



SINCE 1916

STANDARDS QUARTERLY REPORT JUNE 2017

Result of SMPTE® Technology Committee
Meetings
13-16 June 2017

Hosted by
Shanghai Media Group
Shanghai, China

THE NEXT CENTURY



Society of Motion Picture and Television Engineers®

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[Essence](#) [D-Cinema](#) [TV-Broadband](#) [CinemaSound](#) [Metadata](#) [FileSystems](#) [Network](#) [MediaSystems](#) [MediaPackaging](#)



SMPTE® Standards Quarterly Report: Executive Summary

As a result of SMPTE Standards Committee Meetings

13-16 June 2017

Shanghai, CN

Hosted by East China Television Technology League and Shanghai Media Group (ECTTL / SMG)

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

Around 28 members attended in person over the four 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 almost two hundred active projects can be found in the [detailed account](#), after this summary.

New Projects that began in the last quarter

Revision of ST 2086 Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut Images A revision of ST 2086 is necessary to address issues reported since publication.

[DG Project Details](#)

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

[DG Project Details](#)

ST 2067-9 Sidecar Composition Map Develop a specification for the Sidecar Composition Map Document, which is an IMP asset that allows other selected IMP assets (called Sidecar Assets) to be associated with one or more Compositions.

[DG Project Details](#)



Revision ST 2067-101 (IMF Common Image Definitions and Macros) A revision of ST 2067-101 is necessary to address issues reported since publication.

[DG Project Details](#)

ST 2067-200 (DMCVT plug-in) Dynamic Metadata for Color Volume Transform (DMCVT) for IMF Applications

[DG Project Details](#)

P3 Colorimetry This project will produce a normative reference standard or recommended practice(s) 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.

[DG Project Details](#)

Immersive Audio Channels and Soundfield Groups Standard Create a document that standardizes immersive audio channels and soundfield groups. Add informative immersive audio soundfield configuration diagrams. [DG Project Details](#)

ST 425-1 Revision The 32NF-40 HDR Signaling Drafting Group has defined changes to the SDI interface Payload ID to signal HDR and WCG formats. This project will revise the interface documents to include this signaling information

[DG Project Details](#)

ST 372 Revision The 32NF-40 HDR Signaling Drafting Group has defined changes to the SDI interface Payload ID to signal HDR and WCG formats. This project will revise the interface documents to include this signaling information

[DG Project Details](#)

Constrained revision of SMPTE ST 377-1:2011 5 year review revision

[DG Project Details](#)

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. Three core parts - System Timing and Definitions, Uncompressed Active Video, PCM Digital Audio – have passed FCD ballot and comment resolution is well-advanced. Parts on Ancillary Data and on Timing Model for Uncompressed Active Video are close to pre-FCD-ballot review.



[Details](#)

Study Group on Flow Control in Professional Media Networks

This group is compiling 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. [Details](#)

Network-Based Synchronization for the Professional Media Environment

Following the publication of two key documents (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” – some have been held and others are planned (some in co-operation with other organizations). [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). One part deals with the associated topic of Discovery. [Details](#)

“Better Pixels” projects

The next step beyond high-definition television (HDTV) requires improvement in more than just pixel count. Improvements to parameters such as color gamut, displayed dynamic range, frame rates, and electro-optical transfer function all contribute to the improved viewing experience that is needed to justify the launch of new services.

HDR and WCG Signaling on Streaming Interfaces

This project will define a mechanism for signaling the carriage of high-dynamic-range (HDR) and/or WCG essence on streaming interfaces. The group has defined how the SDI Payload ID will be used for HDR / WCG signaling and identified the SDI standards that need revision, some of which have gone through ballot.

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

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](#)

Dynamic Metadata for Color Volume Transform for IMF Applications

[DG Project](#)

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

Constrained Application of ST 268 - HDR DPX

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

Completed HDR/WCG/EOTF work

- Content-Dependent Metadata for Color Volume Transformation of High Luminance and Wide Color Gamut (WCG) Images
This SMPTE suite (ST 2094) comprises one part on Core Components, four parts on individual application schemes, one part on KLV Encoding and MXF Mapping.
- For an overview of these topics, the SMPTE Study Group on the HDR Imaging Ecosystem released its report in Oct. 2015; available [here](#).

