

SCTE | **STANDARDS**

Digital Video Subcommittee

SCTE STANDARD

SCTE 118-2 2019 (R2024)

**Program-Specific Ad Insertion - Content Provider to
Traffic Communication Applications Data Model**

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Note: Standards that are released multiple times in the same year use: a, b, c, etc. to indicate normative balloted updates and/or r1, r2, r3, etc. to indicate editorial changes to a released document after the year.

Note: This document is a reaffirmation of SCTE 118-2 2019. No substantive changes have been made to this document. Information components may have been updated such as the title page, NOTICE text, headers, and footers.

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1. Introduction

1.1. Executive Summary

Note: This document is a reaffirmation of SCTE 118-2 2019. No substantive changes have been made to this document. Information components may have been updated such as the title page, NOTICE text, headers, and footers.

This document describes the information that is required to communicate the Program and Avail structure from a content provider (Network) to an Affiliate's SCTE 35[1] compliant Traffic System.

Additionally, this document describes the information required to comply with the Tier 0, Tier 1 and Tier 2 Program-Specific Ad Insertion models as defined by SCTE 118-1[12].

1.2. Scope

Current Traffic Systems allow Affiliates to schedule the insertion of commercial advertising in either a Time-Based or Event-Based "window" format. Both Time-Based and Event-Based reservations are setup well in advance based on communication from the content provider as described in SCTE 118-1.

This document describes implementation requirements to achieve the functionality associated with Program-Specific Ad Insertion. Program-Specific Ad Insertion is the scheduling and insertion of a Spot into a digital broadcast Program based on the program identifier passed in the SCTE 35 Cue Message.

This document does not specify the source of the data that is required by the Traffic System. This data *may* be provided by the content provider or by a 3rd party (such as a network schedule aggregator, etc.). The data *may* be provided in its entirety, or a subset of the data *may* be provided and then manually supplemented.

1.3. Benefits

When implemented as described in SCTE 118-1 and with additional reference to SCTE 118-3[11], Program-Specific Ad Insertion will allow for an Avail to be associated with a specific Program, as communicated by the Network. By associating advertising to programming instead of simply to windows, the Affiliate *should* be able to earn more revenue by guaranteeing the context of the advertisement, and by adapting to occurrences surrounding live events, such as delayed starts, early ends, or overrun. These scenarios, especially when dealing with sports programming, can involve a great deal of high value advertising.

1.4. Intended Audience

The intended audience is content providers, multi-channel video program distributors, TV Everywhere providers/distributors and vendors/developers who build solutions.

1.5. Areas for Further Investigation or to be Added in Future Versions

See SCTE 118-1, Section 1.5 for implementation comment.

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 35 2017 – Digital Program Insertion Cueing Message for Cable

2.2. Standards from Other Organizations

- [2] SMPTE ST 2021-2:2017- Broadcast Exchange Format (BXF)
 [3] A/65: “Program and System Information Protocol for Terrestrial Broadcast and Cable (PSIP)”, Advanced Television Systems Committee, Washington, DC, 14. 2013
 [4] A/76B: “Programming Metadata Communication Protocol Standard, Revision B”, Advanced Television Systems Committee, Washington, DC, 14 January 2008
 SMPTE 2021-2-2017- Broadcast Exchange Format (BXF)
 [5] ISO 15706-2:2007 – Information and Documentation - International Standard
 Audiovisual Number (ISAN) – Part 2: Version Identifier
 [6] ISO 8601 2004 - Data elements and interchange formats -- Information interchange--
 Representation of dates and times Move to 2.2 or change to non-segmented – get
 updated template

2.3. Published Materials

- [7] W3C Recommendation, “Extensible Markup Language (XML) 1.0 (Fourth Edition)”,
 Tim Bray, et al, 16 August 2006
 [8] W3C Recommendation, “Namespaces In XML (Second Edition)”, Tim Bray, et al, 16
 August 2006
 [9] W3C Recommendation, “XML Schema Part 1: Structures (Second Edition)”, H.
 Thompson, et al, 28 October 2004
 [10] W3C Recommendation, “XML Schema Part 2: Datatypes (Second Edition)”, P. Biron,
 et al, 28 October 2004

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

- [11] SCTE 118-3 2019– Program-Specific Ad Insertion – Traffic System to Ad
 Insertion System File Format Specification.
 [12] SCTE 118-1 2019 – Program-Specific Ad Insertion - Data Field Definitions,
 Functional Overview and Application Guidelines.

