



Standards Quarterly Report December 2015

Result of SMPTE® Standards Committee Meetings
7-10 December 2015 in Atlanta, GA, USA
Hosted by Turner Broadcasting System (TBS)



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

7-10 December 2015

Atlanta, Georgia, US

Hosted by Turner Broadcasting System (TBS)

Nine SMPTE Technology Committees and 10 subgroups scheduled meetings at this round, hosted by Turner Broadcasting System (TBS), 7-10 December 2015.

Around fifty members attended in person over the 4 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 more than one hundred twenty active projects can be found in the [detailed account](#), below.

New Projects started in the last quarter

Revision of ST 430-2 - Digital Certificate (for FIPS changes and 35PM request) [Details](#)

Revision of ST 430-1 - Key Delivery Message (for FIPS changes) [Details](#)

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

Amendment of ST2003:2012 – Types Dictionary Structure [Details](#)

“Better Pixels” projects: There is growing recognition that 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.

High Dynamic Range (HDR) / Wide Color Gamut (WCG) / Electro-Optical Transfer Function (EOTF)

The SMPTE Study Group on the High-Dynamic-Range (HDR) Imaging Ecosystem released its report in October 2015 and is available [here](#).



There is continuing SMPTE work in a project defining Dynamic Metadata for Color Volume Transformation of high luminance and wide color gamut (WCG) Images. A document suite is underway, comprising parts on core components, syntax and carrier as well as 4 parts documenting individual application schemes. The first two of these have been balloted and are in the process of comment resolution. [Details](#)

Higher Frame Rates (HFR)

A project to extend SMPTE ST 12 timecode to cover higher frame rates (HFR) is almost ready for its draft publication vote. [Details](#)

Network-Based Synchronization for the Professional Broadcast Environment

Two key documents defining a system for using synchronization packets on an information technology (IT) network to achieve media synchronization were published earlier this year:

“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 the slaves, allowing them to create any synchronized video, audio or time code signal.

The first interoperability “plugfest” was held the week of 11 Sept. 2015 in order to test implementations of these two standards. [Details](#)

A set of Engineering Guidelines for the use of this system is being drafted. The first, “Introduction to the New Synchronization System” had been balloted and is in the process of comment resolution. [Details](#)

Time Labels

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

One project, defining a 5-part “Generic Time Label” suite, has just completed final committee draft (FCD) ballot. However, some parts of the suite did not pass ballot and will need reballoting.

Another project, defining a 9-part “Full-featured Time Label” suite, has been submitted for working group (WR) review.

Associated with this work is the development of a Recommended Practice on Date-Time Terms and Definitions.

[Details of these projects](#)



SMPTE Video Compression (VC) Standards

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

- Development of a suite of documents defining the VC-5 compression system (developed from a GoPro’s Cineform codec). Two Parts of the suite are published and four more are awaiting publication. [Details](#).
 - A related Standard to define VC-5 mapping in the MXF Generic Container is well advanced. [Details](#)
- Amendment of 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 is also being amended. [Details](#)
- Amendment and revision to VC-2 documents (developed from BBC’s Dirac Pro). This work has taken a new direction at this meeting round, including the addition of a new profile for ultra-high-definition (UHD) video sources for use with a high definition (HD) infrastructure. [Details](#)

Cinema Projects

Cinema Sound Systems (CSS)

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, 3D, 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 draft standard “Calibration Reference Wideband Pink Noise Signal and Test File.” The document is awaiting publication. The aim is to have a consistent pink noise signal for applications including theater testing. [Details](#)
- A WG 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](#)

Digital Cinema (D-Cinema)

This TC has published three, multi-part document suites dealing with the topics Digital Cinema (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. [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 this suite of standards or creating constraints for improved interoperability in a variety of application areas. There are currently 9 MXF projects in process. [Details](#) Two additional MXF projects are planned to begin early in 2016. [Details](#)



SMPTE® Standards Quarterly Report: Detailed Account

As a result of SMPTE Standards Committee Meetings

7-10 December 2015

Atlanta, Georgia, US

Hosted by Turner Broadcasting System

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

We encourage interested parties to learn more about specific activities.

Go to www.smpte.org/standards for more information.

If you are interested in learning more about the SMPTE Standards program, please contact Peter Symes, Director of Standards and Engineering, at psymes@smpte.org.

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](#).

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

Future Meetings

The next quarterly Standards meeting round will be held 29 Feb. - 3 March 2015 in Santa Clara, CA, USA and will be hosted by Arista.

Further quarterly Standards meeting rounds are planned for:

June 2016 – TBA

14-17 September 2016 – Geneva, Switzerland. Hosted by European Broadcasting Union (EBU).

5-9 December 2016 – Burbank, California, USA. Hosted by The Walt Disney Studios.



In addition to the meetings of SMPTE Technology Committees (TC), detailed below, there was a short tutorial on using the new SMPTE Digital Library – access instructions are on [this page](#).

A number of the TCs have documents in the queue for publication, but publication has been delayed by the transfer of the Digital Library to a new host. The library will be brought up-to-date by mid-January 2016.

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

- [Essence Technology Committee \(10E\)](#)
- [Digital Cinema Technology Committee \(21 DC\)](#)
- [Television and Broadband Media Committee \(24TB\)](#)
- [Cinema Sound Systems Committee \(25CSS\)](#)
- [Metadata and Registers Committee \(30MR\)](#)
- [File Formats and Systems Committee \(31FS\)](#)
- [Network and Facilities Architecture Committee \(32NF\)](#)
- [Media Systems, Control and Services Committee \(34CS\)](#)
- [Media Packaging and Interchange Committee \(35PM\)](#)

Details from each Technology Committee (TC) meeting

Essence Technology Committee (TC-10E) chaired by Ed Reuss and Paul Gardiner

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

Topic: TC-10E documents published in the last quarter

Topic: Video compression standards in SMPTE

DG Project: Revision of SMPTE ST 2019 VC-3 Video Compression Documents to add Resolution Independence

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

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



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.

