VSAT Solutions

The enhancement Centre

VSAT Field Engineering Course

Lecture Program

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 applications
- 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)

Lecture Program

Day 2

VSAT Access Methods

- Types of Access Methods ¡V Dedicated Vs Shared
- Dedicated methods ¡V 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 ¡V 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 Systems

- 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

Lecture Program

Day 3

Fundamentals of VSAT Systems

Terminologies with respect to Antennas eg Gain, Patterns, Beanwidth, 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 Suitabilty.
- Tools used in terminating cables/crimping tools.
- Preview of Large Earth Station Equipment.
- Typical block Diagrams of VSAT systems.

VSAT Installation Concepts

VSAT pointing variables:
Latitude
Longitude
Azimuth
Elevation
GEO Arc
AZ-EL Beam Movement Across the Arc

Site Survey

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

Tools and equipments 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

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