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 ruggedized optical SDI connectors [Details](#) and coarse wavelength division multiplexing for SDI interfaces (published in the last quarter). [Details](#).
- There is an SDI interfaces Working Group that is managing a number of other SDI projects [Details](#)

Time Labels

SMPTE “Time Label summits” were held in Hollywood, London, New York in Q4 2016 to collect user requirements that may affect the design of future time labels that are more suited to the current media environment than the ubiquitous ST 12 Time Code. These findings have been published in an Engineering Report; available [here](#). The report has altered the course of Time Labels projects. [Details](#)

SMPTE Video Compression (VC) Standards



SMPTE has standardized four 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](#)

Cinema Projects

Cinema Sound Systems

This Technology Committee (TC) has projects 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 project group developing two Recommended Practices (RPs) “Cinema Sound System Baseline Setup and Calibration” and “Cinema Sound System Recurring/Maintenance Setup and Calibration” [Details](#)
- 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](#)

A standard “Calibration Reference Wideband Pink Noise Signal and Test File” was published in 2016 and a Digital Cinema Package (DCP) for it is in preparation.

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

Cinema Content Creation Cloud (C4) Identification (ID) System



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This is a Metadata and Registers committee project. [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 constraints for improved interoperability in a variety of application areas. There are currently 11 MXF projects in process. [Details](#)



SMPTE® Standards Quarterly Report: **Detailed Account**

As a result of SMPTE Standards Committee Meetings

13-16 June 2017

Shanghai, CN

Hosted by East China Television Technology League and Shanghai Media Group (ECTTL / SMG)

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](#)

If you need assistance 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 20-23 Sept. 2017 in London, UK and will be hosted by Sky UK.



Further quarterly Standards meeting rounds are planned for:

4 – 8 Dec. 2017	Arista, Santa Clara, California, USA
March 2018	TBA
June 2018	SMPTE Toronto Section, Ryerson University, Toronto, CA
Sept. 2018	EBU, Geneva, CH

In addition to the meetings of SMPTE Technology Committees (TCs) and their sub-groups, detailed below, there was training on new arrangements for remote access to SMPTE standards meetings. There was also a short report on the Joint Task Force on Networked Media and the NAB IP showcase.

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 are also provided in the footer of each page to each TC's report to assist with navigation.

Documents published by each TC in the last quarter 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

Note: The revised four parts of ST 2019 on VC-3 compression were published in 2016 Q3 and that project is closed.

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 is being revised to add test materials to support content defined in Parts 5 and 6 (which are ready for publication when Part 2 is ready); the revised Part 2 is at pre-FCD ballot review.

A SMPTE repository for the software and test materials on “bitbucket” is being used.

Work on Part 7 will resume when the above activities are complete; a [new project](#) formalizes this



work. The test materials will require addition of metadata, so that Part 2 will need additional revision.

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

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 2042-1 - VC-2 Video Compression Standard

[DG Project](#)

This revision adds a high quality profile to support Archiving and Production applications.

Status: Ready for publication.

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

[DG Project](#)

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

Status: In pre-FCD ballot review.

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

[DG Project](#)

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

Status: No progress; this work will follow the revision work in ST 2042-1.

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

[DG Project](#)



The project scope is: Specify a new level of VC-2 compression with coding constraints that enables UHDTV video to be compressed to the same bit rates as those of uncompressed HDTV signals.

Status: In ST Audit, closing 30 June 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 (published)

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 and Part 2 are published (and are ready for their one-year review).

Part 3 was published in the last quarter.

Part 4 is nearly ready for pre-FCD-ballot review. The text is complete and the large number of test pattern drawings are nearly complete.

The DG is considering a revision to ST 2080-2 to clarify conventions for when line number ranges quoted begin at 0 or 1. This need was discovered during the development of Part 4.

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

New Standard (suite): ST 2094 - Content-Dependent Metadata for Color Volume Transformation of High Luminance and Wide Color Gamut (WCG) Images

[DG Project](#)

This project has developed a suite of standards for specifying the semantics and representation of content-dependent metadata needed for color volume transformation of HDR and WCG imagery to smaller color volumes (e.g. BT.709 or Digital Cinema) in mastering applications.



Document set:

ST 2094-1 Core Components - published

ST 2094-2 Syntax and Carrier - published (developed in a TC-31FS project).

