



SINCE 1916

STANDARDS QUARTERLY REPORT June 2019

Result of SMPTE® Technology
Committee Meetings
17-20 June 2019

Hosted by
IMAGICA Lab.
Tokyo, Japan

THE NEXT CENTURY



Society of Motion Picture and Television Engineers®

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SMPTE® Standards Quarterly Report: Executive Summary

SMPTE Standards Committee Meetings 17-20 June 2019

Hosted by IMAGICA Lab., Tokyo, JP

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.

46 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, "Date approved" links to this report, if discussed in meeting)

TC	Type	Project	Approval Date
<i>Essence</i>	<i>Revision</i>	<u><i>ST 2065 ACES Document Suite</i></u>	<i>06/18</i>
<i>Essence</i>	<i>Revision</i>	<u><i>ST 2065-1 Academy Color Encoding Specification</i></u>	<i>06/18</i>
<i>Essence</i>	<i>Revision</i>	<u><i>ST 2065-2 Academy Academy Printing Density</i></u>	<i>06/18</i>
<i>Essence</i>	<i>Revision</i>	<u><i>ST 2065-3 Academy Density Exchange Encoding</i></u>	<i>06/18</i>



File Systems	Revision	<u>ST 2065-4 ACES Image Container File Layout</u>	06/18
Metadata / Registers	Revision	<u>"Sriracha" registers release</u>	07/02
TV / Broadband	Revision	<u>Open Binding ID's - SMPTE 2112-10,11,20,21</u>	06/12
Essence	New Registered Disclosure Document	<u>High Density Encoding - Data Encoding Specification</u>	06/05
Network	Amendment or Revision	<u>One Year Review of ST 2110-20</u>	05/27
Network	New Recommended Practice	<u>ST 2059-2 PTP device monitoring capabilities</u>	05/24
Metadata	New Study Group	<u>UUID File Naming</u>	05/22
File Systems	New Recommended Practice	<u>Reference Materials for DPX HDR Implementations</u>	05/14
File Systems	Revision	<u>ST 422: Mapping JPEG 2000 Codestreams into the MXF Generic Container (HTJ2K)</u>	05/30
Essence	New Standard	<u>Academy Spectral Similarity Index (SSI)</u>	03/19



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 (now in revision following one-year-review)
- 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
- Recommended Practice on Single Video Essence Transport over Multiple ST 2110-20 Streams (to support high bitrate streams)
- 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 (both just published in the last quarter) 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:

- 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 [Details](#)
- A Drafting Group will create report “Using ST 2059 in ST 2110 Networks with ST 2022-7 Redundancy” [Details](#)
- 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](#)

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

Following SMPTE's first Technical Specification document from the DPP, published Q3 2018, new projects have been started to add a JPEG 2000 Specification to the suite. [Details](#)

This work is dependent on other work that is underway to add HLG support to IMF's JPEG 2000 application document. [Details](#)

The existing DPP documents are [available here](#).

IMF Audio Essence Projects

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

A number of documents in the IMF suite are currently being revised. [Details](#)

SDI Interfaces

Work continues on the development of SDI interfaces:

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

HDR and WCG Signaling on Streaming Interfaces

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.

The work of the group is just about complete. [Details](#)

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](#)
 - A new Registered Disclosure Document (RDD) for a very specialized compression application of RAW Bayer sensor data. [Details](#)
-

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.

[Details](#)

Digital Cinema (D-Cinema)

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

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

Current projects deal with:

- 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 was published in the Q1 2019. It creates a profile of the DPX file format standard to carry HDR / WCG. A new project has just started to produce a reference implementation. [Details](#)

Material Exchange Format – MXF This widely-used file-based media format does not stand still and there are always projects adding features and mappings to the MXF suite of standards or creating constraints for improved interoperability in a variety of application areas. There are currently 8 MXF projects in process. [Details](#) They include two new projects:

- HEVC in the MXF generic container [Details](#)
- Mapping high throughput JPEG 2000 in the MXF generic container [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](#)

This group is keen to get more participation from implementers of media microservices and has held two Media Microservices Summits in the last quarter to aid recruitment and identify the most important items to focus the work.

