



# STANDARDS QUARTERLY REPORT JUNE 2022

Result of SMPTE<sup>®</sup> Technology Committee  
Meetings

6th to the 9th of June 2022



## 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 6 - 9 June 2022*

*Host: Online Meeting*

### 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](#) after this summary.

Nine SMPTE Technology Committees (TCs) and no subgroups scheduled meetings at this round (the subgroups also meet by telecon, so their normal cadence was able to continue through the meeting week).

65 members attended by remote access over the four days.

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

<b><i>Proposals for new projects submitted in the last quarter</i></b>			
<i>Project Name</i>	Type	SMPTE Group	Approval Period Closes
<i>Image Line Numbering</i>	New Standard	Essence	2022-03-15
<i>ST 2123 Registers Release (Vindaloo)</i>	Revision	Metadata	2022-04-06
<i>ST-2059-2 IEEE 1588-2019 Harmonization</i>	Revision	Network	2022-04-07
<i>ST 377-41 MXF MCA Controlled Vocabulary</i>	Constrained Revision	File Systems	2022-04-15
<i>IMF – Auxiliary Image Sequence Plug-in</i>	New Standard	Media Packaging	2022-04-22

## ***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](#)

Nine parts of the suite are published.

- 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 \*
- ST 291 Ancillary Data \*
- Timed Text streaming

\* These parts are in revision following one-year review. They passed ST Audit and are having change-tracking information added prior to publication.

\*\* This part has just started revision.

There are also parts in development on:

- Transport of metadata that has not been derived from ST 291 packets (3 documents)
- A document tying down additional parameters for streaming standard definition video (will have ST Audit shortly)
- Measurement considerations for 2110 streams

There is a project to create 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 when in-person events can 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 has now passed FCD ballot. [Details](#).
- PTP Engineering Guidelines – one published and starting revision, another being drafted. [Details](#)

## 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](#)

IMF Plugfests are held, they are now conducted virtually. [Details](#)

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

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

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

*Current work on video compression standards comprises:*

- VC-6 is being revised to correct small errors and a VC-6 mapping into MXF standard is underway. [Details](#)
  - An eight-part suite of documents defining the VC-5 compression system (developed from GoPro's Cineform codec). Seven parts of the suite are published and the final part on Metadata and additions to the conformance part for metadata materials are being prepared for publication. [Details](#).
  - 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*

### **Cinema Sound Systems**

This Technology Committee (TC-25CSS) works on improving the quality of sound in cinema presentations, through the standardization of technical practices from the content creation dubbing stages to the commercial outlets.

A revision of the SMPTE ST 2098-2:2021 Immersive Audio Bitstream Specification is being prepared for publication.

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

A revision to the ST 2095-1 Pink Noise standard is progressing.

[Details](#)

### Digital Cinema (D-Cinema)

This Technology Committee (TC-21DC) has published four 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
- Hybrid Tone Mapping

[Details](#)

### Reference Materials for DPX V2.0 HDR Implementations

The HDR DPX standard was published in Q1 2019 and is being amended to include a DPX MIME type registration. This project is working on a reference implementation and tools. [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 17 MXF-related projects in process. Several will be published before the next meeting. [Details](#) They include (list not exhaustive):

- ST 377-1 MXF (revision)
- Mapping VC-3 Coding Units into the MXF Generic Container (amendment)
- Two new ARRI Registered Disclosure Documents
- Mapping Next Generation Audio (NGA) Signals into the MXF Generic Container (two documents)
- Mapping FFV1 essence 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 JPEG 2000 Codestreams into the MXF Generic Container (revision)
- Mapping AES3 and Broadcast Wave Audio into the MXF Generic Container
- Mapping Audio Definition Model to MXF

**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 are two other documents in development. [Details](#)

The group works closely with the Open Services Alliance, OSA - formed towards the end of 2019 to fast-track applications that are then submitted to SMPTE for standardization.