[13] SCTE 67 2017 – Recommended Practice for Digital Program Insertion for Cable

3.2. Standards from Other Organizations

[14] SMPTE OV 2021-0:2017 – Broadcast Exchange Format — Roadmap for the 2021 Document Suite

[15] SMPTE ST 2021-1:2017 – Broadcast Exchange Format (BXF) — General Information and Informative Notes

3.3. Published Materials

- No informative references are applicable.

4. Compliance Notation

<i>shall</i>	This word or the adjective “ <i>required</i> ” means that the item is an absolute requirement of this document.
<i>shall 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

See SCTE 118 Part 1 [12] for Abbreviations used in this part.

5.2. Definitions

See SCTE 118 Part 1 [12] for Definitions used in this part.

6. Data Model Of Content Provider To The Affiliate Traffic System Communications

6.1. Tier 0 Requirements

Tier 0 insertion is non-Program-Specific Ad Insertion using SCTE 35[1] Cue Messages. To support Tier 0 insertion, the following data elements *shall* be provided in the schedule data.

Table 1 - Tier 0 Required Data Elements

Required Data	Notes / Examples
Scheduled Program Date & Time	Calendar Date and Time on which the Program begins.
Scheduled Program Duration	Expected duration in hours, minutes and seconds.
Program Name	Larry King Live, ESPN Sports Center, etc.

6.2. Tier 1 Requirements

Tier 1 insertion is Program-Specific Ad Insertion using SCTE 35 [1] Cue Messages, but does not require matching the avail_num or avails_expected fields of SCTE 35. To support Tier 1 insertion, in addition to the Tier 0 fields above, the following additional data element *shall* be provided in the schedule data.

Table 2 - Tier 1 Required Data Elements

Required Data	Notes
Unique Program Identifier (SCTE 35 [1] unique_program_id field)	The Unique Program Identifier of the Program that is scheduled to air.

6.3. Tier 2 Requirements

Tier 2 insertion is Program-Specific Ad Insertion using SCTE 35 [1] Cue Messages requiring matching the avail_num and avails_expected fields in SCTE 35 messages. To support Tier 2 insertion, in addition to the Tier 0 & Tier 1 fields above, the following data elements *shall* be provided in the schedule data.

Table 3 - Tier 2 Required Data Elements

Required Data	Notes
Avail Number (SCTE 35 [1] avail_num field)	The current Avail opportunity to which the Cue Message refers for a given unique program id.
Avails Expected (SCTE 35 avails_expected field)	Together with the Avail Number, this announces the anticipated Avails for a particular Program.

A Network *shall* communicate all data elements required for Tier 2 support in the Cue Messages that will exist in the data stream for the Program. Due to the Tiered Insertion behavior logic (see SCTE 118-1[12], section 6.3), if an Ad Insertion System recognizes a Cue Message containing Tier 1 or Tier 2 data elements, it will attempt to insert any open window, non-Program-Specific ad content. A Network *may* prevent insertions associated with Cue Messages not intended for a particular Affiliate through the use

of the AuthorizedName (see Section 6.4). If a Network is using Tier 1 behavior, there is no way to prevent or direct an Affiliate to ignore a particular Cue Message.

6.4. Optional Data Items

The following are additional items that *may* appear for each Program. Optional items *may* be used in implementations of any Tier.

