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- SMPTE 260M–1999 — 1125/60 High-Definition Production System—Digital Representation and Bit-Parallel Interface
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- SMPTE 274M–2003 — 1920x1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates
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Useful websites

Advanced Television Systems Committee: www.atsc.org

Digital Video Broadcasting: www.dvb.org

The European Broadcasting Union: www.ebu.ch/en/index.php

International Telecommunications Union: www.itu.int/home/index.html

National Association of Broadcasters: www.nab.org

Society of Motion Picture and Television Engineers: www.smpte.org

Glossary

4:2:2 – A term often used to refer to a component digital video format. Refer to SMPTE 125M or ITU-R BT.601 standards for details. The numerals 4:2:2 denote the ratio of the sampling frequencies of the single luminance channel to the two color-difference channels. For every four luminance samples, there are two samples of each color difference channel.

4fsc – A term used to signify four times subcarrier sampling rate as used in composite digital systems. In NTSC systems, this is 14.3 MHz and for PAL, it is 17.7 MHz.

A

AES/EBU – Audio Engineering Society and European Broadcasting Union. An informal name for a digital audio standard established jointly by these organizations.

algorithm – A set of rules or processes for solving a problem in a finite number of steps.

aliasing – Defects in the picture typically caused by insufficient sampling or poor filtering of digital video. Defects are typically seen as jaggies on diagonal lines and twinkling or brightening in picture detail.

analog – An adjective describing any signal that varies continuously as opposed to a digital signal that contains discrete levels representing the binary digits 0 and 1.

analog component video – The unencoded output of a camera, videotape recorder, or similar device, consisting of the three primary color signals of red, green, and blue (RGB) that together convey all necessary picture information. Some component video formats translate these three components into a luminance signal and two color-difference signals, for example, Y, B-Y, R-Y.

analog composite video – An encoded video signal, such as NTSC or PAL, which includes horizontal and vertical synchronizing information.

ancillary data – In component digital video, the data carried in the data space corresponding to horizontal blanking between the EAV and SAV TRS or in the data space corresponding to vertical blanking. In composite video, ancillary data is only allowed in the serial data (in the tips of the synchronizing signals). See SMPTE 291M.

asynchronous – A transmission process not synchronized by a clock.

B

bandwidth – 1. The difference between the upper and lower limits of a frequency range, often measured in megahertz (MHz). 2. The complete range of frequencies over which a circuit or electronic system can function with less than a 3 dB signal loss. 3. The information-carrying capability of a particular television channel.

baseline shift – A form of low-frequency distortion resulting in a shift in the DC level of the signal.

bit – The binary representation of a 1 or 0. Also, a quantized level of a pixel.

bit parallel – Byte-wise transmission of a digital video signal via a multi-conductor twisted-pair cable where each pair carries a single (ordered) bit. Refer to SMPTE 125M or ITU-R BT.656.

bit serial – Bit-wise transmission of a digital video signal via a single conductor transmission medium such as coaxial cable or fiber optics. Refer to ITU-R BT.656.

bit slippage – 1. Occurs when word framing is lost in a serial signal so the relative value of a bit is incorrect. This is generally reset at the next serial signal, TRS-ID for composite and EAV/SAV for component.

2. The erroneous reading of a serial bit stream when the recovered clock phase drifts enough to miss a bit.

3. A phenomenon which occurs in parallel digital data buses when one or more bits gets out of time in relation to the rest, resulting in erroneous data. The most common cause is differing cable lengths.

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bit stream – A continuous series of bits transmitted on a transmission line.

blocking – A phenomenon which occurs in a multistage routing system when a destination attempts connection to a source but finds that source is unavailable.

BNC – Baby N connector. The cable connector used extensively in television systems.

byte – In digital video, a complete set (sample or word) of quantized levels comprising all of the bits. A byte usually consists of eight bits, while a digital video sample consists of ten bits.

C

cable equalization – The process of compensating for high-frequency attenuation of coaxial cable.

channel coding – Describes the way in which the 1s and 0s of the data stream are represented on the transmission path.

chroma, chrominance – The term used to describe the color-difference signals in a component system. The video signals carrying information about the hue (which color) and saturation (how much color) in a pixel.

clock jitter – Timing uncertainty of the data cell edges in a digital signal.

clock recovery – The process by which timing information is reconstructed from digital data.

coaxial cable – A transmission line with a concentric pair of signal carrying conductors, an inner conductor and an outer conductive metallic sheath or shield. The shield helps prevent external electromagnetic radiation from affecting the signal on the inner conductor and it reduces electromagnetic radiation from the transmission line.

coding – The representation of the levels of a digital video signal by a number, usually of binary form.

coefficients – The quantitative expression of a property of a physical system usually by a number (often a constant).

contouring – Video picture defects resulting from quantizing at too coarse a level.

