STANDARDS QUARTERLY REPORT DECEMBER 2018

SINCE 1916

Result of SMPTE® Technology Committee Meetings
03-06 December 2018

Hosted by
Dolby Laboratories
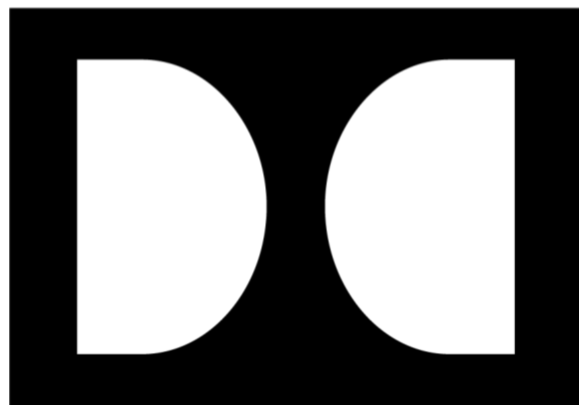San Francisco, CA, United States

THE NEXT CENTURY

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

SMPTE® Standards Quarterly Report:
Executive Summary

SMPTE Standards Committee Meetings 03-06 Dec. 2018

Hosted by *Dolby Labs, San Francisco, CA, US*

This Executive Summary lists the new projects this quarter and captures the more notable project developments. More information on the current status of the 150 active projects can be found in the [detailed account](#), after this summary.

Nine SMPTE Technology Committees (TCs) and 13 subgroups scheduled meetings at this round.

65 members attended in person over the four days, and there was additional participation by remote access.

Documents published in the last quarter from the work of each TC are listed on [this page](#).

New Projects that Began in the Last Quarter
(Project Name links to online project overview, "Details" links to this report)

TC	Type	Project	Details
Digital Cinema	*Revision*	*ST 430-14 - Digital Sync Signal and Aux Data Transfer Protocol*	*here*
Cinema Sound	*Study Group*	*B-Chain Characteristics and Expectations*	*here*
Metadata	*Next Release*	*Metadata Registers ("Tabasco" release)*	*here*
File Systems	*New Registered Disclosure*	*Avid DNxUncompressed - Packing definition and mapping to the MXF Generic Container*	*here*

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File Systems	Revision	ST 377-4:2012 Multichannel Audio Labeling Framework	here
Network	New	ST 2110 Protocol Implementation Conformance Statement (PICS)	here

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Professional Media over IP Projects

Professional Media over Managed IP Networks

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

The first six parts of the suite (the core parts) are published:

- System Timing and Definitions
- Uncompressed Active Video
- PCM Digital Audio
- Traffic Shaping and Delivery Timing for Video
- ST 291 Ancillary Data
- Transparent AES 3 Data

There are also parts in development on:

- Constant Bit Rate Compressed Video (at FCD reballot)
- Recommended Practice on Single Video Essence Transport over Multiple ST 2110-20 Streams (close to FCD ballot)
- Two new projects related to transport of metadata that has not been derived from ST 291 packets
- A project to develop a set of ST 2110 Protocol and Implementation Conformance Statements (PICS)

Associated projects in development are:

- Revision to Seamless Protection Switching of RTP Datagrams document to be more generic, allowing it to cover ST 2110 streams
- A new Standard on Timing of ST 2022-6 streams in ST 2110-10 Systems

Details

Network-Based Synchronization for the Professional Media Environment

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

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- A SMPTE group is organizing ST 2059 "plugfests". Details.
- One-year reviews of the two standards are underway in the light of plugfest experience and implementations. Details
- A Study Group has been started on Security in ST 2059 Networks
- Engineering Guidelines are being drafted. Details

Media Device Control over IP

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

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Interoperable Mastering Format (IMF)

IMF is a file-based mastering framework designed to support multiple high-quality content versions of a finished work destined for distribution channels worldwide. The suite (details) comprises 15 published documents together with some current projects (noted below) to create additional IMF documents or revise existing ones.

IMF Technical Specification for DPP Application

This is SMPTE's first Technical Specification document and it was published Q3 2018, along with the associated requirements document available here. There has since been a plugfest and work is started on a further document. Details

IMF Audio Essence Projects

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

A number of documents in the IMF suite are currently being revised. 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
- An SDI interfaces Working Group is managing other SDI projects Details

HDR and WCG Signaling on Streaming Interfaces

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This group is defining signaling for the carriage of high-dynamic-range (HDR) / wide color gamut (WCG) essence on streaming interfaces; both in the production and distribution environments.

It is revising a number of transport documents to add details to the SDI Payload ID for HDR / WCG signaling.

The group is also drafting two standards on Extended HDR/WCG Metadata Packing and Signaling for Serial Digital Interfaces. Details

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SMPTE Video Compression Standards

SMPTE has standardized five video compression standards – VC-1 to VC-5 - and has started work on VC-6. Current work on video compression standards comprises:

- A new project to standardize VC-6, a picture compression scheme based on "deep learning". Details
- Development of an eight-part suite of documents defining the VC-5 compression system (developed from GoPro's Cineform codec). Seven parts of the suite are published and work is well-advanced on the final Metadata part. Details.
- Projects on the VC-2 document suite (developed from BBC's Dirac Pro). Details

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Cinema Projects

IMF, above, is also highly relevant to the Cinema community

Cinema Sound Systems

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

It has a Working Group on Interoperability of Immersive Sound Systems in Digital Cinema. Two more of the WG's standards were published in the last quarter:

- Immersive Audio Metadata
- Immersive Audio Bitstream Specification

Details

Digital Cinema (D-Cinema)

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

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

Current projects mainly focus on:

- incorporating provisions for stereoscopic subtitles into existing D-Cinema documents
- updating encryption documents
- projects for immersive audio in D-Cinema
- integration of D-Cinema additional frame rate documents.

