Unit-1

Lecture -2

Optical Communication Systems, Advantages, Disadvantages and Applications





- Working is same as general comm. System
- Difference is only just instead of using electrical signals, an optical signal is used.

- Optical source provides the electrical- optical conversion (By Laser / LED)
- The transmission medium consists of an optical fiber cable and the receiver consists of an optical detector which drives a further electrical stage and hence provides demodulation of the optical carrier.
- The optical carrier may be modulated using either an analog or digital information signal.

Digital optical fiber link

Analog modulation involves the variation of the light emitted from the optical source in a continuous manner.

With digital modulation, however, discrete changes in the light intensity are obtained (i.e. on–off pulses).



- Initially, the input digital signal from the information source is suitably encoded for optical transmission.
- The laser drive circuit directly modulates the intensity of the semiconductor laser with the encoded digital signal.
- Hence a digital optical signal is launched into the optical fiber cable.
- The avalanche photodiode (APD) detector is followed by a frontend amplifier and equalizer or filter to provide gain as well as linear signal processing and noise band-width reduction.
- Finally, the signal obtained is decoded to give the original digital informa-tion.

Advantages of optical fiber communication

- Enormous potential bandwidth
- Small size and weight
- Electrical isolation
- Low Transmission Loss : 0.002 dB/Km.
- Immunity to interference and crosstalk.
- Signal security.
- Low transmission loss.
- Ruggedness and flexibility.
- System reliability and ease of maintenance
- Potential low cost.

Disadvantages of optical fiber communication

- Joining Cables
- Bending Cables
- Optics for transmission only : Less availability of optical amplifier ; using electrical repeater for boost its strength

Applications

- Voice Communication
- Video Communication
- Data Transfer
- Military Defense : strategic base comm., guided missiles, sensors
- Health cares : Endoscopes, biomedical sensors
- Power systems
- Etc.