

Materials For Non-Technical Professionals

Day One:

Seminar Overview

1. Introduction

- What is satellite communications?
 - Types of satellite:
 - Communications, broadcasting, government and military, weather, scientific, earth observation
- History of satellite communications
- Terms and acronyms explained
- Sources of information

2. What is a Satellite?

- Spacecraft descriptions
 - Bus and payload
 - Stabilisation
 - Three axis / spin stabilised
- Payload description
- Transponders
 - Bent pipe vs on-board processing
- Antennas
 - Fixed, steerable, phased array, unfurlable (umbrella and frame), digital beam forming and scanning spot beams
- Footprints
 - Global, regional, spot beams
- Inter-Satellite Links
 - Radio and optical
- Mission
 - Fixed services, mobile, TV broadcasting, audio broadcasting and DARS, multimedia satellites, navigation, GPS, low data rate messaging.
- Satellite Control
 - Telemetry and tracking / telecommand
 - Attitude control
 - Stationkeeping
 - Satellite lifetime / fuel

3. Satellite Orbits

- Basic orbital mechanics
- How do satellites stay in orbit?
- Launch / transfer orbit / GSO insertion
- Geostationary (GSO)
 - inclined orbit operation
- Non-geostationary Orbits
 - LEO, MEO, elliptical, polar
- Space Debris
- Radiation belts

4. Launches

- Reusable / expendable launchers
- Launch sites

5. Earth Stations

- Fixed satellite services
 - Gateway earth stations, IBS, SMS, VSATs, DTH
- Mobile services
 - Luggable, briefcase size and handheld
- Earth station antennas
 - Typical sizes, geometry, applications, cost

- Dual feed antennas for DTH
- Applications
- Specialised applications
 - Maritime and aeronautical
- Subsystems and components
 - RF and baseband description

6. The Technical Bits

- The link budget
 - EIRP and G/T, bandwidth, beamwidth, propagation, fade countermeasures, analogue and digital transmission, footprints, frequency bands, link margins, modulation schemes (PSK/QAM), multiple access schemes (TDMA, FDMA, DAMA), error correction
- Typical data rates
- Higher order modulation schemes
- DVB-S2 and DVB-RCS / DOCSIS / IPoS
- Multi-carrier operation, transponder backoff, intermodulation

7. Typical Applications

- Video distribution
 - Bulk telephony
 - Video backhaul
 - Corporate data services
 - Cellular extension and complement
 - Rural and thin route telephony
 - Internet access

8. Operators

- Global
 - Intelsat, SES Global, Intersputnik, Inmarsat.
- Regional
 - Eutelsat, Arabsat, Asiasat
- National
 - DirecTV, Echostar, Palapa
 - The new private equity owners
- FSS industry consolidation:
 - Private equity / global consolidation

9. The Global Marketplace

- Satellite operators
- Spacecraft manufacturers
 - Boeing, EADS Astrium, Lockheed Martin, Space Systems/Loral, ISRO, Russian and Chinese suppliers
 - (NPO-PM, CGWIC)
- Broadcasters
- Content providers
 - The service value chain
- DTH / FSS / broadband (broadcast and interactive)
 - Service providers
 - Services
 - Legal and regulatory, insurance, market research, financing
- Market size
 - Spacecraft, launch services, service provision
- Market growth forecasts

Day Two:

Seminar Overview

10. Applications

TV Broadcasting

- Typical operators
 - DirecTV, BSkyB, Canal Plus, Multichoice, Echostar
 - Business models
 - Bouquets and tiering
- Interactive services
- The neighbourhood / Hot Bird concept
- Applications
 - Pay TV, VOD, IP delivery
- Subscriber growth
- Typical service costs
- Digital TV, HDTV, MPEG, DVB

Trunk Telephony

- Typical users
 - PTTs, carriers
- Competition from submarine cables
- Corporate networking, VSATs
 - Typical users, network topology and applications
 - Shared hub vs dedicated hub
- Equipment providers
- Market size
- Trends

Mobile Satellite Services

- History / Inmarsat
 - Iridium, Globalstar, ICO Global, Ellipso
- Inmarsat BGAN
- Network level operators and regional service providers
- Terminal size and cost, service cost, data rates
- Trends / what went wrong?

Broadband / Multimedia

Satellites

- GSO
 - Spaceway, other systems
- NGSO
 - Teledesic, SkyBridge
- Typical applications
- Ka-band vs Ku-band early entry
- Trends / what went wrong?

12. Financial Aspects

- Cost issues
 - Satellites, launchers, insurance, earth stations, services
- Cost and pricing of services
- Financial services
 - Stock market performance
 - Financing options (debt vs equity)
- Due diligence / Project assessments
 - Market research
 - Business plans
 - Management
 - Financial markets
 - Debt vs equity

13. The Developing World

- Teledensity levels
 - Urban vs rural
- Definitions of universal service
- Affordability and payment methods
- Service requirements
 - Basic telephony, telemedicine, e-commerce

14. Regulatory Issues

- The ITU
 - frequency and orbital filings, coordination, GSO orbital congestion, conflicts, paper satellites and administrative due diligence
- Regional and national service regulators
 - European Commission, FCC, Indian DoC
- Service regulation
- Frequency regulation
- Earth station type approvals
- The GMPGS MoU
 - Free movement for GMPGS equipment
- Export controls, security issues
- Safety and radiation hazards

15. Insurance

- The satellite, space insurance market
- Failure scenarios
 - Launch, transfer orbit, in-orbit
- Historical failure rates for launch and in-orbit cover
- Recent trends

16. Terrestrial Competition

- Submarine cables
 - Global Crossing, FLAG, SE-ME-WE
 - Capacity and pricing
 - Complementarity with satellites
- Fixed Wireless Local Loop
- Application Efficiency
 - ATM, Frame Relay
- Latency
- Speed vs instant infrastructure

17. Forecasting Future Trends

- Increasing penetration of fibre
 - competition or complement?
- Cost and pricing trends
- Content delivery via IP
 - Technology trends
- Higher frequencies (Q/V/W bands)
- Higher order modulation
- Antennas
- Pushing the limits for bandwidth efficiency and digital video coding
- Globalisation of satellite operators
- The role of satellites in 10, 20 and 50 years