SMPTE
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STANDARDS QUARTERLY REPORT MARCH 2017

Result of SMPTE®
Standards Committee Meetings
6-10 March 2017

Hosted by
Intel Corporation
San Jose, California, U.S.A.

THE NEXT CENTURY

Thanks to our Sponsor for making the March Technology Committee Meetings Possible:

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
6-10 March 2017
San Jose, CA, USA
Hosted by Intel/Altera

Nine SMPTE Technology Committees and 15 subgroups scheduled meetings at this round.

Around 60 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

Revision of Multiple Transport Documents *to incorporate Payload ID for HDR* DG Project Details

Revision of ST 2081, ST 2082 Transport Documents *to incorporate Payload ID for HDR* DG Project Details

Revision of RDD 32:2014 - XAVC MXF Mapping and Operating Points *to include newly-added Operating Points* DG Project Details

New Standard: OBID - Open binding technology for persistent content identification in A/V essence DG Project Details

New Standard: OBID-TLC - Open binding technology for binding of distribution IDs and time labels DG Project Details

Constrained revision of ST 377-1:2011 – MXF *to incorporate 2 amendments, update to current template, check and update references, Check ULs* DG Project Details

Constrained revision of SMPTE ST 2057:2011 - Text–based metadata carriage in MXF *to incorporate one amendment, update to current template, check and update references, Check ULs* DG Project Details

One-year Reviews for ST 2059 Suite *for ST 2059-1 and ST 2059-2 and to provide resources for any revisions* DG Project Details

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Amendment of ST 428-12 - D-Cinema Distribution Master Common Audio Channels and Soundfield Groups to add common Immersive Audio formats [DG Project](#) *NOTE: It has just been decided that this work will be done in a new Immersive Audio document.*

Revision of RP 428-4 - D-Cinema Distribution Master Audio File Format and Delivery Constraints to address ambiguities [DG Project](#) *Details*

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"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 been done and are ready for ballot.

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

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

This SMPTE project defining "dynamic" metadata is now complete with the final Part (Part 2) of the six-part suite (ST 2094) published. One part documents core components, four parts document individual application schemes, one Part documents KLV Encoding and MXF Mapping.

Other HDR/WCG/EOTF work

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](#)

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

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

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

Professional Media over IP

Professional Media over IP Networks document suite

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 completed FCD ballot and comment resolution is well-advanced.

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

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

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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 are about to be publshed in an Engineering Report that will be available here. The report may influence 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 close to publication. 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.

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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

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- 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 standard "Calibration Reference Wideband Pink Noise Signal and Test File" was published in 2016.

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

This is a Metadata and Registers committee project. Details

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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 13 MXF projects in process with four more in the pipeline. Details

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SMPTE® Standards Quarterly Report:
Detailed Account

As a result of SMPTE Standards Committee Meetings
6-10 March 2017
San Jose, CA, USA
Hosted by Intel/Altera

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

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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 13-16 June 2017 in Shanghai,China and will be hosted by ECTTL and Shanghai Media Group.

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Further quarterly Standards meeting rounds are planned for:

20 – 23 Sept. 2017	Sky, London, England
4 – 8 Dec. 2017	Arista, Santa Clara, California, USA

In addition to the meetings of SMPTE Technology Committees (TCs) and their sub-groups, detailed below, there was training on "Lucid Meetings", a new teleconferencing system that will be rolled out for SMPTE standards meetings. There was also an update on revisions to the suite of SMPTE Administrative Guidelines and a short report on the Joint Task Force on Networked Media.

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.

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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 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).
— ST 2073-10 - VC-5 Mapping into the MXF Generic Container – this [TC-31FS](#) work is close to publication.

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); the revised Part 2 will be ready for pre-FCD ballot review soon. A minor revision to Part 1 for one-year review was raised to DP status at the TC meeting.

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

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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.

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). 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 document will proceed to DP ballot.

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.

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

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Status: Part 5 pre-FCD ballot review is complete, and the document will proceed to DP ballot.

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

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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 was elevated to DP status by a vote at this TC meeting. 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.

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 whether line number ranges quoted begin at 0 or 1.