**Extensible Time Label (TLX)** A project 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 are posted for a Public CD period and 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. It has sent liaisons to several industry groups known to be working in this area. The task force does not report during these meeting rounds.

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

Deals with the problem of securely exchanging IP flows between third party networks. A Public Committee Draft has been posted. [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.

## SMPTE® Standards Quarterly Report:

### Detailed Account

*SMPTE Standards Committee Meetings 6 - 9 June 2022*

*Host: Online Meeting*

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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 Florian Schleich and Thomas Bause Mason respectively.

There are five Standards Directors, currently Pierre Lemieux, Thomas Kernan, Sally Hattori, Bruce Devlin and Dean Bullock.

Each round comprises meetings of Technology Committees (detail below) as well as any subgroups whose work will benefit from face-to-face meetings (current covid19 situation excepted, of course). Subgroup work proceeds continuously between the quarterly meetings using teleconferences.

A Standards Community meeting is usually held to provide details of future meeting arrangements, webinars and courses, however there was no meeting this round.

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](#).



## Future Meetings

Quarterly Standards meeting rounds are planned for:

September 14-17, 2022: EBU, Geneva, CH

December 2022: Virtual

March 2023: TBA

June 2023: TBA

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

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

[Digital Cinema \(21 DC\)](#)

[Cinema Sound Systems \(25CSS\)](#)

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

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

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

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

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

SMPTE also has a Film Technology Committee (20F). It does not meet during the quarterly face-to-face rounds but the TC did meet at this virtual round; details [here](#). If 20F does align with the quarterly meeting rounds, it will be fully integrated into this report.

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.



## 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: 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: A WD document is awaited.*

#### **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.

##### **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: The group has not made progress in the last quarter. At the last meeting, the DG chair reported that he is considering pulling out the display screen reflectance section of proposed RP 2080-4 and turning it into a standalone document, since this need not be limited to HDTV.*

**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 underway.*

### ***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 draft revision is at FCD Ballot, closing 2022-06-15.*

#### **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: DP vote passed 2022-05-05 with no comments. A package for ST Audit will be submitted to the TC Chairs.*

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

This group standardizes the CineForm / GoPro video compression system.

## Published documents:

ST 2073-1 - VC-5 Elementary Bitstream

RP 2073-2 - VC-5 Conformance Specification

ST 2073-3 - VC-5 Image Formats

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

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

ST 2073-6 - VC-5 Sections

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

## Current projects:

**ST 2073-7 – VC-5 Metadata**

This will provide a basic set of metadata for input image format and facilitate round-tripping embedded metadata from other standards by use of identifiers – ACES, XMP, DPX, MXF, ALE and vendor-specific.

**RP 2073-2 - VC-5 Conformance Specification**

Revision to add material for Part 7 items. Software elements on GitHub are included.

*Status of projects:**ST 2073-7: Passed ST Audit and being prepared for publication**RP 2073-2: Passed ST Audit and being prepared for publication**Two new projects are under consideration:*

- IMF application for VC-5
- Extension to the bitstream to include alternative codebooks

A website has been launched for the VC-5 Codec at <https://vc5codec.org> (not a SMPTE Standards activity).

**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

Current projects:

**Revision: ST 2042-1:2017 - VC-2 Video Compression**

Revision will fix errors in pseudocode and elsewhere. Incorporate clarifications. Update boilerplate text and references.

*Status: ST audit passed 2022-04-15; in publication queue.*

**Revision: RP 2042-3:2010 - VC-2 Conformance Specification**

Revision will add specification of a reference encoder and test materials supporting the last revision of ST 2042-1.

*Status: ST audit passed 2022-02-04; in publication queue.*

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

*Status: FCD ballot passed 2022-05-26; starting comment resolution.*

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

*Status: FCD ballot passed 2022-05-26; starting comment resolution.*

**Revision: RP 2047-5 - VC-2 Level 66**

Revision to incorporate 2018 amendment, update references and make any necessary editorial corrections.

