

# Satellite Communications Fundamentals

For Non-Technical Professionals

**24-25 October 2010**

Grand Hyatt Hotel, Hong Kong SAR

Benefit from a practical and comprehensive understanding of the satellite communications industry and master the concepts, technologies, applications and services in just two information-packed days

**What Every Satellite Professional Needs to Know!**

**RUN THIS COURSE IN-HOUSE! CALL FOR DETAILS**

COMSYS

# Satellite Communications Fundamentals

## The Essential Satellite Seminar You Cannot Afford to Miss

Whether you are new to the industry or simply looking for a thorough, easy-to-understand overview of satellite communications, then this seminar is for you. This intensive structured, two-day series will examine the core principles and dynamics of satellite communications including **satellite orbits, launches, earth stations, satellite technology, applications, commercialisation, finance, regulation, insurance, terrestrial competition, forecasting future trends and much much more!** This seminar will provide a fast track of information essential in enabling today's non-technical executive keep abreast of the current and changing marketplace.

In addition, you will also receive a comprehensive seminar reference manual that will serve as a permanent reference source during and after the seminar, including extensive bibliography, graphs, glossary and full explanation of terms and acronyms.

Nowhere else will you gain such a practical and comprehensive overview of where satellites fit into the Global Information Infrastructure. Don't miss out, on what promises to be the 'must attend' event of the year. Places are strictly on a first come first served basis, so book early to avoid disappointment!

## In-House Training

We will come to you! Tailor this seminar to your company's individual needs and corporate issues. If you have ten or more colleagues who would benefit from this seminar, it may be more cost-effective to hold it in-house at your premises.

**For additional information and a customised proposal please e-mail: [jeremy@comsys.co.uk](mailto:jeremy@comsys.co.uk).**

## Who should attend

- **Executives new to the satellite industry who need to gain a thorough understanding of satellite communications**
- **Executives with a few years experience needing to catch up with the latest in satellite communications**
- **Senior Executives looking at fine-tuning their understanding of the industry and updating themselves on current and emerging technology and market trends**
- **Business Development and Strategic Planning Executives**
- **Sales, Product Managers and Marketing Executives**
- **Financial Analysts, Investment and Banking Executives**
- **Insurance Brokers and Underwriters**
- **Attorneys and Accountants**
- **Human Resource and Public Relations Executives**
- **Non - Technical Managers**
- **Anyone whose business is involved or affected by satellite communications**



## Presented by your Seminar Leader: Jeremy Rose

**Jeremy Rose is in charge of space segment consultancy at COMSYS (Communication Systems Limited) and specialises in strategic planning, financial and marketing due diligence, training and regulatory work. His clients are mostly satellite manufacturers and operators, legal firms / attorneys, financial institutions and governments. Some of his recent work includes:**

- Global market forecasts for transponder services, conducted as part of the due diligence exercise for the purchase of a satellite operator.
- Due diligence study conducted on behalf of a satellite operator planning to finance a follow-on satellite project.
- Marketing training provided to Satélites Mexicanos (Satmex) on behalf of Hughes Space and Communications. This was a week long programme, conducted in Mexico City, involving a comprehensive review of global FSS, BSS and MSS satellite markets.
- Advice provided to the US State Department on the development of the global telecommunications market. Our analysis was used in the department's testimony to the US Congress and in Vice President Al Gore's speech to the ITU Plenipotentiary Conference.
- Expert witness assistance on satellite-related litigation.
- A competitive analysis of mobile and broadband multimedia projects.

Mr Rose founded Communication Systems Limited in 1982 and is a member of the Society of Satellite Professionals, the American Institute of Aeronautics and Astronautics and the International Institute of Communications. He has written more than fifty journal and conference papers on subjects such as the future for satellite communications in the 30/20 GHz band, the prospects for private satellite networks in various parts of the world and the potential for hand held satellite communications terminals. In 1991 and 1992, Mr Rose was named by Via Satellite Magazine as one of its "Top 100 Satellite Industry Executives" worldwide.

Mr Rose began his career with Marconi Space and Defence Systems in 1979, where he was involved in system engineering, research and analysis for UK Ministry of Defence projects. He graduated from Westminster University, London, in 1979.

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

#### Broadband / Multimedia

##### Satellites

- GSO
  - Spaceway / Viasat / Ka-Sat / Avanti / Yahsat / Wildblue
- NGSO
  - Teledesic, SkyBridge
- Typical applications
- Ka-band vs Ku-band
- 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 GMPCS MoU
  - Free movement for GMPCS 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

