



# STANDARDS QUARTERLY REPORT September 2024

Result of SMPTE<sup>®</sup> Technology Committee  
Meetings (Hybrid, In-Person/Online)

Hosted by EBU  
L'Ancienne-Route 17A,  
1218 Grand-Saconnex, Geneva, CH

18th to 19th of September 2024

## THE NEXT CENTURY

## SMPTE® Standards Quarterly Report

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

SMPTE Standards Committee Meetings 18-19 September 2024  
Host: EBU L'Ancienne-Route 17A, 1218 Grand-Saconnex, Geneva, CH

### Executive Summary

This Executive Summary lists new project proposals this quarter and provides 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 101 registrations for attendance over the two days as follows:

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|--|--|
| <ul style="list-style-type: none"> <li>• In Person:           <ul style="list-style-type: none"> <li>○ All Days:               <ul style="list-style-type: none"> <li>▪ Members: 20</li> <li>▪ Guests: 1</li> </ul> </li> <li>○ Wednesday Only:               <ul style="list-style-type: none"> <li>▪ Members: 1</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Virtual:           <ul style="list-style-type: none"> <li>○ All Days:               <ul style="list-style-type: none"> <li>▪ Members: 58</li> <li>▪ Guests: 3</li> </ul> </li> <li>○ Wednesday Only:               <ul style="list-style-type: none"> <li>▪ Members: 9</li> </ul> </li> <li>○ Thursday Only:               <ul style="list-style-type: none"> <li>▪ Members: 9</li> </ul> </li> </ul> </li> </ul> |
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Documents published in the last quarter from the work of each TC are listed on [this page](#).

<b>Proposals for new SMPTE projects submitted in the last quarter</b>			
<b>Project Name</b>	<b>Type</b>	<b>Technology Committee</b>	<b>Approval Period Ends</b>
RP 2110-xx – VPID/SDP interplay	New Recommended Practice	Network Architecture	2024-06-24
ST 2123 Registers (Balsamico)	Revision	Metadata	2024-07-30
Descriptive Metadata Scheme for Identity and Integrity (DMS-II)	New Standard	File Systems	2024-08-14
ST 2138-11 Catena gRPC	New Standard	Media Systems	2024-09-20
ST 2138-12 Catena WSS	New Standard	Media Systems	2024-09-20
ST 2138-13 Catena REST	New Standard	Media Systems	2024-09-20
<i>Approved previous round, retained for context:</i>			
ST 2138-10 Catena Interface	New Standard	Media Systems	2024-03-29

## ***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](#)

Twelve parts of the suite are published, including recent revisions. An application document for the fast metadata transport for audio metadata is also published.

There is also a part in development on 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” has expanded 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](#)

### **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 complete and heading for publication. [Details](#)

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## ***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 Application documents, Audio with Metadata, Auxiliary Image Sequence, Event based Metadata, Virtual Track fingerprint. [Details](#)

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

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

*Most current work involves revisions or additions to these standards suites:*

- 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, though [minor revision](#) is taking place. An IMF Application is underway. [Details](#).
- Projects to revise SMPTE VC-3 documents to add Alpha channel completed recently; more revisions are expected soon. An IMF mapping has just been completed – [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 (with sub-teams researching specific topics)

[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

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:

- Text-based metadata carriage in MXF (revision)
- Mapping VC-6 into the MXF Generic Container
- Mapping VC-5 into the MXF Generic Container
- Mapping VC-3 Coding Units into the MXF Generic Container (amendment)
- Mapping Audio Definition Model to MXF
- Mapping DPX files into the MXF Generic Container
- MXF Mappings for VI Lines and Ancillary Data Packets (revision)
- Extensible Time Label (TLX) in MXF via Descriptive Metadata Scheme for Compatible Time Labels (TLC) – 2 projects
- AVC into MXF Generic Container (revision)
- Descriptive Metadata Scheme for Compatible Time Labels

## Media Microservices

This group has a project in the public Committee Draft stage - IMF Registration Service API. Its Status Reporting and Logging document has just completed ballot. There is a Job Processing Architecture document in development and a new suite of documents for the Catena control interface.

