



SINCE 1916

STANDARDS QUARTERLY REPORT JANUARY 2017

Result of SMPTE®
Standards Committee Meetings
5 - 9 December 2016

Hosted by
The Walt Disney Studios
Burbank, California, USA

THE NEXT CENTURY



Society of Motion Picture and Television Engineers®

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SMPTE® Standards Quarterly Report, December 2016, Page 1

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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

5 - 9 December 2016

Burbank, CA, USA

Hosted by Disney

Nine SMPTE Technology Committees and 17 subgroups scheduled meetings at this round.

Around 90 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 over two hundred active projects can be found in the [detailed account](#), below.

New Projects that began in the last quarter

Amendment to ST 428-12: D-Cinema Distribution Master Common Audio Channels and Soundfield Groups to add Immersive Audio formats [Details](#)

Amendment to RP 428-4: D-Cinema Distribution Master — Audio File Format and Delivery Constraints Update [Details](#)

Study Project on Digital Cinema Encryption NIST SP800-56B Compliance [Details](#)

New Engineering Guideline: Open Binding of IDs - Audience Measurement Ecosystem [Details](#)

Immersive Audio Implementation Study Group [Details](#)

Revision of RP 2079:2013 Digital Object Identifier (DOI) Name and Entertainment ID Registry (EIDR) Identifier Representations [Details](#)

New Standard: Cinema Content Creation Cloud (C4) Identification (ID) System [Details](#)

Constrained revision of SMPTE ST 381-2:2011 Material Exchange Format (MXF) — Mapping MPEG Streams into the MXF Constrained Generic Container [Details](#)



Constrained revision of SMPTE ST 381-3:2013 Material Exchange Format—Mapping AVC Streams into the MXF Generic Container [Details](#)

Revision of ST 2022-7: Seamless Protection Switching of SMPTE ST 2022 IP Datagrams [Details](#)

ST 2081-10 6G-SDI Mapping 1 year review [Details](#)

ST 2082-10 12G-SDI Mapping 1 year review [Details](#)

New Standard: Multi-Dimensional Audio over AES3 using ST 337 [Details](#)

New Standard: IMF ACES Application [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. It will also define a separate Ancillary Data packet for additional signaling information. [Details](#)

Content-Dependent Metadata for Color Volume Transformation of High Luminance and Wide Color Gamut (WCG) Images

This SMPTE project defining “dynamic” metadata is almost complete. Five parts of the six-part suite (ST 2094) are published – one part on core components, plus four parts documenting individual application schemes; these projects will be closed [Details](#). The remaining part on KLV Encoding and MXF Mapping has reached Draft Publication status. [Details](#)

Other HDR/WCG/EOTF work

Still relevant, the SMPTE Study Group on the HDR Imaging Ecosystem released its report in Oct. 2015 and it is available [here](#).

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](#)



A project is underway to create a profile of the DPX file format standard (ST 268) to carry HDR / WCG.

[Details](#)

A project to amend ST 2084 High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays will begin shortly.

Professional Media over IP

IP Media Inter-Networking with Separate Essence Flows

This project is developing a suite of standards defining 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 – were posted for pre-FCD-ballot review and the majority of comments received have been resolved.

[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 beyond just the topic of the various techniques for switching media streams. [Details](#)

Network-Based Synchronization for the Professional Media Environment

Two key documents defining a system for using media synchronization packets on an information technology (IT) network were published in 2015:

- Precision Time Protocol SMPTE Profile for Time and Frequency Synchronization in a Professional Broadcast Environment (ST 2059-2) defines the behavior of the master.
- The SMPTE Epoch and Generation and Alignment of Interface Signals (ST 2059-1) defines the behavior of slaves, allowing them to create any synchronized video, audio or time code signal.

There are continuing projects in support of these standards:

- 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 are about to start.

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](#)



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 targets UHD applications and multi-stream HD applications. [Details](#)
- Projects defining ruggedized optical SDI connectors [Details](#) and coarse wavelength division multiplexing for SDI interfaces [Details](#).
- There is an SDI interfaces Working Group that is managing a number of other SDI projects [Details](#)

Time Labels

SMPTE “Time Code summits” were held in Hollywood, London, New York in the last quarter 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 may affect two current projects defining Time Labels:

- A four-part “Generic Time Label” suite.
 - A nine-part “Full-featured Time Label” suite
- [Details of these projects](#)

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. [Details](#). A part of the suite that defines VC-5 mapping in the MXF Generic Container is being reviewed prior to Draft Publication ballot. [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](#)

The following video compression projects recently completed their work:

- A Registered Disclosure Document (RDD 35) on the IntoPIX TICO lightweight codec.
- Amendments to a suite of documents defining the VC-3 compression system to add image resolution independence and some other improvements (ST 2019 suite).



