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Consumer Technology Association™

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To: Users of CTA-861, *A DTV Profile for Uncompressed High-Speed Digital Interfaces*

From: CTA Technology & Standards Department

Date: November 2, 2017

Subject: CTA-861-G

This document has been revised from its original published version to remove references to a specific company. The company in question requested this change, citing the fact that its company name is trademarked. The specific revisions that have been made include:

2.1.2.1	Removal of informative reference 89
2.2	The term defined as "the optional RGB color space defined in IEC 61966-2-5" was renamed "opRGB."
2.2	The term defined as "the luma-chroma-chroma (YCC) color space defined in Annex A of IEC 61966-2-5. The ITU-R BT.601 color conversion matrix is used to transform RGB values to YCC values" was renamed "opYCC$_{601}$."
5.2.1	The new term "opYCC$_{601}$" replaced a company specific reference.
5.3	The new term "opYCC$_{601}$" replaced a company specific reference. Also, the new term "opRGB" replaced a company specific reference.
Table 13	The new term "opYCC$_{601}$" replaced a company specific reference. Also, the new term "opRGB" replaced a company specific reference.
Table 14	The new term "opYCC$_{601}$" replaced a company specific reference in three places. Also, the new term "opRGB" replaced a company specific reference.
6.4	The new term "opYCC$_{601}$" replaced a company specific reference. Also, the new term "opRGB" replaced a company specific reference.
Table 70	The new term "opYCC$_{601}$" replaced a company specific reference. Also, the new term "opRGB" replaced a company specific reference.
Table 71	The new term "opYCC$_{601}$" replaced a company specific reference. Also, the new term "opRGB" replaced a company specific reference.
7.5.6	The new term "opYCC$_{601}$" replaced a company specific reference in two places. Also, the new term "opRGB" replaced a company specific reference.

No other changes have been made to this document today. Please note that there is also an erratum dated September 13, 2017.

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To: Users of CTA-861-G, A DTV Profile for Uncompressed High Speed Digital Interfaces

From: CTA Technology & Standards Department

Date: September 13, 2017

Subject: AVI InfoFrame Version Errata

Please note that there are several errors in the published version of CTA-861-G (November 2016).

Changed pages with the corrections are provided. We apologize for any inconvenience.

• Page 54, Section 6.4, last sentence of paragraph preceding Table 8 – Two sentences removed:

"A Version 3 AVI InfoFrame shall be used and the Version field set to 0x03 (indicating that the Sink shall decode the additional most-significant bits) whenever either of the most-significant bits Y2 or VIC7 are set to '1'. If both Y2 and VIC7 are set to '0', then a Version 2 AVI InfoFrame shall be used and the Version field shall be set to 0x02 (indicating that the Sink does not have to decode the additional most-significant bits)."

• Page 54, Section 6.4, following Table 9 – Six new paragraphs and algorithm pseudocode added after the last paragraph

"All fields of the Version 4 AVI InfoFrame are described in Table 9. All fields of the Version 4 AVI InfoFrame are the same as Version 3 AVI InfoFrame, except for the InfoFrame Version Number, Length of AVI InfoFrame, and additional Data Byte 14."

as follows:

"

Sinks that support AVI InfoFrames shall include support for AVI InfoFrame Version 2.

Sinks implicitly advertise support for Version 3 AVI InfoFrames by declaring support for VIC≥128 or Y=7 or both.

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Sinks implicitly advertise support for both Versions 3 and 4 AVI InfoFrames by declaring support for any standard indicated by ACE (Additional Colorimetry Extension listed in Table 25) in their Colorimetry Data Block (Table 70). Sinks that support AVI InfoFrame Version 4 shall also support AVI InfoFrame Version 3.

Sources shall not send AVI InfoFrame Version 3 to Sinks that do not indicate support for AVI InfoFrame Version 3 as described above.

Sources shall not send AVI InfoFrame Version 4 to Sinks that do not indicate support for AVI InfoFrame Version 4 as described above.

When Y2 = 0, the following algorithm shall be used for AVI InfoFrame version selection:

if (C=3 and EC=7)

    Sources shall use AVI InfoFrame Version 4.

Else if (VIC≥128)

    Sources shall use AVI InfoFrame Version 3.

Else

    Sources shall use AVI InfoFrame Version 2.

