

# Standards Quarterly Report September 2016



Result of SMPTE® Standards Committee Meetings

14-17 September 2016

Hosted by European Broadcasting Union (EBU)

Geneva, Switzerland



Society of Motion Picture and Television Engineers®

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## **SMPTE® Standards Quarterly Report:** **Executive Summary**

*As a result of SMPTE Standards Committee Meetings*

*14 - 17 September 2016*

*Geneva, Switzerland*

***Hosted by the European Broadcasting Union (EBU)***

Nine SMPTE Technology Committees and 9 subgroups scheduled meetings at this round.

Around 70 members attended in person over the four days, and there was additional participation by remote access. This Executive Summary captures some of the more notable project developments. More information on the current status of the one hundred ninety active projects can be found in the [detailed account](#), below.

### ***New Projects that began in the last quarter***

New Standard: Immersive Audio Cinema Bitstream Standard (work had been underway before the launch of this project) [Details](#)

New Standard: Immersive Sound Model and Bitstream (work had been under way before the launch of this project) [Details](#)

New Standard: Constrained DPX for HDR [Details](#)

Amendment: ST 2067-102 - IMF Common Image Pixel Color Schemes [Details](#)

Revision: EG2021-4 - BXF Schema Documentation [Details](#)

New Document: Develop document for BXF SDK [Details](#)

Revision: ST 2073-1 - VC-5 Elementary Bitstream [Details](#)

Revision: ST 2016-1 - Format for Active Format Description and Bar Data [Details](#)

Amendment: ST335:2012 - Metadata Element Dictionary Structure [Details](#)

Revision: ST 2084 - High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays (work not yet discussed in TC)



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### ***“Better Pixels” projects***

*The next step beyond high-definition television (HDTV) requires improvement in more than just pixel count. Improvements to parameters such as color gamut, displayed dynamic range, frame rates, and electro-optical transfer function all contribute to the improved viewing experience that is needed to justify the launch of new services.*

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

SMPTE has a project defining Dynamic Metadata for Color Volume Transformation of high luminance and wide color gamut (WCG) images. In the last quarter, five parts of the six-part suite have been published – one part on core components, plus four parts documenting individual application schemes [Details](#). The remaining part on KLV Encoding and MXF Mapping is well-advanced. [Details](#)

### **HDR and WCG Signaling on Streaming Interfaces**

A new project to define a mechanism for signaling the carriage of higher-dynamic-range (HDR) and/or WCG essence on streaming interfaces is underway. [Details](#)

### **Other HDR/WCG/EOTF projects**

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

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

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### ***Professional Media over IP***

#### **IP Media Inter-Networking with Separate Essence Flows**

This new project was launched at the beginning of 2016.

The project is developing a suite of standards defining an interoperable system for media IP networks to transport separate video, audio, and ancillary data streams. The system overview and the uncompressed video document are at pre-ballot review. [Details](#)

#### **Study Group on Flow Control in Professional Media Networks**

This group is compiling a report on media flow control in IP networks. The report goes beyond just the topic of the various techniques for switching media streams. [Details](#)



## Network-Based Synchronization for the Professional Media Environment

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

“ST 2059-2: Precision Time Protocol SMPTE Profile for Time and Frequency Synchronization in a Professional Broadcast Environment” defines the behavior of the master.

“ST 2059-1: The SMPTE Epoch and Generation and Alignment of Interface Signals” defines the behavior of slaves, allowing them to create any synchronized video, audio or time code signal.

A SMPTE group is organizing ST 2059 “plugfests” – some have been held and others are planned (several, in co-operation with other organizations). [Details](#).

A set of Engineering Guidelines for the use of this system is being drafted. The first, “Introduction to the New Synchronization System” has been published. [Details](#)

## Media Device Control over IP

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

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## SDI Interfaces

Work continues on the development of SDI interfaces:

- A suite of documents defining 6Gb/s, 12Gb/s and 24Gb/s electrical and optical interfaces targets UHD applications and multi-stream HD applications. [Details](#)
- Projects defining ruggedized optical SDI connectors [Details](#) and coarse wavelength division multiplexing for SDI interfaces [Details](#).
- There is an SDI interfaces Working Group that is managing a number of other SDI projects [Details](#)

## Time Labels

There are two projects defining Time Labels that are more suited to the current media environment than the ubiquitous ST 12 Time Code.

- A project defining a 4-part “Generic Time Label” suite.
- A project defining a 9-part “Full-featured Time Label” suite has been submitted for Technology Committee (TC) review. [Details of these projects](#)

However, “Time Code summits” are planned for Los Angeles, London, New York before the December Standards meeting round to collect user requirements that may affect these two proposals.



## ***SMPTE Video Compression (VC) Standards***

*SMPTE has standardized five video compression (VC) standards – VC-1 to VC-5. Current work on video compression standards comprises:*

- Development of an eight-part suite of documents defining the VC-5 compression system (developed from GoPro’s Cineform codec). Four parts of the suite are published and two more are awaiting publication. [Details](#).  
A related Standard to define VC-5 mapping in the MXF Generic Container is well advanced. [Details](#)
- A project that completed its work this meeting round, to amend a suite of documents defining the VC-3 compression system in order to add image resolution independence and some other improvements (developed from Avid DNxHD). [Details](#)  
The Material eXchange Format (MXF) container document for VC-3 has also completed amendment. [Details](#)
- Projects on the VC-2 document suite (developed from BBC’s Dirac Pro). This includes the addition of a new profile for ultra-high-definition (UHD) video sources for use with a high-definition (HD) infrastructure as well as amendments and revisions to existing VC-2 documents. [Details](#)
- A Registered Disclosure Document (RDD) on the IntoPIX TICO lightweight codec has just been published.

## ***Cinema Projects***

### **Cinema Sound Systems**

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

Current work on Cinema Sound Systems (CSS) comprises:

- A project group developing a Recommended Practice (RP) “Digital Cinema Sound System Setup and Calibration.” [Details](#)
- A standard “Calibration Reference Wideband Pink Noise Signal and Test File.” The document is published and a DCP (Digital Cinema Package) is being produced. The aim is to have a consistent pink noise signal for theater calibration. [Details](#)
- A Working Group on Interoperability of Immersive Sound Systems in Digital Cinema. Its goal is to standardize a single object-based distribution file format and related protocols for interoperable playback into a variety of theater speaker configurations. [Details](#)



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### **Digital Cinema (D-Cinema)**

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

Current projects focus on incorporating provisions for stereoscopic subtitles into existing D-Cinema documents, updating encryption documents and updating facility list management documents. A Working Group is also considering integration of D-Cinema additional frame rate documents. [Details](#)

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**Material Exchange Format – MXF** This widely-used file-based media format does not stand still and there are always projects adding features and mappings to this suite of standards or creating constraints for improved interoperability in a variety of application areas. There are currently 11 MXF projects in process. [Details](#)



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

*As a result of SMPTE Standards Committee Meetings*

*14 - 17 September 2016*

*Geneva, Switzerland*

*Hosted by EBU*

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The Society of Motion Picture and Television Engineers® (SMPTE®) is a global leader in motion-imaging standards and education for the communications, media, entertainment, and technology industries – and the only organization to connect the areas of motion-imaging research, standardization, education, and business success.

We encourage interested parties to learn more about specific activities.

Go to [www.smpte.org/standards](http://www.smpte.org/standards) for more information.

This report is a snapshot in time and should not be regarded as formal minutes, a positioning statement or an analysis piece. Please provide your comments or suggestions at [standards@smpte.org](mailto:standards@smpte.org)

*If you are interested in learning more about the SMPTE Standards program, please contact the [Director of Standards and Engineering](#)*

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If you need assistance getting started with the SMPTE Standards process and some of the conventions / acronyms used in this report, please jump to the [Annex](#).

