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Classroom Digital Conversion Webinar Glossary

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Based on excerpts from Extron Electronics Glossary of Terms

A/D - Analog to Digital (converter). A device that converts an analog signal to a digital value.

AACS – Advanced Access Content System - A digital rights management standard utilized with Blu-ray Disc and other optical formats. AACS incorporates two parts: a set of embedded decryption keys within the source device, and a set of keys encoded in the content that describes each of the playback devices licensed to utilize the content. This approach allows copyright holders to revoke the keys of a particular source device, thus preventing it from playing back future content. AACS also provides for a managed copy system, that is, a mechanism by which one or several, but not an unlimited number of copies can be legally made as backups, for storage on a media server, or for use on a portable device. The ICT – Image Constraint Token is a provision within AACS that allows the content provider to limit analog output resolutions.

ADC - Analog to Digital Converter. A device that converts analog signals to digital signals.

ADSL - Asymmetrical Digital Subscriber Line. One of a number of DSL technologies, and the most common one. ADSL is designed to deliver more bandwidth downstream (from the central office to the customer site) than upstream.

ADSP™ - Advanced Digital Sync Processing™. Using sync processing to allow centering control (H-shift or V-shift) can create problems with some display devices because of the sync delay. This means the digital projector user may have to choose between a stable sync and centering control. Extron's ADSP restores the original sync timing relationship for a stable sync signal while allowing centering control.

ADTV - Advanced Definition Television. An early HDTV system proposed by the Advanced Television Research Consortium in 1992. Now superseded by US HDTV standards.

AES – Advanced Encryption Standard - A data encryption standard adopted by the US Government and approved by the National Security Agency for top secret information. DCP, LLP, the licensing agency for HDCP, has adopted AES 128 encryption for the new HDCP 2.0 standard.

AES3 - A digital audio standard defined by the Audio Engineering Society. The standard specifies several basic physical interconnections between devices:

- Balanced - 3-conductor, 110 ohm cabling with an XLR connector, typically referred to as “AES/EBU audio.”
- Unbalanced - 2-conductor, 75 ohm coaxial cable with an RCA connector, typically used in consumer audio applications. In many consumer products such as DVD players and A/V receivers, this is often referred to as a “digital coaxial” connection type.
- AES-3id - A professional version of the 2-conductor 75 ohm coaxial cable terminated with a BNC connector. AES3 unbalanced and AES-3id audio can be switched or routed using a video switcher with a minimum of 150 MHz (-3 dB, fully loaded) video bandwidth.
- Optical – Plastic optical fiber using an F05 style connector, typically used in consumer audio applications. In many consumer products, this is often referred to as a “digital optical” connection type. TOSLINK is the most common implementation of this connection type.

AM - Amplitude Modulation. A method of radio transmission, by which the information part of the signal causes the amplitude of a carrier frequency to vary without affecting the frequency.

Analog Sunset - When used colloquially, may refer to the general trend of digital video technologies displacing analog, such as when US broadcast television switched to digital transmission, or the increasing use of DVI, HDMI, and DisplayPort video on PCs instead of RGB, etc. In a narrowly defined legal sense, the analog sunset refers to AACS licensing restrictions placed on Blu-ray Disc players where licensed players produced after 2010 must limit analog video output to standard definition, and licensed players produced after 2013 must not output any analog video, when playing protected content.

Artifacts - Visible corruption of the image or undesirable elements or defects in a video picture. These may occur naturally in the video process but must be eliminated to produce a high quality picture.

Aspect ratio - The relationship of the horizontal dimension to the vertical dimension of an image. In viewing screens, standard TV is 4:3, or 1.33:1; HDTV is 16:9, or 1.78:1. Sometimes the ":1" is implicit, making TV = 1.33 and HDTV = 1.78.

Asynchronous - Intermittent, not synchronized or continuous. A conversational type of communication that allows the parties at each end to talk when they like instead of at a prescribed time. Used in videoconferencing.

ATSC - Advanced Television Systems Committee. The ATSC was formed to establish voluntary technical standards for advanced television systems, including digital high definition television (HDTV). The ATSC is supported by its members, who are subject to certain qualification requirements.

BER - Bit Error Rate. The rate at which bit errors are experienced across a data connection.

B-Frame - Bi-directionally predictive coded picture. Contains predictive, difference information from the preceding and following I- or P-frame within a GOP. Data preceding or following the B-frame are required to recreate video information in a B-frame.

Binary - A numbering system using base-2. Each digit is represented by a 1 or a 0 (on or off).

Binary code - A coding system using the digits 0 and 1 to represent a letter, numeral, or other character in a computer. For example: the character "A" in ASCII code becomes 0100 0001 in binary.

Bit - The shortened form of "binary digit" (0 or 1). A bit is the smallest unit of information in a computer.

Bit depth - The number of bits per pixel. Bit depth determines the number of shades of gray or variations of color that can be displayed by a computer monitor. For example, a monitor with a bit depth of 1 can display only black and white; a monitor with a bit depth of 16 can display 65,536 different colors; a monitor with a bit depth of 24 can display 16,777,216 colors

Bit Error - Bit error indicates the number of bits of a data stream over a communication channel that have been altered. A bit error can result in unusable data or the corruption of an image in video streaming solutions.

Bit Error Rate – BER - The fraction of bits that were transmitted with errors, expressed as the ratio of incorrectly to correctly transmitted bits. BER is used to assess transmission accuracy in a fiber optic system.

Bit map - A method of graphic display using rows and columns of dots, or pixels. Each pixel location corresponds to a specific location in memory.

Bit Rate - The rate of digital data transmission, commonly expressed in bits per second–bps, kilobits–kbps per second, Megabits per second–Mbps, and Gigabits per second–Gbps.