Serial Audio Definition Model (ADM) over AES3

This standard specifies a method for transporting 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](#)

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 with extensibility for future requirements. [Details](#)



SMPTE® Standards Quarterly Report: Detailed Account

SMPTE Standards Committee Meetings 17-20 June 2019

Hosted by IMAGICA Lab., Tokyo, JP

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](#)

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

There was also a Standards Community meeting that introduced general updates to the SMPTE Standards development process and sessions that provided training/familiarization with an updated version of the software tool that is used to support the standards processes.

Being in Tokyo, attendees were given the opportunity to visit the NHK Science and Technology Research Labs for demonstrations of their latest research projects as well as a tour of IMAGICA Labs.



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](#).

Future Meetings

Quarterly Standards meeting rounds are planned for:

- Sept. 2019 Fraunhofer, Erlangen, DE
- Dec. 2019 Arista, San Jose, CA, US
- March 2020 SMPTE India Section, Mumbai, IN
- June 2020 AWS, Portland, OR, 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 report are also provided in the footer of each page to assist with navigation.

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



Details From Each Technology Committee (TC) Meeting

Essence Technology Committee (TC-10E) Chaired by 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: Multiplanar Picture Format Part 1. Elementary Bitstream

Status: The draft document has been revised to use a simplified set of terms and definitions. It is in a 4 week pre-FCD-ballot review. Webinars have been held to introduce the VC-6 concepts to make it easier to review the draft standard.

RP 2117-2 VC-6 Conformance

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

[Drafting Project](#)

Status: A reference decoder written in Python has been developed 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)



- 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](#)) completed DP vote the day of the meeting - the vote passed with 3 comments. One comment was accepted and two comments will be treated as late comments to be dealt with at the one-year review.

Part 2 ([Drafting Project](#)) Third revision required to add coverage for VC-5 Part 7. Work has begun on XML Schema and Python scripts for verifying conformance to ST 2073-7 Metadata.

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

Business Impact: Interoperability between systems

VC-2 video compression suite 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

[Drafting Project](#)

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

Status: The DG Chair reported that work is underway on new conformance software to include:

- Bitstream conformance checker
- Bitstream generator
- Bitstream viewer

The conformance checker will be derived directly from the pseudo-code and normative provisions of the VC-2 specification ST 2042-1.

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

New RDD: High Density Encoding – Data Encoding Specification

Losslessly reducing the footprint of large format, RAW, Bayer pattern files from ARRI ALEXA cameras.

[RDD Project](#)

Status: This is a newly-approved project. An introduction to the topic was given by the proponent.

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 – some editorial revision has been identified as a result of experience developing Part 4).

Part 2 is published (and ready for its one-year review). A revision [Drafting Project](#) has been set up. 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 passed FCD rebalot 2019-01-11 with 73 comments to resolve, many of which are now resolved. Comment resolution is ongoing.

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

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

[DG Project](#)

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

Status: The document closed FCD ballot 2019-06-16 with 30 comments to resolve. The document comprises the RP together with spreadsheet elements for the tabular data.

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 FCD ballot did not achieve numerical consensus and was extended for 2 weeks until 2018-12-11.

The extended ballot closed with 78 comments but did not achieve numerical consensus.

There are 6 comments left to address. The revised document will then go to 2nd pre-FCD review. The TC is voting on the content of an advisory note for implementers of the published version of the document.

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 was published 2019-01. The group is preparing a list of informational liaisons for other groups who may wish to update P3 documents to reference ST 2113.

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

[DG Project](#)

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

Status: Work on this document is complete and the DG will be closed.

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.

Status: This SG will be closed down as contributions for its report have not been forthcoming.

Academy Spectral Similarity Index (SSI)

[DG Project](#)

This new project has been initiated to standardize SSI.

Existing color-rendering metrics were designed for human vision or for television cameras, *not* cinema cameras. Digital cinema cameras see light differently than human vision (and each other), so no metric to evaluate lighting based on a single set of spectral sensitivities will work for any camera. The problem is exacerbated by non-Planckian light sources such as LED; existing metrics are unreliable predictors of the color-rendering capability of LED lighting in cinema production.

Status: The project was approved shortly after the last meeting. A Drafting Group has now been set up and the project can start. An initial draft document is available.

Other TC-10E business

Projects are in the the approval phase to revise the ACES documents.

There was discussion about the need for a document for Color Space Identification.