D

D1 – A component digital video recording format that uses data conforming to the ITU-R BT.601 standard. This term is often used incorrectly to indicate digital component video.

D2 – A composite digital video recording format that uses data conforming to SMPTE 244M. This term is often used incorrectly to indicate digital composite video.

delay – The time required for a signal to pass through a device or conductor.

demultiplexer (demux) – A device used to separate two or more signals that were previously combined by a compatible multiplexer and transmitted over a single channel.

deserializer – A device that converts serial digital information to parallel format.

digital component video – A digital representation of a component analog signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by ITU-R BT.601. The parallel interface is specified by ITU-R BT.656 and SMPTE 125M.

digital composite video – A digitally encoded video signal, such as NTSC or PAL, which includes the horizontal and vertical synchronizing information.

digital word – The grouping of bits which represents a single entity by a digital system.

Glossary

dither – Typically a random, low-level signal (oscillation), which may be added to an analog signal prior to sampling. Often consists of white noise of one quantizing level peak-to-peak amplitude. More recently, a repeated pseudo-random manipulation of the one or two least significant bits of parallel digital video data words. This is done to inhibit the formation of encoded serial digital data streams having excessive low frequency content, pathological data patterns for example.

E

EAV – End of active video in component digital data systems.

EBU – European Broadcasting Union. An organization of European broadcasters that, among other activities, produces technical statements and recommendations for the 625/50-line television system.

EDH (error detection and handling) – A method for identifying and logging errors in the serial digital video data signal. See SMPTE RP 165.

embedded audio – Digital audio which is multiplexed into a serial digital video data stream.

encoder – In digital video, a device that encrypts video data, usually when in parallel format, according to the method defined in SMPTE 259M or SMPTE 292M.

eye pattern – On an oscilloscope display, a waveform pattern formed by the overlapping of consecutive data intervals and resembling an eye. It is used to evaluate signal characteristics.

F

format conversion – The process of both encoding/decoding and resampling of digital rates.

frequency modulation – Modulation of a sinewave or “carrier” by varying its frequency in accordance with amplitude variations of the modulating signal.

G

gain – Any increase or decrease in strength of an electrical signal. Gain is measured in terms of decibels or number of times of magnification.

group delay – Distortion of a signal caused by differing propagation delays occurring for different frequencies in a transmission system or network (i.e., the delay at 1 MHz is different than the delay at 5 MHz).

H

horizontal interval (horizontal blanking interval) – The time period between active video lines.

I

interpolation – In digital video, the creation of new pixels in an image by some method that mathematically manipulates the values of neighboring pixels.

I/O – Input/output. Typically refers to sending information or data signals to and from devices.

ITU-R – The International Telecommunication Union, Radio Communication Sector.

ITU-R BT.601 – An international standard for digital component television from which SMPTE 125M was derived. The standard defines the sampling systems, matrix values, and filter characteristics for Y, B-Y, R-Y and RGB digital component television.

J

jitter – The undesirable random time variation of a signal.

L

luma, luminance – The video signal describing the amount of light in each pixel, equivalent to the signal provided by a monochrome camera. Luma is often generated as a weighted sum of the R', G', and B' signals.

M

MPEG-2 – Motion Pictures Expert Group. An international group of industry experts set up to standardize compressed moving pictures and audio.

multiplexer (mux) – A device that combines two or more electrical signals into a single, composite signal.

N

nonlinear encoding – The process by which relatively more levels of quantization are assigned to small amplitude signals and relatively fewer to the large signal peaks.

nonlinearity – The result of a nonadditive operation. For example: gain variation as a function of signal amplitude.

NRZ – non-return to zero. A coding scheme that is polarity sensitive. 0 = logic low; 1 = logic high.

NRZI – non-return to zero inverse. A coding scheme used in video data scrambling that is polarity insensitive. 0 = no change in logic level; 1 = a transition from the one logic level to the other.

NTSC (National Television Systems Committee) – The organization that formulated standards for the NTSC television system. A term used now to describe the American system of color television broadcasting which is used mainly in North America, Japan, and parts of South America.

O

OEM – Output eye monitor.

orthogonal sampling – The process of sampling a repetitive video signal so that samples in each line are in the same horizontal position.