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 standard “Calibration Reference Wideband Pink Noise Signal and Test File.” The document is published and a DCP (Digital Cinema Package) is being produced. The aim is to have a consistent pink noise signal for theater 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](#)

Digital Cinema (D-Cinema)

This TC has published three multi-part document suites dealing with the topics D-Cinema Distribution Master, D-Cinema Packaging and D-Cinema Operations.

Current projects 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

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 this suite of standards or creating constraints for improved interoperability in a variety of application areas. There are currently eight MXF projects in process with four more in the pipeline. [Details](#)



SMPTE® Standards Quarterly Report: Detailed Account

As a result of SMPTE Standards Committee Meetings

5 - 9 December 2016

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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 6 - 10 March 2017 in Altera, San Jose, California, USA and will be hosted by Altera/Intel.

Further quarterly Standards meeting rounds are planned for:



13 – 16 June 2017

20 – 23 Sept. 2017

4 – 8 Dec. 2017

Shanghai Media Group, Shanghai, China

British Telecom, Ipswich, UK

Arista, Santa Clara, California, USA

In addition to the meetings of SMPTE Technology Committees (TCs) and their sub-groups, detailed below, some updates to the suite of SMPTE Administrative Guidelines were explained.

There was also a short report on the Joint Task Force on Networked Media and the series of Time Code Summits that were held in the last quarter.

This Quarterly Report provides a detailed account of the meetings of the following 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 Annie Chang

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 planned document suite comprises:

- ST 2073-1 - VC-5 Elementary Bitstream (Published Q2-2014)
- RP 2073-2 - VC-5 Conformance Specification (Published Q2-2014, in revision to cover additional Parts; only Part 6 left to do) 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).

Status: Parts 1-4 are published, but Part 2 is being further revised to add test materials to support content defined in Parts 5 and 6 (which are ready for publication when Part 2 is ready). Also, minor revision to Part 1 for one-year review has been completed and pre-FCD ballot review is underway.

The test materials that form “elements” of Part 2 are also ready, though the group has decided to create better scripts to automate testing. 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.



A Part 0 overview document is in the SMPTE store.

Work on an MXF wrapper for VC-5 is progressing in [TC-31FS](#).

The VC-5 group is holding joint TC-10E and TC-31FS 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). Further development of VC-2 has recently been rationalized into one drafting group with the following projects:

Revision of ST 2042-1: VC-2 Video Compression Standard

[DG Project](#)

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

Status: Part 1 pre-FCD ballot review is complete, and the DG is addressing comments.

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

[DG Project](#)

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

Status: Part 2 revision drafting is well-advanced, but no progress in the last quarter.

Revision of 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.

Revision of SMPTE RP 2047-3: VC-2 Level 65 Compression of High Definition Video Sources for use with a Standard Definition Infrastructure

This project is closed as the document was published 2016-Q3.

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 UHD TV video to be compressed to the same bit rates as those of uncompressed HDTV signals.



Status: Part 5 pre-FCD ballot review is complete, and the DG is addressing comments.

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-x: Engineering Guideline to provide context and background

Status: Part 1 and Part 2 have been published (and will soon require their one-year review).

Part 3 passed FCD ballot on 12 June 2015 with 13 comments that have now been resolved. The revised draft is ready for pre-DP review. In the course of this work, it has been identified that a separate new RP on with more detail on display surround is needed and it is proposed that the project scope be extended to include this.

The Part 4 text is complete and the test patterns are approaching completion. The DG expects to be able to submit the WD for pre-FCD comment in early January with a goal to complete FCD ballot before March.

Work on drafting the EG will start after ST 2080-3 is at DP and RP 2080-4 is past FCD comment.

The DG has also requested TC-10E to consider extending the scope of the DG to include HDR and WCG and UHDTV.

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 is developing 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.

Current document set:

ST 2094-1 Core Components - published

ST 2094-2 Syntax and Carrier - being 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

This reflects the four detailed method disclosures received from Dolby, Philips, Technicolor, Samsung that are considered sufficiently different to make it impossible to rationalize into a single method.

Status: It was agreed that the work of this group within TC-10E is complete and that these TC-10E projects will be closed. The DG will be retained to finish off activities such as drafting the overview document for the suite and handling liaisons.

