



# STANDARDS QUARTERLY REPORT December 2023

Result of SMPTE<sup>®</sup> Technology Committee  
Meetings (Online only)

11th to 14th of December 2023

## THE NEXT CENTURY

## SMPTE® Standards Quarterly Report

This report comprises an Executive Summary followed by a more [detailed description](#) of this round of Technical Committee meetings:

*SMPTE Standards Committee Meetings 11-14 December 2023*

*Host: SMPTE Teams Online*

### Executive Summary

This Executive Summary lists new project proposals this quarter and gives a high-level view of project developments. More information on the status of the active projects can be found in the [detailed description](#) that follows this summary.

Seven SMPTE Technology Committees (TCs) scheduled meetings at this round (the subgroups mostly develop their projects by telecons).

There were 94 registrations for remote attendance over the four days.

Documents published in the last quarter from the work of each TC are listed on [this page](#).

#### **Proposals for new projects submitted in the last quarter**

<i>Project Name</i>	Type	SMPTE Group	Approval Period Closes
<i>AXFlib – Open Source Toolkit for AXF</i>	New Code	File System	2023-11-09
<i>ST-2110-40 – Ancillary Data (Format Specific Parameters - corrections)</i>	Revision	Network	2023-11-20
<i>ST 2073-10 – VC-5 MXF Wrapper</i>	Revision	File System	2023-12-11
<i>ST-381-3- Mapping AVC into MXF Generic Container</i>	Revision	File System	2023-12-05

## ***Professional Media over IP Projects***

### **Professional Media over Managed IP Networks**

This project group developed the ST 2110 suite that standardizes an interoperable system for media IP networks to transport separate video, audio, and associated data streams. [Details](#)

Eleven parts of the suite are published, including recent revisions.

- System Timing and Definitions
- Uncompressed Active Video
- Traffic Shaping and Delivery Timing for Video
- Constant Bit Rate Compressed Video
- Single Video Essence Transport over Multiple ST 2110-20 Streams (to support high bitrate streams)
- Measurement considerations for 2110 streams
- A document tying down additional parameters for streaming standard definition video
- PCM Digital Audio (undergoing minor revision)
- Transparent AES3 Data (e.g. Dolby E or non-audio in AES3)
- ST 291 Ancillary Data (undergoing minor revision)
- Timed Text streaming

There are also parts in development on:

- Transport of metadata that has not been derived from ST 291 packets (2 documents, both elevated to DP status at this meeting)
- Timing planes for 2110 streams

There are projects creating ST 2110 Protocol Implementation Conformance Statements (PICS) for most of the SMPTE 2110 suite documents. [Details](#)

### **Network-Based Synchronization for the Professional Media Environment**

The ST 2059 suite defines a synchronization system for media using precision time protocol (PTP) packets on an IT network. There are ongoing projects in support of this technology:

- The group that has organized ST 2059 “plugfests” is expanding its scope to write “best practices” documents. [Details](#).
- A revision of ST 2059-2 is being developed to reference and harmonize with the latest revision of the IEEE PTP standard. [Details](#)
- A recommended practice on PTP Device Monitoring Capabilities was published in the last quarter. It is YANG-based and it provides interoperability in network monitoring and diagnostics.

### **Required Application Protocol Standards for IP-Based Media Production**

A study group in the Media Systems, Control and Services TC has researched standards requirements for interoperability of production applications based on a capability view and a workflow analysis. Its report is being reviewed. [Details](#)

### ***Interoperable Master Format (IMF)***

*IMF is a file-based framework designed to support multiple high-quality content versions of a finished work destined for distribution channels worldwide. The suite currently comprises 21 published SMPTE Documents - [Details](#).*

There is work on IMF Output Profile List standards – a revision and 3 new standards. [Details](#)

There is new work on several IMF topics; new Applications, Audio with Metadata, Event based Metadata. [Details](#)

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### ***SMPTE Video Compression Standards***

*SMPTE has standardized six video compression standards – VC-1 to VC-6.*

*Work on video compression standards is nearing completion:*

- A VC-6 mapping into MXF is underway. There is also an IMF application underway [MXF](#) [IMF](#)
- A suite of documents defining the VC-5 compression system is complete. An IMF Application is underway. [Details](#).
- Projects to revise SMPTE VC-3 documents to add Alpha channel. The essence document is complete. An MXF mapping and an IMF mapping are underway – [MXF](#) [IMF](#)

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### ***Cinema Projects***

*IMF, above, is also highly relevant to the Cinema community  
The Cinema Group (27C) is handling the following work*

#### **Document Maintenance**

This Working Group looks after the maintenance of all TC published documents. [Details](#)

#### **Cinema Sound Systems**

This Working Group deals with improving the quality of sound in cinema presentations, through the standardization of technical practices from content creation dubbing stages to commercial outlets.

The TC has a working group on B-Chain Characteristics and Expectations, with drafting groups studying:

- Research on relevant Technical Documents
- In-situ Measurements and Testing

[Details](#)

#### **Digital Cinema (D-Cinema)**

This Group has published four large multi-part document suites dealing with these topics:

- D-Cinema Distribution Master
- D-Cinema Packaging
- D-Cinema Operations
- D-Cinema Quality

Current projects include:

- Minimal Timed Text XML Requirements
- Japanese Subtitle Mastering
- Exhibition Display
- Digital Cinema Distribution Master - Packed Image

[Details](#)

### **DPX Projects ( in the file systems TC)**

The HDR DPX standard was published in Q1 2019. There is ongoing work. [Details](#)

There is a new standard in development on Mapping DPX Picture Sequences into the MXF Generic Container. [Details](#)

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**Material Exchange Format – MXF** This widely-used file-based media format continues to develop with projects adding features and mappings to the MXF suite of standards or creating constraints for improved interoperability in a variety of application areas. There are currently 11 MXF-related projects in process. [Details](#) They comprise:

- ST 380 - MXF Descriptive Metadata Scheme 1 (revision)
- RP 2057 - Text-based metadata carriage in MXF (revision)
- ST 377-1 MXF (revision)
- Mapping VC-3 Coding Units into the MXF Generic Container (amendment)
- Mapping ST 2117-1 into the MXF Generic Container
- Mapping Audio Definition Model to MXF
- Mapping DPX files into the MXF Generic Container
- MXF Mappings for VI Lines and Ancillary Data Packets (revision)
- TLX KLV Encoding and MXF Mapping
- Descriptive Metadata Scheme for Compatible Time Labels

**Media Microservices** This group has two projects in the public Committee Draft stage - IMF Registration Service API and Status Reporting and logging. They are planned to proceed through the publication process this year. There is a Job Processing Architecture document in development. Future work is being developed in RIS-OSA. [Details](#)

**Extensible Time Label (TLX)** This group has developed a Standard suite for a time label that overcomes the shortcomings of SMPTE ST 12 (support for today's higher frame rates, time values greater than 24

hours) as well as supporting additional requirements of current systems and workflows such as a “Digital Birth Certificate” including a Source Ident. The 3 TLX documents were posted for a Public CD period and have passed FCD ballot. Two documents to define KLV Encoding and MXF Mapping for TLX are underway. [Details](#)

**Metadata and Registers** This TC (and its predecessor) has been maintaining metadata ULs on behalf of other SMPTE TCs and industry organizations for the last 20+ years. Its systems have been upgraded to use xml rather than spreadsheets and an additional register has been standardized for Essence elements keys. It now has tools available to check the integrity of requests for new ULs. [Details](#)

**AI and ML in Media** A joint task force with the Entertainment Technology Center is studying this topic and its report should be ready for publication shortly (ER 1010, now published [here](#)).

