# STANDARDS QUARTERLY REPORT Feb/March 2023

Result of SMPTE® Technology Committee Meetings (Hybrid In-Person/Online)

27th of February to 1st of March 2023

THE NEXT CENTURY

Society of Media Professionals, Technologists and Engineers ®
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# 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 27 Feb - 1 March 2023*
*Host: Amazon Studios Culver City, CA, USA*

## *Executive Summary*

This Executive Summary lists new projects 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 also develop their projects by telecons).

There were 49 registrations for in-person attendance and 41 for remote attendance over the three days.

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

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

| *Project Name* | Type | SMPTE Group | Approval Period Closes |
|---|---|---|---|
| *Descriptive Metadata Scheme - TLC* | New Standard | File System | 2022-12-28 |
| *ST 2021-4 BXF Schema* | Revision | Media Systems/Control | 2023-02-02 |
| *Common LUT Format (CLF)* | New Standard | Essence | 2023-02-14 |
| *IMF Application VC-5* | New Standard | Media Packaging | 2023-03-09 |
| *JSON representation of SMPTE Registered Data (RegJSON)* | New Standard | File System | 2023-03-16 |

***Professional Media over IP Projects***



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**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

Nine 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)
- 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 5 Parts were published in the last quarter.
** This part has just started minor revision.

There are also parts in development on:

- Transport of metadata that has not been derived from ST 291 packets (2 documents, both just through FCD Ballot)
- A document tying down additional parameters for streaming standard definition video (awaiting publication)
- Measurement considerations for 2110 streams (now ready for ST Audit)
- Timing planes for 2110 streams

There is a project that is 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 designing a testplan for a plugfest now that in-person events are able to resume. 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 is producing reports 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 Guidelines – one published and revision close to publication, another being drafted. Details



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

A study group within the Media Systems, Control and Services TC is researching 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
- An eight-part suite of documents defining the VC-5 compression system (developed from GoPro's Cineform codec) is complete. An IMF Application is about to start.
- Projects to revise SMPTE VC-3 documents to add Alpha channel – Essence – MXF file
- Projects on the VC-2 document suite (developed from BBC's Dirac Pro). Details

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***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**



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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

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 16 MXF-related projects in process. Details They include (list not exhaustive):

- 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. 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 being prepared. 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 the summary page.



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# SMPTE® Standards Quarterly Report:

## *Detailed Account*

*SMPTE Standards Committee Meetings 27 Feb - 1 March 2023*
*Host: Amazon Studios Culver City, CA, USA*

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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 will benefit from 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; show Administrative Guidelines in their new HTML format as well as plans to transition to HTML standards documents; demonstrate new Apps for use in Standards groups.



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**Future Meetings**

Quarterly Standards meeting rounds are planned for:

Q2 2023 13 - 16 June, Telstra CIC, Melbourne, Australia
Q3 2023 Considering Paris, France or Online
Q4 2023 11-14 December Online
Q1 2024 TBA

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 are also provided in the footer of each page to assist with navigation. Documents published in the last quarter from the work of each TC are listed on this page.

The SMPTE website now has a summary projects page publicly available.

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# Details from each Technology Committee (TC) meeting

## *Essence Technology Committee (TC-10E) 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 will be called. A liaison from the EBU Video Systems Group has been received and the DG Chair will draft a response.*

**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. A draft document exists. It will be revised to extend coverage beyond television to cinema and other applications. There are two basic measurement techniques*

**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:



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**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. Comment resolution is half complete.*

***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: The amendment passed ST Audit 2022-09-28 and is in the publication queue.*

**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: No further work is planned after the projects below reach their imminent completion; the DG will be closed upon publication.*

Current projects:

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

*Status: ST Audit passed November 2022; in the publication queue*

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

*Status: ST Audit passed November 2022; in the publication queue*

**DG: Revision: RDD 36 ProRes Bitstream**

Fixes issues found and adds HLG support

*Status: RDD 36 revision has been 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. Pre-FCD review is expected in time for the June plenary.*

