

NIELIT Gorakhpur

Course Name: O Level (2nd Sem)

Topic: Optical Fiber Cable

Subject: ICT

Date: 22-05-20

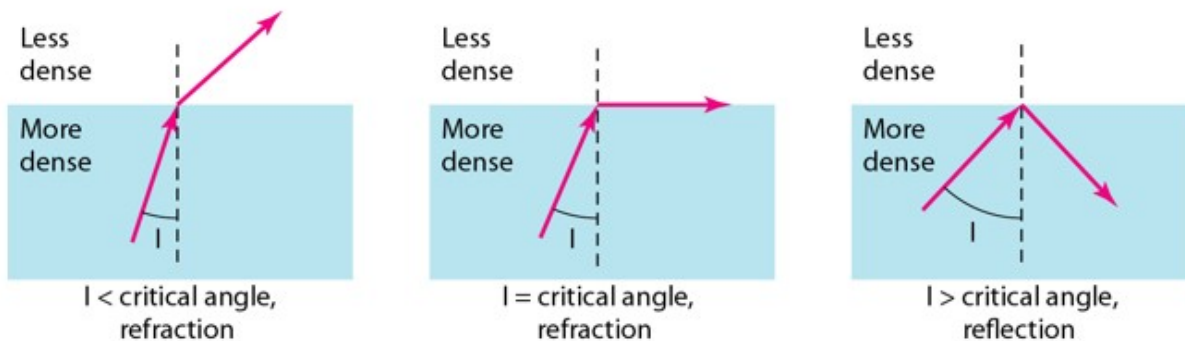
Optical Fiber Cable:

Optical fiber cable is a network cable that is made of glass fibers inside an insulated casing. Optical fiber cable transmits signal in the form of light while the previous cables i.e twisted pair and coaxial cables had metal conductors that transmit signal in the form of electrical form. They are designed for long-distance, high-performance data networking, and telecommunications. In 1952, Indian-born American physicist **Narinder Singh Kapany** invented the first actual fiber optical cable.

Concepts used in optical fiber cable:

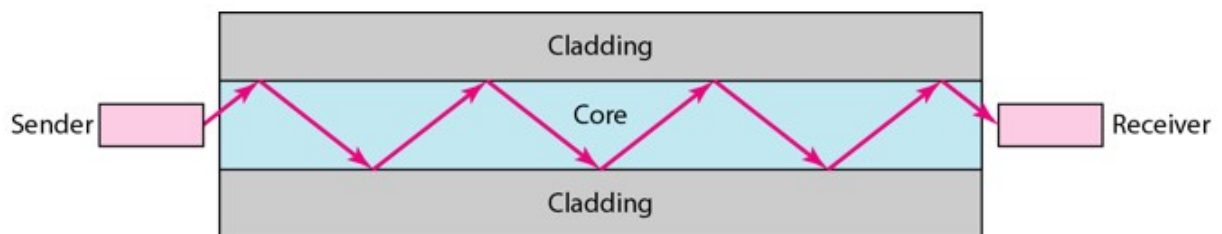
Nature of Light:

Light travels in a straight line as long as it is moving through a single uniform substance. If ray of light travelling through one substance suddenly enters another substance (of a different density), the ray changes direction.



- If the **angle of incidence** I (the angle the ray makes with the line perpendicular to the interface between the two substances) is **less** than the **critical angle**, the ray **refracts** and moves closer to the surface.
- If the angle of incidence is **greater** than the critical angle, the ray **reflects** (makes a turn) and travels again in the denser substance.
- If the angle of incidence is **equal** to the critical angle, the ray refracts and **moves parallel** to the surface

Optical fibers use reflection to guide light through a channel. A glass or plastic core is surrounded by a cladding of less dense glass or plastic. The difference in density of the two materials must be such that a beam of light moving through the core is reflected off the cladding instead of being refracted into it.



Light travels down a fiber-optic cable by bouncing repeatedly off the walls. Each tiny photon (particle of light) bounces down the pipe. This phenomenon is called **total internal reflection**. It keeps the light inside the pipe.

Optical fiber cable is made up of two separate parts. The main part of the cable—in the middle—is called the **core** in which the light travels through. Wrapped around the outside of the core is another layer of glass called the **cladding**. The cladding's task is to keep the light signals inside the core. It can do this because it is made of a different type of glass to the core. (Which means, the cladding has a lower refractive index.)

Exercise:

- What is optical fiber cable? Explain with diagram the concepts used in OFC.