New Document: 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 has been working on comment resolution from a draft document that was circulated earlier in the year for pre-FCD ballot review. The FCD ballot goal is March 2017.

New Document: 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: The document was at FCD ballot at the time of the meeting. The ballot had been extended from 3 weeks to 5 weeks as numerical consensus had not been achieved after 3 weeks.

New Document: RP 219-2 - UHD TV Color Bar Signal



DG Project

RP 219-2 will specify the parameters needed to apply color bars to UHD TV and 2k, 4k production image formats (per ST 2048-1). It will scale the spatial parameters from those of the HDTV pattern, RP 219-1. The intent is to have a test signal for use on interfaces, not to design the best possible test signal for critical examination of the production chain.

Status: The document is published and the project closed.

Other TC-10E Business

The following documents are being considered for revision (from 1 and 5 year review process):

- ST 2084:2014 High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays
- ST 2086:2014 Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut Images
- ST 2046-1:2009 Specifications for Safe Action and Safe Title Areas for Television
- RP 2046-2:2009 Safe Areas for Protection of Alternate Aspect Ratios

There was an AHG meeting to discuss the need for Test Patterns for HDR Systems. The AHG will be set up to continue discussions through to the March 2017 meeting round.

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 CinemaCon conference in Las Vegas, March 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 of 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 document passed DP ballot on 21 November 2016 and will be submitted for ST Audit. The revised document will be published as ST 430-16, so that existing implementations of ST 430-7 are not affected by the extensions. However, there was a question about correcting ST 430-7 for a “trailing slash” error in namespace; it was confirmed that this correction will be applied to ST 430-7.

New Document 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: The document passed DP ballot on 21 November 2016 and will be submitted for ST Audit. A late comment identified an incorrect reference to ST 430-7 and this was corrected to ST 430-16. A second DP elevation vote was held to approve this correction; the vote passed.

Stereoscopic Subtitle / Timed Text projects

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

Revision of 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 awaiting completion of liaison with JDCF.

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: This XML constraints document is at pre-FCD ballot review, closing 19 Dec. 2016.



Revision of 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: The document passed FCD-ballot 16 Feb. 2016 with 16 comments to resolve. Comment resolution is in process.

Revision of 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: There was some further editing of the revised draft this quarter. It will be sent for pre-FCD ballot review when the ST 429-5 and ST 429-17 have got through ballot comment resolution.

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 to consider the implications of the NIST changes.

[SG Project](#)

This is a new project proposal, yet to be approved. It has more specific tasks than the SG project above and the detail was still being refined at the TC meeting (it was originally proposed as a DG, but the meeting resolved that it should be an SG).

Revision of ST 430-1: D-Cinema Operations - Key Delivery Message

[DG Project](#)

This project will amend ST 430-1 to support delivery of MIC (Message Integrity Code) payloads in KDMs and cryptographic keys for AuxData essence.



Status: The ST 430-1 revision closed ST Audit 9 August 2016. There was a problem with a normative reference date that has been corrected and a comment period on the revision is underway, closing 20 Dec. 2016 .

Revision of ST 430-2: D-Cinema Operations - Digital Certificate

[DG Project](#)

This project will amend ST 430-2 to allow devices to identify their ability to process MIC payloads in KDMs (as required by the ST 430-1 revision).

Status: The ST 430-2 revision closed ST Audit 9 August 2016. There was a problem with a normative reference date that has been corrected and a comment period on the revision is underway, closing 20 Dec. 2016 .

Amendment to 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 FCD ballot on 2 Sept. 2016 with 8 comments to resolve. All comments are addressed; 3 are accepted, 5 are pending.

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). The WG Chair expects to restart this work early in the New Year.

Other TC-21DC Business

New Proposed Projects

The following projects were briefly introduced during the TC meeting:

Amendment to ST 428-12: D-Cinema Distribution Master Common Audio Channels and Soundfield Groups

[DG project](#) to add Immersive Audio formats



The project proposal has the following explanation:

With the advent of multiple immersive audio systems and immersive audio creation and deliveries for each system to theaters, a method is needed to unambiguously label the additional Audio Channels and potentially define and label immersive Soundfield Groups that could be carried in an immersive audio DCP, and there is currently no standard that does this. ST 428-12 specifies these for “common” theatrical Audio Channels and Soundfield Groups (e.g. 5.1, 7.1), so it follows that it should be amended to specify the additional ones currently in use for immersive audio.

