

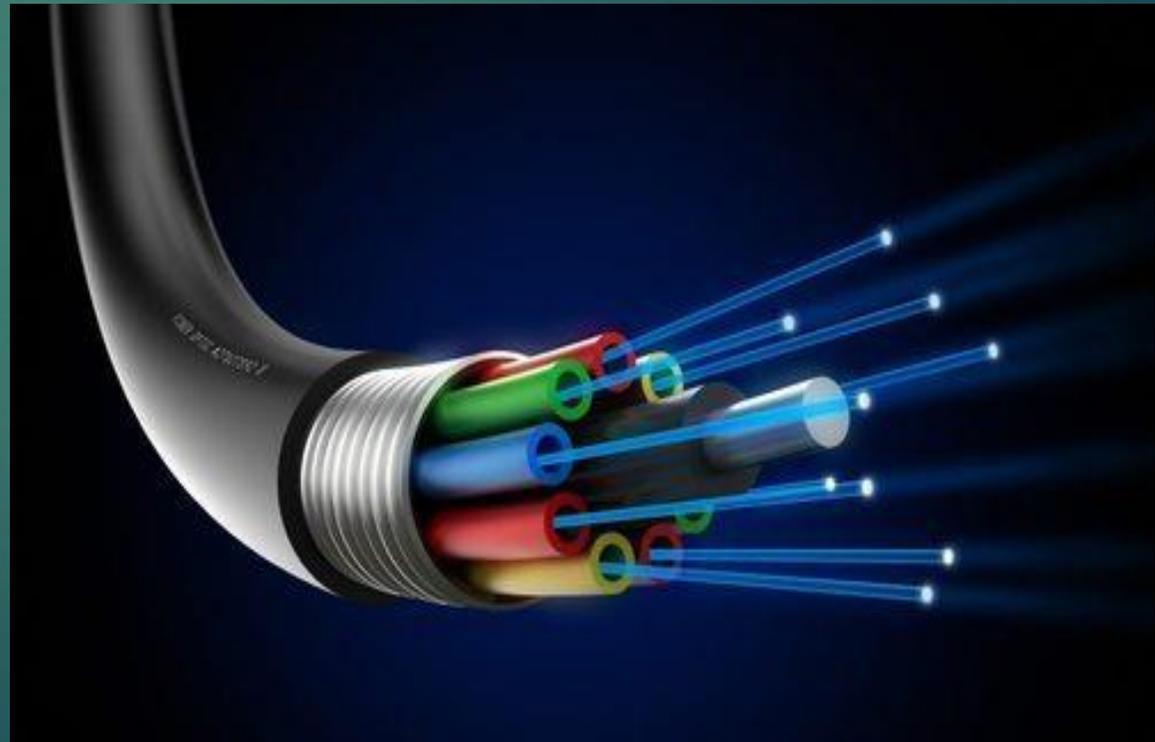
# Topic : Introduction to Optical fiber

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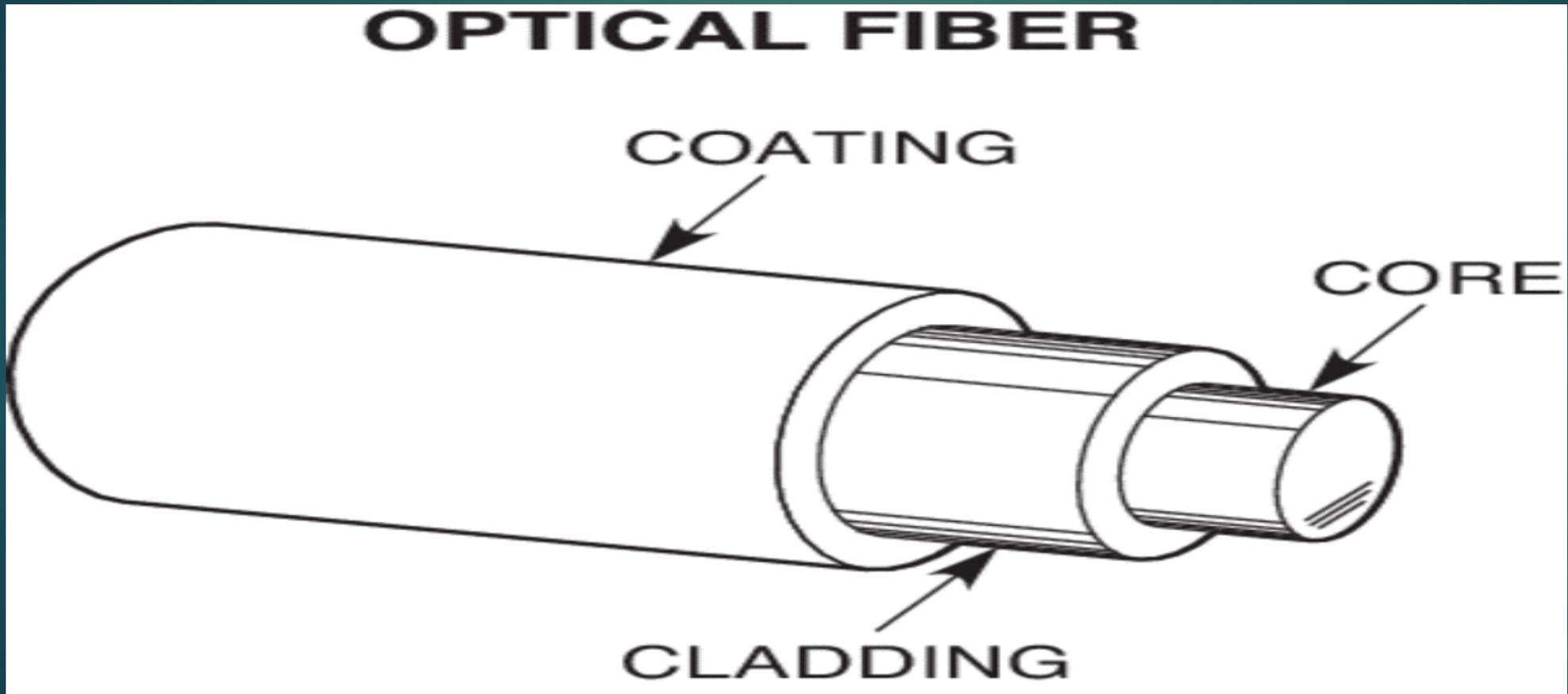
# Introduction

- Optical Fiber refers to the medium and the technology associated with the transmission of information as light pulses along a glass or plastic strand or fiber.
- Optical fiber carries much more information than conventional copper wire and is in general not subject to electromagnetic interference and the need to retransmit signals.

# Fiber optic system

- ▶ Communication system that uses light as the carrier of the information from a source to a destination through a guided fiber cable (glass or plastic) are called fiber optic system.
- ▶ The information carrying capacity of a communication system is directly proportional to its bandwidth.
- ▶ The wider bandwidth the greater is its information carrying capacity.
- ▶ Because of high information carrying capacity and low attenuation ,now-a-days fiber are finding wide application in telecommunications ,Local area networks ,sensors, computer networks ,etc.

# Structure of Optical fiber cable



## ❖ Principle Of Optical Fiber Cable :

It works on the principle of Total Internal Reflection in which Light traveling in an optically dense hits a boundary at an angle larger than the "critical angle" for the media, the light will be completely reflected. This is called total internal reflection.

Fiber optic cables cases total internal reflection inside the optical fiber. The light enters the optical fiber, and every time it strikes the edge of the fiber it experiences total internal reflection. This way the light travels down the length of the optical fiber.