Digital Cinema Technology Committee (21 DC) Chaired by Steve Llamb 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 passed FCD-ballot 2019-01-01 with 11 comments to resolve. This DG met during this round and progressed the comment resolution. Note that there is [other work](#) that has further amended 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. Solutions to the absence of a baseline in Japanese text are being considered.

Status: This has been the major work of the group. IMAGICA has reported that different rendering systems render Japanese subtitles differently. The group is working on determining the cause of each issue. Possibilities include: improper implementation of the standard, use of an old version of the standard, lack of clarity in the standard. Where there is a lack of clarity, the group is attempting to make the standard clear.

Business Impact of Stereoscopic Subtitles projects: Compatibility and Interoperability

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.



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

[Drafting Project](#)

Status: This document is published.

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

[Drafting Project](#)

Status: ST 429-2 amendment was published 2019-01. However, a problem with its normative reference to ST 429-4 was identified at this meeting and the publication was removed from the store. 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 closed FCD rebalot 2019-02-05 with 3 comments to be resolved. It was reported that there is concern that this document references the 2004 version of ST 377 and ST 379 rather than current versions.

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; see ST 430-14 below. The work has been largely done and a UL registration has been submitted.

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. However, it was reported at this meeting that this document may not be needed as the Protocol document is being made clearer.



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 DG Chair reported that this document is being worked on and useful comments are being submitted.

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 document is in the publication queue. The project will be closed.

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 has passed ST Audit and will be prepared for publication. The project will be closed.

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 document is published and the project will be closed.

Amendment: ST 430-1 – Key Delivery Message

[Drafting Project](#)

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 passed DP elevation vote 2019-06-18. Will be posted to ST for audit.



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.

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

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 is processing 1 year reviews as they come due. An "umbrella project" has been set up for this purpose and individual projects will be set up for the drafting work on each document.

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

Status: The document was published in Q3 2018.

EG 2112-2 - Audience Measurement Ecosystem

Status: The document was published in Q3 2018.

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

Status: The document was published in Q2 2018. One-year-review has identified that some clean up is required.

RP 2112-11 - OBID Conformance Test Materials

Status: The document was published in Q2 2018. One year review has identified that some clean up is required.

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

Status: The document was published in Q2 2018. One year review has identified that some clean up is required.

RP 2112-21 - OBID-TLC Conformance Test Materials

Status: The document was published in Q2 2018. One year review has identified that some clean up is required.



Revision: ST 2016-1 - AFD and Bar Data

[DG Project](#)

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

Status: The document revision needs completion.

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 2019-04.

RP 2072 - Emphasis and Preferred Sampling Rate for AES/EBU Digital Audio in Television. This document came up for 5 year review and the TC voted that it should be reaffirmed and stabilized.

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 developed Parts 1, 2 and 5. A vote to reaffirm Part 5 was held. The vote passed. The DG is managing the following document development project:

Revision: ST 2098-2 - Immersive Audio Bitstream Specification

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 pseudocode) that were better handled as a revision rather than an amendment.

Drafting Project

Status: The revised document is in the publication queue.

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 document completed DG review 2019-03-25.

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: Editing work continues at approximately 2-weekly meetings.

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: There was a walk-through of the draft report at the TC. It was clarified that the report is intended for TC-25CSS use only. There will be a TC review period to collect comments.

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

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

UMID Projects

The Chair of the following projects gave a status report.

Application of the Unique Material Identifier (UMID)

[SG Project](#)

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

UMID-related Standards:

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

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: The ST 330 Committee Draft has been submitted to the TC Chairs for FCD Ballot. The TC Chairs have been asked to get approval for the use of an ICAO document to serve as a normative reference.

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: An initial draft revision has been submitted for DG review. Another application example will be added after the ST 330 FCD ballot is complete.

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: The proponent gave a presentation on this dns-like concept for locating A/V essence from its UMID.

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 is at ST Audit, closing 2019-07-09.

RDD 49 Professional Metadata (PMD)

[Drafting Project](#)

Status: This document has been published in the last quarter and the group will be closed.

New Study Group: UUID File Naming

This project will explore ways to unify the application of UUIDs to files, primarily as file names, but respecting whatever UUIDs already have been assigned to files.

[SG Project](#)

This is a newly-approved project and the SG will be set up shortly.



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 the project group is progressing through the ballot process. The entries currently being collected will then be prepared for ballot, to form the “Sriracha” release.

