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## Useful Definitions

The following are some definitions of terms from two books in our library. Additional explanations have been added by PEACESAT. The definitions are useful for terms discussed in various documents on PEACESAT's Web pages on satellite communications and GOES-3/GOES-2 Services Improvement Plan.

The two books are:

Elbert, Bruce. Introduction to Satellite Communication (MA:Artech House)  
Pecar, Joseph;O'Conner; Garbin, David. Telecommunications Factbook (New York: McGraw-Hill, Inc.)

### Analog Signal

A continuous electrical signal that varies in direct correlation with an impressed phenomenon, stimulus, or event that bears intelligence. Sound waves and their electrical analogs, are characterized by loudness (amplitude) and pitch. Analog signals can assume any of an infinite number of amplitude values or states within a specified range, in accordance with, or analogous to, an impressed stimulus. Pitch refers to how many per second the signal swings between high and low amplitudes, i.e., its frequency.

### Backbone Network

A transmission facility designed to interconnect, often lower-speed distribution networks, channels, or clusters of dispersed terminals or devices.

The PEACESAT Network may be viewed as a backbone for public service telecommunications in the Pacific Islands region. The fiber optics networks in Micronesia is also a telecommunications backbone.

### Bandwidth

A frequency range, usually specified by the number of hertz in a band or between upper and lower limiting frequencies. Alternatively, the frequency range that a device is capable of generating, handling, passing or allowing.

### Bit

The most fundamental and widely used form of digital signals are binary signals, in which one amplitude condition represents a binary digit 1, and another amplitude condition represents a binary digit 0. Thus a binary digit, or bit is on if the members of a set of two in a numeration system that is based on two and only two possible different values or states.

### Byte

Generally an 8-bit quantity of information used mainly in referring to parallel data transfer, and data storage, also generally referred to in data communications as an octet, or character.

### Bit Rate

The capacity characteristic of digital signals as defined by the number of bits (or bytes) per second that a channel will support. For example, a transmission facility that can support information exchange at the rate of 1 megabit per second (1 Mbps or 1,000,000 bits per second) delivers the same quantity of information, i.e., throughput, as a 1 kilobit per second (Kbps or 1,000 bits per second) facility, but, in only 1/1000 of the time.

**Carrier**

A local or Long distance telecommunications service providing organization. A wave form, pulsed or continuous which is modulated by another information bearing wave form.

**Channel**

A single communications patch in a transmission medium connecting two or more points in a network, each patch being separated by some means; e.g., spatial or multiplex separation, such as frequency or time division multiplexing. "Channel" and "circuit" are often used interchangeably, however circuit can also describe physical configuration of equipment that provides a network transmission capability for multiple channels. The characteristics of channels and circuits are determined by the network equipment and media used to support them.

**Circuit**

Usually refers to a full-duplex send/receive capability over guided or unguided media.

**Circuit Switching**

A process that establishes connections on demand and permits the exclusive use of those connections until released. Packet and message switching, primarily used in data communications networks are alternative switching techniques.

Circuit switching is required in voice telecommunications, especially when digital voice compression techniques are used.

**Communications**

The process of representing, transferring, interpreting or processing information among persons, places, or machines. Communication implies a sender, a receiver and a transmission medium over which the information travels. The meaning assigned to the data must be recoverable without degradation.

**Digital Signal**

A signal in which information is carried in a limited number of different discrete states. The most fundamental and widely used form of digital signals are binary signals, in which one amplitude condition represents a binary digit 1, and another amplitude condition represents a binary digit 0.

**Digital Bandwidth Manager**

A technology that multiplexes and switches voice circuits and data packets over digital circuits and supports voice compression and data packets.

**Frequency**

Acoustic waves and electrical signals might be made up of only a single tone, like a single note on a piano. In this case the signal wave form is made up of repeating identical "cycles" and is said to be of a single frequency, equal to the number of cycles that occur in one second of time. In communications, frequency was traditionally expressed in cycles per second, but is now expressed in hertz (Hz), still equal to one cycle per second. Thus, one thousand cycles per second is equal to one thousand hertz, or kilohertz (kHz).

**Frequency Division Multiplexing**

Divides the frequency bandwidth (spectrum) of a broadband transmission circuit into many subbands, each capable of supporting a single, full time communications channel on a non-interfering basis with other multiplexed channels. FDM multiplexing is generally suitable for use with analog carrier transmission systems.

**Full-Duplex**

A transmission path capable of transmitting signals in both directions simultaneously.

**Geostationary or Geosynchronous**

Revolves around the Earth in a plane of the equator once in 24 hours, maintaining precise synchronization with the Earth's rotation. It is well known that a system of three satellites in GEO, each separated by 120 degrees of longitude, can receive and send radio signals over the entire globe except for the polar regions.

Geosynchronous or synchronous orbits which all have a 24-hour period of revolution but are typically inclined with respect the equator. As viewed from the earth, a synchronous satellite in an inclined orbit will appear to drift during a day about its normal position in the sky.

**Half-Duplex**

A transmission path capable of transmitting signals in both directions, but only in one direction at a time.

**Hertz (HZ)**

Measurement that distinguishes electromagnetic waveform energy; number of cycles, or complete waves, that pass a reference point per second; measurement of frequency by which one hertz equals one cycle per second.

**Hub**

In satellite communications, the "hub" site receives and transmits communications to several sites simultaneously. The hub site tends to cost more than a remote site, but helps to keep the costs down at a remote site.

**Internet**

A large collection of connected networks running the Internet suite (FTP, TELNET, WAIS, WWW, etc.) of protocols.

**Mesh**

A satellite communications term that refers to the ability of earth stations to send and receive communications directly to/from each other through a satellite without having to be passed through a hub site.