#### **Inter-Entity Trust Boundary**

Deals with the problem of securely exchanging IP flows between third party networks. This document was published in the last quarter. [Details](#)

#### **Other Projects**

A very large number of SMPTE Standards projects are active – too many to cover in an executive summary even though they may be important to implementers. SMPTE has a searchable publicly-available [project summary page](#) that should help locate topics of interest that can then be followed up in the main body of this report.

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## SMPTE® Standards Quarterly Report:

### [Detailed Account](#)

*SMPTE Standards Committee Meetings 11-14 December 2023*

*Host: SMPTE Teams Online*

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SMPTE® is a global leader in motion-imaging technology standards and education for the communications, media and entertainment industries – and the only organization to connect the areas of motion-imaging research, standardization, education, and business success.

We encourage interested parties to learn more about our Standards activities on [this website page](#).

This report is a snapshot in time and should not be regarded as formal minutes, a positioning statement or an analysis piece.

*If you are interested in learning more about the SMPTE Standards program, or would like to submit comments, please contact the [Director of Standards Development](#)*

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### Introduction

The quarterly SMPTE Standards meeting rounds are led by the SMPTE Standards VP, a volunteer post, and the SMPTE Director of Standards Development, a staff post. These posts are currently filled by Sally Hattori and Thomas Bause Mason respectively.

There are six Standards Directors, currently Pierre Lemieux, Thomas Kernen, Florian Schleich, Bruce Devlin, Dean Bullock, Raymond Yeung.

Each round comprises meetings of Technology Committees (detail below) as well as any subgroups whose work requires face-to-face meetings. Subgroup work also proceeds continuously between the quarterly meetings using teleconferences.

If you need some help getting started with the SMPTE Standards process and some of the conventions / acronyms used in this report, please take a look at the [Annex](#).

A Standards Community meeting was held to provide information on:

- SMPTE Standards Document Library Update
- Future Meetings



## Future Meetings

Quarterly Standards meeting rounds are planned for:

- Q1 2024 4-7 March Online
- Q2 2024 3-5 June, Ottawa, CA
- Q3 2024 18-20 September, Geneva, CH
- Q4 2024 9-12 December Online

This Quarterly Report provides a detailed account of the meetings of the following SMPTE Standards TCs and their sub-groups:

[Essence \(10E\)](#)

[Cinema \(27C\)](#)

[Metadata and Registers \(30MR\)](#)

[File Formats and Systems \(31FS\)](#)

[Network and Facilities Architecture \(32NF\)](#)

[Media Systems, Control and Services \(34CS\)](#)

[Media Packaging and Interchange \(35PM\)](#)

Links to each TC report section are also provided in the footer of each page to assist with navigation. Documents published in the last quarter from the work of each TC are listed on [this page](#).

The SMPTE website now has a [summary projects page](#) publicly available.

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## Details from each Technology Committee (TC) meeting

### Essence Technology Committee (TC-10E) Chair: Fred Walls

*The application of the General Scope as it applies to electronic capture, generation, editing, mastering, archiving, and reproduction of image, audio, subtitles, captions, and any other master elements required for distribution across multiple applications*

#### **DG: Common LUT Format**

The Common LUT Format (CLF) can communicate an arbitrary chain of color operators (also called processing nodes) which are sequentially processed to achieve an end result.

The work will be based on an existing CLF specification developed by the Academy (AMPAS), available at <https://docs.acescentral.com/specifications/clf>

Current project:

##### **ST xxxx: Common LUT Format**

*Status: The DG has held 4 meetings in the last quarter. A draft standard and xml schema have been developed in the DG.*

#### **DG: Measurement Methods for Resolution Characteristics of Camera Systems**

Current project:

##### **RP 2130 - Measurement Methods for Resolution Characteristics of Camera Systems**

To facilitate the maintenance and operation of studio equipment, the purpose of this project is to document measurement methods for the spatial resolution characteristics of camera systems. Specifically, to measure the Modulation Transfer Function (MTF).

*Status: The DG Chair gave a presentation. The group has held three meetings in the last quarter. The draft has been written, but not yet reviewed. The technique has been generalized beyond media image formats.*

#### **DG: SMPTE 2080 Document Suite - Reference Display and Environment for Critical Viewing of Television Pictures**

This group has a suite of documents dealing with the use of fixed pixel matrix reference displays.

Published documents:

ST 2080-1: Reference White Luminance Level and Chromaticity (one-year review due)

RP 2080-2: Measurement and Calibration Procedure for HDTV Displays (deals with parameters that can be regularly adjusted)

ST 2080-3: Reference Viewing Environment Characteristics

Current projects:

**RP 2080-4 - Measurement Procedures for Characterization of HDTV Displays**

Defines the procedures, conditions and rules applicable for measuring the parameters of an HDTV Reference Display.

*Status: There was no report at this meeting. A plan was previously announced to initiate a second FCD ballot, incorporating resolved comments from the first FCD ballot.*

**RP 2080-2: Measurement and Calibration Procedure for HDTV Displays**

During development of RP 2080-4, errors in the line numbers of the test patterns in RP 2080-2 were noticed. The patterns also need to be modified to add copyright notices and define risetimes. The specified alternate white point for certain regions (9300K) should be changed to D93 and the x,y coordinates changed.

*Status: There was no report at this meeting; the 2080-4 work will take priority.*

**Business Impact:** Users and industry will have common standards to assess image quality on a reference display.

**DG: IPT-PQ**

Prior to standardization of color representation ICtCp in ITU-R BT.2100, an alternative – IPT-PQ - was used by many major OTT distributors. It is important to these OTT distributors that these assets are labeled as utilizing the IPT-PQ color representation in two variants (scope now modified to only cover IPT-PQ-C2 and not IPT-PQ-C0), and that the characteristics are standardized.

Current project:

**ST 2128 - IPT-PQ color representation.**

*Status: The DG Chair will send a draft document to the TC Chair to initiate pre-DP review.*

**Revision: SMPTE 2046 Suite**

Published Documents:

ST 2046-1:2009 - Specifications for Safe Action and Safe Title Areas for Television

RP 2046-2:2009 - Safe Areas for Protection of Alternate Aspect Ratios

EG 2046-3:2010 - Safe Areas for Television

Current projects:

**ST 2046-1 - Specifications for Safe Action and Safe Title Areas for Television**

Add Safe areas for UHD image formats. Update normative references.

**RP 2046-2 - Safe Areas for Protection of Alternate Aspect Ratios**

Add Safe areas for UHD image formats. Update normative references.

*Status: There was no report at this meeting. It was previously reported that UHD formats have been added to both documents.*

**DG: SMPTE 2073 Document Suite: VC-5 Video Essence**

This group standardizes the CineForm / GoPro video compression system.

Published documents:

ST 2073-1 - VC-5 Elementary Bitstream

RP 2073-2 - VC-5 Conformance Specification

ST 2073-3 - VC-5 Image Formats

ST 2073-4 - VC-5 Subsampled Color Difference Components

ST 2073-5 - VC-5 Layers (this allows embedding multiple images in a single bitstream; used for stereoscopic, HDR and interlaced frames)

ST 2073-6 - VC-5 Sections

ST 2073-7 - VC-5 Metadata

ST 2073-10 - VC-5 Mapping into the MXF Generic Container – this was work in TC-31FS

*Status: Work in the VC-5 DG is winding down but there is an issue that the test materials are not available; the DG Chair will resolve this issue with the Director of Standards.*

*Possible future projects dealing with alternative codebooks, lossless encoding and block-based encoding were described. A VC-5 codec website (not part of SMPTE) is available at <https://vc5codec.org>*

*An IMF application is underway in [TC-35PM](#). There is a [project proposal](#) to revise ST 2073-10, the MXF wrapper, in TC-31FS.*

**Revision: ST 96:2004 Scanned Image Area**

Update to current practices for diagrams, graphics, file formats, and conformance language. In particular, SVG graphics are needed instead of the current low-resolution images.

