

Transmission distance of 10 Gigabit single-mode fiber

Article Overview

10 Gigabit Ethernet over single-mode fiber typically supports distances up to 10 km using 1310 nm 10GBASE-LR SFP+ modules.

Standard Transmission Distance

The most common 10G single-mode fiber standard, 10GBASE-LR, operates at 1310 nm and supports link distances of up to 10 kilometers over single-mode fiber (SMF) using SFP+ transceivers with LC duplex connectors, as defined by IEEE 802.3 specifications . This standard is widely deployed in enterprise backbones, data center interconnects, and metro access networks.

Extended Distance Options

For longer distances, 1550 nm wavelength modules or specialized long-reach 10G SFP+ transceivers can extend transmission beyond 10 km, sometimes up to 40 km, depending on the optical power budget and fiber quality . These modules are suitable for cross-city or carrier backhaul applications where longer reach is required.

Practical Considerations

- o Optical Budget: The actual achievable distance depends on the transceiver's optical power output, fiber attenuation, and connector losses.
- o Compatibility: Most 10G single-mode SFP+ modules are MSA-compliant, ensuring interoperability across switches, routers, and network interface cards .
- o Environmental Factors: Industrial-grade modules may be required for extreme temperatures or outdoor deployments.
- o Monitoring: Modules with Digital Diagnostic Monitoring (DDM/DOM) allow real-time monitoring of optical parameters, which helps maintain reliable long-distance links .

Summary

For standard enterprise and data center applications, 10GBASE-LR over 1310 nm SMF reliably supports 10 km. For longer distances, 1550 nm or extended-reach modules can be used, potentially reaching tens of kilometers, provided the optical budget and fiber quality are sufficient . This makes single-mode fiber ideal for high-speed, long-distance networking where multi-mode fiber would be limited to a few hundred meters.



Transmission distance of 10 Gigabit single-mode fiber

The SFP Single Mode LC Modules are SFP transceivers compatible with standard SFP slots on network switches & fiber converters.

Learn how fiber optic transmission distance varies between single mode vs. multimode fiber. Discover key factors

How do you choose between single mode and multimode fiber? Compare their differences in core size, light source,

Single mode and multimode fiber differ mainly in core size, distance and use case: single

The Cisco SFP-10G-LR10-I supports a link length of 10 kilometers on standard Single-Mode

Ethernet Media Standards and Distances Reference chart for common ethernet media types. Most of the distances

Single mode fiber optic cable is made up of a small diameter glass or plastic core surrounded by cladding, which is a layer of

Multimode Fiber and 10 Gigabit Ethernet The IEEE 802.3ae 10 Gigabit Ethernet specification includes a serial interface referred to as

IEEE defines 40G and 100G Ethernet in two different standards, respectively are IEEE 802.3ba and IEEE 802.3bm. 1. IEEE 802.3ba

There is a variation of ranges, Technically ZR modules are the longest and can transmit data over single-mode fiber

10 Gigabit Ethernet (10GE, 10GbE, or 10 GigE) is a group of computer networking technologies for transmitting Ethernet frames at a

In practical terms, this means the optics are cheaper. Single-mode fiber (SMF) has much tighter tolerances for optics

However, in general, the maximum distance for a 10G SFP transceiver on single-mode fiber is typically up to 40

Single-mode fiber is ideal for long-distance communication, as it has less light dispersion and attenuation. It is often

Transmission distance of 10 Gigabit single-mode fiber

Single-mode fibre is recommended over multimode fibre when planning for Gigabit Ethernet. The multiple light modes found in

Compare 10GBASE-SR and 1G SFP multimode transceiver distances on OM2, OM3, OM4 fiber types. Maximize

Web: <https://millstraining.co.za>