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:

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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 for a short while to handle 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 reached agreement on pre-FCD-ballot comment resolution and the draft will be updated to reflect the agreed resolution. The document can then proceed to FCD ballot.

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 is ready for pre-DP review.

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. Following a decision at this meeting, the document will be reaffirmed.
- ST 2086:2014 Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut Images. A constrained-scope project proposal will be issued to make two changes.

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- 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.

A new project has been proposed to produce normative reference standards for the colorimetric primaries at multiple white points of P3 (the DCI format that lacks a normative definition). The proposal will be prepared for review.

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 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 is moving to ST Audit. The revised document will be published as ST 430-16, so that exising implementations of ST 430-7 are not affected by the extensions. A cover sheet for the withdrawal of ST 430-7 will be prepared.

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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 is moving to ST Audit.

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 waiting for a JDCF representative.

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 FCD ballot closing 27 Mar 2017.

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 completed and a pre-DP package will be sent to the TC Chairs.

> 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.

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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. DCI has completed an impact study and their original memo to SMPTE will be updated.

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).

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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 resolved and the document will be moved to pre-DP review when the 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.

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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:

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 rationale:

> 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.
>
> N.B. In the last quarter, it has been decided that this work would be carried out in a new document in the Cinema Sound Systems group, TC-25CSS and ST 428-12 will not be revised.

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.

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Status: All of these documents have been published in the last quarter. Schema files have also been published on SMPTE-RA.

Document Proposed for Withdrawal

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

At this meeting, it was decided that a withdrawal ballot should be started.

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
— Part x: Engineering Guideline

Status: Parts 1 and 2 are published. The text of the Engineering Guideline is complete with ongoing work reviewing the document structure and improving the graphics. The need for Part 3 is being reconsidered.

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 was on carrying Ad-ID and EIDR identifiers. More recently, the group identified the need for "Open Binding of Distributor IDs and Time

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Labels to Content (OBID-TLC)" . Both types of watermark may be carried simultaneously and independently decoded (including up to four separate TLC's).

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**: In the last quarter, the group selected a technology for use in Parts 1 and 2 and the proponent will document the technology in these two standards. Work on drafting RP 2017-3 and EG 2017-4 has progressed well.

Revision of 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: Revision is underway and the UHD data has been added in a working draft. There is concern about using some reserved bits and liaisons have been generated back to ATSC, CTA and DVB about this. There has also been discussion about older formats using interface standard line numbering starting at "1" and newer formats using image line numbering starting at "0". This issue applies to many SMPTE standards and may be addressed in a new project.

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. 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

Status: The two RP's were submitted to the TC for pre-FCD-ballot review on 6 Dec. 2016. Comments received from the pre-ballot review and through AES liaison have been addressed in the latest drafts and it is expected that they will be submitted to the TC for FCD ballot around 21 March 2017.

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). It was also announced that some work that had been planned to amend ST 428-12 - D-Cinema Distribution Master Common Audio Channels and Soundfield Groups, to add common Immersive Audio formats will now be done in a new Immersive Audio document, ST 2098-5.

New Standard: ST 2098-1 Immersive Audio Metadata

DG Project

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

Status: The document was held to incorporate any changes needed as the bitstream specification developed. These changes have been identified and incorporated in a revised working draft.

New Standard: ST 2098-2 Immersive Audio Bitstream Specification

DG Project

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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 has made good progress; the group is reviewing a few remaining open topics. A sample bitstream has been submitted for evaluation.

Digital Cinema Immersive Audio Renderer

DG Project

This project currently has the following two document drafting projects:

EG 2098-3: Immersive Audio Renderer Expectations

Drafting Project

> **Status:** The draft EG has been reviewed by the DG and is mostly completed. Terms used will be reconciled with the revisions to the ST 2098-1 draft.

RP 2098-4: Immersive Audio Renderer Interoperability Testing Procedure

Drafting Project

> **Status:** An initial draft document has been completed and is under review in the DG. Terms used will be reconciled with the revisions to the ST 2098-1 draft.

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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 has held 5 meetings in the last quarter. The group expects to have a report ready for consensus review by summer 2017. Some liaison activities with TC-21DC – Digigital Cinema have been undertaken.

