

FIBER OPTIC COMMUNICATION

Submitted by
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INTRODUCTION

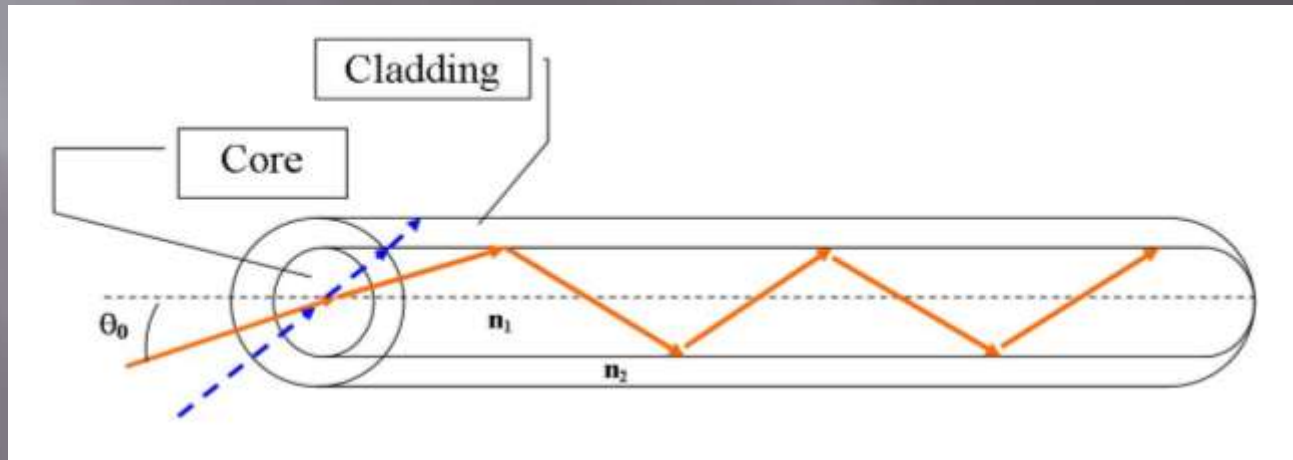
- A fiber optic cable is essentially a light pipe that is used to carry a light beam from one place to another
- Light is an electromagnetic signal like a radio wave
- It can be modulated by information signal and sent over the fiber optic cable

Why Fiber Optics?

- Advantages of Fiber Optic Communications:
 - Low loss
 - Large bandwidth
 - Immunity to electromagnetic interference
 - High propagation delay stability
 - No Radiation
 - Reliability
 - Economy
 - Parallel transmission
 - Flexibility & Ruggedness

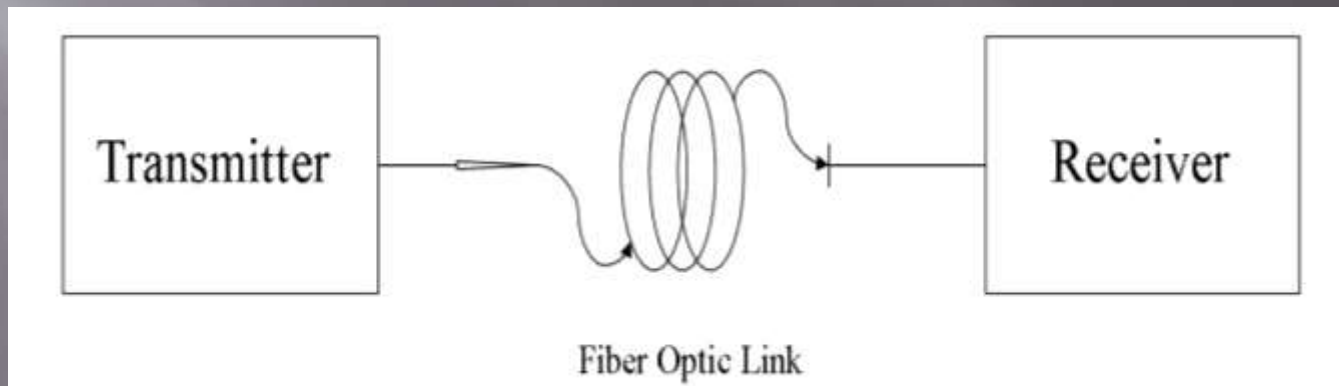
Optical Waveguides

- Total Internal Reflection
- Operates in 800 to 1600 nm range
- Transmission windows with low attenuation



Basic Fiber Optic Link

- 4 Major components required:
 - Light source
 - Modulator
 - Optical fiber
 - Photodetector



Attenuation

- Power loss in a fiber cable is probably the most important characteristics of the cable.
- Power loss is often called as attenuation.
- Attenuation is a measure of decay of signal strength or loss of light power that occurs as light pulses propagate through the length of the fiber

Scattering losses

- Scattering losses in glass arise due to following factors
 - Microscopic variations in the material density
 - Compositional fluctuations
 - Structural inhomogeneities and
 - Structural defects

Bending losses

- Optical fiber suffer radiation losses which causes light energy to be radiated from the fiber, whenever an optical fiber undergoes at bends or curves on their paths
- There are two types of bending losses
 - Macroscopic bending losses and
 - Microscopic bending losses

Dispersion

- The term dispersion refers to spreading of light pulse as it propagates through fiber
- It introduces Inter symbol interference (ISI)
- It limits the information carrying capacity of fiber

Fiber joints

- Optical fiber link is used for both jointing and termination of the transmission medium
- Generally number of intermediate fiber connections or joints is dependent upon the link length
- Interconnecting the fibers in a low loss manner is the basic requirement in any fiber optic system installation

Mechanical Misalignment

- A potentially greater source of loss at a fiber-fiber connection is caused by misalignment of the two jointed fibers
- The three types of misalignment which may occur when joining compatible optical fibers
 - Longitudinal misalignment
 - Lateral misalignment and
 - Angular misalignment

Fiber splicing

- A fiber splice is a permanent or semi-permanent joint between two fibers
- The process of joining two fibers is called as splicing
- Splices may be divided into two broad categories depending upon the splicing techniques
 - Fusion splicing (or) welding
 - Mechanical splicing

Fiber connectors

- Connectors are mechanisms or techniques used to join an optical fiber to another fiber
- At connector joint , it should offer low coupling losses
- Connectors may be separated into two broad categories
 - Butt jointed connectors and
 - Expanded beam connectors

THANK YOU