In addition, since ST 2067-8 normatively references ST 428-12, IMF content creators and equipment manufacturers would also see benefit from this work, as IMF moves toward carrying immersive audio.

Amendment to RP 428-4: D-Cinema Distribution Master — Audio File Format and Delivery Constraints [DG project](#)

The project proposal has the following explanation:

ST 428-4 has been found to have some ambiguities involving Audio Content and Audio Type that should be rectified. It also normatively references ST 428-3, which is being withdrawn, and has terminology whose definitions reference ST 428-3.

Tracking Project for ST 430-4:2008, ST 430-7:2008, ST 430-9:2008 and ST 433:2008 “trailing slash” amendments/revisions

[DG project](#)

The project proposal has the following explanation:

A recent audit discovered that amendments to ST 430-4:2008, ST 430-7:2008, ST 430-9:2008 and ST 433:2008, all of which had passed ST ballot in 2012, had not been published at that time.

Although they are technically approved for publication, enough time has passed that it makes sense for the TC to review these documents prior to publication.

Document Proposed for Withdrawal

As referenced in the ST 428-4 proposed project above, there is a proposal for withdrawal of ST 428-3: D-Cinema Distribution Master Audio Channel Mapping and Channel Labeling.

The proposal was explained and there was a vote to proceed with a withdrawal ballot.

Object-based Audio Essence Packaging

There was a request that TC-21DC start a group to research what work is needed to wrap/package this essence. The topic will be discussed at the next TC-21DC sub-group drafting day.



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.

New 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 (this can currently be done using ST 2038:2008 Carriage of Ancillary Data Packets in an MPEG-2 Transport Stream; it is not certain whether Part 3 will be developed)
- Part x: Engineering Guideline

Status: Parts 1 and 2 are published. The Engineering Guideline is close to being ready for pre-FCD ballot review.

Business Impact: Improved quality of experience and interoperability between systems

New SMPTE 2017 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 is 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)” and it issued a Request for Proposals. The group has developed a Self-Assessment Test Plan.

Planned documents:

ST 2017-1 Open Binding of IDs (OBID)

ST 2017-2 Open Binding of Distributor IDs and Time Labels to Content (OBID-TLC)

RP 2017-3 Audience Measurement Using OBID and OBID-TLC (this document is US-centric)

EG 2017-4 Audience Measurement Ecosystem (project proposal [here](#))

Status: The group’s work is currently in the testing phase (both subjective testing and robustness testing). A technology evaluation / selection session will be held 9-10 Feb. 2017. Work on drafting RP 2017-3 and EG 2017-4 has progressed well. Drafting ST 2017-1 and ST 2017-2 will start after technology selection.



Revision of ST 2016-1: AFD and Bar Data

[DG Project](#)

ST 2016-1 does not include UHD formats. SMPTE has been requested by ATSC, CTA and DVB to update it.

Status: Revision is underway; most items are completed.

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 Co-Chair

It was announced that Engineering Vice-President Alan Lambshead has appointed Bill Redmann to assume the co-chairmanship role from Kurt Graffy. Brian Vessa will continue on as co-chair for 2017.

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. The DG recently 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

EG capturing the work done in this group as a knowledge document

Status: The two RP’s were submitted to the TC for pre-FCD-ballot review on 6 Dec. 2016. The group has decided that the EG is unnecessary at this time. The final output of this group will be RP 2096-1 and RP 2096-2.



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.

A suite of documents is anticipated.

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

New Standard: ST 2098-2 Immersive Sound Model and Bitstream

[DG Project](#)

This group's initial focus was on draft standard ST 2098-1: Metadata Definitions in this [project](#). Work is now underway on an interoperable Bitstream Specification based on this metadata. Input documents have been submitted, including Dolby Immersive sound bitstream, DTS MDA Bitstream, a Dolby Lossless Audio codec and a proposal from Blue Ripple Sound. The Blue Ripple Sound document was selected in October 2015 as the basis for the first draft. However, at a TC meeting in July 2016, this decision was changed to use the Dolby input document as the starting point for ST 2098-2 and the project scope was revised.

Status: The group has completed its Metadata Specification Working Draft; it is being held from progressing to Committee Draft pending harmonization with the Bitstream Specification and Renderer EG and RP work. The Bitstream specification is nearing completion.

Digital Cinema Immersive Audio Renderer

[DG Project](#)

This project currently has the following two document drafting projects:

EG 2098-3: Immersive Audio Renderer Behavior

[Drafting Project](#)

Status: The draft EG has been drafted, and is under final review by the DG.