Bit Rate - The number of bits that are conveyed or processed per unit of time. The bit rate is quantified using the bits per second (bit/s or bps) unit, often in conjunction with an SI prefix such as kilo- (kbit/s or kbps), mega- (Mbit/s or Mbps), giga- (Gbit/s or Gbps).

Blu-ray Disc - An optical disc storage medium developed by Sony as the replacement for DVD. Blu-ray is capable of storing high-definition video, audio, and data with a capacity of 50GB per disc. Blu-ray players are backward-compatible with standard DVDs and audio CDs.

CAT 5 - Category 5. Describes the network cabling standard that consists of four unshielded twisted pairs of copper wire terminated by RJ-45 connectors. CAT 5 cabling supports data rates up to 100 Mbps. CAT 5 is based on the EIA/TIA 568 Commercial Building Telecommunications Wiring Standard.

CAT 5e - Enhanced Category 5. The standard for the next higher grade of unshielded twisted pair (UTP) beyond Category 5. The CAT 5e specification was developed to provide more robust support for 1000Base-T. CAT 5e specifies tighter limits than CAT 5 for NEXT, ELFEXT, and return loss.

CAT 6 - Category 6. The standard for the next higher grade of unshielded twisted pair (UTP) cabling beyond CAT 5e. The standard defines components (cable and connecting hardware) and cabling (basic link and channel) for Category 6 channels, as well as Level III field tester requirements.

CAT 7 - Category 7. The cable standard for 10 Gigabit Ethernet using shielded twisted pair – STP) cable. Cat 7 features strict guidelines for crosstalk and system noise, requiring shielding for each pair of wires and the cable as a whole.

CEC – Consumer Electronics Control - A bidirectional serial control bus defined in the HDMI 1.0 specification and subsequent updates. CEC is used to provide control for multiple products, connected via HDMI cables, from a single remote control. Alternately, one device, for example a Blu-ray Disc player, can turn on another device, such as a display, when put into Play mode. CEC command sets are proprietary to each manufacturer; Sony CEC commands cannot control devices from Panasonic or Sharp, and vice versa.

Chroma crawl - An artifact of encoded video also known as dot crawl or cross-luma. It occurs in the video picture around the edges of highly saturated colors as a continuous series of crawling dots (“dancing ants”) and is a result of color information being confused with luma information by the decoder circuits.

Cliff effect - The sudden or discrete loss of signal at a digital receiver due to the degradation of a transmitted signal that has been terminated due to an error rate being exceeded and the received signal being rejected.

Component digital - Digital video using separate color components, such as Y, Cb, Cr. Digital recording formats such as D1 (Sony, BTS/Philips) and D5 (Panasonic) utilize component digital recording technology. Component digital is the digital representation of the component analog signal set, Y, B-Y, R-Y; it is often represented as 4:2:2. The encoding parameters are specified by ITU-R BT.601-2 (formerly known as CCIR 601).

Component video - Color television systems start with three channels of information: red, green, and blue (RGB). In the process of translating these channels to a single composite video signal, they are often first converted to Y, R-Y, and B-Y. Both three-channel systems, RGB and Y, R-Y, B-Y, are component video signals. They are the components that eventually make up the composite video signal. Higher quality program production is possible if the elements are assembled in the component domain.

Composite digital - Digital video that is essentially the digitized waveform of NTSC or PAL video signals, with specific digital values assigned to the sync, blank, and white levels. Commonly described as “4fsc”, a sampling rate locked to four times the frequency of color subcarrier. Early digital tape formats, such as D2 (Sony) and D3 (Panasonic), used a composite digital recording scheme. Also refers to digitally encoded video signal, such as NTSC or PAL video, that includes horizontal and vertical synchronizing information.

Composite sync - A signal combining horizontal and vertical sync pulses and equalizing pulses with no picture information and no signal reference level. Composite sync is sometimes referred to as “C”, “S” (as in RGSB), or “HV” (as on some connector panels).

Composite video - An all-in-one video signal comprised of the luma (black and white), chroma (color), blanking pulses, sync pulses, and color burst.

Compression - A process in which the digital data is reduced to meet bandwidth requirements, while at the same time without negatively affecting the capability to convey image, video, or audio information, or the contents of a data file.

Coupling Loss - The loss of optical power as light passes through a junction, expressed as the ratio of the optical power measured at the junction, such as a coupler, to the total optical power entering the system.

D/A - Digital to analog.

DA - Distribution amplifier. A device that allows connection of one input source to multiple, isolated (buffered) output destinations such as monitors or projectors.

DAC - Digital to analog converter.

Data - (1) A representation of facts, concepts, or instructions in a format suitable for communication, interpretation, or processing by human or automated means. (2) Any representations, such as characters or analog quantities, that have meaning.

Data Compression - A mathematical algorithm for compressing or encoding data to fit within given bandwidth requirements for transmission or storage.

Data Compression Ratio - The ratio representing the data output from a compression system relative to the original data. A computer-science term used to quantify the reduction in data-representation size produced by a data compression algorithm.

Data Link - A fiber optic system comprising the cable, transmitter, and receiver for transmission of data between two locations.

DDC - Display Data Channel. A bi-directional communications standard developed by VESA (Video Electronics Standards Association) that defines a universal data transmission standard for the connectivity between display devices and computers.

DDSP™ - Digital Display Sync Processing™. A signal handling method, trademarked by Extron, that allows the sync signal to pass through without altering sync pulse timing or width. DDSP disables other sync processing features such as horizontal and vertical centering.

Digital - A system of data or image values in the form of discrete, non-continuous codes, such as binary. When data is in a digital format, it can be processed, stored (recorded), and reproduced easily while maintaining its original integrity.

Digital - A data technology that uses discrete (discontinuous) values.

Digital component video - See "[Component digital](#)."

Digital composite video - "See Composite Digital." Also see "[Composite digital](#)."

