STANDARDS QUARTERLY REPORT Feb/March 2022

Result of SMPTE® Technology Committee Meetings

28th of February to 3rd March 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 28 Feb - 3 March 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 normally meet by telecon, so their normal cadence was able to continue through the meeting week).

77 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.

Proposals for new projects submitted in the last quarter			
Project Name	Type	SMPTE Group	Approval Period Closes
ST 2110-30:2017 PCM Digital Audio	Revision	Network	2021-12-31
Mapping MGA Audio Metadata to ST 2110-41	New Standard	Network	2021-12-31
SMPTE 2110 suite system timing planes	New RP	Network	2021-12-31
Job Processing Architecture (microservices)	New Standard	Media Systems	2022-01-21
Vocabulary (microservices)	New Standard	Media Systems	2022-01-21
RDD 36:2015 ProRes Bitstream	Revision	Essence	2022-01-25

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RP 2047-3:2016 VC-2 Level 65 HD with SD Infrastructure	Revision	Essence	2022-01-28
RP 2047-1:2009 VC-2 Mezzanine Level 1080p	Revision	Essence	2022-01-28
RDD 45:2017 IMF App ProRes	Revision	Media Packaging	2022-02-01
ST 2117-1:2020 VC-6 Elementary Bitstream	Revision	Essence	2022-02-01
ST 96:2004 Scanned Image Area	Revision	Essence	2022-02-21
Mapping ADM to MXF	New Standard	File Systems	2022- 02-22
IMF - Audio with Frame-based S-ADM Metadata Plug-in	New Standard	Media Packaging	2022- 03-01
IMF - Audio with File-based ADM Metadata Plug-in	New Standard	Media Packaging	2022- 03-01
ST 381-5:2020 Mapping HEVC into MXF Generic Container	Revision	File Systems	2022-03-14

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 (including the essential core parts) 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 from one-year review and are about to be submitted for ST Audit.
** This part has just started revision.

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There are also parts in development on:
- Transport of metadata that has <u>not</u> been derived from ST 291 packets (3 documents)
- A document tying down some additional parameters for streaming standard definition video
- 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.

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 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 has been posted as a Public Committee Draft and has now passed FCD ballot. Details.
- A Drafting Group will create a report "Using ST 2059 in ST 2110 Networks with ST 2022-7 Redundancy" (not yet started).
- 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 VC-6 mapping into MXF 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 have passed ST Audit. 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.

The SMPTE ST 2098-2:2021 Immersive Audio Bitstream Specification Review Drafting Group has submitted the latest document set for DP Review.

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

- Technical Documents Research
- 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:

- Subtitles including timed text requirements
- projects for immersive audio in D-Cinema

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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. 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 early 2022. More projects are being submitted. 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 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

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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.

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SMPTE® Standards Quarterly Report:

Detailed Account

SMPTE Standards Committee Meetings 28 Feb - 3 March 2022
Host: Online Meeting

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

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 three Standards Directors, currently Pierre Lemieux, Thomas Kernen and Sally Hattori.

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 the meeting had to be canceled 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.

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Future Meetings

Quarterly Standards meeting rounds are planned for:

June	2022	Brigham Young University, Provo, UT, USA
September	2022	EBU, Geneva, CH
December	2022	TBA
March	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)

Television and Broadband Media (24TB)

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), but it does not meet during the quarterly face-to-face rounds and did not meet at this virtual round.

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

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: The WD will be ready for pre-FCD-ballot review in the next couple of weeks, after the DG Chair has reviewed it. The document number, 2130, was assigned at the plenary.

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. 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 and should speed up in the coming quarter.

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 has been posted for TC Chairs to initiate pre-FCD-Ballot review.

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: Pre-DP review closed 2021-12-20 with no comments. A package for DP vote has been 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*

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

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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: DP vote in progress, closes 2022-03-03.

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: Passed ST Audit.

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

Status: Project approved and drafting started.

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

Status: Project approved and drafting started.

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.

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

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

Status: UHD formats have been added to both documents. They both need the current "boilerplate" added. EG 2046-3 was checked as does not need revision.

Revision: ST 96:2004 Scanned Image Area

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

Status: Newly-approved project will start when DG resources are set up.