Details

Constrained Application of ST 268 - HDR DPX

This standard creates a profile of the DPX file format standard (that will be ST 268-2) to carry HDR / WCG. Publication is imminent. 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 7 MXF projects in process. Details

Extensible Time Label A project is underway to create a Standard for a time label that overcomes the shortcomings of SMPTE ST 12 (higher frame rate support, time values greater than 24 hours) as well as supporting additional requirements of current systems and workflows. Details

Microservices for Media A new project is underway to define a framework for media-related microservices as well as documents defining each microservice. Details

Serial Audio Definition Model (ADM) over AES3

This standard will specify a method of conveying a serial representation of the Audio Definition Model (ADM, Rec. ITU-R BS.2076) alongside synchronized audio signals in professional applications using AES3 serial digital audio interfaces. Details

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SMPTE® Standards Quarterly Report:
Detailed Account

SMPTE Standards Committee Meetings 03-06 Dec. 2018
Hosted by Dolby Labs, San Francisco, CA, US

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 our Standards activities at
www.smpte.org/standards.

This report is a snapshot in time and should not be regarded as formal minutes, a positioning statement or an analysis piece.

If you are interested in learning more about the SMPTE Standards program, or would like to submit comments, please contact the Director of Standards Development

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Introduction

The quarterly SMPTE Standards meeting rounds are led by the SMPTE Standards VP, a volunteer post, and the SMPTE Director of Standards Development, a staff post. These posts are currently filled by Bruce Devlin and Thomas Bause Mason respectively.

Each meeting round comprises meetings of nine Technology Committees (detail below) as well as subgroups whose work will benefit from face-to-face meetings. Subgroup work typically proceeds between the quarterly meeings using teleconferences.

There was also a Standards Community meeting that reviewed the SMPTE Standards development tool and the need for volunteers to test the new version that the supplier plans to roll out.

If you need some help getting started with the SMPTE Standards process and some of the conventions / acronyms used in this report, please take a look at the Annex.

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Future Meetings

Quarterly Standards meeting rounds are planned for:

Mar. 2019   White Plains

June 2019   Imagica, Tokyo, JP

Sept. 2019   Fraunhofer, Erlangen, DE

Dec. 2019   Arista, San Jose, CA, US

This Quarterly Report provides a detailed account of the meetings of the following SMPTE Standards TCs and their sub-groups:

Essence (10E)

Digital Cinema (21 DC)

Television and Broadband Media (24TB)

Cinema Sound Systems (25CSS)

Metadata and Registers (30MR)

File Formats and Systems (31FS)

Network and Facilities Architecture (32NF)

Media Systems, Control and Services (34CS)

Media Packaging and Interchange (35PM)

SMPTE also has a Film Technology Committee (20F), but it does not meet during these rounds.

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

Documents published in the last quarter from the work of each TC are listed on this page.

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Details From Each Technology Committee (TC) Meeting

Essence Technology Committee (TC-10E) Chaired by John Snow and Michael Zink

The application of the general scope as it applies to electronic capture, generation, editing, mastering, archiving, and reproduction of image, audio, subtitles, captions, and any other master elements required for distribution across multiple applications

Video Compression Standards in SMPTE

The currently-active video compression projects are:

SMPTE 2117 Document Suite: VC-6 Picture Compression

This project will document the syntax and semantics of a high efficiency compressed, hierarchical, VC-6 bytestream that uses hierarchical representation of compressed data to allow decoders to flexibly recreate uncompressed imagery.

DG Project

ST 2117-1: VC-6 Multiplanar Picture Format

Status: This project was approved 2018-02-06 and the group has held 34 meetings since then, including a face-to-face at this round. A WD of this standard is well-advanced. The group plans to hold webinars on VC-6 to assist with pre-FCD-ballot review on the document.

RP on VC-6 Conformance

This Recommended Practice will define the VC-6 file based conformance criteria.

Drafting Project

Status: Reference decoder development written in Python is underway using an external developer to test the usability and specifics of the text.

SMPTE 2073 Document Suite: VC-5 Video Essence

DG Project

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

- – ST 2073-0 - VC-5 Suite Overview (Published)
- – ST 2073-1 - VC-5 Elementary Bitstream (Published Q2-2014, revision published Q2-2017)

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- RP 2073-2 - VC-5 Conformance Specification (Published Q2-2014, revision to cover additional Parts published Q1-2018, revision to add Part 7 items underway). 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) (Published Q1-2018)
- 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) (Published Q1-2018)
- ST 2073-7 – Metadata (this will provide a basic set of metadata for input image format and also facilitate round-tripping embedded metadata from other standards by use of identifiers – ACES, XMP, DPX, MXF, ALE and vendor-specific).
- ST 2073-10 - VC-5 Mapping into the MXF Generic Container – this TC-31FS work was published Q2-2017.

Status: All parts except Part 7 are published.

Part 7 ([Drafting Project)](#) is at FCD ballot, closing 2018-12-17.

Part 2 ([Drafting Project)](#) The revision to cover Part 7 is underway to include an XML schema and reference codec.

The VC-5 group continues to hold meetings every 2 weeks.

Business Impact: Interoperability between systems

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

- ST 2042-1: VC-2 Video Compression Standard (latest revision published Q3 2017)
- ST 2042-2: VC-2 Level Definitions (latest revision published Q1 2018)
- RP 2042-3: VC-2 Conformance Specification
- ST 2042-4: Mapping a VC-2 Stream into the MXF Generic Container
- RP 2047-1: VC-2 Mezzanine Level Compression of 1080P High Definition Video Sources
- ST 2047-2: Carriage of VC-2 Compressed Video over HD-SDI
- RP 2047-3: VC-2 Level 65 Compression of High Definition Video Sources for Use with a Standard Definition Infrastructure
- ST 2047-4: Carriage of Level 65 VC-2 Compressed Video over the SDTV SDI
- RP 2047-5: VC-2 Level 66 Compression of UHD for use with HD Infrastructure

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

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Drafting Project

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

Status: The DG Chair reported that progress is slow.

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 (published)

RP 2080-4: Full Measurement / Calibration

ST 2080-x: Reference Display Characteristics

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

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

Part 2 is published (and ready for its one-year review). A revision Drafting Project is underway. It will clarify line numbering conventions, define D93 white point more correctly and fix other minor issues. The revision work will restart when Part 4 has completed DP.

Part 3 was published in Q2 2017.

Part 4 started FCD ballot but some issues were raised and the ballot was withdrawn. The document has been restructured and a new ballot package is ready (now underway and closing 2019-01-11).

