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S T A N D A R D S

Digital Video Subcommittee

AMERICAN NATIONAL STANDARD

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**Content Encoding Profiles 3.0 Specification
(Closed Specification)**

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1. Introduction

1.1. Executive Summary

This document originated as a Cablelabs specification (10/26/16) and then transferred over to SCTE to be retained as a closed SCTE specification. Only version 3.0 of the Cablelabs Content Encoding Profiles document is retained for these purposes.

This specification defines the video, audio, and related encoding parameters for both Standard and High-Definition content for distribution to cable television systems. Encoding parameters defined by this specification can be applied to different content types, including broadcast programming, which may be switched digital video (SDV), VOD content, and advertising content to be inserted into broadcast or VOD content. Broadcast programming is encoded in streams with no finite length and is not formatted as files. Individual VOD programs or ads of finite length are encoded and formatted as files or byte streams for storage on video servers or other headend equipment.

The encoding parameters described in this document are not constraints on the streams delivered by cable systems to a home or business. The streams delivered to a home or business are generally more complex: they may not be finite in length, they are often multiplexes of multiple feeds, and they may include dynamic transitions from program to program.

1.2. Scope

This document defines the content specifications for use with encoding systems, asset management, and distribution. It does not define a distribution method nor define all aspects of the cable system infrastructure that content may encounter during distribution and playback.

Organization of Document

This document contains three major sections. Section 6 covers general encoding, Section 7 gives additional constraints specific to standard definition encoding, Section 8 covers high definition encoding, and Section 9 covers advanced video encoding.

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

- [SCTE 128] ANSI/SCTE 128 2013, AVC Video Systems and Transport Constraints for Cable Television.
- [SCTE 172] ANSI/SCTE 172 2017, Constraints on AVC Video Coding for Digital Program Insertion.
- [SCTE 20] ANSI/SCTE 20 2017, Methods for Carriage of Closed Captions and Non-Real Time Sampled Video.
- [SCTE 27] ANSI/SCTE 27 2016, Subtitling Methods for Broadcast Cable.

- [SCTE 35] ANSI/SCTE 35 2017, Digital Program Insertion Cueing Message for Cable.
- [SCTE 43] ANSI/SCTE 43 2015, Digital Video Systems Characteristics Standard for Cable Television.
- [SCTE 54] ANSI/SCTE 54 2015, Digital Video Service Multiplex and Transport System Standard for Cable Television.
- [SCTE 187-1] SCTE 187-1 2019, Stereoscopic 3D Formatting and Coding for Cable.
- [SCTE 187-2] SCTE 187-2 2019, Stereoscopic 3D PSI Signaling.

2.2. Standards from Other Organizations

- [ATSC A/52B] ATSC A/52B: Digital Audio Compression (AC-3, E-AC-3), Revision B, 2005.
- [ATSC A/53, Part 3] ATSC A/53, Part 3: Service Multiplex and Transport Subsystem Characteristics, 2009.
- [ATSC A/53, Part 4] ATSC A/53, Part 4: MPEG-2 Video System Characteristics, 2009.
- [ATSC A/53, Part 5] ATSC A/53, Part 5: AC-3 Audio System Characteristics, 2007.
- [CEA 608-E] EIA/CEA-608-E: Line 21 Data Services, 2008.
- [CEA 708-D] EIA/CEA-708-D: Digital Television (DTV) Closed Captioning, 2008.
- [CONTENTv3.0] MD-SP-CONTENTv3.0-C01-151104, CableLabs Content 3.0 Specification, November 4, 2015, Cable Television Laboratories, Inc.
- [ETV-AM1.0] OC-SP-ETV-AM1.0.1-120614, Enhanced TV Application Messaging Protocol 1.0, June 14, 2012, Cable Television Laboratories, Inc.
- [ETV-BIF1.0] OC-SP-ETV-BIF1.0.1-120614, Enhanced TV Binary Interchange Format 1.0, June 14, 2012, Cable Television Laboratories, Inc.
- [IEC 11172-3] ISO/IEC 11172-3:1998 (E), International Standard, Information Technology - Coding of Moving Pictures and Associated Audio for Digital Storage Media at up to about 1.5 Mbits/s – Part 3: Audio.
- [IEC 13818-1] ISO/IEC 13818-1:2007, International Standard, Information Technology - Generic Coding of Moving Pictures and Associated Audio Information: Systems.
- [IEC 13818-2] ISO/IEC 13818-2:2000 (E), International Standard, Information Technology - Generic Coding of Moving Pictures and Associated Audio Information: Video.
- [IEC 13818-3] ISO/IEC 13818-3:1998 (E), International Standard, Information Technology - Generic Coding of Moving Pictures and Associated Audio Information: Audio.
- [IEC 13818-4] ISO/IEC 13818-4:1998/Cor-2:1998, International Standard, Information Technology - Generic Coding of Moving Pictures and Associated Audio Information: Conformance Testing, Technical Corrigendum 2
- [IEC 13818-7] ISO/IEC 13818-7:2006, Information technology -- Generic coding of moving pictures and associated audio information -- Part 7: Advanced Audio Coding (AAC)
- [IEC 14496-3] ISO/IEC 14496-3, 2005: Information technology - Coding of audio-visual objects – Part 3 Audio including amendment 1: "Bandwidth Extension" and amendment 2 "Parametric coding for High Quality Audio".
- [IEC 14496-10] ISO/IEC 14496-10, 2010: Information technology -- Coding of audio-visual objects -- Part 10: Advanced Video Coding.
- [IEC 61672-1] IEC 61672-1, Electroacoustics – Sound level meters – Part 1: Specifications.
- [ISO 639-2] ISO 639-2:1998, Codes for the Representation of Names of Languages - Part 2: Alpha-3 Code.
- [ITU H.264] ITU-T Recommendation H.264 (03/2010), Advanced video coding for generic audio visual services.
- [ITU-R BS.1770] ITU-R BS.1770 (07/2006), Algorithms to measure audio programme loudness and true peak audio level.

