

ST SMPTE STANDARD

Mapping MGA Audio Metadata to ST 2110-41



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Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices, and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual. This SMPTE Engineering Document was prepared by Technology Committee 32NF TC Network/Facilities Architecture.

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any clause explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword "reserved" indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword "forbidden" indicates "reserved" and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows: Normative prose shall be the authoritative definition; tables shall be next; then formal languages; then figures; and then any other language forms.

Introduction

This clause is entirely informative and does not form an integral part of this Engineering Document.

SMPTE ST 2127-1 specifies the mapping of an MGA (Metadata Guided Audio) Signal into the Constrained MXF Generic Container. MGA signals comprise Audio Essence and associated Audio Metadata included in a common MGA Frame. MGA Audio Metadata (metadata contained in MGA Audio Metadata sections) is encoded in one or more Audio Metadata sections in the MGA Frame. This document defines mapping of Audio Metadata sections into SMPTE ST 2110-41 Data Item Packages. The Audio Essence (MGA Audio Essence or other forms of essence) associated with the MGA Audio Metadata is transported in other RTP streams (e.g., SMPTE ST 2110-30).

Intellectual Property

At the time of publication, no notice had been received by SMPTE claiming patent rights essential to the implementation of this Engineering Document. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

1 Scope

This standard specifies RTP transport of Metadata Guided Audio (MGA) Audio Metadata using the Fast Metadata framework, including mapping of MGA Audio Metadata sections to Data Item Packages, constraints, and other requirements.

2 Normative References

The following standards contains provisions that, through reference in this text, constitute provisions of this standard. Dated references require that the specific edition cited shall be used as the reference. Undated citations refer to the edition of the referenced document (including any amendments) current at the date of publication of this document. All standards are subject to revision, and users of this engineering document are encouraged to investigate the possibility of applying the most recent edition of any undated reference.

SMPTE ST 2127-1:2022, Mapping Metadata-Guided Audio (MGA) signals into the MXF Constrained Generic Container

SMPTE ST 2110-41:2024, Professional Media over Managed IP Networks: Fast Metadata Framework

SMPTE ST 2110-30:2017, Professional Media Over Managed IP Networks: PCM Digital Audio

SMPTE ST 2109:2019, Format for Non-PCM Audio and Data in AES3 — Audio Metadata

Internet Engineering Task Force (IETF) RFC 5234 Augmented BNF for Syntax Specifications: ABNF, Available at <https://www.rfc-editor.org/rfc/rfc5234>

3 Terms and Definitions

No terms and definitions are listed in this document.

4 MGA Audio Metadata Data Item

4.1 General

MGA Audio Metadata shall be mapped to Data Item Packages according to the provisions described in SMPTE ST 2110-41 with the additional provisions as described in this document.

4.2 Data Item Type

MGA Audio Metadata Data Item Packages shall be identified with the SMPTE ST 2110-41 Data Item Type 0x100 as assigned in the SMPTE ST 2110-41 Data Item Type Public Registry.

4.3 Data Item Contents

4.3.1 General

Each MGA Audio Metadata Data Item Package shall contain all or part of a single SMPTE ST 2127-1 Audio Metadata section, excluding the Index field. The Data Item Contents are as shown in Table 1. When necessary, zero padding following the Audio Metadata field shall be used to ensure the Data Item Contents have a total length that is a multiple of 32 bits.

Table 1 — MGA Audio Metadata Data Item Contents

Item Name	Type	Length	Required?	Value
Identifier	UInt8	1	Req.	See SMPTE ST 2127-1:2022 Table 2
Length	UInt32	4	Req.	See SMPTE ST 2127-1:2022
Audio Metadata	UInt8	Var.	Req.	See SMPTE ST 2127-1:2022

NOTE Contents can exceed the size of a single SMPTE ST 2110-41 Data Item Package. See Clause 4.3.2 for additional information.

4.3.2 Segmentation Method

If the size of the MGA Audio Metadata Data Item Contents, when mapped to an SMPTE ST 2110-41 RTP packet, causes the UDP packet that contains the Data Item Package to exceed the Standard UDP Size Limit defined in SMPTE ST 2110-10 (1460 octets), or if required for other reasons, the MGA Audio Metadata Data Item Contents shall be segmented into two or more MGA Audio Metadata Data Item Packages according to the default segmentation method described in SMPTE ST 2110-41. The Data Items packages shall be conveyed in consecutive SMPTE ST 2110-41 RTP packets identified with the same RTP Timestamp.

NOTE A single SMPTE ST 2110-41 RTP Packet can contain multiple MGA Audio Metadata Data Item Packages and/or Data Item Packages for other Data Item Types.

4.4 Media Clock, RTP clock, and RTP Timestamps

4.4.1 General

To support sample-accurate alignment of MGA Audio Metadata with the associated Audio Essence in other RTP streams, SMPTE ST 2110-41 streams containing MGA Audio Metadata Data Item Packages shall share the same Media Clock, and shall use the same `mediaclk` attribute in the SDP as the RTP stream (or streams) containing the Audio Essence. The RTP Clock rate shall be the same rate as the RTP Clock rate for the streams containing the Audio Essence (i.e., the digital audio sampling rate).