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. Six projects are in preparation to implement this work.

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. A draft register in spreadsheet form has been compiled for existing essence elements (and any new assignments) and is available at the above Development Area URL.

Status: As ST 2088 is nearing publication, there have been discussions with the creator of the online registers and the Essence Element contents will be incorporated into the xml register set.

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 DP ballot has passed, and the document will be submitted for ST Audit after the 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 pre-DP-vote review should occur shortly.

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

[Drafting Project](#)

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

Status: The draft revision of RP 2057 passed FCD ballot on 2018-02-09 with 5 comments to resolve. There is a small amount of work to complete comment resolution and pre-DP-vote review should occur shortly.

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 that are now resolved. There is a small amount of work to complete and pre-DP-vote review should occur shortly.

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

Project scope:



- Create additional MCALabelSubdescriptor properties
- Clarify existing definitions and use of redundancy of properties in multiple subdescriptors
- Replace all occurrences of ISO-8 with ISO7

[DG Project](#)

Status: The working draft has been submitted to the TC for pre-FCD-ballot review. The ULs have been accepted by the register maintenance group in TC-30MR.

New RDD 50: Avid DNxUncompressed - Packing definition and mapping to the MXF Generic Container

[Drafting Project](#)

Status: This document passed RDD ballot on 2019-05-09 with 22 comments. Comment resolution is well advanced.

New Standard ST 381-5: Mapping HEVC Streams into the MXF Generic Container

This project will facilitate 8k and 4k Program Exchange, Archiving and Play-out operations.

[DG Project](#)

Status: The kick-off meeting for this group was held during this meeting round and a first draft of ST 381-5 was reviewed.

Revision ST 422:2014: Mapping JPEG 2000 Codestreams into the MXF Generic Container (HTJ2K)

This project adds support for the wrapping of codestreams that conform to ISO/IEC 15444-15 (High-throughput JPEG 2000).

[DG Project](#)

Status: The DG held its first meeting the week before this meeting round and reported good participation. The work is moving ahead.

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:

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 text update has been complete for some while, but a possible requirement has arisen to add an “any” type to support development of Part 2.

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. Use of IMF metadata is being considered to avoid reinvention.

Status: Work is progressing. The group has discovered a need for “any” data type in Part 1.

New Recommended Practice: Reference Materials for DPX V2.0 HDR Implementations

This project follows hot on the heels of publishing ST 268-2 - Constrained Application of Digital Moving-Picture Exchange (DPX) Format for High Dynamic Range.

Project scope: Generate a reference model and test materials that implement the essential features of HDR DPX workflows.

[DG Project](#)

Status: The DG met during this round and made some changes to the project details in response to comments received. The link above goes to the updated details. The main issue was that, as ST 268-2 is an extension of ST 268-1, the scope of Part 1 materials in the package needed to be clarified.

Other TC-31FS business

Revision of ST 2065-4:2013 ACES Image Container File Layout

A [new project](#) has been proposed. The ACES suite will be prepared for submission to ISO.



Network and Facilities Architecture Committee (32NF) Chaired by Leigh Whitcomb and Thomas Kernen

The application of the general scope as it applies to definition and control of elements supporting the infrastructures of content production and distribution facilities, including file management, transfer protocols, switching mechanisms, and physical networks that are both internal and external to the facility excluding unique final distribution methods.

Working Group on SDI Interfaces

WG Project

The Working Group (32NF40) scope is:

Manage Engineering Documents dealing with electrical and optical SDI interfaces with nominal link rates up to 3Gb/s as well as a 10Gb/s optical interface including the mapping of essence, data, and metadata and the details of the physical interfaces.

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

The WG controls the following projects:

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. It was established at the 2018-12 meeting that pdf can be considered an “editable format” for these documents.

Status: Three EGs, in the form of posters are being produced:

EG 2111-1 SD and HD-SDI Roadmap – ready for ballot, though project needs to be set up

EG 2111-2 UHD-SDI Roadmap - in the publication queue

EG 2111-3 10G-SDI Roadmap - ready for ballot, though project needs to be set up

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 425-3 (dual link) and ST 425-5 (quad link) published in Q2 2019.

ST 2036-4 revision closed ST Audit 2019-06-18 with no comments. [Drafting Project](#)

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.

The document closed ST Audit 2019-05-28 with no comments. [Drafting Project](#)

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](#).