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 passed FCD ballot; one has returned for a second FCD ballot. [Details](#)

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 were upgraded to use xml rather than spreadsheets and an additional register was standardized for Essence elements keys. It 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, ER 1010, is now published [here](#)). It continues to meet to consider standardization requirements.

### **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 18-20 September 2024  
Host: EBU L'Ancienne-Route 17A, 1218 Grand-Saconnex, Geneva, CH*

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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. 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 see [this website page](#) or 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, Steve LLamb, Dean Bullock, and Raymond Yeung.

Each round comprises meetings of Technology Committees (detail in the sections 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 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](#).

## Future Meetings

Quarterly Standards meeting rounds are planned for:

- Q4 2024 9-12 December Online
- Q1 2025 3-6 March Online
- Q2 2025 June; hybrid Tokyo
- Q3 2025 17-19 September; hybrid Europe

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](#).

In addition to the TC meetings, there was a Standards Community meeting that covered:

- Future meetings schedule
- MTS conference details
- HTML editing
- Study Group Updates (Sustainability, Content Provenance, Authenticity)
- Library App
- Publication Update

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 – ST 2136 suite**

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 2136-1: Common LUT Format**

*Status: The DG has held 5 meetings in the last quarter; the next meeting will be 2024-10-01. A draft standard and xml schema are under review in the DG; planning for pre-FCD-ballot review in October.*

##### **ST 2136-10: CLF Broadcast Profiles**

*A project proposal is in preparation for this new Part to the suite for profiles supporting live broadcast workflows.*

#### **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 reported that the group is making progress and that the work has proved to be more complex than expected.*

**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.*

**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. The 2080-4 work will take priority.*

**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: A DG member is building a pre-DP package.*

**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.***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: Test materials are available on a [GitHub repo](#). This link has now been added to the published RP 2073-2 document.**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](#) to revise ST 2073-10, the MXF wrapper, in TC-31FS.**A VC-5 "[landing page](#)" is available on the SMPTE website.*

**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 no progress in the last quarter. The document will be developed in HTML format.*

**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 is numbered 1. In digital standards, the first line is numbered 0.

*Status: There was no report.*

**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.*

**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.*

**Revision of ST 2048 suite**

These are routine revisions arising from a 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: The three documents below are being prepared for publication.*

**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 4096×2160 Digital Cinematography Production Image Formats FS/709 — Mapping into Multi-link 10 Gb/s Serial Signal/Data Interface**

**Other TC-10E business**

A project proposal is being prepared to revise the TC-10E VC-3 documents. Another project proposal is being prepared to standardize diffuse/reference white metadata for HLG workflows.

**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: A large number of document revisions from this group have recently been published. The group will meet later in the meeting week.*

**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 – to Include D-Cinema immersive audio objects and bed channels in an unambiguous manner. 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, aligned with ST 2095-1. Together with SMPTE ST 202, it is intended to assist in standardization of reproduction of motion-picture sound in such rooms.

*Status: The RP 200 revision is entering Pre-FCD-Ballot review in TC-27C.*

**SG: D-Cinema Origins Study Group Final Report Archival Effort**

Researchers of media and technology history need widely-accessible primary source documents to reference in order to accurately recreate milestones in technology and to utilize them in the consideration of future requirements.

There was no published Final Report of the Digital Cinema Study Group, or any collected components of the work of the sub-committees, which should be available for reference and historical significance.

*Status: The SG has held 3 meetings. It is largely in the data-accumulation stage, collating contributions.*

**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: 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: Sub-Teams have been meeting on topics for development of Objective Metrics (all meet bi-weekly):*

- *Linearity and coherence testing team – testing several concepts, reworking tests and creating new variations on what has been learned*
- *Coverage, level, consistency, timbre team – largely in Research stage on existing documents and reviewing standards and research papers*
- *Dialogue intelligibility team – continue developing tests (word lists, sentence lists, music and EFX beds)*

**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 group has been on hiatus, as lead drivers have been working on other B-Chain projects. Editing is in progress.*

**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: No status report, but editing is in progress.*

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.

