



# STANDARDS QUARTERLY REPORT June 2023

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

Hosted by Telstra (Melbourne/Australia)

13th to 15th of June 2023

## THE NEXT CENTURY

## SMPTE® Standards Quarterly Report

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

SMPTE Standards Committee Meetings 13 -15 June 2023

Host: Telstra Melbourne, AU

### Executive Summary

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

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

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

<b>Proposals for new projects submitted in the last quarter</b>			
<i>Project Name</i>	Type	SMPTE Group	Approval Period Closes
<i>Working Group for Data on AES3 (rearrangement of an existing WG)</i>	Revision	Network	2023-06-26
<i>Working Group for SDI Interfaces (new scope for existing WG)</i>	Revision	Network	2023-06-27
<i>ST 2048-3:2012 Digital Cinematography FS/709 Mapping into 10Gb/s SDI</i>	Revision	Essence	2023-06-20
<i>ST 2048-2:2011 Digital Cinematography FS/709 Formatting for SDI</i>	Revision	Essence	2023-06-20
<i>ST 2048-1:2011 Digital Cinematography Production Image Formats FS/709</i>	Revision	Essence	2023-06-20

<i>ST 428-24 D-Cinema Distribution Master — Packed Image (pDCDM)</i>	New Standard	Cinema	2023-04-19
<i>JSON representation of SMPTE Registered Data (RegJSON)</i>	New Standard	File System	2023-03-16

### **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](#)

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

- System Timing and Definitions\*
- Uncompressed Active Video\*
- Traffic Shaping and Delivery Timing for Video\*
- Constant Bit Rate Compressed Video\*
- Single Video Essence Transport over Multiple ST 2110-20 Streams (to support high bitrate streams)
- A document tying down additional parameters for streaming standard definition video
- PCM Digital Audio \*\*
- Transparent AES 3 Data (e.g. Dolby E or non-audio in AES3)\*
- ST 291 Ancillary Data\*
- Timed Text streaming

\* Revisions to these Parts were published in the last two quarters.

\*\* This part is undergoing minor revision.

There are also parts in development on:

- Transport of metadata that has not been derived from ST 291 packets (2 documents, both through FCD Ballot and in comment resolution)
- Measurement considerations for 2110 streams (now in the publication queue)
- Timing planes for 2110 streams

There are projects creating ST 2110 Protocol Implementation Conformance Statements (PICS) for seven documents in the SMPTE 2110 suite. [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:

- A group has organized ST 2059 “plugfests” and is reviewing the best way to carry out testing now that ST 2059 networks have become established. [Details](#).

- Revisions of the two foundational standards are published and a further revision is being developed to reference and harmonize with the latest revision of the IEEE PTP standard. [Details](#)
- A Study Group has completed a second report on Security in ST 2059 Networks [Details](#)
- A recommended practice on PTP Device Monitoring Capabilities provides interoperability in network monitoring and diagnostics. It is YANG-based, has been posted as a Public Committee Draft and is now awaiting publication. [Details](#)
- PTP Engineering Guideline on ST 2059 [Details](#)

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

A study group within 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. [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 16 published SMPTE Engineering Documents.*

Some documents in the IMF suite are currently being revised. [Details](#)

There is work on IMF Output Profile List standards – 2 revisions and 4 new standards. [Details](#)

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

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

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

*Work on video compression standards is nearing completion:*

- VC-6 is being revised to correct small errors and a VC-6 mapping into MXF standard is underway. There is also an IMF application underway. [Revision](#) [MXF](#) [IMF](#)
- A suite of documents defining the VC-5 compression system is complete. An IMF Application is about to start.
- Projects to revise SMPTE VC-3 documents to add Alpha channel – [Essence](#) – [MXF file](#)

### ***Cinema Projects***

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

A revision of the SMPTE ST 2098-2:2021 Immersive Audio Bitstream Specification was published in the last quarter.

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

- Research on relevant Technical Documents
- Modern Movie Clip Analysis (challenging audio)
- In-situ Measurements and Testing

The last two groups plan to merge in the coming quarter.

[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

[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 13 MXF-related projects in process. [Details](#) They comprise:

- ST 377-1 MXF (revision)
- Mapping VC-3 Coding Units into the MXF Generic Container (amendment)
- Mapping ACES Image Sequences in to the MXF Generic Container (revision)
- Mapping ST 2117-1 into the MXF Generic Container
- Dynamic Metadata for Color Volume Transform: KLV Encoding and MXF Mapping (revision)
- Mapping AES3 and Broadcast Wave Audio 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)
- Mapping HEVC into MXF Generic Container (revision)
- MXF MCA Controlled Vocabulary (revision)
- TLX KLV Encoding and MXF Mapping
- Descriptive Metadata Scheme for Compatible Time Labels

**Media Microservices** This group has two projects in the public Committee Draft stage - IMF Registration Service API and Status Reporting and logging. They are planned to proceed through the publication process this year. There is a Job Processing Architecture document in development.