Digital control - A method using discrete digital impulses to control individual functions within a system.

Digital signal - An electrical signal which possesses two distinct states (on/off, positive/negative); typically represented by "0" or "1".

Digitization - The transformation of an analog signal into digital information.

Digitizers - Video digitizers utilize video cameras to take pictures of photographs or live and still action. The information is decoded into RGB (digital form) and stored in the frame buffer.

Discrete Cosine Transform (DCT) - A Fourier-related transform which is used to convert an image from a spatial domain to a frequency domain. Video systems then process the information in the frequency domain. Typically, more signal energy is located in the lower frequencies than the higher frequencies. The DCT is used in many video compression codecs including JPEG, MPEG, MPEG-2, MPEG-4 and H.264.

DisplayID - Released in December 2007, this second-generation version of VESA EDID – Extended Display Identification Data is intended to replace all previous versions. DisplayID represents a 256-byte data structure that conveys display-related information to attached source devices. It is meant to encompass PC display devices, consumer televisions, and embedded displays such as LCD screens within a laptop without need for multiple extension blocks. Display ID is not directly backward compatible with previous EDID/E-EDID versions.

DisplayPort - The newest digital audio/video interconnect standard, designed primarily for use between a computer and display device. DisplayPort supports data rates up to 10.8 Gbps at a distance of 2 meters over standard copper cable. DisplayPort is not directly compatible with DVI or HDMI, but a DisplayPort connector can pass these signals, and the standard does provide an emulation mode for ease of integration with DVI or HDMI equipped products.

Dot clock - Also referred to as pixel clock. The timing device in a graphics card that determines the pixel resolution. The dot clock runs at a rate that produces the highest possible pixel resolution for that device. In a digital projector, the dot clock samples the analog video at a rate that produces the resultant pixel resolution. Also see "[Pixel clock](#)."

Dot crawl - Sometimes called "zipper effect," dot crawl refers to a specific image artifact that is a result of the composite video system. Dot crawl may be seen on TV news, for example, when a picture appears over the anchorperson's shoulder, or when some text appears on top of the video clip. If you look closely, along the edges of the picture, or the text that has been overlaid, you'll notice some jaggies rolling up or down.

Dot pitch - The vertical distance (measured in millimeters) between the centers of like-colored phosphors that are in adjacent pixels on the monitor screen. The closer the spacing, the better the resolution. Dot pitch is specified in pixels/mm.

DPCP – DisplayPort Content Protection - DPCP is a content-protection scheme for DisplayPort, developed by Advanced Micro Devices. Like HDCP 2.0, DPCP uses AES 128 encryption.

DRM – Digital Rights Management - A generic term for technologies such as content scrambling in cable or satellite television transmission, HDCP, and DPCP that can be used to control the access to, or reproduction of, copyrighted, commercially-available content. DRM is used primarily to prevent piracy, the unauthorized duplication and distribution of copyrighted material. However, DRM often also governs how content can be used. Commercially-available DVDs and Blu-ray Discs, for example, are typically licensed for personal use in a residential environment. Use of such content in a public venue, such as a school or business setting, without express consent or licensing by the copyright holder, is typically in violation of the media's license.

DSVP™ - Digital Sync Validation Processing™. In critical environments or unmanned, remote locations, it is vital to know that sources are active and switching. Extron's exclusive DSVP technology confirms that input sources are active by scanning all sync inputs for active signals. DSVP provides instantaneous frequency feedback for composite sync or separate horizontal and vertical sync signals via the switcher's RS-232/422 port.

Dual Link - Dual Link DVI supports 2 x 165 MHz (2048 x 1536 at 60 Hz, 1920 x 1080 at 85 Hz). A dual link implementation utilizes all 24 of the available pins.

Dual-Link DVI - A dual-link DVI output has two TMDS links and twice the bandwidth of single-link DVI, and can therefore support much higher resolutions. With two TMDS links, the number of data channels is doubled, although there is still only one clock signal, so both links are clocked identically. Apple's 30" Cinema Display with a native resolution of 2560x1600, is an example of a display requiring dual-link DVI. See also "[Single-Link DVI](#)." Also see "[Single-Link DVI](#)."

Dual-Link HD-SDI - See "[SMPTE 372M](#)."

DV - Digital Video. A serial digital video format. DV has the advantage over standard analog video of maintaining clear, crisp video without degradation from generation to generation.

DVB/ASI – Digital Video Broadcasting/Asynchronous Serial Interface - A standard for the broadcast of digital television signals. Terrestrial broadcast, primarily seen in Europe, is often stated as DVB-T. In the US, DVB-S is often used for compression and encoding of digital satellite transmission; for terrestrial applications, North America utilizes the ATSC standard.

DVI - Digital Visual Interface. The digital video connectivity standard that was developed by DDWG (Digital Display Work Group). This connection standard offers two different connectors: one with 24 pins that handles digital video signals only, and one with 29 pins that handles both digital and analog video. This standard uses TDMS (Transition Minimized Differential Signal) from Silicon Image and DDC (Display Data Channel) from VESA (Video Electronics Standards Association).

DVI-D - DVI connector that supports digital signals only.

DVI-I - DVI connector that supports both digital and analog signals.

Dynamic IP address - An IP address that is automatically assigned to a client host in a TCP/IP network, typically by a DHCP server. Network devices that serve multiple users, such as servers and printers, are usually assigned static (unchanging) IP addresses.

Dynamic range - The highest and lowest potential signal levels on a given device. Also applies to fiber optic applications in terms of the ratio between the most – or strongest – and least – or weakest – observable optical signals.

EDID - Extended Display Identification Data - EDID is a data structure used to communicate video display information, including native resolution and vertical interval refresh rate requirements, to a source device. The source device will then output the optimal video format for the display based on the provided EDID data, ensuring proper video image quality. This communication takes place over the DDC – Display Data Channel.

