

Telemedicine Resources

Telemedicine Glossary

This glossary contains nearly 200 words and phrases that everyone in the field should be conversant with. We've thrown in our own editorial comments about features where appropriate. To make your word search easier, we've have created links to [underlined](#) words and phrases that are defined in this glossary. Use the alphabet index that follows to jump to any location in the text. We'd like to acknowledge the important input of *Telemedicine Today's* TechTalk columnist Dave Swartz, and of Jim Reid at Innovative Medical Communications.

A

Access control

Protection against unauthorized access to a computer network. A less restrictive tool than a [firewall](#). Using access controls, a [HIN](#) will check its access control list to see if a computer requesting service from the outside world is permitted to use that service. See also [encryption](#). (Vol. 3, #1 p. 15)

ACR-NEMA

American College of Radiology and the National Equipment Manufacturers Association. They have jointly developed [standards](#) for [teleradiology](#) practice. For CT, MRI, ultrasound, nuclear medicine, digital fluoroscopy: images must be scanned at 500 [pixel](#) x 500 line resolution by 8 [bit depth](#) (256 gray scale) or better; for diagnostic X-rays: 2,000 x 2,000 ("2K by 2K") by 12 bit depth (4,096 gray scale).

ADSL

Asymmetric Digital Subscriber Line. Currently under trial in several metropolitan areas. Uses existing copper phone lines. With proper retooling by phone companies, these can supply 6 [Mbps](#) downstream delivery of data.

Algorithm

A mathematical coding scheme for compressing digitized [broadband](#) video or audio signals so that the signals can be transmitted over a lower (and less expensive) [bandwidth](#). [Standards](#)-based algorithms are those which enable communication with standards-based systems from disparate manufacturers. Proprietary algorithms are unique to individual manufacturers and enable communications only between equipment from that manufacturer. Current practice strongly encourages standards-based systems.

Analog

Information (electronic or otherwise) that is created and transmitted as a continuous stream. Wave forms (e.g., on oscilloscopes) are analog. Compare this to [digital](#) information generated by computers. [Modems](#) are used to convert digital computer data to analog form for sending over standard [POTS](#) lines.

Annotation

Simultaneous shared annotation of captured (or, less commonly, live video) images allows conference participants to clearly point out the areas in question on an image, and may provide significant instructional value.

Asymmetric Digital Subscriber Line

See [ADSL](#).

ATM

Asynchronous Transfer Mode. A telecommunications service that supports [switched](#) multimedia communications from [T1](#) (1.544 [Mbps](#)) to very high data rates (155 Mbps and higher). Not commonly available.

Audio only conference add-ins

The ability to add another site into a video conference via an audio connection only. This feature uses a regular phone line connected to the [codec](#) to conference in someone who is not near a video site but needs to be part of the conversation.
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B

Bandwidth

The capacity of an electronic transmission medium to transmit data per unit of time. The higher the bandwidth, the more data can be transmitted. Typically measured in kilobits or megabits per second ([Mbps](#)). Standard telephones are low bandwidth devices (maximum bandwidth = 33.6 Kbps). Cable television uses high bandwidth (up to 140 Mbps).

Beam splitter

For tele-oto/ophthalmoscopes. Allows direct visualization through the device into the eye or ear by the clinician, while still routing a portion of the image to the video camera. This is usually preferred by the clinician who is accustomed to looking directly through the device rather than at a video monitor.

Bit

Binary digit. The basic 0-1 unit of information used by computers for information entry, storage, and transmission. Data rates in telecommunications are often referred to in bits (abbreviated 'b') per second. See [Mbps](#), [Kbps](#), [byte](#), [bandwidth](#).

Bit depth

The number of colors or levels of gray scale a scanner or monitor supports. An 8-bit scanner can differentiate between 256 (2^8) levels of gray. A 12-bit scanner supports $2^{12} = 4,096$ levels of gray. (See Vol. 4, #5 p. 32+)

BRI.

Basic Rate Interface. See [ISDN](#).

Bridge

See [MCU](#).

Bursty data

Short, intense transmissions of grouped, related information. Sometimes called "boluses of data" by medical clinicians.

Byte

Each data character, such as the letter A, is composed of 8 [bits](#), called a "byte" (abbreviated "B"). Units of storage are often referred to in terms of the number of bytes (e.g., a "100 MB hard drive").

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C

C-mount

See [universal C-mount](#).

Camera control

May be near end (local control of local pan/ tilt/ zoom/ iris/ focus) or far end (local control of p-t-z at the remote site). May be quite useful in consultations if the examiner wants to control the remote camera's view without having to provide verbal directions to the assistant at the remote site.

