



SINCE 1916

STANDARDS QUARTERLY REPORT December 2017

Result of SMPTE® Technology Committee
Meetings
4-8 December 2017

Hosted by
Arista Networks
Santa Clara, CA, USA

THE NEXT CENTURY



Society of Motion Picture and Television Engineers®

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SMPTE® Standards Quarterly Report: Executive Summary

As a result of SMPTE Standards Committee Meetings

4-8 Dec. 2017

Santa Clara, CA, USA

Hosted by *Arista Networks*

Nine SMPTE Technology Committees and 18 subgroups scheduled meetings at this round.

69 members attended in person over the five days, and there was additional participation by remote access. This Executive Summary captures some of the more notable project developments. More information on the current status of the 160 active projects can be found in the [detailed account](#), after this summary.

New Projects that began in the last quarter

(Project Name links to online project overview, Details links to this report)

New VR/AR Study Group	At proposal stage
Serial ADM (Audio Definition Model) over AES3	Project Approved
Amendment: RP 2047-5 - VC-2 Level 66 UHDTV over HDTV Infrastructure	Details
Revision: ST 2022-3 - Unidirectional Transport of Variable Bit Rate MPEG-2 Transport Streams on IP Networks	Details
Revision: ST 2038 - Carriage of Ancillary Data Packets in an MPEG-2 Transport Stream	Awaiting Assignment



<u>Amendment: ST 430-1 Digital Cinema Key Delivery Message for Immersive Audio</u>	<u>Details</u>
<u>New Standard: Vocabulary and syntax for MCA Audio Content Kind and Audio Element Kind (for IMF)</u>	<u>Details</u>
<u>New Standard: FS-Gamut and FS-Log Characteristics of Camera Systems</u>	<u>Details</u>
<u>New Metadata Register Release (“Ponzu” release)</u>	<u>Details</u>
<u>New RP2112-21 - OBID-TLC Conformance Test Materials</u>	<u>Details</u>
<u>Revision: ST 2046-1:2009 Safe Areas for Television</u>	Starting shortly
<u>Revision: RP 2046-2:2009 Safe Areas for Protection of Alternate Aspect Ratios</u>	Starting shortly
<u>Revision: ST 2071-3:2014 Media Device Control Discovery (MDCoIP)</u>	<u>Details</u>
<u>New Standard: ST 2071-4:2014 Media Device Control Discovery (MDCoIP) Capability Interface Repository</u>	<u>Details</u>
<u>New RP2112-11 - OBID Conformance Test Materials</u>	<u>Details</u>



Professional Media over IP

Professional Media over Managed IP Networks

This project is developing the ST 2110 suite that standardizes an interoperable system for media IP networks to transport separate video, audio, and ancillary data streams.

Big news! The first four parts of the suite (the core parts) - System Timing and Definitions, Uncompressed Active Video, PCM Digital Audio, Traffic Shaping and Delivery Timing for Video – are approved for publication. There are also parts on Ancillary Data and Transparent AES3 transport.

[Details](#)

Study Group on Flow Control in Professional Media Networks

This group has completed a report on media flow control in IP networks. The report provides a lot of context information on IP media networks in addition to the core topic, the various techniques for switching media streams. The report is available on this SMPTE [website page](#). [Details](#)

Network-Based Synchronization for the Professional Media Environment

Following the publication of two key documents (core parts of the ST 2059 suite) defining a system for using media synchronization packets on an information technology (IT) network, there are ongoing projects in support of the technology:

- A SMPTE group is organizing ST 2059 “plugfests”. [Details](#).
- A set of Engineering Guidelines for the use of this system is being drafted. The first, “Introduction to the New Synchronization System” has been published. [Details](#)
- One-year reviews of the two standards in the light of plugfest experience are underway. [Details](#)

Media Device Control over IP

This project has developed a suite of documents for the control of media-centric devices and services utilizing Internet Protocol (IP). [Details](#)

Interoperable Mastering Format (IMF)

This suite ([details](#)) comprises 12 published documents that have remained stable for some time. There are currently some projects to create additional IMF documents or revise existing ones. There is also SMPTE work outside the Standards Community to produce an [IMF Specification for Broadcast and Online](#) .

IMF Application #5 ACES

The Academy Color Encoding Specification (ACES, ST 2065-1), published in 2012, supports HDR / WCG. A new project extends its use as an application format in the Interoperable Mastering Format (IMF).

[Details](#)



IMF Output Profile Lists

Projects are underway to revise IMF Common Image Definitions and Macros, and create new standard Dynamic Metadata for Color Volume Transform for IMF Applications. A project to amend IMF Common Image Pixel Color Schemes published in the last quarter.

[Details](#)

IMF Audio Essence Projects

Projects are underway on IMF Audio Content and Element Kind Definition and IMF Immersive Audio Bitstream Level 0 Plug-In. [Details](#)

There are also projects to introduce a new standard “IMF Sidecar Composition Map”, a new Registered Disclosure Document “IMF Application for ProRes format”, and to amend the IMF Cinema Mezzanine application. [Details](#)

SDI Interfaces

Work continues on the development of SDI interfaces:

- Suites of documents defining 6Gb/s, 12Gb/s and 24Gb/s electrical and optical interfaces target UHD applications and multi-stream HD applications. [Details](#)
- Projects defining a ruggedized optical SDI connector and its applications [Details](#)
- An SDI interfaces Working Group is managing a number of other SDI projects [Details](#)

HDR and WCG Signaling on Streaming Interfaces

This group has defined a mechanism for signaling the carriage of high-dynamic-range (HDR) and/or WCG essence on streaming interfaces. It has defined how the SDI Payload ID will be used for HDR / WCG signaling and identified the SDI standards that need revision, and is managing their passage through ballot.

The group is also drafting a standard “Extended HDR/WCG Metadata Packing and Signaling for Serial Digital Interfaces”. [Details](#)

SMPTE Video Compression (VC) Standards

SMPTE has standardized five video compression (VC) standards – VC-1 to VC-5. Current work on video compression standards comprises:

- Development of an eight-part suite of documents defining the VC-5 compression system (developed from GoPro’s Cineform codec). Four parts of the suite are published and two more



are ready for publication when revision of the Conformance Specification is complete.

One part of the suite defines VC-5 mapping in the MXF Generic Container. [Details](#).

- Projects on the VC-2 document suite (developed from BBC's Dirac Pro). This includes the addition of a new profile for ultra-high-definition (UHD) video sources carried on high-definition (HD) infrastructure as well as amendments and revisions to existing VC-2 documents. [Details](#)
- A new project proposal was presented at this meeting round for a compression scheme based on "deep learning". [Details](#)

Cinema Projects

Cinema Sound Systems

This Technology Committee (TC) has work aimed at improving the quality of sound in conventional movie theaters, as well as standardization of new immersive audio systems.

Current work on Cinema Sound Systems comprises:

- A Working Group on Interoperability of Immersive Sound Systems in Digital Cinema. Its goal is to standardize a single object-based distribution file format and related protocols for interoperable playback into a variety of theater speaker configurations. [Details](#)
- A Study Group on Immersive Audio Implementation has been set up to identify any additional work that is needed to ensure interoperable immersive sound distribution. [Details](#)

Digital Cinema (D-Cinema)

This TC has published three multi-part document suites dealing with the topics:

- D-Cinema Distribution Master
- D-Cinema Packaging
- D-Cinema Operations

Current projects mainly focus on incorporating provisions for stereoscopic subtitles into existing D-Cinema documents, updating encryption documents and projects for immersive audio in D-Cinema.

