Satellite Basics – Term Glossary

AES
Advanced Encryption Standard is an encryption standard comprised of three blocks of ciphers AES-128, AES-192, and AES-256

ACM
Adaptive Coding and Modulation uses an algorithm to dynamically change the coding and modulation scheme based on atmospheric conditions and network configurations

APSK
Amplitude and Phase Shift Key is a modulation scheme that changes the amplitude and phase of the carrier wave

Analog transmission
Transmission of information using a continuous signal that varies based on amplitude, phase, or other proportion

Antenna
Equipment that typically transmits and receives electromagnetic waves, usually referred to as the satellite dish

Aperture
The cross-sectional portion of the satellite antenna that transmits and receives the signal

A-TDMA
Adaptive Time Division Multiple Access is a channel access method that allows the return channel configuration to optimally change based on link conditions and spectral degradation

Attenuation
Fixed signal loss due to cabling or reduction of signal strength due to atmospheric conditions (see also Rain Fade)

BUC
Block Up Converter. Used for uplink satellite transmission that converts a band from a lower frequency to a higher frequency

Bandwidth
A range of frequencies within a spectrum, expressed in Hertz. Can also be the data transfer rate or throughput, expressed in bits per second

BGP
Border Gateway Protocol is a core routing protocol of the Internet

Bit Rate
Speed of transmission, measured in bits per second (bps)

BPSK
Binary Phase Key Shifting is a modulation scheme that uses two phases separated 180 degrees

Broadcasting
Sending a single transmission to multiple sites that are capable of receiving the signal

CDMA
Code Division Multiple Access is a radio communication technology that uses channel access method

C-band
Frequency band with uplink 5.925-6.425 GHz, downlink 3.7-4.2 GHz. The C band is primarily used for voice and data communications as well as backhauling

Cellular Backhaul
Transmission of cellular voice and data signals, typically from a base station to a remote site

Carrier to Noise Ratio (C/N)
The ratio of the received carrier power and the noise power in a given bandwidth, expressed in dB. This figure is directly related to G/T and S/N. Typically in a signal, the higher the C/N, the better the quality

Channel
The transmission medium over which a signal is sent and received

CIR
Committed Information Rate is the minimum bandwidth guaranteed by a service provider, typically expressed in kilobytes per second

Circular Polarization
Refers to a method of transmitting signals from a satellite. On some satellites, both right-hand rotating and left-hand rotating signals can be transmitted simultaneously on the same frequency; thereby doubling the capacity of the satellite to carry communications channels

Coverage
Footprint or the area on the earth's surface that is covered by a satellite's transmission beam

dBW
The ratio of the power to one Watt expressed in decibels. Typically the E.I.R.P of satellite beams are measured in dBW

D-TDMA
Deterministic Time Division Multiple Access – iDirect's patented access technology that provides simultaneous access to shared upstream channels using dynamically assigned time slots

Delay
The time it takes for a signal to go from the sending station through the satellite to the receiving station. This transmission delay for a single hop satellite connection is very close to 240 ms

Demodulation
The decoding of a carrier wave by amplitude or frequency or phase

Demodulator
A device used to extract information from the carrier wave

Double Hop
Transmission of information from one terminal to another terminal in two stages, first from a remote site VSAT up to the satellite to the network hub or from the network hub up to the satellite then to another remote site

Downlink
Transmission of a signal from the satellite to the earth. In a network it is typically referred to the link between a network hub over the satellite to a remote site

Dielectric Resonator Oscillator (DRO)
An electronic component that exhibits low phase noise and high resonance for a narrow range of frequencies; DRO based products do not provide the same frequency stability as PLL based products, but operate well at low symbol rates and are much less expensive

DVB-S2
Digital Video Broadcasting – Satellite – Second Generation is the enhanced version of the DVB-S satellite broadband transmission standard and has forward error correction and modulation specifications

Earth station
Ground equipment that transmits and receives electromagnetic waves, also referred to as an antenna