ST 2094-10 Application #1 - published

ST 2094-20 Application #2 - published

ST 2094-30 Application #3 - published

ST 2094-40 Application #4 - published

The Applications reflect the four detailed method disclosures received from Dolby, Philips, Technicolor, Samsung that were sufficiently different to prevent rationalization into a single method.

Status: The work of this group is complete and these TC-10E projects are closed. The DG has been kept open to handle liaisons. There is currently a request for clarification of a parameter in ST 2094-10.

New Recommended Practice: RP 2093 - Television Lighting Consistency Index

[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 pre-FCD-ballot comment resolution and the draft will be updated to reflect the agreed resolution.

New Standard: ST 2100-1 - Definition and Representation of Haptic-Tactile Essence

[DG Project](#)

This project deals with technology to allow a remote viewer to receive and experience not only audio and video, but also the haptic or tactile “feeling” and “impact” of an event, regardless of the transmission means. There is an [associated transport project](#) in TC-32NF.

Status: ST 2100-1 passed DP ballot and is now at ST Audit, closing 26 June 2017.

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: This group is newly-formed and is scheduling its first meeting.

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: This group is newly-formed and did not have a report.

Other TC-10E Business

Projects to revise the following documents will be set up:

- ST 2046-1:2009 Specifications for Safe Action and Safe Title Areas for Television. A project proposal to revise this document for UHD images will be issued.
- RP 2046-2:2009 Safe Areas for Protection of Alternate Aspect Ratios. A project proposal to revise this document for UHD images will be issued.

At this meeting, it was also agreed that EG 2046 and RP 218 (on this topic) would be reaffirmed and stabilized.

[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.

Facility List Management projects

These two projects are being managed in one DG

Revision: ST 430-7 - Facility List Message

[DG Project](#)

The revision will add the Extended Facility List Message with the objective of minimizing changes over current practice, while simplifying extensibility and introducing additional features as required.

Status: The revised document will be published as ST 430-16, so that existing implementations of ST 430-7 are not affected by the extensions. ST 430-16 has just been sent for ST Audit. A cover sheet for the withdrawal of ST 430-7 will be prepared.

New Standard: ST 430-15 - Facility List Message Exchange Protocol

[DG Project](#)

Project scope: Specify a protocol to efficiently publish, retrieve, synchronize and submit aggregate FLM instances over the web, based on current industry practices.

Status: ST 430-15 has just been sent for ST Audit.

Stereoscopic Subtitle / Timed Text projects

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

Revision: ST 428-7 - D-Cinema Distribution Master - Subtitle

[DG Project](#)

This revision results from a request from Japan Digital Cinema Forum (JDCF). The work involves clarification of ST428-7 provisions and revision to better match Japanese content creator requirements.

Status: Some drafting of the ST 428-7 revision has been completed, though it is currently on hold waiting for a JDCF representative to join the DG and approve the changes. A JDCF liaison contact will be identified and the request will be made.



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 has been sent to 21DC Chair for pre-DP review.

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 has been sent to 21DC Chair for pre-DP review.

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

[DG Project](#)

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

Status: This document has been held awaiting comment resolution on ST 428-5 and ST 428-17. Work will resume when the requested UL has been registered.

Business Impact of Stereoscopic Subtitles projects: Compatibility and Interoperability

D-Cinema Operations; Encryption

D-Cinema Crypto Evaluation (FIPS Revisions)

[SG Project](#)

This project examines the impact of changes to the FIPS encryption algorithm (deprecation of old random number generator). Output from this SG initiated the ST 430-1 revision, see below. The SG is considering an expected plan from NIST to declare key transport schemes (such as KDM) that are noncompliant to SP 800-56B as “deprecated” through 2017, and “disallowed” thereafter. Non-compliance will prevent Media Block FIPS certification.

Status: This project has been running since 2013 and has now been made inactive in favor of the SG below.



Compliance to NIST SP800-56B

[SG Project](#)

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

Status: This project was approved 31 May 2017.

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 will be posted for pre-DP review now that its UL register request has achieved Mature status.

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: This project was approved in Q3 2016 and the project scope was clarified at the last TC meeting to indicate that only rates that are standardized today would be in scope (meaning that new JPEG HFR's will not be included). There has been no progress in the last quarter.

