# STANDARDS QUARTERLY REPORT March 2025

Result of SMPTE® Technology Committee Meetings (Online Only)

3rd to 6th of March 2025

THE NEXT CENTURY

Society of Motion Picture and Television Engineers®
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# 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 3 - 6 March 2025*
*Host: SMPTE Teams Call*

## *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 103 registrations for attendance over the four days of remote-only meetings.

Documents published in the last quarter from the work of each TC are listed on this page.

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

| Project Name | Type | Technology Committee | Approval Period Ends |
|---|---|---|---|
| ST Visible Difference Predictors: A Class of Perception-Based Metrics | New Standard | 10E Essence | 2025-01-01 |
| ST Visible Difference Predictors: ColorVideoVDP | New Standard | 10E Essence | 2025-01-01 |
| ST 2094-60 Dynamic Range Conversion Characterization Metadata | New Standard | 10E Essence | 2025-03-04 |
| RDD 61 MXF -- Mapping ARRICORE Bitstreams into the MXF Generic Container | New RDD | 31FS File Formats | 2025-01-28 |
| Best Practices for Live Stream Distribution | New Recommended Practice | 34CS Control & Services | 2025-01-16 |



ExecSum ^ TCs: Essence Cinema Metadata FileSystems Network MediaSystems MediaPackaging

## *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 professional media IP networks to transport separate video, audio, and associated data streams. Details
Thirteen parts of the suite are published, including recent revisions. An application document for fast metadata transport of audio metadata is also published.
A 2110 document is in development on Timing Planes for 2110 Streams, a document on the co-existence of VPID data and SDP data, and a revision to correct a small error in the fast metadata document.
There are projects creating ten ST 2110 Protocol Implementation Conformance Statements (PICS) for most of the SMPTE 2110 suite documents, with one document pending on a minor revision of the PCM Digital Audio part. 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 “plug-fests” has expanded its scope to write “best practices” documents; the first is underway. Details.
- A revision of ST 2059-2 is being developed to reference — and harmonize with — the latest revision of the IEEE Precision Time Protocol standard. Details

A document on passing sync pulses over USB-C is in Public CD and should go to ballot in the next quarter.

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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 22 published SMPTE Documents* - Details.

The work on IMF Output Profile List standards is continuing — a revision and 3 new standards. Details

There is new work on several IMF topics; one new Application document, Audio with Metadata, Auxiliary Image Sequence, Event-based text-based Metadata, and Virtual Track Fingerprint. Details

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## SMPTE Video Compression Standards

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

The only work currently in progress is revision to VC-3 documents. Details

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ExecSum ^ TCs: Essence Cinema Metadata FileSystems Network MediaSystems MediaPackaging

***Cinema Projects***

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

**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 (428)
- D-Cinema Packaging (429)
- D-Cinema Operations (430)
- D-Cinema Quality (431)

Current projects include:

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

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

**Material Exchange Format – MXF**

*This 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.* Details

There are currently 12 MXF-related projects in process:

- Text–based metadata carriage in MXF (revision)
- Mapping VC-6 into the MXF Generic Container
- Mapping VC-5 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)
- Extensible Time Label (TLX) in MXF via Descriptive Metadata Scheme for Compatible Time Labels (TLC) – 2 projects
- AVC into MXF Generic Container (revision)
- Mapping Immersive Audio Bitstream into the MXF Generic Container
- Descriptive Metadata Scheme for Identity and Integrity
- Mapping Immersive Audio Bitstream into the MXF Generic Container (RDD)
- Mapping ARRICORE Bitstreams into the MXF Generic Container (RDD)

**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. 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.* 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 many years.* Details

The registers and infrastructure 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.

### 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. The task force continues to meet to consider standardization requirements, and it has initiated three AI metadata projects. 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 3 - 6 March 2025*
*Host: SMPTE Teams Call*

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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 Raymond Yeung and Thomas Bause Mason respectively. At the start of 2025, the Standards VP position passed from Sally to Raymond Yeung.