**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. Work is planned to start around the middle of 2023.*

**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.*

**Other TC-10E Business**

There was a decision that the following two documents will be revised:

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

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

*This TC was formed just before the 2022-12 meeting round to amalgamate three cinema-related TCs: Film (TC-20F), Digital Cinema (TC-21DC) and Cinema Sound Systems (TC-25CSS).*
*This TC inherits all work from those TC's.*

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

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

*Status: A vote was held to reaffirm 8 TC-27C documents. Another vote was held to reaffirm and stabilize a further 4 TC-27C documents. Both votes passed.*

**ST 430-1-202X-Revision D-Cinema Operations - Key Delivery Message**

Update normative references to their current editions (or equivalent documents), consolidate outstanding amendments and resolve issues impacting interoperability such that conformance of existing files and implementations is preserved.

*Status: WD in progress*

**ST 429-3-202X-Revision D-Cinema Packaging - Sound and Picture Track File**

*Status: WD in progress*

**ST 429-20:202X MXF Constraints**

This document will allow DC documents to reference it, rather than referencing ST 377 directly.

*Status: ST Audit passed 2022-12-07; in the publication queue.*

**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 passed FCD ballot 2023-01-13 and is now in comment resolution (9 comments, one late comment).*

**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

*Status: Revision is underway, still some way to go. It was agreed that a Drafting Group should be formed for this work.*

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

There is consideration of producing an Engineering Guideline as well.

Current WG project:

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

This will be the output Recommended Practice from the work of the DGs (see below).

*Status: The WG gave a detailed presentation on progress of the three DGs including comparisons of Reference Cinema and Standard Cinema performance. Work can start after the DGs have reported back with their contributions.*

The Drafting Groups are:

**DG: Technical Documents Research**

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

*Status: Technical Document Research DG has a draft report, looking for resources to complete.*

**DG: Modern Movie Clip Analysis**

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

*Status: Clip Analysis DG has licensed clips and has held a number of listenings.*

**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). There is a sub-group B-Chain Theater Test Procedure Creation.

*Status: The B-Chain Theater Test Procedure Creation sub-group has been meeting every 2-4 weeks, testing benchmark, reference and standard cinema systems. Some graphical results and conclusions were presented at the meeting.*

**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: An initial draft has been produced and has been reviewed in the DG with good feedback.*

**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.*

**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 3 meetings and is identifying and proceeding through topics.*

Current Document:

**Engineering Report**

The report will identify existing SMPTE documents that will need revision to include the new capabilities.

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

## *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.

**DG: UMID-related Standards**

This DG is managing the following projects (a third one, UMID Resolution Protocol, is moved to TC-34CS here):

**ST 2029 UMID Update**

*Status: In the publication queue. There is another revision, see below, that will publish first.*

**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 is updating the WD with examples that have been contributed and noted that further examples are still welcome.*

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**SG: UUID File Naming**

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

*Status: The Chair reported that the SG continues to hold bi-weekly telecons. It is discussing a wide range of implementations and issues and work on the draft report continues. The group needs a new document editor.*

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

Project to create a revision of ST 2029 to include the addition of YANG (Yet Another Next Gen) Data Modeling Language as a resource type.

*Status: This revision is in the publication queue (and will precede the ST 2029 UMID revision to publication).*

**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: Pre-DP review will close 2 weeks after the meeting and an online DP vote is planned.*

**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 2123:2021-08 - SMPTE Standard - SMPTE Metadata Registers (“Sriracha” release)

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

Current projects:

**Metadata Registers**

The current ballot revision is codenamed “Vindaloo”

*Status: The ST 2123 Vindaloo release passed ST Audit and is in the publication queue. The register set will be posted on SMPTE-RA.*

*The next release for ballot will be Jalapeno that is being prepared for balloting after Vindaloo publishes.*

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.*

## 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

**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: A second pre-FCD-ballot review is planned.*

**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 have been identified between smpte-ra & this document; a small AHG will triage the issues. Pre-FCD-ballot review is expected early 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:

