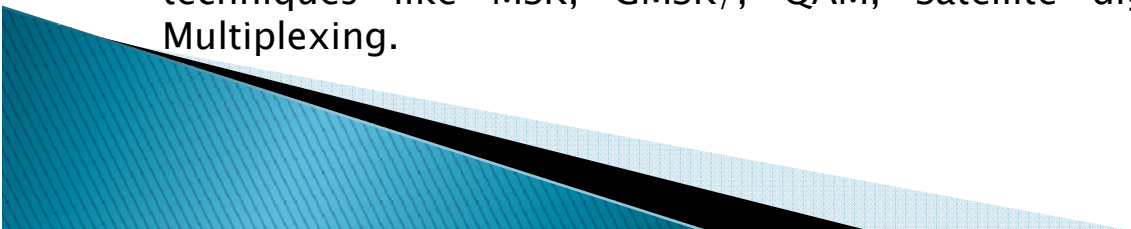


Syllabus

Section-A

- ▶ **PRINCIPLES OF SATELLITE COMMUNICATION:** Evolution & growth of communication satellite, Synchronous satellite, Satellite frequency allocation & Band spectrum, advantages of satellite communication, Active & Passive satellite, Modem & Codec. Applications of satellite communication.
- ▶ **COMMUNICATION SATELLITE LINK DESIGN:** Introduction, General link design equations, System noise temperature, C/N & G/T ratio, Atmospheric & Ionospheric effects on link design, Complete link design, Earth station parameters.

Section-B

- ▶ **ANALOG SATELLITE COMMUNICATION :** Introduction, Base band analog (Voice) signal, FDM techniques, S/N & C/N ratio in frequency modulation in satellite link, S/N ratio in FM with multiplexed telephone signal in satellite link, Single channel per carrier(SCPC) systems, Companded single sideband (CSSB) systems, Analog FM/FDM TV satellite link, Inter-modulation products & their effects in FM/FDM systems, Energy disposal in FM/FDM systems.
 - ▶ **DIGITAL SATELLITE COMMUNICATION :** Advantages of digital communication, Elements of digital satellite communication systems, Digital baseband signals, Digital modulation techniques like MSK, GMSK/, QAM, Satellite digital link design, Time Division Multiplexing.
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Section-C

- ▶ **MULTIPLE ACCESS TECHNIQUES:** Introduction, TDMA, TDMA-Frame structure, TDMA-Burst structure, TDMA-Frame efficiency, TDMA-super frame, TDMA Frame acquisition & Synchronization, TDMA compared to FDMA, TDMA Burst Time Plan, Multiple Beam (Satellite switched) TDMA satellite system, Beam Hopping(Transponder Hopping) TDMA, CDMA & hybrid access techniques.
- ▶ **SATELLITE ORBITS:** Introduction, Synchronous orbit, Orbital parameters, Satellite location with respect to earth, Look angles, Earth coverage & slant range, Eclipse effect, Satellite placement in geostationary orbit, station keeping, Satellite stabilization.

Section-D

SPECIAL PURPOSE COMMUNICATION SATELLITES :