There are four Standards Directors, currently Dean Bullock, Steve LLamb, Florian Schleich and Fred Walls.

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 via teleconference.

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:

Q2 2025 1-3 June; Imagica, Tokyo, JP
Q3 2025 17-19 September Europe
Q4 2025 December Online
Q1 2026 February/March 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.

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

- SMPTE Standards Team
- 2025/2026 TC Meetings
- SMPTE Media Technology Summit 2025
- EBU Production Technology Summit (January 2025) Update
- Study Group on Sustainability in Media Report
- Taskforce on AI in Media Report
- Standards Community Survey
- HTML Document Workflow

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 of Motion Picture Arts and Sciences (AMPAS), available at https://docs.acescentral.com/specifications/clf

Current project:

**ST 2136-1: Common LUT Format**

*Status: Public CD (PCD) for dissemination and industry feedback has started, ending 2025-05-31 (https://github.com/SMPTE/st2136-1). The next meeting will be scheduled after the end of PCD.*

**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 explaining techniques available and the DG's preference for a Wedge Edge Chart (with multiple wedge angles) and the process of deriving a figure for Modulation Transfer Function.*

**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.*

**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 package is being prepared for pre-DP ballot TC 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 for the projects.*

**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 to report for this project.*

**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 for this project.*

**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 for this project.*

**ST 2016 Suite on Active Format Description**

Published Documents:

ST 2016-1:2009 - Format for Active Format Description and Bar Data

ST 2016-2:2014 - Format for Pan-Scan Information

ST 2016-3:2009 - Vertical Ancillary Data Mapping of Active Format Description and Bar Data

ST 2016-4:2014 - Vertical Ancillary Data Mapping of Pan-Scan Information

ST 2016-5:2009 - 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 for this project.*

**Revision of ST 2048 suite**

These are routine revisions arising from 5-year reviews. 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.

Current Projects:

**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**

*Status: ST 2048-1 was published in Q3 2024. ST 2048-2 and ST 2048-3 were published on the day after the previous Q4 2024 TC meeting. The projects are completed.*

**DG: ST 2094-50 DMCVT – Broadcast Application**

The broadcast industry has identified the use of diffuse white (or Reference White) metadata value as an anchor point for video transformations (tone mapping) HDR content to different target displays, HDR or SDR. With knowledge of diffuse white during content creation, a target display can more optimally compress highlights above diffuse white (highlights and speculars), preserving additional detail. Specifically, when diffuse white is used in conjunction with the mastering display color volume metadata:

- PQ contents can benefit from optimal static or dynamic highlight compression when using a knee above diffuse white.
- HLG content receives similar advantages from the identification of the gamma adapted state of the mastering displays EOTF, which is based on its peak brightness capabilities. By including mastering display color volume metadata (MDCV) and nominal diffuse white (ndwt) metadata, an optimized conversion from HLG to PQ, or SDR is possible.

Once the diffuse white metadata (and possibly other items) is standardized, the values set at mastering or live capture can be carried in the media essence and subsequently encoded in video imagery for broadcast.

*Status: The DG Chair is aligning with W3C. A tone mapping scheme will be added due to the need for next generation. The project will be updated accordingly for a new project review during the next quarter.*

**DG: VC-3 Revision**

Current Projects:

**Revision of ST 2019-1 VC-3 Improvements and New Profiles**

There are 3 major areas where the VC-3 family of standards requires attention:

1. Recent work with a VC-3 implementation triggered a careful revision of the standard and produced a significant number of relevant improvements and clarifications that should be included in the standard, that have no backward-compatibility issues but will improve interoperability.
2. Add 2 new profiles which will allow usage of RGB signals in other quality bitrates, such as HQ and SQ. This is a fully backward-compatible change.
3. Integrate Amd.1 into the document.

**Revision of RP 2019-2 VC-3 Reference Materials Update**

As a result of the changes to SMPTE 2019-1 to Improve and add New Profiles, RP 2019-2 also needs to be updated, providing a fresh reference decoder and test materials.