### **Future Meetings**

The next quarterly Standards meeting round will be held 5 - 9 Dec. 2016 in Burbank, California, USA and will be hosted by Disney.

Further quarterly Standards meeting rounds are planned for:





6 – 10 March 2017	Altera / Intel, San Jose, California, USA
June 2017	TBA
20 – 23 September 2017	British Telecom, UK (precise location TBA)
4 – 8 December	TBA

In addition to the meetings of SMPTE Technology Committees (TCs) and their sub-groups, detailed below, some tutorial material was presented on the activities of the Standards Committee (ST) including updates to its suite of Administrative Guidelines.

There was also a short report on the Joint Task Force on Networked Media and the associated IBC Interop demonstration area and a training session on the Kavi User Guide.

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

[Essence \(10E\)](#)

[Digital Cinema \(21 DC\)](#)

[Television and Broadband Media \(24TB\)](#)

[Cinema Sound Systems \(25CSS\)](#)

[Metadata and Registers \(30MR\)](#)

[File Formats and Systems \(31FS\)](#)

[Network and Facilities Architecture \(32NF\)](#)

[Media Systems, Control and Services \(34CS\)](#)

[Media Packaging and Interchange \(35PM\)](#)

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

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## Details from each Technology Committee (TC) meeting

### *Essence Technology Committee (TC-10E) chaired by Ed Reuss and Annie Chang*

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

#### ***TC-10E documents published in the last quarter***

SMPTE ST 2019-1:2016 (Revision of SMPTE ST 2019-1:2014), VC-3 Picture Compression and Data Stream Format

SMPTE RP 2019-2:2016 (Revision of SMPTE RP 2019-2:2014), VC-3 Decoder and Bitstream Conformance

SMPTE ST 2019-4:2016 (Revision of SMPTE ST 2019-4:2014), Mapping VC-3 Coding Units into the MXF Generic Container

SMPTE RP 2047-3:2016 (Revision of SMPTE RP 2047-3:2011), VC-2 Level 65 Compression of High Definition Video Sources for Use with a Standard Definition Infrastructure

SMPTE ST 2087:2016, Depth Map Representation

SMPTE ST 2094-1:2016, Dynamic Metadata for Color Volume Transform – Core Components

SMPTE ST 2094-10:2016, Dynamic Metadata for Color Volume Transform – Application #1

SMPTE ST 2094-20:2016, Dynamic Metadata for Color Volume Transform – Application #2

SMPTE ST 2094-30:2016, Dynamic Metadata for Color Volume Transform – Application #3

SMPTE ST 2094-40:2016, Dynamic Metadata for Color Volume Transform – Application #4

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#### ***Video compression standards in SMPTE***

#### **Revision of SMPTE ST 2019 VC-3 Video Compression Documents to add Resolution Independence**



### DG Project

VC-3 is a compression format based on Avid's DNxHD video codec, defined in a suite of documents:

ST 2019-1:2014 – VC-3 Picture Compression and Data Stream Format

RP 2019-2:2014 – VC-3 Decoder and Bitstream Conformance

ST 2019-3:2008 – VC-3 Type Data Stream Mapping over SDTI

ST 2019-4:2014 – Mapping VC-3 Coding Units into the MXF Generic Container

This project adds "image resolution independence" - 1x1 to 16384x16384 - to the list of VC-3 capabilities by revising ST 2019-1 and includes new bit patterns for conformance testing in RP 2019-2. It also adds support for 12 bits and Rec. ITU-R BT.2020 color space.

The additions are backwards compatible and no current features are deprecated.

**Status:** The four parts of ST 2019 have been published in the last quarter and this project will be closed.

**Business Impact:** Interoperability between systems

### **SMPTE 2073 Document Suite: VC-5 Video Essence**

#### DG Project

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

- ST 2073-1 - VC-5 Elementary Bitstream (Published Q2-2014)
- RP 2073-2 - VC-5 Conformance Specification (Published Q2-2014, in revision to cover additional Parts; only Part 6 left to do) Includes Reference Decoder, Sample Encoder, sample bitstreams
- ST 2073-3 - VC-5 Image Formats (Published)
- ST 2073-4 - VC-5 Subsampled Color Difference Components (Published)
- ST 2073-5 – Layers (this allows embedding multiple images in a single bitstream; used for stereoscopic, HDR and interlaced frames)
- ST 2073-6 - Sections (this mechanism allows implementation of special functions without disturbing standard decoders; it delineates contiguous portions of the bitstream and allows seeking and error detection)
- ST 2073-7 – Metadata (this will provide a basic set of metadata for input image format and also facilitate round-tripping embedded metadata from other standards by use of identifiers – ACES, XMP, DPX, MXF, ALE and vendor-specific).

**Status:** Parts 1-4 are published, but Part 2 is being further revised to add test materials to support content defined in Parts 5 and 6 (which are ready for publication when Part 2 is ready). The draft of Part 2 is done except a few changes to the program documentation.



The test materials that form “elements” of Part 2 are also ready, though the group has decided to create better scripts to automate testing. A SMPTE repository for the software and test materials on “bitbucket” is being used.

Work on Part 7 will now resume, a [new project](#) formalizes this work.

A Part 0 overview document is in the SMPTE store.

Part 1 has become due for its one-year review. A limited-scope [project proposal](#) has been drafted .

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

The VC-5 group is holding joint TC-10E and TC-31FS meetings every 2 weeks.

**Business Impact:** Interoperability between systems

**VC-2 video compression projects** VC-2 is a SMPTE mezzanine video compression standard (based on BBC’s DIRAC pro). Further development of VC-2 has recently been rationalized into one drafting group with the following projects:

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

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

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

**Status:** Part 1 revision drafting is well-advanced.

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

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

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

**Status:** Part 2 revision drafting is well-advanced.

#### **Revision of RP 2042-3: VC-2 Conformance Specification**

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

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

**Status:** No progress; this work will follow the revision work in ST 2042-1.

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

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



The revision will correct errors that have been identified with “override” operation. It is necessary to specify overriding the pixel aspect ratio and the clean area as well as the base video format, together with consequent adjustments to informative Annex A.

**Status:** This document has been published in the last quarter.

**New Standard SMPTE RP 2047-5: VC-2 Level 66 Compression of UHD for use with HD Infrastructure**  
[DG Project](#)

The project scope is: Specify a new level of VC-2 compression with coding constraints that enables UHDTV video to be compressed to the same bit rates as those of uncompressed HDTV signals.

**Status:** Drafting is well-advanced.

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

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**SMPTE 2080 Document suite: Reference Display and Environment for Critical Viewing of Television Pictures**

[DG Project](#)

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

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

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

ST 2080-3: Reference Viewing Environment Characteristics

RP 2080-4: Full Measurement / Calibration

ST 2080-x: Reference Display Characteristics

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

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

Part 3 passed FCD ballot on 12 June 2015 with 13 comments to resolve. When the two remaining comments are resolved, a revised draft will be prepared and it will be submitted for pre-DP review.

There has been significant progress on Part 4 but it is a large task. It is hoped that the draft will be ready for ballot soon.

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



### **New Standard: ST 2087 - Depth Map Representation**

#### [DG Project](#)

This project will define a standard for a data representation of depth maps in multi-view production and post-production.