The group works closely with the Open Services Alliance, OSA. It fast-tracks applications that are then submitted to SMPTE for standardization; more in the pipeline. The OSA has just been merged into the SMPTE Rapid Industry Solutions group. [Details](#)

**Extensible Time Label (TLX)** This group has created a Standard suite for a time label that overcomes the shortcomings of SMPTE ST 12 (support for today’s higher frame rates, time values greater than 24 hours) as well as supporting additional requirements of current systems and workflows such as a “Digital Birth Certificate” including a Source Ident. The 3 TLX documents were posted for a Public CD period and have just passed FCD ballot. A new document on KLV Encoding and MXF Mapping for TLX has been started.

[Details](#)

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

**AI and ML in Media** A joint task force with the Entertainment Technology Center is studying this topic and developing a report.

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

Deals with the problem of securely exchanging IP flows between third party networks. A Public Committee Draft has been posted and FCD ballot is in progress. [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 just created 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.

The project system has been vastly improved and will lead to improvements in this summary page.

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## SMPTE® Standards Quarterly Report:

### Detailed Account

*SMPTE Standards Committee Meetings 13 -15 June 2023*

*Host: Telstra Melbourne, AU*

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

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

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

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

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### Introduction

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

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

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

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

A Standards Community meeting was held to announce arrangements for future meetings and to demonstrate new Roster and Voting Apps that are about to be introduced for use in Standards groups.



## Future Meetings

Quarterly Standards meeting rounds are planned for:

- Q3 2023 20-22 September, Paris, FR
- Q4 2023 11-14 December Online
- Q1 2024 4-7 March Online
- Q2 2024 3-5 June, Ottawa, CA

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

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

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

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

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

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

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

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

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

The SMPTE website now has a [summary projects page](#) publicly available. Click “Reset” to get the latest date range.

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## Details from each Technology Committee (TC) meeting

### *Essence Technology Committee (TC-10E) Chairs: Fred Walls and Lars Borg*

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

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

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

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

Current project:

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

*Status: The project has been approved and the first DG meeting held. A liaison from the EBU Video Systems Group was received and a draft response has been approved.*

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

Current project:

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

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

*Status: The DG Chair gave a presentation. The first meeting addressed the topics:*

- *Range of Applications to be Accommodated*
- *Explanatory Material*

*The next meeting will address:*

- *Technical Characteristics of Measurement Methods*
- *Applying Initial Document Draft to Outline*

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

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

Published documents:

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

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

ST 2080-3: Reference Viewing Environment Characteristics

Current projects:

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

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

*Status: There was no report at this meeting. It is planned to initiate a second FCD ballot in 2023, incorporating resolved comments from the first FCD ballot.*

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

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

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

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

**DG: IPT-PQ**

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

Current project:

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

*Status: The document passed FCD ballot 2021-08-25 with 21 comments to resolve. There are 5 remaining comments to resolve.*

**SMPTE Video Compression Standards**

**Business Impact: Interoperability between systems**

The current video compression groups are:

**DG: VC-6 Picture Compression**

Published documents:

ST 2117-1: VC-6 Multiplanar Picture Format Part 1. Elementary Bitstream

Current Project:

**Revision: ST 2117-1: VC-6 Multiplanar Picture Format Part 1. Elementary Bitstream**

Fix minor errors in Table 18 & Table 23

*Status: The revision passed ST Audit 2022-12-30 and is in the publication queue.*

**DG: Amendment VC-3 Picture Compression and Data Stream Format**

There is an [associated DG](#) to revise the ST 2019-4 MXF mapping document in the file systems TC.

Current project:

**Amendment: ST 2019-1 - VC-3 Picture Compression and Data Stream Format**

This project will extend the VC-3 standard to include carriage of Alpha channel.

*Status: Published in the last quarter and project closed.*

**DG: VC-2 video compression suite**

VC-2 is a SMPTE mezzanine video compression standard (based on BBC's DIRAC pro).