CCD

Charge coupled device = "chip". A 1-CCD ("1-chip") camera contains a single charge coupled device with specialized semiconductors. These contain photosensitive cells that generate voltage when struck by photons of light. One photosensitive cell equates to one [pixel](#) in the displayed image. The number of cells on a chip determines the number of pixels of resolution the camera can display. The larger the chip the greater the image resolution. Increased resolution is accomplished either by using larger chips or by using more of them. Single chip cameras do a good job. 2-CCD cameras use one chip for [chrominance](#) and one for [luminance](#). Three chip cameras do an even better job because they have more total cells and because they use one chip each to capture red, green and blue light. Three chip cameras provide images with higher resolution and better color representation, and can cost 10 times as much as 1-CCD cameras. A 1-CCD camera can support 640 pixels x 480 lines and 24 [bit](#) color. A 3-CCD camera may cost \$10,000 (for 1,524 x 1,012 x 36 bit) up to \$30,000 (for 3,060 x 2,036 x 14 bit). (Vol. 3, No. 4 p. 31)

CCD scanners for teleradiology are less expensive than [laser scanners](#), and may not have the same ability to detect contrast. This may or may not affect their ability to transmit diagnostic quality images. (Vol. 2, #3 p. 22)

CCITT

Consultative Committee for International Telegraphy and Telephony. The forerunner of the [ITU's](#) Telecommunications Standardization Sector ([TSS](#)).

Charge coupled device

See [CCD](#).

Chip

See [CCD](#). An integrated circuit.

Chrominance

Hue and saturation (color) on a video monitor.

CIF

Common Intermediate Format; an international standard for video display formats developed by the TSS (see [ITU-T](#)). See [FCIF](#), [QCIF](#).

Ciné loop

Also called 'paging.' The rapid, repeating display of sequential images in movie fashion. This display method plays a limited number of frames, at a limited frame rate, but gives the impression of dynamic motion. Often used in telecardiology applications (vol. 4, #3 p. 16+)

CODEC

COder/DECoder (also COmpression/DECompression) hardware and/or software used with interactive video systems that converts an [analog](#) signal to [digital](#), then compresses it so that lower [bandwidth](#) telecommunications lines can be used. The signal is decompressed and converted back to analog output by a compatible CODEC at the receiving end. The compression method ([algorithm](#)) may be proprietary or (much preferred) [standards](#) - based. (Vol. 2, #2 p. 8)

Coder/decoder

See [CODEC](#).

Component video

Compared to [composite video](#), keeps the [chrominance](#) and [luminance](#) parts of the video signal separate, yielding better image quality, higher lines of resolution, and better color. See also [S-video](#).

Composite video

Color TV evolved from black/white systems that were developed over 50 years ago. A separated red, green, and blue color broadcast used in [RGB](#) would have taken three times the [bandwidth](#) of existing black/white approaches. An ingenious solution to conserve bandwidth was to create a separate [chrominance](#) signal for color that could be overlaid onto the existing [luminance](#) signal, without increasing bandwidth. The result: composite video. Because of potential interference between the chrominance and luminance, composite video requires periodic adjustment to assure 'true' color. Used with [NTSC](#) and [PAL](#) systems. (Vol. 3, #4 p. 30). See [component video](#), [S-video](#).

Compression ratio The amount that an image is "compressed" using mathematical algorithms to decrease the amount of data that needs to be stored or transmitted. An uncompressed [NTSC](#) ([broadband](#), broadcast quality) signal transmits at about 90 [Mbps](#); this can be compressed using a [CODEC](#) to 384 Kbps (more than 200:1 compression); the resulting image is adequate for most clinical applications (cf. Vol. 4, #4 p. 10+). "Lossless compression" loses no data; generally data compressed more than three times (3:1) is considered "lossy." This is true of the [JPEG](#) compression algorithm. Some compression algorithms ([wavelets](#)) support a higher compression ratio (10:1 or higher) before becoming "lossy." See also [MPEG](#).

CSU/DSU

Channel Service Unit / Data Service Unit. A hardware device that is needed to terminate a high speed telecommunications connection. It is inserted between the telemedicine system (i.e., [CODEC](#)) and the communications line. It conditions and strengthens the signal, and supports the necessary link protocols, for transmission of data from [LANs](#), video systems, and other applications over leased or [switched](#) communications lines ([T1](#), fractional T1, leased or [switched 56](#), [ISDN](#)). Some models allow the allocation and sharing of [bandwidth](#) with other traffic, such as digitized voice from a [PBX](#), and act as a [multiplexer](#). (Vol. 3, #1, p. 15)

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D

DICOM

Digital Imaging and Communications in Medicine. An industry [standard](#) for connection of, and communication among, medical imaging devices. The most recent iteration is DICOM 3. (vol. 5, #1 p. 24+)

Digital

Information coded in discrete numerical values ([bits](#)). Digital data streams are less susceptible to interference than [analog](#) data streams. Also, because they are made up of zeros and ones (bits) than can be manipulated and integrated easily with other data streams (voice/video/data).

Digital camera

Captures images (still or motion) digitally and does not require [analog-to-digital](#) conversion before the image can be transmitted or stored in a computer. The analog-to-digital conversion process (which takes place in [CODEC](#)s) usually causes some degradation of the image, and a time delay in transmission. Avoiding this step theoretically provides a better, faster image at the receiving end.
Document camera See [graphics stand](#).

DS3

A leased line (non-[switched](#)) running at 45 [Mbps](#). Compare [OC3](#), [T1](#), [ISDN](#). (Vol. 4, #5 p. 32+)

DSU

Digital Service Unit. See [CSU/DSU](#).

