

VSAT Installation and Operation Certification



Course Description

This course provides learning and practice in VSAT satellite networks, from the standpoint of remote-site installation and operation. Satisfactory completion of this course qualifies a technical individual to work on commercial satellite communications projects wherein VSATs are installed, commissioned and then support a broad range of government and industrial environments. It provides a technical foundation and a practical understanding of VSAT installation and operation. The certificate of satisfactory completion is issued by an accredited education institution and by a highly experienced satellite Subject Matter Expert.

The training addresses the current multi-vendor environment in terms of antennas (fixed, portable and mobile), amplifiers and other RF devices, modems and baseband equipment, and supporting systems that provide power and physical protection. The interfaces with a centralized hub earth station and the remote site Local Area Network (LAN) are reviewed, based on standard architectures from Hughes, ViaSat, iDirect, and COMTECH EF Data. Space segment capacity at C and Ku bands would come from commercial operators such as Intelsat, SES, Eutelsat and others consideration will also be given to government X and Ka band space assets such as WGS and XTAR. These combinations allow us to examine each element and how they interact to provide an effective and reliable data delivery mechanism.

This foundation relates to all satellite communications systems however, the course is geared to the civilian/commercial side. All of the information is taken from open sources such as non-proprietary vendor documentation and technical course materials used in many standard satellite communications courses presented to contractors, commercial users, satellite and network operators, and government and military units. This assures that the content is properly directed to the purposes of the course in certifying individuals as installers and operators of VSAT equipment. The material is accurate for and understandable to those who have a base of technical knowledge of satellite communications.

Students Will Learn

- **The structure and application of VSATs for remote data communications, based on commercial principles of the satellite communications industry**
- **The nuts and bolts of VSAT construction, installation and operation**
- **The use of different satellites and different frequency bands (C, X, Ku and Ka bands)**
- **How to evaluate VSAT performance in terms of EIRP, G/T and gain**
- **Principles of satellite access, including satellite, polarization and carrier alignment**
- **The requirements to interface the VSAT with a Local Area Network (LAN) and hub/network**
- **Examples of popular VSAT network systems as applied commercially, from Hughes, ViaSat, iDirect, COMTECH, General Dynamics, TCS and others**
- **How to resolve technical issues and problems that affect the installation and operation of the VSAT and network**

Target Audience

Communications technicians who have had some exposure to satellite technology but need a complete understanding of the principles and methods for putting VSATs into service. Anyone interested in/responsible for VSAT system installation, operations, support and/or troubleshooting.

Prerequisites

Basic telecommunications and satellite communications, electronics technology/communications training such as at the Signal School or Devry Institute, along with some prior exposure to satellite technology. Microwave line-of-sight and troposcatter links are acceptable substitutes for satellite.

Course Outline

Module 1. Baseline Points for Satellite Communications

- A. Satellites and Earth Stations
- B. Frequency Bands (C, X, Ku and Ka)
- C. Propagation Review (clear sky and rain; link margin and availability)
- D. Modulation and Coding (Common MODCOD Options, Bandwidth, Eb/No, BER)
- E. Multiple Access (FDMA, TDMA, CDMA)

Module 2. VSAT Network Architecture

- A. Star Networks (hub and spoke)
- B. Mesh Networks (fixed links and DAMA)
- C. Internet Protocol Support (Router Interface, TCP/IP Acceleration, Security)

Module 3. RF Devices and Systems

- A. Antennas (center fed and offset fed reflectors, feed types, flat arrays, manual and auto-pointing/tracking systems, communications on-the-move)
- B. High Power Amplifiers (BUC, SSPA, TWTA)
- C. Diplexers, Polarizers, Waveguide Systems, RFI Filters
- D. EIRP, G/T and Gain Budgets

Module 4. Case Studies of Leading VSAT Products

- A. Broadband VSAT (Hughes DirecWay)
- B. High-speed IP VSAT (iDirect)
- C. FDMA SCPC Star and Mesh (COMTECH CDM Modem)
- D. Mesh TDMA (ViaSat Linkway)
- E. Military vs. Commercial Terminals (General Dynamics, GSI, TCS)

Module 5. Installation Issues

- A. Antennas (Fixed, Portable and Mobile)
- B. Equipment Power and Protection
- C. Alignment on the Satellite, Cross Polarization, Carrier Alignment
- D. Troubleshooting Link Problems (Link, End-to-End, Radio Frequency Interference)
- E. Maintenance of RF and Baseband
- F. Interfacing to LANs and the Hub

Module 6. Final Case Study (Graded Practical Exercise)

Delivery Method

Instructor-led with numerous exercises and case studies.

Equipment Requirements

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

Course Length

4 Days