

4.6 Satellite Communications

- a repeater in the sky
- a switching center in the sky
- a set of network nodes/servers in the sky
- geostationary (synchronous) orbit (GEO), low earth orbit (LEO), medium earth orbit (MEO)
- more sophisticated satellites and smaller/simpler earth terminals
- very small aperture terminals (VSAT)

Characteristics of Satellite Communications

- **Direct Link to large numbers of users in a wide coverage area, good for networks/mobile applications/broadcasting**
- **Overcoming geographical difficulties**
- **Cost relatively independent of distance**
- **Huge attenuation gives difficult challenges to transmission technologies**
- **Serious interference, highly limited bandwidth, frequency reuse by spot beams, trying to use higher frequencies**
- **Fixed delay unavoidable**
- **Special applications (e.g. Global Positioning System, remote sensing, military)**

Refs:

1. *Harold Kolimbris, "Digital Communications Systems —with Satellite and Fiber Optics Applications", Prentice Hall 2000, 全華*
2. *"Special Issue on Direct-to-user Satellite Systems and Technologies at Ka Band and Beyond", IEEE Journal on Selected Areas in Communications, Feb. 1999*
3. *"Special Issue on Global Positioning System", Proc IEEE, Jan. 1999*