*Status: ST Audit passed 2022-02-23; being prepared for publication.*

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

Fixes issues found and adds HLG support

*Status: The RDD ballot closed 2022-03-11. It is believed that comment resolution is complete.*

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**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: UHD formats have been added to both documents. They will not be updated to use the current template.*

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

Update to current practices for diagrams, graphics, file formats, and conformance language

*Status: DG resources have been set up for this newly-approved project.*

**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. There is no WD document yet.*

**Film Technology Committee (20 F) Chaired by Julian Pinn and David Richards**

*The application of the General Scope as it applies to application of mastered essence to theatrical film distribution, including, media and component creation, marking, laboratory methods, reproduction, packaging, projection, and related topics. Additionally, film capture, editing and recording.*

*Status of TC: TC-20F has not met since 2021-12 and this meeting was called to reboot the TC “under new management”. Most of the Working Group Chairs have retired and new names were put forward. There is an intention of holding meetings on a quarterly basis. No projects were discussed, just organizational matters.*

***The information below is the outcome report from the 2021-12 meeting, to provide some background to the group’s work.***

**RP xxxx - On-screen Light Measurement**

New Recommended Practice

*Status: A Working Draft for 2<sup>nd</sup> FCD ballot is available. The remaining sticking point is that there are two proposals for scope sizing. A straw poll was held to determine which proposal goes into the FCD ballot (decided on option known as “5x3”).*

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**WG20F-10 Film Production Technology****ST 157:1999 – for Motion-Picture Film (8-mm Type S) — Camera Aperture Image and Usage**

*Status: Editorial correction has been submitted to SMPTE HQ. The corrected version has not been published yet.*

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**WG20F-20 Laboratory Services**

*Status: The WG Chair has retired; the WG20F-10 Chair volunteered to Chair this group as well.*

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**WG20F-30 Film Audio****RP 2054- Method of Measurement of perceived loudness of short-duration motion picture material**

*Status: A 5-year review group was formed at the last meeting to recommend action. The group requires one more meeting cycle to complete the work.*

**Revision: RP 200 - 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 accommodate immersive sound system surround speaker levels.

*Status: An earlier meeting resulted in approval to enlarge scope to include harmonization with ST 2095-1. It was also agreed to delay work on RP 200 until ST 2095-1 has been revised, however there has been no work to launch that project in TC-25CSS. There has been no progress since the last meeting, but it was decided to keep the project open.*

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**WG20F-40 Theatrical Projection**

*Status: No work required.*

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***Digital Cinema Technology Committee (21 DC) Chairs: Steve Llamb and Jack Watts***

*The application of the General Scope as it applies to application of mastered essence to theatrical digital distribution, including compression, encryption, wrapping, marking, packaging, media, logging, playout, projection, reproduction, and related topics.*

**DG: Stereoscopic Subtitling**

**Business Impact of Subtitles projects:** Compatibility and Interoperability

Current projects:

**ST 428-7 - D-Cinema Distribution Master (DCDM) – Subtitle**

To revise ST 428-7 to improve rendering of Japanese timed text subtitles. The standard normatively references ISO/IEC 10646-1, which defines font files. These files provide the information to properly render horizontal and vertical text. However, current cinema subtitle rendering implementations do not use the vertical metrics and other features of the font file resulting in improper vertical and horizontal positioning of Japanese characters within a vertical string.

*Status: Participation has been falling and it was confirmed this time that the project will be closed.*

**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: RP 428-22 was posted for a 6 month public CD period on 2021-10-19. There are [4 issues](#) on GitHub. The issues will be resolved and the document will be posted for pre-FCD-ballot review.*

**RDD 53 Hybrid Tone Mapping**

Current project:

**RDD 53 - Transport of digital cinema content with multiple dynamic range**

This RDD is intended to support the development of applications that create, read and process Hybrid Tone Mapping content for cinema distribution.