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

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

DG Project

The project scope is to document "Television Lighting Consistency Index (TLCI)" and "Television Lighting Matching Factor (TLMF)". The introduction of light emitting diode (LED) technologies is leading to unintended and possibly expensive consequences, including poor color matching between different light

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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 continues to work on comment resolution from pre-FCD-ballot review, in particular, correction of unclear formulas and procedures. It is estimated that 2 further telecons will be required before the document is ready for FCD ballot (with a second pre-FCD-ballot review).

Revision: ST 2094-40 – Dynamic Metadata for Color Volume Transform — Application #4

To address these issues discovered in current published document:

- Two length specifications (DistributionMaxRGB, BezierCurveAnchors), two range specification (DistributionMaxRGB, KneePoint), one recommendation (DistributionMaxRGB), do not match actual implementations.
- One metadata item (FractionBrightPixels) is optional.

DG Project

> **Status:** The document is at FCD ballot, closing 2018-12-11 (subsequently, the ballot did not pass and has 70 comments to resolve).

New Standard: ST 2113 - Colorimetry of P3 Color Spaces

DG Project

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

> **Status:** The document is at ST Audit, closing 2018-12-10. It was noted that a number of documents refer to P3 colorimetry should be updated to refer directly to ST 2113.

New Standard: ST 2115 - FS-Gamut and FS-Log Characteristics of Camera Signals

DG Project

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

> **Status:** The document is ready for DP elevation vote that will be conducted online.

Study Group on Virtual Reality / Augmented Reality

SG Project

The project scope is to study the current VR and AR ecosystem for production and post production workflows and create a report documenting the current ecosystem, relevant existing standards and recommendations of new standards, recommended practices or engineering guidelines.

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Status: The SG held a meeting at this round. It plans to draft a short report based upon a list of industry assumptions and a few key points.

Other TC-10E Business

A presentation was given on the Academy's Spectral Similarity Index (SSI):

(http://www.oscars.org/ssi)

A new project will be initiated to standardize SSI.

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

The application of the general scope as it applies to application of mastered essence to theatrical digital distribution, including compression, encryption, wrapping, marking, packaging, media, logging, playout, projection, reproduction, and related topics.

Stereoscopic Subtitle / Timed Text related projects

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

DG Project

This revision addresses issues that arose during an earlier ST 428-7 revision and the development of ST 429-16**.**

> **Status:** This document package, including an xml document and the mature UL application is at FCD-ballot, closing 2019-01-01. Note that there is other work that further amends ST 429-2, and will need integration.

Revision: ST 428-7 - D-Cinema Distribution Master (DCDM) - Subtitle

DG Project

Project Scope: To revise ST 428-7 to improve rendering of Japanese timed text subtitles.

> **Status:** This is a new project approved 2018-06-25 and one meeting has been held. Solutions to the absence of a baseline in Japanese text are being considered.

Business Impact of Stereoscopic Subtitles projects: Compatibility and Interoperability

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Additional TC-21DC 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:** All 3 documents were presented for Pre-DP review in October.

Revision: ST 428-1 - D-Cinema Distribution Master (DCDM) - Image Characteristics

Drafting Project

> **Status**: This document is at DP vote, closing 2018-12-17.

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

Drafting Project

> **Status:** ST429-2 amendment passed DP vote 2018-10-24 is being prepared for ST Audit. Be aware of other revision work on ST 429-2 for stereoscopic subtitles.

Revision: ST 429-4 - D-Cinema Packaging - MXF JPEG 2000

Drafting Project

> **Status:** This document is at DP vote, closing 2018-12-17.

Immersive Audio Projects in TC-21DC

New Standard: ST-430-17 - SMS OMB Comm. Protocol

Drafting Project

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

> **Status:** The draft document completed pre-FCD-ballot review but has not progressed to FCD ballot.

New Recommended Practice: RP-430-18 - SMS OMB Comm. Reference Method

Drafting Project

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

> **Status:** The draft document completed pre-FCD-ballot review but has not progressed to FCD ballot. It has been found that revision to ST 430-14 is needed to complete this draft; see new project below.

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

Drafting Project

Revise ST 430-14 to:

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

Status: The group is reviewing proposed changes in first draft.

New Standard: ST 429-19 - DCP Operational Constraints for Immersive Audio

Drafting Project

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

Status: The draft document is at FCD ballot, closing 2018-12-24.

New Standard: ST 429-18 - Immersive Audio Track File

Drafting Project

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

Status: The draft document is at FCD ballot, closing 2018-12-24.

Revision : RDD 29 - Dolby Atmos® Bitstream Specification

Drafting Project

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

Status: The revised document was submitted for publication, but has not yet appeared in IEEE Xplore.

Amendment: ST 430-12 - FSK Sync Signal

Drafting Project

Project Scope: Amend ST 430-12:2014 to add a definition for an associated UL and Label for ST 430-12 FSK Sync signal.

Status: The draft document is at FCD ballot, closing 2018-12-24.

Amendment: ST 430-1 – Key Delivery Message

Drafting Project

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Project Scope: Amend ST 430-1 to add a new Key Type and Forensic Marking Flag to the KDM for encryption of the Immersive Audio track file.

> **Status:** The draft document is at FCD ballot, closing 2018-12-24.

Television and Broadband Media Committee (24TB) Chaired by Bill Miller

The General Scope as applied to mastered essence for television and broadband distribution (both separately and for hybrid television/broadband environments), including compression, encryption, wrapping, marking, packaging, media, tracking/control, presentation, reproduction, and related topics.

ST 2064 Suite of Documents on A-V Sync Measurement and Assessment

DG Project

The scope of this group is "Define recommended techniques for audio-video synchronization error measurement, and techniques and environment for synchronization assessment". It is developing a document suite based on audio and video fingerprints, "Audio to Video Synchronization Measurement":

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

> **Status**: Parts 1 and 2 are published and have had their 1-year review; no revision is needed. The final draft of the Engineering Guideline has been posted to the DG and should soon be ready for TC pre-FCD-ballot review.