Table 4 - Optional Data Elements

Optional Data	Notes
AuthorizedName	A unique identifier for a service level covering one or more MVPDs that all share the same contractual agreement for authorized Avails.
AuthorizationList	A list of AuthorizedName(s)
Avail Date & Time	Anticipated time (within the Program) for the Avail.
Avail Time Tolerances	Specifies potential variation of the anticipated Avail time in minutes minus and minutes plus.
Avail Duration	Expected Avail duration.
Program Type	Live, Scheduled, Repeat, etc.
Program Description	Textual information describing the Program
Episode Information	Textual description or programmer defined numbering scheme to differentiate among episodes of a Program series.
ISAN Identifier	ISAN is an acronym for International Standard Audio/Visual Number. This is a unique identifier of the content as defined by ISO 15706-2:2007 [5]
Program Genre	Textual description of the type of programming: i.e. Movie/Comedy, Talk Show/Political, etc.
Parental Rating	Standard rating as defined by A/65, Section 6.9.3, [3] Content Advisory Descriptor. See also A/76B, [4] Programming Metadata Communication Protocol, for a method of carrying the descriptor in an XML form.

7. Conditional Avail Methods

Content providers frequently establish varying agreements with cable MVPDs with respect to the number of local Avails into which the MVPD *may* insert advertising. Based on these varying agreements, certain MVPDs *may* be offered more or less Avails than others and/or the duration of specified Avails *may* differ among MVPDs. This section describes methods for defining these conditional Avails with varying degrees of privacy among the participating parties.

The following refers to the four Approaches illustrated in the seven / five Avail example in SCTE 67 [13], Section 7.2.6, Table 1 and assumes a full SCTE 118-1[12] Tier 2 implementation. The table is reprinted here as a service to the reader.

Table 5 - From SCTE 67 [13] – 7.2.6 Avail incrementing/skipping Example

AVAIL	Approach 1	Approach 2	Approach 3	Approach 4
1	1 of 7	1 of 5	1 of 7	1 of 7
2	2 of 7	2 of 5	2 of 7	2 of 7
3	3 of 7	----	----	(3 of 7) rcvd but not scheduled
4	4 of 7	3 of 5	4 of 7	4 of 7
5	5 of 7	----	----	(5 of 7) rcvd but not scheduled
6	6 of 7	4 of 5	6 of 7	6 of 7
7	7 of 7	5 of 5	7 of 7	7 of 7

Content providers *may* execute the above approaches using several different methods. The method selected by the content provider will be based on the following considerations:

1. the number of Service Level Agreements it has with MVPDs if different “service levels” are provided,
2. its desire to maintain privacy of their different deals with each MVPD.
3. its ability / desire to generate a single or separate 118-2 schedule file for each “service level”
4. its ability / desire to generate a separate or encrypted SCTE-35[1] message stream for each provided “service level”

Service Level Methods

Table 6 - Communication Method Matrix

	Method 1	Method 2	Method 3	Method 4
118-2	1 Simple	<i>n</i> Simple	1 Enhanced	1 Enhanced
SCTE 35 Streams	1	<i>n</i>	<i>n</i>	1
Avail Privacy	N/A	Yes	No	No

Method 1

A content provider choosing to offer only one service level would deliver the same Avail information via a single Simple File for distribution to all MVPDs (timing of delivery / pickup of these files needs to be determined). Correspondingly, only one stream of SCTE 35[1] Cue Messages would be needed to support the single service level across the marketplace. This is illustrated by Approach 1 in SCTE 67[13] Section 7.2.6, Table 1 included above for reference.

Method 2

A content provider offering more than one service level and having the capacity to generate unique Simple Files and unique SCTE 35[1] Cue Messages per service level could utilize Method 1 for each service level variant, i.e. produce a separate Simple File and a corresponding SCTE 35 Cue Message stream for each variant.

To implement this method a content provider would generate SCTE 118-2 files and SCTE 35[1] Cue Messages illustrated by Approach 1 for the MVPDs with the seven Avail service level and SCTE 118-2 files and SCTE 35 Cue Messages illustrated by Approach 2 for the MVPDs with the five Avail service level.