*Status: There was no report. At the last meeting, the proponent reported that there will be discussions with manufacturers moving forward with the goal of restarting the project before the summer.*

**DG: 21DC Document Maintenance**

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

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

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

*Status: The document closed FCD ballot 2022-05-04 with 5 comments to resolve.*

**Television and Broadband Media Committee (24TB) Chair: Bruce Devlin**

*The application of the General Scope as it applies to mastered essence for television and broadband distribution (both separately and for hybrid television/broadband environments), including compression, encryption, wrapping, marking, packaging, media, tracking/control, presentation, reproduction, and related topics.*

*This TC did not meet and is in the process of being closed down. It is retained in this report for continuity whilst its projects are taken up by other groups, as noted below at the March 2022 meeting round.*

**DG: 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: Reassigned to TC-10E. Last meeting Status: It was agreed that the current revision draft will be used for FCD ballot, and it has been posted to the TC. It includes the UHD TV formats, but there has been no redefinition of four reserved bits as consensus could be achieved.*

**Revision: RP 190:1996 - SMPTE Recommended Practice - Care and Preservation of Audio Magnetic Recordings**

The TC has consulted experts who advise that this document needs revision. It was decided that SMPTE would consult with AES over a joint effort on this subject.

*Status: Reassigned to TC-31FS, DG has yet to be set up. Last meeting Status: The TC-24TB Chair will correspond directly with AES on this topic.*

*Note: AES has standards AES49 and older AES22 on this subject – both stabilized.*

**Cinema Sound Systems (25CSS) Chair: C J Flynn**

*The application of the General Scope as it applies to standards for cinema sound and cinema B-Chain systems, including performance, measurements, setup, calibration, acoustics and related topics.*



*The TC is maintaining a workflow chart, identifying how its projects link up and where other work is needed.*

**DG: ST 2098-2 Constrained Revision**

Current project:

**ST 2098-2 Constrained Revision**

Resolve the issues and clarifications requested in the 2098-2 GitHub reporting system

*Status: The revised document passed ST Audit 2022-05-25 and is being prepared for publication.*

**WG: B-Chain Characteristics and Expectations**

Create recommended practices and engineering guidelines for cinema sound systems to ensure they faithfully play back modern, digital, full dynamic-range movie soundtracks.

*Status: The WG Chair gave a presentation updating the progress of three work areas noted below.*

The Drafting Groups are:

**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 DG meets bi-weekly and has identified a large number of research documents and papers and has brought them to the group for analysis. A core group is drafting its input for the WG report. A spreadsheet records the documents and the relevant sections and a newly-appointed librarian is organizing the documents.*

**Modern Movie Clip Analysis**

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

*Status: DG Meetings Suspended While Small Groups Meet to Analyze Clips. Comparative Listening in two rooms at AMC Century City is planned for the week of June 27.*

**In-situ Measurements and Testing**

Determine what system parameters need to be measured and what kind of measurements can be done in situ (emphasis on repeatability)

*Status: DG Meetings Suspended while small groups prepare test procedures The group is developing a plan for cinema testing based on affordable test equipment and refined variations of Multitone and working with adaptations the new AES M-noise standard that might be appropriate for mid-or-far-field measurements relevant to cinemas. The group plans to piggyback measurement testing after listening tests in the same rooms.*

Current WG project:

**RP xxxx –**

The output Recommended Practice from the work of the DGs.

*Status: Work can start after the DGs have reported back with their contributions. There is consideration of producing an Engineering Guideline as well.*

**DG: 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: The Drafting Group has held 13 meetings. There have been changes to the Python script for compatibility with Python 3. The Normative sections are now more concise and circular references with ST 202 and RP 200 have been avoided. The document is almost ready for pre-FCD-ballot review.*

**Other TC-25CSS Business**

The liaison relationship with CEDIA - Custom Electronics Design & Installation Association – resulted in a joint session in Australia.