Revision: RDD 36 ProRes Bitstream

Fixes issues found and adds HLG support

Status: At RDD ballot closing 2022-03-11.

Other TC-10E business

A new document explaining SMPTE practice for line numbering for video formats is being considered. In analog standards, the first line was numbered 1. In digital standards, the first line was numbered 0.

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: There was no report. It was noted that participation continues to fall and there was discussion of closing the project.

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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 3 issues on GitHub. At the next meeting, the group will decide on moving forward through the process to publication.

DG: SMS-OMB Communication

Work related to communication between a Screen Management System and an Outboard Media Block. Current projects:

ST 430-17 – SMS-OMB Communication Protocol

This project will define the protocol between a Screen Management System and an Outboard Media Block that supports the decryption and playback of an Immersive Audio Track File containing a ST 2098-2 bitstream from a compliant DCP.

Status: ST 430-17 has been published in the last quarter.

ST 430-14 Digital Sync Signal and Aux Data Transfer Protocol

Revise ST 430-14 to:

- allow the client to indicate that it accepts both plaintext or encrypted data items
- correct selected outstanding issues identified through implementation experience, as captured at https://github.com/SMPTE/st430-14/issues

Status: The revised document is being prepared for publication (expecting publication 2-3 weeks after the meeting).

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: The proponent reported that there will be discussions with manufacturers moving forward and the goal is to restart 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 is available as public CD here for 6 months, started 2021-07-23. There are 2 issues submitted that can be incorporated and the document can then proceed through FCD ballot.

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.

The purpose of this meeting was to redistribute the documents assigned to TC-24TB to other TC's to facilitate the closure of this TC. A spreadsheet of over 80 documents assigned to this TC was presented and the target TC's were reviewed and amended. The target TCs are 10E, 31FS, 32NF, 34CS.
There are only 2 active projects, noted below, together with the new TC that has been assigned.

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 UHDTV 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.

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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 was submitted for DP vote 2022-02-07. The ballot period has been extended by 2 weeks as numeric consensus was not achieved.

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 WG will resume meeting when DG work is complete; reports expected by Q4 2022. The DGs work with each other as required to progress the work.

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.

Modern Movie Clip Analysis

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

Status: The group meets bi-weekly. 2-year clip licenses have been obtained and DCPs have been made of the clips. Listening tests at multiple cinemas and reference rooms internationally have been done and many more are planned.

^ Essence D-Cinema TV-Broadband CinemaSound Metadata FileSystems Network MediaSystems MediaPackaging

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: The group meets bi-weekly. 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 and 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 - B-chain characteristics and expectations required to play back modern, digital, full dynamic-range movie soundtracks refined variations of Multitone including the development of an M-noise DCP, and working with adaptations of the new AES M-Noise and standard that might be appropriate for mid- or adapted from the AES standardization work to suit Describes a test procedure that can be used to test the interoperability of an immersive audio renderer.

Status: Work can start after the DGs have reported back with their contributions.

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 five meetings. The changes to the Python script were submitted, approved and are available for testing. Reports are positive. The group has held discussions on how to handle various definitions that were conflicting with other standards and harmonize them within the document.

Other TC-25CSS Business

A liaison relationship has been set up with CEDIA - Custom Electronics Design & Installation Association.

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.

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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 passed ST Audit and is being prepared for publication.

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: There has been no progress in the last quarter. The next step will be to finalize the draft for pre-FCD-ballot review.*

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 has started drafting its report. Its next meeting will be 2 weeks after this plenary.

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 PCD release.

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 was no report.

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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 next revision for ballot is codenamed "Vindaloo"

Status: A snapshot for ballot was taken, but has been reopened to accommodate an extension of ST Audit on a document included in the UL requests.

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 completed pre-FCD-ballot review. Comments resolution is proceeding; all comments believed resolved. The other 3 documents will benefit from the work on ST 335 by using the same format.

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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. A second FCD ballot will be held 2022-06 and it is proposed to stabilize ST 380 after publication. 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. Reference to RP224 will be replaced with reference to online xml registers. Completion expected by 2022-06.

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.

Status: This revision will reflect how MXF is used in the field as well as adopt a consistent formatting for registers. The proponent outlined a proposal to perform the update in 3 phases. The final phase, to decompose this large document into component parts, was debated and the plan will be reconsidered.