Other TC-21DC Business

New Proposed Projects

The following projects were briefly introduced during the TC meeting:

Object Based Audio Essence (OBAE) in Digital Cinema Packaging

Four project proposals have been prepared:

- Immersive Audio Track File
- Operational constraints for track file
- Two documents on communication protocols



Document Proposed for Withdrawal

There is a proposal for withdrawal of ST 428-3: D-Cinema Distribution Master Audio Channel Mapping and Channel Labeling.

Status: A withdrawal ballot is awaited.

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 3: Fingerprint File Binding
- Part x: Engineering Guideline

Status: Parts 1 and 2 are published. The text and graphics of the Engineering Guideline is complete and the EG is being reviewed in the DG. The need for Part 3 is being reconsidered.

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 will develop an open binding technology standard (e.g., watermarks, fingerprints, metadata sidecars, etc.) 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).

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

Drafting Project



EG 2112-2 - Audience Measurement Ecosystem

[Drafting Project](#)

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

[Drafting Project](#)

Planned documents:

RP 2112-11 - OBID Reference Implementation

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

RP 2112-21 - OBID-TLC Reference Implementation

Status: The group has selected a technology for use in Parts 1 and 10. Drafting of Parts 1,2 and 10 is under way with a goal of pre-FCD review by late July 2017.

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, CTA and DVB to update it.

Status: The UHD data has been added in a working draft. Liaisons have been sent to ATSC, CTA and DVB describing this draft's use of previously reserved bits to signal UHD formats and asking if those organizations are aware of any problems, to which they replied that they are not aware of any issues.

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.

New SMPTE 2096 document suite: Digital Cinema Sound System Setup and Calibration (“B-chain Modern Calibration Procedure”)

[DG Project](#)



This group is creating documents that codify and expand currently-practiced measurement methodology using today's technology and analyzers into step-by-step procedure(s) for measuring and calibrating the frequency response and sound pressure levels of the B-chain sound system in indoor theater spaces. A major rewrite was completed and submitted to the DG in early 2015-02. After feedback from the group and potential users of the document, the DG decided to split the work into:

RP 2096-1 Cinema Sound System Baseline Setup and Calibration

RP 2096-2 Cinema Sound System Recurring/Maintenance Setup and Calibration

Drafting work has been completed on the documents.

Status: The two RP's were elevated to DP status by voice vote at the TC meeting.

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 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 document had been completed, awaiting any changes needed as the bitstream specification ST 2098-2 developed. These changes are being incorporated.



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: Drafting work is well-advanced. Input from several trial implementations has been used to add completeness and clarity to the document. There are just a few remaining open topics.

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

[Drafting Project](#)

Status: The document is at FCD ballot, closing 12 July.

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](#)

Status: There is a small amount of drafting work remaining. The project is progressing well.

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

[Drafting Project](#)

Status: The document is still in the drafting stage. It requires reconciliation with 2098-2.

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: Drafting of the SG report is underway, and it has been structured as two consolidated tracks:

- DCP/ Authoring and packaging
- In-theater playback and interoperability

Additional work has been identified and project proposals for TC-21DC prepared.



Other TC-25CSS Business

There has been some delay in preparing a DCP for the ST 2095-1 Calibration Reference Wideband Digital Pink Noise Signal. At the TC meeting, a volunteer stepped up to take over this work.

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 has submitted a [Drafting Project](#) proposal for RP 205 revision for 1 year review and taking account of the ongoing ST 330 update. The project was approved shortly after the TC meeting.

UMID-related Standards

This is a DG managing the following two 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.



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, covering:

- New Material number generation method
- New Instance number generation method
- Source Pack "Where" extension to additionally describe a camera shooting direction

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: This document passed FCD ballot on 13 Feb. 2017 and all 11 comments have been resolved. The document is at pre-DP review, closing 21 June. A small editorial change has been identified.

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 prepared and resolution is underway.

Revision: ST 336 - Data Encoding Protocol Using Key-Length-Value

[DG Project](#)

Revise ST 336 to update references and review whether its provisions reflect current register operation.

Status: The document is at ST Audit, closing 30 June.