Published documents:

ST 2042-1: VC-2 Video Compression Standard

ST 2042-2: VC-2 Level Definitions

RP 2042-3: VC-2 Conformance Specification

ST 2042-4: Mapping a VC-2 Stream into the MXF Generic Container

RP 2047-1: VC-2 Mezzanine Level Compression of 1080P High Definition Video Sources

ST 2047-2: Carriage of VC-2 Compressed Video over HD-SDI

RP 2047-3: VC-2 Level 65 Compression of High Definition Video Sources for Use with a Standard Definition Infrastructure

ST 2047-4: Carriage of Level 65 VC-2 Compressed Video over the SDTV SDI

RP 2047-5: VC-2 Level 66 Compression of UHD for use with HD Infrastructure

*DG Status: The DG can be closed now that the two revisions below have published.*

Current projects:

**Revision: RP 2047-1:2009 VC-2 Level 64**

*Status: Published*

**Revision: RP 2047-3:2016 VC-2 Level 65**

*Status: Published*

**Revision: SMPTE 2046 Suite**

Published Documents:

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

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

EG 2046-3:2010 - Safe Areas for Television

Current projects:

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

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

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

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

*Status: There was no report at this meeting. UHD formats have been added to both documents. They will not be updated to use the current template.*

**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 substantial improvement to the image area diagrams. Incorrect tabular values have been recomputed & corrected. Further editing is required.*

**Image Line Numbering**

This will be a new document 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: This is a newly-approved project, expected to result in an Engineering Guideline.*

**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 this meeting.*

**ST 2016 Suite on Active Format Description**

Published Documents:

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

ST 2016-2 - Format for Pan-Scan Information

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

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

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

Current Projects:

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

Add UHD formats to ST 2016-1

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

**Revision of ST 2048**

*Status: These are routine revisions arising from 5 year review. Part 1 will have an amendment rolled-up. All parts will have their Normative References updated.*

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

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

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

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

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

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

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

*Status: 13 FCD ballots have been posted for digital cinema documents, generated from HTML. They will close 2023-07-05 and comprise:*

*ST 429-2, ST 429-3, ST 429-4, ST 429-5, ST 429-6, ST 429-10, ST 429-14, ST 429-16, ST429-18, ST 429-19, ST 430-1, ST 430-5, ST 430-12. An error was detected with ST 429-2 and the ballot was withdrawn; it will be resubmitted.*

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

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

*Status: This document will go out for DP vote in a couple of weeks ( a minor correction to the draft is needed).*

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

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

*Status: Revision is underway. Definitions have been revised. A solution has been found for description of level setting of surrounds. There are discussions dealing with intricacies of integrating with RP 155, ST 202, ST 2095-1 and RP 2096-1 and -2.*

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

Current WG project:

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

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

*Status: The WG announced some changes to the DG structure. It has decided to combine the Clip Analysis and In-Situ Testing DG's. Also, the in-situ DG's sub-group on B-Chain Theater Test Procedure Creation will be absorbed back into the combined DG.*

The Drafting Groups (prior to the above changes taking place) are:

**DG: Technical Documents Research**

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

*Status: The report was intended to inform the other two DGs; however, this DG now wants to publish the document as an Engineering Report.*

**DG: Modern Movie Clip Analysis**

Representative Clips that challenge B-chain sound systems from 14 modern movies have been identified.

**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).

**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: A draft of EG 428-23 has been sent to the TC for pre-FCD-ballot review.*

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

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

*Status: The document passed FCD ballot 2023-01-13 with 5 comments to resolve. Comment resolution is underway and when complete, the HTML pipeline will be used to produce the draft for pre-DP-vote review.*

**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 group has held 9 meetings and is identifying and proceeding through topics – 16 topics covered so far.*

Current Document:

**Engineering Report**

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

*Status: The group is developing a working draft.*

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

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



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

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

*Status: In pre-FCD-ballot review, closing 2023-06-27. A public CD period is planned.*

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

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

**UMID Projects**

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

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

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

*Status: The SG has reviewed the UMID part of WD-ST-2134 (DMS-TLC) and submitted comments and commented on UMIDs in TLX Items (for discussion on ST2120-2).*

**DG: UMID-related Standards**

This DG is managing the following project:

**RP 205 – UMID Applications**

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

*Status: The DG Chair continues to work on additional UMID application examples. The DG's UMID contribution to ST 2029 has published (see below).*

**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 Chair reported that the SG continues to hold bi-weekly telecons. Work on the draft report continues and the goal is to complete the report by the next plenary. The group needs a new document editor.*

**DG: ST 2029 Uniform Resource Names for SMPTE Resources revision (YANG and UMID update)**

*Status: Published in the last quarter.*

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

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

*Status: The revision was elevated to DP status 2023-05-22 and is ready for ST Audit.*

