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**MPEG-4 AAC Family Audio System – Part 2
Constraints for Carriage over MPEG-2 Transport**

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MPEG-4 HE AAC – PART 2

CONSTRAINTS FOR CARRIAGE OVER MPEG-2 TRANSPORT

1. SCOPE

This document describes the carriage of MPEG-4 AAC, MPEG-4 HE AAC and MPEG-4 HE AAC v2 (referred to collectively in this document as the “AAC family”) profile audio in MPEG-2 transport systems. It also discusses MPEG-2 AAC LC profile audio, which is closely related to MPEG-4 AAC profile audio.

The descriptor necessary to signal AAC family audio and information for signaling mixing of main and associated services in the receiver are defined in this document. Multiplexing and transport for cable using MPEG-2 systems are defined in SCTE 54 [8]. Coding constraints for AAC family audio elementary streams are defined in SCTE 193-1 2014 [1].

2. NORMATIVE REFERENCES

The following documents contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of Subcommittee approval, the editions indicated were valid. All standards are subject to revision; and while parties to any agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below, they are reminded that newer editions of those documents may not be compatible with the referenced version.

- [1] SCTE 193-1 2014, MPEG-4 AAC Family Audio System – Part 1, Coding Constraints for Cable Television
- [2] ISO/IEC 13818-1:2013, Information technology – Generic coding of moving pictures and associated audio information: Systems
- [3] ISO/IEC 14496-3:2009, Information technology – Coding of audio-visual objects – Part 3: Audio
- [4] ISO/IEC 14496-3:2009/Amendment 4:2013: Information technology – Coding of audio-visual objects – Part 3: Audio, Amendment 4: New levels for AAC
- [5] ISO 639-2:1998, Codes for the representation of names of languages – Part 2: Alpha-3 code
- [6] ISO/IEC 8859-1:1998, Information technology – 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1
- [7] ISO/IEC 10646:2012, Information technology – Universal coded Character Set (UCS)

3. INFORMATIVE REFERENCES

The following documents may provide valuable information to the reader but are not required when complying with this standard.

- [8] ANSI/SCTE 54, Digital Video Service Multiplex and Transport System Standard for Cable Television
- [9] ISO/IEC 13818-7:2006, Information technology – Generic coding of moving pictures and associated audio information – Part 7: Advanced Audio Coding (AAC)
- [10] ARIB STD-B32 Part 2, Video Coding, Audio Coding and Multiplexing Specifications for Digital Broadcasting, Part 2, Audio Signal and Coding System
- [11] ETSI EN 300 468, “Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems”
- [12] ETSI TS 101 154, “Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcast Applications based on the MPEG-2 Transport Stream”

4. COMPLIANCE NOTATION

“SHALL”	This word or the adjective “REQUIRED” means that the item is an absolute requirement of this specification.
“SHALL NOT”	This phrase means that the item is an absolute prohibition of this specification.
“SHOULD”	This word or the adjective “RECOMMENDED” means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighted before choosing a different course.
“SHOULD NOT”	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
“MAY”	This word or the adjective “OPTIONAL” means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

5. TERMS AND ACRONYMS

The following defined terms and acronyms are used in this document:

5.1 Terms

Reserved	The term “reserved”, when used in the clauses defining the coded bit stream and associated signaling, indicates that the value may be used in the future for extensions to the standard. Unless otherwise specified, all reserved bits shall be set to ‘1’. Reserved fields and reserved values are intended to be ignored by receiving equipment.
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5.2 Acronyms and Abbreviations

AAC	Advanced Audio Coding
ADTS	Audio Data Transport Stream
AU	Access unit
bslbf	Bit string, left bit first, where "left" is the order in which bit strings are written in this standard
HE AAC	High-Efficiency Advanced Audio Coding
HE AAC v2	High Efficiency Advanced Audio Coding version 2
LATM	Low overhead Audio Transport Multiplex
LOAS	Low Overhead Audio Stream
PES	Packetized Elementary Stream
PMT	Program Map Table
PSI	Program Specific Information
PNS	Perceptual Noise Substitution
PTS	Presentation Time Stamp
RAP	Random Access Point
STD	System Target Decoder
TS	Transport Stream
uimsbf	Unsigned integer, most significant bit first

6. AAC FAMILY IN MPEG-2 TRANSPORT STREAMS

6.1 Introduction

This section specifies the encapsulation and corresponding signaling of AAC family encoded audio in an MPEG-2 transport stream environment.

AAC family elementary streams are carried in MPEG-2 Transport Streams (TS) as Packetized Elementary Streams (PES). Each PES packet may contain one or more Access Units (AU).

The AAC family elementary stream data as defined in SCTE 193-1 2014 [1] shall be encapsulated either in the LATM/LOAS AudioSyncStream() transport syntax or in the ADTS adts_frame() transport syntax per ISO/IEC 14496-3 [3]. The preferred encapsulation is LATM/LOAS.

6.2 AAC Elementary Stream Formatted as LATM/LOAS

When the AAC family elementary stream data is formatted according to the LATM multiplex format and subsequently encapsulated in the LOAS transmission format per ISO/IEC 14496-3 [3] the following constraints shall apply:

The **AudioSyncStream()** version shall be used.

Note: **AudioSyncStream()** adds a sync word to the audio stream to allow for synchronization.

The **AudioMuxElement()** multiplex element format shall be used.

The semantics of the **AudioMuxElement()** and **AudioSyncStream()** formatting are described in subclause 1.7 of ISO/IEC 14496-3 [3].

The following constraints to the LATM multiplex shall apply:

- **audioMuxVersion** shall be '0';
- **allStreamsSameTimeFraming** shall be '1', as all payloads belong to the same AU;
- **numSubFrames** shall be '0', as there is only one **PayloadMux()** (AU) per LATM **AudioMuxElement()**;
- **numProgram** shall be '0', as there is only one audio program per LATM multiplex;
- **numLayer** shall be '0', as no scalable profile is used;
- the field **latmBufferFullness** shall be set to 0xFF, indicating that the stream is variable rate and that buffer fullness measures are not used;
- the value for **frameLengthFlag** contained in the **GASpecificConfig** shall be set to '0', indicating that the transform length of the IMDCT for AAC is 1024 samples for long and 128 for short blocks.

6.2.1 PES Constraints

The PES packet header shall have a Presentation Time Stamp (PTS) associated with the first AU commencing in the PES packet. This PES packet header should have **data_alignment_indicator** set to '1', which requires that the first byte following the PES header is a sync word (per ISO/IEC 13818-1 [2], subclause 2.4.3.7).

6.3 AAC Elementary Stream Formatted as ADTS

When an AAC family elementary stream is formatted according to the ADTS multiplex format per ISO/IEC 14496-3 [3] the following constraints shall apply:

- the semantics of ISO/IEC 14496-3 [3], section 1.A.4.3 shall be followed,
- the **ID** field should be set to '1'