



SINCE 1916

# STANDARDS QUARTERLY REPORT March 2019

Result of SMPTE® Technology Committee  
Meetings  
11-14 March 2019

Hosted by  
SMPTE Headquarters  
White Plains, NY, USA

## THE NEXT CENTURY



## SMPTE® Standards Quarterly Report: Executive Summary

*SMPTE Standards Committee Meetings 11-14 March 2019*

*Hosted by SMPTE HQ, White Plains, NY, 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 12 subgroups scheduled meetings at this round.

44 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 if discussed in meeting)*

| <b>TC</b>                  | <b>Type</b>                | <b>Project</b>   | <b>Details</b>                     |
|----------------------------|----------------------------|--|------------------------------------|
| <b><i>Essence</i></b>      | <b><i>New Standard</i></b> | <b><i><a href="#">Academy Spectral Similarity Index (SSI)</a></i></b>  | <b><i><a href="#">here</a></i></b> |
| <b><i>Packaging</i></b>    | <b><i>Amendment</i></b>    | <b><i><a href="#">ST 2067-21 – IMF Application #2E - to include HLG color system</a></i></b>   | <b><i><a href="#">here</a></i></b> |
| <b><i>File Systems</i></b> | <b><i>New Standard</i></b> | <b><i><a href="#">Mapping HEVC Streams into the MXF Generic Container</a></i></b>  | <b><i><a href="#">here</a></i></b> |
| <b><i>Packaging</i></b>    | <b><i>Revision</i></b>     | <b><i><a href="#">ER 2121-2 - to note additional requirements for a JPEG 2000 based application to meet the needs of DPP members</a></i></b> | <b><i><a href="#">here</a></i></b> |



|   |                                    |  |                             |
|---|------------------------------------|--|-----------------------------|
| <b>Packaging</b>                        | <b>Revision</b>                    | <a href="#"><u>ER 2121-3 - to indicate how the updated requirements of the revised ER 2121-2 are met by the TSP 2121 family of documents</u></a> | <a href="#"><u>here</u></a> |
| <b>Packaging</b>                        | <b>New Technical Specification</b> | <a href="#"><u>TSP 2121-4 – to support JPEG 2000 library masters - dpp</u></a>   | <a href="#"><u>here</u></a> |
| <b>Media Systems, Control, Services</b> | <b>Revision</b>                    | <a href="#"><u>ST 2021-1: BXF - Requirements and Informative Notes (for BXF 7.0 features)</u></a>  |                             |
| <b>Media Systems, Control, Services</b> | <b>Revision</b>                    | <a href="#"><u>ST 2021-2: BXF - Protocol (for BXF 7.0 features)</u></a>  |                             |
| <b>Media Systems, Control, Services</b> | <b>Revision</b>                    | <a href="#"><u>ST 2021-3: BXF – Use Cases (for BXF 7.0 features)</u></a>   |                             |
| <b>Media Systems, Control, Services</b> | <b>Revision</b>                    | <a href="#"><u>EG 2021-4: BXF – Schema Documentation (for BXF 7.0 features)</u></a>  |                             |
| <b>Network</b>                          | <b>Amendment</b>                   | <a href="#"><u>ST 338: Format for Non-PCM Audio and Data in AES3 - Data Types (to include values specified in SMPTE ST 2116)</u></a>             | <a href="#"><u>here</u></a> |
| <b>Metadata / Registers</b>             | <b>New Study Project</b>           | <a href="#"><u>Use of UUIDs</u></a>  | <a href="#"><u>here</u></a> |

---

### **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
- 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:

- 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](#)
- 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](#)

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. [Details](#)

A number of documents in the IMF suite are currently being revised. A new project adds HLG to application 2E. [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. [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](#)



## ***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 last quarter. It creates a profile of the DPX file format standard to carry HDR / WCG. A new project is planned 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 9 MXF projects in process. [Details](#) A new project will standardize HEVC in the generic MXF container. [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](#)



Society of Motion Picture and Television Engineers®

445 Hamilton Avenue

White Plains, NY 10601 USA

[www.smpte.org](http://www.smpte.org)

**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.

### **Serial Audio Definition Model (ADM) over AES3**

This standard will specify a method of 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](#)



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

*SMPTE Standards Committee Meetings 11-14 March 2019*

*Hosted by SMPTE HQ, White Plains, NY, 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](http://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.