A Working Group is also considering integration of D-Cinema additional frame rate documents. [Details](#)

Constrained Application of ST 268 - HDR DPX

Drafting of this standard to create a profile of the DPX file format standard (that will be ST 268-2) to carry HDR / WCG is well-advanced. [Details](#)

Material Exchange Format – MXF This widely-used file-based media format does not stand still and there are always projects adding features and mappings to the MXF suite of standards or creating



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constraints for improved interoperability in a variety of application areas. There are currently 6 MXF projects in process. [Details](#)

Extensible Time Label A new project proposal was presented to create a Standard for a time label that overcomes the shortcoming of SMPTE ST 12 (higher frame rate support, time values greater than 24 hours) whilst supporting other requirements of current systems. [Details](#)



SMPTE® Standards Quarterly Report:

Detailed Account

As a result of SMPTE Standards Committee Meetings

4-8 Dec. 2017

Santa Clara, CA, USA

Hosted by Arista Networks

The Society of Motion Picture and Television Engineers® (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 specific activities.

Go to www.smpte.org/standards for more information.

This report is a snapshot in time and should not be regarded as formal minutes, a positioning statement or an analysis piece. Please provide your comments or suggestions at standards@smpte.org

If you are interested in learning more about the SMPTE Standards program, please contact the [Director of Standards and Engineering](#)

Introduction

For some help getting started with the SMPTE Standards process and some of the conventions / acronyms used in this report, please jump to the [Annex](#).

Future Meetings

The next quarterly Standards meeting round will be held 12-15 Mar. 2018 in White Plains, NY, USA and will be hosted by SMPTE HQ.



Further quarterly Standards meeting rounds are planned for:

June 2018	SMPTE Toronto Section, Ryerson University, Toronto, CA
Sept. 2018	EBU, Geneva, CH
Dec. 2018	Dolby Labs., San Francisco, CA, USA

In addition to the meetings of SMPTE Technology Committees (TCs) and their sub-groups, detailed below, there was a Q and A session and a Standards Community meeting.

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 \(35PM\)](#)

Links to each TC's 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](#).



Details From Each Technology Committee (TC) Meeting

Essence Technology Committee (TC-10E) chaired by Ed Reuss and Michael Zink

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

Video compression standards in SMPTE

The currently-active video compression projects are:

SMPTE 2073 Document Suite: VC-5 Video Essence

DG Project

This project standardizes the CineForm / GoPro video compression system. The document suite comprises:

- ST 2073-0 - VC-5 Suite Overview (Published)
- ST 2073-1 - VC-5 Elementary Bitstream (Published Q2-2014, revision published Q2-2017)
- RP 2073-2 - VC-5 Conformance Specification (Published Q2-2014, in revision to cover additional Parts). Includes Reference Decoder, Sample Encoder, sample bitstreams
- ST 2073-3 - VC-5 Image Formats (Published)
- ST 2073-4 - VC-5 Subsampled Color Difference Components (Published)
- ST 2073-5 – Layers (this allows embedding multiple images in a single bitstream; used for stereoscopic, HDR and interlaced frames)
- ST 2073-6 - Sections (this mechanism allows implementation of special functions without disturbing standard decoders; it delineates contiguous portions of the bitstream and allows seeking and error detection)
- ST 2073-7 – Metadata (this will provide a basic set of metadata for input image format and also facilitate round-tripping embedded metadata from other standards by use of identifiers – ACES, XMP, DPX, MXF, ALE and vendor-specific).
- ST 2073-10 - VC-5 Mapping into the MXF Generic Container – this TC-31FS work was published Q2-2017.

Status: Parts 1-4 are published, but Part 2 has been revised in this [Drafting project](#) to add test materials to support content defined in Parts 5 and 6; the revised Part 2 is being prepared for publication. Parts 5 and 6 are complete and will be published with the revised Part 2.

All test materials are on a SMPTE “bitbucket” repository.

Work on Part 7 is progressing well in this [Drafting project](#). Some metadata requires references to



published documents. The test materials will require addition of metadata, so that Part 2 will need additional revision when Part 7 is finished.

The VC-5 group is holding meetings every 2 weeks.

Business Impact: Interoperability between systems

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

- ST 2042-1: VC-2 Video Compression Standard (latest revision published Q3 2017)
- 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

Revision: ST 2042-2 - VC-2 Level Definitions

[Drafting Project](#)

Revision needed to cover ST 2042-1 Revision and new RP 2047-5

Status: ST 2042-2 is in the publication queue.

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

[Drafting Project](#)

This revision will specify test materials supporting ST 2042-1.

Status: Not much progress.



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

[Proposed Drafting Project](#)

This document was published in Q3 2017. This amendment proposal is to correct an error regarding filter type.

Status: Proposal under review, closing 14 Dec. 2017.

Business Impact of all VC-2 projects: Interoperability between systems

SMPTE 2080 Document suite: Reference Display and Environment for Critical Viewing of Television Pictures

[DG Project](#)

This project group will draft the following suite of documents dealing with the use of fixed pixel matrix reference displays:

ST 2080-1: Reference White Luminance Level and Chromaticity (published)

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

ST 2080-3: Reference Viewing Environment Characteristics

RP 2080-4: Full Measurement / Calibration

ST 2080-x: Reference Display Characteristics

EG 2080-y: Engineering Guideline to provide context and background

Status:

Part 1 is published (and ready for its one-year review).

Part 2 is published (and ready for its one-year review). A revision [Drafting Project](#) is underway. It will clarify line numbering conventions, define D93 white point more correctly and fix other minor issues.

Part 3 was published in Q2 2017.

Part 4 is nearly ready for pre-FCD-ballot review.

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



New Recommended Practice: RP 2093 - Television Lighting Consistency Index (TLCI)

[DG Project](#)

The project scope is to document “Television Lighting Consistency Index (TLCI)” and “Television Lighting Matching Factor (TLMF)”. The introduction of light emitting diode (LED) technologies is leading to unintended and possibly expensive consequences, including poor color matching between different light sources, and very hard-to-correct color reproduction. There is currently no standard method to quantify the quality of lighting with regard to color reproduction for television.

Status: The DG is working on comment resolution from pre-FCD-ballot review. The document will include spreadsheet elements for easy extraction of parameter values.

Revision: ST 2086 - Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut Images

[DG Project](#)

This project will add recommendations on value ranges and minimum precisions for metadata items as well as a means to signal unknown values and update a normative reference.

Status: The revised document has completed FCD ballot comment resolution and a pre-DP-ballot draft is under review in the DG until 8 Dec.

New Document: P3 Colorimetry

[DG Project](#)

This project will produce a normative reference document for the colorimetric attributes of P3 using chromaticity coordinates and unique metadata identifiers for the combination of P3 color primaries and common white points for use in metadata structures associated with RGB streaming or file formats.

Status: The group has held some initial discussions on the accuracy required for colorimetry coordinates. It expects that this document will be a Standard. There was no report at this meeting round.

New Document: FS-Gamut and FS-Log Characteristics of Camera Systems

[DG Project](#)

Using the definitions in SMPTE ST 2048-1, this standard specifies Free Scale Gamut (FS-Gamut) and Free Scale Log (FS-Log) for professional camera systems. It also specifies the specific parameter values for FS-Gamut and FS-Log for professional cameras that make use of FS-Gamut and FS-Log.

