



VIDEO SERVICES FORUM

Video Services Forum (VSF) Technical Recommendation TR-10-0

Internet Protocol Media Experience (IPMX):
Document Organization



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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 and professional audio/video industries. IPMX is based on the SMPTE ST 2110 standard and as such the VSF TR-10 suite of Technical Recommendations is a set of differences between SMPTE ST 2110 and IPMX.

The VSF TR-10-0 document describes the organization of the various Technical Recommendation documents that form the TR-10 specification.

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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 document describes the various documents that form the IPMX TR-10 Technical Recommendations.

This document is informative and contains no normative provisions.

2 Contributors

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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.

The VSF is an association incorporated under the Not For Profit Corporation Law of the State of New York. Membership is open to businesses, public sector organizations and individuals worldwide. For more information on the Video Services Forum or this document, please call +1 929-279-1995 or e-mail opsmgr@videoservicesforum.org.

4 TR-10 General Organization

The transport protocol portion of IPMX is based on SMPTE ST 2110. The TR-10 Technical Recommendations that cover the transport protocol, outline the differences between the SMPTE ST 2110 Standard and VSF TR-10. TR-10 adds requirements related to the mandated use of AMWA NMOS for IPMX.

TR-10-1 IPMX System Timing and Definitions

This Technical Recommendation corresponds to the SMPTE ST 2110-10 document and describes the System Timing used in IPMX. It also defines basic terms used in the IPMX TR-10 family of recommendations. Some of the subjects covered in this document include how IPMX supports asynchronous media sources, the IPMX traffic shaping model, and how IPMX supports networks where PTP is present and in network where PTP is not present.

TR-10-2 IPMX Uncompressed Active Video

This Technical Recommendation corresponds to the SMPTE ST 2110-20 document and describes the transport of uncompressed active video using RTP protocol in IPMX. It documents the differences between TR-10-2 and SMPTE ST 2110-20. Some of the subjects covered in this document include the payload format, Media Clock, RTP Clock, RTP Timestamps and the IPMX Info Block definition for uncompressed active video.

TR-10-3 IPMX PCM Digital Audio

This Technical Recommendation corresponds to the SMPTE ST 2110-30 document and describes the transport of PCM digital audio using RTP protocol in IPMX. It documents the differences between TR-10-3 and SMPTE ST 2110-30. Some of the subjects covered in this document include the payload format, sample rate, Media Clock, RTP Clock, RTP Timestamps and the IPMX Info Block definition for PCM digital audio.

TR-10-4 IPMX SMPTE ST 291-1 Ancillary Data

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 subjects covered in this document include Media Clock, RTP Clock, RTP Timestamps and the IPMX Info Block definition for SMPTE ST 291-1 ancillary data.

TR-10-5 IPMX HDCP Key Exchange Protocol

This document describes interoperability requirements for devices implementing the “High-bandwidth Digital Content Protection System: Direct Adaptation Amendment, Revision 2.3, May 19, 2021” amendment of the “High-bandwidth Digital Content Protection System: Interface Independent Adaptation, Revision 2.3, May 02, 2018” specification.

TR-10-6 IPMX Forward Error Correction (FEC)

This document describes a Forward Error Correction profile of SMPTE ST 2022-5 for use with IPMX.

TR-10-7 IPMX Compressed Video

This Technical Recommendation documents the transport of IPMX RTP streams for any compressed video that does not generate a constant number of bytes per frame as required by TR-10-11. It documents the differences between TR-10-7 and SMPTE ST 2110-22. Some of the subjects covered in this document include payload format, Media Clock, RTP Clock, RTP Timestamps and the IPMX Info Block definition for TR-10-7 compressed video transport.

TR-10-8 IPMX NMOS Requirements

This Technical Recommendation documents the minimum requirements for IPMX Devices with respect to AMWA NMOS support. It documents the requirements and some implementation details related to the AMWA NMOS suite of specifications that concern devices that implement the IPMX TR-10 suites of Technical Recommendations.

TR-10-9 IPMX Requirements for System Environment and Device Behavior

This Technical Recommendation documents the minimum requirements for IPMX devices with respect to system environment and device behavior. Some of the subjects covered in this document include requirements related to network support and how IPMX devices are expected to behave when sending or receiving IPMX streams when PTP is present and when it is not present.

TR-10-10 HDMI InfoFrame Packet Transport

This Technical Recommendation documents the transport of HDMI InfoFrame using RTP protocol in IPMX.

TR-10-11 IPMX Constant Bit-Rate Compressed Video

This Technical Recommendation corresponds to the SMPTE ST 2110-22 document and describes the transport of constant bit-rate compressed video using RTP protocol in IPMX. It documents the differences between TR-10-11 and SMPTE ST 2110-22. Some of the subjects

covered in this document include payload format, Media Clock, RTP Clock, RTP Timestamps and the IPMX Info Block definition for constant bit-rate compressed video.

TR-10-12 IPMX AES3 Transparent Transport

This Technical Recommendation corresponds to the SMPTE ST 2110-31 document and describes the transparent transport of AES3 audio using RTP protocol in IPMX. It documents the differences between TR-10-3 and SMPTE ST 2110-31. Some of the subjects covered in this document include the RTP encapsulation, Media Clock, RTP Clock, RTP Timestamps and the IPMX Info Block definition for AES3 audio.

TR-10-13 IPMX Privacy Encryption Protocol (PEP)

This Technical Recommendation describes a method generating keying material for encrypting, decrypting and authenticating media content over multicast and unicast networks. It is designed to support multiple types of transport protocol adaptations. The default adaptation defined in this document describes privacy encryption of media streams having an RTP payload format.

TR-10-14 IPMX USB

This technical recommendation defines the transport layer technologies for IPMX USB-over-IP networks.

TR-10-15 Part1 IPMX JPEG-XS Codec Requirements for Compressed Video

This document covers the JPEG XS video codec requirements for IPMX. JPEG XS uses TR-10-11 for transport.

TR-10-15 Part2 H.265 Codec Requirements for Compressed Video

This document covers the H.265 video codec requirements for IPMX. H.265 uses TR-10-7 for transport.

TR-10-15 Part3 IPMX H.264 Codec Requirements for Compressed Video

This document covers the H.264 video codec requirements for IPMX. H.264 uses TR-10-7 for transport.

TR-10-16 IPMX HDR Info Block

This technical recommendation defines the Media Info Block for HDR. This Media Info Block is optional and should be added to the IPMX Info Block of the RTCP sender reports only if it is relevant.

5 TR-10 Media Info Block Type

IPMX Senders send RTCP Sender Reports as outlined in TR-10-1. These RTCP Sender Reports include an IPMX Info Block extension and sometimes a Media Info Block. The Media Info Block contains a Media Info Block type identifier that identifies the type of Media Info Block used.

The following table shows the currently allocated values for Media Info Block type and in which TR-10 specification where each one is defined.

Media Info Block type	Specification where defined
0x0001	TR-10-2
0x0002	TR-10-3
0x0003	TR-10-11
0x0004	TR-10-12
0x0005	TR-10-7
0x0008	TR-10-15 Part 1
0x0009	TR-10-15 Part 2
0x000A	TR-10-15 Part 3
0x0010	TR-10-5
0x0011	TR-10-13

Table 1 – Media Info Block type allocation