



**VSAT
FIELD ENGINEERING
COURSE**

LECTURE PROGRAMME

Day 1

INTRODUCTION TO SATELLITE COMMUNICATIONS.

- Introduction to satellites and satellite theory
- Details of the Components of a satellite
- Brief History of satellites communication
- Different types of Satellite orbits
- Satellite Types with focus on Communication satellites
- Radio Frequency Spectrum with focus on Satellite frequencies (L band, KU band, C band)
- Definition of Satellite footprints
- Types of Satellite beams
- Satellite elements
- Satellite signals
- Introduction to RF basics

Introduction to VSAT

- VSAT application
- Advantages and disadvantages of VSATs
- Comparison of VSAT with other terrestrial links
- Vsat Technology
- VSAT Frequency bands in details
- Details of VSAT components-BUC, LNB, Teleport, NOC, Transponder details, Antennas, Feedhorn.

Practicals:

Practical demonstration of components of the assembly: Block UP Converters (BUC), Low Noise Blocker (LNB), Feed horn, OMT (Orthomode Transducer)

Day 2



VSAT Access Methods:

- Types of Access Methods – Dedicated Vs Shared
- Dedicated methods – SCPC
- Shared Access
- Need for frequency optimization
- Signal separation
- PAMA & DAMA
- Shared Access - FDMA
- Shared Access - TDMA
- Shared Access - CDMA
- Capacity allocation
- VSAT carriers- upstream downstream
- Link Parameters – Data rate. Modulation, FEC & Reed Solomon
- Bit rate and Symbol rate
- Definition and relationship between BER & EbNO
- Definition and differentiation if a CW & Modulation carrier

Types of VSAT Networks:

- VSAT Connectivity
- VSAT Topologies
- Propagation delay
- Value of the satellite system
- Data communication basics
- Data communication Protocols in brief
- Types of VSAT data traffic
- TCP acceleration
- Quality of Service (QOS) in VSAT links



Practicals:

Types of Modems and their uses.

Show the class different kind of VSAT modems & perform modem configuration

Day 3

Fundamentals of VSAT Systems:

- Terminologies with respect to Antennas eg Gain, Patterns, Beamwidth, lobes etc
- Antenna Types and Operating principles
- Antenna classes as approved by Satellite operators.
- Types of mounts that support VSATs
- Antenna and Feed Systems: Tx/Rx, Dual Rx, RO
- Theory of Wave Polarization.
 - Launching Linearly Polarized Waves
 - Matching TX and RX Antenna Orientations
 - Cross-Polarized Signals and XPD
 - Pol Frequency Re-use and Cross-Pol Transponders
 - Cross-Pol Interference
 - Linear and Circular Polarization

- Types of cables and their Suitability: RG6, RG11, Rg213 etc
- Types of connectors and their Suitability.
- Tools used in terminating cables/crimping tools.
- Preview of Large Earth Station Equipment.
- Typical block Diagrams of VSAT systems.

Site Survey:

- Undertaking a Site Survey.
- Filling out a Site Survey Report.



VSAT Installation Concepts:

VSAT pointing variables:

- Latitude
- Longitude
- Azimuth
- Elevation
- GEO Arc
- AZ-EL Beam Movement Across the Arc

Tools & Equipment used when pointing at site:

Installation Steps:

- Cabling
- Assembly
- Pointing
- Commissioning i.e Carrier Lineup and Cross-Pol Checks.
- Testing

Common Faults and problems: Site faults, Interference, losses due to weather.
Use of a Spectrum Analyzer to view the satellite spectrum and in troubleshooting.
Mention other types of VSATs other than Fixed VSATs.

Practicals:

Feed Assembly, Mount Assembly, reflector Assembly

Day 4

Practicals:

- *Antenna assembly.*
- *Antenna Pointing using Satellite modem.*
- *Antenna pointing using a Spectrum analyzer*
- *Antenna pointing using a Field Strength Meter (FSM).*
- *Checking site receive levels: EbNo, BER, SNR*

Course Closure