Duplex audio

Full duplex describes the ability of both ends of a conference to speak and be heard simultaneously (like a regular phone call). Half duplex audio supports only one site speaking at a time; other speakers will be cut off. (Vol. 4, #4 p. 27)

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E

Echo cancellation

Prevents a system from picking up the sound from its own speakers and transmitting it back to other conference sites. Highly desirable for acceptable audioconferencing. (Vol. 4, #4 p. 27)

Encryption

A mathematical transposition of a file or data stream so that it cannot be deciphered at the receiving end without the proper key. Encryption is a security feature that assures that only the parties who are supposed to be participating in a video conference or data transfer are able to do so. This has not been an essential feature for telemedicine systems, but with the growing concern about patient privacy in telemedicine networks it may become one. See [firewall](#). (Vol. 3, #1 p. 15)

Ethernet

A 10Mbps to 100 Mbps [LAN](#) data link protocol.

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F

FCIF

Full Common Intermediate Format ("Full sif"). A measure of video resolution. Considered by some a requirement of telemedicine video. See [QCIF](#).

FDA 510K approval

Product has met the FDA's approval criteria, or is similar to a product that has.

Firewall

A computer connected both to the [Internet](#) and the local [HIN](#) that prevents the passing of Internet traffic, in the form of [IP](#) packets, to the internal hospital network. Provides an added layer of protection against 'hackers'. There are two kinds of firewalls: external, which protect all hospital systems from the outside world, and internal, which protect only selected systems. Firewall disadvantages: it restricts information transfer in both directions, and makes file transfer (ftp) and telnet (remote login) more difficult. See [access control](#), [encryption](#). (Vol. 3, #1 p. 15)

Fps

Frames per second. See [Frame Rate](#).

Frame grabber

Captures, into a computer, the analog display output of cameras, [VCRs](#), etc.

Frame rate Frames per second ([fps](#)) displayed on a video monitor. A frame rate of 25-30 fps is considered 'full motion' and is what most broadcast video operates at. A frame rate of 15 fps is noticeably 'jerky'. Slower frame rates may be inadequate for gait and motion observations and analysis. See [NTSC](#), [PAL](#), [SECAM](#).

Frame relay

A service that supports data rates in the range of 56 [Kbps](#) to 1.54 [Mbps](#). The Frame Relay circuit often comes in different levels of committed information rates (CIR). A 1.54 Mbps Frame Relay circuit with a 768 Kbps CIR would indicate that you would never drop below 768 Kbps transmission capability, and could [burst](#) up to 1.54 Mbps. [RBOCs](#) can offer Frame Relay cheaper since they can oversubscribe these circuits to users and share the [bandwidth](#). (See Vol. 4, #5 p. 32+)

Freeze frame

This feature is useful in a medical consultation. It allows the consultant to get a well framed and focused still image of a lesion or other item of interest for closer examination. Often images captured from a live video source are of higher resolution than the live video picture and as a result may provide more diagnostic value. Compare [slow-scan](#), [frame grabber](#).

Frequency response

Measured in cycles/second (Hz); a relative measure of audio quality. Generally the broader the response the better. To approximate a standard acoustic stethoscope, an electronic stethoscope should be able to send and receive sounds as low as 30 Hz (for low-pitched heart murmurs) and as high as 1000 Hz (for squeaks, wheezes and pops heard in lung sounds). Many electronic stethoscopes can have their frequency response optimized for either heart or lung sounds by flipping a switch.

Full motion video

Video running at 25 ([PAL](#), [SECAM](#)) or 30 ([NTSC](#)) frames per second, down to 10-15 fps. Any frame rate less than about 10 fps is approaching [slow-scan](#) video.

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G

Ghosting

A motion artifact in monitor displays of compressed video images. As an image moves quickly across the field of view (e.g., an arm waving) it leaves a trail of 'ghost' images that resolve as the movement stops. See [tiling](#).

Graphic equalizer

Allows user to accentuate or de-emphasize selected frequencies within an audio sample. An example is the different 'tuning' for heart and lung sounds in electronic stethoscopes. See [frequency response](#).

Graphics stand

Document stand. Typically used for capturing and transmitting images of documents. Can be used for skin lesions and the like. Typically uses a 1-[CCD](#) (1-chip) camera. At a minimum, a graphic camera should have color and black and white modes, manual iris, zoom, focus, and color adjustments, additional overhead lights for uniform illumination, and a large (at least 8.5 x 11 inch) back-lighted base. The last feature is useful for capturing images of transparencies and X-ray, CT, and MRI images.

Gray scale

The levels (shades) of gray that a screen or [pixel](#) within a screen can display. See [bit depth](#).

GUI

Graphical User Interface. See [interface](#).

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H

H.26, H.256, H.324, H.263, H.242...

(see [ITU-T](#), video [format](#), [standards](#))

HDTV

High Density TeleVision. High resolution broadcast video. See [MPEG-2](#). Vertical resolution about 4 times that of a standard television (1,125 lines compared to 352 lines in a standard NTSC television output) and an aspect ratio of 16:9, similar to a movie screen.

High pass filter

See [low pass filter](#).

HIS

Hospital Information System. One that supports all hospital functions and activities such as patient records, scheduling, administration, charge-back and billing, and often links to or includes clinical information systems such as an [RIS](#).