**WG 30MR10: Metadata Definition**

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

Published Documents:

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

ST 395:2014 - SMPTE Standard - Metadata Groups Register

ST 400:2012 - SMPTE Standard - SMPTE Labels Structure

ST 2003:2012 - SMPTE Standard - Types Dictionary Structure

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

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

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

Current projects:

**Metadata Registers**

*Status: The ST 2123 “Vindaloo” release was published in the last quarter.*

*The next release for ballot, “Jalapeno”, is being prepared for balloting.*

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

**ST 335 Metadata Element Dictionary Structure**

Normalize to AG18

**ST 395 Metadata Groups Register Structure**

Normalize to AG18

**ST 400 SMPTE Labels Structure**

Normalize to AG18

**ST 2003 Types Dictionary Structure**

Normalize to AG18

*Status: ST 335 FCD ballot passed 2022-07-18 with no comments and the document was automatically elevated to DP status. ST Audit is pending revision of the other 3 documents, so they can publish as a set. Drafts of those 3 documents are being reviewed by the Working Group.*

**File Formats and Systems Committee (31FS) Chair: Tatsuji Yamazaki, 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: ST 380 - MXF Descriptive Metadata Scheme 1**

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

*Status: The document editor proposed at the meeting that, instead of revision, ST 380 should be stabilized.*

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

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

*Status: The draft revision of RP 2057 passed FCD ballot on 2018-02-09 with 5 comments to resolve. Normative References have been checked. In the process of revision, differences were identified between smpte-ra & this document; this is being checked. Pre-FCD-ballot review is expected Q4 2023.*

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

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

Current project:

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

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

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

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

*Status: No progress in the last quarter.*

**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 is at Public CD [here](#), due to finish PCD 2023-09, at which time it is planned to proceed through to publication.*

**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 draft document passed FCD ballot with no comments 2022-01-11. The DG has received 4 late comments that have been addressed in the pre-DP review package. The DG Chair plans to start the DP vote soon.*

**Revision: ST 2094-2 - KLV Encoding and MXF Mapping**

Revise normative references to ST 377-1, ST 2094-10 and ST 2094-40 and revise the examples for ST 2094-10 and ST 2094-40

*Status: The ST 2094-2 revision is in the publication queue.*

**DG: Amendment: ST 385 – SDTI-CP in the MXF Generic Container**

The current ST 385 cites *and* quotes ST 331. This revision will remove the citation, leaving just the normative reference to ST 331.

*Status: ST 385 Amendment 1 passed ST Audit on 17 August 2022; it is in the publication queue.*

### **Revision: ST 382 – Mapping AES3 and Broadcast Wave Audio into the MXF Generic Container**

To include roll-up of Amendment 1 and Amendment 2 (project was amended to include Amd2).

*Status: Published; drop from agenda.*

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

*Status: The DG has held 4 meetings in the last quarter.*

Current Projects:

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

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

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

#### **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: A pre-FCD-ballot review of ST 2134 is underway, closing 2023-06-20; comments are encouraged.*

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

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

*Status: Public CD is on Github [here](#) (ST 2131 + MXF & WAV sample files).*

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

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

*Status: The group’s recommendations for one year review will be a reaffirm vote for ST 377-42 and ST 2124 and for five year review, revision of ST 381-3.*

**DG: Revision of ST 381-5:2020 – Mapping HEVC into MXF GC**

This revision will deal with a problem in the Length specification that needs to be larger to accommodate 8k UHD. Normative references will be updated.

*Status: ST 381-5 revision is in the publication queue.*

**DG: Revision of ST 377-41 MXF MCA Controlled Vocabulary**

This revision will add additional MCA Content Labels to support current practices for labeling independent audio elements.

*Status: ST 377-41 revision is in the publication queue.*

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

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

*Status: There was no progress in the last quarter; work is expected to start in the coming month.*

**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.

*Status: No progress in the last quarter. The kick-off meeting will be announced shortly.*

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**DG: ACES Revision Projects**

Current projects:

**Revision: ST 2065-4 ACES Image Container File Layout**

Will address issues reported since publication and to prepare the document for ISO submission.

**Revision: ST 2065-5 Mapping ACES Image Sequences into the MXF Generic Container**

Will address issues reported since publication and to prepare the document for ISO submission.