*Status: There has been some work in the last quarter preparing the document in HTML format. Further editing is required.*

**Image Line Numbering**

This will be a new document, probably an Engineering Guideline, explaining SMPTE practice for line numbering for video formats. In analog standards, the first line was numbered 1. In digital standards, the first line was numbered 0.

*Status: There was no report at this meeting.*

**Measurement of Video Display Reflectance**

The text will be extracted from the present ST 2080-4 draft.

**RP xxxx: Measurement of Video Display Reflectance**

*Status: There was no report at this meeting.*

**ST 2016 Suite on Active Format Description**

Published Documents:

ST 2016-1 - Format for Active Format Description and Bar Data

ST 2016-2 - Format for Pan-Scan Information

ST 2016-3 - Vertical Ancillary Data Mapping of Active Format Description and Bar Data

ST 2016-4 - Vertical Ancillary Data Mapping of Pan-Scan Information

ST 2016-5 - KLV Coding for Active Format Description, Bar Data and Pan-Scan Information (document withdrawn)

Current Projects:

**ST 2016-1 - Format for Active Format Description and Bar Data**

Add UHD formats to ST 2016-1

*Status: There was no report at this meeting.*

**Revision of ST 2048 suite**

These are routine revisions arising from 5-year review. Part 1 will have an amendment rolled-up. All parts will have their Normative References updated. The “road-map” figure will be replaced with bibliographic reference to the EG 2111 suite.

*Status: FCD ballot for all three parts is underway, closing 2024-01-12.*

**Revision: ST 2048-1:2011 2048 × 1080 and 4096 × 2160 Digital Cinematography Production Image Formats FS/709**

**Revision: ST 2048-2:2011 2048 × 1080 Digital Cinematography Production Image FS/709 Formatting for Serial Digital Interface**

**Revision: ST 2048-3:2012 - SMPTE Standard - 4096×2160 Digital Cinematography Production Image Formats FS/709 — Mapping into Multi-link 10 Gb/s Serial Signal/Data Interface**

**Cinema Technology Committee (TC-27C) Chairs: Steve LLamb and C J Flynn**

*The application of the general scope as it applies to theatrical distribution, reproduction and operations, both analog and digital.*

**WG: Document Maintenance (WG27C-10)**

General document maintenance, document issue tracking, 1-year & 5-year reviews of documents, project proposals for revisions/amendments as required.

*Status: 10 ST Audits for digital cinema documents generated from HTML closed 2023-12-12. They are: ST 429-2, ST 429-3, ST 429-5, ST 429-10, ST 429-14, ST 429-16, ST 429-19, ST 430-1, ST 430-5, ST 430-12. ST Audit for ST 429-18 will close 2023-12-19.*

**Revision ST 2095-1:2015 - Calibration Reference Wideband Digital Pink Noise Signal Standard**

The pink noise signal remains unchanged; this project addresses ambiguities in the prose and possibly the Python script.

*Status: This document is in the publication queue.*

**Revision RP200:2012 - Relative and Absolute Sound Pressure Levels for Motion-Picture Multichannel Sound Systems — Applicable for Analog Photographic Film Audio, Digital Photographic Film Audio and D-Cinema**

Revision to include Immersive Audio. This practice specifies a measurement method and wideband sound pressure levels for motion-picture dubbing theatres, review rooms, and indoor theaters using steady state wideband pink noise methodology. Together with SMPTE ST 202, it is intended to assist in standardization of reproduction of motion-picture sound in such rooms.

*Status: One last "Term" is being discussed, which might ripple down into the document. GitHub Repositories have been set up to track future ideas for changes to RP 200, as well as breadcrumbs that reflect into potential revisions of ST 202 and ST 2096-1 and -2.*

**WG: Sound (WG27C-20)**

Current WG project:

**RP xxxx – B Chain Characteristics and Expectations**

The Working Group output will be a Recommended Practice derived from the results of DGs efforts (see below). There is consideration of producing an Engineering Guideline as well.

The Drafting Groups are:

**DG: Technical Documents Research**

DG is tasked with researching existing documents, standards and research papers pertaining to sound system performance and measurements – with the goal inherent within all DGs - of correlating Perception and Measurement with the potential of modern computers and algorithms.

*Status: The Report document has had some sub-topics elevated into topics, due to feedback from the In-Situ Group. These topics will now get their own areas for document research and storage.*

**DG: In-situ Measurements and Testing**

Re-Examine the system parameters that need to be measured and develop new and easily accessible measurement techniques (emphasis on repeatability).

*Status: The DG meets every 2 weeks. There has been no availability for In-Situ testing as Cinemas and review rooms are busy. The group has been concentrating on:*

- *Continued refinement of the “Single Ended Coherence Test”*
- *Developing different iterations of Test Signals*
- *Developing Recommended Testing Procedures*

**DG: Stereoscopic Subtitling**

Note: this DG also looks after non-stereoscopic subtitle projects.

Current Projects:

**EG 428-23 Mastering Guideline for Japanese Timed Text DCDM**

Creation of a guideline document for XML DCDM mastering of Japanese Timed Text to achieve desired results in current ST 428-7 renderers.

*Status: EG 428-23 is now at PCD [here](#), ending no earlier than 2024-04-10 and no later than 2024-10-10.*

**RP 428-22 D-Cinema Distribution Master – Minimal Timed Text XML Requirements**

A new recommended practice to create a “blank” ST 428-7 DCDM Subtitle file (Minimal Timed Text XML Requirements).

*Status: The document passed FCD ballot 2023-01-13 with 5 comments to resolve. Comment resolution is being worked on. The document has been converted to HTML and HTML publishing pipeline issues have been resolved.*

**SG: Exhibition Display**

The study group shall investigate the needs and wants of the various concerned parties – e.g., DCI, Exhibitors, Manufacturers, Distribution Partners, Installers, QC Testers.

It will investigate Projection and LED displays that now reach into the ITU-R Rec BT.2020 color space and

use ITU-R Rec BT.2100 transfer functions, and the implications of their use in various combinations in current and future infrastructures.

*Status: There have been 11 Sessions with different experts discussing nuance of each topic. Topics have generally been following DCI HDR and Direct View Display Specifications. The SG is looking for potential issues not addressed by DCI.*

Current Document:

### **Engineering Report**

The report will identify existing SMPTE documents that will need revision to include the new capabilities. It will recommend any further work to plug gaps.

*Status: The Study Group report is about 50% written.*

### **DG: DCDM Packed Image (pDCDM)**

Digital Cinema Distribution Master (DCDM) image essence is regularly exchanged between post-production facilities, typically using the constrained TIFF files specified at SMPTE RP 428-5. Such exchange is time-consuming and costly because of the size of these files – on the order of 10 TB for a motion picture.

#### **ST 428-24 D-Cinema Distribution Master — Packed Image (pDCDM)**

This document specifies a mapping of DCDM images, as specified in SMPTE ST 428-1, into mathematically lossless JPEG 2000 codestreams, each called a packed image.

*Status: In public CD [here](#) ending no earlier than 2023-12-29, and no later than 2024-06-28. Reviewers are requested to provide feedback.*

### **Metadata and Registers Committee (30MR) Chairs: Dean Bullock and Bill Redmann**

*The application of the General Scope as it applies to the definition and implementation of the SMPTE Registration Authority, used to identify digital assets and associated metadata such as the definition of shared metadata semantics across multiple committees.*

### **UMID Projects**

*The Chair of the following projects gave a status report.*

#### **SG: Application of the Unique Material Identifier (UMID)**

The UMID is standardized in ST 330. RP 205 covers application of UMIDs in Production and Broadcast Environments. This SG studied ways to make the UMID more useful, resulting in a report available [here](#). The SG remains open for assistance to the other UMID project groups and to review any new work items.