EDID Minder® - A proprietary EDID management process from Extron. EDID Minder® automatically manages the EDID information between a digital display device and one or more input sources. By maintaining continuous EDID communication with all sources, EDID Minder® ensures that digital sources power up properly and maintain their video output, whether or not they are actively connected to the digital display device.

EDTV - Enhanced Definition Television. A new digital TV product category added between High Definition TV (HDTV) and Standard Definition TV (SDTV), with the following attributes: a receiver that accepts ATSC terrestrial digital transmissions and decodes all ATSC Table 3 video formats; a display scanning format with active vertical scanning lines of 480 progressive (480p) or higher; no aspect ratio specified; and receives and reproduces, and/or outputs Dolby Digital audio.

Embedded data - Digital technologies such as SDI, HD-SDI, and HDMI, can carry variety of other data along with the primary video data, including audio, control, metadata such as content title or other identifying information, or other ancillary information. These data are said to be embedded, as they travel with the primary signal from the source device to the destination.

EMI - Electromagnetic Interference. Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment.

Encoder - A device, circuit, or algorithm that converts information from one format to another. Video over IP encoders take analog or digital video input signals and convert them to IP data streams which are transmitted over IP networks.

Encoding - In video, the combination of electronic elements into one signal; for example, S-video is encoded (combined) to create a composite video signal.

Error Correction - A method of detection errors and reconstructing the original information using extra, redundant information sent along with the original data.

Error detection and correction - The ability to detect errors caused by interference or other factors during the transmission of a signal, and then reconstruct the received signal so that it is a faithful reproduction of the original signal, without errors. A process known as Forward Error Correction is often used to allow the receiver to detect and correct some errors without having to “ask” the transmitter to send additional data.

Error propagation - A single error experienced, produces a knock on effect to sequential information. In video streaming solutions decoding products should provide a method by which a single error encountered effects only a small area of a picture and should not affect an entire frame or sequential frames of video.

Expansion slots - Slots inside a cabinet that are used to connect additional circuit modules (cards).

Eye Pattern - The representation of a digital signal on an oscilloscope in which a digital data signal is repetitively sampled. Distortion in the signal waveform due to interference and noise appears as closure of the eye pattern. Signals that are poorly synchronized with the system clock (also known as jitter), too high, too low, too noisy, too slow to change, or which have too much undershoot or overshoot, can be observed from the eye pattern. Eye patterns are used to evaluate the quality of digital signals when passed through cables or signal extension devices, switchers, signal processors, and other electronics.

Forward Error Correction (FEC) - A system of error control for data transmission, whereby the sender adds redundant data to its messages, also known as an error correction code. This allows the receiver to detect and correct errors (within some bound) without the need to ask the sender for additional data. The amount of FEC required to guarantee delivery is not certain. Each application must consider the predictability of the network and the amount of protection that is desired.

fps - frames per second. A measure of information that is used to store and display motion video. Each frame represents a still image and displaying frames in succession creates the illusion of motion. The more frames per second (fps), the smoother the motion appears.

Frame - In interlaced video, a frame is one complete picture. A video frame is made up of two fields, or two sets of interlaced lines. In film, a frame is one still picture of a series that makes up a motion picture.

GOP - Group of successive pictures within a coded video stream. MPEG, MPEG-2 and MPEG-4 compression products apply a GOP structure to their video compression systems. Each coded video stream consists of successive GOPs. From the pictures contained in it, the visible frames are generated. A GOP begins with an I-frame containing the full temporal resolution of the video frame. A series of predictive information is calculated between I –frames. P-frames are predictive and estimate forward, B-frames apply bi-directional prediction and estimate forwards and backwards. Products will apply GOP structures in different manners to support the needs of different applications be it: low delay, low bit rate or error resilience.

H.264 Encoding - A standard for video compression equivalent to MPEG-4 Part 10 or MPEG-4 AVC – Advanced Video Coding. H.264 was created to provide video quality suitable for high definition applications at bit rates lower than that utilized in MPEG-2, the compression standard used in DVD authoring.

H.323 - ITU standard allowing audio, video, and data to be transmitted by way of the Internet Protocol (LAN/WAN). It is the umbrella standard defining multiple codes, call control, and channel setup specifications. Basically, videoconferencing over IP.

Handshake - In communications, the moment when the transmitting and receiving devices identify themselves to each other.

HD connector - A high-density D connector having its pins arranged close together, sometimes in three rows instead of two rows. Example: a 15-pin VGA connector (HD) vs. a Mac connector (D).

HDCP – High-bandwidth Digital Content Protection - A digital rights management scheme developed by Intel to prevent the copying of digital video and audio content. HDCP is mandatory for the HDMI interface, optional for DVI. HDCP defines three basic system components: source, sink, and repeater.

Sources send content to the display. Sources can be set-top boxes, Blu-ray Disc players, computer-graphics cards, and so forth. A source can have only one HDCP transmitter.

Sinks decrypt the content so it can be viewed. Sink is typically used to describe a flat panel display, television, or projector. Sinks can have one or more HDCP receivers.

Repeaters sit between Sources and Sinks. They accept content, decrypt it, then re-encrypt and transmit. Internally, a Repeater may provide signal processing, such as scaling, splitting out audio for use in an analog audio playback system, or splitting the input data stream for simultaneous viewing on multiple displays. Switchers, matrix switchers, and distribution amplifiers are all examples of Repeaters.