As the work of this group is now complete, the DG will be disbanded and projects closed.

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: The WG requests the TC Chairs to initiate FCD ballot.

Other 32NF40 WG Business

As a tidy-up, it was agreed that earlier projects on Haptic-Tactile Essence Transport and Ruggedized SDI Optical connector will be closed.



Working Group on Video Over IP

[WG Project](#)

This Working Group (32NF60) was established to handle projects related to IP transport of media.

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

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 consists of:

Standard: Part 10 - System Timing and Definitions

Published and a one-year review [Drafting Project](#) is underway.

Standard: Part 20 - Uncompressed Active Video

Published and one year review is under way.

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

Published

Standard: Part 22 - Constant Bit Rate Compressed Video

[Drafting Project](#)

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

[Drafting Project](#)

Standard: Part 30 - PCM Digital Audio

Published and one year review is due.

Standard: Part 31 - AES3 Transparent Transport

Published

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

Published

Standard: Part 41 – Fast Metadata

[Drafting Project](#)

Standard: Part 42 – Formatting an ST 2110 Sender SDP Object for Transport using ST 2110-41 Fast Metadata (FMX)

[Drafting Project](#)



Standard: ST 2022-8 - Timing of ST 2022-6 streams in ST 2110-10 Systems This document defines constraints on ST 2022-6 streams for interoperation with ST 2110 streams.

Status of Suite: ST 2110 Parts 10, 20, 21, 30, 31 and 40 and ST 2022-8 are published.

- Part 22 passed DP approval vote 2019-06-11 and has started ST Audit, closing 2019-07-11.
- Part 23 passed FCD ballot 2019-03-08 with 21 comments to address. The comments are believed to be resolved, awaiting official acceptance by commenters.
- ST 2110-10 one-year-review identified topics that require revision, including definitions of syntax for asynchronous operation, definition of Reconstruction delay and improvement to RTP timestamp definitions. The draft revision is in pre-FCD-ballot review.
- ST 2110-20 one-year-review. A new [revision project](#) has just completed its approval period.
- ST 2110-21 one year review and revision. A draft project statement has been posted.
- ST 2110-30 one year review and revision. The group will examine AES67-2018 liaison copy (just received) to determine if changes are needed.
- A new [Project](#) has been approved “Protocol Implementation and Conformance Statement” (like a conformance checklist) for each of the documents in the ST 2110 suite.
- Part 41 work is progressing. The group is deciding between using a KLV structure or a Words-Identifier-Blob structure. Part 42 awaits the definition of Part 41.

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

[Drafting Project](#)

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

Status: The document is published – close group.

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 at ST Audit, closing 2019-07-09.



There may be an additional project, 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. Project proposal awaited.

Working Group on Ultra HD SDI Interfaces

[WG Project](#)

This Working Group (32NF70) was established to create a hierarchy of single-link, dual-link and quad-link electrical and optical SDI interfaces with nominal link rates of 6Gb/s (ST 2081 suite), 12Gb/s (ST 2082 suite) and 24Gb/s (ST 2083 suite). See below for the individual documents in each suite. The optical interface parameters supporting these standards have been added to ST 297-1: Serial Digital Fiber Transmission System for ST 259, ST 344, ST 292-1/2, ST 424, ST 2081-1 and ST 2082-1 Signals.

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

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. They are at ST Audit closing 2019-06-24.

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. . They are at ST Audit closing 2019-06-24.

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

UHD-SDI Stress Pattern and Check Signal

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.

[DG Project](#)

Status: The WG Chair reported that the project is underway.

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.

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.

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. 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 is planned).

Status:

- [ST 2059-1](#): The document completed its pre-FCD review on May 29 and the DG is working through the pre-FCD review comments that were received.
- [ST 2059-2](#): The document completed its pre-FCD review on May 17 and the DG has completed addressing the comments that were received. During this meeting round, the DG reached consensus that the document is ready for FCD ballot.

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 five rounds of testing, all hosted by FOX NE&O in Houston, TX, USA:

- 2015-11, 2016-06, 2017-03, 2018-02, 2019-02.
- Reports (where available) are on this SMPTE [website page](#).

Status: The group will start working on the 2019-02 report at its telecon on June 27, to be ready for next plenary.

