CTA Standard

Audio Format Extensions

CTA-861.1

(Formerly CEA-861.1)

August 2010

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

FOREWORD

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

CONTENTS

Tables

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Audio Format Extensions

1 Scope

This standard specifies additional Audio Format Code Extension values for Audio InfoFrames and CEA Short Audio Descriptors using previously reserved codes listed in Table 26 of CEA-861-E [1]. This standard also defines additional data fields in the previously defined future bits of Data Byte 3 of CEA Short Audio Descriptors, when the Audio Format Code bit-field in Data Byte 1 is set to 15. Recommendations surrounding audio format extensions are also provided.

The requirements of this standard are in addition to and complement CEA-861-E [1]; all devices compliant with CEA-861.1 shall also comply with CEA-861-E [1] except that this standard deprecates and replaces Table 26 of CEA-861-E.

2 General

2.1 References

2.1.1 Normative References
The following references contain provisions, which, through reference in this text, constitute normative provisions of this standard. At the time of publication, the editions indicated below were valid. All documents are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

2.1.1.1 Normative Reference List
1. CEA-861-E, A DTV Profile for Uncompressed High Speed Digital Interfaces, March 2008
2. ISO/IEC 14496-3:2009, Information Technology – Coding of audio-visual objects – Part 3: Audio
3. ISO/IEC 23003-1:2007 Information technology -- MPEG audio technologies -- Part 1: MPEG Surround with corrigenda 1 (February 2008)
4. IEC 61937-11 Digital audio - Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 - Part 11: MPEG-4 AAC and its extensions in LATM/LOAS
5. IEC 61937-12:2010, DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 – Part 12: Non-linear PCM bitstreams according to the DRA formats
6. GB/T 22726-2008, Specification for multichannel digital audio coding technology

2.1.1.2 Normative Reference Acquisition Lists

CEA Standards
- Techstreet, 3916 Ranchero Drive, Ann Arbor, MI USA 48108; Phone 800-699-9277; Fax 734-780-2046; Internet http://www.techstreet.com; Email techstreet.service@thomsonreuters.com

IEC Standards
- International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland. Telephone +41 22 919 02 11; Telefax +41 22 919 03 00; Web: www.iec.ch; Email: inmail@iec.ch

GB/T Standards
- Standardization Administration of the People's Republic of China (SAC), No.9 Madian Donglu Haidian District Beijing 100088,china; Phone +86 10 8226 2609; Fax +86 10 8226 0684; Internet http://www.sac.gov.cn/; E-mail webmaster@sac.gov.cn

2.1.2 Informative References
The following references contain provisions, which, through reference in this text, constitute informative provisions of this standard. At the time of publication, the editions indicated below were valid. All

documents are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

2.1.2.1 Informative Reference List
7.   BDA, Blu-ray Disc Read-Only Format, Part 3 : Audio Visual Basic Specifications, Version 2.3

2.1.2.2 Informative Reference Acquisition
BDA Standards
* Blu-ray Disc Association (BDA), Blu-ray Disc Association 10 Universal City Plaza, T-100 Universal City CA 91608; Fax +1-818-301-1893; Internet http://www.blu-raydisc.com/index.htm; E-mail membership@bdamail.com

2.2 Definitions
For the purposes of CEA-861.1, the following definitions apply.

Sink—A device which receives an uncompressed A/V signal.

Source—A device which generates an uncompressed A/V signal.

2.3 Acronyms, Symbols, and Abbreviations
AAC   Advanced Audio Coding
CEA   Consumer Electronics Association
DRA   Digital Rise Audio (used with the Blu-ray Disc Read-Only Format [7])
MPEG   Moving Picture Experts Group

2.4 Compliance Notation
As used in this document, "shall" denotes mandatory provisions of the standard. "Should" denotes a provision that is recommended but not mandatory. "May" denotes a feature whose presence does not preclude compliance and implementation of which is optional. "Optional" denotes items that may or may not be present in a compliant device.

2.5 Bit Naming Conventions
The names of the individual bits of multi-bit data values are composed using a value's mnemonic followed by a bit number. The significance of each bit is indicated by the bit number according to little-endian convention (i.e. bit number 0 is the least significant). For example, the audio format code value is given the mnemonic 'CXT', which is associated with five bits named 'CXT4', 'CXT3', 'CXT2', CXT1' and 'CXT0'. When the value CXT=5 (decimal), bits CXT4=0, CXT3=0, CXT2=1, CXT1=0, and CXT0=1.

Future bits are a special case. These bits begin with the mnemonic 'F' followed by a bit number. In this case, bit numbers indicate location - not significance. Future bits shall be set to zero and ignored.

2.6 Hexadecimal Notation
The characters 0x preceding numbers or letters A through F designate the following values as hexadecimal notation.