This is perhaps the cleanest method when multiple Service Level Agreements are offered because the communication of Avails is handled separately from end to end and allows for Avail privacy if desired.

Method 3

A content provider offering more than one type of Service Level Agreement *may* instead opt to distribute a single version of the SCTE 118-2 schedule file enhanced with Avail allocation metadata to all MVPDs. With this method, all seven Avails would be listed in the Enhanced File and each Avail would contain an AuthorizationList identifying the eligible service levels of that Avail.

Separate or encrypted SCTE 35[1] Cue Message streams would then need to be generated for each type of service level, exposing only the Avails appropriate for the targeted MVPD, much like Approach 3. Because all Avails are revealed in the single Enhanced File, Avail privacy is forfeited with this method. However, it does spare content providers the burden of producing multiple Simple Files.

Method 4

Content providers that do not have the means or desire to generate separate or encrypted SCTE 35[1] Cue Message streams but wish to support multiple MVPD service levels could produce a single version of the Enhanced File coupled with a single SCTE 35 Cue Message stream. As all the Cue Messages are visible, MVPDs would be trusted to schedule only the Avails identified by the AuthorizationList corresponding with their Service Level Agreements.

With this method, there is full Avail disclosure via the Enhanced File and the honor system is in effect for Avail usage by the MVPD. However, there is no need for multiple or encrypted SCTE 35[1] Cue Message streams.

8. Adoption Of SMPTE 2021

8.1. Objectives

All required and optional data elements of this standard are accommodated within the SMPTE 2021[2] BXF protocol and its associated XML schema for encoding of content provider to Affiliate Traffic System program schedules. Since the BXF protocol covers extensive data beyond the scope of this standard, this standard *shall* be based on a mapping of required and optional data defined in section 6.0 above to BXF XML data elements as defined in section 8.2 below.

8.2. Mapping of Data Elements

The following table defines the mapping of data elements, required for each Tier of this standard, to the BXF protocol as defined in SMPTE 2021[2]. Appendix A provides examples of SCTE 118-2 program schedules encoded using BXF XML.

Table 7 - Mapping of Data Elements to SMPTE 2021

SCTE 118-2 Data Element	Tiers	SMPTE 2021 Data Element (Root) BxfMessage/BxfData/Schedule/ScheduledEvent/...
-------------------------	-------	---

Scheduled Program Date & Time	0,1,2	EventData/StartDateTime with @eventType set to "Primary-ProgramHeader"
Scheduled Program Duration	0,1,2	LengthOption/Duration with @eventType set to "Primary-ProgramHeader"
Program Name	0,1,2	EventData/PrimaryEvent/ProgramEvent/ProgramName where @eventType = "Primary-ProgramHeader"
Unique Program Identifier	1,2	Content/ContentId/AlternateId, with @IdType set to "Unique Program Identifier"
Avail Number	2	Format/Formats/FormatStructure/FormatElements/AvailNumber
Avails Expected	2	Format/Formats/FormatStructure/FormatElements/TotalAvails
AuthorizationList & AuthorizedName	2	Format/Formats/FormatStructure/FormatElements/AuthorizationList
Avail Date & Time	0,1,2	EventData/StartDateTime with @eventType set to "Primary-BreakHeader"
Avail Time Tolerances	0,1,2	Format/Formats/FormatStructure/FormatElements/PrimaryOffset with @minusWindow and
Program Type	Optional	ContentType
Program Description	Optional	Content/Description Content/Name
Episode Information	Optional	Series/SeriesName Series/EpisodeName
ISAN Identifier	Optional	Content/ContentId/Isan
Program Genre	Optional	Content/Genre
TV Rating	Optional	ParentalRating/Rating with @region set to 1 (US)

8.3. Common Schedule Examples (INFORMATIVE)

This section describes four typical examples of schedule constructs addressed by this standard. In all cases these exchanges are from a content provider or designated proxy directed to a MVPD's Traffic System. An outline of the BXF XML mapping for each example is included with the BXF XML elements in bold and brief explanations of the elements employed. In all cases these data are contained within the <BxfMessage/BxfData/Schedule> element of BXF XML and each Program is defined within a <ScheduledEvent> element and its subordinate elements.

