

SCTE • ISBE[®]

S T A N D A R D S

Digital Video Subcommittee

AMERICAN NATIONAL STANDARD

ANSI/SCTE 35 2019r1

Digital Program Insertion Cueing Message for Cable

ANSI/SCTE 35 2019r1

NOTICE

The Society of Cable Telecommunications Engineers (SCTE) / International Society of Broadband Experts (ISBE) Standards and Operational Practices (hereafter called “documents”) are intended to serve the public interest by providing specifications, test methods and procedures that promote uniformity of product, interchangeability, best practices and ultimately the long-term reliability of broadband communications facilities. These documents shall not in any way preclude any member or non-member of SCTE•ISBE from manufacturing or selling products not conforming to such documents, nor shall the existence of such standards preclude their voluntary use by those other than SCTE•ISBE members.

SCTE•ISBE assumes no obligations or liability whatsoever to any party who may adopt the documents. Such adopting party assumes all risks associated with adoption of these documents, and accepts full responsibility for any damage and/or claims arising from the adoption of such documents.

Attention is called to the possibility that implementation of this document may require the use of subject matter covered by patent rights. By publication of this document, no position is taken with respect to the existence or validity of any patent rights in connection therewith. SCTE•ISBE shall not be responsible for identifying patents for which a license may be required or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention.

Patent holders who believe that they hold patents which are essential to the implementation of this document have been requested to provide information about those patents and any related licensing terms and conditions. Any such declarations made before or after publication of this document are available on the SCTE•ISBE web site at <http://www.scte.org>.

All Rights Reserved

© Society of Cable Telecommunications Engineers, Inc. 2019
140 Philips Road
Exton, PA 19341

Table of Contents

Title	Page Number
Table of Contents	3
1. Introduction	8
1.1. Executive Summary	8
1.2. Scope	8
1.3. Benefits	8
1.4. Intended Audience	9
1.5. Areas for Further Investigation or to be Added in Future Versions	9
2. Normative References	9
2.1. SCTE References	9
2.2. Standards from Other Organizations	9
2.3. Published Materials	10
3. Informative References	10
3.1. SCTE References	10
3.2. Standards from Other Organizations	11
3.3. Published Materials	11
4. Compliance Notation	12
5. Abbreviations and Definitions	12
5.1. Abbreviations	12
5.2. Definitions	13
6. Introduction	15
6.1. Splice points (Informative)	15
6.2. Program splice points (Informative)	16
6.3. Splice events (Informative)	16
6.4. Content storage considerations (Informative)	17
6.5. PID selection	17
6.5.1. PID selection (Normative)	17
6.5.2. PID selection (Informative)	17
6.6. Message flow (Informative)	18
6.7. Usage Examples (Informative)	19
6.7.1. SCTE 35 Ad Break Example	19
6.7.1. SCTE 35 Program Example	20
6.7.1. SCTE 35 Complex example	22
7. Notational Conventions	23
7.1. Normative XML schema	23
7.2. Unknown/Unrecognized/Unsupported XML elements and attributes	23
7.3. Element order	23
7.4. Binary representation in XML	24
8. PMT Descriptors	24
8.1. Registration descriptor	24
8.1.1. Semantic definition of fields in Registration Descriptor	25
8.2. Cue Identifier Descriptor	25
8.2.1. Semantic definition of fields in Cue Identifier Descriptor	25
8.2.2. Description of cue_stream_type usage	26
8.3. Stream Identifier Descriptor	26
8.3.1. Semantic definition of fields in Stream Identifier Descriptor	27
9. Splice information table	27
9.1. Overview	27
9.2. Legacy Command Descriptions	28
9.3. Time Signal Command	28
9.4. Command Changes	28
9.5. Time base discontinuities	29
9.6. Splice info section	29