Status: This is a newly-approved project. The first project meeting will be held mid Jan. 2018.



Other TC-10E Business

A project proposal for a new compression system was issued after a presentation on the system was given in the meeting:

- Proposed [Drafting Project](#) VC-x Picture Compression.

Film Technology Committee (20F) chaired by John Miller

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.

This group does not meet during the quarterly sessions that this report covers. The next meeting of this group will be during the Annual Technical Conference in Hollywood, CA, October 2017.

Digital Cinema Technology Committee (21 DC) chaired by Dean Bullock and Chris Witham

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.

Stereoscopic Subtitle / Timed Text related projects

Work on this topic affects the documents below and is being handled by one DG.

New Standard: ST 429-17 - Digital Cinema XML Constraints

[DG Project](#)

This project will draft a Standard containing the XML constraints already reviewed by the Stereoscopic Subtitle and Timed Text Rendering drafting group.

Status: ST 429-17 draft passed DP vote and is at ST Audit, closing 27 Dec. 2017.

Revision: ST 429-5 - Digital Cinema Packaging - Timed Text Track File

[DG Project](#)

This revision project will address issues that arose during an earlier ST 428-7 revision.

The scope has been expanded to include IMF application, references to MXF now allow different Generic Containers, optional Timed Text Descriptor items have been added (including Stereoscopic Subtitles).

Status: ST 428-5 revision passed DP vote and is at ST Audit, closing 27 Dec. 2017.



Amendment: ST 429-2 - Digital Cinema Packaging - DCP Operational Constraints

[DG Project](#)

This amendment will address issues that arose during an earlier ST 428-7 revision.

Status: This document has been held awaiting the UL value request to reach “mature” status.

Business Impact of Stereoscopic Subtitles projects: Compatibility and Interoperability

Compliance to NIST SP800-56B

[SG Project](#)

Scope: Investigate requirements for compliance to NIST SP800-56B, and identify any impact to SMPTE standards.

Status: The group has completed a report. No SMPTE standards are impacted and it was decided at this meeting that the group will be disbanded.

Amendment: ST 429-6 - Digital Cinema Packaging - MXF Encryption

[DG Project](#)

This project amends ST 429-6. TC-35PM has requested an amendment to ST 429-6 (MXF Track File Essence Encryption) for use by IMF by relaxing mandatory use of ST 429-3 (Sound and Picture Track File). Amendments to other TC-21DC documents are also requested to support IMF.

Status: The document passed DP vote and is at ST Audit, closing 27 Dec. 2017.

Additional Frame Rates documents

[WG project](#)

Project Scope: Integrate the separate documents for Additional Frame Rates into the main documents 428-1 and 428-2 (DCDM) and 429-2 (DCP), add HFR to DCP.

Status: The group has submitted a request to the TC Chairs for three document amendment projects to be set up.

Immersive Audio Projects in TC-21DC

New Standard - SMS OMB Comm. Protocol

[Drafting Project](#)

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: This project was approved in late Aug. 2017. It will be developed together with the project below, and the work may take 2 years to complete.

New Recommended Practice – SMS OMB Comm. Reference Method

[Drafting Project](#)

This project will document an existing method for communication between a Screen Management System and an Outboard Media Block to convey an Immersive Audio Track File containing a ST 2098-2 bitstream and to synchronize the OMB.

Status: This project was approved in late Aug. 2017. It will be developed together with the project above, and the work may take 2 years to complete.

New Standard - DCP Operational Constraints for Immersive Audio

[Drafting Project](#)

This project will define all necessary constraints for a DCP that carries ST 2098-2 essence.

Status: This project was approved in early Aug. 2017. The project Chair reported that excellent progress is being made on this work and on the associated project, below.

New Standard - Immersive Audio Track File

[Drafting Project](#)

This project will create a track file specification for use with ST 2098-2 Immersive Audio Bitstream and specify how to use the track file in an ST 429-7 CPL and how to deliver the Immersive Audio Key in a KDM.

Status: This project was approved in early Aug. 2017. The project Chair reported that excellent progress is being made on this work and on the associated project, above.

Revision : RDD 29 - Dolby Atmos® Bitstream Specification

[Drafting Project](#)

Since RDD29 was published in 2014, differences between this RDD and actual implementations have been discovered. This document will be updated to reflect those differences.

Status: This project was approved 1 Aug. 2017. Work is awaiting completion of ST 2098-2.



Television and Broadband Media Committee (24TB) chaired by Michael Dolan

The General Scope as applied 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.

ST 2064 suite of documents on A-V Sync Measurement and Assessment

DG Project

The scope of this group is “Define recommended techniques for audio-video synchronization error measurement, and techniques and environment for synchronization assessment”. It is developing a document suite based on audio and video fingerprints:

- Part 1: Fingerprint Generation
- Part 2: Fingerprint Stream Transport (includes VANC in SDI/HD-SDI, IP, MPEG)
- Part x: Engineering Guideline

Status: Parts 1 and 2 are published and are now undergoing their 1-year review. The draft of the Engineering Guideline is almost complete.

Business Impact: Improved quality of experience and interoperability between systems

New SMPTE 2112 document suite on Open binding technology for persistent content identification in A/V essence

DG Project

This project group is developing a suite of standards for embedding end-to-end persistent content identifiers into audio/video essence in a way that survives processing, compression and distribution. The group’s focus was on carrying Ad-ID and EIDR identifiers. More recently, the group identified the need for “Open Binding of Distributor IDs and Time Labels to Content (OBID-TLC)”. Both types of watermark may be carried simultaneously and independently decoded (including up to four separate TLC’s).

Status: In addition to document drafting, detailed below, the group is undertaking Proof-of-Concept testing.

RP 2112-1 - Audience Measurement Using OBID and OBID-TLC

Drafting Project

Status: The working draft is well advanced and will be completed when parts 20 and 21 have started FCD ballot.

EG 2112-2 - Audience Measurement Ecosystem

Drafting Project

Status: The working draft is well advanced and will be completed when parts 20 and 21 have started FCD ballot.



ST 2112-10 - Open Binding of IDs (OBID)

[Drafting Project](#)

Status: The document passed FCD ballot on 24 Nov. 2017 with 24 comments to resolve. Three comments remain to be resolved.

RP 2112-11 - OBID Conformance Test Materials

[Drafting Project](#)

Status: The document passed FCD ballot with no comments and now has DP status. It normatively references ST 2112-10 and will be held from publication until ST 2112-10 is ready.

ST 2112-20 - OBID Time Label and Content Distribution Identifiers (OBID-TLC)

[Drafting Project](#)

Status: The working draft is complete, but will not go to FCD ballot until ST 2112-10 comment resolution is complete in case any minor edits become necessary.

RP 2112-21 - OBID-TLC Conformance Test Materials

[Drafting Project](#)

Status: The working draft is complete, but will not go to FCD ballot until ST 2112-10 comment resolution is complete in case any minor edits become necessary.

Revision: ST 2016-1 - AFD and Bar Data

[DG Project](#)

ST 2016-1 does not currently include UHD formats. SMPTE has been requested by ATSC, and DVB to update it. Liaisons have been exchanged with them, as well as CTA to help ensure backwards compatibility.

Status: The UHD information has been added in a working draft.