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.

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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 has submitted a proposal for RP 205 revision. A project to cover this work will be posted for approval.

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 second draft revision has been submitted to the UMID Related Standards DG, covering:
> - New Material number generation method
> - New Instance number generation method
> - Source Pack "Where" extension to additionally describe a camera shooting direction

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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 with 11 comments to resolve. All comments have been addressed and are awaiting commenter response.

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. Comment resolution was almost complete at the time of the TC meeting (and now is).

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: This document was published in the last quarter and the project will be removed from the next agenda.

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. The draft will be submitted for FCD ballot when the pre-FCD review comments are resolved.

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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 Q4 2016 and has made significant progress. It expects to submit the draft standard for FCD ballot this summer.

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 revised draft document passed FCD ballot on 13 Feb. 2017 with 4 comments that are now all resolved. The document will be sent for pre-DP review in the week after the meeting.

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 next revision of the four registers in xml form (code-named "Brown Sauce") is at FCD ballot, closing 17 Mar. 2017. The Metadata Registers Development Area is available here: https://registry.smpte-ra.org/pages/
> An Administrative Guideline (AG18) is being drafted to define the process for adding new UL definitions to the metadata registers.

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.

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Other 30MR Business

ST 2003 Amendment project

A project proposal to correct some details in this standard is awaiting approval.

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. In next few weeks, the document will go for pre-DP review.

Revision ST 380: MXF Descriptive Metadata Scheme 1
DG Project

Revise as part of the 5-year review in coordination with the revision of EG42. In addition ensure that the labels in ST 380 are consistent with the new 30MR xml representations.

Status: The draft revision of ST 380 has been updated to address comments from the Feb. 2014 FCD ballot that failed numeric consensus. Responses from one commenter are awaited.

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

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DG Project

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

Status: The draft document passed FCD reballot on 9 Jan. 2017 and the 59 comments received have been resolved. The TC will post the document for 2 week pre-DP-ballot review.

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: An editorial issue is being dealt with and then the SG report will be published. The SG will be closed.

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 reballot on 5 Aug. 2015 with 37 voter comments; all were resolved. Some pre-DP-ballot review comments were received. The TC will chase the project proponents for a progress report.

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 is in the publication process. The document's ULs have been checked against the UL registry.

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

DG Project

Status: The document has been published and the group will be closed.

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.

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Status: The draft document is being prepared for ST Audit.

Revision of ST 2057:2011 - Text–based metadata carriage in MXF

Drafting Project

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

Status: There were no comments on the project proposal and it should be straightforward.

Revision of ST 377-1:2011 - 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: At the meeting, it was proposed that the project should be handled in two phases to separate the amendment roll-up from the other issues. It was agreed that this project would be modified to create a stable ST 377-1 and an additional project introduced to deal with the issues that may be more complicated to implement.

Revision of SMPTE ST 381-2: 2011 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 is almost ready for pre-FCD-ballot review.

Constrained revision of SMPTE ST 381-3:2013 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 has been submitted to the TC Chairs for pre-FCD-ballot review.

Revision of RDD 32:2014 XAVC MXF Mapping and Operating Points

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

Status: This project is at the proposal stage.

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Working Group on Archive Exchange Format (AXF)

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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 is being prepared for publication.

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: 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 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 met during this meeting round and walked-through the draft document which is in good shape. Pre-FCD-ballot review is expected soon.

Other TC-31FS Business

There was discussion about intorducing a "style guide" for the representation of SMPTE ULs in MXF documents. There is currently a variety of ways that ULs are defined, ranging from tables that define

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every byte in the UL to a format that expresses the UL in a single line. A small group will develop a document on this subject.

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

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**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 RP 198 draft revision was posted for 2-week pre-FCD-ballot review, closed 22 Feb. 2017. The DG is addressing the comments received.

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 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 has started on the RP.

New ST 2100 Suite: Transport of Haptic-Tactile Essence
DG Project

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

> **Status:** This group has been on hiatus for 18 months to focus effort on the 10E project that is now close to completion. 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

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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 published in the last quarter. The project included possible additional work that will only proceed if a new proponent is found.

