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STANDARDS

**Digital Video Subcommittee**

**AMERICAN NATIONAL STANDARD**

# ANSI/SCTE 243-2 2017

# Next Generation Audio Carriage Constraints For Cable Systems: Part 2 – AC-4 Audio Carriage Constraints

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# 1. Introduction

## 1.1. Scope

This document is part of a three-part standard that specifies carriage constraints of Next Generation Audio (NGA) codecs in MPEG-2 transport systems and in MPEG DASH. In conjunction with SCTE 243-1 2017 [2], this document defines the carriage of AC-4 audio in MPEG-2 transport systems and MPEG DASH.

# 2. Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this document. At the time of Subcommittee approval, the editions indicated were valid. All documents are subject to revision; and while parties to any agreement based on this document 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 might not be compatible with the referenced version.

## 2.1. SCTE References

[1] SCTE 242-2 2017, Next Generation Audio Coding Constraints for Cable Systems: Part 2 – AC-4 Audio Coding Constraints

[2] SCTE 243-1 2017, "Next Generation Audio Carriage Constraints for Cable Systems: Part 1 – Common Transport Signaling"

## 2.2. Standards from Other Organizations

[3] ATSC S34-188r7, ATSC Candidate Standard: A/342 Part 2, AC-4 System

[4] ETSI TS 101 154 V2.2.1 (2015-06), Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG 2 Transport Stream

[5] ETSI TS 103 190-1 V1.2.1 (2015-06), Digital Audio Compression (AC-4) Standard; Part 1: Channel based coding

[6] ETSI TS 103 190-2 V1.1.1 (2015-08-30), Digital Audio Compression (AC-4) Standard; Part 2: Immersive and personalized audio

[7] DVB BlueBook A038 (2016-10), Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems

[8] ISO/IEC 14496-12:2015, Information technology -- Coding of audio-visual objects -- Part 12: ISO base media file format

# 3. Informative References

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

## 3.1. SCTE References

[9] ANSI/SCTE 54 2015, Digital Video Service Multiplex and Transport Subsystem Standard for Cable Television

# 4. Compliance Notation

| | |
|---|---|
| ***shall*** | This word or the adjective "***required***" means that the item is an absolute requirement of this document. |
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# 5. Abbreviations and Definitions

## 5.1. Abbreviations

| | |
|---|---|
| AP | access point |
| DASH | MPEG Dynamic Adaptive Streaming over HTTP (ISO/IEC 23009-1) |
| ES | elementary stream |
| PES | packetized elementary stream |
| SCTE | Society of Cable Telecommunications Engineers |
| TS | transport stream |

# 6. AC-4 Compressed Audio Transport

This section describes the carriage of AC-4 audio elementary streams, as defined in SCTE 242-2 2017 [1], in MPEG-2 transport systems and MPEG DASH.

## 6.1. Carriage in MPEG-2 Transport Streams

This section outlines the constraints and signaling for AC-4 compressed audio carried in an MPEG-2 Transport Streams.

### *6.1.1. Audio Elementary Stream Format*

When AC-4 is multiplexed into an MPEG-2 Transport Stream, the AC-4 audio elementary stream shall be formatted using the AC-4 sync frame format as specified in ETSI TS 103 190-2 [6], Annex C.

#### 6.1.2. PES Packaging

Placement of raw AC-4 frames of an AC-4 Elementary Stream (ES) into Packetized Elementary Stream (PES) and thence into Transport Stream (TS) packets shall be done in accordance with ETSI TS 101 154 [4], Section 6.6.2.

#### 6.1.3. Audio/Video Synchronization

AC-4 can encode audio at the same frame rate as the accompanying video to facilitate keeping audio and video in sync throughout the distribution chain. When this feature is enabled, the AC-4 audio elementary stream shall comply with the constraints defined in ETSI TS 101 154 [4], Section 6.6.6.

### 6.2. ISOBMFF Packaging for Carriage in MPEG DASH

This section describes the packaging rules for AC-4 compressed audio carried in the ISO Base Media File Format (ISOBMFF) for transport in MPEG DASH.

#### 6.2.1. Packaging of AC-4 Bitstreams into ISOBMFF Segments

Each raw AC-4 frame shall be packaged as an ISO Base Media File Format sample. For more information, refer to ETSI TS 103 190-2 [6], Annex E.3. AC-4 sync frames as described in ETSI TS 103 190-2 [6], Annex C, shall not be packetized directly into ISO Base Media File Format.

#### 6.2.2. Additional Constraints on AC-4 Elementary Streams

ETSI TS 103 190-2 [6], Annex E, describes the constraints that shall be applied to the AC-4 bitstream for storage within the ISO base media file format. For the use of DASH with the ISO base media file format, the additional constraints listed in ATSC A/342 Part 2 [3], Section 5.6.2 shall apply when packaging AC-4 audio into DASH Representations.

#### 6.2.3. Random Access Point and Stream Access Point

To facilitate random access and seamless switches, the constraints defined in ATSC A/342 Part 2 [3], Section 5.6.4 shall apply.

#### 6.2.4. Packaging of Individual Audio Elements

In scenarios where AC-4 DASH Representations from different Adaptation Sets form an AC-4 presentation, the constraints listed in ATSC A/342 Part 2 [3], Section 5.6.5 shall apply.

## 7. Service Information Signaling

### 7.1. Signaling of an AC-4 Bitstream in MPEG-2 Transport Streams

#### 7.1.1. AC-4_descriptor

The **AC-4_descriptor** syntax provides information about individual AC-4 elementary streams within a Transport Stream that are to be identified in the PSI PMT sections. The **AC-4_descriptor** is defined in DVB BlueBook A038 [7], and located in the PMT of the SI Tables that are also defined in DVB BlueBook A038 [7].

The **AC-4_descriptor** shall be included in a program map section at most once in each relevant ES_info descriptor loop which describes an elementary stream carrying an AC-4 audio stream, coded in accordance with ETSI TS 103 190-1 [5] or ETSI TS 103 190-2 [6], that is included in a Transport Stream.

### *7.1.2. audio_preselection_descriptor*

The **audio_preselection_descriptor**, specified in DVB BlueBook A038 [7], provides information about the available Audio Preselections for one Audio Program contained in one or more AC-4 Audio associated elementary streams within a Transport Stream that are to be identified in the PSI PMT sections.

The contents of the **audio_preselection_descriptor** and the information carried in the AC-4 Audio elementary stream should match as shown in DVB BlueBook A038 [7], table M.1.

## 7.2. Signaling of an AC-4 Bitstream in ISOBMFF

The basic structures defined within ISO/IEC 14496-12 [8] to identify audio tracks shall be used with specific extensions to provide detailed information on the characteristics of an AC-4 stream.

The AC4SampleEntry Box shall be included in the Sample Description Box according to ETSI TS 103 190-2 [6] Annex E. The box type of the AC4SampleEntry Box shall be 'ac-4'.