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:

- June 2019 Imagica, Tokyo, JP
- Sept. 2019 Fraunhofer, Erlangen, DE
- Dec. 2019 Arista, San Jose, CA, US
- March 2020 TBA

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 is being revised to use a simplified set of terms and definitions. The document author gave a presentation at the DG meeting describing the key concepts of VC-6. Splitting the document into four parts is under consideration.

##### **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. It will be aligned with the new terms and definitions in Part 1.

##### **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](#)) passed FCD ballot 2018-12-17 with 46 comments to resolve. Comment resolution continues on the one comment that remains unresolved.

Part 2 ([Drafting Project](#)) Third revision required to add coverage for VC-5 Part 7. Work has started on XML Schema, Python scripts, and reference codec.

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 to produce the conformance materials and reference decoder.

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

---

## SMPTE 2080 Document Suite: Reference Display and Environment for Critical Viewing of Television Pictures

### [DG Project](#)

This project group will draft the following suite of documents dealing with the use of fixed pixel matrix reference displays:

ST 2080-1: Reference White Luminance Level and Chromaticity (published)

RP 2080-2: Measurement and Calibration Procedure for HDTV Displays (deals with parameters that can be regularly adjusted - published)

ST 2080-3: Reference Viewing Environment Characteristics (published)

RP 2080-4: Full Measurement / Calibration

ST 2080-x: Reference Display Characteristics

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

#### **Status:**

Part 1 is published (and ready for its one-year review – some editorial revision has been identified).

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 were resolved during the face-to-face meeting this week. 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 is in pre-FCD-ballot review, closing 2019-03-21. 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. 52 comments had been resolved by this meeting round. Incompatible new constraints are being handled through versioning.

#### **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 - Free Scale Gamut and Free Scale 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 being prepared for publication and the group will be closed when that occurs. TC-30MR has been informed that the UL used in the document needs to be classified as “accepted”.



## 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:** The SG plans to draft a short report based upon a list of industry assumptions and a few key points.

## 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 is in its approval phase, closing 2019-03-19. A presentation was given at the meeting, further explaining the problem that SSI will help to solve.

## [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. A comment resolution draft has been



developed in the DG. 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. Solutions to the absence of a baseline in Japanese text are being considered.

**Status:** Attention has focused on typography, determining what information is available in font files regarding baseline, bounding box, and other font metrics. The group is studying the rendering issues to determine the cause. Where the standard has been misinterpreted, text and drawings further explaining the intent are being added.

**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.

**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 in the publication queue.

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

#### [Drafting Project](#)

**Status:** ST429-2 amendment was published 2019-01. 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 DP vote 2018-12-17. However, it contained an erroneous update in a normative reference to a more recent MXF standard, which in fact is not appropriate for D-cinema use. The document will therefore be submitted for a new FCD ballot after 3 comments have been addressed.



---

### ***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.

#### **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 project below.

#### **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 will be picked up again shortly and changes will be carried forward to ST 430-17 as far as possible.

#### **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 closed FCD ballot 2018-12-24 and the 3 comments are resolved. Passed DP vote at this meeting.

#### **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 closed FCD ballot 2018-12-24 and the 7 comments are resolved. Passed DP vote at this meeting.

### **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 is in the publication queue and the group has been 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 draft document passed FCD ballot 2018-12-24 and the 3 comments are resolved. Passed DP vote at this meeting.

### **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 FCD ballot 2018-12-24 and the 3 comments are resolved. Pre-DP-vote review will be started as soon as possible.

## ***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. Based on implementation experience, it was decided at this meeting by consensus vote that the Engineering Guideline is not needed. This DG will be closed.

**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 process 1 year reviews as they come due.

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

#### [Drafting Project](#)

**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. One-year-review will make a correction to number the Scope section.

### **RP 2112-11 - OBID Conformance Test Materials**

#### [Drafting Project](#)

**Status:** The document was published in Q2 2018. One year review has identified that no changes are required.



**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.

---

**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.

RP2072 - 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 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



pseudocode) that were better handled as a revision rather than an amendment. The revision passed FCD ballot 2019-01-04 and the 3 ballot comments are resolved. Pre-DP ballot review is also complete. A DP elevation vote was held. The vote passed.

---

## **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 is in DG review to confirm the WD document is stable, closing 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:** The DG continues to meet every 2 weeks. Editing work is in progress.

---

## **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:** The SG gave a presentation on its findings. The TC decided that a short, formal report should be produced. It is proposed that the group will transition its work to drafting an RP and then an EG.