Cinema Sound Systems (25CSS) chaired by Brian Vessa and Bill Redmann

The application of the general scope as it applies to standards for theater 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. A regular feature of the meetings is a set of rapporteur reports from related organizations – MPEG, AES, EBU, InfoComm, ITU, ASA.

At this meeting round, TC-25CSS groups held 5 hours of face-to-face meetings to progress the TC's documents

Interoperability of Immersive Sound Systems in Digital Cinema

[WG Project](#)

This working group is charged with identifying areas of the D-Cinema architecture that require standardization to achieve interoperability of audio for systems with capability greater than 7.1. It will create engineering documents as needed, including standardizing a single object-based distribution file format and related protocols for interoperable playback into a variety of theatrical speaker configurations.

The group is also considering recommended calibration methods for these audio playback systems, requirements for backwards compatibility and other standards the group determines to be necessary to achieve D-Cinema interoperability.

Status: This WG (25CSS-10) gave a status report focusing on the work of the drafting groups (see below).

Immersive Sound Model and Bitstream

[DG Project](#)

Status: This DG is managing the following three document development projects:

New Standard: ST 2098-1 - Immersive Audio Metadata

[Drafting Project](#)

The group's initial focus was on this metadata definitions document.

Status: The draft document that was completed some time ago is now being updated to harmonize with other draft Standards / EG's, primarily ST 2098-2.



New Standard: ST 2098-2 - Immersive Audio Bitstream Specification

[Drafting Project](#)

At a TC meeting in July 2016, a decision was taken to use a Dolby input document as the starting point for ST 2098-2.

Status: Full document review is now completed. Some clean-up / formatting remains to be done.

New Standard: ST 2098-5 - D-Cinema Immersive Audio Channels and Soundfield Groups

[Drafting Project](#)

Status: The document did not pass ST Audit due to issues regarding conformance language. This group will consider resolution of the problem.

Digital Cinema Immersive Audio Renderer

[DG Project](#)

This DG is managing the following two document drafting projects:

New Engineering Guideline: EG 2098-3 - Immersive Audio Renderer Expectations

[Drafting Project](#)

Specifies the baseline expected behavior of a generic renderer in response to particular bitstream expressions and playback environment parameters.

Status: Near complete; awaiting industry testing roadmap.

New Recommended Practice: RP 2098-4 - Immersive Audio Renderer Interoperability Testing Procedure

[Drafting Project](#)

Describes a test procedure that can be used to test the interoperability of an immersive audio renderer

Status: Near complete; awaiting industry testing roadmap.

Study Group: Immersive Audio Implementation

[SG Project](#)

It has been recognized that a standardized Immersive Sound Model and Bitstream is only one part in ensuring interoperable immersive sound distribution. This SG has been formed to identify any additional work that is needed. The SG was approved 21 Nov. 2016.



Status: The Study Group draft report is being reviewed. It covers two main areas:

- DCP creation and interoperability
- Exhibition Equipment Interoperability

SG work has resulted in the creation of two TC-21DC drafting groups working on two documents each; details [here](#). There is an additional recommendation for amendment to RP 200 to cover Audio Level in Immersive Sound System B-Chain.

The SG report is expected to be ready for consensus review by Jan. 2018.

Other TC-25CSS Business

There has been some consideration of interoperability testing for immersive sound systems. An AHG will be formed to consider how to take this work forward.

Metadata and Registers Committee (30MR) chaired by John Hurst and Mike DeValue

The application of the general scope as it applies to definition and implementation of the SMPTE Registration Authority, used to identify digital assets and associated metadata. Additionally, the common definition of metadata semantic meaning across multiple committees.

UMID Projects

The Chair of the following projects gave a status report.

Application of the Unique Material Identifier (UMID)

SG Project

The UMID is standardized in ST 330 and 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 to provide assistance to the other UMID project groups and to review any new work items.

Status: The SG Drafting Project proposal for RP 205 revision was approved in Q3 2017 (see below). There have been no other SG issues.

UMID-related Standards:

This is a DG managing the following three document development projects:

New Document: UMID Resolution Protocol

Drafting Project



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. It follows from SG report Part 2.1.

Status: An initial strawman draft was submitted to the UMID Related Standards DG. There has been no further progress in the last quarter, though interest was shown at this meeting and help offered.

Revision: ST 330 - UMID

[Drafting Project](#)

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: A final draft revision is almost complete. Some time-related aspects have been reviewed by SMPTE time experts and the feedback will be incorporated in the ST 330 revision.

Revision: RP 205 – UMID Applications

[Drafting Project](#)

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 work has not yet started.

New Standard: ST 2102 - SMPTE Core Metadata Set

[DG Project](#)

This group's scope is to define an interoperable minimum core set of descriptive metadata for professional motion imaging applications and users.

Existing SMPTE metadata is application-specific and is not supported right through media workflows.

Status: The document was published in the last quarter. The DG and the project will be closed.

Business Impact: Potential foundation for Metadata



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

[DG Project](#)

This project creates a controlling standard for SMPTE ULs used as essence keys in MXF standards.

Status: The document passed FCD ballot 20 October 2016 with 15 comments to resolve. A Comment Resolution draft has been completed. The DG Chair will consult with commenters to see whether the latest draft resolves their comments.

Amendment: ST 335 - Metadata Element Dictionary Structure

[Drafting Project](#)

This project corrects an error that was introduced in ST335:2012 table 1.

Status: The ST 335 amendment has started FCD ballot, closing 12 Jan. 2018.

Metadata Definition

WG Project

This Working Group (30MR10) co-ordinates the process for adding or maintaining metadata items in registers. Experts within the WG recently cleaned up the register data, in particular the removal of redundancy. Registers are now maintained and balloted in xml format (spreadsheets were previously used). An online tool has been introduced to assist with the development of metadata entries and their acceptance for batched ballots.

Status: The next revision of the four registers in xml form (code-named “Ponzu”) is in preparation – [Drafting Project](#).

The Metadata Registers Development Area is available here: <https://registry.smpte-ra.org/pages/>
An Administrative Guideline (AG18) that defines the process for adding new UL definitions to the metadata registers has been published.

The existing Standards defining ULs for Elements, Groups, Types and Labels will be revised in line with AG18.

Create and Update Essence Element Register Contents

[DG Project](#)

This is a temporary activity to record SMPTE ULs for use as essence keys and process requests for register additions, modifications and deprecations. When ST 2088 publishes, this group will be closed and the work will pass to the WG.

Status: A draft register has been compiled for existing essence elements and is available in spreadsheet form at the above URL (login required).



File Formats and Systems Committee (31FS) chaired by Bruce Devlin and Paul Gardiner

The application of the General Scope as it applies to definition of common wrappers, file formats and file systems 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

New Document: ST 377-2 - KLV-encoded extension syntax (KXS)

[DG Project](#)

This work specifies an alternative approach to the 'Application Metadata Plug-ins' specified in SMPTE 377-1. The document passed a second FCD ballot on 17 Nov. 2013 with 70 comments, but then went into hiatus. The work has recently resumed.

Status: This document was held awaiting publication of the registers containing ULs used by this document. That publication has now occurred and the document will have a final DG review on 15 Dec. and then proceed to pre-DP ballot review.

Revision: ST 380 - MXF Descriptive Metadata Scheme 1

[DG Project](#)

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: The draft revision of ST 380 is at pre-FCD-ballot review, closing 19 Dec. 2017.