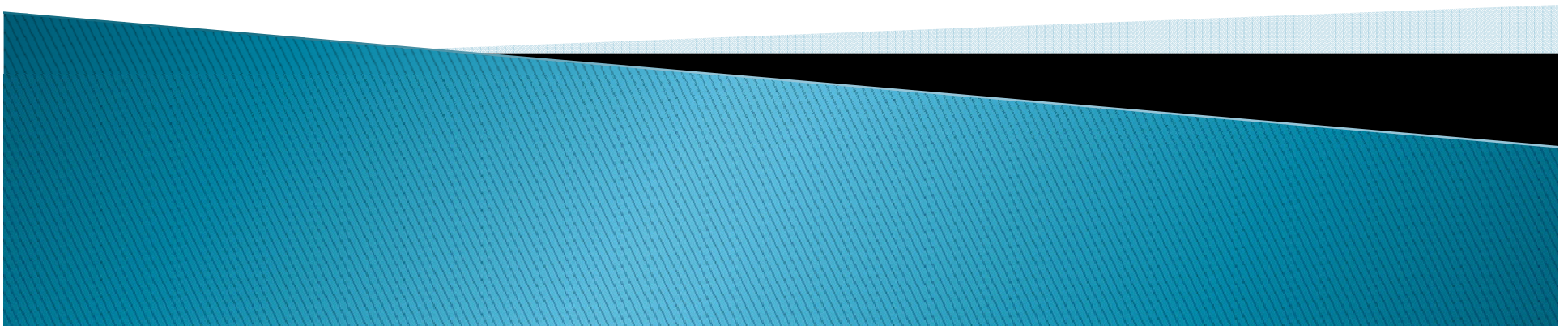
BDS, INMARSAT, INTELSAT, VSAT (data broadband satellite), MSAT(Mobile Satellite Communication technique), SARSAT (Search & Rescue satellite) & LEOs (Lower earth orbit satellite), Satellite communication with respect to Fibre Optic Communication, LANDSAT, Defence satellite.

LASER SATELLITE COMMUNICATION: Introduction, Link analysis, Optical satellite link transmitter, Optical satellite link receiver, Satellite Beam Acquisition, Tracking & Positioning, Deep Space Optical Communication Link.



Section A

Principles of Satellite Communication

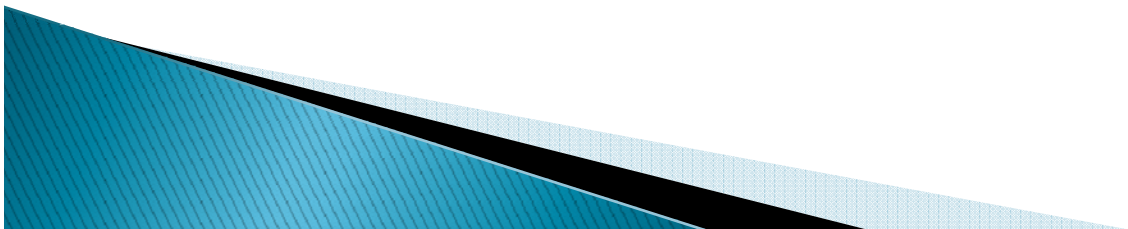


Evolution and growth of communication

1945 Arthur C. Clarke(writer)

SPUTNIK I RUSSIA

SCORE USA (1958) EXPLORER SATELLITE



Arthur C. Clarke publishes an essay about „Extra Terrestrial Relays“

1957 first satellite SPUTNIK

1960 first reflecting communication satellite ECHO

1963 first geostationary satellite SYCOM

1965 first commercial Geostationary Satellite “Early Bird” (INTELSAT I): 240 duplex telephone channels or 1 TV channel, 1.5 years lifetime

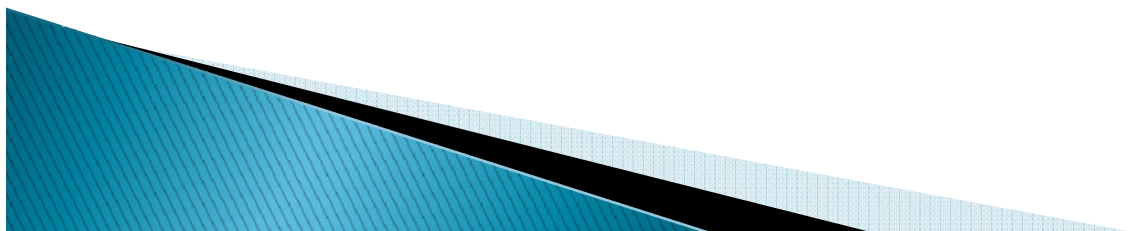
1976 three MARISAT satellites for maritime communication