*Status: The SG does not have any active work.*

### **DG: UMID-related Standards**

This DG is managing the following project:

#### **RP 205 – UMID Applications**

This project will produce an updated version of RP 205 after its 1 year review and taking account of the most recent ST 330 update.

*Status: Pre-FCD-ballot review will be initiated in the TC imminently.*

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### **SG: UUID File Naming**

This project will explore ways to unify the application of UUIDs to files, primarily as file names, but respecting whatever UUIDs already have been assigned to files.

*Status: The SG continues to hold bi-weekly telecons. The draft report is approaching completion. The group is looking for a new document editor.*

### **DG: ST 331:2011 - SMPTE Standard - Element and Metadata Definitions for the SDTI-CP amendment**

This project will increase resolution and/or rate of creation date/time stamps

*Status: The revision is in ST Audit, closing 2023-10-03.*

### **WG 30MR10: Metadata Definition**

This Working Group co-ordinates the process for adding or maintaining metadata items in registers. Registers are maintained and balloted in xml format. An online tool has been introduced to assist with the development of metadata entries and their validation and acceptance for batched ballots. The document is ST 2123 - SMPTE Metadata Registers. It contains a prose document and elements containing the individual registers in xml form. Requests for changes to the registers are processed and collected into batches for balloting. The current ST 2123 register release is available online [here](#).

Published Documents:

ST 335:2012 - SMPTE Standard - Metadata Element Dictionary Structure and Amendment 1 2019

ST 395:2014 - SMPTE Standard - Metadata Groups Register

ST 400:2012 - SMPTE Standard - SMPTE Labels Structure

ST 2003:2012 - SMPTE Standard - Types Dictionary Structure

ST 2088:2019 - SMPTE Standard - Essence Element Key Register Structure

ST 2123:2023-04 - SMPTE Standard - SMPTE Metadata Registers (“Vindaloo” release)

The Metadata Registers are publicly available here: <https://registry.smpte-ra.org/pages/>

Current projects:



**Metadata Registers**

Adding requested Universal Labels to the registers that comprise ST 2123 - SMPTE Metadata Registers.

*Status: The ST 2123 “Jalapeno” release candidate is at pre-FCD-ballot review in the TC, closing 2023-12-15.*

There are WG projects to revise and simplify existing metadata Standards in line with [administrative guideline AG18](#) that defines the process for adding new UL definitions to the metadata registers.

**ST 335 Metadata Element Dictionary Structure**

Normalize to AG18

**ST 395 Metadata Groups Register Structure**

Normalize to AG18

**ST 400 SMPTE Labels Structure**

Normalize to AG18

**ST 2003 Types Dictionary Structure**

Normalize to AG18

*Status: ST 335 FCD ballot passed 2022-07-18 with no comments and the document was automatically elevated to DP status. ST Audit is held, pending revision of the other three documents. Those three closed pre-FCD-ballot review 2023-10-06 with one overall comment that will be addressed in the FCD ballot drafts.*

**[File Formats and Systems Committee \(31FS\) Chair: Tatsuji Yamazaki, Wolfgang Ruppel](#)**

*Mr Yamazaki completed his term as Chair at this meeting and was thanked.*

*The application of the General Scope as it applies to definition of common wrapper and file structures for storage, transmission, and use in the carriage of all forms of digital content components.*

**Material Exchange Format (MXF)**

MXF defines a file format for Video, Audio and Data essence along with associated Metadata, for use in production systems (rather than final delivery).

There are several MXF projects under way. Some define new MXF features / applications, others revise existing documents for better interoperability.

**Business Impact of all MXF-related work items:** Interoperability between systems in file-based production

### **Revision: ST 380 - MXF Descriptive Metadata Scheme 1**

Revise as part of the 5-year review in coordination with the revision of EG42. In addition, ensure that the labels in ST 380 are consistent with the new 30MR xml representations. References to RP 210 and RP 224 will be replaced with references to online xml registers and the ST 377-1 reference will be updated. Some minor typos will be fixed and boilerplate updated. Note: similar updates to EG 42 are proposed.

*Status: It was decided that ST 380 will not be revised – instead, it will be reaffirmed and stabilized.*

### **Revision: RP 2057 - Text-based metadata carriage in MXF**

This is a constrained revision to roll-up an amendment and check Normative References. However, the document is also being revised in line with AG24 – MXF Style Guide.

*Status: The draft revision of RP 2057 passed FCD ballot on 2018-02-09 with 5 comments to resolve. The document author has migrated the document to HTML and will use the HTML authoring tools to complete the revision.*

### **DG: ST 377-1 - MXF full revision**

This DG published the constrained revision, ST 377-1:2019, and is now starting the full revision.

Current project:

#### **Revision: ST 377-1 - Material Exchange Format (MXF)**

This project will catalogue issues in the document and align it with the xml-based SMPTE registers.

There is an issue-reporting site at <https://github.com/SMPTE/ST377-1-full-revision>

The plan is to identify and fix urgent bugs reported on GitHub in a phase 1 revision and then to decide if the remaining reported issues require a phase 2 revision.

*Status: At this meeting it was agreed that this project should be closed. It may re-open when resources become available.*

### **DG: ST 2117-10 mapping ST 2117-1 into MXF**

Current project:

#### **ST2117-10- Mapping ST 2117-1 (VC-6) into the MXF Generic Container**

*Status: The document has completed Public CD [here](#), and a package for FCD ballot has been prepared.*

### **DG: Amendment to ST 2019-4:2016 VC-3 Mapping to MXF Generic Container**

Current project:

#### **Amendment: ST 2019-4:2016 - Mapping VC-3 Coding Units into the MXF Generic Container**

This project will add support to ST 2019-4: 2016 for mapping a VC-3 bitstream carrying an Alpha channel into MXF, using the pre-defined HD raster profiles. There is a [related project](#) in the Essence TC.

*Status: The document is ready for ST Audit. The DG Chair will prepare an ST Audit package.*

## **DG: TLX and TLC MXF mapping**

Current Projects:

### **ST 2120-4 - TLX KLV Encoding and MXF Mapping**

TLX is Extensible Time Label, ST 2120 parts 1-3 that have just completed FCD ballot in this [TC-32NF DG](#). This document defines TLX-KLV elements in accordance with 377-1 to assure useability within MXF. The DG does not want a PCD phase for this document.

*Status: There is no working draft yet as a new approach has been adopted, based on mapping TLX components into “TLC”, a more generic structure; see the next project below. This will be the bulk of the work for the DG in the coming months; no WD yet.*

### **ST 2134: Descriptive Metadata Scheme for Compatible Time Labels (TLC)**

Specify an architecture to support multiple schemes for time labels and for collections of time labels that is compatible with MXF and KLV and permits the representation and serialization of these labels in MXF, KLV, XML and JSON. Specify at least one such scheme (besides TLX).

*Status: Pre-FCD-ballot review of ST 2134 closed 2023-06-20. The document editor is working with the TC-30MR Registry Maintenance team to resolve some Universal Label issues. When the labels are resolved, the document will go to FCD ballot.*

## **DG: ST 2131 - Mapping ADM to MXF**

ADM = Audio Definition Model. Define a means of mapping audio metadata RIFF chunks to MXF with specific consideration of the requirements related to ADM metadata – mapping ST 2067-204 to MXF in the same way that ST 2127 maps ST 2067-203 into MXF. There has been close collaboration & overlap with “35PM DG IMF Audio with Metadata”.