New Standard: HDR and WCG Signaling on Streaming Interfaces

[DG Project](#)

This project will define an HDR and WCG carriage mechanism representation which can 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 HDR/WCG signaling parameters in the Payload ID (ST 352), and all other HDR-related metadata in a **new** separate ANC packet (the "HDR/WCG Ancillary Data Packet"), document "Extended HDR/WCG Metadata Packing and Signaling for Serial Digital Interfaces". The Payload ID changes have been agreed with ITU-R SG6, and a liaison statement has been sent to ITU-R.

The first standards – SDI interfaces ST372 and ST425-1 – have been revised and submitted to the TC Chairs to initiate 2-week pre-FCD-ballot review.

Other WG32NF-40 Issues

There are contining efforts to harmonize ITU-R BT.1120 with SMPTE ST 425-1 and to draft a liaison back to ITU-R on this subject.
The WG is investigating a request for further support of ST 2048 image formats in SDI.

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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 (FCD balloted)
[Drafting Project](#)

New Document: Part 20: Uncompressed Active Video (FCD balloted)
[Drafting Project](#)

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

New Document: Part 30: PCM Digital Audio (FCD balloted)
[Drafting Project](#)

New Document: Part 31: AES3 Transparent Transport (under development)

New Document: Part 40: Ancillary Data (under development)
[Drafting Project](#)

New Document: Part 50: Interoperation of ST 2022-6 streams (under development)
[Drafting Project](#)

Status: Initial drafts for all Parts above have been submitted.
Parts 10, 20, 30 passed FCD ballot 3 Mar. 2017 with 67, 59 and 26 voter comments respectively to resolve. The DG had a full-day meeting at this round to work on comment resolution. Part 21 has been added as a Normative Reference for Part 20. A few days after the meeting, the DG reached consensus on comment resolution for Parts 10, 20, 30 and the TC will be asked to start pre-DP-ballot review.

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

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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.

Status: In the last quarter, there was a proposal to extend ST 2022-7 to provide seamless protection switching of a range of RTP streams, including AES67 and ST 2110 (as shown in the new project description above). At this meeting, the TC agreed to the change of project scope.

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).

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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.

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 Q4 2016.

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 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)

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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. All were resolved shortly after this meeting.

The one year review revision of ST 2081-10 will be posted for FCD ballot. It includes additions to signal HDR/WCG. These additions will also be applied to ST 2081-11 and -12 and any new ST 2081 documents.

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. All were resolved shortly after this meeting.

The one year review revision of ST 2082-10 will be posted for FCD ballot. It includes additions to signal HDR/WCG. These additions will also be applied to ST 2081-11 and -12 and any new ST 2081 documents.

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

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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 June PTP interop report has been released. Results from the JT-NM Interoperability tests and IBC planning, August 22 to 26 2016, are also covered as well as Timing demonstrations from IBC and the SMPTE Annual Conference. A SMPTE Webcast on this report will be held 30 Mar. 2017 at 11:00 AM PDT.

The DG has been focused on preparing for the upcoming Interop, 20-24 March at Fox in Houston. 14 companies plan to attend and tests include Mixed and Unicast mode, Master and Slave TLV tests, Lock Time, Boundary Clock and Transparent Clock. There will be ST 2059 demonstrations at the IP showcse at NAB.

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

[DG Project](#)

This DG has begun to collect issues that need attention in these documents. It is waiting for the interop tests (above) to complete before starting revision work, as there may be further input from the tests.

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

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.

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; however, their 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.

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A report from these summits has been produced and the TC meeting agreed that it should be forwarded to the Standards Vice President with a request to publish.

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: On hold for the Time Label Summits conclusions. 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: On hold for the Time Label Summits conclusions. 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.

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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.

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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: A new proposal "Carriage of ADM (Audio Definition Model) in AES3 was presented at this TC meeting. This DG was asked to review the proposal in the light of the ST 2109 project (below) and identify the best way forward.

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 was submitted to the DG in Dec. 2016.

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.

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New document 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: An updated draft was reviewed at the 24 Feb. meeting. The next meeting is planned for May.

