

1.1 Introduction

Need of Fiber optic Communication

Fiber optic communication system has emerged as most important communication system.

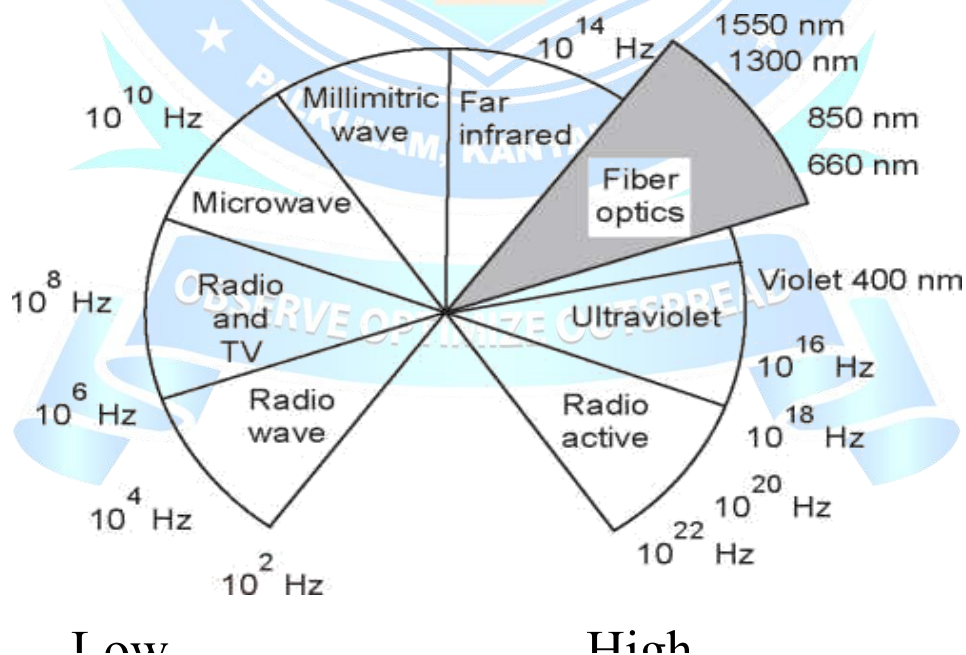
- In long haul transmission system there is need of low loss transmission medium.
- There is need of compact and least weight transmitters and receivers.
- There is need of increased span of transmission.
- There is need of increased bit rate-distance product.
- A fiber optic communication system fulfills these requirements, hence most widely accepted

Electromagnetic Spectrum

- The radio waves and light are electromagnetic waves. The rate at which they alternate in polarity is called their frequency (f) measured in hertz (Hz).
- The speed of electromagnetic wave (c) in free space is approximately 3×10^8 m/sec.
- The distance travelled during each cycle is called as wavelength (λ).

$$\text{Wavelength } (\lambda) = \frac{\text{Speed of light } (c)}{\text{Frequency } (f)}$$

In fiber optics, it is more convenient to use the wavelength of light instead of the frequency



Spectral band used in optical fiber communication

Name	Designation	Spectrum (nm)	Origin of Name
Original band	O - band	1260 - 1360	Original (first) region used for single-mode fiber links
Extended band	E - band	1360 - 1460	Link use can extend into this region for fibers with low water content
Short band	S - band	1460 - 1530	Wavelengths are shorter than the C-band but higher than the E-band
Conventional band	C - band	1530 - 1565	Wavelength region used by a conventional EDFA
Long band	L - band	1565 - 1625	Gain decreases steadily to 1 at 1625 nm in this longer wavelength band
Ultra - long band	U - band	1625 - 1675	Region beyond the response capability of an EDFA

Advantages of Optical Fiber Link

1. Wide bandwidth
2. Low losses
3. Immune to cross talk
4. Interference immune
5. Light weight
6. Small size
7. More strength
8. Security
9. Long distance transmission
10. Environment immune
11. Safe and easy installation

12. Less cost

Disadvantages of Optical Fiber Link

- High initial cost
- Maintenance and repairing cost
- Joining and test procedures
- Tensile stress
- Short links
- Fiber losses

Z cApplications of Fiber Optic Transmission System

- Telephone networks
- Urban broadband service networks