*Status: Public CD is on Github [here](#) (ST 2131 + MXF & WAV sample files). The public CD period will finish in March 2024.*

## **WG: MXF-related Documents Maintenance**

Formed at the 2021-08 meeting to manage maintenance of MXF documents.

*Status: Currently no document maintenance required.*

## **DG: Revision of ST 436-1 MXF Mappings for VI Lines and Ancillary Data Packets**

Update the normative references and make any additional editorial adjustments required.

*Status: There was no progress in the last quarter.*

**DG: Mapping DPX files into the MXF Generic Container**

- Project Scope: Specify mapping of a sequence of DPX pictures as defined by SMPTE ST 268-1 and SMPTE ST 268-2 into the MXF Generic Container. DPX sequence handling could be simpler if wrapped into a container and MXF is the container of choice. MXF+DPX solves many issues for both standards.

*Status: There will be a review of the first draft document 2024-01.*

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**WG: Archive Exchange Format (AXF)**

This Working Group (31FS-30) has defined an archive format that will promote interoperability between all forms of archive media.

Published document:

ST 2034-1 - Archive eXchange Format (AXF) - Part 1: Structure & Semantics (Rev. 1 published 2017)

Part 1 has also been published by ISO as a Publicly Available Specification, ISO/IEC DIS 12034-1.

**Business Impact:** Interoperability and more cost-effective handling of technology migration issues in archives

*Status: The Working Group meets weekly.*

Current projects:

**Revision: ST 2034-1 - Archive eXchange Format (AXF) — Part 1: Structure & Semantics**

This part creates “Wrapped” AXF Objects. Scope: Revise ST 2034-1 to correct syntax errors in XSD file, edit text document to support XSD changes, prepare a readme file to accompany the XSD file. It was intended to remove UML diagrams from the text document, but a means has been found to edit them.

*Status: Revision of ST 2034-1 prose was substantially completed in 2020. The document is awaiting update of XSD File to match text & update of UML diagrams.*

**ST 2034-2 - Archive eXchange Format (AXF) - Part 2: External Uses of XML Schema**

Part 2 covers the use of AXF Structures in “Unwrapped” form, enabling aggregation of files into a “Bundle”. It is useful in workflows. The schema can serve as a manifest and it can apply hierarchical structure to files. It is intended for use from file capture on set through to archive input. There was a strong end-user demand for this technique that gathers metadata as material passes along the workflow. Use of IMF metadata is being considered to avoid reinvention.

*Status: The WG is studying workflows to include in the consideration of requirements. A conceptual model has been completed. 49 Use Cases have been considered; Use Cases are being modeled.*

**AXFlib – Open-Source Toolkit for AXF**

Availability of Open-Source Code should increase AXF Traction - Small Archives & Libraries can't afford large-scale systems, but they are interested in applying AXF.

Wider availability of AXF systems helps large vendors, too; it increases confidence of long-term AXF support. It helps assure recoverability of large investments in libraries.

Issues such as ownership & licensing need to be decided (and could form a model for SMPTE)

*Status: Open-Source Code for some key services in Part 1 is being developed. Planned initial functions are Presentations, Unwrapper, Validation Tools, Wrapper, Selectively pull files out, Metadata reader for AXF Objects. AXF tools will be developed.*

**DG: JSON Representation of SMPTE Registered Data (RegJSON)**

Specify an isomorphic (reversible) mapping of SMPTE metadata to JSON, following the approach of defining mapping rules and normative schemas as employed for ST 2001 XML Representation of SMPTE Registered Data (Reg-XML). The public CD process will be used.

**ST 2135 JSON Representation of SMPTE Registered Data**

*Status: A sample file is available to the DG. Mapping rules are under development, starting simple becoming more complex:*

- *Map MXF scalars to JSON*
- *Map MXF rationals to JSON*
- *Map MXF lists to JSON*

**DG: Constrained DPX for HDR**

Published document:

ST 268-2 - Constrained Application of Digital Moving-Picture Exchange (DPX) Format for High Dynamic Range (including Amendment 1, also published)

Current projects:

**RP 268-3 - Reference Materials for DPX V2.0 HDR Implementations**

Project scope: Generate a reference model and test materials that implement the essential features of HDR DPX workflows.

- *Status: RP 268-3 was published in the last quarter. A revision project will be started shortly to support the newly-defined FP16 format from the ST 268-2 revision.*

**Revision: ST 268-2: Digital Moving-Picture Exchange (DPX) — Format Extensions for High Dynamic Range and Wide Color Gamut**

The project adds 16-bit floating point support, updates references, and incorporates Amd1.

*The revision has been published.*

*Note that the image/dpx IANA MIME Type registration will need to be updated. The DG Chair has contacted the Director of Standards to initiate this process.*

### **Network and Facilities Architecture Committee (32NF) Chairs: Ievgen Kostiukevych and Bruce Devlin**

*The application of the General Scope as it applies to definition and control of elements supporting the infrastructures of content production and distribution facilities, including file management, transfer protocols, time labelling of essence, synchronization of systems, switching mechanisms, and physical networks that are both internal and external to the facility excluding unique final distribution methods.*

#### **WG: SDI Interfaces**

The Working Group (32NF40) scope is:

Develop and maintain SMPTE documents related to electrical and optical SDI interfaces, including SDI, HD-SDI, and Ultra HD-SDI interfaces. Provide input on one and five year reviews, revise existing documents as directed, and develop new documents when needed.

*NOTE: The work of WG-32NF70 on UHD SDI interfaces has been merged into this group and the scope has been updated.*

**Business Impact** of all WG 32NF40 work items concerns interoperability between systems.

Current Projects:

#### **Revision ST 2081-1: 6Gb/s Signal/Data Serial Interface – Electrical**

Minor revision including updated references.

*Status: ST 2081-1 revision passed ST Audit. The document is being prepared for publication, including reviewing some editorial changes.*

#### **Revision ST 2082-1: 12Gb/s Signal/Data Serial Interface – Electrical**

Minor revision including updated references.

*Status: ST 2082-1 revision passed ST Audit. The document is being prepared for publication, including reviewing some editorial changes.*

**WG: Video Over IP**

This Working Group (32NF60) handles projects related to IP transport of media.

**Business Impact** of all WG 32NF60 work items concerns interoperability between IP - based media systems.

**DG: SMPTE 2110 suite - Professional Media over Managed IP Networks**

This group is responsible for a suite of standards specifying the carriage, synchronization and description of separate elementary essence streams over IP for the purpose of live production and facility interconnects.

Published documents:

- ST 2110-10 - System Timing and Definitions
- ST 2110-20 - Uncompressed Active Video
- ST 2110-21 - Traffic Shaping and Delivery Timing for Video
- ST 2110-22 - Constant Bit Rate Compressed Video
- RP 2110-23 - Single Video Essence Transport over Multiple ST 2110-20 Streams
- RP 2110-24 – Standard Definition Video in ST 2110
- RP 2110-25 – Measurement Practices (related to ST 2110 video, audio, ancillary data streams)
- ST 2110-30 - PCM Digital Audio
- ST 2110-31 - AES3 Transparent Transport
- ST 2110-40 - SMPTE ST 291-1 Ancillary Data
- ST 2110-43 – Timed Text Markup Language for Captions and Subtitles

*Status of DG: Revisions to parts 10, 20, 21, 22, 24, 31, 40 were published over the last year as well as publication of new document RP 2110-25.*

Current projects:

**Revision: ST 2110-40 - SMPTE ST 291-1 Ancillary Data**

Errors were discovered in SDP entries in the currently published version, caused by it being published in 2023 rather than the anticipated 2022.