HL7.

Health Level 7. A [standard](#) interface between hospital information systems. The HL7 standard defines the format for interchange of text files between healthcare databases. (Vol. 4, #1 p. 24)

Home page

The first screen of a [URL](#), which usually introduces the host organization and provides pointers to other pages within the web site.

Hot link

Hypertext link. A highlighted word, phrase, or graphic within an Internet document that, when selected, automatically links to another site ([URL](#)) on the Internet.

html

HyperText Markup Language. A simple computer language used for formatting and presentation of Internet hypermedia documents. It is used to embed hypertext links ("[hot links](#)") into documents.

Hub

Provides a cost-effective single point of connection to the network for workstations and other devices.

Hypertext link

See [hot link](#), [html](#).

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I

IATV

InterActive TeleVideo (=ITV)

IEC

(IXC) InterExchange Carrier. The long distance companies in the U.S. that provide inter-[LATA](#) telephony services. E.g., Sprint, AT&T, MCI. See [LEC](#).

Image capture

See [freeze frame](#).

Image management

Stored image management denotes the ability to sort, arrange, and manipulate stored images into functional groups. Some systems allow the user to store images, but once done they cannot be arranged and are permanently stored in the order in which they were saved. This may be cumbersome.

IMUX

Inverse [multiplexer](#). Re-aggregates split subchannels in a data stream into a single channel. See [ISDN](#).

INMARSAT

An international global telecommunications satellite network established by government treaty in 1979, with 79 member countries. Land Earth Stations (fixed or portable, even to suitcase-sized) provide links between rural sites and telecom networks. Can provide low-[bandwidth](#) digital services anywhere on the earth's surface for as little as \$1/minute. (See Vol. 4, #5 p. 20)

Integrator

A vendor that uses retail parts from other manufacturers to produce a product that other vendors might make and assemble within the company. See [VAR](#), [OEM](#).

Interexchange carrier

See [IEC](#).

Interface

How the system enables information to be accessed and modified. A graphical user interface (GUI) is typically simple to use, with mouse controlled point-and-click onscreen icons. See [primary user interface](#).

Internet

A loose aggregation of thousands of computer networks forming an enormous worldwide [WAN](#) (although some would not use the term WAN for this generally low-[bandwidth](#) system).

Intranet

A "private [Internet](#)" that employs [TCP/IP](#) communications protocols used over the [Internet](#). The intranet may be linked to the public Internet through a tightly managed, controlled gateway.

IP

See [TCP/IP](#). (Vol. 2, #3 p. 13)

ISDN

Integrated Services Digital Network, a low-to-medium speed technology for digital telephony. Usually transmits at 64-128Kbps, although higher speeds are possible. ISDN is broken into 64 Kbps bearer channels (B-channels) and 16 Kbps data channels (D-channels) . Basic Rate Interface (BRI) generally provides a 128 Kbps data rate ("2B+D"), while Primary Rate Interface (PRI) can provide up to 1.54 [Mbps](#) (the equivalent of a [T1](#) circuit). To combine channels to provide a virtual circuit at greater than the basic 64 Kbps an [inverse multiplexer](#) may be needed. (See Vol. 3, #2 p. 28; Vol. 4, #5 p. 32+)

ISO

International Standardization Organization. Establishes and coordinates worldwide standards for electronic information exchange.

ISP

Internet Service Provider. The local, regional, or national (AOL, CompuServe, etc.) company that provides dial-up connections to the Internet, as well as hosting of home pages

ITU-T Standards

International Telecommunications Union (the T is for [TSS](#)). Founded in 1865 as a telegraphy standards body. Now a United Nations agency. **H series** (videoconferencing): H.320 defines how the whole H series works together & contains instructions for ISDN and some G (audio) algorithms as well; H.323 are [LAN](#) standards; H.324 permits video, voice, and data over a single [analog](#) phone line; H.261 is a video compression protocol for dissimilar [CODECs](#); H.230 for [multipoint control](#); H.263 is a video coding interface subset of H.324 and supports [html](#); H.723 is a dual speech coder that transmits at 6.4 and 5.3 Kbps; H.242 is an audio conference setup and termination protocol. **T.120 series**: image capture, annotation and transfer in video conferences. **G series** (G.721, G.722, G.728): audioconferencing. See [CCITT](#), [TSS](#).(Vol. 2, #3 p. 12)

ITV

Interactive TeleVideo (=IATV)

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J

JPEG

Joint Photographic Experts Group. This international group, a joint effort of the [ISO](#) and [TSS](#), has developed [standards](#) for still image compression. Motion JPEG applies JPEG compression to each frame of a video clip.

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K

Kbps

Kilobits (thousands of [bits](#)) per second. A typical compressed video clinical interaction is transmitted at 385 Kbps.

KB

Kilo**byte**. 1,024 [bits](#) of data.

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L

LAN

Local Area Network. A computer network linking computers, printers, servers, and other equipment within an enterprise. Can support audio, video, and data exchange. Typically runs at 10-100 [Mbps](#).

LAN connectivity

The ability to connect the video system to a [LAN](#) within the health care facility. This can allow access to and sharing of patient records, test reports, demographics, etc. during a video conference. Currently few institutions are capitalizing on this potential.