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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. The SG suffered a small interruption at the end of 2016 but it has resumed work – the next meeting is 22 Mar. 2017.

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)

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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 (recently published, as noted above). As work on BXF 5.0 winds down, the group is now 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 BXF 5.0 are currently being FCD balloted with revisions to Parts 1,2,3,4,9 and a new Part 6. The FCD ballots close 7 Apr. 2017.

New Recommended Practice RP 2021-6: BXF SDK
Drafting Project
For BXF SDK documentation as part of BXF 5.0.

BXF Schema Documentation
Drafting Project
Revise EG 2021-4 document to incorporate BXF 5.0 updates

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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.

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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 Q4 2016.

Part 3 revision and Part 4 will be posted for pre-DP-ballot review.

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.

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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

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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 Sony, Los Angeles, 16-17 Feb. Tests Vectors were used to conduct the tests and the results were very good, especially on subtitles.

The group is considering a plugfest in June 2017 focusing on OPL and one in October 2017 for Transcoder. A plugfest will also be held at IRT, Munich in May 2017.

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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, 30 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.

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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.

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 draft amendment is at FCD ballot, closing 3 Apr. 2017.

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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.

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Status: A Working Draft is being developed. The group decided to develop an Engineering Report initially, and a draft ER was posted 3 Mar. 2017.

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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 draft document is close to being ready for FCD ballot.

Other TC-35PM Business

Update on ST 2067-40

A plugfest specifically for ST 2067-40 was held in Erlangen, Germany 1-2 Mar. 2017.
A UL error has been found in this document and a project to correct the document (and possibly include some additions) will be set up.

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SMPTE Standards Publications in the last Quarter

10E Essence:

SMPTE OV 2094-0:2017, Dynamic Metadata for Color Volume Transformation – Overview for the SMPTE ST 2094 Document Suite

20F Film:

21DC Digital Cinema:

SMPTE ST 430-1:2017, D-Cinema Operations – Key Delivery Message

SMPTE ST 430-2:2017, D-Cinema Operations – Digital Certificate

Amendment 1:2011 to SMPTE ST 430-4:2008, D-Cinema Operations – Log Record Format Specification – Amendment 1

Amendment 1:2011 to SMPTE ST 430-7:2008, D-Cinema Operations – Facility List Message – Amendment 1

Amendment 1:2011 to SMPTE ST 430-9:2008, D-Cinema Operations – Key Delivery Bundle – Amendment 1

Amendment 1:2011 to SMPTE ST 433:2008, D-Cinema – XML Data Types – Amendment 1

24TB Television & Broadband Media:

25CSS Cinema Sound Systems:

30MR Metadata & Registers:

Amendment 1:2017 to SMPTE RP 2092-1:2015, Advertising Digital Identifier (Ad-ID®) Representations – Amendment 1

31FS File Formats & Systems:

SMPTE OV 379-0:2015, Material Exchange Format (MXF) – MXF Generic Container – Overview for the SMPTE ST 379 Document Suite

SMPTE ST 2094-2:2017, Dynamic Metadata for Color Volume Transform – KLV Encoding and MXF Mapping

32NF Network & Facilities Architecture:

SMPTE OV 297-0:2017, Serial Digital Fiber Transmission System and Multi-Link and Multi-Channel SDI Using CWDM – Overview for the 297 Document Suite

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SMPTE ST 297-1:2015, Serial Digital Fiber Transmission System for SMPTE ST 259, SMPTE ST 344, SMPTE ST 292-1/2, SMPTE ST 424, SMPTE ST 2081-1 and SMPTE ST 2082-1 Signals
(Note: This document previously published as SMPTE ST 297:2015; Content Unchanged)

SMPTE ST 297-2:2017: Multi-Link and Multi-Channel 1.5G, 3G, 6G and 12G-SDI Using CWDM

SMPTE ST 2091-1:2017, Ruggedized Fiber-Optic Connectors for HDTV and UHDTV SDI

34CS Media Systems, Control & Services:

35PM Media Packaging & Interchange:

SMPTE OV 2067-0:2017, Interoperable Master Format – Overview for the SMPTE ST 2067 Document Suite

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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.

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