*Status: The FCD ballot closed 2023-12-12 with one comment that has been resolved. At this meeting, it was agreed that the revision would bear the year 2023 when published rather than 2024, to avoid repletion of the issue.*

**RP 2110-11 – SMPTE 2110 System Timing Planes**

This practice will specify additional behaviors of media devices using controls available in ST 2110-10. While 2110 suite documents describe device interfaces, some additional practices are required to address inter-essence timing alignment at a system level.



*Status: Meeting participants are considering the best method for carrying the data to enable the alignment of the essence streams at a chosen processing point.*

**Revision: ST 2110-30 – PCM Digital Audio**

Scope-limited revision to update the reference to AES67-2018 to allow reference to the PICS contained in that revision of AES67. If other improvements are identified by the PICS team, they will be included.

*Status: The revised document closed FCD ballot 2023-10-11 with one comment that has been resolved.*

**ST 2110-41 – Fast Metadata eXpress (FMX)**

An RTP Payload Format for general metadata objects. Intended for transporting any metadata that did not originate as ST 291 ancillary data. Each type of metadata needs a defining document (SMPTE or other).

Supports “tightly-bound” metadata (associated to an essence stream) as well as other metadata with no specific relationship to an essence stream.

*Status: The document was raised to DP status by a vote at this meeting.*

**ST 2127-2 - Mapping MGA Audio Metadata to ST 2110-41**

Provide a standard for mapping Metadata-Guided Audio (MGA) Audio Metadata, as defined in SMPTE ST 2127-1, to the SMPTE ST 2110-41 Fast Metadata framework.

*Status: The document was raised to DP status by a vote at this meeting.*

**DG: RP 2110-1xx’s - Protocol Implementation Conformance Statements (PICS’s) for ST 2110 suite**

A PICS functions like a conformance checklist that implementers can complete. Each PICS document is numbered 100 greater than the document it applies to – e.g. RP 2110-110 applies to ST 2110-10. The group provided feedback to the 2110 DG which was processed as late comments in the one-year-review versions of these documents.

*Status: Parts 110, 120, 121, 122 closed FCD ballot 2023-06 with no comments and were automatically elevated to DP status. FCD ballot of parts 124, 131, 140, 143 closed 2023-11-29 with 4,3,3,0 comments respectively. Comment resolution will start at the next DG meeting, 2023-12-18.*

**WG: Time Labeling and Synchronization**

This Working Group (32NF80) was established to handle projects for next-generation synchronization of systems using packetized networks and time labeling of essence.

**Business impact of WG 32NF80 work items:** Network-based facility synchronization and new functionalities for time labeling.

Published documents:

ST 2059-1 - Generation and Alignment of Interface Signals to the SMPTE Epoch



ST 2059-2 - SMPTE Profile for Use of IEEE-1588 Precision Time Protocol in Professional Broadcast Applications

EG 2059-10 - Introduction to the New Synchronization System (revision published in 2023)

RP 2059-15 - YANG Data Model for ST 2059-2 PTP Device Monitoring in Professional Broadcast Applications

Current DGs and projects:

### **DG: ST 2059 Suite Revisions**

The DG meets bi-weekly and currently has the following project:

#### **Revision: ST 2059-2 - SMPTE Profile for Use of IEEE-1588 Precision Time Protocol in Professional Broadcast Applications**

Investigate how ST 2059-2 could be made compatible with the 2019 version of IEEE 1588 without breaking existing implementations. Two issues have already been uncovered that impact ST 2059-2; Mixed unicast/multicast mode delay request message rate signaling and TLV messages.

*Status: The remaining major issue is the SMPTE TLV. The method used to transport this TLV in the current version of ST 2059-2 is not allowed in PTP V2.1. The group is working to revise ST 2059-2 so that it defines two transport methods for the TLV:*

- *SM TLV Method 1: conveyed using legacy Management messages*
- *SM TLV Method 2: attached to Announce messages*

*A public CD period is planned to permit implementations to test compatibility.*

### **DG: ST 2059 Interoperability Testing**

The purpose is to confirm that the provisions of the standards are unambiguous and that the technology yields the intended results. The Interop DG itself is open to all SMPTE Standards Community members, but its Testing AHG and attendance at the interop meetings is subject to signing a non-disclosure agreement and memorandum of understanding.

There have been five rounds of testing, all hosted by FOX NE&O in Houston, TX, USA:

2015-11, 2016-06, 2017-03, 2018-02, 2019-02.

Reports (where available) are on this SMPTE [website page](#).

*Status: DG wants to change the scope of 32NF-80 DG ST 2059 PTP Interoperability Testing to include drafting documents to promote PTP Best Practices. A new project proposal has been drafted. It will also restart work on EG 2059-14 Best Practices for Large Scale SMPTE 2059-2 PTP Deployments – another project proposal has been drafted. Proposed new DG name: PTP Interoperability and Best Practices. The DG will Continue looking for opportunities for small focused interops for specific standards*

- *YANG Model – RP 2059-15*
- *ST 2059 new TLV and backwards compatibility*
- *ST 2059 security*

- *Possible remote virtual events*

**DG: ST 2120: Extensible Time Label (TLX)**

Create a basic Time Label with a defined mechanism for registration of additional fields. There is associated MXF work in this [File Systems technology committee DG](#).

Current Projects:

**ST 2120-1 – Extensible Time Label – TLX Structure**

**ST 2120-2 – Extensible Time Label – TLX Items** (includes a JSON schema element ST 2120-2a)

**RP 2120-3 – Extensible Time Label – TLX Profiles** (includes a JSON schema element ST 2120-3a)

*Status: The group has held 5 meetings this quarter; the next meeting is 2024-01-04. The three documents above passed FCD ballot 2022-12-26.*

*Part 1 passed with 15 comments (including late comments) – all are addressed, 7 accepted, 7 non-responsive, 1 on which progress has been slow; efforts to resolve that last comment have been protracted.*

*Part 2 has 36 comments and Part 3 has 25 comments to resolve; some comments have been addressed but the work is awaiting completion of Part 1 comments.*

**DG: UTC Aligned Timecode**

Develop algorithms and methods to accurately relate the timecode date, time, and metadata to PTP referenced time for both integer and fraction frame rates

Current Project:

**ST12-4 – UTC-Aligned Timecode**

Develop a new standard to document the new timecode generation process

*Status: The DG has held 3 meetings in the last quarter. Pre-FCD-ballot review is underway, closing 2023-12-22.*

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**WG: Data over AES3**

This Working Group (32NF90) was established to handle projects that standardize AES3 carriage of data streams. These streams may be compressed audio, metadata – anything other than AES3 audio itself!

*Status: The structure of this WG has been simplified. A project proposal is awaited to restart development of ST 2041-4 – MPEG H Data in AES3.*

### SG: Security in SMPTE ST 2059

This Study Group investigates vulnerabilities in ST 2059 systems, both malicious and accidental. The group has decided to issue limited-scope incremental reports, whilst collecting topics (in a “backlog”) for future reports.

#### Published Reports:

Version 1 of the report is published, [ER 1004](#). It focused on the Threat Landscape.

Version 2 that focuses on threat detection and mitigation strategies is published, [ER 1009](#).

*Status: A new Chair for this SG is required for it to take on any new work. The group has not been closed, as it is possible that there may be a 3rd report on new security features introduced in IEEE 1588:2019 once the best practice on secure key exchange methods settles down.*

### DG: 32NF Inter Entity Trust Boundary

Current Project:

#### RP 2129: Inter Entity Trust Boundary

The document introduces the concept of a Trust Boundary, which is a security function at the edge of an Entity’s network, and explains how most of the security, address space and firewalling challenges can be overcome to securely exchange IP flows between third party networks in a pre-defined architecture using existing protocols.