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

**Business Impact:** to support interoperability and exchange between relevant processes

### **New Standard (suite): ST 2094: Content-Dependent Metadata for Color Volume Transformation of High Luminance and Wide Color Gamut (WCG) Images**

#### [DG Project](#)

This project will develop a suite of standards for specifying the semantics and representation of content-dependent metadata needed for color volume transformation of HDR and WCG imagery to smaller color volumes (e.g. BT.709 or Digital Cinema) in mastering applications.

Initial document set (further Parts will be added if more proponents submit disclosures):

ST 2094-1 Core Components - published

ST 2094-2 Syntax and Carrier

ST 2094-10 Application #1 - published

ST 2094-20 Application #2 - published

ST 2094-30 Application #3 - published

ST 2094-40 Application #4 - published

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

**Status:** This group held a meeting during this round and made progress with comment resolution on Part 2. As shown above, ST 2094 Part 1 as well as the four application documents - Part 10, Part 20, Part 30, Part 40 – have been published in the last quarter.

ST 2094 Part 2 is being developed in a [TC-31FS project](#).

Documents have been created specifying SEI messages for each of the application formats. However, they reside in a variety of places and the DG will collate the information on locating them.

### **New Document: RP 2093 - Television Lighting Consistency Index**

#### [DG Project](#)

The project scope is to document “Television Lighting Consistency Index (TLCI)” and “Television Lighting Matching Factor (TLMF)”. The introduction of light emitting diodes (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:** There has been a change of Chair for this group and there was a request for confirmation that the RP is still needed. A draft document was circulated earlier in the year for pre-FCD ballot review and comments had been received.

### **New Document: ST 2100-1 - Definition and Representation of Haptic-Tactile Essence**

#### [DG Project](#)

This project deals with technology to allow a remote viewer to receive and experience not only audio and video, but also the haptic or tactile “feeling” and “impact” of an event, regardless of the transmission means. There is an [associated transport project](#) in TC-32NF.

**Status:** The DG Chair reported that all FCD ballot comments have been resolved and a new draft document has been posted to the DG.

### **New Document: RP 219-2 - UHDTV Color Bar Signal**

#### [DG Project](#)

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

**Status:** The document is in the publication queue. The DG will be closed after it has dealt with a liaison query.

### **Other TC-10E Business**

A number of documents came up for one-year and five-year review and the majority were reaffirmed at the last TC meeting. Documents that are being considered for revision are:

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





**Film Technology Committee (20F) chaired by John Miller**

*The application of the general scope as it applies to application of mastered essence to theatrical film distribution, including, media and component creation, marking, laboratory methods, reproduction, packaging, projection, and related topics. Additionally film capture, editing and recording.*

This group does not meet during the quarterly sessions. The next meeting of this group will be during the Annual Technical Conference in October, in Hollywood, CA

***TC-20F documents published in the last quarter***

None

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

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

***TC-21DC documents published in the last quarter***

None

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***Facility List Management projects***

*These two projects are being managed in one DG*

**Revision of ST 430-7 – Facility List Message**

**DG Project**

The revision will add the Extended Facility List Message with the objective of minimizing changes over current practice, while simplifying extensibility and introducing additional features as required.

**Status:** The document passed FCD ballot on 8 June 2016 with seven comments; all are now resolved. The revised document will be published as ST 430-16, so that existing implementations of ST 430-7 are not affected by the extensions.





## **New Document ST 430-15 - Facility List Message Exchange Protocol**

### [DG Project](#)

Project scope: Specify a protocol to efficiently publish, retrieve, synchronize and submit aggregate FLM instances over the web, based on current industry practices.

**Status:** The document passed FCD ballot on 8 June 2016 with three comments; all are now resolved.

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## ***Stereoscopic Subtitle / Timed Text projects***

Work on this topic affects the documents below and is being handled by a DG. There will be further work at a 21DC sub-group meeting day on 23 Sept. 2016.

### **Revision of ST 428-7: D-Cinema Distribution Master – Subtitle**

#### [DG Project](#)

This revision results from a request from Japan Digital Cinema Forum (JDCF). The work involves clarification of ST428-7 provisions and revision to better match Japanese content creator requirements.

**Status:** Some drafting of the ST 428-7 revision has been completed, though it is currently on hold awaiting liaison with JDCF to confirm the changes implemented.

### **Revision of ST 429-5: Digital Cinema Packaging - Timed Text Track File**

#### [DG Project](#)

This revision project will address issues that arose during an earlier ST 428-7 revision. The scope has been expanded to include IMF application, references to MXF now allow different Generic Containers, optional Timed Text Descriptor items have been added (including Stereoscopic Subtitles).

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

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

#### [DG Project](#)

This revision project will address issues that arose during an earlier ST 428-7 revision.

**Status:** The revised draft will be sent for pre-FCD ballot review when the ST 429-5 ballot comments are resolved.



## Digital Cinema XML Constraints

### [DG Project](#)

This project will draft a Standard containing the XML constraints already reviewed by the Stereoscopic Subtitle and Timed Text Rendering drafting group.

**Status:** This XML constraints document has been forwarded to the TC Chairs to initiate pre-FCO ballot review. A document number needs to be issued.

**Business Impact of Stereoscopic Subtitles projects:** Compatibility and Interoperability

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## *D-Cinema Operations; Encryption*

### D-Cinema Crypto Evaluation (FIPS Revisions)

#### [SG Project](#)

This project examines the impact of changes to the FIPS encryption algorithm (deprecation of old random number generator). Output from this SG initiated the ST 430-1 revision, see below. The SG is considering an expected plan from NIST to declare key transport schemes (such as KDM) that are noncompliant to SP 800-56B as “deprecated” through 2017, and “disallowed” thereafter. Non-compliance will prevent Media Block FIPS certification.

**Status:** At the meeting, a presentation from Digital Cinema Initiative on compliance with SP 800-56Br1 was reviewed. DCI requests that SMPTE undertake projects to define and implement the requirements for compliance to SP800-56B.

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

#### [DG Project](#)

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

**Status:** The ST 430-1 revision closed ST Audit 9 August 2016. There are comments to resolve including a possible problem with a normative reference that could require rerun of the ballots.

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

#### [DG Project](#)

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



**Status:** The ST 430-2 revision closed ST Audit 9 August 2016. There are comments to resolve including a possible problem with a normative reference that could require rerun of the ballots.

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### **Amendment to ST 429-6: Digital Cinema Packaging - MXF Encryption**

#### [DG Project](#)

This project will amend ST 429-6 to incorporate requests from TC-35PM for use by IMF. Amendments to other TC-21DC documents are also required to support IMF.

**Status:** The document passed FCD ballot on 2 Sept. 2016 with 8 comments to resolve.

### **Additional Frame Rates documents**

#### [WG project](#)

Project Scope: Integrate the separate documents for Additional Frame Rates into the main documents 428-1 and 428-2 (DCDM) and 429-2 (DCP), add HFR to DCP.

**Status:** This project was approved since the last meeting and the group has held two web meetings as well as a face-to-face meeting at this round. The project scope was reviewed at the TC meeting and it was clarified that only rates that are standardized today would be in scope (meaning that new JPEG HFR's will not be included).

### **Other TC-21DC Business**

Some proposed new work was presented to standardize the Entertainment ID Registry in SMPTE CPL extension metadata.



### **Television and Broadband Media Committee (24TB) chaired by Michael Dolan**

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

#### ***TC-24TB documents published in the last quarter***

None

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#### **New ST 2064 suite of documents on A-V Sync Measurement and Assessment**

##### **DG Project**

The scope of this group is “Define recommended techniques for audio-video synchronization error measurement, and techniques and environment for synchronization assessment”. It is developing a document suite based on audio and video fingerprints:

- Part 1: Fingerprint Generation
- Part 2: Fingerprint Stream Transport (includes VANC in SDI/HD-SDI, IP, MPEG)
- Part 3: Fingerprint File Binding
- Part x: Engineering Guideline

**Status:** Parts 1 and 2 are published.

Work on the Engineering Guideline is progressing.