RP 2098-4: Immersive Audio Renderer Testing



Drafting Project

Status: An initial draft document has been completed and the DG began it's thorough review in early December.

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 additional work that is needed.

Status: The SG was approved 21 Nov. 2016. It is planned to divide the work into three sub-groups:

- Post Production Workflow and Tools Implementation Requirements
- Distribution Requirements
- Exhibition / In-theater requirements

The Study Group will commence work during a kick-off meeting on December 19.

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. Note that another project in this set, revision of RP 205, has published and that DG is disbanded.

Application of the Unique Material Identifier (UMID)

SG Project

The UMID is standardized in ST 330. RP 205 covers application of UMIDs in Production and Broadcast Environments. This SG studied ways to make the UMID more useful, resulting in a report available [here](#) and revision to RP 205 as well as proposing the UMID projects below. The SG remains open to provide assistance to the other UMID project groups and to review any new work items.

Status: The SG is preparing for RP 205 one-year review. A project to cover this work will be requested at the March 2017 plenary.



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 of 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 draft revision has been submitted to the UMID Related Standards DG. A further draft is planned, proposing new technology.

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 DG has addressed all comments from the pre-FCD-ballot review and the draft document will be posted for FCD ballot.

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. Comment 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 passed FCD-ballot 10 Sept. 2016 with 6 comments to resolve and some late comments. A comment resolution draft will be submitted to the DG early in the New Year.

Amendment of RP 2092-1: Advertising Digital Identifier (Ad-ID®) Representations

[DG Project](#)

This amendment corrects errors found in sections 2.1, 2.2, 2.3, 2.4

Status: The amendment passed DP elevation ballot on 2 Nov. 2016 . There was no status report at the meeting.

Amendment of 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. There has been no progress since, possibly in view of the need to revise all the register controlling standards (see WG below).

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

[Drafting 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: The project was approved in the last quarter and has made significant progress. It expects to submit the draft standard for pre-FCD-ballot review in Jan. 2017.

Revision of 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 project was inadvertently omitted from the agenda as it only completed approval 1 Dec. 2016. A draft revision has been submitted to the TC Chairs for pre-FCD-ballot review.



Metadata Definition

WG Project

This Working Group (30MR10) co-ordinates a number of DG projects for adding or maintaining metadata items in registers. Because the registers are updated frequently, a version number identifies each revision.

Experts within the WG have been working on a cleanup of the register data, in particular the removal of redundancy. Registers are now maintained and balloted in xml format, instead of spreadsheets that 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 four registers in xml form (for the first time) are published on smpte-ra. The call to publish the next versions of the registers closed 29 Sept. 2016 and the next FCD ballot should be held shortly. The Metadata Registers Development Area is available here: <https://registry.smpte-ra.org/pages/>

Create and Update Essence Element Register Contents

[DG Project](#)

The group will create a register of 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](#)

Approval of this amendment project has been deferred with the agreement of the proponent.

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 work will be completed when the next registers ballot has been held.

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 document has been updated to address comments from the Feb. 2014 FCD ballot that failed numeric consensus.

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: The draft document failed FCD ballot through lack of numeric consensus on 23 Oct. 2015. It had 11 comments to resolve. All comments have now been resolved and a revised registers request has been submitted. When the status of that request is made "mature", the document will go for a 3-week FCD ballot.

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 draft SG report will be submitted to the SVP for approval of publication. The title will be improved to emphasize that it is dealing with current practice and does not cover future time label formats.



New Document: 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. 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 Standard ST 2073-10: VC-5 Mapping into the MXF Generic Container

[DG Project](#)

This project creates a standard for mapping a VC-5 bitstream into the MXF Generic Container, supporting the VC-5 Image work in [TC-10E](#).

Status: The draft Standard completed pre-DP-ballot review some time ago. The register application has reached “mature” status and ST 2073-10 has been submitted for a second pre-DP ballot review.

New ST 2094-2: Dynamic Metadata for Color Volume Transformation – Encodings

[DG Project](#)

Status: The document passed FCD ballot 8 August 2016 with 16 comments, now all resolved. At this meeting round, a vote was held to raise the document to DP status. The vote passed. The other 5 parts of the ST 2094 suite are all published (work in [TC-10E](#)).

New 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: The draft document is at RDD ballot, closing 26 Dec. 2016.

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

[WG Project](#)

The Part 1 document is published. However, initial implementation work has shown up some inconsistencies between the prose and the XSD file and a revision project has been started.