*Status: RP 2129 has been published in the last quarter. It was posted as Public CD [here](#) (comment period now closed). RP 2129 is being used as a “poster child” for SMPTE micro-branding of its standards or standards families.*

### 32NF Document Maintenance Group

This group holds monthly meetings to address issues reported on GitHub and to make the process easier to use. It also works on one-year and five-year document reviews. There are 6 GitHub repos and more are needed:

*Status: There are 111 documents in the master*

<a href="#">ST 299-1 GitHub</a>	<a href="#">ST 2022-1 GitHub</a>	<a href="#">ST 2059-2 GitHub</a>	<a href="#">ST 2110-10 GitHub</a>
<a href="#">RP 2110-23 GitHub</a>	<a href="#">ST 2110-30 GitHub</a>		

*list. Of those, 45 documents are left for review; volunteers please!*

**Media Systems, Control and Services Committee (34CS) Chairs: Karyn Reid and Paul Gardiner**

*The application of the General Scope as it applies to the implementation of media services, methods of managing and controlling hardware devices and software systems, and the management of media workflow processes, including associated signaling and control mechanisms.*

**DG: UMID Resolution Protocol**

This project will draft a new SMPTE standard that specifies an industry-standard method for a given UMID to be converted into the corresponding URL of its audiovisual (AV) material.

*Status: There has been no progress in the last quarter as the DG Chair has focused on associated TC-30MR UMID work.*

**DG: BXF Suite of Documents**

Published documents:

RP 2021-1: General Information and Informative Notes

ST 2021-2: Protocol

EG 2021-3: Use Cases

ST 2021-4: Schema Documentation

RP 2021-5: Ad-ID / EIDR in BXF

RP 2021-6: BXF SDK Documentation

RP 2021-9: Implementing BXF

BXF is an XML-based system that standardizes exchange of Schedule, As-run, Content Transfer instructions, Content-related metadata, and Agency instructions.

BXF incremental development - New features are added to the suite at regular intervals and these are batched into versions using a numeric version number – current published version is BXF 8.0.

*Status: The DG has completed a project for a quick BXF 8.1 revision to incorporate NABA requested changes (until now all revisions have been “dot zero”). The only document affected is ST 2021-4. Publication is expected very shortly.*

*The group has been working on assembling all BXF document elements from v 1.0 to 8.1 into a GitHub repo for easy access by implementers. It anticipates addressing a few minor updates in the New Year for BXF 9.0.*

**SG: Required Application Protocol Standards for IP-Based Media Production**

This group will explore prospective Media Industry layering models and standards requirements for interoperability of production applications running on IP-based media networks.

*Status: The SG report is being reviewed in the SG before submission to the TC for review.*

**DG: Media Microservices**

This group has been managing Microservices projects submitted to SMPTE from the Open Services Alliance, OSA. In the last quarter, the OSA has been merged into the SMPTE RIS activity – Rapid Industry Solutions.

*Status: Topics for future work are being developed in RIS-OSA. They include Catena (Data Model, Security, Architecture, Orchestration, GitHub); Best Practices for Stream Distribution; Global Service Repository.*

Projects currently underway:

**ST 2125 – IMF Registration Service API**

This project facilitates the use of IMF packages.

*Status: Issued as public CD document [on this page](#). The DG has decided to revise the Public CD and submit the revision for a second public CD period. The DG believes it can change JSON Schema to an informative reference, collect updates from document editor, and then proceed to FCD.*

**ST 2126 – Microservices Status Reporting and logging**

This project creates a standardized approach to implement status reporting to overcome the problem of multiple proprietary and non-interoperable ways.

*Status: Issued as public CD document [on this page](#). It now includes terms harmonized with the terminology project and it is ready to move on to next step (FCD ballot).*

**Media Microservices Terminology**

Provides definitions for terminology used in the other Microservices documents.

*Status: This project will proceed, but the output will be an online vocabulary and not a standard – the allocated ST 2132 document number is no longer needed. The format (XLSX, JSONLD, etc) is being considered.*

**ST 2133 - Job Processing Architecture**

Aims to overcome variations in existing Job Processing Architectures that cause interoperability problems.

*Status: A new draft has just been posted, adding terminology and making requirements normative.*

**Media Packaging and Interchange Committee (35PM) Chairs: Raymond Yeung and Mitch Jacobs**

*Mitch Jacobs has reached his term limit as Chair and he was thanked by the meeting. JoAnne Kim will take on the role.*

*The application of the General Scope as it applies to the packaging of media elements, to facilitate interchange and interoperability of formats within specific integrated application ecosystems in the professional fields of media creation, production, postproduction archiving and related topics.*

**Interoperable Mastering Format (IMF)**

*IMF is a file-based framework designed to support multiple high-quality content versions of a finished work destined for distribution channels worldwide. It facilitates management and processing of these content versions, including playback, validation and transformation to the various master formats used by each distribution channel. IMF is intended for international use in professional applications.*

**Business Impact:** Interchange of file-based masters for current and next generation audiovisual content, including wide-color gamut (WCG), high-dynamic range (HDR) imaging and immersive audio.

**DG (35PM-50): IMF Document Maintenance**

Issues are continuously collected and discussed in SMPTE 35PM GitHub repository - <https://github.com/SMPTE?q=2067> - and members contribute to revision work, for both bugs and improvement requests.

*Status: The DG has taken on work to review the impact of the deprecation and eventual removal of support for SHA-1 hashing on IMF standards. The DG Chair delivered a report that noted that SHA-1 is used as an error check in IMF but not for content security. An advisory note is proposed to explain this situation. The DG does not currently have any documents in maintenance,*

Published Interoperable Mastering Format documents:

- ST 2067-2 - Core Constraints
- ST 2067-3 - Composition Playlist
- ST 2067-5 - Essence Component
- ST 2067-8 - Common Audio Labels
- ST 2067-9 - Sidecar Composition Map
- ST 2067-20 - Application #2
- ST 2067-21 - Application #2E
- ST 2067-30 - Application #3
- ST 2067-40 - Application #4 Cinema Mezzanine
- ST 2067-50 - Application #5 ACES
- ST 2067-60 - Application #6 UHD TV Program Workflow (AVC)

RDD 45 - Application ProRes  
RDD 59-1 - Application Constraint DPP (ProRes)  
ST 2067-100 - Output Profile List  
ST 2067-101 - Output Profile List - Common Image Definitions and Macros  
ST 2067-102 - Output Profile List - Common Image Pixel Color Schemes  
ST 2067-103 - Output Profile List - Common Audio Definition and Macros  
ST 2067-200 - Dynamic Metadata for Color Volume Transform (DMCVT) Plug-in  
ST 2067-201 - Immersive Audio Bitstream Level 0 Plug-in  
ST 2067-202 - Isochronous Stream of XML Documents (ISXD) Plugin  
ST 2067-203 - IMF Audio with Frame-based S-ADM Metadata Plug-in

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## **DG: IMF Output Profile List**

This group created parts 100, 101, 102, 103 of the IMF suite.

*Status: There has been no work on the remaining OPL documents in the last quarter. The DG undertook to pick up the pace of development in 2024. A decision has been made to convert to the HTML document development workflow for the four projects below.*

Current projects:

### **Revision: ST 2067-101-OPL-Image Macros**

Revision to clarify the handling of images that are: i) chroma-subsampled; ii) Interlaced; and iii) stereoscopic.

This project also adds new common image processing macros to ST 2067 -101:2018 including 3x3 matrix, 1D LUT (Look Up Table), named transfer function decode/encode and named color space conversion.