**Business Impact:** Improved quality of experience and interoperability between systems

#### **New SMPTE 2017 document suite on Open binding technology for persistent content identification in A/V essence**

##### **DG Project**

This project will develop an open binding technology standard (e.g., watermarks, fingerprints, metadata sidecars, etc.) for embedding end-to-end persistent content identifiers into audio/video essence in a way that survives processing, compression and distribution. The group’s focus is on carrying Ad-ID and EIDR identifiers. More recently, the group identified the need for “Open Binding of Distributor IDs and Time Labels to Content (OBID-TLC)” and it issued a Request for Proposals. The group has developed a Self-Assessment Test Plan.



Planned documents:

ST 2017-1 Open Binding of IDs (OBID)

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

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

EG 2017-4 Audience Measurement Ecosystem

**Status:** The group's work has been rearranged to accommodate OBID-TLC and the required testing work. Selection of technology for OBID will be postponed until the OBID-TLC testing is complete. The group plans to submit its Robustness and Subjective Test Plans to the TC for review.

### **Revision of ST 2016-1: AFD and Bar Data**

#### [DG Project](#)

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

**Status:** The project was approved in the last quarter. The TC Chair will post a call for participation.

### [Cinema Sound Systems \(25CSS\) chaired by Brian Vessa and Kurt Graffy](#)

*The application of the general scope as it applies to standards for theater sound and cinema B-Chain systems, including performance, measurements, setup, calibration, acoustics and related topics.*

*The TC is maintaining a workflow chart, identifying how its projects link up and where other work is needed. A regular feature of the meetings is a set of rapporteur reports from related organizations – MPEG, AES, EBU, InfoComm, ITU, ASA.*

### ***TC-25CSS documents published in the last quarter***

None

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### **New Standard ST 2095-1: Calibration Reference Wideband Pink Noise Signal and Test File**

#### [DG Project](#)

Examination of various "reference" noise files has revealed inconsistency in both RMS and Peak amplitude values. This group will create a pink-noise calibration Standard, and produce a reference pink-noise .wav file and a DCP containing the file. The pink noise characteristics defined in ST 202:2010 and RP 200:2012 will be used as a basis, and the algorithm used to generate the pink-noise file will be specified.

**Status:** ST 2095-1 has been published. It includes .wav files for the noise signal.

There is work underway to create a DCP containing the reference calibration noise signal. A final



package has been forwarded to SMPTE HQ including read-me files which fully explain the 4 versions of DCPs and their intended usage. When the DCP is completed and available in the SMPTE Store, this DG will be disbanded.

### **New document suite: Digital Cinema Sound System Setup and Calibration (“B-chain Modern Calibration Procedure”)**

#### [DG Project](#)

This group will create a Recommended Practice that codifies and expands currently-practiced measurement methodology using today’s technology and analyzers into step-by-step procedure(s) for measuring and calibrating the frequency response and sound pressure levels of the B-chain sound system in indoor theater spaces. A major rewrite was completed and submitted to the DG in early 2015-02.

**Status:** The DG has recently decided to split the work into:

- RP on baseline calibration – fine editing, final graphics, and formatting in progress
- RP on maintenance calibration – work has started in a smaller group
- EG capturing the work done in this group as a knowledge document – work will start in the fall

### **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 as well as any other standards the group determines to be necessary to achieve D-Cinema interoperability. A suite of documents is anticipated.

**Status:** This WG (25CSS-10) gave a status report, focusing on the work of the drafting groups (see below). There is a new WG activity to form a SG to analyze the submitted Simple Lossless Codec (SLC).

### **Digital Cinema Immersive Audio Renderer**

#### [DG Project](#)

This project currently has the following two document drafting projects:

#### **EG 2098-3: Immersive Audio Renderer Behavior**

#### [Drafting Project](#)



## **RP 2098-4: Immersive Audio Renderer Testing**

### [Drafting Project](#)

**Status:** The draft EG “Immersive Audio Renderer Behavior” is under review by the DG. Some new candidate material on surround plane is being reviewed. The group meets every two weeks.

There is a new draft of the RP “Immersive Audio Renderer Testing” that incorporates input documents from DG members.

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

### [DG Project](#)

This group’s initial focus was on draft standard ST 2098-1: Metadata Definitions in this [drafting group](#). Work is underway on a Bitstream Specification. Input documents were originally submitted – Dolby Immersive sound bitstream, DTS MDA Bitstream, a Dolby Lossless Audio codec and a document from Blue Ripple Sound. The Blue Ripple Sound document was selected in October 2015 as the basis for the first draft. However, at a TC meeting in July 2016, this decision was changed to use the Dolby input document as the starting point for the standards document.

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

The project scope has been revised to reflect the July 2016 decision to adopt the Dolby input document as the starting point for the standard.

## **[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.*

### ***TC-30MR documents published in the last quarter***

SMPTE EG 2061:2016, Stereoscopic Distribution Master – Glossary

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## **EG 2061: Glossary of Stereoscopic 3D Terms**

### [DG Project](#)

This project takes as its starting point the glossary developed by the 3D Home Master project in TC-35PM.





**Status:** This document has been published and the project will be closed.

**Business Impact:** Understanding and common use of terms

### ***UMID Projects***

*The Chair of the following projects gave a status report. Note that another project in this set, revision of RP 205, has published and that DG is disbanded.*

#### **Application of the Unique Material Identifier (UMID)**

##### [SG Project](#)

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

#### **UMID Resolution Protocol**

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

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

**Status:** An initial strawman draft has been submitted to the UMID Related Standards DG.

#### **Revision of ST 330: UMID**

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

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

**Status:** This project was approved in the last quarter and will also be developed in the UMID Related Standards DG.

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#### **New Standard ST 2102: SMPTE Core Metadata Set**

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





This group's scope is to define an interoperable minimum core set of descriptive metadata for professional motion imaging applications and users.

Existing SMPTE metadata is application-specific and is not supported right through media workflows.

**Status:** The DG Chair reported the draft document was posted for pre-FCD-ballot review and some good comments were received. A revised document draft will be posted before the next meeting.

**Business Impact:** Potential foundation for Metadata

### **New Standard ST 2088: SMPTE Essence Element Key Register Structure**

#### [DG Project](#)

This project creates a controlling standard for SMPTE ULs used as essence keys in MXF standards.

**Status:** The document is at FCD ballot, closing 20 October 2016.

### **Revision ST 336: Data Encoding Protocol Using Key-Length-Value**

#### [DG Project](#)

Revise ST 336 to update references and review whether its provisions reflect current register operation.

**Status:** The document passed FCD-ballot 10 Sept. 2016 with 6 comments to resolve.

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

#### [DG Project](#)

This project was approved in the last quarter. The document passed FCD ballot on 7 Sept. 2016 with one comment that is now resolved. A 2-week pre-DP-ballot review will be initiated.

### **Amendment of ST 335: Metadata Element Dictionary Structure**

#### [Drafting Project](#)

This project was approved in the last quarter.

### **Metadata Definition**

#### WG Project

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

Experts within the WG have been working on a cleanup of the register data, in particular the removal of redundancy. Registers are now maintained and balloted in xml format, instead of spreadsheets that were previously used. An online tool has been introduced to assist with the development of metadata entries and their acceptance for batched ballots.