New Recommended Practice: ST 2059-2 PTP Device Monitoring Capabilities

The project will create a reference model containing a set of parameters to query the status of ST 2059-2 PTP devices.

[DG Project](#)

Status: This new project has just completed approval.

New Engineering Report: Using ST 2059 in ST 2110 Networks with ST 2022-7 Redundancy

The current ST 2059 documents and their underlying references (IEEE-1588:2008) do not provide sufficient clarity in regard to the behaviors of Grandmaster Candidates or Slave-only devices when operating on networks with redundant parallel infrastructures.

[DG Project](#)

Status: No progress



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

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

[DG Project](#)

Status: The DG made good progress but suffered disruption when the Chair stepped down. It will resume meetings starting week of June 24. It is 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 2059-14 - Best Practices for Large Scale SMPTE ST 2059-2 PTP deployments

[Drafting Project](#)

Status: A new draft was posted during the 2019-03 meeting week. No further progress.

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

[Drafting Project](#)

A Part 2 document is also planned, dealing with Other Media Terms and Definitions.

Status: No new progress to report.

Working Group on Data over AES3

[WG Project](#)

This Working Group (32NF90) 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 is at ST Audit, closing 2019-07-09.

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: The WD document is in progress.

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 document passed FCD ballot 2019-06-11 with 8 comments to resolve. Proposed resolutions were discussed at a DG meeting during this round.

A [related project](#) **Amend SMPTE 338 Format for Non-PCM Audio and Data in AES3 — Data Types** makes the addition of the ADM data type and adds ST 2116 to the bibliography. It was agreed at this meeting that this is such a simple addition that it can go straight to FCD ballot.

Study Group: Security in SMPTE ST 2059

This project was approved 2018-12-03.

[SG Project](#)

This SG will investigate vulnerabilities in ST 2059 systems, both malicious and accidental



Status: The SG has completed a short initial report to inform industry and draw cybersecurity expertise. For the main report, the SG is currently focusing on a PTP threat list and table and Threat Model. It has developed a PTP architecture diagram to visualize threats and trust boundaries.

Media Systems, Control and Services Committee (34CS) Chaired by John Footen 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

The Broadcast Exchange Format document suite comprises:

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.

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 6.0.

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:

All BXF 6.0 document revisions have been published in the last quarter.

BXF 7.0 revision work is complete - documents and schema for pre-FCD-ballot review shortly:

- Enhancements for Viacom, FOX, etc. completed
- Comprehensive HDR work (PQ and HLG) completed



- J2K IMF Application Constraint completed (NABA DPP)
- UHD Air Ready Master completed (NABA DPP)

BXF 7.0 Projects

Revision: RP 2021-1 Broadcast Exchange Format (BXF) — Requirements and Informative Notes (BXF 7.0)

[DG Project](#)

Revision: ST 2021-2 Broadcast Exchange Format (BXF) — Protocol (BXF 7.0)

[DG Project](#)

Revision of EG 2021-3 Broadcast Exchange Format (BXF) — Use Cases (BXF 7.0)

[DG Project](#)

Revision of ST 2021-4 Schema Documentation (BXF 7.0)

[DG Project](#)

Media Device Control over IP

[DG Project](#)

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

ST 2071-1: Media Device Control - Framework - Published in 2012, updated in 2014, 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 – In Development

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. WSDL & XML Schemas are included.

Status:

Part 3 revision ([Drafting Project](#)) and Part 4 ([Drafting Project](#)): These documents have returned to



WD status following some issues with document revision control during balloting.

The DG has taken the opportunity to substantially restructure and improve the revision to ST 2071-3. Pre-FCD-ballot review for draft revision ST 2071-3 is expected in the next quarter.

There was an introduction at the meeting to possible work to harmonize ST 2071, AES70 and NMOS specifications.

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

However, the group needs more members with hands-on microservices development experience and so two “Media Microservices Summits” were held in Los Angeles and New York in May 2019.

The summits helped the group to define some target items: Defining a common taxonomy, terms & definitions, resource management, decomposition of services, orchestration of services, security, service discovery mechanisms. It is hoped that a face-to-face DG meeting can be held in August to re-initiate the work.