Amendment: ST 335 - Metadata Element Dictionary Structure

[Drafting Project](#)

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

Status: The amendment was circulated for pre-FCD-ballot review in June 2016. The project was deferred to the next meeting agenda.

New Standard: ST 2114 - Cinema Content Creation Cloud (C4) ID

[DG project](#)

When using cloud services for storing, processing and exchanging content data, it is essential to identify it in a robust and immutable fashion. Current data identification systems have problems with uniqueness, consistency, usability and security.

Status: ST 2114 was raised to DP status by voice vote at the TC meeting. The group recommends revision of another TC-30MR document, ST 2029.

Revision: RP 2079 - Digital Object Identifier (DOI) Name and Entertainment ID Registry (EIDR) Identifier Representations

[Drafting project](#)

Revision of SMPTE RP 2079:2013 to reflect the recently published IETF RFC 7972, which specifies a URN representation of EIDR Identifiers, and recent improvements to the EIDR online resolution service.

Status: This revised draft document is at ST Audit, closing 2 July.

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 “Brown Sauce”), closed FCD ballot 17 Mar. 2017 and is now at ST Audit, closing 3 July.

The Metadata Registers Development Area is available here: <https://registry.smpte-ra.org/pages/>
An Administrative Guideline (AG18) has been drafted to define the process for adding new UL definitions to the metadata registers and it was posted for comment to the TC during the meeting round.



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.

Other 30MR Business

[ST 2003 Amendment project](#)

A project proposal to correct some details in this standard is awaiting approval. Discussion was deferred to the next TC meeting.

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: The DG has verified that the document's ULs match the UL register. Work is proceeding, but has been temporarily interrupted by illness.



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 has been updated to address comments from the Feb. 2014 FCD ballot that failed numeric consensus. The draft will be prepared for a second FCD ballot.

New Document: ST 381-4 - AAC Family Compressed Digital Audio in MXF

[DG Project](#)

This new MXF mapping document will cover all the variants of AAC that are used in broadcast applications.

Status: ST 381-4 is being prepared for publication.

MXF Timecode Mapping and Labeling

[SG Project](#)

It has been identified that a number of topics on the use of timecodes in MXF require additional guidance or definition. This project will review requirements, existing techniques and documents, and if necessary propose revision or new documents.

Status: The report is published [here](#). The SG has been closed.

New Recommended Practice: RP 2092-2 - Ad-ID Digital Ad Slate for MXF

[DG Project](#)

The group will develop a Recommended Practice, with principal input document being AMWA AS-12 (which this document will ultimately replace). An associated Ad-ID representation project is complete in TC-30MR.

Status: There was no report at this meeting round, but it is understood that there is renewed interest in completing this work. The document passed FCD rebalot on 5 Aug. 2015 with 37 voter comments; all were resolved. Some pre-DP-ballot review comments were received.

New Registered Disclosure Document: RDD 44 - Mapping Apple ProRes into the MXF Generic Container

[Drafting Project](#)

This work is an application document as well as a generic container mapping.

Status: RDD 44 was published in the last quarter. The project will be closed.



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

[Drafting Project](#)

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

Status: This work was deferred in favor of the ST 377-1 project, below.

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: This project will be handled in two phases to separate the amendment roll-up from the other issues. It was agreed that this would be an editorial project to create a stable ST 377-1 and an [additional project](#) introduced to 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 revision passed FCD ballot on 10 May 2017 with one comment on adding a Multi-channel audio ID. The proponent is considering how to resolve that comment.

Revision: ST 381-3 - Material Exchange Format - Mapping AVC Streams into the MXF Generic Container

[Drafting Project](#)

This is a constrained revision to update references and bibliography.

Status: The draft revision passed FCD ballot 10 May 2017 with 3 comments. These comments are now resolved and the document will proceed to pre-DP review.

Revision: RDD 32 - XAVC MXF Mapping and Operating Points

[Drafting Project](#)

A description of the operating points newly added since 2014 is required.

Status: The document is at RDD ballot, closing 13 July.



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, but a revision project (see below) is underway.

Part 2 will cover "External Uses of XML Schema".

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

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

[WG Project](#)

A revision to the Part 1 document was published in the last quarter. The document has been submitted to ISO to be balloted as a Publicly Available Specification.

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 currently stalled due to the loss of the principal document editor.