**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 has completed PCD [here](#). Update work is underway on comments received.*

**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: A comment was received during pre-DP-ballot review; work is ongoing.*

**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: Passed FCD ballot 2024-07-19 with 9 comments to resolve (mostly editorial).*



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

*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 has started to explore how UMID can contribute to the “material” identity and integrity (relates to DMS-II project in 31FS).*

**DG: UMID-related Standards**

This DG is managing the following project:

**Revision 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: The RP 205 revision has passed ST Audit and will be prepared for publication. However, during preparation for publication some issues were discovered and the document editor has agreed to have a second FCD ballot.*

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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 – next meeting 2024-09-23. Work on the draft report is continuing.*

**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 (“Jalapeno” release)

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

## Current projects:

**Revision ST 2123 SMPTE Metadata Registers**

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

*Status: The ST 2123 “Jalapeno” release was published, and the xml registers released [here](#) on SMPTE-RA 2024-05-27.*

*The next planned release “Balsamico” is closed and a snapshot candidate for the next ballot was taken 2024-07-31.*

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.

**Revision ST 335 Metadata Element Dictionary Structure**

Normalize to AG18

**Revision ST 395 Metadata Groups Register Structure**

Normalize to AG18

**Revision ST 400 SMPTE Labels Structure**

Normalize to AG18

**Revision 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. FCD ballot of the other three documents closed 2024-08-20. ST 395 had 53 comments, ST 400 had 2 comments, ST 2003 had 5 comments.*

*Many comments were editorial and it was recognized that some apply to ST 335. Consequently, it is planned to reballoon ST 335.*

**File Formats and Systems Committee (31FS) Chair: Wolfgang Ruppel**

*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: 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 is generating code directly from the SMPTE-RA data (to ensure consistency) and an MXF vocabulary. The author anticipates an HTML version of RP 2057 in 2024-12.*

**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 passed ST Audit and publication is being 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 published, and the project will be closed.*

**DG: ST 2073-10 mapping ST 2073 into MXF**

Current project:

**Revision ST 2073-10 - Mapping VC-5 Video Essence into the MXF Generic Container**

Current version omits capabilities from VC-5 documents published after ST 2073-10 was published.

*Status: Work on ST 2073-10 revision will begin soon, depending on comments posted against IMF Application VC-5 in 35PM at Public Committee Draft.*

**DG: TLX and TLC MXF mapping**

*Status: The DG has held 2 meetings in the last quarter. It is not planning a Public CD for these documents.*

Current Projects:

**ST 2120-4 – Carriage of TLX in DMS-TLC (was Mapping TLX into MXF and KLV)**

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 it is dependent on mapping TLX components into “TLC”, a more generic structure; see the next project below. It is also waiting for ST 2120-2 in TC-32NF to stabilize.*

**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: FCD ballot of ST 2134 closed 2024-06-17 with 23 comments to resolve. Three comments remain unresolved, and the meeting Chair suggested waiting another week to achieve resolution with the commenters.*

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

ADM = Audio Definition Model. Defines 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 comment period has closed (on GitHub [here](#), ST 2131 + MXF & WAV sample files). The DG has got some useful additions for the document to take it forward to prepare the FCD ballot package.*

**WG: MXF-related Documents Maintenance**

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

**Revision-ST-381-3-AVC into MXF Generic Container**

*Status: The revision passed FCD ballot 2024-07-26 with 28 comments to resolve; only one comment left to resolve.*

**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: Some changes have been incorporated. The DG Chair hopes to get to FCD ballot soon.*

**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.

Includes:

- Define frame/clip wrapping for SMPTE ST 268-1 & ST 268-2
- Define necessary SMPTE Registry ULs for DPX into MXF identification
- Define basic constraints on DPX sequences that can be mapped into MXF
- Allow future extensions and constraints for specific applications
- Support advanced colorimetry and bit depth as defined in ST 268-2

*Status: Core constraints defined; ULs defined; Frame/Clip wrapping modes defined; Mapping/Helper tables provided for implementers. Last review before preparing for PCD process.*

**DG: Descriptive Metadata Scheme for Identity and Integrity**

There is a current requirement for Identity and Integrity Metadata to be carried in professional media files throughout the production process. Professional media file formats include at least ST 377 MXF.