*Status (both): The DG Chair reported that the DG met twice since the last plenary. Draft documents are being developed. Interested members are encouraged to comment.*

**DG: Visible Difference Predictors**

The Visible Difference Predictors (VDP) are a class of data-driven, white box, efficiently implemented image and video difference metrics. They model important aspects of perception like spatial and temporal vision, foveation, etc., and are calibrated on datasets relevant for display and graphics applications. Unlike other available metrics, VDPs are display geometry and photometry aware (especially important for specialized display modes, such as HDR, VR, and AR), and present an output scaled in perceptually relevant just-objectionable-difference (JOD) units. Modern VDP metrics (including the foveated FovVideoVDP, and the color-aware ColorVideoVDP have been published and have datasets and reference code available on GitHub. This DG intends to lead the development and standardization of a practical guide for selecting the appropriate metric for specific engineering problems and discuss how metrics can be effectively combined with subjective testing for high-confidence assessments.

Current Projects:

**ST 2144-1 Visible Difference Predictors: A Class of Perception-Based Metrics**

This standard will define the common elements of VDPs to simplify standardization of individual VDPs. These elements will include a reference and test input, a model photometry, a model display geometry, a model of human vision, real-world image quality datasets for calibration, and perceptually meaningful units.

**ST 2144-10 Visible Difference Predictors: ColorVideoVDP**

This project will standardize the ColorVideoVDP metric.

1. Starting with input contributions from proponents, review and verify the efficacy of the CVVDP versus other approaches to reach consensus on the methodology and publish as a standard.
2. Repeat for the numerous artifact classes up to most complex XR use case.
3. Prepare reference source material/test code for each VDP, document and publish in GitHub as a SMPTE reference

*Status (both): The DG Editor presented a brief introduction to the subject of Visual Difference Predictors. The DG Chair and Editor responded to question from the TC members. The DG will prepare input documents and kick off the work.*

**DG: ST 2094-60 Dyn Range Conversion Characterization Metadata**

The Drafting Group will produce a standard for metadata to characterize conversions between high dynamic range (HDR) and standard dynamic range (SDR) images and video. Live production workflows, such as sports events, use diverse, complex pipelines to deliver HD, UHD, SDR, and HDR content. Diverse conversion tools are used in production to convert SDR content to HDR content, and HDR content to SDR content. The different solutions available in the market are all incompatible in various aspects. A method to characterize and select conversions appropriately is needed to improve interoperability among the different technologies.

Current Project:

**ST 2094-60 Dynamic Range Conversion Characterization Metadata**

Provide metadata to allow characterization of HDR/SDR conversion. Specifically, SDR diffuse white level, SDR reference level, SDR maximum signal level, SDR minimum signal level, HDR diffuse white level, HDR reference level, HDR level for SDR nominal peak level, HDR level for SDR maximum signal level.

*Status: The DG Chair reported that two comments were received on the project proposal with the review period closing soon.*

## 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 and 5-year reviews of documents, project proposals for revisions/amendments as required.

*Status: The new Library App is being tested with 1-year and 5-year review document status updates. The revision project submissions are being worked on.*

**Revision RP 200:2012 - 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 group received a great deal of editorial suggestions. The document is close to being submitted for pre-FCD TC review.*

**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 subcommittees, which should be available for reference and historical significance.

*Status: The second version of the SG report has been submitted. It was decided in the last meeting that an "archival document" means no revisions. The final task is for the group to draft a short overall summary document to link to the archival documents.*

**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 and reproducibility).

*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)*
- *Clip Analysis team – Subjective listening testing of known, difficult-to-handle movie clips*

*The DG reported on the tasks completed, impressions, sample data, and the tasks in progress.*

**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: The audio portion of emissive display has been through two editing passes and ready for a group review. The display portion needs a team to be appointed.*

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: Pre-FCD TC review will start after DG review closed on March 14, 2025.*

**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 TC 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: This document is published and the project is completed.*

## *Metadata and Registers Committee (30MR) Chairs: 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 continues to explore how UMID can contribute to "material" identity and integrity (relates to DMS-II project in 31FS).*

**DG: UMID-related Standards**

Current 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 DG is preparing a Working Draft for the pre-FCD TC review towards a second FCD ballot. The DG will propose revisions to the "Terms and Definitions" clauses in both RP 205 and ST 330 to remove discrepancies.*

**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. Work on the draft report is continuing.*

**DG: AI Model Metadata**

This DG covers the scope of three projects based on the conclusion of a study conducted by a joint task force with the Entertainment Technology Center. The resulting report of this study ER 1010 is published here.

