



Satellite Basics

Benefits of Satellite

People need access to enterprise-class, high-speed voice, video and data applications wherever they happen to be. Satellite connectivity has the power to drive communications advances across a broad range of industries and geographies.

Whether it's a ship-to-shore maritime communications, Internet access for remote, rural classrooms, or vital data and communications for petroleum operations, satellite applications meet a broad range of needs.

iDirect's communication platform enables any IP application to run reliably and efficiently over satellite. iDirect's advanced technology provides organizations with immediate global reach – making mission critical communication possible in the most challenging and diverse environments.

Communication satellites are used in fixed or mobile wireless communications to receive and transmit radio signals from an orbiting satellite to another terrestrial location. There have been such advances in bandwidth utilization and reliability of communications that satellite service now provides affordable, always-on, high-speed, quality connectivity.

Global Coverage (African Wide Coverage)

Today, satellite communication can deliver a terrestrial-grade experience with voice, video and data that can be accessed anywhere in the world. Ubiquitous coverage can be obtained with a global network of multiple satellites all tying it to one central network management system.

Reliability

Satellite networks are dependable, providing constant connectivity even when terrestrial networks fail. With satellite networks, enterprises can maintain business continuity with built-in redundancy and automatic back-up service.

Security

Satellite networks already constitute a private network. By adding encryption technology satellite can provide a more secure connection than terrestrial networks, making it an ideal solution for government, military and enterprise VPN (virtual private network) solutions.

Scalability

The modularity of VSAT systems allows for quick time-to-market and fast upgrades. VSAT remotes can be deployed rapidly and new remote locations are easily added to a network where limited terrestrial infrastructure exists simply by configuring bandwidth to the site and having ground equipment installed.

Fast Deployment

Satellite technology is an ideal solution for quick deployment, immune to the challenges posed by difficult terrain remote locations, harsh weather, and terrestrial obstacles. In this rapidly expanding market, satellite allows a service provider to get to market quickly and efficiently and provide immediate connectivity in disaster and emergency relief scenarios.

Cost Savings

Satellite technology can deliver a communications infrastructure to areas where terrestrial alternatives are unavailable, unreliable or simply too expensive. Satellite allows service providers to insure scalability, profitability and maintain low operating expenses, all while overcoming a lack of existing infrastructure.

How Satellite works

A communications satellite is a satellite located in space for the purpose of telecommunications. There are three altitude classifications for satellite orbits:

LEO – Low Earth Orbit

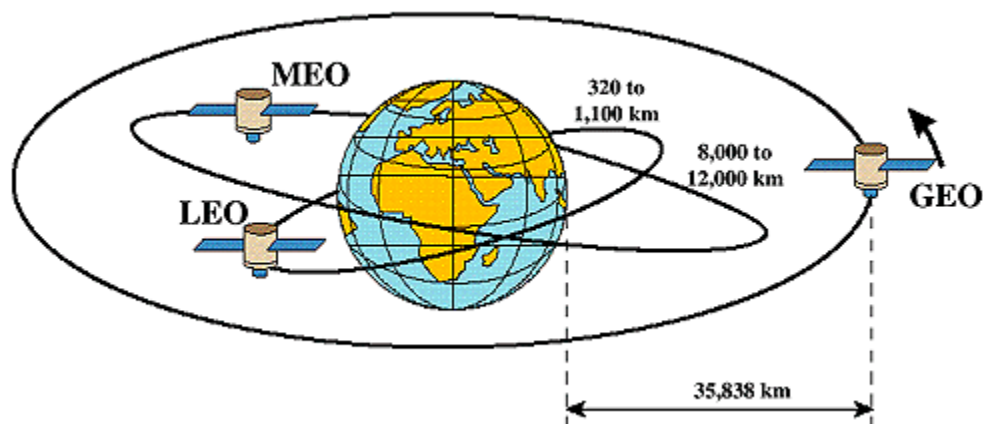
LEO satellites orbit from 160-2000km above the earth, take approximately 1.5hrs for a full orbit and only cover a portion of the earth's surface, therefore requiring a network or constellation of satellites to provide global, continual coverage. Due to the proximity to Earth, LEO satellites have a lower latency (latency is the time between the moment a packet is transmitted and the moment it reaches its destination) and requires less amplification for transmission.

MEO – Medium Earth Orbit

MEO satellites are located above LEO and below GEO satellites and typically travel in an elliptical orbit over the North and South Pole or in an equatorial orbit. These satellites are traditionally used for GPS navigation systems and are sometimes used by satellite operations for voice and data communications. MEO satellites require a constellation of satellites to provide continuous coverage. Tracking antennas are needed to maintain the link as satellites move in and out of the antenna range.

GEO – Geostationary Orbit

GEO satellites orbit at 35'786km (22'282mi) above the equator in the same direction and speed as the earth rotates on its axis. This makes it appear to the earth station as fixed in the sky. The majority of commercial communications satellites operate in this orbit; however due to the distance from the earth there is no longer latency.



Frequency Bands

There are four radio frequency bands that communication and military satellite operate within:

C-Band - uplink 5.925–6.425GHz; downlink 3.7–4.2GHz

The C-band is primarily used for voice and data communications as well as backhauling. Because of its weaker power it requires a larger antenna, usually above 1.8m. However, due to the lower frequency range, it performs better under adverse weather conditions on the ground.