ANSI/SCTE 35 2019r1

9.6.1.	Semantic definition of fields in splice_info_section()_____	31
9.7.	Splice commands _____	35
9.7.1.	splice_null()_____	35
9.7.2.	splice_schedule() _____	35
9.7.2.1.	Semantic definition of fields in splice_schedule() _____	37
9.7.3.	splice_insert() _____	39
9.7.3.1.	Semantic definition of fields in splice_insert() _____	41
9.7.4.	time_signal() _____	43
9.7.4.1.	Semantic definition of time_signal() _____	44
9.7.5.	bandwidth_reservation() _____	44
9.7.6.	private_command() _____	45
9.8.	Time _____	46
9.8.1.	splice_time() _____	46
9.8.1.1.	Semantic definition of fields in splice_time() _____	46
9.8.2.	break_duration() _____	47
9.8.2.1.	Semantic definition of fields in break_duration() _____	47
9.9.	Constraints _____	48
9.9.1.	Constraints on splice_info_section() _____	48
9.9.2.	Constraints on the interpretation of time _____	48
9.9.2.1.	Constraints on splice_time() for splice_insert() _____	48
9.9.2.2.	Constraints on break_duration() for splice_insert() _____	49
10.	Splice Descriptors _____	50
10.1.	Overview _____	50
10.2.	Splice descriptor _____	50
10.2.1.	Semantic definition of fields in splice_descriptor() _____	51
10.3.	Specific splice descriptors _____	52
10.3.1.	avail_descriptor() _____	52
10.3.1.1.	Semantic definition of fields in avail_descriptor() _____	52
10.3.2.	DTMF_descriptor() _____	53
10.3.2.1.	Semantic definition of fields in DTMF_descriptor() _____	54
10.3.3.	segmentation_descriptor() _____	54
10.3.3.1.	Segmentation descriptor details _____	57
10.3.3.2.	Cablelabs metadata identifier _____	64
10.3.3.3.	MPU() definition and semantics _____	65
10.3.3.4.	MID() definition and semantics _____	65
10.3.3.5.	Segmenting Content - Additional semantics _____	65
10.3.3.6.	Programs - Additional semantics _____	67
10.3.3.7.	Chapters - Additional semantics _____	68
10.3.3.8.	Break – Additional semantics _____	68
10.3.3.9.	Delivery Restrictions – Additional semantics _____	69
10.3.3.10.	Content Identifiers – Additional semantics _____	70
10.3.3.11.	Placement Opportunities – Additional semantics _____	70
10.3.4.	time_descriptor() _____	74
10.3.4.1.	Informative description of TAI _____	74
10.3.4.2.	Semantic definition of fields in time_descriptor() _____	75

ANSI/SCTE 35 2019r1

10.3.4.1.	Synchronized Client Clock _____	76
10.3.4.2.	Synchronized Clock carriage in HLS Timed Metadata (ID3 tags)_____	77
10.3.5.	audio_descriptor()_____	77
10.3.5.1.	Semantic definition of fields in audio_descriptor()_____	79
11.	Encryption _____	80
11.1.	Overview _____	80
11.2.	Fixed key encryption _____	81
11.3.	Encryption algorithms _____	81
11.3.1.	DES – ECB mode _____	81
11.3.2.	DES – CBC mode _____	81
11.3.3.	Triple DES EDE3 – ECB mode _____	82
11.3.4.	User private algorithms _____	82
12.	SCTE 35 Usage _____	82
12.1.	SCTE 35 Usage in DASH _____	82
12.2.	SCTE 35 Usage in HLS _____	82
12.2.1.	SCTE 35 markup in HLS using EXT-X-DATERANGE _____	82
12.2.2.	SCTE 35 markup in HLS using EXT-X-SCTE35 _____	83
12.2.3.	HLS cue tags _____	83
12.2.4.	HLS playlist example _____	85
13.	SCTE 35 XML elements and types _____	86
13.1.	Ext element _____	86
13.2.	PTSType _____	87
13.3.	Segmentation Upid Element _____	87
14.	Sample SCTE 35 Messages (Informative) _____	87
14.1.	Time_Signal – Placement Opportunity Start _____	88
14.2.	Splice_Insert _____	88
14.3.	Time_Signal – Placement Opportunity End _____	89
14.4.	Time_Signal – Program Start/End _____	90
14.5.	Time_Signal – Program Overlap Start _____	90
14.6.	Time_Signal – Program Blackout Override / Program End _____	91
14.7.	Time_Signal – Program End _____	92
14.8.	Time_Signal – Program Start/End - Placement Opportunity End _____	92

List of Figures

Title	Page Number
Figure 1 - SCTE 35 Ad Break Example	19
Figure 2 - SCTE 35 Program Example	20
Figure 3 - SCTE 35 Program Example	22
Figure 4 - SignalGroup	24
Figure 5 - SpliceInfoSection	31
Figure 6 - SpliceNull	35
Figure 7 - SpliceSchedule	37
Figure 8 - SpliceInsert	41
Figure 9 - TimeSignal	44
Figure 10 – BandwidthReservation	44
Figure 11 - PrivateCommand	45

