Video Services Forum (VSF)
Technical Recommendation TR-10-4

Internet Protocol Media Experience (IPMX): SMPTE ST 291-1 Ancillary Data

April 14, 2023

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Executive Summary

Internet Protocol Media Experience (IPMX) was created to foster the adoption of open standards-based protocols for interoperability over IP in the media and entertainment (M&E) and professional audio/video industries. IPMX is based on the SMPTE ST 2110 and as such the VSF TR-10 suite of Technical Recommendations is built as set of differences between SMPTE ST 2110 and IPMX.

This Technical Recommendation corresponds to the SMPTE ST 2110-40 document and describes the transport of SMPTE ST 291-1 ancillary data using RTP protocol in IPMX. It documents the differences between TR-10-4 and SMPTE ST 2110-40. Some of the subject covered in this document include Media Clock, RTP Clock, RTP Timestamps and the IPMX Info Block definition for SMPTE ST 291-1 ancillary data.

Table of Contents

1 Introduction (Informative)

IPMX, which stands for IP Media Experience, is based on two families of specifications. The SMPTE ST 2110 Professional Media Over Managed IP Networks suite of standards for the transport of video, audio, and ancillary/control signals over IP networks, and the NMOS REST APIs from AMWA, which provide discovery, connection management, and control.

IPMX is an accessible, open standard that meets the needs of professional and consumer video and audio users in a wide variety of contexts while giving manufacturers and developers what they need to build low-latency, interoperable, IP based audiovisual products or applications.

This Technical Recommendation (TR) covers the IPMX transport of SMPTE ST 291-1 Ancillary Data using the RTP protocol. Other parts of the TR-10 family of Technical Recommendation describe IPMX other media essence types, along with their requirements, and defines other aspects of the IPMX system.

2 Contributors

The following individuals participated in the Video Services Forum IPMX working group that developed this Technical Recommendation.

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3 About the Video Services Forum

The Video Services Forum, Inc. (www.videoservicesforum.org) is an international association dedicated to video transport technologies, interoperability, quality metrics and education. The VSF is composed of service providers, users and manufacturers. The organization's activities include:

- providing forums to identify issues involving the development, engineering, installation, testing and maintenance of audio and video services;
- exchanging non-proprietary information to promote the development of video transport service technology and to foster resolution of issues common to the video services industry;
- identification of video services applications and educational services utilizing video transport services;
- promoting interoperability and encouraging technical standards for national and international standards bodies.

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4 Conformance Notation

Normative text describes elements of the design that are indispensable or contain the conformance language keywords: "shall," "should," or "may."

Informative text 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 and any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed 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.

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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; followed by formal languages; then figures; and then any other language forms.

5 Normative References

- SMPTE ST 2110-40:2018 Professional Media Over Managed IP Networks: SMPTE ST 291-1 Ancillary Data
- SMPTE ST 2110-10:2022 Professional Media over Managed IP Networks: System Timing and Definitions
- VSF TR-10-1 Internet Protocol Media Experience (IPMX): System Timing and Definitions
- Internet Engineering Task Force (IETF) RFC 8331 RTP Payload for Society of Motion Picture and Television Engineers (SMPTE) ST 291-1 Ancillary Data

6 Definitions

For the purposes of this document, the terms, and definitions of VSF TR-10-1 and those of SMPTE ST 2110-40:2018 section 4.1 to 4.4 apply.

7 General Provisions

All SMPTE ST 291-1 Ancillary Data IPMX Senders and Receivers compliant with this Technical Recommendation (TR) shall comply with the following specifications:

SMPTE ST 2110-40:2018 Sections 5.1,5.2 and 5.5

IPMX network interface requirements shall be in accordance with the provisions of SMPTE ST 2110-10:2017 section 6, subject to the additional constraints in this document.

All IPMX Media stream shall have a UDP destination port value that is even and greater than 1024 and should use a value greater than 5000.

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Note: The interested reader can refer to RFC 3551 section 8 for
a description of the selection of the above port number range.
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IPMX Senders shall make their SDP object available through the management programming interface of the device.

The UDP size of each RTP packet shall not exceed the Standard UDP Size Limit as specified in SMPTE ST 2110-10.

Note: As outlined in appendix B of VSF TR-05, some ANC data packet types should not be transported using SMPTE ST 2110-40. VSF TR-10-4 discourages the transport of these packets as well. These ANC Data packets include Embedded Audio Packets, Embedded Audio Control Packets, EDH Packets (DID F4h), Packets marked for Deletion (DID 80h) and SDI Payload Identifier (DID 41h / SDID 01h)

8 Media Clock, RTP Clock, and RTP Timestamps

The Media Clock and RTP Clock shall comply with the provisions of VSF TR-10-1 for an IPMX Ancillary Sender.

The Media Clock and RTP Clock rate for streams compliant with this TR shall be 90 kHz.

All RTP packets which are part of the same progressive frame shall contain the same RTP Timestamp value.

All RTP packets which are part of the same interlaced field shall contain the same RTP Timestamp value.

9 Session Description Protocol (SDP)

The SDP object shall be constructed as described in IETF RFC 8331, subject also to the provisions of SMPTE ST 2110-10 and TR-10-1.

10 IPMX Info Block for SMPTE ST 291-1 Ancillary Data

IPMX Senders shall send RTCP Sender Reports as outlined in TR-10-1. These RTCP Sender Reports shall include an IPMX Info Block extension.

IPMX Senders need not include a Media Info Block in the IPMX Info Block extension.