The drafting group will develop the following three standards:

**ST 2041 Metadata Generated by LLMs: Contextual and Versioning Standards**

This project seeks to establish a standardized set of metadata fields to ensure the reliability and maintenance of LLM-generated metadata. The project will define the necessary metadata fields for LLM-generated content, including context, model version, prompt, hyperparameters. It will also develop guidelines for capturing and storing this metadata to ensure traceability and reproducibility.

**ST 2042 Embeddings as Metadata: Contextual and Non-Human Readable Fields**

Embeddings are inherently non-interoperable and non-human readable, making them difficult to use effectively without additional context. This project aims to standardize the metadata required to ensure consistency, reliability and interoperability of embeddings:

1. define the metadata required for embeddings generation;
2. investigate methods to ensure interoperability of embeddings between different systems.

**ST 2043 AI Model Metadata and Creation of a Centralized Model Registry**

This project will develop a standardized metadata schema for AI models and establish an official, maintained database of registered models with the following tasks:

1. define a comprehensive set of metadata fields that cover various aspects of AI models;
2. create a centralized registry to store and manage this metadata, facilitating better discoverability, reproducibility, and management of AI models across the industry.

*Status (all): The DG held one meeting with future meeting cycle planned. The first step is to resolve the comments from the project review.*

**WG 30MR10: Metadata Definition**

This Working Group coordinates 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 at DP status. ST audit will close 2025-03-13. Codenames for the next two releases are "Vegemite" and "Hoisin".*
*Requested UL additions are being processed for the Vegemite release.*

There are WG projects to revise and simplify existing metadata Standards in line with administrative guideline AG-18 that defines the process for adding new UL definitions to the metadata registers.

**Revision ST 335 Metadata Element Dictionary Structure**

Normalize to AG-18

**Revision ST 395 Metadata Groups Register Structure**

Normalize to AG-18

**Revision ST 400 SMPTE Labels Structure**

Normalize to AG-18

**Revision ST 2003 Types Dictionary Structure**

Normalize to AG-18

*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. Comment resolution is the next step. Many comments were editorial, and it was recognized that some apply to ST 335. Consequently, re-ballot of ST 335 is most likely.*

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## 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.

**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 AG-24 – MXF Style Guide.

*Status: The document author reported that the DG was still working on the deployment of RP 2057 as written. No document progress in the quarter.*

**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 document revisions that have been published after ST 2073-10 was published.

*Status: Work on ST 2073-10 revision has bi-weekly meetings but communication has been over emails. The new features that are being reviewed for inclusion are Layers, Sections, and Metadata. The project seems to be easier than expected. A new draft has been circulated to the DG for reviews and comments.*

**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 has been waiting for ST 2120-2 in TC-32NF to progress in comment resolution and re-ballot.*

**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: This document passed ST Audit as of 2025-01-29. It is now in the publication queue with SMPTE HQ.*

**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 and overlap with "35PM DG IMF Audio with Metadata".

*Status: No progress on this document was reported for this quarter.*

**WG: MXF-related Documents Maintenance**

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

*Status: The group proposed one-year and five-year review disposition recommendations on documents and assistance was given during the TC meeting. The status of RP 2089 will require further inquiry with the EIDR organization.*

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

*Status: The WG has prepared an ST Audit package for final approval.*

**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: The DG chair plans to hold DG review soon in preparation for pre-FCD TC review.*

**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 and 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: The document editor reported no DG activity in the last quarter.*

**RDD 60 Mapping IAB into the MXF Generic Container**

Standards and guidance already exist for mapping Immersive Audio Bitstream essence into MXF for D-Cinema and IMF applications. *This document* defines a baseline method of mapping IAB essence to the MXF generic container in a manner compatible with requirements for broadcast in-house archival and repository file formats.