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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 pre-FCD-ballot review will restart when the submission achieves "mature" status.

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 that a second FCD ballot would be held.

RDD 54 - Mapping ARRIRAW Essence into the MXF Generic Container

Status: RDD 54 is in ballot, closing 2022-03-14.

RDD 55 - MXF Carriage of ARRI Camera System Metadata

Status: RDD 55 is in ballot, closing 2022-03-14.

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): DP vote passed 2022-01-28. ST Audit is in progress.

Amendment: RDD 48 - Mapping FFV1 Essence Stream to MXF

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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: This work was awaiting completion of IETF work on FFV1 (RFC 9043) – this is now published. The amendment passed ST Audit and is being prepared for publication.

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 passed FCD ballot 2021-12-20 with no comments and is being prepared for 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 passed FCD ballot 2022-02-28.

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: FCD ballot passed 2022-01-20 with 6 comments to resolve.

ST 2020-4 - TLX KLV Encoding and MXF Mapping

TLX is Extensible Time Label, ST 2020 parts 1-3 currently at PCD in this TC-32NF DG. Defining TLX-KLV elements in accordance with 377-1 to assure useability within MXF.

Status: The draft is being developed to improve extensibility support, perhaps using ST 377-2 KLV-Encoded Extension Syntax.

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

Status: This project has just completed approval and resources are being set up.

WG: MXF-related Documents Maintenance

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

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Status: The group has met twice in the last quarter. The one-year and five-year review document spreadsheets are being updated and issues reported on GitHub are being reviewed.

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 was elevated to DP status at this plenary by voice vote.
ST 2065-5 has passed FCD ballot, now on hold until ST 2065-4 is 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: The included xsd file needs to be updated to match the text. The group is putting together a "golden file" to support the xml effort. Part 2 development revealed that an item in Part 1 is unnecessary; it will be deleted.

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.

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Status: The structure for the xsd file for Part 2 has been identified and work is underway on semantics. A list of 49 use-cases is being documented graphically.

DG: Constrained DPX for HDR

Published document:

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

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 ; the review period will run for 3 to 12 months (to be decided).

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 is at ST Audit (extended by 2 weeks to reach numeric consensus).

Other TC-31FS Business

New project proposal: 31FS Revision of ST 381-5:2020 HEVC into MXF GC

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

Network and Facilities Architecture Committee (32NF) Chairs: Leigh Whitcomb and Thomas Kernen

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.
Thomas Kernen has been appointed Standards Director and will be replaced as TC Chair by Bruce Devlin

WG: SDI Interfaces

The Working Group (32NF40) scope is:

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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.

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

Status: All 32NF40 DG projects are complete. The 32NF70 Working Group is being merged into this Working Group. When that is complete, the projects 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: 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)

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: At this TC meeting, a DP elevation vote on ST 2110-22 was conducted. The vote passed, so this document joins 5 others that are ready for ST Audit -details below.

A new document is planned for a payload format for audio metadata (ST 2127-1 metadata), using the ST 2110-41 FMX transport (see below).

Revision: ST 2110-10 - System Timing and Definitions

Revision following one-year review

Status: Should be posted for ST Audit shortly.

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

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Status: Should be posted for ST Audit shortly.

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

Revision following one-year review

Status: Should be posted for ST Audit shortly.

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: A DP elevation vote on ST 2110-22 was conducted at this meeting. The vote passed, so this document is ready for ST Audit.

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: Pre-DP-vote comments are resolved. The DP ballot should open shortly.

RP 2110-25 – Measurement Considerations for 2110-20 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: A sub-group has been developing the draft RP. It was posted for pre-FCD-ballot review in the TC, now closed, and comment resolution is almost complete (1 comment unresolved).

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: Should be posted for ST Audit shortly.

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

Revision following one-year review

Status: Should be posted for ST Audit shortly.

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: Draft document is at WD status and has been shared with AES for comment (AES has a project that will reference ST 2110-41). Each type of metadata needs a defining document. Pre-FCD-ballot review concluded without comment. FCD Ballot is held waiting for ST 2110-42 (or other payload) to catch up.

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 will use the metadata packaging being defined in Part 41.

ST xxxx - 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. A document number is awaited.