Business Impact: Improved quality of experience and interoperability between systems

New SMPTE 2112 Document Suite on Open Binding Technology for Persistent Content Identification in A/V essence

DG Project

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

> **Status:** All parts are now published and the group will go into hiatus until 1 year reviews come due.

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

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Status: The document was published in Q3 2018.

EG 2112-2 - Audience Measurement Ecosystem
Drafting Project

Status: The document was published in Q3 2018.

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

Status: The document was published in Q2 2018.

RP 2112-11 - OBID Conformance Test Materials
Drafting Project

Status: The document was published in Q2 2018.

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

Status: The document was published in Q2 2018.

RP 2112-21 - OBID-TLC Conformance Test Materials
Drafting Project

Status: The document was published in Q2 2018.

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Revision: ST 2016-1 - AFD and Bar Data
DG Project

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

Status: There has been some further progress in the last quarter.

Other TC-24TB business

EG 26 - Audio Channel Assignments for Digital Television Tape Recorders with AES/EBU Digital Audio Inputs - is proposed for withdrawal and a ballot will be issued in the week after the meeting.

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Cinema Sound Systems (25CSS) Chaired by Brian Long 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.

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.

Working Group Documents

ST 2098-1 Immersive Audio Metadata (Published)

ST 2098-2 Immersive Audio Bitstream Specification (Published, in revision)

EG 2098-3 Immersive Audio Renderer Expectations

RP 2098-4 Immersive Audio Renderer Interoperability Testing Procedure

ST 2098-5 D-Cinema Immersive Audio Channels and Soundfield Groups (Published)

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

Immersive Sound Model and Bitstream

DG Project

Status: This DG is managing the following document development project:

Revision: ST 2098-2 - Immersive Audio Bitstream Specification

Drafting Project

Status: The document was published in August 2018. An amendment project was then proposed to add functionality for IMF. However, additional changes were identified (improvement to

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pseudocode) that were better handled as a revision rather than an amendment. The revision is at FCD ballot, closing 2019-01-04.

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Digital Cinema Immersive Audio Renderer

DG Project

This DG is managing the following two document drafting projects:

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

Drafting Project

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

Status: The DG continues to meet every 2 weeks. Progress is "slow but steady".

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

Drafting Project

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

Status: The DG continues to meet every 2 weeks. Progress is "slow but steady".

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Study Group on B-Chain Characteristics and Expectations

Drafting Project

Determine the documents needed to specify the B-Chain characteristics required to play back modern movie soundtracks in dubbing theaters and cinemas with the sustained high levels and transients that are now common. Create project statements for a drafting group to write these documents and a project statement for each document.

Status: This project was approved in the last quarter and the group has held one meeting. A 2 week meeting cadence is planned.

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.

Application of the Unique Material Identifier (UMID)

SG Project

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

UMID-related Standards:

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

New Document: UMID Resolution Protocol

Drafting Project

This project will draft a new SMPTE standard that specifies an industry-standard method for a given UMID to be converted into the corresponding URL of its audiovisual (AV) material. It follows from SG report Part 2.1.

> **Status:** An initial strawman draft was submitted to the UMID Related Standards DG. There has been no further progress in the last quarter.

Revision: ST 330 - UMID

Drafting Project

This project will revise ST 330 so that it additionally specifies new methods for generation of UMID Material and Instance Numbers as well as description of a camera's shooting direction in order to enhance the UMID applications. It will also consider any points needed for the 5 year review of ST 330:2011.

> **Status:** In the last quarter, additional text has been produced. A couple of topics still remain to be discussed before the document is ready for pre-FCD-ballot review.

Revision: RP 205 – UMID Applications

Drafting Project

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

> **Status:** The work will start after ST 330 revision is complete.

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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 2016-10-20 with 15 comments to resolve. The DG Chair reported that comment resolution has just been completed and awaits acceptance from the commenters.

Amendment: ST 335 - Metadata Element Dictionary Structure

[Drafting Project](#)

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

Status: The amendment is ready for ST Audit.

RDD 49 Professional Metadata (PMD)

[Drafting Project](#)

Status: This document is at RDD ballot, closing 2018-12-12. It is related to **draft** ST 2109 and the way that metadata is being used.

Metadata Definition

WG Project

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

Status: The current revision of the four registers in xml form (code-named "Ponzu") was published in 2018 Q3. The next release will be "Tabasco" and a project to ballot that version is underway.
The Metadata Registers Development Area is available here: https://registry.smpte-ra.org/pages/

The existing Standards defining ULs for Elements, Groups, Types and Labels will be revised in line with administrative guideline AG18 that defines the process for adding new UL definitions to the metadata registers.

Create and Update Essence Element Register Contents

[DG Project](#)

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

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Status: A draft register in spreadsheet form has been compiled for existing essence elements and is available at the above Development Area URL.

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File Formats and Systems Committee (31FS) Chaired by Fred Walls 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 2013-11-17 with 70 comments, but then went into hiatus. The work has now resumed.

> **Status:** The document was posted for pre-DP review and there is a comment that needs discussion. It is hoped that this can be dealt with in a telecon rather than waiting for the next meeting.

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:** FCD ballot comment resolution is complete and ST 380 revision can proceed to pre-DP-vote review when the TC Chairs receive the document package.

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

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[Drafting Project](#)

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

> **Status:** The draft revision of RP 2057 passed FCD ballot on 2018-02-09 with 5 comments to resolve. Comment resolution is ongoing but there has been no progress in the last quarter.

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

[DG Project](#)

This is a constrained revision to roll-up two amendments and check Normative References and deal with any consequences arising. Note that an [additional project](#) will deal with substantive issues that may be more complicated to implement.

> **Status:** The draft ST 377-1 passed FCD ballot 2018-01-05 with 7 comments to resolve. Comment resolution is complete and ST 377-1 revision can proceed to pre-DP-vote review when the TC Chairs receive the document package.

Revision: ST 2042-4 - Mapping a VC-2 Stream into the MXF Generic Container

[DG Project](#).

Project Scope: Update ST 2042-4 so that it is consistent with ST 2042-1:2017, registering new SMPTE ULs if necessary. Update references and make any necessary editorial corrections.

> **Status:** The document is being prepared for publication and the DG will be closed.