New document: 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 group has submitted a draft for Pre-FCD-ballot review; the TC Chairs initiated the review after the meeting. It will close 3 July.



**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.

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

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

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 (this will be formatted as a wallchart for the May SMPTE journal)

EG 2111-3 10G-SDI Roadmap

This material will also be presented as an SDI 'Wallchart' in the SMPTE journal – targeting the July issue.

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.

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 UHDTV 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.

Work on RP 2091-2 is underway and it is hoped that the document will be ready for FCD ballot prior to the September 2017 meeting round.

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 will restart meetings around the beginning of July 2017, having been on hiatus to focus effort on the 10E document ST 2100-1 that has now achieved DP status. Two Drafting Projects were set up (both projects are still at the proposal stage):

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

At the Sept. 2015 meeting, it was decided that this group may also define the use of HANC space for carriage.

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

At the Sept. 2015 meeting, it was decided that this group may confine its attention to the use of VANC space for carriage.



New Standard: ST297-2 - CWDM optical interface for multi-link SDI

[DG Project](#)

This project has standardized a Coarse Wavelength Division Multiplex optical interface for multi-link SDI. It was decided that this document should be ST 297-2, with ST 297 renamed to ST 297-1.

Status: ST 297-2 was published Q1 2017. The project included possible additional work but a proponent could not be found and the TC decided to close the project.

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.

Several 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. The Payload ID changes have been agreed with ITU-R SG6, and a liaison statement has been sent to ITU-R.

Status:

ST 372 revision passed FCD ballot 17 May 2017 with 29 comments to resolve.

ST 425-1 revision passed FCD ballot 17 May 2017 with 28 comments to resolve.

ST 2081-10 and ST 2082-10 are being revised in WG 32NF-70; see [below](#).

ST 2036-3 revision in DG for review.

Next up for revision: ST 292-1, ST 425-3, ST 425-5, ST 2081-11, ST 2081-12, ST 2082-11, ST 2082-12

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 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 (FCD balloted)

[Drafting Project](#)

New Standard: Part 20 - Uncompressed Active Video (FCD balloted)

[Drafting Project](#)

New Standard: Part 21 - Timing Model for Uncompressed Active Video (under development)

[Drafting Project](#)

New Standard: Part 30 - PCM Digital Audio (FCD balloted)

[Drafting Project](#)

New Standard: Part 31 - AES3 Transparent Transport (under development)

New Standard: Part 40 - Ancillary Data (under development)

[Drafting Project](#)

New Standard: Part 50 - Interoperation of ST 2022-6 streams (under development)

[Drafting Project](#)

Status: Parts 10, 20, 30 passed FCD ballot 3 Mar. 2017 with 67, 59 and 26 voter comments respectively to resolve. The DG reached consensus on comment resolution for Parts 10, 20, 30 shortly after the last meeting round. The TC was asked to conduct disposition votes on a small number of comments. There was insufficient time to complete this process and an additional TC meeting will be set up.

For Part 21, there are continuing discussions regarding a Network Compatibility Model parameter. Considerable analysis work on streams has been done to guide the choice of values for the parameter.

For Part 40, work is awaiting IETF progress on a draft RFC for ancillary data.

Drafts exist for Parts 31 and 50, but the above Parts have taken precedence.

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

[DG 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.

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[Essence](#) [D-Cinema](#) [TV-Broadband](#) [CinemaSound](#) [Metadata](#) [FileSystems](#) [Network](#) [MediaSystems](#) [MediaPackaging](#)



Status: The WG has reached consensus that the document should be issued for pre-FCD-ballot review. The ultra-low-skew class has been relaxed slightly to deal with a “corner case” that could have caused problems.

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 (TBA). 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. ST 2081-10 and ST 2082-10 have been revised for this addition (see below) and drafting for ST 2081-11, ST 2082-12, ST 2082-11, ST 2082-12 has started.

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, jitter amendment 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](#) has been initiated.

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: [Drafting Project](#) Transport of Multiple 3Gb/s or 1.5Gb/s signals on a 6G-SDI link

Status: ST 2081-30 has completed pre-DP review and a DP elevation ballot will be held (time did not permit a voice vote at the TC meeting).

The one year review revision of ST 2081-10 includes additions to signal HDR/WCG. It passed FCD ballot 21 April 2017 with 30 comments. Comment resolution is underway.

