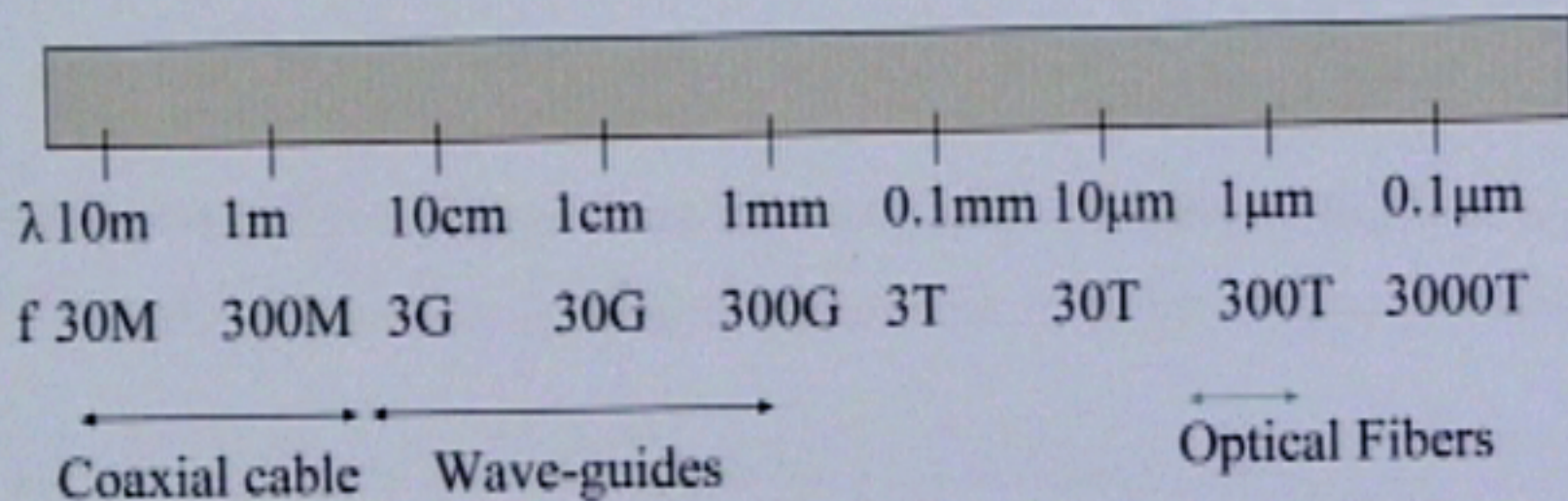


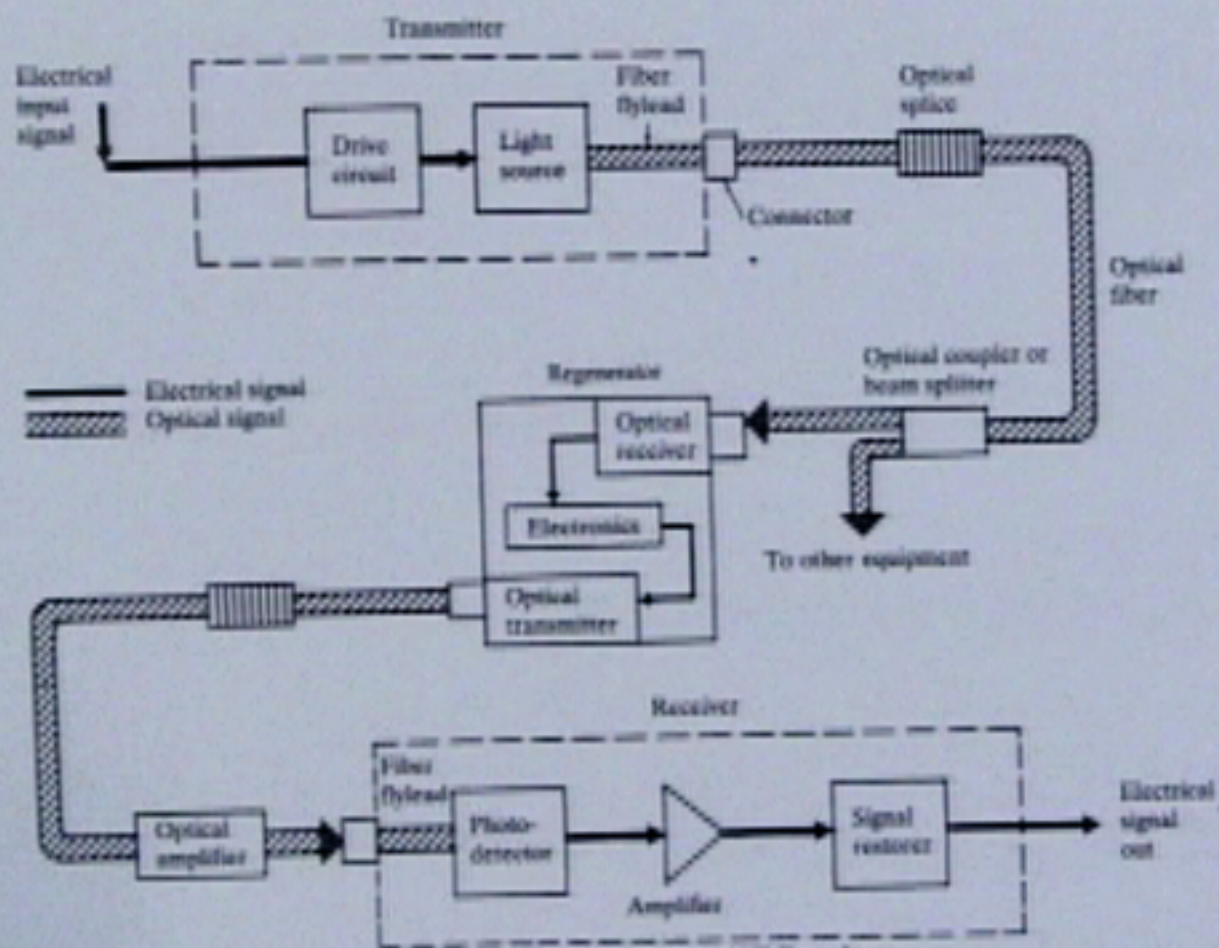
# Electromagnetic Spectrum



$$BW = \frac{f_0}{Q}$$

$$BW \propto f_0$$

## Major elements of an optical fiber link



Prof. R.K. Shevgaonkar, IIT Bombay

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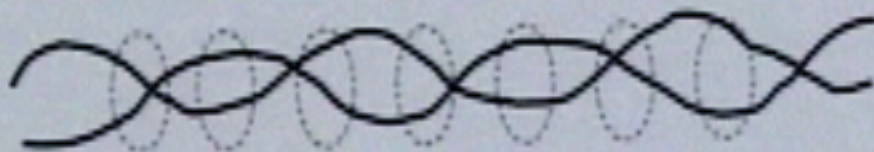
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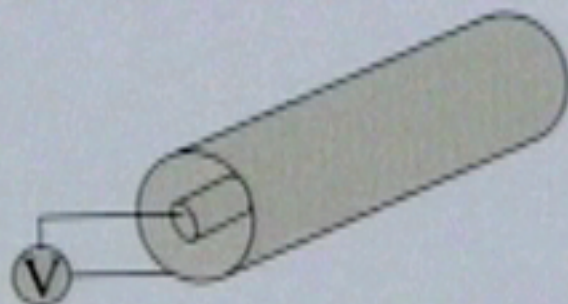
# Transmission Media

## Twisted Pair: (point-to-point)



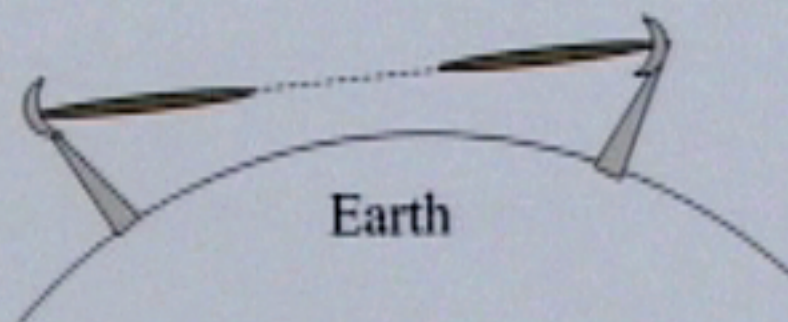
Telephone Lines  
Low data rate  
High EMI  
Lossy at RF

## Co-axial Cable (point-to-point)



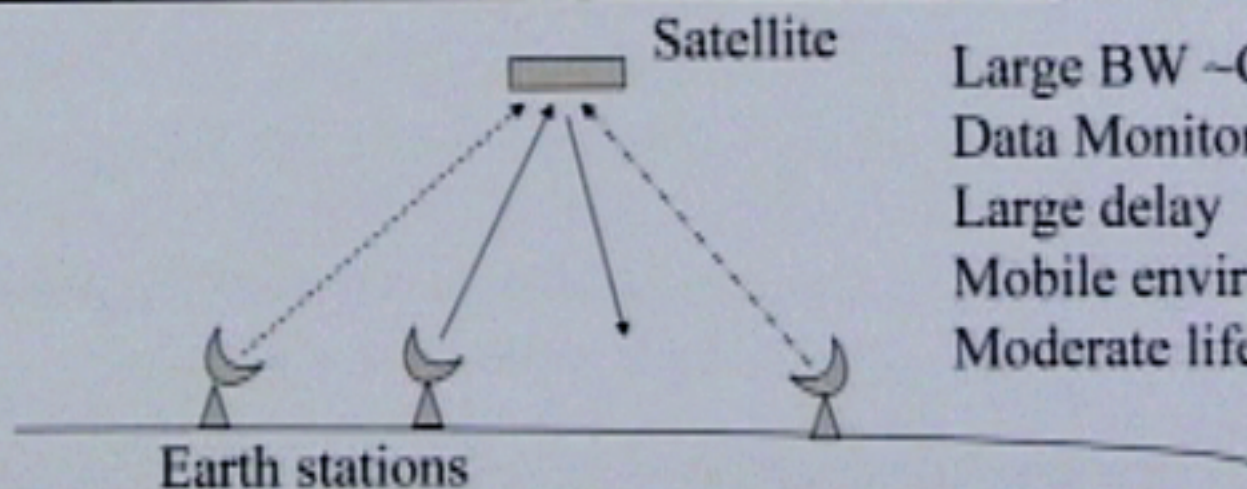
LAN  
Data rates few Mbps  
Low EMI  
Moderate loss

### Microwave Link (point-to-point)



- Long distance
- Large BW
- Line-of-sight
- High free-space loss

### Satellite Communication (point-to-multi-point)



- Large BW ~GHz
- Data Monitoring
- Large delay
- Mobile environment
- Moderate life



# Satellite vs Fiber Optics

- **Satellite**

- Point to Multi-point
- BW ~ GHz
- Maintenance free
- Short life ~7-8 Yr
- No upgradeability
- Mobile, air, sea

- **Fiber Optics**

- Point to point
- BW ~ THz
- Needs Maintenance
- Long life
- Upgradeable
- On ground only

Two will co-exist due their complementary nature