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 (was 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

IMF document maintenance DG

This DG deals with any issues discovered with the above documents and manages document revision



IMF Issue Triage

[Drafting Project](#)

Issues are continuously collected and discussed in SMPTE 35PM GitHub repository and contribute to revision work, for both bugs and improvement requests. Contact TC Chairs for access:

<https://github.com/orgs/SMPTE/teams/35pm/repositories>

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

[Drafting Project](#)

Status: Pre-FCD review is complete and a meeting is scheduled for 2019-07-27 to address comments.

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

[Drafting Project](#)

Status: Pre-FCD review is complete and a meeting is scheduled for 2019-07-27 to address comments.

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

[Drafting Project](#)

Status: Pre-FCD review is complete and a meeting is scheduled for 2019-07-27 to address comments.

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

[Drafting Project](#)

Project to reflect implementation and interchange experience.

Status: Pre-FCD review is complete and a meeting is scheduled for 2019-07-27 to address comments.

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

Revision will include amendment ST 2067:2016 Amd1:2017; propose a solution for storage of HDR content; update the normative references

[Drafting Project](#)

Status: WD under development. Proponents agreed to introduce non-linear transfer function(s) rather than half-float encoding.

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



Drafting Project

The amendment will add support for Hybrid-Log-Gamma color system as specified in ITU BT 2100.

This project will be the first test for a new process that allows publication of the CD document prior to FCD ballot in order to verify independent implementations at a SMPTE IMF plugfest. When interoperability is verified, the document will proceed to FCD ballot.

Status: Publicly available pre-FCD-ballot review starting soon.

IMF Plugfest DG **Drafting Project**

The SMI group has held several plugfests, the most recent was in London, 2019-05, at Amazon HQ.

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

There is a related activity outside of SMPTE – The IMF Users Group: <https://imfug.com>

Status: The London plugfest topics were Application DPP - TSP-2121-4, Internet Media Subtitles and Captions 1.1 (IMSC1.1), Timeline Testing, IMF Application #5 (ACES) - SMPTE ST 2067-50:2018, SMPTE RDD 45:2017 (IMF Application ProRes).

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.

Status: This DG has no active projects, but new projects are in preparation.

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.

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



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 closed ST Audit the day after the meeting. There is one comment to resolve.

WG 35PM-60: IMF DPP Application

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

Status: The three documents in the projects below will be submitted for TC review when a separate [amendment project](#) to add HLG to ST 2067-21 is complete.

Revision: ER 2121-2: Application DPP Requirements Document

[DG Project](#)

The DPP/NABA members have identified additional requirements for the use of J2K within the TSP 2121 family, which should be reflected in ER 2121-2. ER 2121-2 will be revised to reflect the new requirements.

Status: The document is ready for TC review.

Revision: ER 2121-3: DPP Audit of Business Requirements

[DG Project](#)

Revise ER 2121-3 to note how requirements of revised ER 2121-2 are met by the TSP 2121 family of documents.

Status: The document is ready for TC review.

New Specification: TSP 2121-4: Application Constraint DPP (JPEG 2000)

[DG Project](#)



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This Specification will constrain IMF Application #2E to define specific technical requirements which will be implemented in a common way for many broadcast and online users of IMF, whilst keeping aligned with the broader App #2E.

Status: The document is ready for TC review.



SMPTE Standards Publications in the Last Quarter

10E Essence:

ST 2115:2019: Free Scale Gamut and Free Scale Log Characteristics of Camera Signals

20F Film:

21DC Digital Cinema:

24TB Television & Broadband Media:

25CSS Cinema Sound Systems:

30MR Metadata & Registers:

31FS File Formats & Systems:

32NF Network & Facilities Architecture:

ST 2022-7:2019: Seamless Protection Switching of RTP Datagrams

ST 2022-8:2019: Professional Media Over Managed IP Networks: Timing of ST 2022-6 Streams in ST 2110-10 Systems

ST 425-3:2019: Image Format and Ancillary Data Mapping for the Dual Link 3 Gb/s Serial Interface

ST 425-5:2019: Image Format and Ancillary Data Mapping for the Quad Link 3 Gb/s Serial Interface

34CS Media Systems, Control & Services:

EG 2021-3:2019: Broadcast Exchange Format (BXF) — Use Cases

RP 2021-1:2019: Broadcast Exchange Format (BXF) — Requirements and Informative Notes

ST 2021-2:2019: Broadcast Exchange Format (BXF) — Protocol

35PM Media Packaging & Interchange:



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 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 to revise if 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](#).*