New RDD 48: MXF Archive and Preservation Format Application Specification

[DG Project](#)

RDD 48 specifies a vendor-neutral subset of the MXF file format for the long-term archiving and preservation of moving image and other audiovisual content, including all forms of Ancillary Data, together with Associated Materials.

> **Status:** RDD 48 is ready for publication.

Revision: ST 377-4 – MXF Multichannel Audio Labeling Framework

Project scope:

- Create additional MCALabelSubdescriptor properties in Table 3 to allow for a more granular description of audio content and for a controlled vocabulary to be created to facilitate automation
- Clarify existing definitions where appropriate
- Clarify use of redundancy of properties in multiple subdescriptors
- Replace all occurrences of ISO-8 with ISO7

[DG Project](#)

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Status: This is a recently-approved project, but a working draft is already available. The DG has been set up.

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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. Part 1 has been published for some while and deals with 'AXF Structure and Semantics' and includes an XML schema. A revision to the Part 1 document was published in Q2 2017. It has been published by ISO as a Publicly Available Specification, ISO/IEC DIS 12034-1. There are 2 current projects, detailed below:

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

[Drafting Project](#)

Project Scope: Revise ST 2034-1 to correct syntax errors in XSD file, edit text document to support XSD changes, prepare a readme file to accompany the XSD file. It was intended to remove UML diagrams from the text document, but a means has been found to edit them.

> **Status:** The project completed approval 2018-06-16. The text update is complete. The work to update the diagram needs completion.

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

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

[WG Project](#)

Part 2 covers the use of AXF Structures in "Unwrapped" form, enabling aggregation of files into a "Bundle". The schema can serve as a manifest and it can apply hierarchical structure to files. It is intended for use from file capture on set through to archive input. There was a strong end-user demand for this technique that gathers metadata as material passes along the workflow.

> **Status:** Work is progressing. Discussion in this group about making persistent filenames using uuids may result in a spin-off project.

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

[DG Project](#)

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This project will develop a new constrained standard for DPX for the application of high dynamic range (HDR) and wide color gamut (WCG) pictures. This is 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: ST 268-2 is being prepared for publication. The DG will be kept open in case an idea to develop a reference implementation gains traction.

Other TC-31FS business

- Proposed new project: RDD on Avid DNx Uncompressed Packing into MXF. A presentation was given on plans to introduce this work as a two-part RDD.
- A total of 8 TC-31FS documents have had their 5 year reviews. They will all be reaffirmed and 5 will be stabilized (still in force but not reviewed every 5 years).

Network and Facilities Architecture Committee (32NF) Chaired by Friedrich Gierlinger

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.

Pat Waddell served as "interim Co-Chair" for this meeting.

Working Group on SDI Interfaces

WG Project

The Working Group (32NF-40) scope is:
Manage Engineering Documents dealing with electrical and optical SDI interfaces with nominal link rates up to 3Gb/s as well as a 10Gb/s optical interface including the mapping of essence, data, and metadata and the details of the physical interfaces.

Business Impact of all WG 32NF-40 work items concerns interoperability between systems.

The WG controls the following projects:

New Document Suite: EG 2111 on SDI Interfaces
DG Project

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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.

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

> > EG 2111-1 SD and HD-SDI Roadmap

> > EG 2111-2 UHD-SDI Roadmap

> > EG 2111-3 10G-SDI Roadmap

> EG 2111-2 has completed ST Audit with a minor editorial comment. It was established at the meeting that pdf can be considered an "editable format" and that EG 2111-1 and EG 2111-3 can progress through ballot as pdf files.

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

DG Project

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

Many SMPTE interface standards will require amendment as part of this work. The plan is to put static HDR/WCG signaling parameters in the Payload ID (ST 352), and all other HDR-related metadata in **new** data structures, documented in ST 2108-1 and ST 2108-2.

At the 2018-09 meeting, the group decided that it would not add payload ID data for HDR/WCG to the stereoscopic transport standards.

> **Status:**

> ST 372 revision was published Q4 2017.
> ST 425-1 revision was published Q4 2017.
> ST 2036-3 revision was published in Q2 2018.
> ST 292-1 revision was published in Q2 2018.
> ST 2036-4 revision is ready for posting for pre-DP review. Drafting Project

> ST 425-3 (dual link) 425-3 Projectand ST 425-5 (quad link) 425-5 Project were both elevated to DP status at the meeting.

> In Q1 2018, it was decided that ST 2108 should comprise two documents:

> ST 2108-1, ANC messages, based on SEI messages for the distribution environment, which cover static metadata and constrained sets of ST 2094-x metadata was published Q3 2018.

> ST 2108-2, based on a KLV format as specified in ST 2094-2 for the production environment, which supports all parameters in the ST 2094 suite of standards. At this meeting, the DG reached consensus that the document is ready for FCD ballot. Drafting Project

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WG 32NF-70 documents ST 2081-10 and ST 2082-10 were published in Q2 2018 and ST 2081-11, ST 2081-12, ST 2082-11, ST 2082-12 are now ready for pre-DP-vote review; see below.

Revision: ST 2038 - Carriage of Ancillary Data Packets in an MPEG-2 Transport Stream

Drafting Project

This revision adds a note describing limitations of usage with low-frame-rate 720p transports.

> **Status:** There was no report, but FCD ballot is expected soon.

Working Group on Video Over IP

WG Project

This Working Group (32NF-60) was established to handle projects related to IP transport of media. The WG has produced the seven-part ST 2022 suite of standards as well as the ST2100 suite of standards.

> **Business Impact** of all WG 32NF-60 work items concerns interoperability between IP - based media systems.

New Document Suite: ST 2110 - Professional Media over Managed IP Networks

DG Project

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

The suite of ST 2110 documents currently comprises:

New Standard: Part 10 - System Timing and Definitions
Published and a one-year review Drafting Project has just started.

New Standard: Part 20 - Uncompressed Active Video
Published

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

 New Standard: Part 22 - Constant Bit Rate Compressed Video

Drafting Project

 New Recommended Practice: Part 23 - Single Video Essence Transport over Multiple ST 2110-20 Streams

Drafting Project

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The document continues to make progress and is being reviewed in the DG for readiness to submit to the TC for pre-FCD-ballot review.