A detailed BXF XML encoding sample addressing the salient aspects of these scenarios is also included in Appendix A – Sample BXF XML Encoding of Program Schedules.

8.3.1. Fixed Duration Program with Two Breaks

In practice, the majority of Program content is defined as a fixed duration Program with a predefined number of Breaks that are also of fixed duration. Such a Program would be defined within a <ScheduledEvent> element as follows:

1. An **<EventData>** element defining the **<EventId>**, a **<StartDateTime>** and **<LengthOption/Duration>** for the Program.
2. A **<Content>** element defining the Program by **<ContentId>**, **<Name>**, **<Genre>**, and **<Description>**
3. A **<Format/Formats>** element giving the identifier of the format **<FormatId>**, defining the duration of the format **<FormatLength>** and listing two records under the **<FormatStructure/FormatElements>** each with an identifier **<PrimaryElementId>**, and a type **<FormatElementType>** set to “Break” and with the first record the **<AvailNumber>** set to 1 and **<TotalAvails>** set to 2 and the second record with **<AvailNumber>** set to 2 and **<TotalAvails>** set to 2.

8.3.2. Live Program with Four Fixed and Two Potential Extra Breaks

Live Programs frequently vary from the originally scheduled duration as in the case of overtime play in a live sporting event. In this scenario, it is useful to define “extra” Breaks that *may* be offered if the event goes over time. Such a Program would be defined within a **<Scheduled>** element as follows:

1. An **<EventData>** element defining the **<EventId>**, a **<StartDateTime>** and **<LengthOption/Duration>** for the Program.
2. A **<Content>** element defining the Program by **<ContentId>**, **<Name>**, **<Genre>**, and **<Description>**
3. A **<Format/Formats>** element giving the identifier of the format, defining the duration of the format and declaring four **TotalAvails** in the same manner as the first example under the **<FormatStructure/FormatElements>**.
4. A **<FormatStructure>** element containing exactly six **<FormatElements>**
5. Four **<FormatElements>** of type **Break** defining the details of each fixed Break by offset time within the format and duration.
6. Two **<FormatElements>** of type **Break** defining the details of each extra Break by anticipated offset time within the format and duration. In this case the offset times will be greater than the scheduled Program duration and the Avail numbers will exceed the Avails expected.

8.3.3. Conditional Number of Avails by Service Level

When multiple Service Level Agreements are to be encoded within a single BXF XML schedule (see Section 7.0 – Method 3) the **<AuthorizationList>** element is employed. This element will be included for each Break where the carriage is restricted to MVPDs by service level. Each service level is identified by a **<AuthorizedName>** that directly corresponds to the contract specifying the carriage details. The presence of an **<AuthorizationList>** indicates that the Break is conditional and only available to MVPDs with matching **<AuthorizedName>**. For example, consider a Program with two Breaks where the second Break is conditional as follows:

1. An **<EventData>** element defining the **<EventId>**, a **<StartDateTime>** and **<LengthOption/Duration>** for the Program.
2. A **<Content>** element defining the Program by **<ContentId>**, **<Name>**, **<Genre>**, and **<Description>**
3. A **<Format/Formats>** element giving the identifier of the format, defining the duration of the format and declaring two **TotalAvails**.
4. A **<FormatsStructure>** element containing exactly two **<FormatElements>**

5. A **<FormatElements>** of type **Break** defining the details of the first Break by offset time within the format and duration. This Break is carried by all MVPDs and, therefore, contains no **<AuthorizationList>**.
6. A **<FormatElements>** of type **Break** defining the details of the second Break by offset time within the format and duration. This Break is carried conditionally and, therefore, contains an **<AuthorizationList>** with one or more **<AuthorizedName>** elements corresponding to the service level contract(s) providing those Breaks.