### **ST 2067-104 – OPL Composite and Blend Macros**

This new document develops the processing macros for image composite and blending between a foreground and a background plate with an alpha (channel) image to control the operation. The macros are part of the IMF OPL framework defined by ST 2067-100.

### **ST 2067-105 – OPL Output Macros**

This new document develops the image and audio output macros for the IMF OPL framework defined by ST 2067-100. This project will add a set of output macros based on the AMWA AS-11 in OPL report (SMPTE ER 1006) and IAB in OPL report (SMPTE ER 1005) including the generation of ISO BMFF (QuickTime), TTML, AMWA AS-11, PCM essence in ISO BMFF (QuickTime) and immersive audio in BWF+ADM files.



*Status: Completion will follow Parts 101 and 104.*

### **ST 2067-106 – OPL EssenceType Transform Macros**

This new document develops the essence type transform macros for timed-text rasterization and immersive audio bitstream (IAB) conversion. The macros are part of the IMF OPL framework defined by ST 2067-100.

*Status: Completion will follow Parts 101 and 104.*

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### **DG: IMF Application VC-3**

Current project:

#### **ST 2067-70 - IMF Application of ST 2019-1 (VC-3)**

To define a mastering workflow using VC-3 family of codecs in IMF, focused on broadcast post-production. A public CD release is intended.

*Status: The document was posted as a PCD on [GitHub](https://github.com) and has been well publicized. It passed FCD ballot 2023-04-01 with 11 comments to resolve. Proposed comment resolution is complete and the commenters will be contacted to ask for their approval.*

### **DG: IMF Application VC-5**

IMF Application for VC-5 based on ST 2073-10 MXF Wrapper

Current Project:

#### **ST 2067-72 - IMF Application VC-5**

*Status: The document has been packaged for pre-FCD-ballot review. The current draft is being revised to add some suggested elements that were missing.*

### **DG: IMF Application VC-6**

Current Project:

#### **ST 2067-71 - IMF Application VC-6**

*Status: The document completed its PCD period on [GitHub](https://github.com) with no comments. An FCD package has been prepared.*

### **DG: IMF Audio with Metadata**

*Status: First implementations of both standards are available. Both standards are on the agenda of the IMF User Group plugfests 13 and 14 December.*

Current projects:

#### **ST 2067-203 - IMF Audio with Frame-based S-ADM Metadata Plug-in**



Draft a standard for an IMF Plug-in for adding MGA signals with S-ADM metadata as Virtual Tracks to IMF compositions.

*Status: Published.*

#### **ST 2067-204 IMF Audio with ADM Metadata Plug-in**

Develop a standard for an Interoperable Master Format (IMF) plug-in to allow ADM (Audio Definition Model, ITU-R BS.2076) metadata to be carried alongside PCM essence in IMF compositions, where the Track Files used are Audio Track Files (SMPTE ST 2067-2) augmented by ADM metadata

*Status: ST 2067-204 is now posted for Public CD review [here](#).*

#### **DG: ST 2067-205 IMF Auxiliary Image Sequence**

Specify Auxiliary Image Sequence Track File, Virtual Track for CPL, and any additional constraints. Sign language is an example use-case.

*Status: This project has been impacted by personnel change. There are efforts to get the project underway again.*

#### **DG: Event-based Text-based Data Plug-in**

*Status: Projects are approved but have been dormant for some time. It was reported at the meeting that there is already an implementation available.*

Current Projects:

#### **ST 2067-206 IMF Event-based, Text-based Metadata Plug-in**

Develop a standard for an Interoperable Master Format (IMF) plug-in to add event-based, text-based metadata to IMF Compositions, including an optional XML/JSON scheme for generic event-based metadata.

#### **ST 2067-207 IMF Video Viewports Metadata Plug-in**

Develop a standard that extends the “Interoperable Master Format — Event-based, Text-based Metadata Plug-in” for use in adding video viewports metadata (similar to “pan and scan” metadata) to IMF Compositions.

**SMPTE Standards Publications in the Last Quarter***Includes Revisions and Amendments***10E Essence**[ST 2117-1:2023 - SMPTE Standard - VC-6 Multiplanar Picture Format — Part 1: Elementary Bitstream](#)**27C Cinema****30MR Metadata & Registers****31FS File Formats & Systems**[RP 268-3:2023 - SMPTE Standard - Reference Materials for DPX V2.0 HDR Implementations](#)**32NF Network & Facilities Architecture**[RP 2129:2023 - SMPTE Recommended Practice - Inter-Entity Trust Boundary](#)[RP 2059-15:2023 - SMPTE Recommended Practice - YANG Data Model for ST 2059-2 PTP Device Monitoring in Professional Broadcast Applications](#)**34CS Media Systems, Control & Services****35PM Media Packaging & Interchange**[ST 2067-203:2023 - SMPTE Standard - Interoperable Master Format — Audio with Frame-based S-ADM Metadata Plug-in](#)

These documents are hosted on the IEEE *Xplore* website. SMPTE has announced that its document hosting will move – here is the announcement:

*Beginning in January of 2024, SMPTE subscriptions will no longer be managed by IEEE.*

*All SMPTE materials, including publication workflows for standards, conference papers, and the Motion Imaging Journal, will be transferred back to SMPTE.org. This means even greater access and benefits for SMPTE members.*

*All current SMPTE subscriptions will remain active on IEEE Xplore until they expire and during this period, you will have access to content on both platforms.*

*We are working closely with IEEE to ensure the seamless transition of member services.*

*SMPTE is grateful to IEEE for our past collaboration and we anticipate new opportunities for future partnerships.*

**SMPTE Public Committee Drafts***Link to current PCDs [here](#)*

## Notes on this Report and the SMPTE Standards Process

*Any trademarks appearing herein are the property of their respective owners.*

*SMPTE Technology Committees (TCs) are tasked with the development and ongoing maintenance of engineering documents concerning Television, Broadband, Cinema. TCs are set up by the Standards Vice President (SVP) and are overseen by the Standards Committee (ST).*

*The standards process operates under the [SMPTE Standards Operations Manual \(OM\)](#) All participants must abide by these provisions. A suite of [Administrative Guidelines](#) support the Standards OM.*

*Within Technology Committees, there may also be Working Groups (WGs), Study Groups (SGs) Drafting Groups (DGs) and Ad-Hoc Groups (AHGs).*

*The ‘Standards Community’ (SC) is a “parent group” that encompasses all Technology Committees. Joining SC requires a Standards Participation subscription that allows members to join all TCs and sub-groups that are of interest. An SC meeting is held during each meeting round to convey information that is relevant to all TCs, such as meeting logistics and registration information.*

### **SMPTE Document Development Process**

*The document stages are:*

**WD** = Working Draft    **CD** = Committee Draft inc. **pCD** option for early public exposure via GitHub

**FCD** = Final Committee Draft (has passed FCD ballot)

**DP** = Draft Publication, which initiates.....    **ST Audit** - a due-process check by the Standards Committee

### **SMPTE Document-Type Prefixes**

**ST** = Standard

**RP** = Recommended Practice

**EG** = Engineering Guideline

**RDD** = Registered Disclosure Document    **ER** = Engineering Report (from Study Group or Task Force)

**OV** = Overview, usually used with multipart document suites to explain the structure

### **SMPTE Document Review**

*The SMPTE Operations Manual calls for review of published documents:*

*- One Year after original publication - to check whether comments have been received during initial implementations and to revise if required*

*- At Five Year intervals after original publication - to check whether the provisions need to be revised*

*Options are: Revise; Reaffirm; Stabilize; Withdraw.*

### **Other Notes**

*This report describes each active **Project** in each TC. Occasionally, there is more than one project group working on a technology topic. In this case, those projects are grouped under a **Topic** headline.*