***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 draft revision is at pre-FCD-ballot review, closing 2019-03-20. The DG Chair reported that some valuable comments have been received.

**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.

**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 DG will review initial thoughts contained in Study group report on umid applications Part 2-1.

---

### **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 expects that the revised document will be ready for pre-DP-ballot review next month.

### **RDD 49 Professional Metadata (PMD)**

#### [Drafting Project](#)

**Status:** This document is in the publication queue.

### **UUID File Naming**

#### [SG Project](#)

This is a new project that will be submitted for project approval 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 ready to start pre-ballot review.

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. A presentation analyzing what is required to bring these documents into line with the current process was given at the TC meeting.



## 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.

**Status:** 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.

---

## ***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. A comment was made that identified a problem, and that has been fixed in the latest draft. When the DG reaches consensus that the document is ready for DP vote, it will be submitted.

### **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 the draft revised ST 380 will be submitted for pre-DP-vote review early in 2019-04.

#### **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 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:** ST 2042-4 was published in the last quarter.

#### **New RDD 48: MXF Archive and Preservation Format Registered Disclosure Document**

##### [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 was published in the last quarter.

#### **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](#)

**Status:** The working draft has been reviewed in the DG and pre-FCD-ballot review is expected by mid 2019-04.

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

##### [Drafting Project](#)

**Status:** This document was approved for a 3 week RDD ballot at the TC meeting. The ballot has since been started, closing on 2019-04-04.

---

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

Discussion in this group about making persistent filenames using uuids has resulted in a [spin-off project](#).

---

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

#### [DG Project](#)

This project will develop a new constrained standard for 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 was published in the last quarter.

The DG has been kept open for work to develop a reference implementation. The proposal “Informative reference model for HDR-DPX (ST 268-2)” was discussed and encouraged at this meeting.

### **Other TC-31FS business**

#### **New Standard: Mapping HEVC Streams into the MXF Generic Container**

##### [DG Project](#)

A presentation was given describing this proposal. It will facilitate 8k and 4k Program Exchange, Archiving and Play-out operations. The project has actually completed its approval process and work will start.



**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.

*A new Chair for this WG has been appointed and its work has resumed following a short hiatus*

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.

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

EG 2111-1 SD and HD-SDI Roadmap

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

EG 2111-3 10G-SDI Roadmap

It was established at the last 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 425-3 (dual link) and ST 425-5 (quad link) are both in the publication queue.

ST 2036-4 revision was raised to DP status by vote at this meeting. [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 was raised to DP status by vote at this meeting. [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 close to completion, it is expected that the DG will be disbanded in the near future.

## **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 revised draft has been submitted to the TC for FCD ballot.



## **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 comprises:

#### **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 due.

#### **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.

[Drafting Project](#)

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

- Part 22 passed FCD rebalot 2019-03-04 with one comment that has been addressed.
- Part 23 passed FCD ballot 2019-03-08 with 21 comments to address.
- ST 2022-8 passed ST Audit 2019-02-22 and has started the publication process.
- ST 2110-10 one-year-review has identified topics that require revision, including definitions of syntax for asynchronous operation, definition of Reconstruction delay and improvement to RTP timestamp definitions. A revision document has been drafted and an overview was presented at the DG meeting.
- 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.
- There have been detailed presentations on plans for Part 41 and a higher level overview of Part 42. Further discussions are needed before drafting can begin.

**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 in the publication queue.

**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 ready for DP vote.

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 and have passed DP vote.

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 DP vote.

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.

---

### ***Working Group on Time Labeling and Synchronization***

#### [WG Project](#)

*This Working Group (32NF80) was established to handle projects for next-generation synchronization of systems using packetized networks and time labeling of essence in both digital and analog forms.*

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

**Business impact of WG 32NF80 work items:** Network-based facility synchronization and new functionalities for time labeling.

### **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:** Current status:



- ST 2059-1: The DG has reached consensus on the main alignment issues documented in the most recent draft of the document, though 2048x1080p alignment is still an open issue and more information from industry on fielded implementations is required. 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).
- ST 2059-2: The DG has reached consensus that ST 2059-2 is ready for pre-FCD-ballot review.

## 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:** A JT-NM “dirty hands” workshop was held at Fox NE&O in Houston week of 2019-02-18. It is for “Full Stack” testing, but this DG was invited to use the event for 2059 testing that included:

- GrandMaster failover /slave behavior
- Recovery on large systems after power loss
- Behavior of management messages passing through complex networks
- Management messages causing storms
- PTP operation for slaves with redundant port ala ST2022-7

A detailed report is expected at the next meeting round. A dedicated PTP testing event is being considered for late 2019.