3 Additional Audio Format Code Values

A source may signal the extended audio type it is outputting by sending an Audio InfoFrame with the CT bit-field in Data Byte 1 set to 15 and the CXT bit-field of Data Byte 3 set to a corresponding code. Likewise, a sink's EDID may indicate support for an extended audio type by including a CEA Short Audio Descriptor with the Audio Format Code bit-field in Data Byte 1 set to 15 and the Audio Format Code bit-field in Data Byte 3 set to a corresponding code. Both Audio InfoFrames and EDID CEA Short Audio Descriptors use a common set of extended audio format codes. An initial set of extended audio format codes and related references is given in Table 26 of CEA-861-E [1], which is deprecated and replaced by codes 0-3 of Table 1 below. Additional audio format codes and related references are also listed here in Table 1.

CXT	Audio Coding Extension Type	Audio Stream Encoding Standard	Audio Stream Transport Standard
0x00	Refer to Audio Coding Type (CT) field in Data Byte 1		
0x01	Not in use		
0x02	Not in use		
0x03	Not in use		
0x04	MPEG-4 HE AAC	ISO/IEC 14496-3 [2]	IEC 61937-11 [4]
0x05	MPEG-4 HE AAC v2	ISO/IEC 23003-1 [3]	IEC 61937-11 [4]
0x06	MPEG-4 AAC LC	ISO/IEC 14496-3 [2]	IEC 61937-11 [4]
0x07	DRA	GB/T 22726 [6]	IEC 61937-12 [5]
0x08	MPEG-4 HE AAC + MPEG Surround	ISO/IEC 14496-3 [2], ISO/IEC 23003-1 [3]	IEC 61937-11 [4]
0x09	Reserved		
0x0A	MPEG-4 AAC LC + MPEG Surround	ISO/IEC 14496-3 [2], ISO/IEC 23003-1 [3]	IEC 61937-11 [4]
0x0B – 0x1F	Reserved		

Table 1 Additional Audio Format Code Extension Values (Data Byte 3)

4 Additional data fields in CEA Short Audio Descriptors
When the Audio Format Code bit-field in Data Byte 1 of a CEA Short Audio Descriptor is set to 15, it shall conform to the formats given in Table 2 or Table 3 as a function of the Audio Coding Extension Type Code.

The format of the third byte is determined by the Audio Format Code Extension contained in the third byte as shown in Table 2 and Table 3. For some compressed formats, byte 3 is further defined in other format-specific documents.

Byte#	7	6	5	4	3	2	1	0
1	F17=0	Audio Format Code = 1111				Max Number of channels - 1		
2	F27=0	F26=0	F25=0	96kHz	88.2kHz	48kHz	44.1kHz	32kHz
3	Audio Coding Extension Type Code					1024_TL	960_TL	F30=0

Table 2 CEA Short Audio Descriptor for Audio Coding Extension Type Codes 4 to 6

For audio format extension type code values 4, 5, 6, 8 & 10 (decimal), bits 1 and 2 of Data Byte 3 (see Table 2) are used to indicate support for different AAC audio frame lengths. If an AAC frame length of 960 samples is supported, bit 1 shall be set to 1. If an AAC frame length of 1024 sample is supported, bit 2 shall be set to 1.

Byte#	7	6	5	4	3	2	1	0
1	F17=0	Audio Format Code = 1111				Max Number of channels - 1		
2	F27=0	F26=0	F25=0	96kHz	88.2kHz	48kHz	44.1kHz	32kHz
3	Audio Coding Extension Type Code					1024_TL	960_TL	MPS_L

Table 3 CEA Short Audio Descriptor for Audio Coding Extension Type Codes 8 and 10

MPEG Surround (MPS) data may be present in MPEG-4 AAC bit streams. When present, MPS provides a significant increase of audio compression efficiency. Spatial audio data can be conveyed in the AAC extension_payload() mechanism using extension_type EXT_SAC_DATA or as a second layer in the PayloadMux(), as defined by ISO/IEC 14496-3 [2]. The presence of MPS data can be signaled either implicitly or explicitly. With implicit signaling, the mere presence of the EXT_SAC_DATA extension elements in the bit stream implies that MPS data is present. With explicit signaling, the presence of MPS data is signaled by means of the audio object type (AOT) MPEG Surround (30) in the AudioSpecificConfig() data, which permits the conveyance of configuration data specific to the MPS decoder [2].

For audio format extension type code values 8 and 10 (decimal), bit 0 of Data Byte 3 (see Table 3) is used to indicate whether the sink supports implicit or both implicit and explicit signaling of MPEG Surround data. If the bit 0 is set to 0, then the sink supports only implicitly signaled MPEG Surround data. If bit 0 is set to 1, then the sink supports both implicitly and explicitly signaled MPEG Surround data.

It is strongly recommended that, if a sink indicates support for core audio stream coding type (e.g. MPEG-4 HE AAC), then the sink should be able to receive MPEG Surround (e.g. MPEG-4 HE AAC + MPEG Surround) and be able to decode the core audio stream and ignore the MPEG Surround extension in the bit stream. Also, it is strongly recommended that source devices should not refuse transmission of an implicitly signaled MPEG Surround-encoded audio stream if the sink device indicates support for the core audio stream coding type, but does not indicate support for the core audio stream in conjunction with MPEG Surround.

Consumer Technology Association Document Improvement Proposal

If in the review or use of this document a potential change is made evident for safety, health or technical reasons, please email your reason/rationale for the recommended change to standards@ce.org.

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