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

[Drafting Project](#)

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

Status: A draft RP 2057 is in pre-FCD-review, closing 19 Dec. 2017.

Revision: ST 377-1 - Material Exchange Format (MXF) - File Format Specification (and Amendments)

[DG Project](#)



This is a constrained revision to roll-up two amendments and check Normative References and deal with any consequences arising.

Status: The draft ST 377-1 is at FCD ballot, closing 5 Jan. 2018. Note that this is a project to create a stable ST 377-1 and an [additional project](#) will then deal with substantive issues that may be more complicated to implement.

Revision: ST 381-2 - Material Exchange Format (MXF) - Mapping MPEG Streams into the MXF Constrained Generic Container

[Drafting Project](#)

This is a constrained revision to update references and bibliography.

Status: The draft completed pre-DP-vote review with no comments. AT the TC meeting, the document was elevated to DP status.

Revision: RDD 44:2017 - Apple ProRes in MXF

[Drafting Project](#)

Add provisions needed for IMF and clarify the usage of these provisions for other applications.

Status: The revised Registered Disclosure Document is now in the publication queue.

Working Group on Archive Exchange Format (AXF)

This Working Group (31FS-30) has defined an archive format that will promote interoperability between all forms of archive media. A multipart suite of documents is planned:

Part 1 deals with ‘AXF Structure and Semantics’ and includes an XML schema. This document is published. A revision to the Part 1 document was published in Q2 2017. It has been published by ISO as a Publicly Available Specification, ISO/IEC DIS 12034-1.

Part 2 will cover “External Uses of XML Schema”.

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

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

[WG Project](#)

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.



Status: Work is progressing; AXF sidecar files are under consideration and the use of URLs rather than URIs to allow material to be obtained rather than just identified.

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

[DG Project](#)

This project will develop a new constrained standard for ST 268:2014 (DPX) for the application of high dynamic range (HDR) and wide color gamut (WCG) pictures. This will be a new engineering document and not a revision of ST 268. It is intended to be as constrained as possible to achieve the best interoperability.

Status: The draft ST 268-2 passed FCD ballot on 30 Aug. 2017 with 43 comments to resolve. The DG met during this round and some comments are now better-understood.

Other TC-31FS Business

As part of 1 and 5 year document reviews, the meeting made the following decisions:

- ST 385:2012 – MXF - Mapping SDTI-CP Essence and Metadata into the MXF Generic Container was reaffirmed
- ST392:2013 – MXF – Operational Pattern OP2a was reaffirmed and stabilized.

The Federal Agencies Digital Guidelines Initiative (FADGI), proposed new work to produce an RDD: MXF AS-07 Application Specification for Archiving and Preservation. A TC-31FS project proposal will be submitted.



Network and Facilities Architecture Committee (32NF) chaired by Friedrich Gierlinger and John Snow

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, switching mechanisms, and physical networks that are both internal and external to the facility excluding unique final distribution methods.

Working Group on SDI Interfaces

WG Project

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.

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

The WG Chair gave a report on its projects, detailed below.

New Document Suite: EG 2111 on SDI Interfaces

DG Project

This group will draft EGs to provide a tutorial on the many SMPTE SDI interface standards and technologies, including how they relate to each other, what image formats are carried, performance. As this task is potentially large, it was decided at the July 2015 meeting that initial focus would be on HD and UHD SDI interfaces.

Status: Three EGs, in the form of posters, are well-advanced covering:

EG 2111-1 SD and HD-SDI Roadmap

EG 2111-2 UHD-SDI Roadmap

EG 2111-3 10G-SDI Roadmap

The first of the SMPTE wall charts (proposed EG 2111-2 UHD-SDI Roadmap), was published in the July edition of the SMPTE journal and has been updated to make it more suitable as an EG. This revision of EG 2111-2 has been circulated for review in the DG prior to sending for pre FCD review in TC 32NF.



New Document Suite: SMPTE 2091 - Broadcast and Video Serial Digital Fiber Transmission Systems – Ruggedized Connector Interfaces

[DG Project](#)

This project is creating a standard for a ruggedized optical connector suitable for SDI as used in HDTV and UHD TV systems. The system also has the following features: automatic dust protection, automatic laser source eye protection, high durability, low maintenance and small size. The document will include a section on labeling requirements for improved interoperability.

It was decided that connectivity requirements for the ST 2036-4 interface would be removed from this draft standard and moved to a new RP. So it is expected that the standard will become ST 2091-1 and the recommended practice RP 2091-2.

Status: ST 2091-1:2017 published on February 13th 2017.

RP 2091-2 passed FCD ballot 3 Nov. 2017 with 10 comments to resolve. Comment resolution is underway.

New Standard: ST 2108 - Extended HDR/WCG Metadata Packing and Signaling for Serial Digital Interfaces (and associated document revisions)

[DG Project](#)

This project will define an HDR and WCG carriage mechanism to provide information to ensure that content is correctly processed in a production facility as well as correctly displayed on professional reference displays using SMPTE interface standards.

Many SMPTE interface standards will require amendment as part of this work. The plan is to put static HDR/WCG signaling parameters in the Payload ID (ST 352), and all other HDR-related metadata in a **new** “HDR/WCG Ancillary Data Packet”, documented in ST 2108.

Status:

ST 372 revision was published Q4 2017.

ST 425-1 revision was published Q4 2017.

ST 2081-10 and ST 2082-10 are moving to ST Audit in WG 32NF-70 and ST 2081-11, ST 2081-12, ST 2082-11, ST 2082-12 will follow; see [below](#).

ST 2036-3 revision will be posted for pre-DP-ballot review (done 11 Dec.). [Drafting Project](#)

ST 292-1 revision will be posted for pre-DP-ballot review (done 11 Dec.). [Drafting Project](#)

Next up for revision in this DG: ST 425-3, ST 425-5.

Work on the new document, ST 2108, has resumed; a new draft was posted to the DG earlier in the meeting week.

New ST 2100 Suite: Transport of Haptic-Tactile Essence

[DG Project](#)



This project was split away from the [TC-10E project](#) on *Coding* of Tactile Essence some while ago in order to focus on defining the *transport* of this essence.

Status: This group has restarted meetings, having been on hiatus to focus effort on the 10E document ST 2100-1 that has now been published. Two Drafting Projects are set up (both projects are still at the proposal stage):

[Drafting Project ST 2100-2: Coding and Transport Of Haptic-Tactile Essence in AES3](#)

[Drafting Project ST 2100-3: Coding and Transport Of Haptic-Tactile Essence in Ancillary Space](#)

The DG is reviewing the suitability of draft ST 2109 as a framework for carriage in AES3.

Revision: EG 34 - Pathological Conditions in Serial Digital Video Systems

and

Revision: RP 198 - Bit-Serial Digital Checkfield for Use in High-Definition Interfaces

[DG Project](#)

It has been agreed that RP 198 – HD Check-field – is higher priority than EG 34, in order to get 3Gb/s interfaces specified, and should be completed first.

Status: The RP 198 draft revision closed FCD ballot 15 May 2017 with 72 comments to resolve. A DG meeting was held in the last quarter and some progress has been made with comment resolution in an updated DG draft. The WG has received a request from ITU-T for updated information on timing/jitter requirements for SDI video signals.

Working Group on Video Over IP

[WG Project](#)

This Working Group (32NF60) was established to handle projects related to IP transport of media. The WG has produced the seven-part ST 2022 suite of standards.