Laser digitizer

Laser scanner. Employs a laser to capture image information to digital form. Very high resolution and wide gray scale range are possible. Because it uses coherent light, the laser scanner can penetrate thick films (an ability measured in units of optical density) and extract information better than [CCD](#) scanners. Serves the same function as CCD X-ray scanners, but generally at higher resolution, better contrast, and much higher price. (Vol. 2, #2 p. 8)

LATA

Local Access and Transport Areas. The areas within which the [RBOC](#) and [LEC](#) can provide telephony services. Inter-LATA connections are provided by [IECs](#).

Lavaliere

A small microphone that is typically clipped to clothing at breast pocket level. May be wired or wireless. Coined from the Duchesse de La Vallière (1644-1710), a mistress of Louis XIV, who wore a jeweled pendant on a chain around her neck. (Vol. 4, #4 p. 26)

Leased line

Private line. A point-to-point connection that is logically similar to two cans tied together with a dedicated piece of string. You pay for the sole use of the circuit and the price does not vary as a function of usage, as with switched lines.

Leased 56

A leased line providing a transmission rate of 56 [Kbps](#).

LEC

Local Exchange Company. The local telephone office that bridges between the long-distance carrier and the customer site. May be part of an [RBOC](#) or an independent telephone company. See [LATA](#), [IEC](#).

Leveling

A software manipulation technique, using mathematical algorithms, to compensate for a [teleradiology](#) monitor's inability to provide the same contrast and [bit depth](#) as the original hardcopy X-ray. The great variation in the density of X-ray exposure within an image can lead to seriously over- and underexposed portions of a monitor (screen) image. Thus, a chest film may have very high density (white) portions, such as the spine, and very low density portions (such as the lungs). Using locally adapted histogram leveling, [bit depth](#) (contrast; [gray scale](#)) can be selectively adjusted for different portions of the image, or for different pixel depths. This yields much more useable clinical information. (Torbjørn Sund article, this issue)

Local Area Network

See [LAN](#).

Lossless compression See [compression ratio](#).

Lossy compression

See [compression ratio](#).

Low pass filter

A filter for leveling out the borders in the screen display of a radiology image. The image is altered by placing a value on each [pixel](#) which is the weighted sum of the pixels in a small square surrounding the pixel in the original image. The weights or filter coefficients determine how the new image will look, and the borders of the image can be leveled out ("low pass filter") or sharpened ("high pass filter"). (Torbjørn Sund article, this issue)

Luminence

Characteristics of brightness for a video monitor. See [composite video](#).

Lux

A unit of illumination. Generally, lighting levels of 1000-3500 lux are satisfactory for telemedicine applications, while newer "low lux" cameras produce quality pictures at levels as low as 750 lux. Having a lux level above 1000 enables the camera to keep more of the image in focus, since the trade-off for low light conditions is lower depth of field. (vol. 4, no. 5 p. 26)

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M

MAN

Metropolitan Area Network.

MB

Megabytes or millions of [bytes](#).

Mbps

Megabits (millions of [bits](#)) per second. A typical uncompressed video signal requires 45 Mbps (or more) to transmit.

MCU

Multipoint Control (or Conferencing) Unit = Bridge. A device that enables participants at more than two sites to participate in voice or video calls.

Mic level inputs

The input jacks available for microphones. Some applications may require multiple microphones. A [mixer](#) can be added if there are not enough mic level inputs.

Microphone audio overlays playing tape audio

The ability to talk to the other end while using the VCR as the audio/video input source. In a telemedicine consult, this feature is valuable when playing a pre-recorded tape of a procedure or examination and the providers want to discuss what is being seen at the same time.

Microsoakable camera

An oddball term meaning that the camera can be sterilized by soaking in disinfectant solutions. This adds significantly to the camera's expense but may be necessary.

Mini-PACS

An image management system that focuses one or more of the digital modalities, such as an ultrasound mini-[PACS](#), or one application areas such as neuroradiology. (Vol. 4, #6 p. 32+)

Mixer

(see [mic level inputs](#)) Enables multiple audio or video inputs to a processor.

Modem

Modulator/Demodulator. Enables transmission of [digital](#) data (by transforming it to and from analog waveforms) over standard [analog](#) phone lines and cable video systems.

Modem access for remote diagnostic support

Indicates that a technical support center can call into the system on a separate modem line to perform remote diagnostics.

MPEG

Moving Picture Experts Group. A group of [standards](#) for compression and storage of motion video. MPEG-1 provides images of 240 lines x 360 [pixels/line](#), digital transfer rates up to 1.5 [Mbps](#), and [compression ratios](#) of about 100:1. MPEG-2 provides a higher quality picture - 720 horizontal lines x 480 vertical lines (pixels/line). The MPEG-2 standard is used for [HDTV](#), and will be used for cable broadcasts. See also Motion [JPEG](#). (See Vol. 4, no. 4, p. 32+)

Multiplexer

"MUX." A hardware device that divides a digital transmission stream into two or more subchannels. This can be done by frequency division (splitting the single band into multiple narrower bands) or by time division (allotting a common channel to several different transmitting devices one at a time). Compare [IMUX](#).