**Metadata and Registers Committee (30MR) Chairs: Dean Bullock and Phil Warren**

*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: No new work items, though a contribution for the textual representation of UMIDs has been produced for ST 2029 (revision project below).*

**DG: UMID-related Standards**

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

**ST 330 - UMID**

This project will revise ST 330 so that it additionally specifies new methods for generation of UMID Material and Instance Numbers as well as description of a camera's shooting direction in order to enhance the UMID applications. It will also consider any points needed for the 5-year review of ST 330:2011.

*Status: ST 330 has been published in the last quarter.*

**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 has implemented "UMID Applications in MXF and Streaming Media". The DG Chair issued a "Final Call" for any further UMID Application Examples.*

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**SG: UUID File Naming**

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

*Status: The SG Chair reported that the SG continues to hold bi-weekly telecons. It has created a framework for discussions but keeps finding itself straying outside the SG scope; expansion of the scope is being considered.*

**DG: ST 2029 Uniform Resource Names for SMPTE Resources amendment**

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: The DG has prepared the revised ST 2029 with the YANG urn structure added for FCD ballot. The ballot will not start immediately because it was discovered that some pre-FCD-ballot reviewers had not received a response on how their comments had been addressed; they will be contacted first.*

**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: There is a dependency on RDD 55, which is now in the publication queue. So this revision can now proceed through process.*

**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 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)

Current projects:

**Metadata Registers (“Vindaloo” release)**

The revision for ballot is codenamed “Vindaloo”

*Status: pre-FCD-ballot review for ST 2123 Vindaloo release is imminent.*

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

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 is ready for FCD ballot; the TC Chairs have requested initiation of the ballot. The other 3 documents will benefit from the work on ST 335 by using the same format.*

***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.

*Status: FCD ballot comment resolution is complete. The proponent outlined a plan to complete the work. References to RP210 and RP224 will be replaced with references to online xml registers and the ST377-1 reference will be updated. Some minor typos have been fixed. A second FCD ballot will be held 2022-07/08. Note: similar updates to EG 42 are proposed.*

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

This is a constrained revision to roll-up an amendment and check Normative References.

- *Status: The draft revision of RP 2057 passed FCD ballot on 2018-02-09 with 5 comments to resolve. The document is also being revised in line with AG24 – MXF Style Guide. Normative References have been updated. In the process of revision, differences have been identified between smpte-ra & this document; a small AHG will triage the issues. Ballot is planned for 2022-09.*

**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>

*Status: The DG Chair outlined a plan 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.*

**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 was being prepared for public CD release but issues were discovered with the UL register submission; a corrected submission has been made and the document is ready for pre-FCD-ballot review. Public CD is requested.*

**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. However, it was noticed that an additional normative reference (to Amd 1 of ST 2019-1) was needed and there was a plenary decision last time that a second FCD ballot would be held. There was no report this time.*

**RDD 54 - Mapping ARRIRAW Essence into the MXF Generic Container**

*Status: RDD 54 is in the publication queue.*

**RDD 55 - MXF Carriage of ARRI Camera System Metadata**

*Status: RDD 55 is in the publication queue.*

**DG: Mapping Next Generation Audio Signals into the MXF Generic Container**

Current projects:

**ST 2127-1 - Mapping Metadata Guided Audio (MGA) signals into the MXF Constrained Generic Container**

ST 2127-1 will be agnostic of specific audio metadata formats.

**ST 2127-10 - Mapping Metadata Guided Audio (MGA) signals with S-ADM Metadata into the MXF Constrained Generic Container**

ST 2127-10 will be a specialization, defining specific requirements for S-ADM (Serialized Audio Definition Model) audio metadata.

*Status (both): Documents are in the publication queue.*

**Amendment: RDD 48 - Mapping FFV1 Essence Stream to MXF**

The project will amend tables and add an Annex K referencing the IETF work for FFV1 to accommodate community demands for using FFV1 in MXF. FFV1 is a lossless intra-frame video encoding format.

*Status: RDD 48 revision is in the publication queue.*

**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 revision passed FCD ballot 2021-08-25 with 11 comments to resolve; comment resolution is in progress.*

**Revision: ST 422 Mapping JPEG 2000 Codestreams into the MXF Generic Container**

Revise ST 422:2019 to allow D-Cinema applications to continue using the FU frame-based wrapping but otherwise deprecate it.