New Standard: Part 30 - PCM Digital Audio
Published

New Standard: Part 31 - AES3 Transparent Transport
Published

New Standard: Part 40 - SMPTE ST 291-1 Ancillary Data
Published

New Standard: Part 41 – Fast Metadata
Drafting Project Project approval closed 2018-10-04

New Standard: Part 42 – Formatting an ST 2110 Sender SDP Object for Transport using ST 2110-41 Fast Metadata (FMX)
Drafting Project Project approval closed 2018-10-04

New Standard: ST 2022-8 - Timing of ST 2022-6 streams in ST 2110-10 Systems The group is also developing this document that defines constraints on ST 2022-6 streams for interoperation with ST 2110 streams (originally planned to be ST 2110-50).
Drafting Project

Status of Suite: ST 2110 Parts 10, 20, 21, 30, 31 and 40 are published.

- Part 22 reached ST Audit, where a comment was made about the process for adding compression formats to the associated online register. It was agreed at this meeting that the revised document will go to a 3-week FCD ballot and that no pre-FCD review is needed.

- Part 23 is at WD status and the document continues to be developed. The DG reached consensus to include quad paths (Square Division) and reference ST 435-1.

- ST 2022-8 was raised to DP status at the meeting.

- A new Project Proposal has been initiated "Protocol Implementation and Conformance Statement" (like a conformance checklist) for each of the documents in the ST 2110 suite.

- The proponent gave a detailed presentation on plans for Part 41 and a brief higher level overview of Part 42.

- There may be an addition to the suite, an EG on migrating from SDI and Black/Burst to 2110 and PTP. This was originally planned to just deal with synchronization, but it is felt that combining the topics could be better.

Revision: ST 2022-7 - Seamless Protection Switching of RTP Datagrams
Drafting 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. The project scope was amended at the March 2017 meeting to extend ST 2022-7 to provide seamless protection switching of a range of professional media RTP streams, including AES67 and ST 2110, hence the new title above.

Status: The document passed DP vote on 2018-09-17 and is moving to ST Audit.

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

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

Status: The revised draft is in pre-DP review, ending 2018-12-18

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Working Group on Ultra HD SDI Interfaces
WG Project

This Working Group (32NF-70) was established to create a hierarchy of single-link, dual-link and quad-link electrical and optical SDI interfaces with nominal link rates of 6Gb/s (ST 2081 suite), 12Gb/s (ST 2082 suite) and 24Gb/s (ST 2083 suite). See below for the individual documents in each suite. The optical interface parameters supporting these standards have been added to ST 297-1: Serial Digital Fiber Transmission System for ST 259, ST 344, ST 292-1/2, ST 424, ST 2081-1 and ST 2082-1 Signals.

WG Status: Although there are separate drafting groups for 6Gb/s and 12Gb/s (see below), the WG generally develops its documents so that the two are kept "in step". Additional work has been passed to this WG from the SDI WG HDR signaling project to include HDR signaling over these UHD-SDI standards, with revision work as noted below. The next documents to be developed will be the ST 2083 suite.

ST 2081 Suite - 6Gb/s Signal/Data Serial Interfaces
DG Project
This group is responsible for the following documents:

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

ST 2081-10: 2160-line and 1080-line Source Image and Ancillary Data Mapping for **Single**-link 6G-SDI (published and HDR revision published Q2 2018)

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

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

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

Status:

The one year review revisions of ST 2081-11 and -12 include the additions to signal HDR/WCG and have passed FCD ballot. The DG Chair has requested that these two documents be posted for pre-DP-vote review.

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

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

DG Project

This project is responsible for the following documents:

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

ST 2082-10: 2160-line and 1080-line Source Image and Ancillary Data Mapping for **Single**-link 12G-SDI (published and HDR revision published Q2 2018)

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

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

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

Status:

The one year review revisions of ST 2082-11 and -12 include the additions to signal HDR/WCG and have passed FCD ballot. The DG Chair has requested that these two documents be posted for pre-DP-vote review.

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

UHD-SDI Stress Pattern and Check Signal

DG Project

Status: At the June 2018 meeting, a technical presentation was given describing the requirements for a new test signal / pattern that could be used for UHD-SDI system testing. The project will create a recommended practice that defines a test signal that can be used for debug and acceptance testing of UHD-SDI systems. This project has since been set up, but there have not yet been any meetings.

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Working Group on Time Labeling and Synchronization
WG Project

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This Working Group (32NF-80) 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 32NF-80 work items: Network-based facility synchronization and new functionalities for time labeling.

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

[DG Project](#)

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

Status: The DG has worked through a number of comments received from the PTP Interop. DG along with others. The group has held 9 meetings in the last quarter.

It has been decided that mention of a 5 second lock time will be removed from the Introduction of ST 2059-1 as lock time is a complex parameter to define (a new project for a 2059 family document on this subject has been requested). Current status:

- ST 2059-1: A new draft is under review in the DG

- ST 2059-2: An updated draft was reviewed last week and the DG is examining remaining issues with this document

ST 2059 Interoperability Testing

[DG Project](#)

The purpose is to confirm that the provisions of the standards are unambiguous and that the technology yields the intended results. The Interop DG itself is open to all SMPTE Standards Community members, but its Testing AHG and attendance at the interop meetings is subject to signing a non-disclosure agreement and memorandum of understanding.

There have been four rounds of testing, all hosted by FOX NE&O in Houston, TX, USA:

- Nov. 2015, June 2016 March 2017, Feb. 2018

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

Status: A "dirty hands" workshop is planned by JT-NM, again at Fox NE&O in Houston week of 2019-02-18. It is for "Full Stack" testing, but this DG has been invited to use the event for 2059 testing. It will be preceded by a month-long virtual workshop, where some testing can be done remotely.

The DG is also planning its own interop for the May/June 2019 timescale.

New Standard Suite ST 2120: Extensible Time Label (TLX)

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

DG Project

Status: The DG is currently drafting 3 document parts:
- ST 2120-1 – Extensible Time Label – System
- ST 2120-2 – Extensible Time Label – Items
- ST 2120-3 – Extensible Time Label – Profiles

Projects will be set up to track these three documents.

