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**Consumer audio/video equipment – Digital interface –
Part 8: Transmission of ITU-R BT.601 style digital video data**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONSUMER AUDIO/VIDEO EQUIPMENT –
DIGITAL INTERFACE –**

Part 8: Transmission of ITU-R BT.601 style digital video data

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61883-8 edition 1.1 contains the first edition (2008-11) [documents 100/1446/FDIS and 100/1476/RVD] and its amendment 1 (2014-02) [documents 100/2051/CDV and 100/2106/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 61883-8 has been prepared by technical area 4: Digital system interfaces and protocols, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61883 series, under the general title *Consumer audio/video equipment – Digital interface*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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- replaced by a revised edition, or
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INTRODUCTION TO AMENDMENT 1

The revision of IEC 61883-8:2008, has become necessary to define the following new additional copy control information.

- Analog sunset token
- Digital only token
- Copy count

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CONSUMER AUDIO/VIDEO EQUIPMENT – DIGITAL INTERFACE –

Part 8: Transmission of ITU-R BT.601 style digital video data

1 Scope

This part of IEC 61883 specifies a protocol for the transport of uncompressed or compressed video data in the 4:2:2 format of recommendation ITU-R BT.601 (including compatible extensions to this format for the higher and lower resolutions of other commonly used video resolutions) over high performance serial bus, as specified by IEEE Std 1394-1995 as amended by IEEE Std 1394a-2000 and IEEE Std 1394b-2002 (collectively IEEE 1394). The data formats for the encapsulation of video data are compatible with those specified by IEC 61883-1. Associated audio data, if any, should be formatted as specified by IEC 61883-6.

There are many commonly used video formats unsupported by IEC 61883, such as MPEG-4, Windows Media Format (WMF) and the format used by automotive navigation applications. Support for all or most of these formats in rendering devices would require implementation of multiple video codecs. This is an undue burden that may be avoided if the source device converts to ITU-R BT.601 4:2:2 format and, if necessary, compresses the data with a codec supported by all destination devices. An additional advantage is that on-screen display (OSD) information may be mixed with video data prior to transmission to the rendering device.

Because ITU-R BT.601 4:2:2 format is widely used internally in contemporary AV equipment, this specification permits straight-forward integration of IEEE 1394 into these devices and enables markets whose usage scenarios include single video sources transmitting to one or more video displays, such as:

- consumer electronic STB or DVD video rendered by multiple displays in the home;
- automotive navigation and entertainment; and
- aeronautical in-flight entertainment.

For the sake of interoperability and bounded implementation complexity, it is essential that the specification provide the following:

- a 1394 TA controlled list of compression codecs; and
- at a minimum, a reference to one video compression codec.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61883 (all parts), *Consumer audio/video equipment – Digital interface*

IEC 61883-1, *Consumer audio/video equipment – Digital interface – Part 1: General*

ISO/IEC 11172-2:1993, *Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s – Part 2: Video*

IEEE Std 1394-1995, *Standard for a high performance serial bus*

IEEE Std 1394a-2000, *Standard for a high performance serial bus*
Amendment 1

IEEE Std 1394b-2002, *Standard for a high performance serial bus*
Amendment 2

Throughout this document, the term IEEE 1394 refers to IEEE Std 1394-1995 as amended by IEEE Std 1394a-2000 and IEEE Std 1394b-2002.

1394 Trade Association 2004006, *AV/C Digital Interface Command Set General Specification*
Version 4.2

1394 Trade Association 2003017, *IIDC 1394-based Digital Camera Specification* Ver.1.31

EIA/CEA-861-B 2002, *A DTV Profile for Uncompressed High Speed Digital Interfaces*

IEEE Std 1394.1-2004, *Standard for High Performance Serial Bus Bridges*

ITU-R BT.601-5 1995, *Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios*

ITU-R BT.656-4 1998, *Interfaces for digital component video signals in 525-line and 625-line television systems operating at the 4:2:2 level of recommendation ITU-R BT.601*

ITU-R BT.709-4 2000, *Parameter values for the HDTV standards for production and international programme exchange*

ITU-R BT.1358 1998, *Studio parameters of 625 and 525 line progressive scan television systems*

ITU-T H.263 1998, *Video coding for low bit rate communication*

SMPTE 267M-1995, *Television – Bit-Parallel Digital Interface – Component Video Signal 4:2:2 16x9 Aspect Ratio*

SMPTE 274M-1998, *Television – 1920 × 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates*

SMPTE 293M-1996, *Television – 720 × 483 Active Line at 59.94-Hz Progressive Scan Production – Digital Representation*

SMPTE 296M-2001, *Television – 1280 × 720 Progressive Image Sample Structure – Analog and Digital Representation and Analog Interface*

VESA Monitor Timing Specifications, VESA and Industry Standards and Guidelines for Computer Display Monitor Timing, Version 1.0, Revision 0.8

3 Abbreviations and conventions

3.1 Abbreviations

For the purposes of this document, the abbreviations given in IEC 61883-1, as well as the following, apply.