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

New document suite: ST 2110 - Professional Media over Managed IP Networks

[DG Project](#)

This group is developing a suite of standards specifying the carriage, synchronization and description of separate elementary essence streams over IP for the purpose of live production. The resulting standards use VSF Technical Recommendations TR-03 and TR-04 as their starting point.

The suite of ST 2110 documents currently comprises:



New Standard: Part 10 - System Timing and Definitions

[Drafting Project](#)

New Standard: Part 20 - Uncompressed Active Video

[Drafting Project](#)

New Standard: Part 21 - Traffic Shaping and Delivery Timing for Video

[Drafting Project](#)

New Standard: Part 30 - PCM Digital Audio

[Drafting Project](#)

New Standard: Part 31 - AES3 Transparent Transport

New Standard: Part 40 - Ancillary Data

[Drafting Project](#)

The group is also developing this document that defines constraints on ST 2022-6 streams for interoperation with ST 2110 streams:

New Standard: ST 2022-8 - Interoperation of ST 2022-6 streams (had been planned to be ST 2110-50)

[Drafting Project](#)

Status of Suite: ST 2110 Parts 10, 20, 21 and 30 were published during this meeting round. Celebration!

Part 40 passed FCD ballot 25 Sept. 2017 with 41 comments to resolve (only two comments are unresolved).

Part 31 is at FCD ballot, closing 24 Dec. 2017.

A new draft of ST 2022-8 has been submitted to the group.

Planning is underway for a JT-NM interop 11-16 Feb. 2018 for ST 2110 and associated standards.

Revision: ST 2022-7 - Seamless Protection Switching of RTP Datagrams

[Drafting Project](#)

A revision to SMPTE ST 2022-7 to add a Ultra-Low-Skew receiver class, and to make it applicable to any RTP flow (rather than just ST 2022 flows). This is based on a one-year review. The project scope was amended at the March 2017 meeting to extend ST 2022-7 to provide seamless protection switching of a range of professional media RTP streams, including AES67 and ST 2110, hence the new title above.

Status: A WD was submitted to the TC on 5 Dec. 2017 for pre-FCD-ballot review.

Revision: ST 2022-3 - Unidirectional Transport of Variable Bit Rate MPEG-2 Transport Streams on IP Networks

This is a project to revise bit rate abbreviations in ST 2022-3 as part of five-year review

[Drafting Project](#)



Working Group on Ultra HD SDI Interfaces

[WG Project](#)

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). 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 System for ST 259, ST 344, ST 292-1/2, ST 424, ST 2081-1 and ST 2082-1 Signals.

WG Status: Although there are separate drafting groups for 6Gb/s and 12Gb/s (see below), the WG generally develops its documents so that the two are kept “in step”. Additional work has been passed to this WG from the [SDI WG HDR signaling project](#) to include HDR signaling over these UHD-SDI standards.

It was decided at the Sept. 2017 meeting round that the next documents to be developed will be the ST 2083 suite.

ST 2081 suite - 6Gb/s Signal/Data Serial Interfaces

[DG Project](#)

This project is responsible for the following documents:

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

ST 2081-10: 2160-line and 1080-line Source Image and Ancillary Data Mapping for **Single-link** 6G-SDI (published) A [one-year review project](#) is underway.

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

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

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

Status: ST 2081-30 was published in Q4 2017.

The one year review revision of ST 2081-10 includes additions to signal HDR/WCG. It passed DP ballot 29 Nov. 2017 and has been submitted for ST Audit.

The one year review of ST 2081-11 and -12 is in progress, and the additions to signal HDR/WCG are being included.

There are a further 3 documents (like -10, -11, -12) planned for stereoscopic content.

ST 2082 suite - 12Gb/s Signal/Data Serial Interfaces

[DG Project](#)

This project is responsible for the following documents:



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

ST 2082-10: 2160-line and 1080-line Source Image and Ancillary Data Mapping for **Single-link** 12G-SDI (published) A [one-year review project](#) is underway.

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

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

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

Status: ST 2082-30 was published in Q4 2017.

The one year review revision of ST 2082-10 includes additions to signal HDR/WCG. It passed DP ballot 29 Nov. 2017 and has been submitted for ST Audit.

The one year review of ST 2082-11 and -12 is in progress, and the additions to signal HDR/WCG are being included.

There are a further 3 documents (like -10, -11, -12) planned for stereoscopic content.

Working Group on Time Labeling and Synchronization

[WG Project](#)

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

WG Status: The WG met during this meeting round to discuss its projects, noted below. The topic of timing after rasters become a thing of the past (e.g. elementary streams) also arose. This topic will be developed in future meetings.

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

ST 2059 Interoperability Testing

[DG Project](#)

The aim is to confirm that the provisions of the standards are unambiguous and that the technology does, indeed, yield 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 three rounds of testing, all hosted by FOX NE&O in Houston, TX, USA:

- Nov. 2015



- June 2016
- March 2017

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

Status: The group has started planning for a further ST 2059 interop 5-10 Feb. 2018, with some further testing in a broader JT-NM interop the following week – both at FOX NE&O once again. New tests are being planned for timecode generation from PTP/TLV and simulated large systems. Lock time will be retested to determine whether implementations have improved and further ST 2022-7 testing will be done.

One-year reviews of ST 2059-1 and ST 2059-2

[DG Project](#)

This DG will revise these two PTP standards in the light of interop testing since original publication.

- **Status:** This DG waited for the March 2017 interop tests to complete before starting revision work. A number of comments, mostly on ST 2059-2, have been posted so far, including issues uncovered during interops. The group has held 11 meetings and has worked through most issues submitted so far. The group is investigating adding alignment points for UHD transports into ST 2059-1.

Development of a suite of PTP synchronization Engineering Guidelines

[DG Project](#)

This group manages the development of a suite of Engineering Guidelines related to the ST 2059-1 and ST 2059-2 Synchronization documents in the drafting projects below.

These documents are an important way to ensure that new implementers, who may not have been part of the development, will correctly implement the system.

New Engineering Guideline: EG 2059-10 - Introduction to the New Synchronization System

This document will provide users of the system, both implementers and operators, to understand the context and technology of what some may see as a major technology shift.

Status: This document is published, but kept in this report to give a clear picture of the suite. There is consideration of introducing an RP project for “Local Time”. There would be considerable overlap between that document and this draft EG.

New Engineering Guideline: EG 2059-11 – Management of Time Discontinuities

[Drafting Project](#)

Status: A WD was submitted 20 April 2015; no progress since.



New Engineering Guideline: EG 2059-12 - Systemization Considerations for using SMPTE ST 2059

[Drafting Project](#)

Status: This document had previously been called “Facility Migration Guide”. A WD was submitted 23 April 2015; no progress since.

New Engineering Guideline: EG 2059-14 - Best Practices for Large Scale SMPTE ST 2059-2 PTP deployments

[Drafting Project](#)

Status: The most recent WD was submitted 26 Nov. 2014, no progress since.

New Time Labeling System

Until a WG meeting in June 2017, there had been two time label projects underway. At that June meeting, a decision was taken to close those projects and to entertain a single proposal to create a single new time label. This action followed strong user feedback at the Timecode Summits (report [here](#)) that SMPTE should standardize just one time label format.