Development of a Suite of PTP synchronization Engineering Guidelines

DG Project

This group was set up to develop a suite of Engineering Guidelines related to the ST 2059-1 and ST 2059-2 Synchronization documents. EG 2059-10 - Introduction to the New Synchronization System – was published some time ago. After some pruning, the documents below remain.

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

Drafting Project

Status: It is very likely that this project will be closed and transferred to the 2110 suite to include aspects of SDI to 2110 migration (project above).

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

Drafting Project

Status: The two authors have agreed to concatenate their various conference papers as a fresh start on this EG.

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

Drafting Project

It has been agreed that this document will comprise two Parts:
1. Date-Time Terms and Definitions.
2. Other Media Terms and Definitions.

Status: A draft of RP 2104-1 was posted for review and comment July 2015. Since this meeting, a revised document has been posted.

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Working Group on Data over AES3
WG Project

This Working Group (32NF-90) was established to handle projects that standardize AES3 carriage of data streams. These streams may be compressed audio, metadata – anything other than AES3 audio itself!

WG Status: The WG met during this meeting round to discuss its projects, noted below.

ST 337 family of documents
DG Project

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

Status: Projects currently assigned to this DG are:

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

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

Status: The draft document closed FCD ballot at the end of the day of the TC meeting (2018-12-05). There were 8 comments. Some comments had been reviewed in a DG meeting earlier in the week.

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

MPEG-H provides for carriage of immersive and interactive audio in the form of channels and objects and also in the form of Higher Order Ambisonics (HOA). The project will develop a standard to specify the format for carriage of MPEG-H data for professional applications as Non-PCM audio using the AES3 serial digital audio interface defined by ST 337.

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

New Standard: ST 2116 - Serial Audio Definition Model (ADM) over AES3
DG Project

This standard will specify a method of conveying a serial representation of the Audio Definition Model (ADM, Rec. ITU-R BS.2076) alongside synchronized audio signals in professional applications using AES3 serial digital audio interfaces.

Status: The project was approved 2017-12-06. A draft document has been discussed in the DG and comments have been resolved. The document is ready for pre-FCD-ballot review.

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Other TC-32NF business

A new SG project on Security in ST 2059 systems has been set up. The Project Proposal approval period closed 2018-12-03.

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:

RP 2021-1: General Information and Informative Notes

ST 2021-2: Protocol

EG 2021-3: Use Cases

ST 2021-4: Schema Documentation

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

RP 2021-6: BXF SDK Documentation

RP 2021-9: Implementing BXF

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

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

BXF 6.0. This work is managed in the TC-34CS10 BXF Drafting Group, with the projects below. Note that this set of revisions changes the document type of Part 1 from ST to RP and Part 4 from EG to ST. BXF 6.0 includes various items received from NABA, Extreme Reach, NBCU, Channel 4, Viacom.

Status: ST Audit of Parts 1,2,3 closed 2018-11-06. Part 4 was elevated to DP at the meeting and will be sent for ST Audit (this has since started, closing 2018-12-31).

BXF 7.0 is expected to include:

- More on multi channel audio

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- Additional HDR support (PQ and HLG)?

- More items requested by Channel 4 and others that we couldn't get into BXF 6.0.

- Additional requests from NBCU, FOX, and others

- NABA DPP Specifications: J2K, OPL/CPL, UHD

Revision: RP 2021-1 - Requirements and Informative Notes (BXF 6.0)

Drafting Project

Revision: ST 2021-2-2018 Broadcast Exchange Format (BXF) Protocol (BXF 6.0)

Revision: EG 2021-3-2018 Broadcast Exchange Format (BXF) Use Cases (BXF 6.0)

Revision: ST 2021-4 - Schema Documentation (BXF 6.0)
Drafting Project

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

ST 2071-1: Media Device Control - Framework - Published in 2012, updated in 2014, Q4 2016.

ST 2071-2: Media Device Control - Protocol – Published in 2012, updated in 2014, Q4 2016.

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

Status:
Part 3 revision (Drafting Project) and Part 4 (Drafting Project): These documents have returned to

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WD status following some issues with document revision control during balloting. The DG is taking the opportunity to substantially restructure and improve the revision to ST 2071-3. The TC has instructed the DG to ensure that there is consistency between this revision and the published Parts 1 and 2.

In the process of revising ST 2071-3, a new project proposal for an Open Directory Architecture has been drafted but not yet submitted for approval.

Business Impact: Interoperable Media Device Control

New Document: Media Microservices Overall Architecture

[DG Project](#)

Project scope: Create a base document for a suite of documents, specifying an overall architecture enabling interoperable microservices, and manage the development of later documents in the suite. This project was approved 2018-03-28. The long-term goals are to publish the suite of architectural documents and provide the ability for contributors to register microservices with SMPTE, making a functional set of interoperable media microservices available for implementers.

Status: The group has early drafts of four documents thus far:

- Media Microservices Terms and Definitions

- Media Microservices Overall Architecture

- Media Microservices Architectural Requirements

- Media Microservices Decomposition

The group needs more members with hands-on microservices development experience and the DG Chair will draft a request for participation to the SMPTE Standards Community.

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

The General Scope as applied to the packaging of media elements, to facilitate interchange and interoperability of formats within specific integrated application ecosystems in the professional fields of media creation, production, post-production archiving and related topics.

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

TC-35PM-50: IMF Document Maintenance DG

IMF is a file-based framework designed to support multiple high-quality content versions of a finished work destined for distribution channels worldwide. It facilitates management and processing of these content versions, including playback, validation and transformation to the various master formats used by each distribution channel. IMF is intended for international use in professional applications.