*Status: The new document was introduced by the proponent. The RDD ballot will close on 2025-04-07.*

**RDD 61 Mapping ARRICORE Bitstreams into the MXF GC**

Maps new ARRICORE bitstreams into the MXF constrained Generic Container. Mapping is quite similar to that of RDD 54 ("RDD 54: MXF — Mapping ARRIRAW Bitstreams into the MXF Generic Container"), but the essence has a unique and non-raw structure. Leverages the same metadata RDD ("RDD 55: MXF — Carriage of ARRI Camera System Metadata") as RDD 54 does.

*Status: The project was approved on 2025-01-28. Metadata Registry submission review closed on 2025-02-25 with a "mature" status. RDD ballot is scheduled to close 2025-04-07.*

**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 Playout. 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 ST 377 MXF files using the ST 336 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 has held 2 well-attended meetings in the last quarter. ST 2140-1 will address Architecture, Data Model, Representations, and Bindings. The effort to establish proper liaison relationships with possibly ISO and others is underway. The work is being advanced primarily via email and SKN.*

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

This Working Group (31FS-30) has defined an archive format that will promote interoperability among 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: A second revision is awaiting completion. The document requires update of XSD file including code and comments and update of UML diagrams derived from the schema.*

**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: Part 2 is in abeyance until the open-source work is completed. 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.*

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

The availability of Open-Source Code should increase AXF Traction — Small Archives and 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 and licensing need to be decided (and could form a model for SMPTE).

*Status: AXF open source includes code in C++ or GO, a library of compiled source code (AXFlib). A private repository is established in SMPTE GitHub for evaluation and validation of code. The repository will be available to the public when ready.*

**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: The DG has been creating some infrastructure and is looking at the relationship with SMPTE ST 2003 (Types register). The chair expects more progress in the next quarter and hopes to have some working demos by the next plenary.*

**DG: Constrained DPX for HDR**

Published documents:

ST 268-2:2023 - Constrained Application of Digital Moving-Picture Exchange (DPX) Format for High Dynamic Range

ST 268-3:2023 - 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 has been in the process of modifying the reference software accordingly (including changes to the interface functions for better memory efficiency). Modifications believed complete. New FP16 example images will be added. Some issues in the current reference materials will also be fixed.*

## *Network and Facilities Architecture Committee (32NF) Chairs: Dean Bullock 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.

*Status: The WG does not have any current projects.*

**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:

OV 2110-0 – Roadmap for the 2110 Document Suite
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 Framework
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, and 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. Proponents have intention to resume work.*

**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 document passed 2nd FCD ballot on 2024-12-20. Comment resolution will follow.*

**ST 2110-41 – Fast Metadata Network**

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 underway. It will implement the recommendations contained in this advisory note. The revised document is ready for pre-FCD TC review.*
*A register for ST 2110-41 Data Item Types has been set up here. A few register submissions were already published.*

**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 in the SMPTE ST 2110-41 register here.*

**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 is underway with document drafting in progress.*

**DG: RP 2110-1xx's - Protocol Implementation Conformance Statements (PICSs) 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: There was only a brief report at this meeting round. The situation previously was as follows: 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. Parts 130 and 141 were not balloted yet. However, a comment about using dated references vs. undated references resulted in a request to repeat the FCD ballot for 110, 120, 121 and 122. Part 130 and 141 will go through FCD ballot at the same time.*

**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, 2024, and DG is currently working on changes to the document based on review feedback.*

*This document is ready to go to public CD; this should occur 2025-01.*

**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: There was no overall DG report given at this meeting.*

Current Projects:

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

*Status: The DG is working on the RP document as scoped. The DG meets about once per month and is making steady progress towards a WD.*