EIRP
Effective Isotropic Radiated Power. This term describes the strength of the satellite signal in dBW and is a result of the transponder output power and the gain of the satellite transmit antenna

EMEA
World Region including Europe, Middle East and Africa

Evolution
iDirect's next-generation product line of routers, line cards, and iDX software, all built on the DVB-S2 standard with Adaptive Coding and Modulation (ACM)

FAP
Fair Access Policy is a bandwidth cap that limits the transfer of a specified amount of data over a period of time, particularly when a channel is intended to be shared by multiple users but may become overloaded by a few users

FDMA
Frequency Division Multiple Access. It is a channel access method that allocates each application or user a different frequency band

FEC
Forward Error Correction. It is the system for error control that has the sender include redundant data so errors can be detected and corrected at the receiver

FIPS 140-2
Federal Information Processing Standard Publication 140-2 is a U.S. government computer security standard that accredits cryptography modules

Footprint
The area on the earth's surface that is covered by a satellite's transmission beam

FSS
Fixed Satellite Service is the classification for geostationary communications satellites used for broadcast feeds for television stations and radio stations and broadcast networks, as well as telephony, telecommunications and data communications

Gain
A measure of amplification expressed in dB

GEO
Geostationary Earth Orbit satellites orbit at 35,786 km (22,282 mi) above the equator in the same direction and speed as the earth rotates on its axis, making them appear as fixed in the sky

GSM
Global System for Mobile communications is a standard for digital wireless communications to mobile phones

GQoS
Group Quality of Service is iDirect's bandwidth allocation and prioritization algorithm that allows for countless possibilities of quality of service levels, bandwidth management and traffic prioritization

G/T
A figure of merit of an antenna and low noise amplifier combination expressed in dB. "G" is the gain of the system and "T" is the noise temperature. The higher the G/T, the better the system

Guard Band
Transmission carriers are separated on a transponder by spacing them several kilohertz apart. This unused space serves to prevent the adjacent transmission carriers from interfering with each other

GUI
Graphical User Interface is a type of user interface that allows users to interact with electronic devices using images rather than text commands

HNO
Host Network Operator is a network operator who leases out hub space to smaller service providers

HTS
High Throughput Satellites is a classification for communications satellites that provide at least twice, though usually by a factor of 20 or more, the total throughput of a classic Fixed Satellite Service (FSS) satellite for the same amount of allocated orbital spectrum thus reducing cost-per-bit

HTTP
Hyper Text Transfer Protocol is an application level protocol used to request and transfer objects across the web

Hub
Satellite network equipment that controls the satellite bandwidth allocation, often located at a teleport. It usually consists of a chassis and other equipment connected to terrestrial networks

IDU
Indoor Unit is network equipment typically located inside a building that consists of a modem and router (or hub if it is inside a teleport) connected to the corporate LAN or terrestrial infrastructure

IP
Internet Protocol is a protocol used for data communication across a packet switched network. Typically used with TCP, a higher level protocol

ISO
International Organization for Standardization is a standard setting body composed of multiple national standards organizations

ISP
Internet Service Provider is a company that offers Internet access to customers

ITU
International Telecommunication Union is a United Nations organization helping governments and private organizations coordinate global telecommunications usage

Inbound
Transmission of a signal to the satellite. In a network it is typically referred to as the transmission from the remote router to a satellite to a hub

Inroute
See Inbound

iNFINITI
iDirect's product line of routers and line cards, built on iDirect's proprietary implementation of the TDM protocol

Ka Band
Frequency band with uplink 26.5-40GHz; downlink 18-20 GHZ, this band was previously known for consumer broadband applications and is now widening to enterprise and military use

Kbps
Kilobits per second. Refers to transmission speed of 1,024 bits per second

Ku Band
Frequency band with uplink 14 GHz; downlink 10.9-12.75 GHz, with more powerful transmission from the satellite more susceptible to rain fade than C-Band