HDMI – High-Definition Multimedia Interface - An interface used primarily in consumer electronics for the transmission of uncompressed high definition video, up to 8 channels of audio, and control signals, over a single cable. HDMI is the de facto standard for HDTV displays, Blu-ray Disc players, and other HDTV electronics. Introduced in 2003, the HDMI specification has gone through several revisions:

- HDMI 1.0 – Defined a maximum single-link bandwidth of 165 MHz, supporting resolutions up to 1920x1080 @ 60 Hz; color depth of 24 bits; and up to 8 channels of 24-bit audio. HDCP content protection and CEC – Consumer Electronics Control were optional.
- HDMI 1.1 – Added support for DVD-Audio
- HDMI 1.2 – Added support for SACD – Super Audio CD quality audio. A later revision also added specification for the CEC command set.
- HDMI 1.3 – Increased single-link bandwidth to 340 MHz for signal resolutions beyond 1080p/60. Added support for Deep Color, automatic lip sync correction, and Dolby TrueHD and DTS-HD Master audio.
- HDMI 1.4 – Expected specification publish date June 30, 2009. Adds HDMI Ethernet Channel, Audio Return Channel, supports higher maximum resolutions, adds 3D support up to 1080p, and creates a new HDMI Micro Connector.

HDSDI - The high-definition version of SDI specified in SMPTE-292M. This signal standard transmits audio and video with 10 bit depth and 4:2:2 color quantization over a single coaxial cable with a data rate of 1.485 Gbit/second. Multiple video resolutions exist including progressive 1280x720 and interlaced 1920x1080 resolution. Up to 32 audio signals are carried in the ancillary data.

HD-SDI - High-definition version of SDI specified in SMPTE-292M. This standard transmits audio and video over a single coaxial cable with a data rate of 1.485 Gbit/second.

HDTV - High Definition Television. HDTV refers to a complete product/system with the following minimum performance attributes: a receiver that receives ATSC terrestrial digital transmissions and decodes all ATSC Table 3 video formats; a display scanning format with active vertical scanning lines of 720 progressive (720p), 1080 interlaced (1080i), or higher; aspect ratio capabilities for displaying a 16:9 image; receives and reproduces, and/or outputs Dolby Digital audio.

Hot Plug/Hot Plug Detect - Describes a feature of DVI, HDMI, USB, and other digital technologies which allows a host device, such as a computer, to detect the presence of a new device without intervention by the user. Hot Plug technology allows a new device to be added to a system while it's still connected to a power source. Once the new device is connected, the Hot Plug Detect circuit, or HPD, senses the new device and tells the rest of the system that the device is ready to either send or receive a data stream.

ICT – Image Constraint Token - Part of AACMS, the Blu-ray Disc digital rights management system, the Image Constraint Token can cause the output of a Blu-ray Disc player to be down-converted to low-resolution video, similar in quality to a DVD. AACMS requires that all components in the display chain, from the source to the display device, to be secured through HDCP or DPCP content protection. If the ICT flag is set and the Blu-ray player is connected to a device that does not support HDCP, for example an analog television or video recorder, the player automatically reduces the high-definition video quality to a maximum of 960x540 pixels before outputting it.

ID bit termination - Used to identify what type of display device is attached to a computer-video output port. ID bit termination involves connecting specific data lines or "pins" to the electrical ground. ID bit termination assures that the correct video signals will be sent to the display device. A computer checks for ID bits during the power-up self diagnosis, and sets the video output frequency and resolution based on how the ID bits are set. Some computers will not send any video signal if they do not sense any ID bits on boot-up, so no picture will be displayed. ID bits are also called "sense lines."

IEC - International Electro-technical Commission. The body that has responsibility for developing international A/V standards. ICIA cooperates with IEC sub-committee SC-60.

Interlace - In TV, each video frame is divided into two fields with one field composed of odd numbered horizontal scan lines and the other composed of even numbered horizontal scan lines. Each field is displayed on an alternating basis.

Interlacing - A video frame is made up of two fields. Interlacing is the process of scanning the picture onto a video screen whereby the lines of one scanned field fall evenly between the lines of the preceding field.

Latency - The amount of time it takes for a data packet (i.e., a unit of data) to move across a network connection. Latency and bandwidth are the two factors that determine the speed of a network connection.

Latency - A measure of time delay experienced in a system, the precise definition of which depends on the system and the time being measured. In video processing or encoding products, it is a measure of the amount of time used to process an input signal. In a packet-switched network it is measured either one-way (the time from the source sending a packet to the destination receiving it), or round-trip (the one-way latency from source to destination plus the one-way latency from the destination back to the source).

LCD projector - Utilizing LCD panel technology, these projectors separate the red, green, and blue information to three different LCD panels. Since LCD panels do not produce color, the appropriate colored light is then passed through each panel and combined to exit through the projector lens and onto a viewing screen.

LPCM - Linear PCM - A specific method of pulse code modulation that is used to represent an analog waveform as a sequence of amplitude values. LPCM has been defined as part of the DVD and Blu-ray Disc standards, and is also used by HDMI. Also see "[PCM – Pulse Code Modulation](#)."

Lumen - The unit of measure for light coming out of a light source, such as a projector. CRT projectors usually use a 10% white window pattern for measurement purposes, while LCD and DLP projectors use a 100% white window (ANSI standard). Also see "[ANSI lumen](#)."

LVDS - Low Voltage Differential Signal. A signal transmission standard developed for the connection of laptop computers to their local LCD displays. National Semiconductor is the manufacturer that is promoting this standard. SGI used LVDS on the 320 and 540 NT Visual Workstations for connection to their 1600SW series, 16 x 9 aspect ratio, LCD monitor.

MAC - Media Access Control. The Media Access Control data communication protocol sub-layer provides addressing and channel access control mechanisms that make it possible for several terminals or network nodes to communicate within a multi-point network, typically a local area network (LAN). Access to the media may be spread out over time, or as in Ethernet, a mechanism is developed which allows random access, but provides a method for reattempting use of the media if a collision is experienced.

