

VSAT Tutorial



Product Overview

VSAT stands for “Very Small Aperture Terminal” and refers to receive/transmit terminals installed at dispersed sites connecting to a central hub via satellite using small diameter antenna dishes (0.6 to 3.8 meter). Generally, these systems operate in the Ku-band and C-band frequencies for consumer usage, with L and Ka frequencies in the MSS (Mobile Satellite Services - Inmarsat and Iridium).

Frequency Bands

- Generally, VSAT operates on either Ku-band, or C-band with growing use of Ka-band and L-band.
- L-band is primarily used by mobile satellite services; Inmarsat and Iridium.
- Ka-band is primarily used in consumer broadband and military applications.
- Ku-band based networks are used primarily in Europe and North America.
- C-band used extensively in Asia, Africa and Latin America.
- Ku-band generally requires a smaller antenna diameter than C-band which generally requires a larger diameter antenna

Types of Operations

Bi-Directional Operation - The dish both sends (uplinks) and receives (downlinks) information.

Receive-Only Operation - The dish receives (downlinks) information only.

VSAT Networks

There are basically five types of networks employed in VSAT operations.

Multipoint Network

The Multipoint Network Structure is used in data-oriented networks that require voice. The network structure provides for two-way data, voice and multi-media operations. The network configuration is a star type network that connects one or more main sites to various remote sites. It employs a central hub station and a communication satellite. Each main site uplinks and downlinks from the central hub through terrestrial (land) links. Each remote site can only uplink to the hub. If a remote site has data to send to any other location, it must first pass the information to the hub, and then it can be routed to its final destination. This type of network is very flexible, supporting multiple interfaces available for LAN, Voice and Data connections and can support numerous transport protocols. The network employs TDMS (Time Division Multiple Access) as the means to send data to each remote site. This provides a secure means of transporting data, as each data packet contains the specific address of the station that it is addressed to and only that station can receive the data and pass it on to its network.

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Full-Meshed Network

For Voice oriented networks a Full-Meshed Designed Network is utilized. In a Full-Meshed there is no central hub and each site can communicate directly with all network nodes. It employs single satellite hops between each network nodes, which enables superior voice quality, and efficient fast-response data connections. Since the network does not employ a central hub, each station requires increased processing and transmission power. Each remote must uplink and downlink with other remote sites with exactly the same size antenna over the same radio frequency. In this network one site on the network must provide a Network Control System. It is responsible for setting up calls between the sites and monitors the traffic and bandwidth use. From this site all operating statistics are generated, and billing information is produced. The Network Control System established the allocation of bandwidth as each connection is established through bandwidth-on-demand, that is as one node initiates a call to another node, the Network Control System demands a certain amount of bandwidth from the bandwidth pool and then assigns it to the two nodes for the duration of the communication. Once a call is terminated, the bandwidth is then free, and is back available from the bandwidth pool. This type of network is capable of providing interconnection of dissimilar communication devices. It provides the capability of providing connections between must all currently available communication devices. The system can provide a connection for an individual handset, PBX (Public Branch Exchange) or can provide a gateway system.

Hybrid Voice and Data Network

This type of network is a hybrid between the Multipoint and Full-Meshed network. Like the Full-Meshed Network it does not contain a central hub, though it provides all remote sites with the capability to communicate directly with all other sites. It provides the ability to offer voice, fax, and videoconferencing opportunities between the sites. Data and video can be broadcast is bi-directional between the central hub and the remote site. This system takes separate voice and data interfaces at the remote site and then processes this and combines them onto a single cable connecting to the antenna. The remote HES VSAT acts as a switch routing all connections to their appropriate destination. The system is capable of a wide-range of advance telephony and PBX voice services and provides an efficient LAN/WAN network service.

Single Channel Per Carrier (SCPC) - Point-to-Point

SCPC circuits are point-to-point circuits that provide two-way communication between VSAT terminals located at two sites. It is a very flexible system and has the capability to handle multiple data types over multiple protocols. The system can handle voice, fax, and video application. the data rates range from 9.6 kbps up to 8.4 Mbs. It is ideally suited for bringing Internet to remote ISP sites. Internet access is provided through one satellite dish connected to the Internet through a point-to-point line and transmission is accomplished between it and another terminal at the remote ISP through the use of a satellite. This system is capable of both asymmetric and well as symmetric connections.

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Broadcast Networks

Broadcast Networks provide for the transmission of data, video and audio files to any number of users. The system "broadcasts" from the central site to the end user remote sites. This one-way system provides an uplink from the central site and each remote site downlinks (receives) only. It provides high speed channel up linked, providing this information to numerous units.

VSAT COMPONENTS

ODU (Outdoor Unit): consists of the dish/reflector antenna and Feed horn which contains either an LNB for receive only systems or an LNA for bi-directional systems, which amplify the signal received by the unit. Other electronic components consist of a Transmit Reject Filter, Up/Down Converter (Transceiver), High Frequency Power Amplifier, and Transmit Type N Transition. These components are either packaged separately or packaged together in a single unit, depending on the manufacturer.

IDU (Indoor Unit): consists of the electronic interface that allows connection to the network. It provides the interface.

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