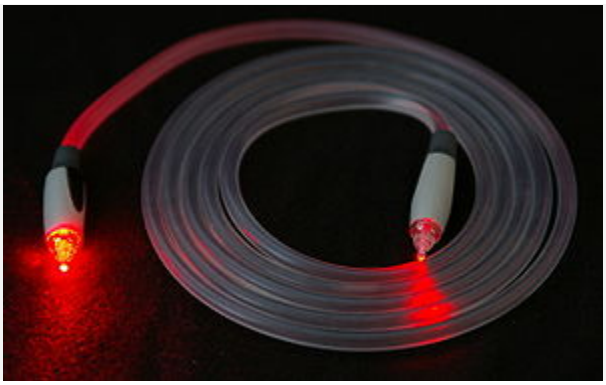
THE ADVANTAGES AND DISADVANTAGES OF FIBER OPTICS



Advantages of fiber optics:

1. **Extremely high bandwidth** – No other cable-based data transmission medium offers the bandwidth that fiber does.

2. **Easy to accomodate increasing bandwidth** – Using many of the recent generations of fiber optic cabling, new equipment can be added to the inert fiber cable that can provide vastly expanded capacity over the originally laid fiber. DWDM, or Dense Wavelength Division Multiplexing, lends fiber optic cabling the ability to turn various wavelengths of light traveling down the fiber on and off at will. These two characteristics of fiber cable enable dynamic network bandwidth provisioning to provide for data traffic spikes and lulls.

3. **Resistance to electromagnetic interference** – Fiber has a very low rate of bit error (10 EXP-13), as a result of fiber being so resistant to electromagnetic interference. Fiber-optic transmission are virtually noise free.

4. **Early detection of cable damage and secure transmissions** – Fiber provides an extremely secure transmission medium, as there is no way to detect the data being transmitted by “listening in” to the electromagnetic energy “leaking” through the cable, as is possible with traditional, electron-based transmissions. By constantly monitoring an

optical network and by carefully measuring the time it takes light to reflect down the fiber, splices in the cable can be easily detected.

Disadvantages of Fiber Optics:

1. **Installation costs, while dropping, are still high** – Despite the fact that fiber installation costs are dropping by as much as 60% a year, installing fiber optic cabling is still relatively costly. As installation costs decrease, fiber is expanding beyond its original realm and major application in the carrier backbone and is moving into the local loop, and through technologies such as FTTx (Fiber To The Home, Premises, etc,) and PONs (Passive Optical networks), enabling subscriber and end user broadband access.

2. **Special test equipment is often required** – The test equipment typically and traditionally used for conventional electron-based networking is of no use in a fiber optic network. Equipment such as an OTDR (Optical Time Domain Reflectometer)
is required, and expensive, specialized optical test equipment such as optical probes are needed at most fiber endpoints and connection nexuses in order to properly provide testing of optical fiber.

3. **Susceptibility to physical damage** – Fiber is a small and compact cable, and it is highly susceptible to becoming cut or damaged during installation or construction activities. Because railroads often provide rights-of-way for fiber optic installation, railroad car derailments pose a significant cable damage threat, and these events can disrupt service to large groups of people, as fiber optic cables can provide tremendous data transmission capabilities. Because of this, when fiber optic cabling is chosen as the transmission medium, it is necessary to address restoration, backup and survivability.

4. **Wildlife damage to fiber optic cables** – Many birds, for example, find the Kevlar reinforcing material of fiber cable jackets particularly appealing as nesting material, so they peck at the fiber cable jackets to utilize bits of that material. Beavers and other rodents use exposed fiber cable to sharpen their teeth and insects such as ants desire the plastic shielding in their diet, so they can often be found nibbling at the fiber optic cabling. Sharks have also been known to

damage fiber optic cabling by chomping on it when laid underwater, especially at the repeating points. There is a plant called the Christmas tree plant that treats fiber optic cable as a tree root and wraps itself around the cable so tightly that the light impulses traveling down the fiber are choked off.

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