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, jitter amendment underway)

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](#) has been initiated.

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

Status: ST 2082-30 has completed pre-DP review and a DP elevation ballot will be held (time did not permit a voice vote at the TC meeting).

The one year review revision of ST 2082-10 includes additions to signal HDR/WCG. It passed FCD ballot 21 April 2017 with 30 comments. Comment resolution is underway.

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.

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.

The first round of testing was the week of 9 Nov. 2015, hosted by FOX NE&O in Houston, TX. The main



conclusion was that ST 2059-1 and -2 fundamentally work as intended; it was confirmed that goals for Lock Time and Accuracy are achievable.

A second testing round took place in June 2016, again at FOX NE&O in Houston, Texas. This testing round included some tests with AES67 equipment. [Report on this page.](#)

Status: There has been a further interop since the last meeting round, 20-24 March at Fox in Houston. The DG has completed a report from this interop and it is expected to be published in due course.

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 had been waiting 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 first meeting is scheduled for 26 June.

Development of a set 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 as part of the family.

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

Status: At a WG meeting in early June, a decision was taken to request the parent TC to:

- close both existing time label projects (SMPTE 2103 suite and SMPTE 2105 suite)
- archive all documents
- entertain a single proposal to start a new project to create a single new time label (with new documents not copied from the existing ones)

This action followed strong user feedback at the Timecode Summits (report [here](#)) that SMPTE should standardize just one time label format.

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.

Note: The TC-32NF meeting ran out of time before the remaining projects below could be covered. However, presentations for these projects had already been submitted, so the information below is based on those reports.

ST 337 family of documents

[DG Project](#)

Originally, this project was set up to manage individual drafting projects needed to introduce a code-point extension mechanism for documents in the ST 337 family; adding the extension mechanism in ST 337 and adding the extended data types in ST 338 as well as revising or adding any other documents as required. When the extension mechanism was done, the DG was kept open to document other formats for encapsulation in AES3.

Status: The Drafting Projects currently being managed by the DG are:

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[Essence](#) [D-Cinema](#) [TV-Broadband](#) [CinemaSound](#) [Metadata](#) [FileSystems](#) [Network](#) [MediaSystems](#) [MediaPackaging](#)



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. No activity this quarter.

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 were posted in April and June and these were reviewed in DG meetings. There is ongoing discussion.

Flow Control in Professional Media Networks

[SG Project](#)

This SG is investigating current and future professional media network management technologies, determining user requirements, transmission methods for management commands and providing background information. Key Elements in report:

- 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: This report is almost complete. There are just a few continuing discussion topics and it is hoped that these will be completed at the next meeting on 28 Jun. 2017. The report will then just need a couple of meetings for cleaning-up.

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 (in revision for BXF 5.0)

ST 2021-2: Protocol (in revision for BXF 5.0)

EG 2021-3: Use Cases (in revision for BXF 5.0)

EG 2021-4: Schema Documentation (in revision for BXF 5.0)

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

RP 2021-6: BXF SDK Documentation (new document for BXF 5.0)

RP 2021-9: Implementing BXF (in revision for BXF 5.0)

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 4.0.

As work on BXF 5.0 winds down, the group is considering inputs for the next BXF version, 6.0.

BXF 5.0

[DG Project](#)

BXF 5.0 introduces 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 and a new Part 6, were all raised to DP status by voice vote at the TC meeting (now at St Audit, closing 7 July). Note that Part 9 was also



revised for BXF 5.0, but as there were no comments it went straight to ST Audit, closing 26 June.
For BXF 6.0, there have been requests for NABA / DPP work.

Revision: ST2021-1 Broadcast Exchange Format Requirements and Informative Notes

[Drafting Project](#)

Revision: EG 2021-2 - Broadcast Exchange Format (BXF) Protocol

[Drafting Project](#)

Revision: EG 2021-3 - Broadcast Exchange Format (BXF) Use Cases

[Drafting Project](#)

Revision: EG 2021-4 - BXF Schema Documentation

[Drafting Project](#)

New Recommended Practice RP 2021-6: BXF SDK

[Drafting Project](#)

Revision: RP2021-9 - Broadcast Exchange Format (BXF) Implementation

[Drafting Project](#)

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. The TC and HQ will decide the best way forward – another DP ballot or proceed, implementing only editorial comments.