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

**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 was raised to DP status by voice vote at this meeting.*

**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 is being amended to include Am2).

*Status: The revision is at ST Audit, closing 2022-06-08.*

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

TLX is Extensible Time Label, ST 2120 parts 1-3 currently at PCD 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: The draft is being developed to improve extensibility support. The class hierarchy is being developed in UML.*

**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.

*Status: The DG has held three meetings and has produced a partial draft document. The aim is for PCD around the time of the September plenary.*

**WG: MXF-related Documents Maintenance**

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

*Status: The group has met once in the last quarter (4 times total). The one-year and five-year review document spreadsheets are being updated and issues reported on GitHub are being reviewed.*

**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.

*Status: A draft has been reviewed in the TC and there is correspondence to resolve one comment. The document will then be elevated to CD status.*

**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 group is just getting going and expects to report significant progress at the next 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 will start Pre-DP-vote review after 2065-4 has been published.*

**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

Part 1 has 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

Current projects:

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



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: There was no report at this meeting.*

### **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”. 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: There was no report at this meeting.*

### **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)

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 has been posted for [Public CD](#) . One issue (typo) was logged against the code and resolved.*

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

Project scope: The amendment will include the registration template information required by RFC 6838. The amendment will add a DPX IANA MIME type registration.

*Status: The amendment has been published. The DG chair requested that HQ submit the final registration template to IANA.*

**[Network and Facilities Architecture Committee \(32NF\) Chairs: Leigh Whitcomb 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 a new scope is being drafted.

**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 be in 32NF40.*

### **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: Did not meet, awaiting merger. Draft revisions for ST 2081-1 and ST 2082-1 from 5-year review passed FCD ballot 2021-04-15. There was no report on progress of these documents.*

### **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)

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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

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

Current projects:

*Status of DG: Six ST 2110 parts are in the ST Audit / Publication process; see below.*

#### **Revision: ST 2110-10 - System Timing and Definitions**

Revision following one-year review

*Status: Being prepared for publication (change log text being added).*

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

This practice will specify additional behaviours 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: The project was approved 2021-12-31. The initial meetings have reviewed the problem and the tools available to align the essence streams at a desired processing point.*

#### **Revision: ST 2110-20 - Uncompressed Active Video**

Revision following one-year review

*Status: Being prepared for publication (change log text being added).*

**Revision: ST 2110-21 - Traffic Shaping and Delivery Timing for Video**

Revision following one-year review

*Status: Being prepared for publication (change log text being added).*

**Revision: ST 2110-22 - Constant Bit Rate Compressed Video**

Revision. Scope will be limited to clarifying that gapped packet transmission is permitted, adding the option to use the N network compatibility model (as an alternative to NL), addressing any feedback from PICS drafting group and making editorial updates such as dates of references.

*Status: Being prepared for publication (change log text being added).*

**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: The DP ballot passed 2022-04-21 and the ST Audit package is being prepared.*

**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: FCD ballot closed 2022-05-25 with 47 comments – about half had been worked through at the time of 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.

*Status: The project was approved 2021-12-31. The PICS team will draft the revised document.*

**Revision: ST 2110-31 - AES3 Transparent Transport**

This revision adds clarifications and notes, but no substantive changes.

*Status: Completes ST Audit 2022-06-24.*

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

Revision following one-year review

*Status: Completes ST Audit 2022-06-24.*

**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.

Supports “tightly-bound” metadata (associated to an essence stream)

*Status: Pre-FCD-ballot review concluded without comment. FCD Ballot is held waiting for ST 2110-42 (or another payload) to catch up 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: Document is in development, draft exists. It is designed to use the metadata packaging defined in Part 41. However, there is discussion in the DG about whether this work remains important.*

**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 project was approved 2021-12-31.*

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

This 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 has provided feedback to the 2110 DG which has been processed as late comments in the one-year-review versions of these documents.

