

Glossary of Satellite Terms

Glossary of Satellite Terms A-D

The following terms and definitions will help familiarize you with your Satellite solution.

Adaptive Coding and Modulation (ACM)—Technology which automatically changes the forward error correction and modulation of satellite links to compensate for changes in link conditions due to weather, e.g. rain fade, and other sources such as RF level changes or interference.

Amplifier—An amplifier is a device that increases the power of a signal by use of an external energy source.

Antenna—See Parabolic Antenna.

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

Attenuation—Signal loss due to cabling, or reduction of signal strength due to atmospheric conditions.

Azimuth—The angle of rotation (horizontal) that a ground based parabolic antenna must be rotated through to point to a specific satellite in a geosynchronous orbit. The azimuth angle for any particular satellite can be determined for any point on the surface of the earth given the latitude and longitude of that point. It is defined with respect to due north as a matter of easy convenience.

Backhaul—A terrestrial communications channel linking an earth station antenna to a local switching network or population center.

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.

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

Block Up Converter (BUC)—The transmitter for a satellite antenna. It converts a band from a lower frequency to a higher frequency, and performs power amplification, normally located directly at the satellite antenna input, or close to it.

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

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

Channel—A Channel is a frequency band in which a specific broadcast signal is transmitted. Channel frequencies are specified in the United States by the Federal Communications Commission. The higher the frequency, the higher the gain that can be achieved with smaller antenna sizes. Higher frequency bands are more susceptible to rain fade.

Committed Information Rate (CIR)—The minimum expected bandwidth for your satellite connection.

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

Contention Ratio—The number of customer links sharing a satellite capacity at the same time. Alaska Communications discloses satellite contention ratios, so you can predict your minimum expected bandwidth at any time.

Coverage—A footprint or the area on the earth's surface that is covered by a satellite's transmission beam.

Decibel Watt (dBW)—The ratio of the power to one Watt expressed in decibels. Typically, the EIRP of satellite beams are measured in dBW. The higher the dBW, the stronger the signal strength, and the smaller the satellite dish that is required.

Double Hop—Transmission of information from one terminal to another terminal in two stages; first from

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a remote-site, up to the satellite and to the network hub. The second stage transports information from the network hub to the satellite then to another remote site.

Downlink (Remote Site Downlink)—Transmission of a signal from a network hub, to a satellite, to a remote site.

Downlink Frequency—Frequency used for transmission of signals from the satellite to the earth station receiver.

Earth Station—The ground equipment that transmits and receives electromagnetic waves, also referred to as a parabolic antenna.

Effective Isotropic Radiated Power (EIRP)—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.

Elevation of Satellite Antenna—The upward tilt to a satellite antenna measured in degrees required to aim the antenna at the communications satellite. When aimed at the horizon, the elevation angle is zero. If it were tilted to a point directly overhead, the satellite antenna would have an elevation of 90 degrees, depending on the offset of the antenna.

Feedhorn (Feed)—A small antenna with flaring metal waveguides shaped like a horn that emits radio waves in a concentrated beam or collects and focuses radio waves that are incident on its aperture. In a receiving system, it collects microwave signals reflected from the surface of the antenna. In a transmitting system, it directs microwave signals onto the reflector surface for focusing into a narrow beam aimed at the satellite.

Frequency Bands—Frequencies are divided into welldefined bands. For satellites, the relevant bands are L-Band, C-Band, X-Band, Ku-Band, and Ka-Band.

Frequency Coordination—A process to eliminate frequency interference between different satellite systems or between terrestrial microwave systems and satellites. This activity relies upon a computerized service utilizing an extensive database to analyze potential microwave interference problems that arise between organizations using the same microwave band. As the same C-band frequency spectrum is used by telephone networks and CATV companies when they are contemplating the installation of an earth station, they will often obtain a frequency coordination study to determine if any problems will exist.

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

Gain—A measure of amplification expressed in decibels.

Geostationary Earth Orbit (GEO)—Satellites orbiting 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.

Gain-to-Noise-Temperature (G/T)—A figure of merit of a satellite antenna and low noise amplifier combination expressed in decibels. "G" is the gain of the system and "T" is the noise temperature. The higher the G/T, the better the system.

Hub—Satellite network equipment that controls the satellite bandwidth allocation, often located at a teleport. Usually consisting of a chassis operating software and network managment, typically the master station of the satellite network.

Indoor Unit (IDU)—Network equipment typically located inside a building, consisting of a modem connected to the corporate LAN.

Inbound/En route—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.

Ka Band—Frequency band with uplink frequencies from 26.5 to 40GHz and downlink frequencies from 18 to 20 GHZ. This band is primarily used for two-way consumer broadband. With Ka band, dishes are much smaller and transmission power is much greater compared to C, X or Ku band. Due to the higher frequencies of this band, it can be more vulnerable to signal quality problems caused by rain fade.