Ku-Band – uplink 14GHz; downlink 10.9-12.75GHz

Ku-Band is used typically for consumer direct-to-home access, distance learning applications, retail and enterprise connectivity. The antenna sizes, ranging from 0.9m – 1.2m are much smaller than C-band because the higher frequency means that higher gain can be achieved with small antenna sizes than C-Band. Networks in this band are more susceptible to rain fade, especially in tropical areas.

Ka-Band – uplink 26.5-40GHz; downlink 18-20GHz

The Ka-Band is primarily used for two-way consumer broadband and military networks. Ka-Band dishes can be much smaller and typically range from 60cm – 1.2m in diameter. Transmission power is much greater compared to the C or Ku band beams. Due to the higher frequencies of this band, it can be more vulnerable to signal quality problems caused by rain fade.

VSAT Network

Network Equipment

A network typically consists of a larger earth station, commonly referred to as a teleport, with HUB equipment at one end and Very Small Aperture Terminal (VSAT) antenna with remote equipment at the other end. The network equipment can be divided into two sets of equipment connected by a pair of cables; the Outdoor Unit (ODU) and the Indoor Unit (IDU).



ODU (Antenna)

An ODU is the equipment located outside of the building and includes the satellite antenna / dish, a low noise block converter (LNB) and the block up converter (BUC). The LNB converter amplifies the receive signal and down converts the satellite signal to the L-Band (950MHz – 1550MHz), while the BUC amplifies the uplink transmission when the antenna is transmitting.

IDU (Modem)

The IDU equipment at the teleport usually consists of a rack-mounted HUB system and networking equipment connected to terrestrial networks, like the PSTN or Internet backbone. There is also a device that converts between satellite and IP Protocols for local LAN applications such as PC's, voice calls and video conferencing.

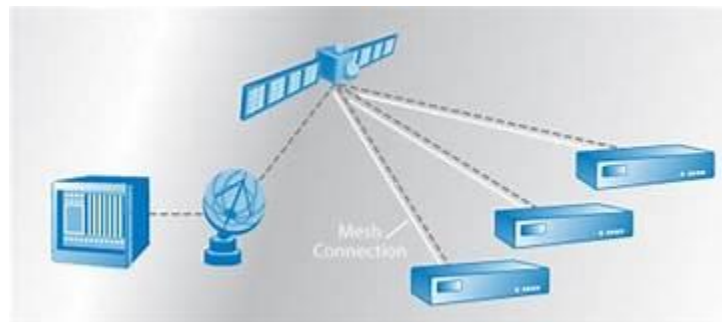
At the remote locations, a router connects to a small VSAT antenna receiving the IP transmission from the HUB over the satellite and converts it into real applications like Internet, VoIP and Data.

Topologies

Network topologies define how remote locations connect to each other and to the HUB. The link over the satellite from the HUB to the remote is called the outbound or downlink transmission, whereas the link from the remote to the HUB is referred to as inbound or uplink. Satellite networks are primarily configured in one of these topologies:

Star (HUB and Spoke) Network

In a star network topology, the HUB connects to the remote, where all communications are passed back through the HUB. Virtually an unlimited number of remotes can be connected to the HUB in this topology. Smaller, lower powered BUC's can be used at the remote end since they are only connecting back to the larger HUB antenna



Point to Point Connectivity (eg. Microwave link)

Contrary to the network topologies, a point-to-point topology involves a dedicated connection between two antennas. This topology is a direct pipeline with a set bandwidth capacity regardless of usage and is typically designed with Single Carrier per Channel (SCPC) technology.



Value Chain

Equipment Vendors

Equipment vendors are generally distinguished between pure antenna manufacturers and satellite equipment manufacturers that produce indoor or outdoor ground equipment including antennas, LNBS, BUCs, HUBs, Routers, Software and network management systems.

Satellite Operators

Satellite operators are responsible for the planning and cost of the construction and launch of satellite into space. They own and manage a constellation of satellites and determine coverage and geographic areas. Satellite operators lease this bandwidth to service providers, government entities, television broadcasters, enterprises and sometimes direct to the end consumer.

Service Providers / Network Operators

Service providers sometimes known as network operators, are telecommunication companies or specialized satellite service companies who sell a full-service package to the end customer. They lease capacity from satellite operators, purchase and operate the network equipment and the antenna, and are responsible for the installation and maintenance of the network.

Customers

Customers are the enterprises, organizations and consumers who use satellite communication services. Government or large corporate customers may operate as their own service provider by managing the equipment directly and leasing bandwidth from satellite operators. Individuals and smaller enterprises typically work with service providers who manage the equipment and connections.

Application

Always-on, high speed connectivity is needed for a variety of applications. Whether broadcasting radio to consumers or multi-casting data for enterprise networks, satellite can support all user's networking requirements, including:

- VoIP
- Email
- Internet
- Video
- Data
- VPN
- Broadcasting

Satellite can provide the right solution for a number of applications, whether extending the edge of the terrestrial networks to remote places or as a stand-alone solution, such as:

- Enterprise Connectivity
- Retail Transactions (POS)
- Internet Connections (ISPs)



- Video / TV Direct to Home
- Maritime (Ships)
- Cellular Backhaul
- Military Defense
- Energy & Utilities (Telematrix, Nampower, Namwater)
- Oil & Gas
- Business Continuity (Scorpion Zinc)
- Disaster Recovery / Emergency Relief
- Education & Training (Schools)
- Aeronautical Connectivity (Planes, Airbuses)

Contact US

Namibia: +264 833 003 101

International: +442 070 609 696

+156 724 42 000

Stand By: +264 811 550 986

Mail: sales@sat-space.net

Web: <http://www.sat-space.net>