LAN
Local Area Network is a computer network that covers a small physical area

Low Noise Amplifier (LNA)
This is the preamplifier between the antenna and the earth station receiver. For maximum effectiveness, it must be located as near the antenna as possible, and is usually attached directly to the antenna receive port

Low Noise Block Downconverter (LNB)
A combination Low Noise Amplifier and downconverter built into one device attached to the feed. It is used for the downlink satellite transmission by converting a band from a higher frequency to a lower frequency

L-Band
Frequency band from 1 to 2 GHz, this band is the result of the down-conversion of the received downlink satellite signal from the LNB

LDPC
Low Density Parity Check is a forward error correction code that is currently the most efficient scheme, used with DVB-S2

LEO
Low Earth Orbit satellites orbit from 160-2000km above the earth and take approximately 1.5 hrs for a full orbit and only cover a portion of the earth's surface

MEO
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

Mesh network
Topology whereby a remote VSAT location communicates with another remote location without routing through the hub

MF-TDMA
Multiple-Frequency Time Division Multiple-Access is a broadband access method where different data streams are put into different slots that are separated by both frequency and time

MIR
Maximum Information Rate is the theoretical maximum amount of bandwidth available to a subscriber, typically expressed in kilobits per second

Modem
A piece of network equipment containing a modulator and demodulator for receiving or transmitting satellite signals

Modulation
The encoding of a carrier wave by amplitude or frequency or phase

Modulator
A device which modulates a carrier

Multicast
Multicast is a subset of broadcast whereby the signal can be sent to many sites within a defined group, but not necessarily to all sites in that group

Multicast FastPath
iDirect feature that allows the transmission of the same data to a select group of workstations, improving multicast performance by bypassing most regular processing and forwarding the data directly to the Ethernet port

Multi-channel Demodulation (MCD)
iDirect feature on certain line cards (e.g. XLC-M) that allows multiple TDMA or SCPC channels to be received by a single line card, improving hub scalability

Multiplexing
Sending multiple signals or streams of information on a carrier simultaneously transmitting on a single signal

Narrowband
Refers to satellite communications of 128 kbps or lower (per Frost & Sullivan)

NOC
Network Operations Center is a centralized location where control over operation of a network is managed and monitored

Noise
Any unwanted and unmodulated energy that is always present to some extent within any signal

NMS
Network Management System is the hardware and software that monitors and controls a satellite network

NTP
Network Time Protocol is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks

ODU
An Outdoor Unit is the equipment located outside of a building close to the satellite dish or antenna and typically includes, a low noise block converter (LNB), and a block-up-converter (BUC)

OSS
Operational Support System refers to network systems dealing with the telecom network itself, supporting processes such as maintaining network inventory, provisioning services, configuring network components, and managing defaults

Outbound
Transmission of a signal from the satellite to an antenna. In a network it is typically referred to as the transmission from the hub to a satellite to a remote router

PBX
A Private Branch Exchange is a telephone exchange that connects a private enterprise or organization to the public switched telephone network

PCMA
The Paired Carrier Multiple Access (PCMA) Hub Canceller is a satellite signal canceller that maximizes the capacity of satellite networks by using ViaSat's patented PCMA technology to reduce satellite bandwidth as much as 50 percent

PDU
Power Distribution Unit is a device fitted with multiple outlets designed to distribute electric power, especially to racks of computers and networking equipment located with the data center

Phase-Locked Loop (PLL)
A type of electronic circuit used in a wide variety of telecommunications equipment. PLL circuits generate an output signal which is phase-locked to an input signal, leading to more stable output frequencies that are less affected by noise and temperature. For example, the frequency output from a PLL LNB will be more stable than the output from a regular LNB

Polarization
A technique used by satellite operators to reuse the satellite transponder frequencies when transmitting these signals to Earth. Two methods are possible: linear and circular. To successfully receive and decode these signals on earth, the antenna must be outfitted with a properly polarized linear or circular feedhorn to select the signals as desired

PSK
Phase Shift Key is a digital modulation scheme that changes the phase of the carrier wave

PSTN
Public Switched Telephone Network is an international network for public circuit-switched voice telephony