- [OCAP] OC-SP-OCAP1.3.1-130530, OpenCable Application Platform Specification, May 30, 2013, Cable Television Laboratories, Inc.

2.3. Published Materials

- No normative references are applicable.

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

- [SCTE 30] ANSI/SCTE 30 2017, Digital Program Insertion Splicing API.
- [SCTE 104] ANSI/SCTE 104 2017, Automation System to Compression System Communications Applications Program Interface (API).
- [SCTE 187-3] SCTE 187-3 2012, Informative Guidance for Stereoscopic Video.

3.2. Standards from Other Organizations

- [VOD 1.1] MD-SP-VOD-CONTENT1.1-C01-120803, CableLabs Video-On-Demand Content 1.1 Specification, August 3, 2012, Cable Television Laboratories, Inc.
- [CEA-CEB10-A] CEA-CEB10-A: EIA-708-B Implementation Guidance, 2002
- [FCC 47 CFR 79.1] FCC Rules 47 CFR 79.1: Closed Captioning of Video Programming
- [FCC 00-259] FCC 00-259: Closed Captioning Requirements for Digital Television Receivers

3.3. Published Materials

- No informative references are applicable.

4. Compliance Notation

<i>shall or must</i>	This word or the adjective “ required ” means that the item is an absolute requirement of this document.
<i>shall not or must not</i>	This phrase means that the item is an absolute prohibition of this document.
<i>forbidden</i>	This word means the value specified shall never be used.
<i>should</i>	This word or the adjective “ <i>recommended</i> ” 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.
<i>should not</i>	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.
<i>may</i>	This word or the adjective “ <i>optional</i> ” 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.
<i>deprecated</i>	Use is permissible for legacy purposes only. Deprecated features may be removed from future versions of this document. Implementations should avoid use of deprecated features.

5. Abbreviations and Definitions

5.1. Abbreviations

ANSI	American National Standards Institute
ATSC	Advanced Television System Committee
AVC	advanced video coding
CBR	constant bit rate
CEA	Consumer Electronics Association
DPB	decoded picture buffer
DTS	decoding time stamp
DTV	digital television
DVB	Digital Video Broadcasting Group
DVS	Digital Video Specification
EIA	Electronic Industries Alliance
fps	frames per second
GOP	group of pictures
HD	high definition
IDR	instantaneous decoder refresh
IEC	International Electrotechnical Commission
IRE	Institute of Radio Engineers
ISO	International Organization for Standardization
ITU	International Telecommunication Union

JVT	joint video team
Mbps	megabits per second
MPEG	moving picture experts group
NPT	normal play time
NTSC	National Television System Committee
PAT	program association table
PCR	program clock reference
PID	packet identifier
PES	packetized elementary stream
PMT	program map table
PSI	program-specific information
PTS	presentation time stamp
QAM	quadrature amplitude modulation
S3D	stereoscopic, three-dimensional
SAR	sample aspect ratio
SbS	side-by-side
SCTE	Society of Cable Telecommunication Engineers
SD	standard definition
SEI	supplemental enhancement information
SPS	sequence parameter set
SPTS	single program transport stream
T-STD	transport stream system target decoder
TaB	top-and-bottom
UI	user interface
VBR	variable bit rate
VOD	video on demand
VUI	video usability information

5.2. Definitions

The syntax and semantics of this specification conform to [IEC 13818-1].

The following terms warrant a definition as used in the context of this specification:

access unit	In the case of audio, an access unit is the coded representation of an audio frame. In the case of MPEG-2 video, an access unit includes all the coded data for a picture and any stuffing that follows it. If the picture is preceded by a Sequence Header, the access unit begins with the first byte of the sequence_header_code. If the picture is preceded by a group of pictures Header and no Sequence Header, the access unit begins with the first byte of the group_start_code. If the picture is not preceded by a Sequence Header or group of pictures, the access unit begins with the first byte of the picture_start_code. In the case of AVC video, an access unit is as defined in [IEC 13818-1]section 2.14.1.
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