**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.*
*Part 1 was re-balloted at FCD. It passed 2024-09-26 with 43 comments. 22 are editorial and have been addressed. The remaining 21 are substantive and comment resolution is underway.*

*Part 2 and Part 3 passed FCD ballot. Part 2 has 36 comments (11 addressed,) and Part 3 has 25 comments including late comments (22 addressed). Substantive comment resolution awaits stabilization of Part 1 after re-ballot.*

**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 DG chair reported one DG meeting since December, 2024. Ballot comments are resolved and TC review package provided to the DG and TC.*

**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 have only USB-C connections to join systems that use, e.g., the sync signal defined in SMPTE 274:2008, Clause 10.

*Status: The DG started on 2024-07-16. There were 16 calls with an average of 6 attendees. Public CD started 2025-02-27 ending no later than 2025-05-12 ( https://github.com/SMPTE/st2139 ). DG chair considers ending Public CD in mid-April 2025.*

**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. The 32NF document maintenance group has recommended an amendment roll-up for ST 338.*

**WG: 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:

| | | | |
|---|---|---|---|
| *ST 299-1 GitHub* | *ST 2022-1 GitHub* | *ST 2059-2 GitHub* | *ST 2110-10 GitHub* |
| *RP 2110-23 GitHub* | *ST 2110-30 GitHub* | | |

*Status: The TC agreed to check for documents that must be withdrawn, then stabilize the rest of the list. If a document requires changes, a new project will be opened. The existing Document Maintenance Group (DMG) recommendations can be reviewed. The TC chair will post the DMG document review recommendations to the TC mailing list.*

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## *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. The work in TC 30MR will continue and the preparation of the SKN workspace is planned. The DG hopes to provide an initial draft.*

**DG: BXF Suite of Documents**

Published documents:

- OV 2021-0: Roadmap for the 2021 Document Suite
- 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 8.1.

*Status: The group anticipates working on BXF 9.0 when there is a critical mass of new items; currently there is no BXF activity.*

**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: During the final review of the report, it was identified that it is now outdated. The TC chair has not heard from the proponents. The TC agreed that this project will be removed from the agenda for future meetings.*

**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, (followed by) 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 TC agreed that the ST 2125 Public CD should be extended (renewed) to end of September 2025 and provide time for the revision to be completed.*

**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. ST 2126 closed pre-DP-vote TC review 2024-11-21 with one editorial comment. The DG awaits the resolution of this comment to move forward.*

**Media Microservices Terminology**

Provides definitions for terminology used in the other Microservices documents.

*Status: The SMPTE editor has created a reconciliation spreadsheet for the DG to go through next.*

**ST 2133 - Job Processing Architecture**

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

*Status: This document has been posted as a public CD through July 3, 2026.*

**Catena Projects**

Catena is a media resource control system. It will be a multi-part suite, with the following projects approved:

**ST 2138-10 – Catena Model**

**ST 2138-11 – Catena gRPC Connection**

**ST 2138-50 – Security**

*Status: The DG chair reported that the projects are progressing well with SMPTE ST 2138-10 and SMPTE ST 2138-11 wrapping up in SMPTE RIS-OSA. A SMPTE GitHub repo will be set up once the ST 2138-10 document moves into SMPTE development. There is also ST 2138-50 – Security underway in SMPTE RIS-OSA. Draft documents for these 3 projects should be sent to SMPTE after NAB 2025. The proponent has a Catena GitHub repo at https://github.com/rossvideo*

**ST 2138-12 – Catena REST Connection**

**ST 2138-13 – Catena WSS Connection**

*Status: The projects for SMPTE ST 2138-12 and SMPTE ST 2138-13 are approved. Waiting for draft document.*

**RP Best Practices for Live Stream Distribution**

This project aims to establish best practices to simplify and secure the area of live stream distribution (B2B) between content producers/providers and streaming platforms.