A new proposal was presented at the WG meeting this round. It was reviewed and agreed that this proposal should go forward – the following project proposal was subsequently posted:

New Document: Extensible Time Label

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

Proposed [Drafting Project](#)

Status: The project proposal will be reviewed until 25 Dec. 2017

New Recommended Practice: RP 2104-1 - Date-Time Terms and Definitions

[Drafting Project](#)

It has been agreed that this document will comprise two Parts.

Part 1 will be Date-Time Terms and Definitions; this is required urgently so that it can be a Normative Reference for the other time / sync documents.

Part 2 will be other Media Terms and Definitions.

Status: A draft of RP 2104-1 was posted for review and comment July 2015. There has been no progress since.

ST 337 family of documents

[DG Project](#)

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



Status: The TC approved the creation of a new working group 32NF-90 WG Data on AES3 to look after the projects that were previously managed by this DG. Projects assigned to 32NF-90 are:

New Standard: ST 2041-4 - Carriage of MPEG-H 3D Audio Streams (MHAS) in AES3 Transport

[Drafting Project](#)

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: An initial draft document was submitted to the DG in Dec. 2016. A revised document is being drafted.

New Standard: Multi Dimensional Audio (MDA) in AES3 using ST 337

[Drafting Project](#)

Based on the MDA specification (ETSI TS 103 223), the project will develop a standard that describes the carriage of MDA over AES3.

Status: This project was approved in Nov. 2016. A draft document is awaited.

New Standard: ST 2109 - Format for Non-PCM Audio and Data in AES3 - Audio Metadata

[Drafting Project](#)

This project will develop new documents for the open transport over AES3 of real-time, dynamic (time synchronous) audio metadata. The use of the KLV data type, defined in ST 355, is being considered.

Status: Updated drafts have been reviewed by the group, the most recent was 1 Dec., reviewed during the meeting round. There is ongoing discussion. The DG was asked to consider whether a separate proposal for carrying ADM over AES3 could be integrated into ST 2109. After review, the consensus view was that this proposal should become a separate project.

New Standard: Serial Audio Definition Model (ADM) over AES3

Proposed [Drafting Project](#)

This standard will specify a method of conveying a serial representation of the Audio Definition Model alongside synchronized audio signals in professional applications using an AES3 serial digital audio interface.

Flow Control in Professional Media Networks

[SG Project](#)

This SG report includes these key elements:



- What Is Flow Management?
- Network Switch Architecture Overview
- Methods of Flow Switching
- Methods of Clean Switching Packetized Video
- Methods of Flow Control
- Control Protocols
- Congestion Control
- Recommendations for SMPTE Work

Status: The report is published, available on this SMPTE [website page](#).

Media Systems, Control and Services Committee (34CS) chaired by Chris Lennon and Karl Paulsen

The General Scope as applied 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.

BXF Suite of Documents

This TC is responsible for a suite of documents defining the Broadcast Exchange Format, comprising:

ST 2021-1: General Information and Informative Notes

ST 2021-2: Protocol

EG 2021-3: Use Cases

EG 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 primarily an XML-based system that standardizes exchange of Schedule, As-run, Content Transfer instructions, Content-related metadata, and Agency instructions. The group has an XML AHG which manages schema enhancements.

Features are steadily being added to BXF and these are batched into versions. The current published suite includes features introduced in versions up to BXF 5.0.

As work on BXF 5.0 was completed in the last quarter, the group is **inviting inputs for the next BXF version, 6.0**. It was reported at the Sept. 2017 meeting that nine inputs had been received, including



additional NABA and DPP work in BXF schema (Library Masters, CPL/OPL, UHD Air Ready Master, IMF Broadcast Delivery Spec, Delivery of TV Programs as AS-11 files).

BXF 5.0

[DG Project](#)

BXF 5.0 introduced new components and improvements to extend BXF functionality. There is work on Program Synopsis Support, QC Node, Point of Interest, Graphic Slate Template Support, NABA DPP Content Delivery Specification Schema, BXF SDK. There are also various small improvements to the suite of documents.

Status: BXF 5.0 documents, comprising revisions to Parts 1,2,3,4,9 and a new Part 6, were all published in Q3 2017. The DG is currently on a well-earned hiatus, but will resume work early in 2018 to start on BXF 6.0.

Media Device Control over IP

[DG Project](#)

This project has developed a suite of documents for the control of media-centric devices and services utilizing Internet Protocol and well-established Internet / IT standards and best practices wherever possible:

ST 2071-1: Media Device Control - Framework - Published in 2012, updated in 2014, 2016.

ST 2071-2: Media Device Control - Protocol – Published in 2012, updated in 2014, 2016.

ST 2071-3: Media Device Control - Discovery – Published in 2014.

Describes an IETF Zero Configuration (ZeroConf) - compliant protocol for Device and Service discovery operations.

ST 2071-4: Media Device Control - Capability Interface Repository

WSDL & XML Schemas are included.

Defines the Capability Interface definitions/API and systemic requirements for a repository/registry that can contain Capability Interface definitions, their corresponding documentation, programmatic artifacts, unit tests, and test cases. Provides a common infrastructure and API with which vendors and SDOs can register Capability Interface Definitions, their documentation, unit tests, and test cases and where Developers, Customers, and Interface Consumers can query the definitions, documentation, and tests for the Capability Interfaces implemented by Devices and Services used within their systems.

(Proposed) ST 2071-5: Media Device Control - RESTful Protocol+HATEOAS – New intended project, proposal will be issued. HATEOAS = Hypermedia as the Engine of Application State.

Status:

Part 1 and Part 2 revisions were published Q4 2016.



Part 3 revision and Part 4: A DP ballot was held, but comments were permitted in error and there are doubts about the document version that was submitted. At this meeting, it was decided that both documents will be reballoted at FCD as soon as possible. The next DG telecon will be 18 Dec. 2017.

Part 5 [project proposal](#) exists. It is likely that this activity will follow completion of Parts 3 and 4.

Business Impact: Interoperable Media Device Control

Media Packaging and Interchange Committee (35PM) chaired by Pierre Lemieux and Florian Schleich

The General Scope as applied 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, post-production archiving and related topics.

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

Overview of TC-35PM structure and IMF

This TC's work is currently about developing and maintaining the suite of Interoperable Master Format (IMF) documents.

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.



Current IMF Publications

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 2067-20, Interoperable Master Format — Application #2

ST 2067-21, Interoperable Master Format – Application #2E (previous title Application #2 extended)

ST 2067-30, Interoperable Master Format — Application #3

ST 2067-40, Interoperable Master Format – Application #4 Cinema Mezzanine

ST 2067-100, Interoperable Master Format – Output Profile List

ST 2067-101, Interoperable Master Format – Output Profile List – Common Image Definitions and Macros

ST 2067-102, Interoperable Master Format – Output Profile List - Common Image Pixel Color Schemes

ST 2067-103, Interoperable Master Format – Output Profile List – Common Audio Definition and Macros

WG 35PM50: IMF Document Maintenance and Sample Material Interchange (SMI)

[IMF Plugfest Project](#)

The SMI group has held several plugfests, the most recent was at IRT, Munich, in May 2017.

Content for IMF testing is hosted on a SMPTE resource using Signiant Media Shuttle.

There is a related activity (launched mid-2017) – The IMF Users Group. More information:

<https://imfug.com>

Status: The group had not met in the last quarter and it was proposed to temporarily close the project. However, Sony Pictures wants to organize a plugfest at its facility in Culver City, California, and has volunteered resources. The aim is for the next plugfest to be held before the March meeting round.

