (WDM)

Bidirectional fiber enables bidirectional communication over a single strand of fiber. It is commonly used to expand or grow the fiber network by utilizing an existing single dual-strand fiber connection and splitting it into two single-strand fiber connections (without needing to run new fiber cabling). This is achieved by using two different transmit/receive wavelengths (e.g. Tx: 1550nm / Rx: 1310) for data transmission over a single strand of fiber. It can also be used in cases where dual-strand fiber connections are no longer possible with the given amount of fiber strands.



SFPs

Mini-GBIC

Small form-factor pluggable (SFPs) are small media connectors for fiber connectivity. They are a cost-effective solution to add fiber capabilities to a device like a network switch. SFPs are interchangeable modules that can be replaced or upgraded to adapt to network changes. Standard SFP modules support data rates up to 1 Gbit/s, while SFP+ modules support data rates up to 10 Gbit/s. SFP+ modules are used exclusively for 10G fiber networking and are not backwards compatible with standard SFP modules.

Quick Facts

There are 10-20 types of fiber connectors (i.e. SC, LC, ST, etc.). There are two main types of fiber cables: multi-mode and single-mode. With gigabit multi-mode, the types are further segmented by cable diameter (which also dictates maximum distance).