**Status:** The four registers in xml form (for the first time) are published on [smpte-ra](http://smpte-ra). The call to publish the next versions of the registers closes 29 Sept. 2016 and this will trigger pre-FCD ballot review of the draft registers.

### **Create and Update Essence Element Register Contents**

#### [DG Project](#)

The group will create a register of SMPTE ULs for use as essence keys and process requests for register additions, modifications and deprecations. When ST 2088 publishes, this group will be closed and the work will pass to the WG.

**Status:** A draft register has been compiled for existing essence elements.

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### **Other 30MR Business**

#### [ST 2003 Amendment project](#)

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

#### [Proposed project for Cinema Content Creation Cloud \(C4\) ID](#)

A presentation was given to the TC on the need for this identifier. Project approval closes 26 Sept. 2016.

### **[File Formats and Systems Committee \(31FS\) chaired by Bruce Devlin and Paul Gardiner](#)**

*The application of the General Scope as it applies to definition of common wrappers, file formats and file systems for storage, transmission, and use in the carriage of all forms of digital content components.*

### ***31FS Publications in last quarter***

SMPTE RDD 39:2016, MXF OP-1a Interoperability Specification for AVC-ULTRA

SMPTE ST 2019-4:2016 (Revision of SMPTE ST 2019-4:2014) Mapping VC-3 Coding Units into the MXF Generic Container

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## ***Material Exchange Format (MXF)***

MXF defines a file format for Video, Audio and Data essence along with associated Metadata, for use in production systems (rather than final delivery).

There are several MXF projects under way. Some define new MXF features / applications, others revise existing documents for better interoperability.

**Business Impact of all MXF-related work items:** Interoperability between systems in file-based production

### **New Document: ST 377-2 - KLV-encoded extension syntax (KXS)**

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

This work specifies an alternative approach to the 'Application Metadata Plug-ins' specified in SMPTE 377-1. The document passed a second FCD ballot on 17 Nov. 2013 with 70 comments, but then went into hiatus. The work has recently resumed.

**Status:** There was no report at this meeting round.

### **Revision ST 380: MXF Descriptive Metadata Scheme 1**

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

**Status:** The draft revision document has been updated to address a number of comments. The DG Chair expects progress by the next meeting round.

### **New Document: ST 2042-4 - Wrapping VC-2 Video Essence in the MXF Generic Container**

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

**Status:** This document is on the point of publication.

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

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

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

**Status:** The draft document failed FCD ballot through lack of numeric consensus on 23 Oct. 2015. It has 11 comments to resolve. There has been no recent progress but the DG Chair reported that work will now restart.



## **MXF Timecode Mapping and Labeling**

### [SG Project](#)

It has been identified that a number of topics on the use of timecodes in MXF require additional guidance or definition. This project will review requirements, existing techniques and documents, and if necessary propose revision or new documents.

**Status:** A draft of the SG report was submitted to the TC for a review period closing 3 weeks after the meeting.

## **New Document: RP 2092-2 - Ad-ID Digital Ad Slate for MXF**

### [DG Project](#)

The group will develop a Recommended Practice, with principal input document being AMWA AS-12 (which this document will ultimately replace). An associated Ad-ID representation project is complete in TC-30MR.

**Status:** There was no report at this meeting round. The document passed FCD rebalot on 5 Aug. 2015 with 37 voter comments; all were resolved. Some pre-DP-ballot review comments were received.

## **New Standard ST 2073-10: VC-5 Mapping into the MXF Generic Container**

### [DG Project](#)

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

**Status:** The draft Standard completed pre-DP-ballot review some time ago. In co-operation with the 30MR metadata definition group, there has been some reworking of the ULs used in the document. When the register application reaches “mature” status, ST 2073-10 will go to a second pre-DP ballot review.

## **New document: ST 2065-5 ACES Codestreams in MXF**

### [DG Project](#)

An ACES file container exists (SMPTE ST 2065-4), but no code stream wrapper, or other supporting data structure exists. This project will specify descriptive metadata items for correctly processing and transforming ACES codestreams.

**Status:** A vote to elevate ST 2065-5 to DP status was held at this TC meeting. The vote passed.

## **New RDD 39: MXF OP-1a Interoperability Specification for Panasonic AVC-ULTRA Codec**

### [RDD Project](#)

This RDD provides the specification for implementing an MXF OP-1a file that encapsulates AVC-ULTRA video essence, uncompressed PCM audio essence, and data essence originally carried in ancillary packets.



**Status:** The document was published in the last quarter.

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

#### [DG Project](#)

**Status:** The document passed FCD ballot 8 August 2016 with 16 comments. At this meeting round, the DG met to discuss comment resolution, resulting in more than half of the comments being resolved.

### **New document: RDD 44 - Mapping Apple ProRes into the MXF Generic Container**

#### [Drafting Project](#)

**Status:** The project Chair has requested that a drafting group be set up to facilitate comment discussion. There has been some feedback on the draft document that has proved useful.

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### ***Working Group projects on Archive Exchange Format (AXF)***

This Working Group (31FS-30) has defined an archive format that will promote interoperability between all forms of archive media. A multipart suite of documents is planned:

Part 1 deals with ‘AXF Structure and Semantics’ and includes an XML schema. This document is published, but a revision project (see below) is underway.

Part 2 will cover “External Uses of XML Schema”.

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

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

#### [WG Project](#)

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

[Revision Project](#) **Status:** The revised draft Standard was posted for pre-FCD-ballot review and small changes have been made regarding the schema “boilerplate”. There are a couple of issues to fix with SMPTE HQ and the draft can go out again for pre-FCD-ballot review.

### **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 work.

**Status:** Work is proceeding on the document. A feature for capturing metadata much earlier in the process has been added at the request of the Hollywood community and the group is now deciding what additional elements to include.

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

### **DG Project**

This project will develop a new constrained standard for ST 268:2014 (DPX) for the application of high dynamic range (HDR) and wide color gamut (WCG) pictures. This is to be a new engineering document and not a revision of ST 268.

**Status:** This project was approved in the last quarter. The group has held one meeting, with further meetings scheduled through the rest of 2016.

### **Other TC-31FS Business**

Some new project proposals (prior to being formally submitted for approval) are in the pipeline:

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

The planned proposal was introduced.

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

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

**New document: Mapping HEVC streams into MXF GC**

A presentation was given at the last TC meeting and a formal project proposal is awaited.



**Network and Facilities Architecture Committee (32NF) chaired by Friedrich Gierlinger  
and John Snow**

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

**32NF Publications in last quarter**

SMPTE OV 2081-0:2016 (Revision of SMPTE 2081-0:2015), 6G-SDI Bit-Serial Interfaces – Overview for the SMPTE ST 2081 Document Suite

SMPTE EG 40:2016 (Revision of SMPTE EG 40:2012), Conversion of Time Values between SMPTE ST 12-1 Time Code, MPEG-2 PCR Time Base and Absolute Time

SMPTE EG 2059-10:2016, Introduction to the New Synchronization System

SMPTE ST 338:2016 (Revision of SMPTE ST 338:2015), Format for Non-PCM Audio and Data in AES3 – Data Types

SMPTE ST 2106:2016, Format for Non-PCM Audio in AES3 – Type17 Compressed Audio

SMPTE ST 2081-11:2016, 2160-line Source Image and Ancillary Data Mapping for Dual-link 6G-SDI

SMPTE ST 2081-12:2016, 4320-line and 2160-line Source Image and Ancillary Data Mapping for Quad-link 6G-SDI

SMPTE OV 2082-0:2016 (Revision of SMPTE 2082-0:2015), 12G-SDI Bit-Serial Interfaces – Overview for the SMPTE ST 2082 Document Suite

SMPTE ST 2082-11:2016, 4320-line and 2160-line Source Image and Ancillary Data Mapping for Dual-link 12G-SDI





SMPTE ST 2082-12:2016, 4320-line and 2160-line Source Image and Ancillary Data Mapping for Quad-link 12G-SDI

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### **Working Group on SDI Interfaces**

#### **WG Project**

*The Working Group (32NF40) scope is:*

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

The WG Chair gave a report on its projects, detailed below.