MAC address - Media Access Control. A unique hardware number given to devices that connect to the Internet. When your computer or networking device (router, hub, interface, etc.) is connected to the Internet, a table (see "ARP") relates the device's IP address to its corresponding physical (MAC) address on the LAN. Also see "[ARP](#)."

Matrix switcher - A means of selecting an input source and connecting it to one or more outputs. Like a regular switcher, but with multiple inputs and multiple outputs.

Mbps - Megabits per second. One million bits per second; a unit of measurement for data transmission.

Media player - A software application used for the playback of audio and video files.

MHz - Megahertz. One million hertz (cycles per second). Video bandwidth is measured in megahertz.

Mode - A path for light within an optical fiber. Singlemode fiber comprises a single path, while in multimode fiber, there are multiple light paths.

MPEG - Motion Picture Experts Group. A standards committee under the auspices of the International Standards Organization working on algorithm standards that allow digital compression, storage and transmission of moving image information such as motion video, CD-quality audio, and control data at CD-ROM bandwidth. The MPEG algorithm provides inter-frame compression of video images and can have an effective compression rate of 100:1 to 200:1.

MPEG-2 - The second generation standard for video compression of audio and video applying the discrete cosine transform. The standard includes a combination of lossy video and audio compression methods which permit storage and transmission of movies using currently available storage media and transmission bandwidth. Commonly used for digital television transmission, DVD, and other similar equipment.

MPEG-4 - Similar to MPEG-2, but with a much greater ability to scale to different compression rates and resolutions. MPEG-4 is suitable for applications ranging from low bit-rate streaming video applications for videoconferencing and cell phone video delivery, to high bit-rate high definition television production systems.

NAT - Network Address Translation. Method of concealing a set of host addresses on a private network behind a pool of public addresses. It allows conservation of registered IP addresses within private networks and simplifies IP address management tasks through a form of transparent routing, and increases network privacy by hiding internal IP addresses from external networks.

Native Resolution - The native resolution of a LCD, LCoS or other flat panel display refers to its single fixed resolution. It is the resolution that an image was originally produced at.

Non-interlaced - Also called progressive scan. A method by which all the video scan lines are presented on the screen in one pass instead of two. Also see "[Interlacing](#)" and "[Progressive scan](#)."

Packet - A block of data that is transmitted over a network in a packet-switched system. A packet is also referred to as a frame or datagram.

Packet jitter - The term jitter is used as a measure of the variability over time of the packet latency across a network. In real-time applications such as VoIP and video, variation in the rate at which packets in a stream are received that can cause quality degradation. Video decoders must account for jitter which may be experienced delivering packets across a network.

Packet loss - Occurs when one or more packets of data traveling across a computer network fail to reach their destination. Packet loss is distinguished as one of the three main error types encountered in digital communications; the other two being bit error and spurious packets caused due to noise. Packet loss is typically experienced in the real world as a random burst of packet loss.

PanelLink® - Silicon Image's TMDS (Transition Minimized Differential Signaling) all-digital video transmission standard. PanelLink technology was designed to provide the bandwidth necessary to support digital displays.

Pixel - Picture element. A pixel is a single point in a graphic image or screen. Pixels are arranged in rows and columns. Also see "[Pixel resolution](#)."

Pixel clock - Dot clock. The pixel clock divides the incoming horizontal line of video into pixels. This pixel clock has to be stable (a very small amount of jitter) relative to the incoming video or the picture will not be stored correctly. The higher the frequency of the pixel clock, the more pixels that will appear across the screen (pixel resolution).

Pixel loss - A video problem in which picture information is missing, giving the appearance of specks in the image.

Pixel phase - An adjustment common to scalers and projectors, which adjusts the point in time that a sample is taken in the A-D conversion process. The pixel (or dot) clock in a computer and the pixel clock in a display device may operate at the same frequency for a given resolution and refresh rate, but not necessarily in phase with each other. Pixel phase adjustments are provided on digital monitors and projectors to synchronize the two independent clocks. A test generator like the Extron VTG 300 includes an alternating pixel pattern, which is used to eliminate banding and shimmering artifacts that are symptomatic of pixel phase error.

Pixel resolution - In computer graphics and video images, the number of pixels in the display. For example, a picture with 1,024 x 768 pixels is much sharper, or has higher resolution, than a picture with 640x480 pixels. The total number of pixels is the product of these two numbers.

Powered Ethernet - A standard (IEEE 802.3af) that provides power to network devices by utilizing the existing Ethernet connection, thereby eliminating the need for additional, external power supplies.

Progressive - A method for displaying, storing or transmitting moving images in which all the lines of each frame are drawn in sequence.

Progressive scan - A method by which all the video scan lines are presented on the screen in one pass instead of two. Typically denoted by the letter "p", as in "480p", which indicates a signal with 480 active lines running at 60 frames per second. Also see "[Non-interlaced](#)."

QUXGA - Quad UXGA, a computer resolution of 3200 x 2400 pixels (four times 1600 x 1200)

QXGA - Quantum extended graphics array. A graphics standard with 2048 x 1536 pixels.

Repeater - See "[HDCP – High-bandwidth Digital Content Protection](#)."

Resistance - The opposition to the flow of electric current. Also see "[Ohm](#)" and "[Power \(electrical\)](#)."

Resolution - The density of lines or dots that make up an image. Resolution determines the detail and quality in the image. A measure of the ability of a camera or video system to reproduce detail, or the amount of detail that can be seen in an image. Resolution is often expressed as a number of pixels, but more correctly, it is the bandwidth. A sharp, clear picture has high resolution. Also see "[Resolution \(horizontal\)](#)" and "[Resolution \(vertical\)](#)."

Resolution (horizontal) - The amount of detail in a horizontal direction in a video image. It is expressed as the number of distinct vertical lines, alternately black and white, that can be seen in the width of the picture. This information is usually derived from observation of the vertical wedge of the test pattern. Horizontal resolution depends on the high frequency amplitude and phase response of the pickup equipment, as well as the transmission medium and the monitor itself.