**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: A new project proposal completed approval 2022-12-27.*

**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.*

**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. Pre-DP review is on hold awaiting a Normative Reference (ST 2019-1) to publish.*

**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 was elevated to DP by a vote at the meeting and it will proceed to ST Audit.*

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

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; 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: The revision is in the publication queue.*

**DG: TLX and TLC MXF mapping**

Current Projects:

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

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

*Status: There is no working draft yet as a new approach has been adopted, based on mapping TLX components into "TLC", a more generic structure; see the next project below.*

*There is proposed new work for a JSON equivalent to RegXML (ST 2001-1). The project proposal approval period finishes 2023-03-16.*

**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 expected to follow this plenary meeting. A presentation explaining the approach was given at the meeting.*

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

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: There have been twelve DG meetings, though none in the last quarter. Update: The draft document was Public CD and will be submitted to Github imminently (prose + MXF & WAV sample files).*

**WG: MXF-related Documents Maintenance**

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

*Status: The group met once in the last quarter. It has made recommendations for one year and five year review actions.*

**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 closed ST Audit 2023-02-28 (the day after the meeting).*

**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*: *The ST 377-41 revision document was raised to DP status by a vote at the meeting.*

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

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

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

Project Scope: Specify mapping of a sequence of DPX pictures as defined by SMPTE ST 268-1 and SMPTE ST 268-2 into the MXF Generic Container.

*Status: There has been no progress as the editor has been busy organizing this plenary meeting.*

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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 is in the publication queue. ST 2065-5 passed ST Audit 2023-02-28 with no comments.*

**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 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: 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 is now at FCD ballot, closing 2023-04-02.*
*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 FCD ballot with 6 comments that are now resolved. The draft is in 1-week DG review. If no further comments received, a pre-DP review package will be 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: All 32NF40 DG projects are complete. The 32NF70 Working Group projects and documents below will move into 32NF40. The merging of projects and files is awaited.*

**WG: Ultra HD SDI Interfaces**

This Working Group (32NF70) was established to create a hierarchy of single-link, dual-link and quad-link electrical and optical SDI interfaces with nominal link rates of 6Gb/s (ST 2081 suite), 12Gb/s (ST 2082 suite) and 24Gb/s (ST 2083 suite, never started). See below for the individual documents in each suite. The optical interface parameters supporting these standards have been added to ST 297-1: Serial Digital Fiber Transmission Systems.

*WG Status: Awaiting merger. Draft revisions for ST 2081-1 and ST 2082-1 from 5-year review passed FCD ballot 2021-04-15 with no comments (requires verification). Upon verification, the two documents will be elevated to DP status and ST Audit can start.*

**DG: 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

**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)

**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

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: Parts 10, 20, 21, 22, 31 were published towards the end of 2022. However, some of the normative inter-references between parts of the updated documents say 2021 instead of 2022. The documents are being revised by headquarters.*

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 have reviewed the problem and the tools available to align the essence streams at a desired processing point. There has been 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: ST Audit passed 2022-09-28; well-advanced in the publication queue.*

**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 was elevated to DP status by a DP vote during the meeting.*

**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.*

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

Revision following one-year review

*Status: On the point of publication.*

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

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

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

*Status: The document passed FCD Ballot 2023-02-16 with 23 comments to resolve. 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 2110-42 – FMX Payload for ST 2110 Technical Metadata**

An Object Format for Technical Metadata associated with 2110. Example usage:

-20: Carries the values of the FMTP parameters for the stream

-30/31: Carries the ptime and number of channels

-40: Carries the video format tag (VPID byte)

All: Can carry the AMWA Sender ID and/or Flow ID

*Status: The DG has reached consensus to shelve this work and stop, as there is no active proponent. The project will be closed.*

**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: The DG has Increased meeting time to 1.5 hours per week to drive to completion. Pre-FCD-ballot review is complete for RP 2110-110 and RP 2110-120 and the remaining documents will go out for pre-FCD-ballot review in batches over the coming few weeks.*