ANSI/SCTE 35 2019r1

Figure 12 - SpliceTime	46
Figure 13 - BreakDuration	47
Figure 14 - SpliceDescriptorType	51
Figure 15 - AvailDescriptor	52
Figure 16 - DTMFDescriptor	53
Figure 17 - SegmentationDescriptorType	56
Figure 18 - TimeDescriptor	75
Figure 19 – Time Relationships	76
Figure 20 – AudioDescriptor	79
Figure 21 - Ext Element	86
Figure 22 - SegmentationUpid	87

List of Tables

Title	Page Number
Table 1 - registration_descriptor()	25
Table 2 - cue_identifier_descriptor()	25
Table 3 - cue_stream_type values	26
Table 4 - stream_identifier_descriptor()	27
Table 5 - splice_info_section()	29
Table 6 - splice_command_type values	34
Table 7 - splice_null()	35
Table 8 - splice_schedule()	36
Table 9 - splice_insert()	40
Table 10 - time_signal()	43
Table 11 - bandwidth_reservation()	44
Table 12 - private_command()	45
Table 13 - splice_time()	46
Table 14 - break_duration()	47
Table 15 - Splice Descriptor Tags	50
Table 16 - splice_descriptor()	51
Table 17 - avail_descriptor()	52
Table 18 - DTMF_descriptor()	53
Table 19 - segmentation_descriptor()	55
Table 20 - device_restrictions	58
Table 21 - segmentation_upid_type	60
Table 22 - segmentation_type_id	62

ANSI/SCTE 35 2019r1

Table 23 – MPU()	65
Table 24 – MID()	65
Table 25 - time_descriptor()	74
Table 26 - audio_descriptor()	78
Table 27 - Encryption algorithm	81
Table 28 - Tag #EXT-X-SCTE35	83
Table 29 - Tag attributes	83

ANSI/SCTE 35 2019r1

1. Introduction

1.1. Executive Summary

This standard, “Digital Program Insertion Cueing Message for Cable” (SCTE 35), is the core signaling standard for advertising and distribution control (e.g., blackouts) of content for content providers and content distributors. SCTE 35 is being applied to QAM/IP, Title VI/TVE (TV Everywhere), and live/time shifted (DVR, VOD, etc.) delivery. SCTE 35 signals can be used to identify advertising breaks, advertising content, and programming content (e.g., specific Programs and Chapters within a Program).

SCTE 35 complements other Standards to complete the eco-systems. [SCTE 30] is used to support splicing of advertising into live QAM MPEG-2 transport streams. [SCTE 130-3] is used to support alternate content decisions (advertising, blackouts, stream switching) for live and time shifted delivery. [SCTE 214-1] defines how SCTE 35 is carried in MPEG-DASH. [SCTE 224] (ESNI) is used to pass event and policy information from provider or other systems to communicate distribution control instructions.

The recommended practices for SCTE 35 are contained in [SCTE 67] “Recommended Practice for Digital Program Insertion for Cable”.

1.2. Scope

This standard supports delivery of events, frame accurate or non-frame accurate, and associated descriptive data in MPEG-2 transport streams, MPEG-DASH and HLS. This standard supports the splicing of content (MPEG-2 transport streams, MPEG-DASH, etc.) for the purpose of Digital Program Insertion, which includes advertisement insertion and insertion of other content types. This standard defines an in-stream messaging mechanism to signal splicing and insertion opportunities. As such, this standard does not specify the insertion method used or constraints applied to the content being inserted, nor does it address constraints placed on insertion devices.

Fully compliant MPEG-2 transport stream (either Multi Program Transport Stream or Single Program Transport Stream), MPEG-DASH content, etc. is assumed. No further constraints beyond the inclusion of the defined cueing messages are placed upon the stream.

This standard specifies a technique for carrying notification of upcoming points and other timing information in the transport stream. A splice information table is defined for notifying downstream devices of splice events, such as a network break or return from a network break. For MPEG-2 transport streams, the splice information table, which pertains to a given program, is carried in one or more MPEG Sections carried in PID(s) referred to by that program’s Program Map Table (PMT). In this way, splice event notification can pass through most transport stream remultiplexers without need for special processing. For MPEG-DASH, the splice information table is carried in the DASH MPD (See [SCTE 214-1]) or in media segments (see [SCTE 214-2] and [SCTE 214-3]). Section 12.2 details how SCTE 35 messages are carried in HLS manifests.

1.3. Benefits

SCTE 35 is a key part of the eco-system to enable advertising and content distribution business. A common/well-formed signaling model enables downstream systems to be implemented in a cost effective, consistent and non-ambiguous fashion to achieve business objectives.