*Status (both): ST 2065-4 revision is published. ST 2065-5 revision is in the publication queue.*

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

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

Published document:

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

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

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

*Status: The Working Group meets weekly. Open-Source Code for some key services in Part 1 is being developed.*

Current projects:

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

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

*Status: Revision of ST 2034-1 prose was substantially completed in 2020. The document is awaiting update of XSD File to match text (expected by end 2023) & update of UML diagrams.*

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

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

*Status: The WG is studying workflows to include in the consideration of requirements. Roughly 50 Use Cases have been considered.*

### **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 ST2001 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 held 2 meetings in the last quarter. Goals and outline document suite parts have been agreed. A normative reference to a JSON Schema specification will be required, and outreach to json-schema.org has been initiated. It was noted that microservices work in TC-34CS is also waiting for JSON Schema to be published.*

### **DG: Constrained DPX for HDR**

Published document:

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

Current projects:

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

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

*Status: RP 268-3 was posted for [Public CD](#). It has now passed FCD ballot and the 4 comments received are resolved. It is at pre-DP-vote review until 2023-06-14.*

*Note that after the ST 268-2 revision (below) publishes, it is likely that FP16 materials will be added in a small revision project.*

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

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

*The revision has passed DP vote and a ST Audit package has been submitted to the TC Chairs.*

*Note that the image/dpx IANA MIME Type registration will need to be updated following publication.*

## **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:

Manage Engineering Documents dealing with electrical and optical SDI interfaces with nominal link rates up to 3Gb/s as well as a 10Gb/s optical interface including the mapping of essence, data, and metadata and the details of the physical interfaces.

NOTE: It has been agreed that the work of WG-32NF70 on UHD SDI interfaces will be merged into this group; the scope will then not be limited to 3Gb/s and the following new scope is proposed in a new WG project statement that has been submitted to TC Chairs:

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.

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

*Status: The merge process, mentioned above, is almost complete. All 32NF40 DG projects are complete and their projects have been closed. This WG will manage the two projects transferred from WG-32NF70, see below.*



**ST 2081 Suite - 6Gb/s Signal/Data Serial Interfaces**

Published documents:

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

ST 2081-10: 2160-line and 1080-line Source Image and Ancillary Data Mapping for Single-link 6G-SDI

ST 2081-11: 2160-line and 1080-line Source Image and Ancillary Data Mapping for Dual-link 6G-SDI

ST 2081-12: 4320-line and 2160-line Source Image and Ancillary Data Mapping for Quad-link 6G-SDI

ST 2081-30: Transport of Multiple 3Gb/s or 1.5Gb/s signals on a 6G-SDI link

*Status: ST 2081-1 revision passed FCD ballot with no comments; automatically becomes DP and will be prepared for ST Audit.*

**DG: ST 2082 Suite - 12Gb/s Signal/Data Serial Interfaces**

Published documents:

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

ST 2082-10: 2160-line and 1080-line Source Image and Ancillary Data Mapping for Single-link 12G-SDI

ST 2082-11: 2160-line and 1080-line Source Image and Ancillary Data Mapping for Dual-link 12G-SDI

ST 2082-12: 4320-line and 2160-line Source Image and Ancillary Data Mapping for Quad-link 12G-SDI

ST 2082-30: Transport of Multiple 6Gb/s, 3Gb/s or 1.5Gb/s signals on a 12G-SDI link (published)

*Status: ST 2082-1 revision passed FCD ballot with no comments; automatically becomes DP and will be prepared for ST Audit.*

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**WG: Video Over IP**

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

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

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

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

Published documents:

ST 2110-10 - System Timing and Definitions

ST 2110-20 - Uncompressed Active Video

ST 2110-21 - Traffic Shaping and Delivery Timing for Video

ST 2110-22 - Constant Bit Rate Compressed Video

RP 2110-23 - Single Video Essence Transport over Multiple ST 2110-20 Streams

RP 2110-24 – Standard Definition Video in ST 2110

ST 2110-30 - PCM Digital Audio

ST 2110-31 - AES3 Transparent Transport

ST 2110-40 - SMPTE ST 291-1 Ancillary Data

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

*Status of DG: Revisions to parts 10, 20, 21, 22, 31, 40 were published in the last two quarters.*

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: Meeting participants are considering the best method for carrying the data to enable the alignment of the essence streams at a desired processing point. There is continuing liaison with AMWA regarding signaling link offset delay configuration.*

### **RP 2110-24 – Standard Definition Video in ST 2110**

Recommended Practice for transporting the standard-definition television signals described in SMPTE ST 125 within the SMPTE ST 2110-20 payloads; provides further definition of Pixel Aspect Ratio, Height, Alignment with SDI raster.

