

1.4 Optical Modes and Configurations

- Fiber cables can also be classified as per their mode. Light rays propagate as an electromagnetic wave along the fiber. The two components, the electric field and the magnetic field form patterns across the fiber. These patterns are called **modes** of transmission.
- The **mode** of a fiber refers to the number of paths for the light rays within the cable. According to modes optic fibers can be classified into two types.
 - i) Single mode fiber
 - ii) Multimode fiber.

Multimode Fiber

- Multimode fiber was the first fiber type to be manufactured and commercialized.
- The term multimode simply refers to the fact that numerous modes (light rays) are carried simultaneously through the waveguide.
- Multimode fiber has a much larger diameter, compared to single mode fiber, this allows large number of modes.

Single Mode Fiber

- Single mode fiber allows propagation of light ray by only one path.
- Single mode fibers are best at retaining the fidelity of each light pulse over longer distance also they do not exhibit dispersion caused by multiple modes.
- Thus more information can be transmitted per unit of time.
- This gives single mode fiber higher bandwidth compared to multimode fiber.
- Some disadvantages of single mode fiber are smaller core diameter makes coupling light into the core more difficult.
- Precision required for single mode connectors and splices are more demanding.

Advantages and disadvantages of multimode fibers

Advantages :

- More than one modes can be transmitted.
- Suitable for short distances.

Disadvantages :

- Modal noise is present.
- Greater intermodal dispersion