Multipoint control unit

See [MCU](#). Contrasts with point-to-point.

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N

Network

An assortment of electronic devices (computers, printers, scanners, etc.) connected (by wires or wireless) for mutual exchange of digital information.

Network interface

Connectivity options for the system.

NTSC

National Television Systems Committee. This body adopted a video signaling [standard](#) for black and white television in 1953 (EIA RS-170 specification). The NTSC standard defines all of the parameters that allow television sets in N. America to receive broadcast signals. NTSC has a display rate of 30 frames per sec ([fps](#)) in interlaced fashion: odd lines in one pass, even lines in the next. The vertical resolution is determined by the number of [rasters](#) (scan lines). It actually consists of 525 scan lines, but due to 'vertical blanking intervals' many of these drop out, resulting in 484 lines. In actual practice this is usually reduced to 352 lines. Thus, many systems advertise "352 x 288 lines of [resolution](#)." Horizontal resolution is determined by how small the scanning point is in the camera and the number of vertical lines that can alternate between white and black in an area as wide as the overall image is tall. (see [PAL](#), [SECAM](#), [video format](#)) (See Vol. 3, 34 p. 30+)

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O

Ocular tube adapter

Allows a camera to be mounted to any microscope. This feature is needed to adapt a telepathology system to an existing ocular microscope without a camera port. Capturing images through an ocular tube has some disadvantages that must be weighed against the cost of a new scope.

OC3

A high-speed digital transmission capability of 155 [Mbps](#). Compare [DS3](#), [T1](#), [ISDN](#).

OEM

Original equipment manufacturer. Compare [VAR](#), [integrator](#).

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P

Px64

"P time 64". Synonymous with the ITU H.261 standard.

Paging

See "[ciné](#) loop."

PACS

Picture Archiving and Communication System, an image system that embraces all modalities (X-ray, CT, MR, nuclear medicine, ultrasound) and links users with display workstations over a high speed network to an image server, an archive, printers, and radiology information systems ([RIS](#)).

PAL

Phase Alternation Line. A European alternative to [NTSC composite video](#) signaling used in N. America, adopted in 1967. Provides greater [bandwidth](#) for [chrominance](#), yielding better color resolution. Also, the number of [scan lines](#) is increased to 625 over NTSC's 525 (or less on the monitor). However, the [frame rate](#) is reduced to 25 fps from NTSC's 30. See [SECAM](#), [video format](#).

PBX

Private Branch eXchange. A telephone switch, typically located at the customer site, connected to the public telephone network but operated by the customer. PBXs may be [digital](#) rather than [analog](#).

PC

Personal Computer. Generally, but not necessarily, IBM-compatible (as opposed to Macintosh).

PC platform for data/applications access and storage

Indicates if a personal computer ([PC](#)) is integrated into the system and is available for use by PC applications.

PC applications as a video input source

Indicates whether a separate [PC](#) application (e.g., PowerPoint, MS Word) can be run on the system during a video conference and sent as the video picture to the far end.

PC applications conferencing

Describes the ability to run a [PC](#) application on one end of a video conference and to share that application with the PC at the other end of the video conference. This computer sharing application allows the monitors and keyboards to simultaneously interact with the computer program while in a conference. It has use primarily in administrative applications when working in a financial spreadsheet or database, and in distance learning environments when using educational software.

Peripheral devices

Attachments to videoconferencing systems to augment their communications or medical capabilities. Examples include: electronic stethoscopes, oto-/ophthalmoscopes, dermascopes, [graphic stands](#), and scanners. (Vol. 5, #1 p. 22+)

Picture in picture

See [PIP](#).

PIP

PIP allows both ends of the video conference to be viewed simultaneously on a single monitor. Picture in picture swap allows the two video pictures to change positions so that the local video fills the largest portion of the screen. On some two monitor systems, PIP allows both live video images to be seen simultaneously on one screen while higher resolution graphic images are seen on the other.

Pixel

The smallest unit of a [raster](#) display. A picture cell with specific color and/or brightness. The more pixels an image has, the more detail, or resolution, it can display. The pixel size in a high-end computer

monitor's screen (a "1K x 1K monitor") is approximately 0.28 x 0.28 mm. The pixel size for diagnostic teleradiology monitors ("2K x 2K") is much smaller than this.

POTS

Plain Old Telephone System. The [analog](#), public [switched](#) telephone network in common use throughout the world. Also known as Public Switched Telephone Network (PSTN). Enables voice phone calls and data transmission of up to 33.6 [Kbps](#), as well as limited videoconferencing.

Presets

Determines how many predefined camera positions can be set. Presets are useful for rapid changes in camera position - for example, to quickly move from a close up of a patient to a larger view of both the patient and the physician.

PRI.

Primary Rate Interface. See [ISDN](#).

Primary user interface device

Indicates what type of device is used to control the video conferencing system. Hardwired and wireless, keyboard, mouse, and touchscreen options each have advantages and disadvantages. The user should seriously consider in what setting and for what application the system will be used to determine which is the preferred interface.