Resolution (vertical) - The amount of resolvable detail in a vertical direction in a video image. It is expressed as the number of distinct horizontal lines, alternately black and white, that can be seen in a test pattern. Vertical resolution is primarily determined by the number of horizontal scanning lines in a frame.

RGB - Red, Green, and Blue. The chroma information in a video signal. The basic components of the color television system. They are also the primary colors of light in the additive color process. Also see "[Subtractive color process](#)."

RJ-45 - Registered Jack-45. A connector similar to a telephone connector that holds up to eight wires, used for connecting Ethernet devices.

RS-232 - An Electronic Industries Association (EIA) serial digital interface standard specifying the characteristics of the communication path between two devices using either DB-9 or DB-25 connectors. This standard is used for relatively short-range communications and does not specify balanced control lines. RS-232 is a serial control standard with a set number of conductors, data rate, word length, and type of connector to be used. The standard specifies component connection standards with regard to the computer interface. It is also called RS-232-C, which is the third version of the RS-232 standard, and is functionally identical to the CCITT V.24 standard.

RTP - Real-time Transport Protocol, an IETF standard for streaming realtime multimedia over IP in packets.

RTSP - Real Time Streaming Protocol. A network control protocol designed for use in entertainment and communications systems to control streaming media servers.

Run length encoding - Simple form of data compression in which runs of data are stored as a single data value and count, rather than as the original run. This is most useful on data that contains many such runs: for example, relatively simple graphic images such as icons, line drawings, and animations.

Scaling - Scaling is changing the size of an image to fit the native rate (or pixel size) of a display device, without changing its shape. For example, to fit a 720x480 resolution TV image on a 1024x768 XGA resolution display, the TV image has to be scaled "up"; pixels need to be created in order for the original image to fill the screen. Alternately, to fit a 1280x1024 SXGA resolution image on an XGA resolution screen, the image will need to be scaled "down"; pixels need to be removed from the original image in order for it to fit on the screen. There are many different methods for image scaling, and some produce better results than others.

Scan converter - Also called "video converter" or "TV converter," a scan converter is a device that changes the scan rate of a source video signal to fit the needs of a display device. Examples: computer-video to NTSC (TV), or NTSC to computer-video.

SDI - Serial Digital Interface. Standard definition video is carried on this 270 Mbps data transfer rate. Video pixels are characterized with a 10-bit depth and 4:2:2 color quantization. Ancillary data is included on this interface and typically includes audio or other metadata. Up to sixteen audio channels can be transmitted. Audio is organized into blocks of 4 stereo pairs.

SDI - Serial Digital Interface. The standard based on a 270 Mbps transfer rate. This is a 10-bit, scrambled, polarity independent interface with common scrambling for both component ITU-R 601 and composite digital video and four channels of (embedded) digital audio.

SDSL - Symmetrical Digital Subscriber Line. Offers bandwidth of up to 2.3Mbps upstream and downstream over a single twisted pair copper phone line, over distances up to about 10,000 feet on an unrepeaters basis.

SDTV - Standard digital television. A serial digital format whose samples and timing are derived from 4:2:2 digital component video sources. The main difference between existing digital component video and SDTV is an MPEG-2 compression step to reduce the channel bandwidth.

SED - Surface-conduction Electron-emitter Display. SED is a new type of flat-panel display technology developed by Canon and Toshiba. SED is capable of high levels of brightness and color performance, as well as a wide angle of visibility, that on a par with a CRT. Large screens can be produced by simply increasing the number of electron emitters in accordance with the required number of pixels.

Serial data - A way to transfer information by breaking the characters of a word into bits, which are then transmitted sequentially along a single line. Compare to parallel, which uses more than one line.

Serial port - An input/output connection on the computer that allows it to communicate with other devices in a serial fashion data bits flowing on a single pair of wires. The serial port is used with RS-232 protocol.

Single-Link DVI - The electrical signaling used to transmit data over DVI is known as transition minimized differential signaling, or TMDS. A single TMDS link carries three data channels and one clock signal, with a maximum video frequency of 165MHz, capable of standard resolutions up to 1920x 1200 pixels. See also "Dual-Link DVI." Also see "[Dual-Link DVI.](#)"

Single-Link HD-SDI - See "[SMPTTE 292M.](#)"

Singlemode Fiber – SMF - An optical fiber with a small core, through which only a single mode can propagate.

Sink - See "[HDCP – High-bandwidth Digital Content Protection.](#)"

SMTP - Simple Mail Transfer Protocol. Internet standard for e-mail exchange across systems/networks on the Internet.

Source - The optical source in a fiber optic system, usually an LED or laser diode. Also see "[HDCP – High-bandwidth Digital Content Protection.](#)"

Static IP - An IP address that has been specifically (instead of dynamically see "DHCP") assigned to a device or system in a network configuration. This type of address requires manual configuration of the actual network device or system and can only be changed manually or by enabling DHCP. Also see "[DHCP.](#)"

Subnet mask - The method used for splitting IP networks into a series of subgroups or subnets. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

Subtractive color process - Process used in color printing. Mixing cyan, magenta, yellow, and black (CMYK) produces millions of desired colors. Examples: 0% of C, M, Y and K = white (no ink); 100% of C and M = red; 100% C, M, and Y = process black. Also see "[Additive color process.](#)"

TCP - Transmission Control Protocol. A method (protocol) used along with the Internet Protocol to send data in the form of message units between computers over the Internet. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the individual units of data (called a packet) that a message is divided into for efficient routing through the Internet.

TCP/IP - Transmission Control Protocol/Internet Protocol. The communication protocol of the Internet. Computers and devices with direct access to the Internet are provided with a copy of the TCP/IP program to allow them to send and receive information in an understandable form.