*Status: Pre-FCD-ballot review is complete on RP 2110-110. RP 2110-120 has just started pre-FCD-ballot review. Next in the queue for development is -130.*

*PICS drafts for 2110-10, -20, -21, 22, -30, -31, -40 all had an initial review to feed back comments whilst those documents were in revision.*

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**WG: Time Labeling and Synchronization**

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

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

## Published documents:

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

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

EG 2059-10 - Introduction to the New Synchronization System

## 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: FCD ballot closed 2022-04-11 with 10 comments that are now resolved. The document should be ready for DP vote by the end of June.*

**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 continues to work on the revision of ST 2059-2 to harmonize it with IEEE 1588:2019. The DG is making progress, but there is still much work to do. A public CD period is planned.*

**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.

*Status: A second version of the RP 2059-15 Public CD, including comment resolution from the first Public CD, was posted 2021-11-12 [on GitHub](#) for public comment. There is also a companion survey for*

*potential implementors. The group has also contacted SDOs and industry to encourage interest and feedback on this document. FCD ballot on RP 2059-15 closed 2022-01-24 and pre-DP-vote review is completed with comment resolution underway.*

### **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 until Q1 2023 as JT-NM is planning a “tested” event for 2022-08.*

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

Create a basic Time Label with a defined mechanism for registration of additional fields

Three documents have been developed:

**ST 2120-1 – Extensible Time Label – TLX Structure** PCD [here](#)

**ST 2120-2 – Extensible Time Label – TLX Items** (includes a JSON schema element ST 2120-2a)  
PCD [here](#)

**RP 2120-3 – Extensible Time Label – TLX Profiles** (includes a JSON schema element ST 2120-3a)  
PCD [here](#)

*Status: The 3 documents above are nearing completion of their Public CD period (closing 2022-07-01) that was intended to expose the designs to potential implementers for comment. There is only one comment open against ST 2120-1 and one against ST 2120-2. There is associated work in [this DG](#) in the File Systems technology committee:*

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

### **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!

**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.*

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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.

*Status: A new Chair for the SG has been appointed, allowing the group to resume work with meetings bi-weekly.*

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

*The SG has significantly updated contents for Version 2 that focuses on threat detection and mitigation strategies, it should be finalized at the next SG meeting, 2022-06-30.*

*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](#). The group is working with SMPTE Marketing on outreach approaches to industry to increase awareness and encourage comment on GitHub. A new idea is to launch SMPTE “microbrands” for key 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 (ST 330 revision, now published). Work on the UMID Resolution Protocol can proceed in parallel with the remaining TC-30MR revision work on RP 205 – UMID Applications and the DG Chair requested TC-34CS members to consider any UMID Applications that could be added to the RP 205 revision.*

#### **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.

*Status: Revision projects to add BXF 8.0 items in EG 2021-3 (Use Cases) and ST 2021-4 (Schema Documentation) are in process. Both documents have passed ST Audit and await publication. Some items are already being considered for BXF 9.0 and further proposals are welcome. The DG Chair*

*described an idea for a quick BXF 8.1 revision to incorporate NABA-requested additions (until now all revisions have been “dot zero”.*

**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 generally meets bi-weekly and expects to have a draft report for submission to TC-34CS shortly.*

**DG: Media Microservices**

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

*Status: There is work in the OSA that is expected to be contributed to the DG:*

- *Privacy and Security (Likely future SMPTE project; OSA currently focused on use-case of Identity Verification and Access to Content)*

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 has decided that it will keep in PCD until Terminology document (ST 2132, see below) is published.*

**ST 2132 - Media Microservices Terminology**

Provides definitions for terminology used in the other Microservices documents.