Printer interface

Allows data and images sent or received via the [PC](#) to be sent to a printer. This enables reports, images, and data shared in a videoconference to be rendered as hard copy for record keeping and teaching purposes.

PSTN

Public Switched Telephone Network. See [POTS](#).

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Q

QCIF

Quarter Common Intermediate Format ("Q-sif"). A measure of video resolution, displaying 176 [pixels](#) by 144 lines. Has half of the CIF spatial resolution of [FCIF](#). This is the 'default' minimum [H.261](#) format. Typically used in desktop videoconferencing.

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R

RAID

Redundant Array of Inexpensive Disks. Any of six arrangements of conventional disk drives to increase data transmission speed and reliability, and better assure safe backup.

Raster

Scan line. See [NTSC](#).

RBOC

"R-BOCK." Regional Bell Operating Company. The "Bell" companies (SW Bell, PacBell, Nynex/Bell Atlantic, Bell South, Ameritech, US West, Pacific Telesis) that were the result of the AT&T breakup of the 1970s. See [LEC](#).

Real time

Sends and receives audio / video / data simultaneously, without more than a fraction of a second delay. Applications that are transmitted within a few seconds are sometimes called **near real time**. Compare [store-and-forward](#), [slow scan](#).

Resolution

The level of detail that can be captured or displayed. For video displays (teleradiology or interactive video) resolution is measured in [pixels](#) x lines x [bit depth](#). (vol. 5, no. 2)

RGB

Red Green Blue. A coding language that controls the electron gun in CRT (Cathode Ray Tube) monitors. The video signal that comes into the monitor is separated into its component parts and converted to RGB; the video images are then rendered on the monitor's screen.

RIS

Radiology Information System. A specialized system that supports radiology charge capture and billing, storage of patient data, scheduling, and reporting. May be a part of a larger hospital information system ([HIS](#)).

RJ-11 jack

The connector jack used for standard telephone and FAX lines.

Rollabout unit

Common term for a teleconferencing/ [telemedicine](#) unit where the monitor, [CODEC](#), camera, etc. are placed in a cabinet with wheels that can be rolled from room to room. Often a somewhat ludicrous misnomer, since some 'rollabout units' weigh over 500 lb. Compare to [room unit](#). (Vol. 2, #1 p. 1+)

Room unit

Common term for a large teleconferencing/ [telemedicine](#) unit, usually with two large monitors, that is placed more or less permanently at a single site.

Router

A device which routes data to the segment of the [network](#) it was meant to go to, rather than be broadcast to all segments. (Vol. 2, #3 p. 12)

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S

S&F. See [store-and-forward](#).

Scan line

[Raster](#). See [NTSC](#).

SECAM

Sequential Couleur Avec Memoire. A color television signaling standard with 625 [scan lines](#) and 25 interlaced frames/second. Used in France, the Newly Independent States (NIS) of the former Soviet Union, and parts of the Middle East. See [PAL](#), [NTSC](#).

Slow-scan

"Still video." A slow progression of freeze-frames (less than 1 or 2 per second). Compare [full motion](#).

Spooling

As one image or data set is being reviewed, additional images can be received and stored for sequential review without "locking up" the computer.

Standards

See [ITU-T](#), [DICOM](#), [ISO](#), [ACR-NEMA](#), [MPEG](#), [JPEG](#). (Vol. 2, #3 p. 13)

Store-and-forward

Captured audio clips, video clips, still images, or data that is transmitted or received at a later time (sometimes no more than a minute). Email is a store-and-forward system. Enables dissynchronous communication, with the advantage of not needing concurrent participant involvement. Compare to [real time](#).

Stored image management

See [image management](#)

S-video

Similar to [component video](#), but closer to the [RGB](#) signaling required by monitors.

Switch

A high speed bridge that links devices on a network.

Switched line or network

A telecommunications option that operates like a dial-up phone line (which is, in fact, a switched line-as are [ISDN](#), [ATM](#), [switched 56](#)). There is often a usage charge for switched services, particularly for long distance connections such as phone lines. Compare to [leased line](#), where the connection is continuously open and charges are usually on a flat, monthly rate. (See Vol. 3, no. 2 p. 28; Vol. 4, no. 5 p. 32+)

Switched 56

A dial-up 56 Kbps digital line, billed at a monthly rate + cost/minute, as with a regular [POTS](#) phone line.

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T

T1

A [leased](#) T1 line, marketed and serviced by [LECs](#), that provides 1.544 [Mbps](#) data rate (in N. America; the European T1 provides 2.048 Mbps). T1 is available almost everywhere, and can be fractionated. Fractional T1 services are less expensive than full T1. Typical interactive video-mediated telemedicine programs transmit video images at "1/4 T1" rates (384 Kbps). (See Vol. 4, #5 p. 28; Vol. 4, #5 p. 32+)

T.120

A standard for audio and graphics exchange, supporting higher resolutions and pointing and annotation (which the [H.320](#) standard does not).

Tariff

The cost of telecommunications set by either a federal or state regulatory body.

TCP/IP

Transmission Control Protocol / Internet Protocol. The most popular open-standard protocols used in data networks today. The Internet Protocol is used to route packets of data on a network.

TELCO

Telephone Company.