*Status: Published in the last quarter; project will close.*

### **RP 2110-25 – Measurement Practices (related to ST 2110 video, audio, ancillary data streams)**

This work arose out of the one-year review discussions of ST 2110-21. Rather than add this information to ST 2110-21, the DG decided that this topic should be separated into its own document. Scope: Recommend key measurements for video, audio and ancillary data along with nomenclature and formulas. Recommend ways to implement measurements and report the results. Clarify measurement meanings.

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

### **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 PICS team is drafting the revised document. Pre-FCD-ballot review closed 2023-02-24. It was pointed out at this meeting that AES67 is currently being revised, so maybe the ST 2110-30 revision should be based on that work.*

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

Revision following one-year review

*Status: Revision published in the last quarter; project will close.*

#### **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 passed FCD Ballot 2023-02-16 with 23 comments that are being resolved. The ballot was coordinated with FCD ballot for ST 2127-2, see below, so that voters can see how the two documents work together.*

#### **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 passed FCD Ballot 2023-02-16 with 14 comments to resolve.*

#### **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. Current plan is to draft a PICS for parts 10, 20, 21, 22, 30, 31, 40. 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 are currently at FCD ballot, closing this week. The remaining PICS documents are ready for review in the TC and the group has started to prepare a PICS for an additional document, ST 2110-41 (that is not yet published).*

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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

Current DGs and projects:

**DG: ST 2059 Suite Revisions**

DG Status: It was agreed at this TC meeting that the DG name should no longer be limited to one-year revisions. The DG meets bi-weekly and has the following two projects:

**Revision: EG 2059-10 - Introduction to the New Synchronization System**

The EG requires update for normative references and to use new terms “leader”, “follower”. The 2019 version of IEEE-1588 will be referenced.

*Status: EG 2059-10 revision is in the publication queue.*

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

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

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

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

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

**DG: RP 2059-15 - ST 2059-2 PTP Device Monitoring Capabilities**

Current project:

**RP 2059-15 - ST 2059-2 PTP Device Monitoring Capabilities**

The project creates a reference model containing a set of parameters to query the status of ST 2059-2 PTP devices. The Data Model is built on IETF RFC 8575 “YANG Data Model for the Precision Time Protocol (PTP)” with additional parameters:

- GNSS and Grand Master specific parameters
- SMPTE ST 2059-2 specific parameters
- RFC 8173 PTP MIB specific parameters

RP 2059-15 includes a .yang file as an element of the standard.

The group has also contacted SDOs and industry to encourage interest and feedback on this document.

*Status: The document passed ST Audit 2022-11-10. It was held until a Normative Reference, [ST 2029 revision](#), was published – that has now happened. The document is in the publication queue. At this meeting it was agreed that the RP 2059-15 elements (other than the main prose documents) would be*

*kept on the GitHub repo and referenced by URL in the standard. The GitHub repo would also reference the published prose document.*

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

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

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

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

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

- *Status: The group is rethinking the PTP interop process. Industry may have less need or support for continuing the existing interops:*
  - *Technology has become mature enough that most companies can test on their own*
  - *Multiple architectures have been proven and promoted by various means*

*The group is considering small, focused interops for specific topics – e.g. YANG model, new TLV, security. It is also considering leveraging customer proof-of-concept testing.*

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

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

Current Projects:

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

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

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

*Status: The group has held 7 meetings this quarter. The three documents above passed FCD ballot 2022-12-26 (extended due to lack of numeric consensus).*

*Part 1 passed with 15 comments (including late comments) – all are addressed, 7 accepted, 7 non-responsive, 1 on which progress has been slow.*

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

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### **WG: Data over AES3**

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

*Status: The structure of this WG is being simplified. It is proposed that the ST 2041-4 project below will be restarted as a drafting group under the new structure.*

### **ST 2041-4 - Carriage of MPEG-H 3D Audio Streams (MHAS) in AES3 Transport**

MPEG-H provides for carriage of immersive and interactive audio in the form of channels and objects and also in the form of Higher Order Ambisonics (HOA). The project will develop a standard to specify the format for carriage of MPEG-H data for professional applications as Non-PCM audio using the AES3 serial digital audio interface defined by ST 337.

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### **SG: Security in SMPTE ST 2059**

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

Published Reports:

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

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

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

### **DG: 32NF Inter Entity Trust Boundary**

Current Project:

#### **RP 2129: Inter Entity Trust Boundary**

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

*Status: RP 2129 is posted as Public CD [here](#) (comment period now closed). It has now proceeded to FCD ballot, closing 2023-07-13. RP 2129 is being used as a “poster child” for SMPTE micro-branding of its standards or standards families.*

### **32NF Document Maintenance Group**

This group holds monthly meetings to address issues reported on GitHub and to make the process easier to use. It also works on one-year and five-year document reviews.