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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 passed ST Audit and 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 DG is working on the revision of ST 2059-2 to harmonize it with IEEE 1588:2019, though little progress has been made in the last quarter. Currently, it is focusing on the SMPTE TLV; the current SMPTE TLV is not compatible with PTP V2.1. It is considering whether it can create a single profile that supports both the old and the new TLV messaging structure.*

*It will also consider new V2.1 monitoring features and PTP security.*

**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 will not be published until a Normative Reference, ST 2029 revision, is published. The two documents are at the formatting stage of publication process.*

**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: Detailed test plans are being compiled for future interops, especially selecting network topologies of greatest interest. The group has delayed the next in-person event, giving more time for implementations of new features to be available. A potential location has been identified in Inglewood, California.*

**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:

ST 2120-4 – Extensible Time Label - TLX KLV Encoding and MXF Mapping.

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 3 documents above completed their Public CD period 2022-07-01 and passed FCD ballot 2022-12-26 (extended due to lack of numeric consensus). Part 1 has 31 comments, Part 2 has 32 comments and Part 3 has 34 comments to resolve. The document editors have taken up initial addressing of comments.*
*The DG is also drafting an API for a Python library for typical TLX manipulations.*

**DG: PTP synchronization Engineering Guidelines**

Published document:
EG 2059-10 - Introduction to the New Synchronization System (being revised in this group)

Current project:

**EG 2059-14 - Best Practices for Large Scale SMPTE ST 2059-2 PTP deployments**

*Status: A draft was posted during the 2019-03 meeting week. No progress since, though that draft has a substantial amount of useful information.*

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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: At the last meeting round, the WG Chair described a restructuring removing the DG: ST 337 family of documents and placing all projects directly under the WG. The group is awaiting feedback from the TC Chairs and Project Review initiation.*
*The proposed scope will be:*
*Develop and maintain SMPTE documents related to transport of data on the AES3 interface as defined in ST 337 "Format for Non-PCM Audio and Data in AES3 Serial Digital Audio Interface", including ST 338 "Format for Non-PCM Audio and Data in AES3 - Data Types" and documents defining the transport of specific Data Types. Provide input on one and five year reviews, revise existing documents as directed, and develop new documents when needed.*

**DG: ST 337 family of documents**

This group manages documents that define carriage of data formats using the ST 337 method.

Current projects:

**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.

*Status: There has been no progress on the WD document for several quarters; there is still intent to complete the work. As described at the last meeting, the project will be replaced with a DG and project directly under the WG.*

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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 Report:
Version 1 of the report is published, ER 1004. It focused on the Threat Landscape.

Current Report:
Version 2 that focuses on threat detection and mitigation strategies.

*Status: This version of the report will be ER 1009 – Security in ST 2059. It has been sent to the TC Chairs to initiate 2 week TC review.*
*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. It has been decided to proceed with FCD ballot. A new document editor has been appointed and FCD ballot is expected shortly.*

**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*

*The group requests the creation of an "umbrella" repo for all IP Networking & SDI issues and promotion of the new repo via a SMPTE landing page for "document maintenance and issues".*

## *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. It is hoped that an initial "skeleton" draft of the resolution protocol document will be available in the coming quarter.*

**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 7.0, becoming BXF 8.0 very soon (see below).

*Status: Revision projects to add BXF 8.0 items resulted in revisions to EG 2021-3 (Use Cases) and ST 2021-4 (Schema Documentation). EG 2021-3 and ST 2021-4 are published, though there is a problem with IEEE Xplore and ST 2021-4 will be resubmitted.*

*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")*

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 DG has Prepared CD package with revision to 2021-4, schema package and xml schema representation. Hoping to reach consensus that this is ready for pre-FCD review by 34CS in March 6 DG meeting.*

**SG: Required Application Protocol Standards for IP-Based Media Production**
This group will explore prospective Media Industry layering models and standards requirements for interoperability of production applications running on IP-based media networks.