## 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 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 2059-14 - Best Practices for Large Scale SMPTE ST 2059-2 PTP deployments**

#### [Drafting Project](#)

**Status:** A new draft was posted during the meeting week. Still a work in 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 passed DP elevation vote on 2019-02-08.



**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 completed pre-FCD-ballot review in 2018-12 and an updated draft was posted 2019-03-01. This document defines a new data type that needs to be added to the extended data type table in ST 338. A new project was proposed at the TC meeting to amend ST 338 to make the addition and add ST 2116 to the bibliography.

---

**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 made an initial framework for the report. It is currently focusing on a PTP threat list and table and PTP architecture diagrams. It is intended that a very brief, early report will be issued to publicise this effort at NAB.

**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***

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.

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-34CS 10 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:**

BXF 6.0. Some issues were found when Parts 1,2,3 went through ST Audit and corrected versions of the documents were submitted back to the TC. The corrected documents were elevated to DP status by vote at the meeting and will be sent again for ST Audit.

Part 4 was published in the last quarter.

BXF 7.0 is expected to include:

- More on multi channel audio
- 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

BXF 7.0 Projects

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

[DG Project](#)



Society of Motion Picture and Television Engineers®

445 Hamilton Avenue

White Plains, NY 10601 USA

[www.smpte.org](http://www.smpte.org)

**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

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 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. Pre-FCD ballot review for draft revision ST 2071-3 is expected in the next quarter.

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 that the Standards VP can publicise.

### **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

### ***IMF document maintenance DG***

*This DG deals with any issues found 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. An IMF bug tracker (used for both bugs and improvement requests) is in operation at: <https://github.com/orgs/SMPTE/teams/35pm/repositories>

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

##### [Drafting Project](#)

**Status:** WD document posted for DG review.

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

##### [Drafting Project](#)

**Status:** WD document posted for DG review.

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

##### [Drafting Project](#)

**Status:** WD document posted for DG review.

#### **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 document posted for DG review.

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

#### Drafting Project

**Status:** WD under development.

### **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.

**Status:** Project approved

---

#### ***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 outside of SMPTE – The IMF Users Group: <https://imfug.com>

**Status:** The group has organized a plugfest in London, 2019-05, at Amazon HQ. Tests carried out at the AMPAS plugfest were Internet Media Subtitles and Captions, Simple OPL Macros, IMF Application #5 (ACES), RDD 45 - 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 anticipates a need to amend Part 102 pixel color schemes in support of App2/2E.



### ***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 is at DP elevation vote, closing 2019-03-20. It will be held until one of its normative references, ST 429-18 (currently at DP status in TC-21DC), starts ST Audit.

---

### ***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):*

#### **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 has been updated, reviewed by the WG, and no further feedback is pending.

**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 updated document is ready for review by the WG.

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

[DG Project](#)

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 WG has reviewed initial draft of 2121-4 and updates are currently being made based on feedback. A separate [amendment project](#) to add HLG to ST 2067-21 supports this TSP .



**SMPTE Standards Publications in the Last Quarter**

***10E Essence:***

***ST 2113:2018 Colorimetry of P3 Color Spaces***

***20F Film:***

***21DC Digital Cinema:***

***ST 429-2:2013 Am 1:2018 D-Cinema Packaging - DCP Operational Constraints***

***RDD 29:2019 Dolby Atmos® Bitstream Specification***

***24TB Television & Broadband Media:***

***25CSS Cinema Sound Systems:***

***30MR Metadata & Registers:***

***RDD 49:2019 Professional Metadata (PMD) Specification***

***ST 335:2012 Am 1:2019 Metadata Element Dictionary Structure - Amendment 1***

***31FS File Formats & Systems:***

***ST 268-2:2018: Digital Moving-Picture Exchange (DPX) - Format Extensions for High Dynamic Range and Wide Color Gamut***

***ST 2042-4:2018: Mapping a VC-2 Stream into the MXF Generic Container***

***RDD 48:2018: MXF Archive and Preservation Format Registered Disclosure Document***

***32NF Network & Facilities Architecture:***

***OV 2110-0:2018 Professional Media over Managed IP Networks Roadmap for the 2110 Document Suite***

***34CS Media Systems, Control & Services:***

***ST 2021-4:2018 Broadcast Exchange Format (BXF) - Schema Documentation***

***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 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](#).*