

SCTE • ISBE[®]

S T A N D A R D S

Digital Video Subcommittee

AMERICAN NATIONAL STANDARD

ANSI/SCTE 67 2017

**Recommended Practice for
Digital Program Insertion for Cable**

ANSI/SCTE 67 2017

NOTICE

The Society of Cable Telecommunications Engineers (SCTE) 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 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 members.

SCTE 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. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, then details may be obtained from the standards developer. SCTE 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 web site at <http://www.scte.org>.

All Rights Reserved

© Society of Cable Telecommunications Engineers, Inc. 2017
140 Philips Road
Exton, PA 19341

Table of Contents

Title	Page Number
Table of Contents	2
1. Introduction	6
1.1. Executive Summary	6
1.2. Scope	6
1.3. Benefits	6
1.3.1. Improvements in Ad Timing Synchronization	6
2. Informative References	6
2.1. SCTE References	6
2.2. Standards from Other Organizations	7
2.3. Published Materials	7
3. Compliance Notation	8
4. Abbreviations and Definitions	8
4.1. Abbreviations	8
4.2. Definitions	9
5. Overview	10
5.1. Example SCTE 35 Decoder	12
6. Application Guidelines	12
6.1. Practical Boundaries for splice_time() in splice_insert()	12
6.2. System Delays	13
6.2.1. SCTE 104 Insertion Delays	13
6.2.2. Encoder Delays	13
6.2.3. Transmission Delays	13
6.2.4. Splicer/Multiplexor Delays	13
6.3. Splice Time Accuracy	13
6.3.1. Splicer Timing	15
6.4. Splice_event_id Usage and Uniqueness	15
6.5. Use of splice_schedule() Command	17
6.6. Component Splice Mode	17
6.6.1. Erroneous Component Splice Commands	18
6.7. Pre-Roll Functionality - Accomplishing a Pre-Roll Function	18
6.8. Conditional Access and Cue Encryption	19
6.8.1. What to Encrypt	19
6.8.2. Operation in a Cue Insertion Device	19
6.8.3. Operation in an Ad Insertion Device	19
6.8.4. Theory of Operation	20
7. Usage of fields in the Splice_Insert command	24
7.1. Usage of unique_program_id	24
7.1.1. What is a "Program"?	25
7.1.2. What is a "program_id"?	25
7.1.3. Why Should Programs Be Identified and Differentiated?	25
7.1.4. Why Does the Time at Which a Program Is Scheduled Not Identify It?	25
7.1.5. How Will a unique_program_id Alleviate Problems?	25
7.2. Avail Fields Usage	26
7.2.1. What is an Avail?	26
7.2.2. How Many Avails Occur Within a Program?	26
7.2.3. Why is it important to identify the Avails Within a Program?	26
7.2.4. How Do the Avail Fields Provide for This?	27
7.2.5. What Does the avails_expected Field Do?	27
7.2.6. Conditional Avails	27
8. Cue Usage	29
8.1. Starting a Break	29
8.2. Ending a Break	29

ANSI/SCTE 67 2017

8.3.	Spot Sharing Within a Break	30
9.	Creation and Usage of Splice Descriptors	30
9.1.	What are Descriptors	30
9.1.1.	The Problem	31
9.1.2.	The Solution	31
9.2.	Registration	31
9.3.	Creating Compatible Private Descriptors	31
9.4.	Using the avail_descriptor.	32
9.5.	Using the DTMF Descriptor	33
9.5.1.	Pre-roll Timing	33
9.5.2.	DTMF Tone Sequence	34
9.5.3.	SCTE 35 Operating Modes	34
9.6.	Usage of Segmentation Descriptors	34
9.6.1.	Segmentation Descriptor Field Usage	34
9.6.2.	Delivery of Segmentation Descriptors	36
9.6.3.	Processing of Segmentation Descriptors	36
9.6.4.	Specific Use Cases	37
9.6.5.	Identifying Placement Opportunities	38
9.6.6.	Identifying Standalone Advertisements	39
10.	Presentation Time Stamp considerations	42
10.1.	Handling Time Base Discontinuities	42
10.2.	Cascaded Splicing Devices	43
10.2.1.	Restamping Cue Messages	43
10.2.2.	Cue Propagation	44
10.2.3.	Delay	44
10.2.4.	Logical Cascading	44
11.	Command Usage	44
11.1.	Bandwidth Reservation Command	44
11.1.1.	Why Use a Bandwidth Reservation Command?	44
11.2.	Heartbeat Messages	45
11.2.1.	Why Use a Heartbeat Message	45
11.3.	Time Signal Command	45
11.3.1.	Uses for the Time Signal Command	45
11.3.2.	Practical Boundaries for splice_time() in time_signal()	45
12.	Implementing SCTE 35 for Signaling in Linear Content	46
12.1.	System Architecture - Provider	46
12.1.1.	Rights	47
12.1.2.	Programming	47
12.1.3.	Sports	47
12.1.4.	Ads	47
12.1.5.	Scheduling	47
12.1.6.	Automation	48
12.1.7.	Master Control	48
12.1.8.	Live/Servers	48
12.1.9.	SCTE 104	48
12.1.10.	Slate/Alternate Switch/Generator	48
12.1.11.	Encoder	48
12.1.12.	Packager	48
12.1.13.	Origin	49
12.1.14.	CDN	49
12.1.15.	Distributor	49
12.1.16.	Metadata Generation	49
12.1.17.	App Server	49
12.1.18.	Clients	49
12.2.	System Architecture - Distributor	49
12.2.1.	Broadcast/Mezzanine	50