8.3.4. Conditional Duration of Avails by Service Level

In some cases, the variation among Service Level Agreements *may* result in the same number of Breaks but differing durations. The **<AuthorizationList>** also covers this scenario as in the following example where the second of two Breaks *may* be longer for some service level(s):

1. An **<EventData>** element defining the **<EventId>**, a **<StartDateTime>** and **<LengthOption/Duration>** for the Program.
2. A **<Content>** element defining the Program by **<ContentId>**, **<Name>**, **<Genre>**, and **<Description>**
3. A **<Formats>** element giving the identifier of the format, defining the duration of the format and declaring two **TotalAvails**.
4. A **<FormatsStructure>** element containing exactly three **<FormatElements>**
5. A **<FormatElements>** of type **Break** defining the details of the first Break by offset time within the format and duration. This Break is the same duration for all MVPDs and, therefore, contains no **<AuthorizationList>**.
6. A **<FormatElements>** of type **Break** defining the details of the second Break by offset time within the format and duration. This Break duration varies and, therefore, contains an **<AuthorizationList>** with one or more **<AuthorizedName>** elements corresponding to the Service Level Agreement(s) for the specified duration.
7. A **<FormatElements>** of type **Break** defining the alternative details of the second Break by offset time within the format and alternative duration. This Break duration varies and, therefore, contains an **<AuthorizationList>** with one or more **<AuthorizedName>** elements corresponding to the Service Level Agreement(s) for the specified alternate duration.

9.0 Appendix A – Sample BXF XML Encoding Of Program Schedules (Informative)

The following example defines the live sporting event and fixed duration talk show as described and illustrated in Section 8.3. Note that this is a fragment of a BXF XML file and includes only the required header data and those elements relevant to SCTE 118-2 to define two Programs and their Avails. This sample is provided as an informative reference only. In the event of any conflict between this sample and the standard as defined in SMPTE 2021[2], the requirements of SMPTE 2021 are definitive.

```
<?xml version="1.0" encoding="UTF-8"?>
<BxfMessage id="urn:uuid:3A725992-7656-456e-94F6-6090DE940E00" dateTime="2006-09-
20T00:00:00.00"
messageType="Information" origin="Traffic System" originType="Traffic" userName="Traffic
System User" xmlns="http://smpte-ra.org/schemas/2021/2007/BXF"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://smpte-ra.org/schemas/2021/2007/BXF
bxfschema.xsd"
xmlns:pmcp="http://www.atsc.org/XMLSchemas/pmcp/2007/3.1" >
<BxfData action="add">
  <Schedule type="Primary" scheduleId="urn:uuid:3A725992-7656-456e-94F6-
6090DE940F01" scheduleName="CHAN1"
  scheduleStart="2012-09-
21T00:00:00.00"
  scheduleEnd="2012-09-
22T00:00:00.00">
    <Channel channelNumber="1" status="active"
      type="digital_television" ca="false" shortName="ESPN1E"
      outOfBand="true" action="add">
      <pmcp:Name lang="eng" action="add">ESPN East
      Feed</pmcp:Name>
      <pmcp:Description lang="eng">channel
      desc</pmcp:Description>
    </Channel>
  <ScheduledEvent>
    <EventData>
      <EventId>urn:uuid:3A725992-7656-456e-94F6-6090DE940E0A</EventId>
      <PrimaryEvent type="ProgramHeader">
        <ProgramEvent>
          <SegmentNumber>1</SegmentNumber>
          <ProgramName>NBA Basketball</ProgramName>
        </ProgramEvent>
      </PrimaryEvent>
      <StartDateTime>
        <SmpteDateTime broadcastDate="2012-09-21">
          <SmpteTimeCode>17:00:00:00</SmpteTimeCode>
        </SmpteDateTime>
      </StartDateTime>
      <LengthOption>
        <Duration>
          <SmpteDuration><SmpteTimeCode>02:30:00:00</SmpteTimeCode></SmpteDuration>
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