Status: 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](#)

There was discussion at this meeting about whether to create an “umbrella” repo for all IP Networking & SDI issues and its possible promotion via a SMPTE landing page for “document maintenance and issues”. It was noted that the user community is much larger than the numbers attending TC meetings and they need an easy path to report issues with standards.

### [Media Systems, Control and Services Committee \(34CS\) Chairs: Karyn Reid and Paul Gardiner](#)

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

#### **DG: UMID Resolution Protocol**

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

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

#### **DG: BXF Suite of Documents**

Published documents:

RP 2021-1: General Information and Informative Notes

ST 2021-2: Protocol

EG 2021-3: Use Cases

ST 2021-4: Schema Documentation

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

RP 2021-6: BXF SDK Documentation

RP 2021-9: Implementing BXF

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

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

*Status: The DG has been working on a project for a quick BXF 8.1 revision to incorporate NABA requested changes (until now all revisions have been “dot zero”). The only document affected is ST 2021-4 and the revision closes FCD ballot just after this meeting round. Some requests for BXF 9.0 work have been received.*

#### Current Projects

##### **Revision: ST 2021-4: BXF Schema (NABA-Recommendation)**

Edit the schemas and related documentation in ST 2021-4 to follow the NABA Ad Spot Metadata Recommendation

*Status: The only document affected is ST 2021-4 and the revision closes FCD ballot just after this meeting round.*

##### **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 document editor considers the report finished and it will be submitted to the SG for final comment before being forwarded to the TC.*

##### **DG: Media Microservices**

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

*Status: An [OSA/SMPTE Media Microservices Summit](#) was held 10-11 January 2023 in NYC. New work in OSA (now moving to RIS) involves Best Practices for Stream Distribution; Global Service Repository; Catena (Data Model, Security, Architecture, Orchestration, GitHub).*

#### Projects currently underway:

##### **ST 2125 – IMF Registration Service API**

This project facilitates the use of IMF packages.

*Status: Issued as public CD document [on this page](#). The DG has decided to revise the Public CD and submit the revision for a second public CD period.*

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



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

*Status: Issued as public CD document [on this page](#). The DG had decided that it will keep in PCD pending completion of the Terminology work. It was intended that this would be ST 2132, but now the needed terms will simply be added to ST 2126.*

### **Media Microservices Terminology**

Provides definitions for terminology used in the other Microservices documents.

*Status: This project will proceed, but the output will be an online vocabulary and not a standard – the ST 2132 document number is no longer needed. Awaiting input from document editor.*

### **ST 2133 - Job Processing Architecture**

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

*Status: The draft document was reviewed in DG. It is being edited to make it read more normatively and terminology will be added.*

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

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

### **Interoperable Mastering Format (IMF)**

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

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

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

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

*Status: The DG has taken on work to review the impact of the deprecation and eventual removal of support for SHA-1 hashing on IMF standards.*

## Published documents:

- ST 2067-2 - Interoperable Master Format — Core Constraints
- ST 2067-3 - Interoperable Master Format - Composition Playlist
- ST 2067-5 - Interoperable Master Format - Essence Component
- ST 2067-8 - Interoperable Master Format - Common Audio Labels
- ST 2067-9 - Interoperable Master Format - Sidecar Composition Map
- ST 2067-20 - Interoperable Master Format - Application #2
- ST 2067-21 - Interoperable Master Format - Application #2E
- ST 2067-30 - Interoperable Master Format - Application #3
- ST 2067-40 - Interoperable Master Format - Application #4 Cinema Mezzanine
- ST 2067-50 - Interoperable Master Format - Application #5 ACES
- ST 2067-60 - Interoperable Master Format - Application #6 UHD TV Program Workflow (AVC)
- RDD 45 - Interoperable Master Format - Application ProRes
- RDD 59-1 - Interoperable Master Format - Application Constraint DPP (ProRes)
- ST 2067-100 - Interoperable Master Format - Output Profile List
- ST 2067-101 - Interoperable Master Format - Output Profile List - Common Image Definitions and Macros
- ST 2067-102 - Interoperable Master Format - Output Profile List - Common Image Pixel Color Schemes
- ST 2067-103 - Interoperable Master Format - Output Profile List - Common Audio Definition and Macros
- ST 2067-200 - Interoperable Master Format - Dynamic Metadata for Color Volume Transform (DMCVT) Plug-in
- ST 2067-201 - Interoperable Master Format - Immersive Audio Bitstream Level 0 Plug-in