ANSI/SCTE 67 2017

12.2.2.	QAM/Satellite _____	50
12.2.3.	VOD/nPVR _____	50
12.2.4.	Transcoder _____	50
12.2.5.	Packager _____	51
12.2.6.	Origin _____	51
12.2.7.	Metadata Reader _____	51
12.2.8.	Player/App Server _____	51
12.2.9.	MVPD Distribution _____	51
12.3.	Extensions to Content Identification for Real Time Signaling _____	51
12.3.1.	SCTE 35 Guidelines _____	51
12.3.2.	USAGE of SCTE 35 Restriction Bits _____	52
12.3.3.	Web Restriction Use Cases _____	52
12.3.4.	Regional Blackout Use Cases _____	56
12.3.5.	Alternate Content _____	57
12.3.6.	Alternate Content Removal _____	58
12.3.7.	Archive Use Cases _____	58
12.3.8.	Device Restriction Use Cases _____	58
13.	Recommendations on carrying SCTE 35 in other than MPEG2 Transport Streams _____	58
13.1.	General Comments on Transforming SCTE 35 _____	58
13.1.1.	Time Base Conversions _____	58
13.1.2.	Ad Signaling for RTMP _____	60
13.1.3.	AD Signaling for Microsoft Smooth Streaming _____	61
13.1.4.	AD Signaling for MPEG-DASH _____	61
13.1.5.	Ad Signaling for HLS _____	64
14.	Additional Information _____	67
14.1.	Considerations for Evaluation of MPEG-2 Splicing Devices _____	67
14.2.	Overview _____	67
14.2.1.	Splicer Technology _____	67
14.2.2.	Environment _____	68
14.2.3.	Splicer Performance _____	71
14.3.	Ad Timing Recommendations _____	74
14.3.1.	Provider Issues _____	74
14.3.2.	Distributor Monitoring _____	75
14.3.3.	Cue Timing Monitoring Points _____	76

List of Figures

Title	Page Number
Figure 1 - System Overview	11
Figure 2 - Cue Message Insertion Points	16
Figure 3 - DES ECB Example	22
Figure 4 - DES CBC Encryption Example	22
Figure 5 - DES CBC Decryption Example	22
Figure 6 - Triple-DES ECB Encryption Example	23
Figure 7 - Triple-DES ECB Decryption Example	24
Figure 8 - Cascading of Splicer / Server Devices	43
Figure 9 - System Architecture	46
Figure 10 - Example Distributor Architecture	50
Figure 11 - Cue Timing Monitoring Points	76

ANSI/SCTE 67 2017

Figure 12 - Example Cue Timing Monitoring

78

List of Tables

Title	Page Number
Table 1 - Avail incrementing/skipping Example	28
Table 2 - (of SCTE 35): splice_descriptor()	32

ANSI/SCTE 67 2017

1. Introduction

1.1. Executive Summary

This Recommended Practice is to serve as an informational enhancement to SCTE 35, Digital Program Insertion Cue Message for Cable. SCTE 35 is necessarily brief in many areas in order to maintain conciseness and accuracy. This document serves as a companion to SCTE 35.

1.2. Scope

This document is an informational companion to SCTE 35. It is not in itself a specification or a standard. The information within is intended as guideline information. Where this document contradicts SCTE 35, SCTE 35 takes precedence.

1.3. Benefits

The purpose of this document is to aid splicing equipment designers, ad insertion equipment designers as well as the purchasers and users of such equipment, such as the networks that will originate Cue Messages from their uplink sites. This document is also expected to aid in the system integration of advertising related equipment, both at the Message origination end and at the Message reception end.

SCTE 35 includes content segmentation messages, and this document has been updated to aid the users of these messages. Some of the new devices that will be interpreting the SCTE 35 commands include transcoders, packagers, network PVR and other content manipulation, storage and streaming delivery systems.

There may be crucial information within this document for manufacturers of equipment that pass the Cue Message as part of the MPEG-2 transport stream. An example of such equipment is a rate altering re-multiplexer, which performs complex processing of the stream. When the stream is demultiplexed and processed and then re-multiplexed, it is very important to place the Cue Message in the proper position relative to the video service and relative to nearby time-base discontinuities. Such equipment may also be required to alter the Message before retransmission

1.3.1. Improvements in Ad Timing Synchronization

This document makes recommendations on how to maintain proper time synchronization between servers and splicers. These recommendations include the time synchronization method used between servers and splicers; methods for configuring splicer controlled Ad Insertion Systems; and methods for monitoring the proper timing of Cue Messages.

2. Informative References

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

2.1. SCTE References

- [SCTE 35] ANSI/SCTE 35 2016 - Digital Program Insertion Cueing Message for Cable.
- [SCTE 30] ANSI/SCTE 30 2015 - Digital Program Insertion Splicing API.
- [SCTE 40] ANSI/SCTE 40 2016 - Digital Cable Network Interface Standard.