This metadata must be inserted as soon as it is available (as early as camera crew assignment) and must persist throughout the production chain - through Ingest, Editing, Packaging and Payout. At each stage of the production chain, media and metadata must be able to be augmented and modified.

Current Project:

**ST 2140-1 Descriptive Metadata Scheme for Identity and Integrity**

The DMS-II project will develop and document an architecture, a data model and a detailed specification to carry Identity and Integrity metadata in ST377 MXF files using the ST336 KLV Protocol.

The data model and specification will include the categories listed above.

The specification for bindings will address MXF media structures including I frame and long GOP media and Frame wrapped, Clip wrapped and Partitioned files.

*Status: The group gave a short tutorial on this newly-approved project. The meeting recognized that this is important work and that SMPTE Marketing should publicize it.*

**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.

*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: No major progress in last quarter (focus has been on Open-Source project). 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 has studied workflows to include in the consideration of requirements. A conceptual model has been completed. 49 Use Cases have been identified and have led to revisions to ST 2034-1; Use Cases are being modeled.*

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

Availability of Open-Source Code should increase AXF Traction - Small Archives & Libraries cannot 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: A problem has arisen regarding the original offer of open-source code. The group is considering ways to continue this work.*

**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: There has not been much progress recently, but the work is proceeding towards the next update of the WD.*



**DG: Constrained DPX for HDR**

Published documents:

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

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

Current projects:

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

Project scope: A revision project has been initiated to support the newly-defined FP16 format from the ST 268-2 revision.

*Status: The DG is in the process of modifying the reference software accordingly (including changes to the interface functions for better memory efficiency). Once the software is known to be working, new FP16 example images will be added. Some issues in the current reference materials will also be fixed.*

*A related item: IANA has updated the image/dpx mime type – completing the ST 268-2 revision project.*

**Other TC-31FS business**

The TC received a new request for a new RDD project:

Material Exchange Format (MXF) - Mapping Immersive Audio Bitstream into the MXF Generic Container for Repository File Formats.

***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.*

Current Projects:

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

Minor revision including updated references.

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

Minor revision including updated references.

*Status for both: Published, and the group will be closed.*

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**WG: Video Over IP**

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

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

ST 2110-43 – Timed Text Markup Language for Captions and Subtitles

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

*Status of DG: Revisions to parts 10, 20, 21, 22, 24, 31, 40 have been published as well as publication of new documents RP 2110-25, ST 2110-41, ST 2127-2.*

Current projects:

### **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: Regular bi-weekly meetings will resume following a hiatus.*

### **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: Pre-DP-vote closed 2024-03-11 with no comments. There has been no further work towards publication.*

### **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 is published. However, an error in an Annex has been identified and a revision is planned (awaiting revision project proposal and review). It will implement the recommendations contained in [this advisory note](#).*

*A register for ST 2110-41 Data Item Types has been set up [here](#) and a request to add a code range for IPMX will be added (awaiting a document number from VSF for reference).*

**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 is published (kept here for its relationship to ST 2110-41). It also has a Data Item Type registration.*

**RP 2110-xx - VPID-SDP Interplay**

Most SDI signals, by rule, include a VPID (Video Payload Identifier) within the ancillary data space. Within the ST 2110 system, information about the video signals is conveyed through management systems using SDP objects, and this information includes some of the data that also exists in the VPID. This document establishes recommended practices for the interplay of SDP and VPID information in ST 2110 systems.