# Fiber cable construction

- ▶ There are many different cable designs available today.
- ▶ Depending on configuration, the cable may include a core, a cladding, a protective tube and one or more protective jackets.
- ▶ The fiber cable consist of a core at the center and a cladding outside the core.
- ▶ The buffer jacket or coating provide protection for the fiber from external mechanical influences that could cause fiber breakage or excessive optical attenuation.
- ▶ The type of cable construction used depends on the performance requirements of the system and both the economic and environmental constraints.

# Advantage of Fiber Optic Communication

1. Extremely Wide (Large) Bandwidth
2. Immunity to electrostatic interference
3. Elimination of cross talk
4. Lighter weight and smaller size
5. Lower cost
6. Security
7. Greater safety
8. Longer life
9. Longer life and easy to maintenance

# Types of optical fibres

## 1. Based on material

- Plastic core with plastic cladding
- Plastic core with glass cladding
- Glass core with glass cladding

## 2. Based on mode of transmission

- Single mode fiber
- Multimode fiber

## 3. Index profile

- Step-index fiber
- Graded index fiber

# Application of optical fiber

- ▶ Communication :- It is use in Wi-Fi router, Landline phone and server- connector. A single optical fiber can carry over 3,000,000 full-duplex voice calls or 90,000 TV channels So it is use in Broad bandwidth.
- ▶ Military :- Optical fiber is use to make military equipment, and weapons. It is also use to make antenna to communicate in far areas.
- ▶ Sensor :- Most of sensors are made from optical fiber. Optical is also use to make detectors i.e. Metal detector