Revision Project Status: The revised draft Standard passed FCD ballot on 14 Nov. 2016 with 6 comments that have now been resolved.

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: The group has a new xml resource and is accumulating the elements to include in the standard.

New document: Constrained Application of ST 268:2014 - HDR DPX

[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 is to be a new engineering document and not a revision of ST 268.

Status: The group has worked through several iterations of the document. It was decided at the TC-31FS meeting that the constrained application document should be ST 268-2.

Other TC-31FS Business

Some new project proposals are about to be submitted for approval:

Revision of ST 377-1:2011, Television - Material Exchange Format (MXF) - File Format Specification (and Amendments)

[Proposed Project](#) Definition of “backwards compatible” was added to the project.



Constrained revision of SMPTE ST 381-2: 2011 Material Exchange Format (MXF) — Mapping MPEG Streams into the MXF Constrained Generic Container

[Proposed Project](#)

Constrained revision of SMPTE ST 381-3:2013 Material Exchange Format—Mapping AVC Streams into the MXF Generic Container

[Proposed Project](#)

Constrained revision of SMPTE ST 2057:2011 Text-Based Metadata Carriage in MXF

[Proposed Project](#) Rolling up amendment & checking Normative References

A presentation on good practice for TC-31FS submissions to the TC-30MR UL process was given.

[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 SMPTE 2076: Stereoscopic 3D (S3D) Production Timing and Synchronization

[DG Project](#)

The suite of four documents that were FCD balloted (ST 2076-1 Camera Systems, ST 2076-2 Live Production Systems, ST 2076-3 Physical Layer for Video Transport, EG 2076-4 Physical Layer and System Guidance) have been reorganized in line with ballot comments as:



RP 2076-1, "Production Timing and Synchronization – for S3D or Multi-View Camera Systems"

EG 2076-2, "Synchronization for Stereoscopic 3D (S3D) or Multi-view Images- Alignment, Transport and System Guidance".

Status: Both documents RP 2076-1 and EG 2076-2 are published and the project will be closed.

New Document: EG 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: The group has decided that rather than producing an EG, it will create at least 2 posters - one containing 1.5G, 3G, 6G, 12G and proposed 24G standards, the other containing all of the 10G standards.

Revision of EG 34: Pathological Conditions in Serial Digital Video Systems and Revision of 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 WG resolved a point of disagreement - whether only flat-fields/frames are permitted or non flat-fields/frames; it was decided that non flat-fields/frames are permitted. Drafting will be completed on this basis.

New Document: ST 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 passed DP elevation ballot on 29 Nov. 2016. It will be posted for ST Audit. Work will start on the RP.



New ST 2100 Suite: Transport of Haptic-Tactile Essence

[DG Project](#)

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

Status: This group has been on hiatus for a year to focus effort on the 10E project, whose FCD rebalot is about to close.

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 will standardize 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 elevated to DP status by a vote at the TC meeting. It will be posted for ST Audit.

New Standard: HDR and WCG Signaling on Streaming Interfaces

[DG Project](#)

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

It is expected that SMPTE interface standards will require amendment as part of this work.

Status: The DG has achieved consensus on a plan to put static signaling parameters in the Payload ID (ST 352), and all other HDR-related metadata in a **new** separate ANC packet. The bit assignments for the Payload ID parameters are in alignment with the ITU-R proposed HDR / WCG PID assignment for BT.2077-1.

Project statements have been prepared for revision of the applicable SDI interface standards in both the 32NF70 UHD-SDI WG and the 32NF40 SDI mapping WG.



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 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 Document: Part 10: System Timing and Definitions

[Drafting Project](#)

New Document: Part 20: Uncompressed Active Video

[Drafting Project](#)

New Document: Part 21: Compressed Active Video (currently a suggested additional part)

New Document: Part 30: PCM Digital Audio

[Drafting Project](#)

New Document: Part 31: Full AES3 Transport (currently a suggested additional part)

New Document: Part 40: Ancillary Data

[Drafting Project](#)

New Document: Part 50: SDI as an Essence (SMPTE 2022-6 transport)

[Drafting Project](#)

Status: Initial drafts for all Parts above except provisional Parts 21 and 31 have been submitted. Parts 10, 20, 30 have gone through pre-FCD-ballot review. Most comments are resolved, there are just a few outstanding issues. The “goal” is to submit all three parts for FCD ballot within the next few weeks.