*Status: The project completed the approval period 2024-06-24; the project needs to be assigned to this WG.*

**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. However, a comment about using dated references vs. undated references has held up progress on these documents. Part 130 awaits completion of ST 2110-30 revision.*

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**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 objectives of the revision are:*

- *Achieve compliance with IEEE Std 1588-2019 (PTP V2.1)*
- *Allow for backward compatibility with current version of ST 2059-2*
- *Allow installations to migrate gradually from current version of ST 2059-2 to new version*
- *Allow use of new features of PTP V2.1*

*Revised ST 2059-2 document completed pre-FCD review in August and DG is currently working on changes to the document based on review feedback*

*This document will go to public CD*

### **DG: ST 2059 PTP Interoperability and Best Practices**

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](#).

The DG recently extended its scope to include documenting best practices.

*Status: 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*

Current Projects:

### **EG 2059-14: PTP Best Practices for Professional Media Over Managed IP Networks**

*Status: The DG has submitted a change to make this a Recommended Practice rather than an Engineering Guideline. The document is taking shape.*

**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 three documents above passed FCD ballot 2022-12-26. It was decided at the last meeting that Part 1 would be reballoted at FCD. It is currently at FCD ballot closing 2024-09-26.*

*Part 2 has 36 comments (11 addressed), and Part 3 has 25 comments (22 addressed). Comment resolution may be affected by comments on the reballot of Part 1.*

**DG: UTC-aligned Timecode**

Current Project:

**ST 12-4 – 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.

Define the binary group coding of the date, UTC offset and optionally the rate and higher rate metadata utilizing ST 262 or ST 309.

Develop a new standard to document for the new timecode generation process

*Status: The document is at FCD ballot, closing 2024-10-16.*

**DG: Signal Sync Alternate Mode**

Current Project:

**ST 2139 - Signal Sync Alternate Mode**

Enable transport of timing signals using a USB-C Alt mode. This would enable devices that only have USB-C connections to join systems that use, e.g., the sync signal defined in SMPTE 274:2008 Clause 10.

*Status: The WD is in progress. Public CD is planned.*

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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: A project proposal is awaited to restart development of ST 2041-4 – MPEG H Data in AES3.*

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### 32NF Document Maintenance Group

This group holds bi-weekly 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:

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

*Status: There are 111 documents in the master list. Of those, 47 documents are left for review. Volunteers, please!*

### **Media Systems, Control and Services Committee (34CS) Chair: Karyn Reid**

*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: BFX 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 BFX

RP 2021-6: BFX SDK Documentation

RP 2021-9: Implementing BFX

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

BFX 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 BFX 8.1.

*Status: The group has completed work to assemble all BFX document elements from v 1.0 to 8.1 into a GitHub repo for easy access by implementers.*

*It anticipates working on BFX 9.0 when there is a critical mass of new items; currently the group's work is paused.*

#### **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 was reviewed in the TC and comments were submitted. The SG's response to the comments has been received and the report can progress through the publication process.*



**DG: Media Microservices**

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

*Status: Topics for future work are being developed in RIS-OSA. Currently they are: Best Practices for Live Stream Distribution, Global Service Repository.*

Projects currently underway:

**ST 2138: Catena**

This will be a suite of documents defining the Catena control system and comprising parts on Interface, Security, Architecture, Orchestration (perhaps more).

*Status: Proceeding well with bi-weekly meetings. There was a decision to separate out the connection types from the data model; Catena will now become a standards suite (when the new project proposals are approved - [details](#)).*

**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 protocols.

*Status: Issued as public CD document [on this page](#) (comment period now closed). It now includes terms harmonized with the terminology project and passed FCD ballot 2024-06-07 with 7 comments that are all now resolved. The document will go to pre-DP-ballot review.*

**Media Microservices Terminology**

Provides definitions for terminology used in the other Microservices documents.

*Status: This project is proceeding as an online vocabulary resource on the SMPTE website.*

**ST 2133 - Job Processing Architecture**

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

*Status: Pre-FCD-ballot review closed 2024-06-06 with no comments. It can proceed to public CD.*

***Media Packaging and Interchange Committee (35PM) Chairs: Raymond Yeung and JoAnne Kim***

*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/orgs/SMPTE/repositories?q=2067> - and members contribute to revision work, for both bugs and improvement requests.