1982 first mobile satellite telephone system INMARSAT-A

1988 first satellite system for mobile phones and data communication INMARSAT-C

1993 first digital satellite telephone system

1998 global satellite systems for small mobile phones

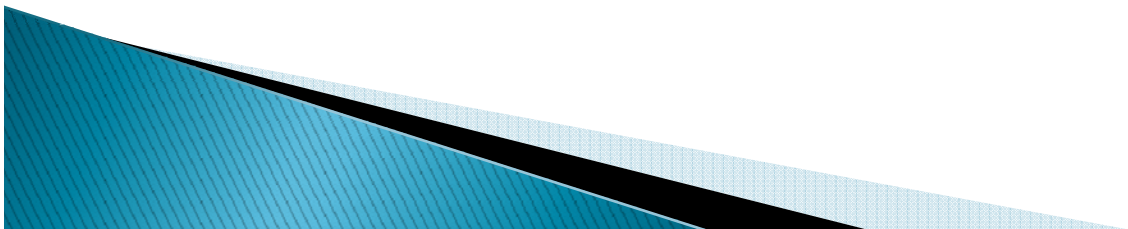


Important Milestones (1960's)

First satellite communications

- 1960 First passive communication satellite launched into space (Large balloons, Echo I and II).
- 1962: First non-government active communication satellite launched Telstar I (MEO).
- 1963: First satellite launched into geostationary orbit Syncom 1 (comms. failed).
- 1964: International Telecomm. Satellite Organization (INTELSAT) created.
- 1965 First communications satellite launched into geostationary orbit for commercial use Early Bird (re-named INTELSAT 1).

- 1972 First domestic satellite system operational (Canada). INTERSPUTNIK founded.
- 1975 First successful direct broadcast experiment (one year duration; USA-India).
- 1977 A plan for direct-to-home satellite broadcasting assigned by the ITU in regions 1 and 3 (most of the world except the Americas).
- 1979 International Mobile Satellite Organization (Inmarsat) established.