This DG maintains the currently-published IMF documents:

> ST 2067-2: Interoperable Master Format — Core Constraints
>
> ST 2067-3: Interoperable Master Format – Composition Playlist
>
> ST 2067-5: Interoperable Master Format – Essence Component
>
> ST 2067-8: Interoperable Master Format — Common Audio Labels
>
> ST 2067-9: Interoperable Master Format — Sidecar Composition Map
>
> ST 2067-20: Interoperable Master Format — Application #2
>
> ST 2067-21: Interoperable Master Format – Application #2E (previous title Application #2 extended)
>
> ST 2067-30: Interoperable Master Format — Application #3
>
> ST 2067-40: Interoperable Master Format – Application #4 Cinema Mezzanine
>
> ST 2067-50: Interoperable Master Format – Application #5 ACES
>
> 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
>
> ST 2067-200: Interoperable Master Format - Dynamic Metadata for Color Volume Transform (DMCVT) Plug-in

As a number of the documents above have come due for maintenance, a new project has been started:

Issue Triage (For IMF)
Issues are continuously collected and discussed in SMPTE 35PM GitHub repository and contribute to revision work. An IMF bug tracker (used for both bugs and improvement requests) is in operation at:
https://github.com/orgs/SMPTE/teams/35pm
Drafting Project

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Status: SMPTE 35PM GitHub team has 47 members. Editors have addressed several issues in current revision draft documents. Resolution of some issues filed would benefit from user-testing/implementation experience, so DG to trial a proposed public CD process for revisions/amendments. DG to meet in January to discuss next steps.

Revision: ST 2067-2 - Interoperable Master Format – Core Constraints

Drafting Project

Status: WD under development.

Revision: ST 2067-3 - Interoperable Master Format – Composition Playlist

Drafting Project

Status: WD under development.

Revision: ST 2067-5 - Interoperable Master Format – Essence Component

Drafting Project

Status: WD under development.

Revision: ST 2067-21 - Interoperable Master Format – Application #2E

Drafting Project

Project to reflect implementation and interchange experience, and to add support for the HLG color system as specified in ITU BT.2100-1.

Status: WD under development.

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

Drafting Project

Status: WD under development.

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IMF Plugfest DG
Drafting Project

The SMI group has held several plugfests, the most recent was at AMPAS, 2018-10-18 to 19.

The group aims to have 2 plugfests per year, one in Europe and one in USA.

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

https://imfug.com

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Status: An IMF plugfest was held just before the SMPTE conference, 2018-10-18 to 19 at AMPAS. The group is working on a plugfest in Europe, perhaps London, 2019-05.

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IMF Audio Essence Projects

This DG supports the following projects:

New Standard: IMF - Vocabulary and syntax for MCA Audio Content Kind and Element Kind
Drafting Project

This project will draft a standard for controlled vocabulary and syntax for MCA Audio Content Kind and MCA Audio Element Kind, two essential elements that describe soundfield groups in accordance with IMF Core Constraints. It will also investigate the need to define a controlled vocabulary and syntax for MCA Title and MCA Title Version, both of which are required by IMF Core Constraints.
The group has developed a draft Engineering Report "IMF – Specifying Audio Element and Content Kind in Application #2E Compositions". The TC has reviewed and approved the Engineering Report.

Status: The group has decided to put this work on hold in favor of starting a ST 377-4 revision in TC-31FS. This work will resume when that work is complete.

New Standard: ST 2067-201 - IMF - Immersive Audio Bitstream Level 0 Plug-In
Drafting Project

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

- Mapping of ST 2098-2 bitstream into IMF Track Files

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

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

Status: The draft has passed DP elevation vote and is being held until one of its normative references, ST 429-18 (Currently in FCD ballot, closing 2018-12-24), publishes.

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WG 35PM-60: IMF DPP Application

DPP is the Digital Production Partnership in the UK. This WG is co-ordinating two projects concerned with the creation of a SMPTE Technical Specification (TSP):

New Report: ER 2121-2: Application DPP Requirements Document
DG Project

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Project scope: To deliver the Requirements for a SMPTE Technical Specification that constrains an Application of SMPTE ST 2067 - the Interoperable Master Format.

Status: Published here.

New Specification: TSP 2121-1: Application DPP

DG Project

This project will create a Technical Specification meeting the requirements from the project above.

* **Status:** Published here. At the AMPAS plugfest, TSP 2121-1:2018 Test Vector was tested. ProRes proved good interoperability. DPP is working to expand functionality within the TSP 2121 family:

  - Time-variant metadata resource and sample OPLs are examples.

  - TSP 2121-4 to support JPEG2000 as per Application #2E.

  - Scoping for H.264 support has begun.

A SMPTE Project Log, ER 2121-3 is also available here.

The DPP is working to define phase 2 of the project to include additional functionality to TSP 2121.

New Registered Disclosure Document: RDD 47: IMF Isochronous Stream of XML Documents (ISXD) Plugin

DG Project

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

SMPTE Standards Publications in the Last Quarter

10E Essence:

20F Film:

21DC Digital Cinema:

24TB Television & Broadband Media:

OV 2112-0:2018   Roadmap for the 2112 Document Suite

25CSS Cinema Sound Systems:

30MR Metadata & Registers:

31FS File Formats & Systems:

32NF Network & Facilities Architecture:

ST 2108-1:2018   HDR/WCG Metadata Packing and Signaling in the Vertical Ancillary Data Space

34CS Media Systems, Control & Services:

35PM Media Packaging & Interchange:

RDD 47:2018   Interoperable Master Format - Isochronous Stream of XML Documents (ISXD) Plugin

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Notes on this Report and the SMPTE Standards Process

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SMPTE Technology Committees (TCs) are tasked with the development and ongoing maintenance of engineering documents concerning Television, Broadband, Film and Digital Cinema. TCs are set up by the Standards Vice President (SVP) and are overseen by the Standards Committee (ST).
The standards process operates under the SMPTE Standards Operations Manual. 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*

TSP = *Technical Specification* **RDD** = *Registered Disclosure Document*
OV = *Overview, usually used with multipart document suites to explain the structure*

SMPTE Document Review

The SMPTE Operations Manual calls for review of published documents:
- One Year after original publication - to check whether comments have been received during initial implementations and revise as required
- At Five Year intervals after original publication - to check whether the provisions need to be revised
Options are: Revise; Reaffirm; Stabilize; Withdraw.

Other Notes

*This report describes each active **Project** in each TC. Occasionally, there is more than one project group working on a particular technology field. In this case, those projects are grouped under a **Topic** headline.*

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

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