## Current Projects:

**Revision: ST 2067-21 - Interoperable Master Format - Application #2E**

Add support for image codestreams that conform to ISO/IEC 15444-15, Consolidate ST 2067-21:2020 Am1:2020 ("HLG")

*Status: The revision has been published; work complete.*

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## DG: IMF Output Profile List

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

*Status: There has been no work on the remaining OPL documents in the last quarter. A hybrid approach with code (schema & examples) elements selectively excerpted into docs and referred to in normative tables is being used for Parts 101, 104, 105, 106. Some other projects are related to OPL: 2067-203, 2067-204, 2067-205, 2067-206, 2067-207 (see below), as well as the Common LUT work in TC-10E.*

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.

*Status: Development of the document revision is in progress in GitHub using markdown format. Will form the “template” for other OPL documents below.*

### **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.

*Status: Development of the document revision is in progress in GitHub using markdown format.*

### **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.*

### **ST 2067-202 - Isochronous Stream of XML Documents (ISXD) Plugin**

Conversion of RDD 47-2018 to a standard; conformance to IMF core constraints

*Status: Passed ST Audit 2022-11-24; on the point of publication.*

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

Current project:

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

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

*Status: The document was posted as a PCD on [GitHub](#) and has been well publicized. It passed FCD ballot 2023-04-01 with 11 comments to resolve. Comment resolution is in progress.*

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

Current Project:

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

*Status: The DG Chair is preparing to launch document development work in the next quarter.*

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

Current Project:

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

*Status: The document is at PCD on [GitHub](#) and awaiting feedback. It is planned to proceed through the publication process after the next plenary.*

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

Current projects:

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

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

#### **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 (both docs): ST 2067-203 passed FCD Ballot with 4 comments to resolve. ST 2067-204 is being reviewed in the DG – pre-FCD-ballot review in the TC is expected soon.*

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

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

*Status: The DG has been formed. Kick-off is expected soon.*

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

*Status: Projects are approved and work will get going soon.*

Current Projects:

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

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

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

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

**SMPTE Standards Publications in the Last Quarter***Includes Revisions and Amendments***10E Essence:**

[OV 2073-0:2023](#) - SMPTE Overview Document - VC-5 Video Essence — Document Suite Overview

[RP 2047-1:2023](#) - SMPTE Recommended Practice - VC-2 Mezzanine Level Compression of 1080P High Definition Video Sources

[RP 2047-3:2023](#) - SMPTE Recommended Practice - VC-2 Level 65 Compression of High Definition Video Sources for Use with a Standard Definition Infrastructure

[ST 2019-1:2016](#) Amd 1:2023 - SMPTE Amendment - VC-3 Picture Compression and Data Stream Format — Amendment 1

**27C Cinema:****30MR Metadata & Registers**

[ST 2029:2023](#) - SMPTE Standard - Uniform Resource Names for SMPTE Resources

[ST 2123:2023-04](#) - SMPTE Standard - SMPTE Metadata Registers

**31FS File Formats & Systems:**

[ST 2065-4:2023](#) - SMPTE Standard - ACES Image Container File Layout

[ST 382:2023](#) - SMPTE Standard - Material Exchange Format — Mapping AES3 and Broadcast Wave Audio into the MXF Generic Container

**32NF Network & Facilities Architecture:**

[RP 2110-24:2023](#) - SMPTE Recommended Practice - Special Considerations for Standard Definition Video Using SMPTE ST 2110-20

[ST 2110-40:2023](#) - SMPTE Standard - Professional Media over Managed IP Networks: SMPTE ST 291-1 Ancillary Data

[SMPTE ER 1009:2023](#) - Security in SMPTE ST 2059: Threats, Controls and Mitigation Strategies

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

[ST 2067-21:2023](#) - SMPTE Standard - Interoperable Master Format — Application #2E



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[ST 2067-60:2023](#) - SMPTE Standard - Interoperable Master Format — Application #6 UHDTV Program  
Workflow (AVC)

***[SMPTE Public Committee Drafts](#)***

*Links to current PCDs [here](#)*

## Notes on this Report and the SMPTE Standards Process

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

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

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

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

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

### **SMPTE Document Development Process**

*The document stages are:*

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

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

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

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

**ST** = Standard

**RP** = Recommended Practice

**EG** = Engineering Guideline

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

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

### **SMPTE Document Review**

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

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

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

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

### **Other Notes**

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