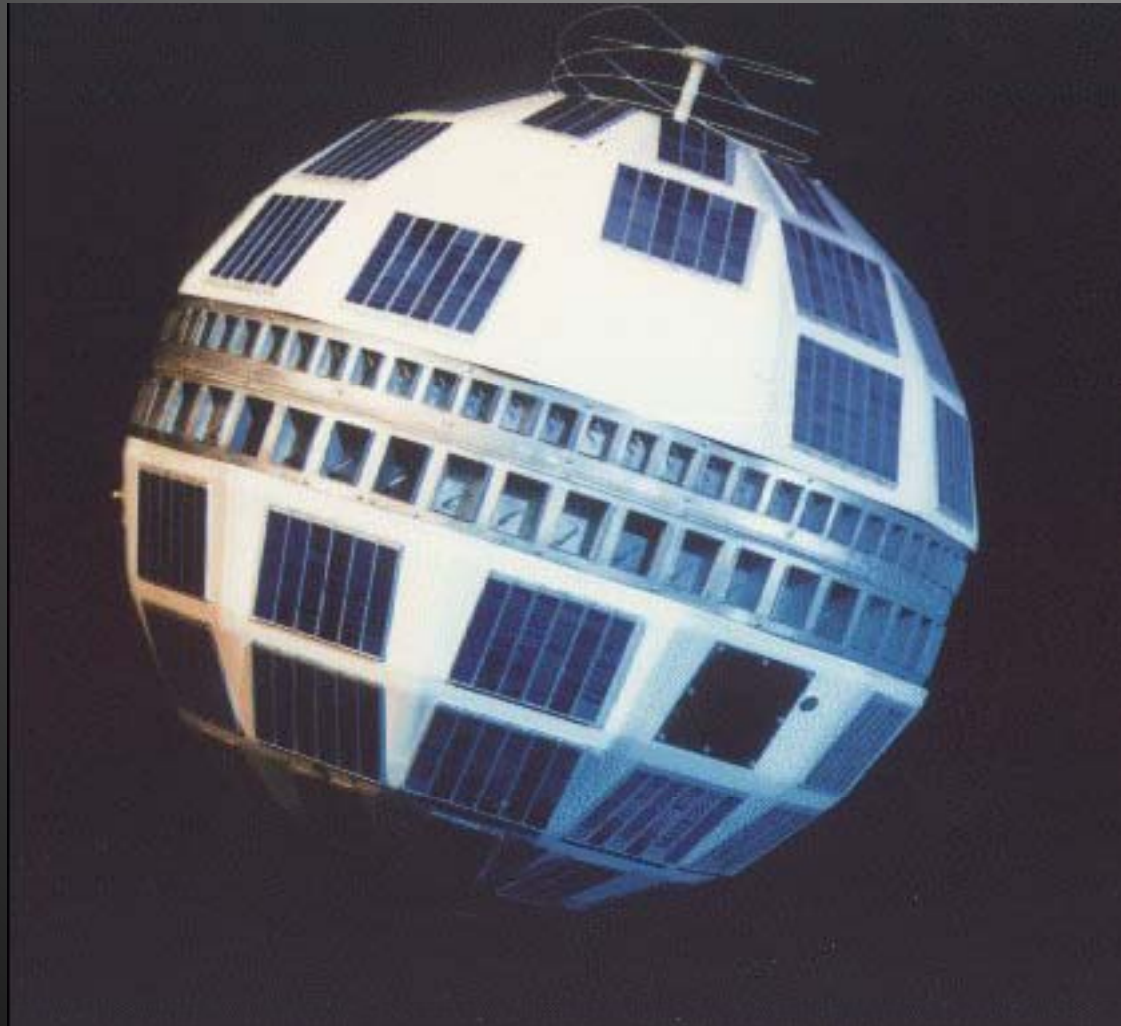


ECHO I

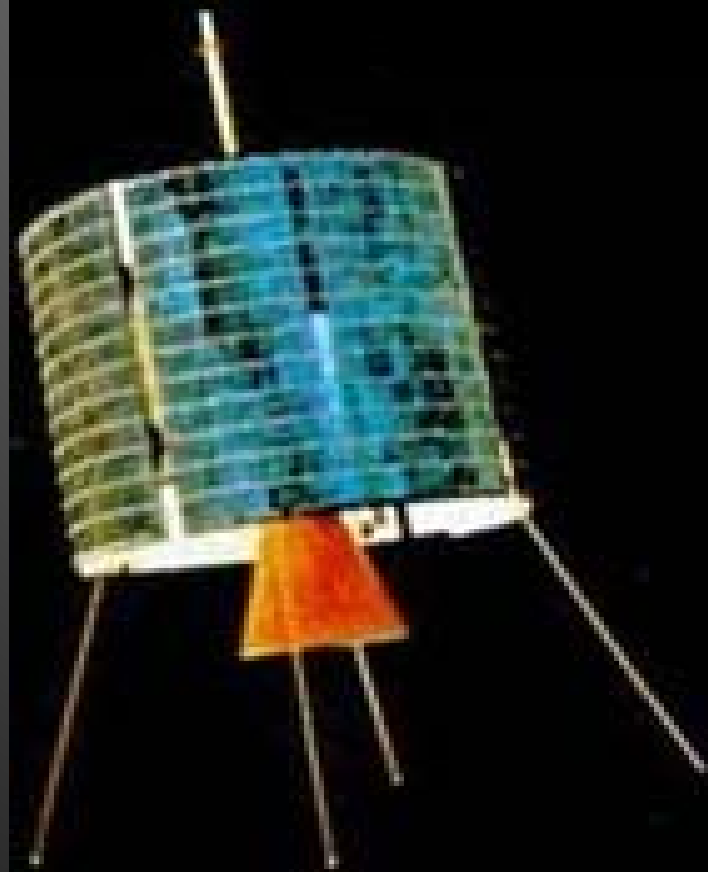
100 FT IN
DIAMETER
(PASSIVE
REFELECTOR)



Telstar I



Intelsat I



SYNCHRONOUS SATELLITE

- GEO STATIONARY SATELLITE

- 24 hours

- 36000 km

- Advantage:–

- a) Sufficiently small values of orbital eccentricity and inclination to the equator that changes in its apparent direction relative to the rotating earth

- b) Well above the high intensity inner radiation belt
Above the most intense region considerably Milder
outer belt

- c) fix antenna positions, no adjusting necessary