*Status: The SG has almost completed its draft report and requests that it moves ahead within the TC.*

**DG: Media Microservices**
This group is managing Microservices projects submitted to SMPTE from the Open Services Alliance, OSA.

*Status: The group meets monthly. an OSA/SMPTE Media Microservices Summit was held 10-11 January 2023 in NYC. New work in OSA involves Best Practices for Stream Distribution; Global Service Repository; Catena.*

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. It is hoped that this will provide time for JSON Schema to be standardized in IETF.*

**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 until the Terminology document (ST 2132, see below) is published; however it looks like ST 2132 will not proceed and the required terms will be moved into the microservices documents that use them.*

**ST 2132 - Media Microservices Terminology**

Provides definitions for terminology used in the other Microservices documents.

*Status: Likely to abandon this document and close project.*

**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 use cases 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 received one year and 5 year review lists from HQ that it will process early in 2023.*

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
- 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 passed ST Audit 2022-11-24 and should be published very soon.*

**DG: IMF Plugfests**

The Plugfest DG has held several plugfests, the most recent was at Disney/ABC - Burbank, CA, US 2020-02-12 and 13.

Current projects:

**IMF Plugfests**

Maintains a forum for the interchange of sample IMF material for interoperability testing.

*Status: There was a decision to close the plugfest group and have testing done in the groups developing or revising documents.*

**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)*

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; expect publication early 2023.*

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**WG: IMF Application DPP**

DPP is the Digital Production Partnership in the UK. This WG (35PM-60) coordinated projects concerned with the creation of two SMPTE Technical Specifications (TSP) that are now being converted to RDDs, but only RDD 59-1 is being taken forward:

**RDD 59-1 IMF Application Constraint DPP (ProRes)**

Convert TSP 2121-1 to RDD 59-1

*Status: RDD 59-1 is published, project closed.*

**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 has been posted as a PCD on GitHub and has been well publicized. It is now at FCD, closing 2023-04-01.*

**DG: IMF Application UHDTV Program Workflow (AVC)**

Current project:

**ST 2067-60 IMF Application 6 UHDTV program workflow (AVC)**

IMF Application to improve the efficiency of UHDTV program workflows in broadcasting stations mainly in terms of processing time and storage capacity.

*Status: The document is in the publication queue. The group will consider whether it is possible to draw the attention of AVC users to this document.*

**DG: IMF Application VC-6**

Current Project:

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

*Status: The document is about to be posted for PCD.*

**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 is currently in pre-FCD-Ballot review. Work on ST 2067-204 is restarting as the underlying ST 2131 document in 31FS is about to enter PCD.*

**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, with good membership. An initial document has been started and a new group member will develop the document.*

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

*Status: Projects are approved but there has not been significant work yet.*

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.

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## *SMPTE Standards Publications in the Last Quarter*

*Includes Revisions and Amendments*

### 10E Essence:

RDD 36:2022 - SMPTE Registered Disclosure Doc - Apple ProRes Bitstream Syntax and Decoding Process

### 27C Cinema:

ST 2098-2:2022 - SMPTE Standard - Immersive Audio Bitstream Specification

SMPTE ER 1008:2022 - Digital Cinema – Overview for the SMPTE 428, 429, 430, 431, 432, and 433 Document Suites

### 30MR Metadata & Registers:

### 31FS File Formats & Systems:

RDD 44:2022 - SMPTE Registered Disclosure Doc - Material Exchange Format — Mapping and Application of Apple ProRes

### 32NF Network & Facilities Architecture:

### 34CS Media Systems, Control & Services:

### 35PM Media Packaging & Interchange:

RDD 59-1:2022 - SMPTE Registered Disclosure Doc - Interoperable Master Format — Application DPP (ProRes)

RDD 45:2022 - SMPTE Registered Disclosure Doc - Interoperable Master Format — Application ProRes



ExecSum ^ TC's: Essence Cinema Metadata FileSystems Network MediaSystems MediaPackaging

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## 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.*



ExecSum ^ TC's: Essence Cinema Metadata FileSystems Network MediaSystems MediaPackaging