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

### **New document suite SMPTE 2076: Stereoscopic 3D (S3D) Production Timing and Synchronization**

#### **DG Project**

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

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

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

**Status:** Both documents RP 2076-1 and EG 2076-2 are in the publication queue. Once published, the project will be closed.

### **New Document: EG on SDI Interfaces**

#### **DG Project**

This group will draft EGs to provide a tutorial on the many SMPTE SDI interface standards and technologies, including how they relate to each other, what image formats are carried, performance. As this task is potentially large, it was decided at the July 2015 meeting that initial focus would be on HD and UHD SDI interfaces.

**Status:** In order to make more rapid progress, it has been agreed to focus on the production of a SDI roadmap "poster" or poster series to be published as an EG.





## **Revision of EG 34: Pathological Conditions in Serial Digital Video Systems and Revision of RP 198: Bit-Serial Digital Checkfield for Use in High-Definition Interfaces**

### [DG Project](#)

It has been agreed that RP 198 – HD Check-field – is higher priority than EG 34, in order to get 3Gb/s interfaces specified, and should be completed first.

**Status:** A new draft of RP 198 was posted to the DG in the last quarter. One issue has arisen that needs to be resolved: whether only flat-fields/frames are permitted or fields/frames with alternating line patterns. It is hoped that a new draft will resolve this problem.

## **New Document: ST 2091 - Broadcast and Video Serial Digital Fiber Transmission Systems – Ruggedized Connector Interfaces**

### [DG Project](#)

This project will create a standard for a ruggedized optical connector suitable for SDI as used in HDTV and UHD TV systems. The system also has the following features: automatic dust protection, automatic laser source eye protection, high durability, low maintenance and small size. The document will include a section on labeling requirements for improved interoperability.

It was decided that connectivity requirements for the ST 2036-4 interface would be removed from this draft standard and moved to a new RP. So it is expected that the standard will become ST 2091-1 and the recommended practice RP 2091-2.

**Status:** ST 2091 passed FCD Ballot on 8 July 2016 with 33 comments to resolve. All are addressed and 19 are resolved. Comment resolution continues.

## **New ST 2100 Suite: Transport of Haptic-Tactile Essence**

### [DG Project](#)

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

**Status:** This group has been on hiatus for the last three quarters to focus effort on the 10E project. Two Drafting Projects were set up (both projects are still at the proposal stage):

### [Drafting Project ST 2100-2: Coding and Transport Of Haptic-Tactile Essence in AES3](#)

At the Sept. 2015 meeting, it was decided that this group may also define the use of HANC space for carriage.

### [Drafting Project ST 2100-3: Coding and Transport Of Haptic-Tactile Essence in Ancillary Space](#)

At the Sept. 2015 meeting, it was decided that this group may confine its attention to the use of VANC space for carriage.



### **New Standard: ST297-2 CWDM optical interface for multi-link SDI**

#### [DG Project](#)

This project will standardize a Coarse Wavelength Division Multiplex optical interface for multi-link SDI. It was decided that this document should be ST 297-2, with ST 297 renamed to ST 297-1.

**Status:** ST 297-2 passed FCD Ballot on 8 September 2016 with 25 comments to resolve. Late comments have also been received and resolution is underway.

A liaison has been prepared to ITU-R, requesting them to harmonize their BT.2077-1 Part 3 document with the wavelengths selected in this document.

### **New Standard: HDR and WCG Signaling on Streaming Interfaces**

#### [DG Project](#)

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

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

**Status:** Several proposals have been received including putting all information in a separate ANC package, defining a completely new Payload ID, and a combination of Payload ID changes with an ANC package. The group is working on a requirements document for the parameters that need to be carried.

### ***Working Group on Video Over IP***

#### [WG Project](#)

*This Working Group (32NF60) was established to handle projects related to IP transport of media. The WG has produced the seven-part ST 2022 suite of standards.*

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

### **New document suite: ST 2110 Media Networking with Coordinated Essence Flows**

#### [DG Project](#)

This group will develop a set of standards specifying the carriage, synchronization and description of separate elementary essence streams over IP for the purposes of live production. The resulting standards will be based on VSF Technical Recommendations TR-03 and TR-04.

The suite of ST 2110 documents are (at present):

#### **New Document: Part 10: System Overview**

#### [Drafting Project](#)



**New Document: Part 20: Uncompressed Active Video**

[Drafting Project](#)

**New Document: Part 30: PCM Audio**

[Drafting Project](#)

**New Document: Part 31: AES3 Audio Formats**

**New Document: Part 40: Ancillary Data**

[Drafting Project](#)

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

[Drafting Project](#)

**Status:** Drafts for all Parts above except Part 31 have been submitted and are being developed.

The DG has submitted WD ST 2110-10 & WD ST 2110-20 to TC-32NF for four-week pre-FCD review (to accommodate IBC & Geneva SMPTE meetings), ending 28 Sept. 2016.

Work has started on preparing WD ST 2110-30 for submission to TC-32NF, then Part 40 will be done.

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***Working Group on Ultra HD SDI Interfaces***

**[WG Project](#)**

*This Working Group (32NF70) was established to create a hierarchy of single-link, dual-link and quad-link electrical and optical SDI interfaces with nominal link rates of 6Gb/s (ST 2081 suite), 12Gb/s (ST 2082 suite) and 24Gb/s (TBA). See below for the individual documents in each suite.*

**WG Status:** Although there are separate drafting groups for 6Gb/s and 12Gb/s (see below), the WG generally develops its documents so that the two are kept “in step”. There is additional work considering HDR signaling over UHD-SDI.

**New ST 2081 suite: 6Gb/s Signal/Data Serial Interfaces**

[DG Project](#)

This project is responsible for the following documents:

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

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

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



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

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

**Status:** ST 2081-30 has been submitted to the TC for pre-FCD-ballot review.

An [amendment project](#) to correct the jitter specification in ST 2081-1 and ST 2082-1 is underway in this DG; the amendments were elevated to DP status by vote at the TC meeting.

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

### **ST 2082 suite: 12Gb/s Signal/Data Serial Interfaces**

#### [DG Project](#)

This project is responsible for the following documents:

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

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

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

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

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

**Status:** ST 2082-30 has been submitted to the TC for pre-FCD-ballot review.

An [amendment project](#) to correct the jitter specification in ST 2081-1 and ST 2082-1 is underway in the 2081 DG; the amendments were elevated to DP status by vote at the TC meeting.

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

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

#### [WG Project](#)

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

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



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

## **ST 2059 Interoperability Testing**

### [DG Project](#)

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

The first round of testing was the week of 9 Nov. 2015, hosted by FOX NE&O in Houston, TX. The main conclusion was that ST 2059-1 and -2 fundamentally work as intended; it was confirmed that goals for Lock Time and Accuracy are achievable.

**Status:** A second testing round took place in June 2016, again at FOX NE&O in Houston, Texas. This testing round included some tests with AES67 equipment. There was also a JT-NM interop testing round in August 2016 with an expanded scope of testing IP media transport and IP discovery and registration (AMWA IS-04), as well as PTP.

A report of the PTP interop has been completed and the TC is reviewing the report and considering whether it can be publicly released.