Revision of ST 2022-7: Seamless Protection Switching of SMPTE ST 2022 IP Datagrams

[DG Project](#)

This revision will add an "Ultra-Low-Skew" mode to ST 2022-7 to meet LAN use-case requirements

Status: This new project was approved 1 Nov. 2016. It is a straightforward addition of a Class “D” to the skew specification table.



Other 32NF60 business

Arising from 5 year reviews, the WG is considering revision to ST 2022-6 Transport of High Bit Rate Media Signals over IP Networks (HBRMT) and ST 2022-5 Forward Error Correction for Transport of High Bit Rate Media Signals over IP Networks (HBRMT) to take account of additional SDI interfaces (e.g. 6 and 12 Gb/s, see below).

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.

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. Note that 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.

Amendments to correct the jitter specification in ST 2081-1 and ST 2082-1 published in the last quarter.

New 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 underway)

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 passed FCD ballot on 5 Dec. 2016 with 7 comments to resolve. The comments have been addressed.

The one year review revision of ST 2081-10 will be posted for pre-FCD-ballot review.

There are also 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: Transport of Multiple 6Gb/s, 3Gb/s or 1.5Gb/s signals on a 12G-SDI link

Status: ST 2082-30 passed FCD ballot on 5 Dec. 2016 with 12 comments to resolve. The comments have been addressed.

The one year review revision of ST 2082-10 will be posted for pre-FCD-ballot review.

There are also 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.

Status: The JT-NM task force held additional interop testing in August 2016 with an expanded scope of testing IP media transport and IP discovery and registration (AMWA IS-04), as well as PTP. The results from this testing were demonstrated at the IBC Interop Zone. A demonstration of the PTP interop was also given at the SMPTE Annual Technical Conference in October.

Release of the June PTP interop report was discussed at the WG meeting. It was realized the report needs vital context for people to understand it properly and it is proposed that the DG Chair will deliver the report in a SMPTE webinar and that a recording of the webinar be made public.

Development of a set of synchronization Engineering Guidelines

[DG Project](#)

This group facilitates 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.

Status: There are four EG drafting projects, see below. Participants in the Interop tests have expressed a desire for more guidance in the form of these EGs.

New Document: 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 Document: EG 2059-11 – Management of Time Discontinuities

[Drafting Project](#)

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

New Document: 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 Document: 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

[DG Project](#)

This project facilitates development of documents on Time Labeling – see projects below.

Status: There are currently three projects managed by this group. Two projects – the Generic Time Label (GTL) and the Time Related Label (TRL) are developing labels whose data structures are not compatible.

At the June 2016 WG meeting, it was agreed that “Time Labels Summits” would be held to gather user requirements (and help to decide whether either of the proposed time labels meet the requirements of the user community). Summits were held in Hollywood, London and New York City in October / November 2016.

A report from these summits has been produced and it is being studied by the WG. A WG telecon will be scheduled for early Jan. 2017 to work out the best way forward for Time Labeling.

SMPTE 2103 Suite: Generic Time Label

[Drafting Project](#)

The following suite of documents closed FCD ballot 21 Sept. 2015:

ST 2103-1: Generic Time Label - Data Definition (passed)

ST 2103-2: Generic Time Label - Transmission in Ancillary Data Space (passed)

ST 2103-3: Generic Time Label - Character Representation (failed on numeric consensus)

RP 2103-4: Generic Time Label - Interoperation with Time and Control Code (failed on numeric consensus)

RP 2103-5: Generic Time Label - Time and Date Calculations (failed on numeric consensus and now dropped from the suite)

Status: The proponent has reconsidered the best form for this label since the ballot and has submitted details of a “v2” label. Data now consists of ISO 8601-like fields (Year-Month-Day) Hour:Minute:Second.fractionalsecond.

SMPTE 2105 Suite: Time Related Label (TRL)

[Drafting Project](#)

The current suite comprises:

EG 2105-1: Time Related Label (TRL) – Ecosystem

RP 2105-2: Time Related Label (TRL) – Terms and Definitions

ST 2105-3: Time Related Label (TRL) – Date, Time and Media Counts

ST 2105-4: Time Related Label (TRL) – Data Objects and Container Structure



ST 2105-5: Time Related Label (TRL) – Data Format Conversions

ST 2105-6: Time Related Label (TRL) – Character Format (TCF)

ST 2105-11: Time Related Label (TRL) – Ancillary Data Mapping

ST 2105-21: Time Related Label (TRL) – Legacy Timecodes

RP 2105-31: Time Related Label (TRL) – Profiles

Status: The TC conducted a two-week pre-FCD ballot review for this suite of documents earlier in 2016 and some of the draft documents were updated.