*Status: 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. A decision has been made to convert to the HTML document development workflow for the four projects below.

*Status: The DG has been developing the Working Draft documents; other projects have prevented progress. The Common LUT work in TC-10E may get this work moving again.*

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.*

**DG: IMF Application VC-3**

This group documents an IMF Application for VC-3 image essence as specified by SMPTE ST 2019-1.

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 published 2024-09-03; the project will be closed.*

**DG: IMF Application VC-5**

IMF Application for VC-5 based on ST 2073-10 MXF Wrapper. This group documents an IMF Application for VC-5 based on SMPTE ST 2073-10 MXF Wrapper. The DG holds bi-weekly meetings.

Current Project:

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

Completion of an IMF Application for VC-5 image essence limited to the capabilities of the VC-5 MXF wrapper specified in SMPTE ST 2073-10.

*Status: Public CD has been initiated [here](#). This version handles most IMF workflows but omits capabilities specified in VC-5 documents published after ST 2073-10:2017. When that document has been updated to include the new capabilities, Part 72 will be updated to include them.*

**DG: IMF Application VC-6**

This group documents an IMF application for the video codec VC-6 specified by the SMPTE ST 2117 document suite.

Current Project:

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

Define a simple mapping for VC-6 to enable it to be used in IMF workflows.

*Status: The document passed ST Audit 2024-08-06. It is being prepared for publication.*

**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 posted for Public CD review [here](#). A joint meeting with the ST 2131 group in TC-31FS was held, as this project is closely bound with that one. FCD ballot is expected shortly.*

**DG: IMF Aux Image Sequence Plug-in**

This group documents the use of plug-in tracks for the IMF packaging framework to support additional image sequences beyond the main image virtual track.

Current Project:

**ST 2067-205 IMF Auxiliary Image Sequence Plug-in**

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

*Status: The source documents from the DPP are available and the DG is just awaiting rights assurances from the DPP.*

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

This group documents the use of plug-in tracks for the IMF packaging framework to support timed-based textual metadata. Such metadata presents event-based metadata in XML format.

*Status: The DG Chair gave a status update presentation that illustrated use-cases and options. The initial WDs will be developed using the new HTML Publishing tool.*

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 – Event-based, Text-based Metadata: Video Viewports**

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

**ST 2067- 4 IMF - Virtual Track Fingerprint**

This project is managed under the TC by individuals without a group. The scope is to define a method for computing a unique identifier for the contents of a virtual track in an IMF Composition Playlist.

*Status: A GitHub repo has been created for this work and the document has been added. A status meeting was held with the proponents.*

**SMPTE Standards Publications in the Last Quarter***Includes Revisions and Amendments*

SMPTE introduced a new policy at the beginning of 2024 of making its standards available free of charge to SMPTE members. To support this, the standards (along with conference papers and the Motion Imaging Journal) are available on [smpte.org](http://smpte.org) – go to <https://my.smpte.org/s/>

**10E Essence****27C Cinema****30MR Metadata & Registers****31FS File Formats & Systems****32NF Network & Facilities Architecture**

ST 2081-1:2023 - 6 Gb/s Signal/Data Serial Interface — Electrical

Published 2024-07-22

ST 2082-1:2023 - 12 Gb/s Signal/Data Serial Interface — Electrical

Published 2024-07-23

**34CS Media Systems, Control & Services****35PM Media Packaging & Interchange**

ST 2067-70:2023 - Interoperable Master Format

— Application SMPTE ST 2019-1 (VC-3)

Published 2024-09-03

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

## Annex: Notes on this Report and the SMPTE Standards Process

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 as follows:

**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

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

**RDD** = Registered Disclosure Document

**ER** = Engineering Report (from Study Group or Task Force)

**AN** = Advisory Note

**AG** = Administrative Guideline

### SMPTE Document-Type Suffix

**Amendment** = Amendment

### 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 as follows: Revise; Amend; Reaffirm; Stabilize; Withdraw.

A review may be conducted at any time to update specifications and/or to correct errors.

### 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.