**Microwave**

Frequencies above 1 Ghz.

**Network**

Specified sets of information transfer capabilities furnished to users between telecommunications network points-of-termination. Network Services categories include access and transport, public and private, and switched and non-switched.

**NTIA**

National Telecommunications and Information Administration. Agency of the United States Department of Commerce that is responsible for many telecommunications programs, including the Public Telecommunications Facilities Program (PTFP), Telecommunications and Information Infrastructure Assistance Program (TIIAP), Children's Television, and PEACESAT.

**PEACESAT Site**

Any current or new site that uses a 3-Meter antenna and 50W Power Supply. All sites can increase their existing capacity by adding a channel selector (for a new 32 Kbps channel) and will need a digital modem.

**PEACESAT Hub Site**

Sites that upgrade to:

6-Meter Solid Parabolic Antenna

3 Transceivers

1 for Analog Voice or Analog/Digital Data

1 for 32 Kbps Circuit to PEACESAT Network Hub

1 for 128 Kbps Compressed Video/Data

Digital Bandwidth Manager

Voice compression

X.25 Data Concentration

Video Teleconference Center

Network Interfaces for local access.

**PEACESAT Video Receive Only Site**

Sites that upgrade to:

6-Meter Mesh Parabolic Antenna

2 Transceivers

1 for Analog Voice or Analog/Digital Data

1 for 128 Kbps Compressed Video/Data

Video Teleconference Center (Receive Only)

## **PEACESAT Network Hub**

Honolulu site with 10 Meter Antenna

Multiple Transceivers

1 for Analog Voice or Analog/Digital Data

8 for 32 Kbps Circuit to PEACESAT Hub Sites

2 for 128 Kbps Compressed Video/Data

Digital Bandwidth Manager

Voice compression

X.25 Data Concentration

Video Teleconference Center

Video Conference Multi-point Bridge

Network Interfaces for local access.

## **PSTN**

Public Switched Telephone Network - a general acronym for the telephone network operated by the regulated common carrier.

## **Satellite Communications**

A communication satellite permits two or more points on the ground (earth stations) to send messages to one another over great distances using radio waves.

It entails microwave radio, line-of-sight propagation from a transmitting earth terminal (usually ground based but potentially ship or airborne) through the atmosphere and outer space media to a satellite, and back to earth bound receiving terminals. In essence, satellites are equivalent to orbiting microwave repeaters.

## **Simplex**

A transmission path capable of transmitting signals in only one direction.

## **Signaling**

The process of generating and exchanging information between components of a telecommunications system to establish, monitor, or release connections (call handling functions) and to control related network and system operations (other functions).

## **Switching**

Refers to the process of connecting appropriate lines and/or trunks to form a desired communications path between two station sets, or more generally, any two arbitrary points in a telecommunications network. Included are all kinds of related functions, such as signaling, monitoring the status of circuits, translating address to routing instructions, alternate routing, testing circuits for busy conditions, and detecting and recording troubles.

## **Tariff**

A published rate for a specific telecommunications service, equipment, or facility that constitutes a public contract between the user and the telecommunications supplier. Tariff services and rates are established by and for telecommunications common carriers review, public comments, possible amendment and approval.

## **Telecommunications**

Any process that enables one or more users to pass to one or more other users information of any nature delivered in any usable form, by wire, radio, visual, or other electrical, electromagnetic, or optical means.

A Telecommunications Network is a system of interconnected facilities designed to carry traffic from a variety of telecommunications services. The network has two different but related aspects. In terms of its physical components, it is a facilities network. In terms of the variety of telecommunications services that it provides, it can support a set of many traffic networks, each representing a particular interconnection of facilities.

Telecommunications service is a set of information transfer capabilities provided to a group of users by a telecommunications system.

## **Terrestrial Microwave Radio**

Transmission systems consisting of at least two radio transmitter/receivers (transceivers) connected to high gain antennas (directional antennas which concentrate electromagnetic or

radiowave energy in narrow beams) focused in pairs on each other. The operation is point-to-point, that is, communications are established between two and only two antennas (installations) with line of sight visibility. This can be contrasted to point-to-multipoint systems like broadcast radio or television.

### **Time Division Multiplexing**

A transmission facility shared in time (rather than frequency), i.e., signals from several sources share a single channel or bus in successive time slots. A discrete time slot or interval is assigned to each signal source.

### **Transmission Facilities**

Provides the communication paths that carry user and network control information between nodes in a network. In general, transmission facilities consist of a medium (e.g., free space, the atmosphere, copper or fiber optic cable) and electronic equipment located at points along the medium. This equipment amplifies (analog systems) or remission facilities connect to switching systems, and may provide the means to combine many separate sets of call information into a single "multiplexed" signal to enhance the transmission efficiency.

### **Transmission Impairments**

Degradation caused by practical limitations of channels (e.g., signal level loss due to attenuation, echo, various types of signal distortion, etc.), or interference induced from outside the channel (such as power-line hum or interference from heavy electrical machinery).

### **Very Small Aperture Terminal (VSAT)**

Earth terminals using small antenna (1.5-6 feet in diameter). This technology typically operates in the Ku band (11/14 Ghz), and Ka band (20/30 Ghz).

### **Video Teleconferencing**

The real-time, usually two-way transmission of voice and images between two or more locations. Today, both voice and video analog signals are digitized by video codecs before transmission which can involve wide bandwidths. To conserve bandwidth, some systems employ "freeze frame," where a television screen is only "repainted" every few seconds. Codecs for higher quality full motion video, attempt to minimize bandwidth requirements by taking advantage of intervals with relatively little motion (which require smaller bandwidths), and by trading-off smooth motion tracking and picture resolution.

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