Telehealth

See "telemedicina"

Telemedicine

The provision of health care and education over a distance, using telecommunications technology.

Teleradiology

A system that transmits images over a distance, using leased or [switched](#) transmission lines. See also "[PACS](#)" and "[RIS](#)."

Thumbnails

Miniature pictures of images using very small, low [resolution](#) data files. These download for display very quickly, and can be compared on-screen to select the proper high-resolution image.

Tiling

An artifact of digitization and [compression](#). Portions of the on-screen video image break into smudged squares. Tends to happen when there is too much on-screen motion, overwhelming the ability of the [compression algorithm](#) adequately to apportion system resources to both motion handling and resolution. See [ghosting](#).

Transmission rate

Amount of information / unit of time that a technology such as a regular ([POTS](#)) or digital ([ISDN](#) or [T1](#)) phone line, satellite or wireless technology, or local area network ([LAN](#)) can transmit. A typical POTS-based [modem](#) can transmit 33.6 thousand bits (Kbps) of information/second. In Telemedicine Today's 3rd Annual Program Review (vol. 4, no. 4), 7 of the top 10 North American [telemedicine](#) programs conducted some or all of their teleconsultations at 384 Kbps.

TSS

Telecommunications Standardization Sector of the [ITU](#).

Twisted pair

A pair of copper wires that have been twisted to minimize electronic interference. Standard phone wire.

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U

Universal C-mount

Enables a video camera to be attached to any medical peripheral device that uses the same connector. These are increasingly common.

Unsharp Mask

Despite the name, this is an edge enhancing filter frequently used in [teleradiology](#). It is created by first generating a [low-pass filter](#)ed image, which is then subtracted from the original image. This effectively removes part of the background, leaving an image where contours are emphasized. (Torbjørn Sund article, this issue)

URL

Universal Resource Locator. The World Wide Web address (typically in the form: http://www.name_of_site) of an [Internet home page](#) or other document.

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V

VAR

Value Added Reseller. Adds functionality to product(s) from [OEM\(s\)](#). Compare [integrator](#).

VCR

Video Cassette Recorder.

VCR Simultaneous playing of pre-recorded tape and recording of conference

Relates to the ability to have one VCR playing a pre-recorded tape into the system as a video source, while simultaneously having another VCR connected and recording the videoconference in progress. This is necessary for those telemedicine programs that maintain a policy of recording all consults and which periodically use pre-recorded tapes of patient procedures or educational tapes as part of a video conference.

VCR record source control

One-source control indicates if the system allows the user to push one button and start or stop recording either end of the video conference. Several systems require entering a complex series of commands (multiple button pushes) to initiate or stop recording the conference, or to change which end of the conference is being recorded. This is very cumbersome when a user only remembers shortly after the start of a conference to turn the tape on, or when trying to record sequential segments of the participants at both ends of a video conference. We have not found an off the shelf system that allows the user to record both ends of a video conference simultaneously on one tape.

VCR Simultaneous playing of pre-recorded tape and recording of conference

Concerns the ability to have one VCR playing a pre-recorded tape into the system as a video source, while simultaneously having another VCR connected and recording the videoconference in progress. This is necessary for those telemedicine programs that maintain a policy of recording all consults and which periodically use pre-recorded tapes of patient procedures or educational tapes as part of a video conference.

Video format

[NTSC](#), [PAL](#), [HDTV](#), [SECAM](#).

Video on Demand

The ability to provide instantaneous access to remotely stored sources of video. A video server stores and manages large amounts of multimedia data and delivers it on demand to one, or many, users. Limitations to deployment are bandwidth availability, video server price, and video compression protocols (See vol. 4, no. 4, p. 32+).

Video output

[Composite](#), [S-video](#).

Videophone

Small, stand-alone video appliance with a small camera and circulation, not part of a computer or larger videoconferencing system, that enables interactive audio-video communications over [POTS](#) or [ISDN](#).

VoD

See [Video on Demand](#).

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W

WAN

Wide Area Network. Wider in geographic scope than a [LAN](#). Provides digital communications (voice / video / data) over [switched \(ISDN, switched 56\)](#) or unswitched (fractional T1, [T1](#)) networks. Some consider commercial dial-up networks (America OnLine, the [Internet](#)) to be WANs.

Wavelets

An image compression technique that enables more or less lossless [compression ratios](#) of 10:1 or even 20:1, compared to the standard 3:1 maximum for lossless [JPEG](#) compression. (Vol. 3, no. 2, p. 28)

Whiteboard

Shared notebook. The shared whiteboard feature provides the electronic equivalent of an onscreen blackboard. This feature's greatest utility is when a video call is established but the audio portion is not functioning. One can then write a note on the white board for one end to make a phone call to the other to discuss the problem. May have modest utility.

Wide Area Network

See [WAN](#).

Windowing

A software manipulation technique, using mathematical algorithms, to compensate for a [teleradiology](#) monitor's inability to provide the same contrast and [bit depth](#) as the original hardcopy X-ray. [Pixels](#) within a certain range of bit-depth values are assigned the full range of possible [grayscale](#) values, while those outside that range are either white or black. This allows emphasis of contrast for those structures that lie within the grayscale "window". (Torbjørn Sund article, this issue)

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