*Status: The DG chair reported that this document is almost ready to transition from SMPTE RIS-OSA to this DG. Probably before the June 2025 Plenaries.*

## *Media Packaging and Interchange Committee (35PM) Chair: 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/SMPTE?q=2067 — and members contribute to revision work, for both bugs and improvement requests.

Current Projects:

**Revision of ST 2067-21:2023 – IMF – Application #2E**

This revision will add support for image rasters up to 8192x6224. Various GitHub issues will also be addressed.

*Status: This revision is the fifth edition. The document is close to pre-FCD ballot TC review. No comment received from the DG review. The editor will prepare a pre-FCD ballot TC review package to be submitted to the TC chair.*

**Revision of ST 2067-201:2021 – IAB Level0 Plugin**

The IAB Level 0 Plug-in defines wrapping of the Immersive Audio Bitstream in MXF. The encoded bitstream contains metadata about its contents, but this metadata is currently not accessible to MXF parsers without IAB decoding capabilities. This revision introduces new MXF-level sub-/descriptor items that allow carriage of IAB object and channel metadata information within the MXF metadata. By way of introducing metadata in MXF descriptors, it will also become available in the IMF CPL for easy access. This revision will introduce MXF Sub-/Descriptor definitions and items to support relevant IAB object/channel metadata. Bitstream constraints will be clarified and/or refined but not substantively changed.

*Status: This document has completed pre-FCD review. The comments received are being processed. The editors addressed all comments and asked for clarifications. The document is moving forward to balloting.*

*Status (both): Overall, the next step is to move the CD documents to balloting.*

Published Interoperable Mastering Format documents:

- OV 2067-0 - Interoperable Master Format
- 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 (Withdrawn)
- 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 UHDTV Program Workflow (AVC)
- ST 2067-70 - Application SMPTE ST 2019-1 (VC-3)
- ST 2067-71 - Application SMPTE ST 2117-1 (VC-6)
- 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) Plug-in
- ST 2067-203 - IMF Audio with Frame-based S-ADM Metadata Plug-in

**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.

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 (Lookup 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.

**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 (all): The DG chair reported that there have been no drafting calls since the last plenary meeting. The revision of ST 2067-101 will proceed with a needed component maturing, i.e., the 10E ST 2136-1 Common LUT Format in Public CD. The remaining new standards will follow the revision project.*

**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 is available here. The public review period is scheduled to end no later than 2025-05-19. The DG will respond to comments submitted to the GitHub issue tracker. The DG will reach out to the IMF User Group as part of the marketing effort in the next quarter. This version handles most IMF workflows, but omits capabilities specified in VC-5 documents published after VC-5 MXF Wrapper, ST 2073-10:2017. When that document has been updated to include the new capabilities, Part 72 will be updated to include them. No meeting is planned during the revision of ST 2073-10.*

**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: The DG chair reported that there had been no activities in this quarter.*

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

This group documents the use of a plug-in track 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 (based on DPP006) are available and the DG has been in communication with the DPP regarding rights assurances. There had been no DG activities in this quarter. The DG hopes to start work next quarter.*

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

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

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 (such as "pan and scan" metadata) to IMF Compositions.

*Status (both): The DG chair reported one DG meeting in this quarter. The document drafting is moving forward.*

**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: No report was provided at this meeting.*

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## *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 at: https://my.smpte.org/s/

### 10E Essence

SMPTE ST 2048-2:2024, *2048 × 1080 Digital Cinematography Production Image FS/709 Formatting for Serial Digital Interface*

SMPTE ST 2048-3:2024, *4096 × 2160 Digital Cinematography Production Image Formats FS/709*

### 27C Cinema

SMPTE ST 428-24:2024, *D-Cinema Distribution Master — Packed Image*

### 30MR Metadata & Registers

### 31FS File Formats & Systems

### 32NF Network & Facilities Architecture

### 34CS Media Systems, Control & Services

### 35PM Media Packaging & Interchange

## *SMPTE Public Committee Drafts*

*Link to current PCD page here*

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## *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 the 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, including → **PCD:** Public Committee Draft 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.*