QEF
Quasi Error Free is a condition where the transmission system or storage medium used to transfer a signal has a relatively low bit error rate

QoS
Quality of Service provides priority and guarantees a certain level of network response time and other performance factors for each application and user

QPSK
Quadrature Phase Key Shifting is a modulation scheme that uses four phases

Rain Fade
Decrease of satellite signal strength due to rainfall. This occurs typically at Ku Band frequencies due to its increased sensitivity to noise temperature

RF
Radio Frequency is the electromagnetic frequencies for wireless transmission that is above the audio range and below infrared light; typically used in the satellite industry in the context of RF-equipment (antenna system and BUC)

RIP
Routing Information Protocol is a dynamic routing protocol used in local area and wide area networks

Router
A device connected to the modem and the antenna on one side and the computers and other LAN devices on the other side. It forwards IP packets based on network layer information and enables applications such as VoIP, Video and data

RTTM
Real Time Traffic Management is an iDirect feature set that is designed to enable high-quality transmission of voice applications that are less tolerant to delay or jitter that can occur on satellite links

Satellite
Communications satellites orbit the earth and transmit and receive radio signals from earth stations

SCADA
Supervisory Control and Data Acquisition is the system that monitors and controls industrial or facility based remote devices

Single-Channel-Per-Carrier (SCPC)
A satellite access method that dedicates one channel to each remote site, sometime used for very high capacity links. See also TDMA

Signal to Noise Ratio (S/N)
The ratio of the signal power and noise power. The higher the number the better the quality

Single hop
Transmission of information from one remote site to another antenna. Typically it describes the path between two remote stations in a mesh network. Single hop occurs when transmission is passed from one remote directly to another mote without having to go to the hub (double hop)

SNG
Satellite news gathering typically done from a transportable unit (truck or mobile entity) to transmit video and voice feeds back to the studios

Space Segment
The portion of the satellite bandwidth and transmission power assigned to the communication network

Spot Beam
A spot beam is a satellite signal that covers a concentrated geographic area so only antennas in that area will receive the signal

Spread Spectrum
Eliminates adjacent satellite interference by spreading the signal over the available bandwidth to enable extremely small antennas or phased array antennas in mobile operations

Star network
Topology whereby a remote VSAT location communicates with another remote location by routing through the hub

TCP
Transmission Control Protocol is a core Internet protocol that is a higher level protocol often combined with IP

TDM
Time Division Multiplex is a type of digital multiplexing in which two or more signals are transferred simultaneously as sub-channels in one communication channel, but are physically taking turns on the channel through several recurrent timeslots of fixed length

TDMA
Time Division Multiple Access is channel access method that allows applications or users to share the same frequency by dividing the full bandwidth into specific timeslots

Transponder
Receives outbound signal at the satellite and amplifies the signal before retransmitting it to an earth station

TRANSEC
Transmission Security secures VSAT transmissions with encryption to prevent from interception and exploitation

Unicast
Transmission between a single sender and a single receiver over a network. Contrast with Multicast, which is transmission between a single sender and multiple receivers.

Uplink
Transmission of a signal from the remote router to a satellite to a hub

VLAN
Virtual LAN is a group of hosts that simulates a LAN although they are not located locally on the same network switch

VNO
Virtual Network Operators lease hub space from HNOs while keeping complete control of their network and their remotes. iDirect offers this capability by assigning each VNO operator its own line cards and NMS servers and protocol processors. The VNO commissions, controls and operates its remote sites in the proprietary network as if it owns a physical hub

VSAT
Very Small Aperture Terminal is an antenna that is typically less than 3 meters in diameter

WAN
Wide Area Network is a computer network that covers a broad area that connects multiple remote locations

WGS
Wideband Global Satcom is a satellite communication system used by the U.S. Department of Defense

X-Band
Frequency band with uplink 7.9- 8.4 GHz, downlink 7.25 – 7.75 GHz, this band is primarily used for military communications and Wideband Global Satcom (WGS) systems