AV/C Audio Video Control

+AMD1:2014 CSV © IEC 2014

BCD	Binary Coded Decimal
BT.601	ITU-R BT.601-5 1995
CIP	Common Isochronous Packet
CSR	Control and status register
DAC	Digital Analog Converter
DCT	Discrete Cosine Transform
DV	Digital Video
ND	No Data
OSD	Onscreen Display
OUI	Organizationally Unique Identifier
r	Reserved
MPEG	Moving Picture Experts Group
SIM	Stream Information & Metadata
VDSP	Video Data Source Packet
WMF	Windows Media Format

3.2 Notation

3.2.1 Numeric values

Decimal and hexadecimal are used within this standard. By editorial convention, decimal numbers are most frequently used to represent quantities or counts. Addresses are uniformly represented by hexadecimal numbers. Hexadecimal numbers are also used when the value represented has an underlying structure that is more apparent in a hexadecimal format than in a decimal format.

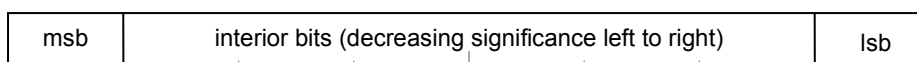
Decimal numbers are represented by Arabic numerals without subscripts or by their English names. Hexadecimal numbers are represented by digits from the character set 0 – 9 and A - F followed by the subscript 16. When the subscript is unnecessary to disambiguate the base of the number it may be omitted. For the sake of legibility hexadecimal numbers are separated into groups of four digits separated by spaces.

As an example, 42 and 2A₁₆ both represent the same numeric value.

3.2.2 Bit, byte and quadlet ordering

This specification uses the facilities of Serial Bus, IEEE 1394, and therefore uses the ordering conventions of Serial Bus in the representation of data structures. In order to promote interoperability with memory buses that may have different ordering conventions, this specification defines the order and significance of bits within bytes, bytes within quadlets and quadlets within octlets in terms of their relative position and not their physically addressed position.

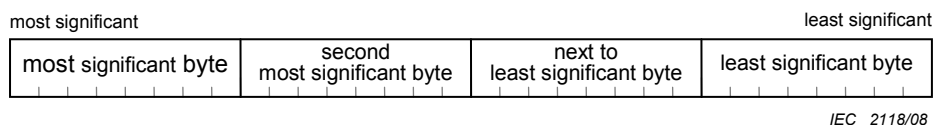
Within a byte, the most significant bit, msb, is that which is transmitted first and the least significant bit, lsb, is that which is transmitted last on serial bus, as illustrated below. The significance of the interior bits uniformly decreases in progression from msb to lsb.



IEC 2117/08

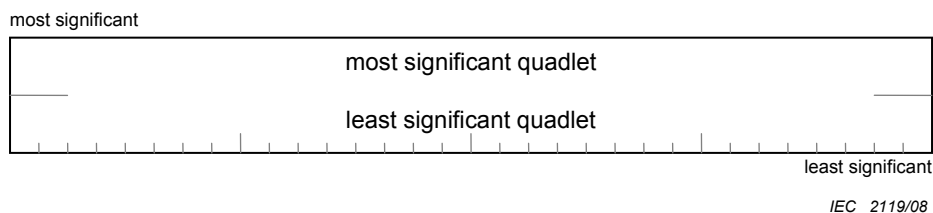
Figure 1 – Bit ordering within a byte

Within a quadlet, the most significant byte is that which is transmitted first and the least significant byte is that which is transmitted last on serial bus, as shown below.



IEC 2118/08
Figure 2 – Byte ordering within a quadlet

Within an octlet, which is frequently used to contain 64-bit serial bus addresses, the most significant quadlet is that which is transmitted first and the least significant quadlet is that which is transmitted last on serial bus, as the figure below indicates.



IEC 2119/08
Figure 3 – Quadlet ordering within an octlet

When block transfers take place that are not quadlet aligned or not an integral number of quadlets, no assumptions can be made about the ordering (significance within a quadlet) of bytes at the unaligned beginning or fractional quadlet end of such a block transfer, unless an application has knowledge (outside of the scope of this specification) of the ordering conventions of the other bus.

4 Reference model for data transmission

4.1 Model overview

The presently defined compression standards for IEEE 1394 transport, DV and MPEG2, have difficulties at the system level in a practical consumer AV network. Both offer excessive compression for simple transport over a wide bandwidth network and carry the associated complexity of coding and decoding signals. Each are fine for their intended purpose, but have excessive cost for simple video transport. Conventional video equipment is interfaced with analog cables carrying a number of signal formats, and it is this low cost and universal connection capability which digital interfaces need to emulate. Thus the analog output from any DVD player will connect to any TV, and this is seen as adequate by equipment manufacturers. Digital interfaces would allow many additional features, but providing every input with the capability of decoding both DV and MPEG2 in all available standards and resolutions is unnecessarily expensive. Inside equipment variations on the broadcast equipment ITU-R BT.601-5/BT.656-4 interface are common and provide a universal interface standard for digital video transport. The coding system in ITU-R BT.601-5 sends YUV data across an 8 bit interface between integrated circuits, for example an MPEG decoder and DAC. If the decoder and DAC are separated by 1394 in their separate boxes there will be a reduction in cost at the source device and the sink device will be independent from the video encoding mechanism.

This standard describes the method of passing YUV video signals across IEEE 1394 based upon the formats defined by ITU-R BT.601-5. Familiarity with the specifications ITU-R BT.601-5, ITU-R BT.656-4 and IEC 61883 is necessary to follow the technical details.

There is also the capability to transfer data in YUV 4:4:4 and 24 bit RGB formats. This allows video to be transferred without the need for color space sub-sampling.

It is valid to transmit all video modes as uncompressed data as long as the IEEE 1394 bus bandwidth is available. In practice some video modes will not be transportable in an uncompressed state.