RP 2104 Suite: 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.

Other WG 32NF80 Business

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

A project and DG to undertake this effort will be set up. The DG will decide what needs to be updated and in which document.

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.

Now that the extension mechanism is done, the DG is being used to document other formats for encapsulation in AES3.

Status: A number of completed projects in this DG will be closed. The Drafting Projects currently being managed by the DG are:

New document 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 has been submitted to the DG.

New Standard ST 2106: DTS Audio over AES3

[Drafting Project](#)

Status: This document was published in Sept. 2016 and the project will be closed.

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.

New document Audio Metadata over AES3

[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: A new WD document was reviewed in the DG in Oct. 2016. The next meeting is expected early 2017.

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 SG has held five meetings in the last quarter. The report is about 80% complete and needs the insertion of User Survey response summaries. The work has suffered a small interruption while a new Chair was found for the SG.

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 2021-9: 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 4.0 (recently published, as noted above).

As work on BXF 5.0 winds down, the group will be 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: The following items are complete:

- Program Synopsis Support
- QC Node
- Point of Interest
- Graphics Slate Template Support
- Various small improvements

In progress:

NABA DPP Content Delivery Specification Schema

- There has been additional work to incorporate input from EBU QC project (to avoid possible incompatibility later)

BXF SDK – new document (2021-6) drafted (project below)

The goal is to get documents into pre-FCD-ballot review by early Q1 2017.

New Recommended Practice RP 2021-6: BXF SDK

[Drafting Project](#)

For BXF SDK documentation as part of BXF 5.0.

Status: The SDK has been posted to the DG and a few minor fixes have been identified. It was proposed in the TC meeting that the SDK should be posted to bitbucket to control the development.

BXF Schema Documentation

[Drafting Project](#)

Revise EG 2021-4 document to incorporate BXF 5.0 updates

Status: There was no specific update

Media Device Control over IP

[DG Project](#)

This project is developing 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:

Parts 1-3 are revisions of the published documents.

Part 1 and Part 2 revisions were published in last quarter.

Part 3 revision and Part 4 were elevated to DP status by vote at the TC meeting.

Part 5 [project proposal](#) exists. However, 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.

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 and its WG 35PM50 manages Sample Material Interchange (SMI, which includes plugfest activities) 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 was a plugfest at Fox Los Angeles, 30 Nov. – 1 Dec. Another plugfest is planned for 15 Feb. 2017.

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



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, 25 issues were recorded.

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.

New Project: 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 Working Draft completed pre-FCD-ballot review and the document is being prepared for FCD ballot.

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: A Working Draft is being developed and should be made available to the DG late Dec. 2016.



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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 group has been working on requests to TC-30MR for UL's. It is making good progress.



SMPTE Standards Publications in the last Quarter

10E Essence:

SMPTE RP 219-2:2016, Ultra High-Definition, 2048 × 1080 and 4096 × 2160 Compatible Color Bar Signal

20F Film:

None

21DC Digital Cinema:

None

24TB Television & Broadband Media:

None

25CSS Cinema Sound Systems:

SMPTE RDD 41:2016, MDA D-Cinema Application

SMPTE RDD 42:2016, MDA Program Specification

SMPTE RDD 43:2016, MDA Bitstream Specification

30MR Metadata & Registers:

None

31FS File Formats & Systems:

SMPTE ST 2065-5:2016, Material Exchange Format – Mapping ACES Image Sequences into the MXF Generic Container

SMPTE ST 2042-4:2016, Mapping a VC-2 Stream into the MXF Generic Container

32NF Network & Facilities Architecture:

SMPTE RP 2076-1:2016, Production Timing and Synchronization for Stereoscopic (S3D) or Multi-Camera Array

SMPTE EG 2076-2:2016, Image Identification, Alignment, Transport and System Guidance for Stereoscopic (S3D) or Multi-Camera Array

SMPTE RDD 40:2016, Essence-independent IP Live Networked Media Transport

Amendment 1:2016 to SMPTE ST 2081-1:2015, 6 Gb/s Signal/Data Serial Interface – Electrical – Amendment 1

Amendment 1:2016 to SMPTE ST 2082-1:2015, 12 Gb/s Signal/Data Serial Interface – Electrical – Amendment 1



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34CS Media Systems, Control & Services:

None

35PM Media Packaging & Interchange:

None



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

There may be proposals to Revise or Amend documents, or they may be reaffirmed, made stable or withdrawn.

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” with the project title.