*Status: SMPTE project approved and draft reviewed in DG at its 2022-03-04 meeting.*

**ST 2133 - Job Processing Architecture**

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

*Status: SMPTE project approved and draft reviewed in DG at its 2022-03-04 meeting.*

***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.

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
- ST 2067-100 - IMF - Output Profile List
- ST 2067-101 - IMF - Output Profile List - Common Image Definitions and Macros
- ST 2067-102 - IMF - Output Profile List - Common Image Pixel Color Schemes
- ST 2067-103 - IMF - Output Profile List - Common Audio Definition and Macros
- ST 2067-200 - IMF - Dynamic Metadata for Color Volume Transform (DMCVT) Plug-in

ST 2067-201 - IMF - 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 CD is posted for PCD review, with planned end date 2022-06-15.*

*Interchange has been demonstrated across several implementations and two minor issues have been logged. The issues will be addressed and the revised document posted as a second PCD, as well as proceeding through the ballot process.*

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**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: The group has been working on HTJ2K with a trailer length of content for the next plugfest.*

**DG: IMF Output Profile List**

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

*Status: The DG has held 1 telecon 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.*

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.*

**Revision: ST 2067-102 - OPL Common Image Pixel Color Schemes**

Revision to add support for the pixel color schemes corresponding to the added 12 and 16 bit for COLOR.3 in the revised SMPTE ST 2067-21:2020. Add support for the pixel color schemes for the HLG

amendment to IMF Application 2. Add support for the pixel color schemes for out-of-range pixel values in YCbCr use cases.

*Status: Second ST Audit passed, pending publication.*

#### **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: Pre-FCD-ballot review completed with 2 comments to address.*

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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:

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

Convert TSP 2121-1 to RDD 59-1

#### **RDD 59-2 IMF Application Constraint DPP (J2K)**

Convert TSP 2121-4 to RDD 59-2

*Status (both): The documents are available as public CDs and awaiting feedback, [here](#).*

*The proponents reported that there has been essentially no adoption of the RDD 59-2 document and*

*there will be no further work to publish the document.*

*However, RDD 59-1 is widely-used and it was noted that the current revision to RDD 45 makes this work easier. RDD 59-1 will proceed to publication.*

### **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 pre-FCD review ended 2020-11-20. The editor is working on 2 remaining comments and then a PCD package will be prepared so that the TC Chairs can request a PCD period.*

### **DG: IMF Application UHD TV Program Workflow (AVC)**

Current project:

#### **ST 2067-60 IMF Application 6 UHD TV program workflow (AVC)**

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

*Status: A second Public CD phase began 2021-10-01 on [GitHub](https://github.com). The document has now passed ST Audit and is in the publication queue.*

### **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): Four DG calls were held in the last quarter. The DG has made progress regarding the soundfield definition based on ADM/S-ADM metadata; the goal is: Common MCA labeling for both documents.*

### **DG: 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.



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*Status: The review closed 2022-04 with one comment that is being resolved.*



## *SMPTE Standards Publications in the Last Quarter*

10E Essence:

20F Film:

21DC Digital Cinema:

[ST 430-14:2022 - SMPTE Standard - D-Cinema Operations &#x2014; Digital Sync Signal and Aux Data Transfer Protocol](#)

25CSS Cinema Sound Systems:

30MR Metadata & Registers:

[ST 330:2022 - SMPTE Standard - Unique Material Identifier \(UMID\)](#)

31FS File Formats & Systems:

[RDD 48:2018 Amd 1:2022 - SMPTE Registered Disclosure Doc - MXF Archive and Preservation Format Application Specification; Amendment 1](#)

[ST 268-2:2018 Amd 1:2022 - SMPTE Amendment - Digital Moving-Picture Exchange \(DPX\); Format Extensions for High Dynamic Range and Wide Color Gamut; Amendment 1](#)

32NF Network & Facilities Architecture:

34CS Media Systems, Control & Services:

35PM Media Packaging & Interchange:



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

All 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, Film and Digital 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.

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 provides access to all Technology Committees. An SC meeting is held during each meeting round to convey information that is relevant to all TC's, 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

**FCD** = Final Committee Draft

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

#### SMPTE Document-Type Abbreviations

**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.