Thin Client - A computer or a computer program which depends heavily on some other computer (its server) to fulfil its traditional computational roles.

TMDS - Transition Minimized Differential Signaling. An all-digital video transmission standard developed by Silicon Image, Inc. TMDS is the core technology used in DVI (Digital Visual Interface) and HDMI (High Definition Multi-media Interface.) As implemented in DVI, the TMDS standard is limited to 5 meters or 15 feet. There are no such cable length limitations specified for HDMI. Silicon Image markets this standard as PanelLink®.

Transmitter - A device that converts from one signal type to another for transmission. In fiber optics, the component or subsystem that converts an electrical signal to an optical signal and launches the optical signal down a fiber optic cable using a light source, such as an LED or laser.

Transport Stream - A defined package for delivering data. Transport Streams are multiplexes of audio, video and other content which are usually broadcast over-the-air, although they can be streamed over IP networks too.

Tri-level sync - A sync level scheme developed for HDTV in which the sync line first goes low, then transitions high while going through the reference voltage level, and then drops back down to the reference voltage. The transition of the positive-going sync signal through the reference voltage is the sync trigger.

UDP (User Datagram Protocol) - A connectionless protocol providing "best effort" delivery of packets across networks. UDP is frequently used in real-time streaming applications where best effort delivery is acceptable and the network devices and applications manage data flow control and errors.

VESA - Video Electronics Standards Association. A nonprofit member organization dedicated to facilitating and promoting personal computer graphics through improved standards for the benefit of the end-user. www.vesa.org

VGA - Video Graphics Array. Introduced by IBM in 1987, VGA is an analog signal with TTL level separate horizontal and vertical sync. The video outputs to a 15-pin HD connector and has a horizontal scan frequency of 31.5 kHz and vertical frequency of 70 Hz (Mode 1, 2) and 60 Hz (Mode 3). The signal is non-interlaced in modes 1, 2, and 3 and interlaced when using the 8514/A card (35.5 kHz, 86 Hz) in mode 4. It has a pixel by line resolution of 640 x 480 with a color palette of 16 bits and 256,000 colors.

VLAN - Virtual LAN. A group of devices on a network with a common set of requirements that communicate as if they were attached to the same broadcast domain, regardless of their physical location. A VLAN is a Layer 3 network function. A group of network devices can be grouped together into a functionally separate logical network. VLAN and their network traffic will be segmented from other devices that may be connected to the same physical system.

VOD - Video on Demand. Unicast streaming video offered by service providers that enables the reception of an isolated video session per user with rewind, pause, and similar VCR-like capabilities.

VPN - Virtual Private Network. A method of providing a private network connection via a secure communications tunnel over the Internet. VPNs maintain privacy applying tunneling protocol, encryption, and security procedures.

WAN - Wide Area Network. A computer network that covers a broad area such as a link across a metropolitan, regional, or national boundary.

Waveform - A display of a signal (on an oscilloscope) that shows the magnitude of current or voltage signals with respect to time. By displaying the waveform of a signal on an oscilloscope, the time between cycles can be measured and its frequency can be calculated.

Wavelength - The distance from one peak to the next between identical points in adjacent waves of electromagnetic signals propagated in space or along a wire. Wavelength is usually specified in meters, centimeters, or millimeters. In the case of infrared, visible light, ultraviolet, and gamma radiation, the wavelength is usually specified in nanometers (10e-9 meter) or Angstroms (10e-10 meter). Wavelength is inversely related to frequency. The higher the frequency of the signal, the shorter the wavelength.

Wavelength Division Multiplexing – WDM - The combination of two or more optical signals at different wavelengths for transmission within a single optical fiber.

WSXGA - "Wide-SXGA" defines a class of SXGA displays with a width resolution sufficient to create an aspect ratio of 16:9. Resolution is defined as the number of individual dots that a display uses to create an image. These dots are called pixels. A WSXGA display has 1920 to 1600 horizontal pixels and 1080 to 900 vertical pixels respectively that are used to compose the image delivered by the projector.

WXGA - "Wide-XGA" defines a class of XGA displays with a width resolution sufficient to create an aspect ratio of 16:9. Resolution is defined as the number of individual dots that a display uses to create an image. These dots are called pixels. A WXGA display has 1366 to 1280 horizontal pixels and 768 to 720 vertical pixels respectively that are used to compose the image delivered by the projector.

XGA - eXtended Graphics Array card. IBM's graphics standard that includes VGA and extended resolutions up to 1024 x 768 (interlaced 35 kHz). This card uses a 15-pin HD VGA-style connector.

XGA - Extended Graphics Array. A screen resolution of 1024x768 pixels.

XGA-2 - eXtended Graphics Array card, 2nd generation. Capable of scanning from 31 to 68 kHz and resolutions up to 1600 x 1200 pixels, this card uses a 15-pin HD VGA-style connector.

xvYCC - Extended-gamut YCC color space. xvYCC can be used in the electronics of televisions and other video displays to improve the image quality of high-definition video signals.

Y Pb Pr - Used to describe the color space for progressive-scan (non-interlaced) component video. Also see "Y, R-Y, B-Y."

Y, R-Y, B-Y - Color difference signal designation. Y corresponds to the luminance signal; R-Y corresponds to the red minus luminance signal, and B-Y corresponds to the blue minus luminance signal. After luminance is subtracted from red and blue, the remainder is considered to be the green portion of the RGB video signal. These signals are derived as follows: $Y = 0.3 \text{ red} + 0.59 \text{ green} + .11 \text{ blue}$; $R-Y = 0.7 \text{ red} - 0.59 \text{ green} - 0.11 \text{ blue}$; $B-Y = 0.89 \text{ blue} - 0.59 \text{ green} - 0.3 \text{ red}$

Z - A symbol for impedance.