Part 5 [project proposal](#) exists. There has been no recent activity. At an earlier meeting it was identified that there are no standards for RESTful protocol that could be referenced. The group is therefore considering a new approach based on ST 2071-4 that allows for many Interface Definition types to be defined, allowing the market to select the best.

The SMPTE Director of Engineering drew attention to a JT-NM Request for Technology that may be relevant to the ST 2071 group:

[RFT- Industry Standards and Specifications of Control, Connection Management and Discovery and Registration Activity](#)

Business Impact: Interoperable Media Device Control

[Media Packaging and Interchange Committee \(35PM\) chaired by Pierre Lemieux](#)

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 represent multiple high-quality content versions of a finished work destined for distribution channels worldwide. It facilitates predictable inventory 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.

The TC manages new IMF projects directly and its WG 35PM50 manages Sample Material Interchange (including plugfests) as well as IMF document maintenance.

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

[IMF Plugfest Project](#)

The SMI group has held several plugfests. In the last quarter there has been one plugfest, IRT, Munich, in May.

The group is considering a plugfest focusing on OPL and possibly one for Transcoder, though the group is not sure that this should be a SMPTE activity.

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

The WG announced that a related activity has been launched – The IMF Users Group. More information:

<https://imfug.com>



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, 36 issues were recorded; no issues are considered urgent to fix.

Document Maintenance Status

The WG has completed the one-year review revisions (designated "IMF 1.1") of the following core IMF standards:

- ST 2067-2: IMF Core Constraints
- ST 2067-3: IMF Composition Playlist
- ST 2067-5: IMF Essence Component
- ST 2067-20: IMF Application #2
- ST 2067-21: Application #2E. This revision adds support for 4K, Wide Color Gamut (WCG) and High-Dynamic Range (HDR) images.

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 group hopes to start on a new standard defining "Composite Operator" soon. It has identified a small correction needed in Part 101 and the need to support Dynamic Metadata in IMF.

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 draft amendment is at DP ballot, closing 19 June. It is planned that the amendment will be rolled-up as soon as possible by creating a revision project and holding an electronic ballot.

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: A WD has been submitted to the group and it is being developed for pre-FCD-ballot review, expected shortly.

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

[DG Project](#)

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

Status: A WD is expected shortly.

IMF Audio Essence DG

IMF Audio Content and Element Kind Definition

[DG Project](#)

Define controlled vocabulary for Multi channel Audio (MCA) Audio Content Kind and MCA Audio Element Kind as they pertain to IMF.

Status: The group has developed a draft Engineering Report, and the TC agreed that it should be posted for 2 week review (which started the following day, 17 June).

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 DG Chair reported that there have been some major additions to the WD in the last quarter. A DG telecon is planned for the following week, after which it should be possible to estimate when the draft document will be ready for FCD ballot.

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

Status: This is a newly-approved project. A draft document was presented at the TC meeting.



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Other TC-35PM Business

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

Proposed [DG Project](#) (approval period ends 28 June)

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.



SMPTE Standards Publications in the last Quarter

10E Essence:

SMPTE ST 2073-1:2017 (Revision of SMPTE ST 2073-1:2014), VC-5 Video Essence – Part 1: Elementary Bitstream

SMPTE ST 2080-3:2017, Reference Viewing Environment for Evaluation of HDTV Images

20F Film:

21DC Digital Cinema:

24TB Television & Broadband Media:

25CSS Cinema Sound Systems:

30MR Metadata & Registers:

31FS File Formats & Systems:

SMPTE ST 2034-1:2017, Archive eXchange Format (AXF) – Part 1: Structure & Semantics

SMPTE ST 2073-10:2017, MXF – Mapping VC-5 Video Essence into the MXF Generic Container

SMPTE RDD 44:2017, Material Exchange Format – Mapping and Application of Apple ProRes

32NF Network & Facilities Architecture:

34CS Media Systems, Control & Services:

35PM Media Packaging & Interchange:

Element ST 2067-2b-2016.xsd of published SMPTE ST 2067-2:2016



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 **Kavi**.*

*Kavi has a **Project View** that includes a publicly accessible project summary page. It is used to state the project justification 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”.