IMF Document Maintenance

An IMF bug tracker (used for both bugs and improvement requests) is in operation at:

<https://standards.atlassian.net/projects/IMF/issues/IMF-1?filter=allopenissues>

These bug reports contribute to document revision work. At the time of the meeting, 40 issues were recorded.



IMF Output Profile Lists (OPL) DG

An OPL defines the transformation of a single IMF Composition into deliverables appropriate for downstream distribution channels. This transformation consists of a sequence of parameterized steps, called Macros.

The following OPL projects are underway:

Amendment: ST 2067-102 - IMF Common Image Pixel Color Schemes

[DG Project](#)

Add support for all the color schemes specified in ST 2067-21:2016 ("Application #2E") and transfer function as specified in ST 2084:2014

Status: The amendment was published in the last quarter and the project will be closed.

Revision: ST 2067-101 - IMF Common Image Definitions and Macros

[DG Project](#)

This revision addresses four bug-tracker issues: IMF-15, 16, 17, 18 as well as editorial issues.

Status: The WD has completed pre-FCD-ballot review and the document will be submitted to the TC for FCD ballot after the holidays.

New Standard: ST 2067-200 - Dynamic Metadata for Color Volume Transform for IMF Applications

[DG Project](#)

This document defines a plug-in that allows Dynamic Metadata for Color Volume Transform (as specified in ST 2094-2) to be added to compatible IMF Applications.

Status: Document development is underway. The next DG meeting is 14 Dec. 2017.

IMF Audio Essence Projects

New Standard: IMF - Specifying Audio Element and Content Kind in Application #2E Compositions

[DG Project](#)

This project will draft a standard for controlled vocabulary and syntax for MCA Audio Content Kind and MCA Audio Element Kind, two essential elements that describe soundfield groups in accordance with IMF Core Constraints. It will also investigate the need to define a controlled vocabulary and syntax for MCA Title and MCA Title Version, both of which are required by IMF Core Constraints.

The group has developed a draft Engineering Report "IMF – Specifying Audio Element and Content Kind in Application #2E Compositions".



Status: The TC has reviewed and approved the Engineering Report. The group has moved on to drafting the Standard. The next DG meeting is 12 Dec. 2017.

New Standard: IMF Immersive Audio Bitstream Level 0 Plug-In

[Drafting Project](#)

Specify a plug-in for the carriage of (draft) ST 2098-2 Immersive Audio bitstream in IMF compositions for use with feature and episodic content, including:

Mapping of ST 2098-2 bitstream into IMF Track Files

Mapping of ST 2098-2 bitstream into the IMF Composition as Virtual Tracks

Extension mechanisms for adding metadata to the Track File containing the ST 2098-2 bitstream

Status: A WD is in progress. The group is waiting for TC-25CSS to complete their ST 2098 amendment work.

New Standard: ST 2067-50 - IMF Application #5 ACES

[DG Project](#)

This project will specify an application of the IMF framework that uses image essence conforming to SMPTE ST 2065-4 (ACES), and audio and subtitle essence as specified in SMPTE ST 2067-2.

Status: The Draft ST 2067-50 passed FCD ballot. All comments are resolved and it is in Pre DP ballot review, closing 18 Dec. 2017.

New Standard: ST 2067-9 - Sidecar Composition Map

[DG Project](#)

This project will define an XML document that (a) can be carried as an IMP asset and (b) associates other selected IMP assets (called Sidecar Assets) with one or more IMF Compositions. The document defines the Sidecar Composition Map structure, which allows a Sidecar Asset to be associated with a Composition Playlist.

Status: The document is at FCD ballot, closing 11 Dec. 2017 (the ballot passed with 5 comments to resolve).

Amendment: ST 2067-40 - IMF Application #4 Cinema Mezzanine

[DG Project](#)

A plugfest specifically for ST 2067-40 was held in Erlangen, Germany 1-2 Mar. 2017 and some errors, including a UL error were discovered. This amendment will correct the errors. The plugfest report should be available soon.

Status: ST 2067-40 amendment is at ST Audit, closing 27 Dec. 2017.



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New Registered Disclosure Document: RDD 45 - IMF Application for ProRes format

[DG Project](#)

This RDD specifies an IMF application based on Application #2E (SMPTE ST 2067-21) that uses Apple ProRes image essence (as specified in SMPTE RDD 44) instead of JPEG 2000 image essence.

Status: The RDD is at ST Audit, closing 8 Dec. 2017.



SMPTE Standards Publications in the Last Quarter

10E Essence:

[ST 2042-2:2017 VC-2 Level Definitions](#)

[RP 2073-2:2017 VC-5 Video Essence – Part 2: Conformance Specification](#)

[RDD 32:2017 XAVCTM MXF Mapping and Operating Points](#)

ST 2073-6:2015 VC-5 Video Essence - Part 6: Sections

ST 2073-5:2015 VC-5 Video Essence - Part 5: Layers

20F Film:

21DC Digital Cinema:

24TB Television & Broadband Media:

25CSS Cinema Sound Systems:

30MR Metadata & Registers:

[ST 2102:2017 SMPTE Core Metadata](#)

31FS File Formats & Systems:

[RDD 44:2017-11 Material Exchange Format — Mapping and Application of Apple ProRes](#)

[ST 381-3:2017 Material Exchange Format— Mapping AVC Streams into the MXF Generic Container](#)

32NF Network & Facilities Architecture:

[ST 2110-30:2017 Professional Media Over Managed IP Networks: PCM Digital Audio](#)

[ST 2110-20:2017 Professional Media Over Managed IP Networks: Uncompressed Active Video](#)

[ST 2110-10:2017 Professional Media Over Managed IP Networks: System Timing and Definitions](#)

[ST 2110-21:2017 Professional Media Over Managed IP Networks: Traffic Shaping and Delivery Timing for Video](#)

[ST 372:2017 Dual Link 1.5 Gb/s Digital Interface for 1920 × 1080 and 2048 × 1080 Picture Formats](#)

[ST 425-1:2017 Source Image Format and Ancillary Data Mapping for the 3 Gb/s Serial Interface](#)

[ST 2081-30:2017 Transport of Multiple 3Gb/s or 1.5Gb/s signals on a 6G-SDI link](#)

[ST 2082-30:2017 Transport of Multiple 6Gb/s, 3Gb/s or 1.5Gb/s signals on a 12G-SDI link](#)

34CS Media Systems, Control & Services:

[OV 2021-0:2017 Broadcast Exchange Format — Roadmap for the 2021 Document Suite](#)

35PM Media Packaging & Interchange:

[ST 2067-102:2017 Interoperable Master Format – Common Image Pixel Color Schemes](#)



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 relevant to 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](#). 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 includes all Technology Committees. It is used to convey information that is relevant to all TC’s, such as meeting logistics and registration information. An SC meeting is held during each meeting round.

SMPTE Document Development Process

The document stages are:

PD = Project Draft **WD** = Working Draft **CD** = Committee Draft **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

OV = Overview used with multipart document suites

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 revise as 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 particular technology field. In this case, those projects are grouped under a **Topic** headline.*

*SMPTE manages its standards documentation, meetings and ballots in an online system called **SMPTE Workspace**. It has a **Project View** that includes a publicly accessible project summary page. It is used to state the project scope and details at the proposal stage and to track progress through to completion. In this report access to the project view is via a hyperlink such as [DG Project](#).*