## **Development of a set of synchronization Engineering Guidelines**

### [DG Project](#)

This group facilitates development of a suite of Engineering Guidelines related to the ST 2059-1 and ST 2059-2 Synchronization documents in the drafting projects below. These documents are an important way to ensure that new implementers, who may not have been part of the development, will correctly implement the system.

**Status:** There are four EG drafting projects, see below, and a draft exists for a possible fifth one on “Local Time” – now likely to be a recommended practice, RP 2059-20 – see [project proposal](#).

Participants in the Interop tests have expressed a desire for more guidance in the form of these EGs.

## **New Document: EG 2059-10 - Introduction to the New Synchronization System**

### [Drafting Project](#)

This document will provide users of the system, both implementers and operators, to understand the context and technology of what some may see as a major technology shift.

**Status:** This document is published.

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

### [Drafting Project](#)



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

### **New Document: EG 2059-12 - Systemization Considerations for using SMPTE ST 2059**

#### [Drafting Project](#)

**Status:** This document had previously been called “Facility Migration Guide”. A WD was submitted 23 April 2015; no progress since.

### **New Document: EG 2059-14 - Best Practices for Large Scale SMPTE ST 2059-2 PTP deployments**

#### [Drafting Project](#)

**Status:** The most recent WD was submitted 26 Nov. 2014, no progress since.

### **New Time Labeling System**

#### [DG Project](#)

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

**Status:** There are currently three projects managed by this group. Two projects – the Generic Time Label (GTL) and the Time Related Label (TRL) are developing labels whose data structures are not compatible. At the last WG meeting, it was agreed that “Time Labels Summits” would be held to gather requirements (and thus see if either of the proposed time labels meet the requirements of the user community). Until these are held, no further ballots on either document suite will be held. Sessions are planned for:

Los Angeles area mid-October

London early November

New York City mid-November

Details and exact dates TBA

### **SMPTE 2103 Suite: Generic Time Label**

#### [Drafting Project](#)

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

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

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

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

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

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



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

The suite will not go to FCD ballot until after the Timecode Summits have been held.

### **SMPTE 2105 Suite: Time Related Label (TRL)**

#### [Drafting Project](#)

The current suite comprises:

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

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

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

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

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

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

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

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

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

**Status:** The TC conducted a two-week pre-FCD ballot review for this suite of documents earlier in 2016 and some of the draft documents have been updated. The suite will not go to FCD ballot until after the Timecode Summits have been held.

### **RP 2104 Suite: Date-Time Terms and Definitions**

#### [Drafting Project](#)

It has been agreed that this document will comprise two Parts.

Part 1 will be Date-Time Terms and Definitions; this is required urgently so that it can be a Normative Reference for the other time / sync documents.

Part 2 will be other Media Terms and Definitions.

**Status:** A draft of RP 2104-1 has been posted for review and comment.

### **Amendment of EG 40: Conversion of Time Values Between SMPTE 12-1 Time Code, MPEG-2 PCR Time Base and Absolute Time**

#### [DG Project](#)

This project will make small corrections to formulas. Errors had been pointed out during the 2014-06 meeting round.

**Status:** The amendment published in the last quarter and the project will close.





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## ST 337 family of documents

### [DG Project](#)

Originally, this project was set up to manage individual drafting projects needed to introduce a code-point extension mechanism for documents in the ST 337 family; adding the extension mechanism in ST 337 and adding the extended data types in ST 338 as well as revising or adding any other documents as required.

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

**Status:** The following Drafting Projects are being managed by the DG:

### **Revision of ST 338: Format for Non-PCM Audio and Data in AES3 — Data Types**

#### [Drafting Project](#)

Revision to add AC-4 (code point 24), DTS type IV (code point 17) - see these projects below.

**Status:** This document was published in the last quarter.

### **New document ST 2041-4 (proposed): MPEG-H in AES3**

#### [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 project proponents expect to submit a draft document in the next quarter.

### **New Standard ST 2106: DTS Audio over AES3**

#### [Drafting Project](#)

**Status:** This document was published in the last quarter.

### **New document Audio Metadata over AES3**

#### [Drafting Project](#)

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

**Status:** A new WD document was submitted to the DG just before this meeting round for comments.





## **Flow Control in Professional Media Networks**

### [SG Project](#)

This SG is investigating current and future professional media network management technologies, determining user requirements, transmission methods for management commands and providing background information. It will review existing standards and specifications and identify gaps to recommend standards development.

**Status:** This SG has held five meetings in the last quarter. The two main tasks are:

- Integrating contributions into the draft report.
- Surveys for users and technology providers. Both completed, preparing report inclusion.

Goal is to get report ready for publication before end of 2016.

## **Media Systems, Control and Services Committee (34CS) chaired by Chris Lennon and Karl Paulsen**

*The General Scope as applied to the implementation of media services, methods of managing and controlling hardware devices and software systems, and the management of media workflow processes, including associated signaling and control mechanisms.*

### **34CS Publications in last quarter**

SMPTE RDD 38:2016, Networked Device Control Protocol – Message Data Structure and Method of Communication

SMPTE ST 2071-1:2016 (Revision of SMPTE ST 2071-1:2014), Media Device Control Framework (MDCF)

SMPTE ST 2071-2:2016 (Revision of SMPTE ST 2071-2:2014), Media Device Control Protocol (MDCP)

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### **BXF Suite of Documents**

This TC is responsible for the suite of documents defining the Broadcast Exchange Format, comprising:

ST 2021-1: General Information and Informative Notes

ST 2021-2: Protocol

EG 2021-3: Use Cases

EG 2021-4: Schema Documentation



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

RP 2021-9: Implementing BXF

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

Features are steadily being added to BXF and these are batched into versions. The current published suite includes features introduced in versions up to BXF 4.0 (recently published, as noted above).

## **BXF 5.0**

### [DG Project](#)

BXF 5.0 introduces new components and improvements to extend BXF functionality. There is work on Program Synopsis Support, QC Node, Point of Interest, Graphic Slate Template Support, NABA DPP Content Delivery Specification Schema, BXF SDK. There are also various small improvements to the suite of documents.

**Status:** The following items are complete:

- Program Synopsis Support

- QC Node

- Point of Interest

- Graphics Slate Template Support

- Various small improvements

In progress:

- NABA DPP Content Delivery Specification Schema

- Additional work to incorporate input from EBU QC project (incorporated to avoid possible incompatibility later)

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

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

## **BXF SDK**

Proposed [Drafting Project](#)

Draft new BXF RP – RP 2021-6 suggested - for BXF SDK documentation as part of BXF 5.0.

## **BXF Schema Documentation**

Proposed [Drafting Project](#)

Revise EG 2021-4 document to incorporate BXF 5.0 updates



## Media Device Control over IP

### [DG Project](#)

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

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

2015 Revision in process to add support for FIMS v1.2; now published.

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

2015 Revision under development to add support for FIMS v1.2; now published.

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

Describes Zero Configuration (ZeroConf) and Device, Service, and Capability discovery operations for Media Device Control using well established and widely used Internet Protocol standards.

ST 2071-4: Media Device Control - Capability Interface Repository

WSDL & XML Schemas are included.

Defines the Capability Interface definitions/API and systemic requirements for a repository/registry that can contain Capability Interface definitions, their corresponding documentation, programmatic artifacts, unit tests, and test cases. Provides a common infrastructure and API with which vendors and SDOs can register Capability Interface Definitions, their documentation, unit tests, and test cases and where Developers, Customers, and Interface Consumers can query the definitions, documentation, and tests for the Capability Interfaces implemented by Devices and Services used within their systems.