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Kilobits per second (Kbps)—Transmission speed of 1,024 bits per second.

Kilohertz (KHz)—One Kilohertz is the equivalent of one thousand Hertz, or one thousand cycles per second. It is used to measure frequency and bandwidth.

Ku Band—Frequency band with uplink frequencies from 14 GHz to 14.5 GHz and downlink frequencies from 10.9 to 12.75 GHz. Typically used for consumer direct-tohome access, distance learning applications, retail, and enterprise connectivity. Antenna sizes, for Ku band are smaller than C-band.

Latency—The time it takes for a signal to go from the sending station through the satellite to the receiving station. All stationary satellites are located 22,300 miles above the equator. This means that the round trip is 90,000 miles or more. The speed of light is 186,000 MPH, so the time it takes for a round trip is about 500 milliseconds (1/2 second).

Linear/Plane Polarization—Polarization of an electromagnetic wave in which the electric vector at a fixed point in space remains pointing in a fixed direction, although varying in magnitude. With satellites, the planes are referred to horizontal polarization or vertical polarization and allows for frequency re-use on the satellite for more bandwidth capability.

Low Earth Orbit (LEO)—Satellites orbiting from 160-2,000km above the earth and will take approximately 1.5 hours for a full orbit, which only covers a portion of the earth's surface at any time.

Low Noise Amplifier (LNA)—A preamplifier between the satellite 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. This boosts the desired signal while adding as little noise or distortion as possible.

Low Noise Block Downconverter (LNB)—A combination of 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. This is simply the receiver on a satellite dish.

Medium Earth Orbit (MEO)—Satellites located above LEO and below GEO satellites, typically traveling 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.

MHz (Megahertz)—One Megahertz is equivalent to one million Hertz, or one million cycles per second. It is used to measure frequency and bandwidth.

Maximum Information Rate (MIR)—The theoretical maximum amount of bandwidth your satellite connection can burst to, typically expressed in kilobits or megabits 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, frequency, or phase.

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

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

Outdoor Unit (ODU)—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).

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.

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Parabolic Antenna—An antenna that uses a parabolic reflector, which is a curved surface with a cross-sectional shape of a parabola, to direct the radio waves to feedhorn. This is known as dish antenna or parabolic dish.

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.

Quality of Service (QoS)—The set of techniques to manage network resources, which provides priority and guarantees a certain level of network response time and other performance factors for each application and user. QoS enables better service to certain flows, by either raising the priority of a flow or limiting the priority of another flow.

Rain Fade—The reduction of satellite signal strength due to rainfall.

Radio Frequency (RF)—The electromagnetic frequencies for wireless transmission above the audio range and below infrared light.

Router—A physical device joining multiple networks together by forwarding IP packets based on network layer information and enabling applications such as VoIP, video and data.

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

Satellite Receiver—A receiver designed for a satellite reception system, which receives modulated signals from an LNA or LNB and converts them into their original audio, video, or data form.

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 remote without having to go to the hub.

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

Spot Beam—A satellite signal that covers a concentrated geographic area so only antennas in that area will receive the signal.

Spread Spectrum—The elimination of adjacent satellite interference by spreading the signal over the available bandwidth which enables 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.

Sun Outage—A predicted degradation of service due to solar activity when the sun aligns perfectly with a satellite and the receiving antenna on the ground (line-of-sight). When it happens (twice a year), it may impact services for a few minutes each day for a few days.

Teleport—A Telecommunications Hub, or Super Hub, which provides access to communications satellites and other long-distance media.

Terminal—One of the communications stations that receives, processes, and transmits signals between itself and a satellite.

Transponder—A device located on board the satellite which receives signals uplinked from an earth station and amplifies and transmits them back to earth on a difference frequency.

Transmission Security (TRANSEC)—Securing VSAT transmissions with encryption to prevent from interception and exploitation.

Glossary of Satellite Terms U-Z

Unicast (Remote Site Uplink)—Transmission between a single sender and a single receiver over a network. Contrast with Multicast, which is a transmission between a single sender and multiple receivers.

Uplink—Transmission of a signal from the remote modem to a satellite to a hub.

Uplink Frequency—Frequency used for transmission of signals from earth station transmitter to the satellite.

Very Small Aperture Terminal (VSAT)—A two-way ground station with an antenna that is typically less than 8 meters in diameter. Frequency bands used by VSAT dishes are C-Band, Ku-Band, Ka-Band and X-Band.

Wideband Global Satcom (WGS)—A satellite communication system used by the U.S. Department of Defense.

X-Band—Frequency band with uplink from 7.9 to 8.4 GHz and downlink from 7.25 to 7.75 GHz. This band is primarily used for military communications and WGS systems.