NOTE 1 Per SMPTE ST 2110-10:2022, the clock source is typically a Common Reference Clock used by the audio essence stream(s), or if a Common Reference Clock is not available, an alternative clock source that allows ST 2110-41 streams containing MGA Audio Metadata to be synchronized with associated essence streams by a mutual receiving Device.

NOTE 2 MGA Audio Metadata can be associated with Audio Essence in multiple RTP streams. In these cases, all Audio Essence streams share a common clock source that is the same as the MGA Audio Metadata.

NOTE 3 The RTP Clock Offset will be zero for audio essence streams that comply with SMPTE ST 2110-10. Audio essence streams that do not comply with SMPTE ST 2110-10 might contain non-zero offsets.

4.4.2 Audio Essence Transported in SMPTE ST 2110-30

When the Audio Essence associated with the MGA Audio Metadata is transported in one or more SMPTE ST 2110-30 stream(s), the Media Clock and RTP Clock of the SMPTE ST 2110-41 stream containing the MGA Audio Metadata Data Item Packages shall conform with the Media Clock and RTP Clock requirements of SMPTE ST 2110-30.

4.5 Reference Point and Reference Position

The Reference Point of an MGA Audio Metadata Data Item Package is defined as the time indicated by the RTP Timestamp of the SMPTE ST 2110-41 RTP packet containing the Data Item Package.

The default Reference Position for an MGA Audio Metadata Data Item Package is when the Reference Point is aligned with the time of the first audio sample of the Audio Essence that is associated with the MGA Audio Metadata in the Data Item Package.

NOTE 1 For SMPTE ST 2110-30 streams that contain PCM Audio Essence, the RTP Timestamp of the SMPTE ST 2110-41 packets will not necessarily equal the RTP Timestamps of the SMPTE ST 2110-30 RTP packets, depending on the alignment of the first audio sample within the SMPTE ST 2110-30 RTP packets.

NOTE 2 The “first audio sample” in this application is equivalent to the first audio sample contained in the Audio Essence section of an MGA Frame containing the MGA Audio Metadata section.

NOTE 3 Some MGA Audio Metadata types (e.g., SMPTE ST 2109 Audio Metadata Packs) support offsets from the default Reference Position so all or some of the audio metadata within an MGA Audio Metadata Data Item Package might deviate from the default Reference Position indicated by the RTP timestamp; however, in the absence of any offset or other timing indication, the Reference Position as indicated by the RTP Timestamp, will apply.

4.6 Repetition Rate

RTP packets for a SMPTE ST 2110-41 stream containing MGA Audio Metadata Data Item Packages should be transmitted at a regular repetition rate. For example, in applications where the Audio Essence is associated with a corresponding Video Essence, it might be desired to transmit MGA Audio Metadata Data Item Packages at a repetition rate corresponding to the Video Essence frame rate. In other applications not associated with Video Essence, it might be desired to transmit MGA Audio Metadata Data Item Packages at a repetition rate corresponding to an audio block rate associated with the metadata. The actual repetition rate is application-specific.

4.7 SDP Signaling

In addition to the provisions of SMPTE ST 2110-41, senders should signal the Format Specific Parameter AMT with a value containing a comma-separated list of hexadecimal Audio Metadata Types which might appear in the stream.

The AMT parameter `amt-param` is described in ABNF notation (defined in IETF RFC 5234) as:

```

st-2109-tag    = 1*6HEXDIG
amt-val       = st-2109-tag *(", " st-2109-tag)
amt-param     = %d65.77.84.61 amt-val           ; "AMT=" amt-val

```

`st-2109-tag` shall encode an Audio Metadata Type identified by a SMPTE ST 2109 static payload tag that is assigned in the SMPTE ST 2109 Administrative Register. Hexadecimal values are case insensitive and will not include a leading "0x". Whitespace characters are not allowed within the comma-separated list of Audio Metadata Types.

NOTE 1 The AMT parameter supports static payload tags up to 3 bytes in length (1 to 6 hexadecimal digits).

NOTE 2 The AMT parameter only supports signaling of Audio Metadata Types identified with SMPTE ST 2109 static payload tags. Signaling of Audio Metadata Types identified with SMPTE Universal Labels is not supported.

The following example indicates a SMPTE ST 2110-41 stream that is expected to contain Data Item Packages with two different Audio Metadata Types, one identified by the static payload tag "12" and the other by the static payload tag "3FFF":

```
a=fmtp:117 SSN=ST2110-41:2024; DIT=100; AMT=12,3FFF
```

NOTE 3 The AMT parameter provides an indication of Audio Metadata types expected to be conveyed within the MGA Audio Metadata Data Items in a SMPTE ST 2110-41 stream. A type's presence in the AMT list does not guarantee that the type will appear in every packet, nor that it will appear in the stream at all. In addition, Audio Metadata Types that are not listed in the AMT values can appear in the stream.

Bibliography (Informative)

SMPTE ST 2110-10:2022, Professional Media over Managed IP Networks: System Timing and Definitions