(Proposed) ST 2071-5: Media Device Control - RESTful Protocol+HATEOAS – New intended project, proposal will be issued. HATEOAS = Hypermedia as the Engine of Application State.

#### **Status:**

Parts 1-3 are revisions of the published documents.

Part 1 published in last quarter.

Part 2 published in last quarter.

Part 3 closed FCD ballot 16 July 2015 with nine comments. All comments are resolved.

Part 4 closed FCD ballot 15 July 2015 with three comments. All comments are resolved.

Parts 3 and 4 have completed pre-DP-ballot review and can proceed to DP elevation ballot.

Part 5 [project proposal](#) exists. However, there are no standards for RESTful protocol that could be referenced. The group is therefore considering a new approach based on ST 2071-4 that allows for many Interface Definition types to be defined, allowing the market to select the best.

**Business Impact:** Interoperable Media Device Control



**New Registered Disclosure Document: RDD 38 Sony Lightweight Networked Device Control Protocol**  
[Drafting Project](#)

**Status:** RDD 38 was published in the last quarter.

**Media Packaging and Interchange Committee (35PM) chaired by Pierre Lemieux**

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

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

***35PM Publications in last quarter***

SMPTE ST 2067-2:2016 (Revision of SMPTE ST 2067-2:2013), Interoperable Master Format – Core Constraints

SMPTE ST 2067-3:2016 (Revision of SMPTE ST 2067-3:2013), Interoperable Master Format – Composition Playlist

Amendment 1:2016 to SMPTE ST 2067-5:2013, Interoperable Master Format – Essence Component, Amendment 1

SMPTE ST 2067-20:2016 (Revision of SMPTE ST 2067-20:2013), Interoperable Master Format – Application #2

SMPTE ST 2067-21:2016 (Revision of SMPTE ST 2067-21:2014), Interoperable Master Format – Application #2E

SMPTE ST 2067-40:2016, Interoperable Master Format – Application #4 Cinema Mezzanine

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***Overview***

The Interoperable Master Format (IMF) is a file-based framework designed to represent multiple high-quality content versions of a finished work destined for distribution channels worldwide. It is meant to

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



facilitate the predictable inventory management and processing of these content versions, including playback, validation and transformation to the various master formats used by each distribution channel. The IMF is intended for international use and professional applications.

### ***Current Publications***

*ST 2067-2; Interoperable Master Format — Core Constraints*

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

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

*ST 2067-8, Interoperable Master Format — Common Audio Labels*

*ST 2067-20, Interoperable Master Format — Application #2*

*ST 2067-21, Interoperable Master Format – Application #2E (previous title Application #2 extended)*

*ST 2067-30, Interoperable Master Format — Application #3*

*SMPTE ST 2067-40, Interoperable Master Format – Application #4 Cinema Mezzanine*

*ST 2067-100, Interoperable Master Format – Output Profile List*

*ST 2067-101, Interoperable Master Format – Output Profile List – Common Image Definitions and Macros*

*ST 2067-102, Interoperable Master Format – Output Profile List - Common Image Pixel Color Schemes*

*ST 2067-103, Interoperable Master Format – Output Profile List – Common Audio Definition and Macros*

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### ***Topic: WG 35PM50: IMF Document Maintenance and Sample Material Interchange***

*This Working Group focuses on Sample Material Interchange (SMI, which includes plugfest activities) as well as IMF document maintenance.*

### **IMF Plugfest Project**

The SMI group has held several plugfests. In the last quarter, there were:

- 29 June at Sony Pictures, CA, USA - mainly for ST 2067-21 IMF App2e.
- 13/14 September 2016 at the EBU, Geneva, CH.

An IMF bug tracker (used for both bugs and improvement requests) is in operation at:

<https://standards.atlassian.net/projects/IMF/issues/IMF-1?filter=allopenissues>

The next plugfest will be in Los Angeles, 30 Nov. – 1 Dec. 2016.

### **Document Maintenance Status**

The WG has completed the one-year review (designated "IMF 1.1") of the following core IMF specifications:



- ST 2067-2: IMF Core Constraints
- ST 2067-3: IMF Composition Playlist
- ST 2067-5: IMF Essence Component
- ST 2067-20: IMF Application #2
- ST 2067-21: Application #2E. This revision adds support for 4K, Wide Color Gamut (WCG) and High-Dynamic Range (HDR) images.

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***Topic: 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.

**New Project: Amendment ST 2067-102 (IMF Common Image Pixel Color Schemes)**

[DG Project](#)

Add support for all the color schemes specified in ST 2067-21:2016 ("Application #2E") and transfer function as specified in ST 2084:2014

**Status:** A Working Draft is expected shortly for pre-FCD-ballot review.

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***Topic: IMF Audio Essence DG***

**New Project: IMF Audio Content and Element Kind Definition**

[DG Project](#)

Define controlled vocabulary for MCA Audio Content Kind and MCA Audio Element Kind as they pertain to IMF.

**Status:** A Working Draft is expected shortly for pre-FCD-ballot review.

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**Topic: ST 2067-40 - IMF Application #4 Mezzanine Film Format**

[DG Project](#)

This standard extends the capabilities of IMF Application #2, JPEG2000, to include amendments to satisfy cinematographic needs including (but not limited to) resolutions up to 8k, lossless J2K, XYZ and 16 bits. Intended for film archive applications.



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**Status:** The document is published, and the project disbanded accordingly.

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***Other TC-35PM Business***

**Proposed Project: IMF ACES Application**

[Proposed Drafting Project](#)

This proposed project will specify an application of the IMF framework that uses image essence conforming to SMPTE ST 2065-4 (ACES), and audio and subtitle essence as specified in SMPTE ST 2067-2.





## Notes on this report and the SMPTE Standards Process

*All trademarks appearing herein are the property of their respective owners.*

*SMPTE Technology Committees (TCs) are tasked with the development and ongoing maintenance of engineering documents relevant to Television, Broadband, Film and Digital Cinema. TCs are set up by the Standards Vice President (SVP) and are overseen by the Standards Committee (ST).*

*The standards process operates under the [SMPTE Standards Operations Manual](#). All participants must abide by these provisions.*

*Within Technology Committees, there may also be Working Groups (WGs), Study Groups (SGs) Drafting Groups (DGs) and Ad-Hoc Groups (AHGs).*

*The ‘Standards Community’ (SC) is a “parent group” that includes all Technology Committees. It is used to convey information that is relevant to all TC’s, such as meeting logistics and registration information. An SC meeting is held during each meeting round.*

### SMPTE document development process

*The document stages are:*

**PD** = Project Draft    **WD** = Working Draft    **CD** = Committee Draft    **FCD** = Final Committee Draft  
**DP** = Draft Publication, which initiates    **ST Audit** - a due process check by the Standards Committee

### SMPTE document-type abbreviations

**ST** = Standard                      **RP** = Recommended Practice  
**EG** = Engineering Guideline    **RDD** = Registered Disclosure Document  
**OV** = Overview used with multipart document suites

### SMPTE document review

*The SMPTE Operations Manual calls for review of published documents:*

- One Year after original publication - to check whether comments have been received during initial implementations and revise as required
  - At Five Year intervals after original publication - to check whether the provisions need to be revised
- There may be proposals to Revise or Amend documents, or they may be reaffirmed, made stable or withdrawn.*

### Other Notes

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

*SMPTE manages its standards documentation, meetings and ballots in an online system called **Kavi**.*

*Kavi has a **Project View** that includes a publicly accessible project summary page. It is used to state the project justification at the proposal stage and to track progress through to completion.*

*In this report access to the project view is via a hyperlink such as “DG Project” with the project title.*