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.
PICS drafts for 2110-10, -20, -21, 22, -30, -31, -40 have all had an initial review and editing of RP 2110-120 is well-advanced.

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.

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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: Pre-FCD review closed 2021-12-08 and comments received have been addressed. FCD ballot has been requested and should start soon.

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: A project proposal will be submitted to revise ST 2059-2 to make it compatible with IEEE 1588:2019
The changes are envisioned to be backwards compatible with current ST 2059-2:2021 implementations. In addition, a workshop is proposed to help in the migration from ST 2059-2:2021 to the new revision.

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.

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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. An FCD ballot on RP 2059-15 closed 2022-01-24 and comment resolution is 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: Test plans are being compiled for future interops, especially selecting network topologies of greatest interest. The group is looking at potential dates and locations for an in-person and virtual event in Q2/Q3 2022.

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 DG has held 3 meetings in the last quarter. The 3 documents above have been posted as Public CDs to expose the designs to potential implementers for comment. Public review will last until 2022-07-01.
The DG has developed a draft for a further document that will be developed in this DG *in the File Systems technology committee:*

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

Efforts are underway to publicise the ST 2020 suite, including an introductory presentation, webinar and HPA breakfast roundtable.

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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.

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; it is still intended to complete the work.

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 will finalize contents for Version 2 that focuses on threat detection and mitigation strategies, it is almost ready for publication.
There may be a 3rd report on new security features introduced in IEEE 1588:2019.

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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.

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.

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.

^ Essence D-Cinema TV-Broadband CinemaSound Metadata FileSystems Network MediaSystems MediaPackaging

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Status:
Revision projects to add BXF 8.0 items in EG 2021-3 (Use Cases) and ST 2021-4 (Schema Documentation) are in process. EG 2021-3 has passed ST Audit . There was a voice vote to raise ST 2021-4 to DP at this meeting; the vote passed, so ST 2021-4 can proceed to ST Audit. Some items are already being considered for BXF 9.0 and further proposals are welcome. Work on BXF 9.0 is expected to start Q2/Q3 2022.

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 has settled on the following work plan:

1. *(Completed) Build a Standards-relevant **capability view** of Production Applications*

2. *(Completed) Identify a **slate of workflows** that comprehensively cover the Capabilities*

3. *(In progress) Draft the report*

4. *Engage with other SDOs to Validate and Refine*

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:
- *Vocabulary – Title: Media Microservices Terminology (SMPTE project approved and draft expected in DG at its 2022-03-04 meeting)*
- *Jobs and Services – Title: Job Processing Architecture (SMPTE project approved and draft expected in DG at its 2022-03-04 meeting together with accompanying YAML files)*
- *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 met 2022-02-04 and agreed to conclude Public CD period and proceed with remainder of the standardization process for ST 2125.

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.

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

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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.

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 testing for the next interop. There was no report at this meeting.

DG: IMF Output Profile List

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

Status: The DG has held 4 telecons in the last quarter. In addition to the projects below, the group continues to refine document development tools and structures.

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 continues 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: The document is at DP ballot closing 2022-03-02. Update: The vote passed with no comments, meaning that the document will be submitted for ST Audit shortly.

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 continues in GitHub using markdown format, referencing XML schemas and examples.

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: Development of the document continues in GitHub using markdown format, referencing XML schemas and examples.

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: Development of the document continues in GitHub using markdown format, referencing XML schemas and examples.

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

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

Status: Draft document in preparation and the proponent has submitted ULs release letter to SMPTE.

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)

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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. Two comments on RDD 59-2 have been forwarded to the proponents. The WG will consider next steps in progressing towards 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 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: A second Public CD phase began 2021-10-01 on GitHub. The document is now at FCD ballot, closing the end of the meeting day.

SMPTE Standards Publications in the Last Quarter

10E Essence:

20F Film:

21DC Digital Cinema:

ST 430-17:2022 - SMPTE Standard - SMS-OMB Communications Protocol Specification

24TB Television & Broadband Media:

25CSS Cinema Sound Systems:

30MR Metadata & Registers:

31FS File Formats & Systems:

32NF Network & Facilities Architecture:

34CS Media Systems, Control & Services:

35PM Media Packaging & Interchange:

Notes on this Report and the SMPTE Standards Process

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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.