End if

“

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CTA Standard

A DTV Profile for Uncompressed High Speed Digital Interfaces

CTA-861-G

November 2016

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(Formulated under the cognizance of the CTA **R4.8 DTV Interface Subcommittee**.)

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FOREWORD

This standard was developed under the auspices of the Consumer Electronics Association (CTA) R4.8 DTV Interface Subcommittee.

CTA-861-G supersedes CTA-861-F and incorporates the Erratum issued in April 2016, as well as the CTA-861.2 Advanced Audio Extensions of August 2015 and CTA-861.3-A HDR Static Metadata Extensions of August 2016.

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A DTV Profile for Uncompressed High Speed Digital Interfaces

1 Scope

CTA-861 establishes protocols, requirements, and recommendations for the utilization of uncompressed digital interfaces by consumer electronics devices such as Digital Televisions (DTVs), digital cable, satellite or terrestrial set-top boxes (STBs), and related peripheral devices including, but not limited to DVD players/recorders, and other related Sources or Sinks.

CTA-861 is applicable to a variety of standard DTV-related high-speed digital physical interfaces - such as Digital Visual Interface (DVI) 1.0 [4], Open LVDS Display Interface (LDI) [8], and High-Definition Multimedia Interface (HDMI) [71] specifications. Protocols, requirements, and recommendations that are defined include Video Formats and waveforms; colorimetry and quantization; transport of compressed and uncompressed, as well as Linear Pulse Code Modulation (L-PCM), audio; carriage of auxiliary data; and implementations of the Video Electronics Standards Association (VESA*) Enhanced Extended Display Identification Data Standard* (E-EDID) [9], which is used by Sinks to declare display capabilities and characteristics.

CTA-861 adopters are strongly encouraged to implement High-bandwidth Digital Content Protection (HDCP) [3] content protection, defined by the Digital Content Protection, LLC (DCP) method, in order to be compatible with digital cable STBs as authorized by 47 C.F.R. § 76.602 [69] and 47 C.F.R. §76.640 [70]. HDCP [3] permits viewing of high-value content that may be available from other video Sources in a home network.

2 General

2.1 References

CTA-861 includes mechanisms that allow a digital video Source (such as a cable, satellite or terrestrial STB, digital VCR, or DVD player) to supply displayable, baseband, digital video to High Definition Television (HDTV) devices, as well as peripheral devices such as repeaters, switchers, and recorders, as defined in *CTA Expands Definitions for Digital Television Products* [64].

2.1.1 Normative References

The following standards contain provisions that, through reference in this text, constitute normative provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision. Users of this Standard are cautioned that a newer edition might or might not be compatible.

2.1.1.1 Normative Reference List

1. SMPTE ST 170:2004 (Archived 2010) Television – Composite Analog Video Signal – NTSC for Studio Applications
2. SMPTE ST 274:2008 Television – 1920 x 1080 Image Sample Structure, Digital Representation and Digital Timing Reference Sequences for Multiple Picture Rates
3. DCP, L.L.C., High-bandwidth Digital Content Protection System, Revision 1.1, June 9, 2003
4. DDWG, Digital Visual Interface, Revision 1.0, April 2, 1999
5. IEC 61966-2-4: Multimedia systems and equipment - Colour measurement and management - Part 2-4: Colour management - Extended-gamut YCC colour space for video applications, January 2006
6. Recommendation ITU-R BT.601-5, Studio Encoding parameters of Digital Television for standard 4:3 and wide-screen 16:9 aspect ratios, 1995
7. Recommendation ITU-R BT.709-5, Parameter Values for the HDTV standards for production and International Programme Exchange, 2002 – Part 2: HDTV system with square pixel common image format – 3: Signal format
8. Open LVDS Display Interface (Open LDI) Specification, Version 0.95, May 13, 1999
9. VESA E-EDID™ Standard, VESA Enhanced Extended Display Identification Data Standard, Release A, Revision 1, February 9, 2000 --- Defines EDID Structure Version 1, Revision 3
10. VESA DDC/CI Standard, VESA Display Data Channel Command Interface (DDC/CI) Standard, Version 1.1, October 29, 2004
11. ATSC Standard A/52:2012: Digital Audio Compression (AC-3, E-AC-3), December 17, 2012