FIBER OPTIC FACTS

To connect computers using fiber optic cables, you need two fiber strands. One strand transmits signals, and the other strand receives signals. Long-haul runs sometimes only need one fiber. The send and receive signals are transmitted over the same fiber. The following are the components of fiber optic cabling:

* The core carries the signal. It is made of glass or plastic.
* The cladding maintains the signal in the center of the core as the cable bends.
* The sheathing protects the cladding and the core.

Fiber optic cabling offers the following advantages and disadvantages:

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| --- | --- |
| **Advantages** | **Disadvantages** |
| * Totally immune to EMI (electromagnetic interference) * Highly resistant to eavesdropping * Supports extremely high data transmission rates * Allows greater cable distances without a repeater | * Very expensive * Difficult to work with * Special training required to attach connectors to cables |

**Multi-Mode vs. Single-Mode**

Multi-mode and single-mode fiber cables are not interchangeable. The following table describes multi-mode and single-mode fiber cables.

|  |  |
| --- | --- |
| **Type** | **Description** |
| Single-Mode | * Data transfers through the core using a single light path. * The core diameter is around 8–10.5 microns. * Cable lengths can extend a great distance. * There is less modal dispersion, so bandwidths can be higher. * Higher-cost electronics are required to send signals down a single path. * Optimized for 1310 nm and 1550 nm light sources. |
| Multi-Mode | * Data transfers through the core using multiple light paths. * The core diameter is around 50 to 100 microns. * There is more modal dispersion due to the multiple paths. * Cable lengths are limited in distance and are dependent on bandwidth. * Higher light gathering capacity simplifies connections and allows lower-cost electronics. * Optimized for 850 nm and 1300 nm light sources. |

**Connector Types**

Fiber optic cabling uses the following connector types:

|  |  |
| --- | --- |
| **Type** | **Description** |
| ST Connector  https://cdn.testout.com/_version_509/netpro2018v5-en-us/en-us/resources/text/cbl_fbr/fb_cab180c.jpg | * Used with single-mode and multi-mode cabling. * Has a keyed bayonet-type connector. * Also called a push-in and twist connector. * Each wire has a separate connector. * Nickel plated with a ceramic ferrule to ensure proper core alignment and prevent light ray deflection. * Mnemonics are Set-and-Twist or Straight Tip. |
| SC Connector  https://cdn.testout.com/_version_509/netpro2018v5-en-us/en-us/resources/text/cbl_fbr/fb_cab183c.jpg | * Used with single-mode and multi-mode cabling. * Has a push-on/pull-off connector that uses a locking tab to maintain connection. * Each wire has a separate connector. * Uses a ceramic ferrule to ensure proper core alignment and prevent light ray deflection. * Mnemonics are Set-and-Click or Square Connector. |
| LC Connector  https://cdn.testout.com/_version_509/netpro2018v5-en-us/en-us/resources/text/cbl_fbr/fb_cab184c.jpg | * Used with single-mode and multi-mode cabling. * Composed of a plastic connector with a locking tab that is similar to a RJ45 connector. * A single connector with two ends keeps the two cables in place. * Uses a ceramic ferrule to ensure proper core alignment and to prevent light ray deflection. * Is half the size of other fiber optic connectors. * Mnemonics are Lift-and-Click or Little Connector. |
| MTRJ Connector  https://cdn.testout.com/_version_509/netpro2018v5-en-us/en-us/resources/text/cbl_fbr/fb_cab185c.jpg | * Used with single-mode and multi-mode cabling. * Composed of a plastic connector with a locking tab. * Uses metal guide pins to ensure that it is properly aligned. * A single connector with one end holds both cables. * Uses a ceramic ferrule to ensure proper core alignment and prevent light ray deflection. |
| FC Connector  https://cdn.testout.com/_version_509/netpro2018v5-en-us/en-us/resources/text/cbl_fbr/fb_cab186c.jpg | * Typically used with single-mode cabling. * Each wire has a separate connector. * Uses a threaded connector. * Designed to stay securely connected in environments where it may experience physical shock or intense vibration. |

For long cable running between floors or overhead, you might hire an experienced contractor to install the cable and the necessary connectors. Adding connectors onto a fiber optic cable takes some practice. Remember to complete the following:

* Keep the area as clean as possible.
* Cut the cable with a clean 90-degree cut.
* Polish the end of the cable prior to adding the connector. Use special polishing film and tools for polishing cable ends.
* Glue or crimp the connector onto the cable.
* Cover or cap any connectors that won't be hooked up immediately.
* If necessary, you can directly splice two cable ends together; however, this requires expensive and specialized equipment.

**Fiber Optic Cable Facts**

There are two light source technologies prevalent in fiber optic communications, diode laser and high-radiance light-emitting diode (LED). The light produced by these technologies is in the infrared region of the light spectrum.

* The most common wavelengths used in fiber optics are 850 nm, 1300 nm, 1310 nm and 1550 nm.
  + In glass, these longer wavelengths have lower attenuation or signal loss due to scattering.
  + Attenuation in glass due to light absorption for these wavelength is almost zero.
* Multi-mode fiber is designed to operate at 850 nm and 1300 nm.
* Single-mode fiber is optimized for 1310 nm and 1550 nm.

Wave Division Multiplexing (WDM) joins several light wavelengths (colors) onto a single strand of fiber.

* This enables light signals in both directions across a single fiber.
* Today's systems can easily multiplex 160 signals.
* WDM is mostly used by long-haul and high-speed providers.
* Most WDM systems are designed to be used with single-mode fiber.

When working with fiber optic cabling, you can use media converters to switch between different network media. For example, you can convert:

* Single-mode fiber to copper Ethernet wiring
* Multi-mode fiber to copper Ethernet wiring
* Single-mode or multi-mode fiber to coaxial wiring
* Single-mode fiber to multi-mode fiber