P

PAL – (Phase Alternate Line) The name of the color television system in which the V component of burst is inverted in phase from one line to the next in order to minimize hue errors that may occur in color transmission. Often used to describe the predominantly European television system of broadcasting.

patch panel – A manual method of routing signals using a panel of receptacles for sources and destinations and wire jumpers to interconnect them.

peak to peak – The amplitude (voltage, current, etc.) difference between the most positive and the most negative excursions (peaks) of an electrical signal.

phase distortion – A signal defect caused by unequal delay (or phase shift) of different frequency components within the signal as they pass through different impedance elements such as filters, amplifiers, and transmission lines.

phase shift – The relative timing movement of a signal in relation to another signal.

pixel – The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words “picture” and “element.”

PRBS – Pseudo random binary sequence.

production switcher (vision mixer) – A device or system that allows switching or transitioning between different video pictures or inclusion of mixing or other special effects.

Glossary

propagation delay – The time taken for a signal to travel through a circuit, piece of equipment, or a length of cable.

Q

quantization – The process of converting a continuous analog input into a set of discrete output levels.

quantizing noise – The noise (deviation of a signal from its original or correct value) that results from the quantization process. In serial digital video, a granular type of noise which only occurs in the presence of a signal.

R

rate conversion – Technically, the process of converting from one sample rate to another. Often used incorrectly to indicate both resampling of digital rates and encoding or decoding.

reclocking – The process of clocking the data with a regenerated clock. Intended to correct timing distortion of the digital signal intervals to that of the ideal fundamental bit interval.

resolution – The number of bits (e.g., 4, 8, 10) which determines the resolution of the digital signal. (4 bits is a resolution of 1 in 16, 8 bits is a resolution of 1 in 256, and 10 bits is a resolution of 1 in 1024). Eight bits is deemed the minimum acceptable for broadcast TV.

routing switcher – An electronic device or system that routes a user-supplied signal (i.e., audio, video) from any input to any user-selected combination of outputs.

S

sampling – The process whereby analog signals are measured or sampled. For example: 13.5 millions of times per second for some video.

sampling frequency – The number of discrete sample measurements made in a given period of time, often expressed in MHz for video.

SAV – Start of Active Video in component digital systems.

scrambling – The conversion of digital data according to an ordered process in an attempt to break up the low-frequency patterns associated with serial digital video signals. The digital signal is shuffled to produce a more uniform spectral distribution.

segmented frames – A scanning format in which the picture is captured as a frame in one scan, as in progressive formats. The even lines are then transmitted as one field and the odd lines in the next field as in an interlaced format.

serial digital – Digital information that is transmitted in serial form; often used informally to refer to serial digital television video signals.

serializer – A device that converts parallel digital information to serial digital.

SMPTE – Society of Motion Picture and Television Engineers. A professional organization that recommends and maintains standards for the television and film industries.

still store – A device for the storage of specific frames of digital video.

synchronous – A transmission process whereby the bit or character stream are slaved to accurately synchronized clocks at both the sending and receiving ends.

sync word – A unique pattern of bits or data used to synchronize data reception or to identify unique reference points in the digital television data signal.

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T

telecine – A device for converting movie film into video signal format.

temporal aliasing – A visual defect occurring when the image being sampled moves too fast for the sampling rate. A common example is helicopter blades that appear to rotate slowly or in reverse.

TRS (Timing Reference Signals) – The four-word long sequences used to maintain timing in composite digital video systems.

TRS-ID (timing reference signal identification) – A four-word long digital-reference signal used to maintain timing in composite digital video systems.

truncation – The process of deletion of the lower significant bits on a digital data system that usually results in digital noise.

V

VTR (video tape recorder) – A device that permits audio and video signals to be recorded on magnetic tape.

W

waveform – The displayed envelope or shape of an electromagnetic wave. A graphical representation of the relationship between voltage or current and time.

word – See byte.

Y

Y', C'b, C'r – A gamma corrected color-difference signal set used in digital component formats.

Y, Pb, Pr – A version of (Y R-Y B-Y) specified for the SMPTE analog component standard.

Y, R-Y, B-Y – The general set of CAV signals used in the PAL system as well as for some composite encoder and most composite decoders in NTSC systems. Where: Y is the luminance signal, R-Y is the 1st color-difference signal, and B-Y is the 2nd color-difference signal.

Y, U, V – Luminance and color-difference components for PAL systems. Often imprecisely used to signify Y', P'b, P'r.

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