

# Course: Data communication & Computer Network

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**1.** Why is Fiber Optics Cable considered as the most efficient transmission medium? Explain with Reasons.

Fiber optic cable is a networking cable that is made up of strands of glass fibers enclosed in an insulated casing.

It is also called as optical-fiber cable. It is used for high-performance long-distance data networking. Fiber optic lines have a higher bandwidth than coaxial cables and can carry data over longer distances.

A fiber optic cable is made up of one or more glass strands that are only slightly thicker than a human hair. The middle of each strand is known as the core, and it serves as the path for light to travel. The core is surrounded by cladding, which is a layer of glass that reflects light inward to reduce signal loss and allows light to pass through bends in the cable.

Fiber optic cables have a greater bandwidth (180 to 370 THz) than any other physical media. Because fiber optic cables carry data in the form of light.

When copper cables are strung in parallel over long distances, parasitic electrical impulses interfere with data transmission, resulting in either data loss or inaccurate information being transferred.

Co-axial cables required repeaters to transmit data over long distance. But Fiber cables are used for transmitting data over long distances in the form of light. This cable does not need any type of repeaters to transmit data over long distances.

Fiber Optic cables are much lighter in weight than copper cables. So it is easy for installation.

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| **WIRED TRANSMISSION MEDIA** | | | |
|  | **Twisted Pair Cable** | **Coaxial Cable** | **Fiber Optics Cable** |
| **Bandwidth/Frequency** | Up to 4700MHz | 7500Mhz | Up to 4700MHz |
| **Transmission Speed** | 10Mbps-100Mbps | 10Mbps | 100Mbps-1Gbps |
| **Distance Coverage** | Up to 100 meters | Up to 500 meters | Up to 80 km |
| **Real Time Applications** | Telephone Lines | Old Television Lines | Internet connection |
| **Advantages** | Cost effectively | Very Durable | Perform in long distances |
| **Disadvantages** | Lower durability | Signal leak | Expensive |

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| **WIRELESS TRANSMISSION MEDIA** | | | |
|  | **Radio Waves** | **Microwave** | **Infra-red** |
| **Bandwidth/Frequency** | 3KHz-1GHz | 1GHz-300GHz | 300GHz-400GHz |
| **Transmission Speed** | 299,775km/s | 300Mbps-1Gbps | 15Kbps-16Mbps |
| **Distance Coverage** | Up to 100 km | Up to 100 meters | 700 nm(nanometer) to 1 mm(millimeter) |
| **Real Time Applications** | Radio communication | Micro-Wave | Remote control |
| **Advantages** | The transmitter and receiver do not need to be in the line of sight | Cheaper | Low power consumption |
| **Disadvantages** | Cannot transmitted huge amount of data | Limited bandwidth | Line of sight |