Note: A [separate project](#) is underway in TC-31FS to update ST 2019-4 to support this feature in MXF.

Status: ST 2019-1 passed ST Audit 2015-10-26, but will be held back from publication until the revision of RP 2019-2 is ready. Pre-FCD ballot review for RP 2019-2 has completed.

Business Impact: Interoperability between systems

DG Project: SMPTE 2073 Document Suite: VC-5 Video Essence

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) Includes Reference Decoder, Sample Encoder, sample bitstreams
- ST 2073-3 - VC-5 Image Formats
- ST 2073-4 - VC-5 Subsampled Color Difference Components
- 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 embedding metadata from other standards – ACES, XMP, DPX, MXF, ALE).

Status: Parts 1 and 2 are published, but Part 2 has been revised to add test materials to support content defined in Parts 3 and 4 – it is awaiting publication. A repository for the software and test materials is being developed with SMPTE HQ.

Parts 3 and 4 are also awaiting publication.

Part 5 and Part 6 passed ST Audit 2015-10-26 and are awaiting publication.

Part 7 is at the Working Draft stage.

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: it was explained at the meeting that the VC-2 proponent plans to reorganize the existing projects below together with newly proposed VC-2 projects into one drafting group, with a new Chair. There is to be a further revision of VC-2 to support new video formats, and a new VC-2 profile will also be introduced for compression of Ultra High Definition Video Sources for use with a High Definition Infrastructure.

DG Project: Revision of ST 2042-1: VC-2 Video Compression Standard and RP 2042-3: VC-2 Conformance Specification

The revision of the SMPTE mezzanine video compression standard (based on BBC's DIRAC pro) adds a high quality profile to support Archiving and Production applications.

Status: The most recent Part 1 revision had been published 2012-08-30.

For the corresponding Part 3, the proponent reported that the sample encoder and reference decoder software has been uploaded to an open source repository (github). However, in view of the newly planned further revision of Part 1, the current incomplete Amendment project for Part 3 is to be replaced by a new Revision project.

Business Impact: Interoperability between systems

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

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: Work is re-starting following a reassignment of the proponent's staff.

Business Impact: Interoperability between systems

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

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-x: 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.

Part 3 passed FCD ballot on 2015-06-12 with 13 comments to resolve. 2 comments regarding the level of surround illumination that should be specified are in the process of resolution. A revised draft will be prepared and it will be submitted for pre-DP review prior to the next telecon where any comments will be discussed.

The next Parts to be worked on will be the Full Measurement / Calibration RP and the EG.

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

DG Project: New Document: ST 2087 - Depth Map Representation

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

Status: The document passed FCD ballot on 2014-10-28 with 11 comments to resolve. All comments were resolved. A revised version was submitted for pre-DP review and further comments were received. It is expected that these can be dealt with and that a DP elevation vote can be started in early 2016.

Business Impact: to support interoperability and exchange between relevant processes

Topic: Projects on Systems for High Dynamic Range (HDR) and Wide Color Gamut (WCG)

SG Project: Study Group on HDR Ecosystem

Scope: To identify the specific parameters and respective ranges that constitute “High Dynamic Range” (HDR). Based on the agreed definitions, review the impact to form a complete ecosystem for the creation, delivery and playback of HDR content across both linear and home entertainment distribution platforms. Deliverable is a report on existing standards that are impacted; identifying standards gaps which should be addressed, and recommendation on methodology and priority.

Status: The SG report is published [here](#) and the SG has been disbanded.

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

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



ST 2094-2 Syntax and Carrier
ST 2094-10 Application #1
ST 2094-20 Application #2
ST 2094-30 Application #3
ST 2094-40 Application #4

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 except Part 2.

Status: This group held a meeting during this round and made progress with comment resolution. ST 2094 Parts 1 and 30 passed FCD ballot 2015-11-26; Part 1 had 64 comments and Part 30 had 38 comments.
ST 2094 Parts 10 and 20 were posted for pre-FCD-ballot review 2015-11-20; both received many comments.
The ST 2094 Part 40 editorial team is reviewing change proposals.
There was no progress this quarter on ST 2094 Part 2.
The DG continues to hold mostly weekly telecons.

DG Project: New Document: RP 2093 - Television Lighting Consistency Index

The project scope is to document “Television Lighting Consistency Index (TLCI)” and “Television Lighting Matching Factor (TLMF)”. The introduction of light emitting diodes (LED) lighting 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: Drafting of the RP 2093 document had almost been completed at the September meeting round, but the document editor has been busy and it was reported that a new editor has been sought but not yet found; the situation will be reviewed at the next meeting round.

DG Project: New Document: ST 2100-1 - Definition and Representation of Haptic-Tactile Essence

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 draft ST 2100-1 passed FCD-ballot on 2015-06-05 and all of the eight-eight comments were resolved. However, further comments were received at the pre-DP review and the DG held a meeting during this round to discuss how to resolve these comments. A further document revision will be posted to address a particular late comment and to correct some errors inadvertently introduced into the pre-DP review version.



DG Project: New Document: RP 219-2 - UHDTV Color Bar Signal

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 the HDTV spatial parameters of 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 draft RP 219-2 passed FCD ballot 2015-09-18, with 22 comments to resolve. Comment resolution is underway.

DG Project: Amendment ST 2048-1: 2160-line and 1080-line Production Image Formats for Digital Cinematography

This project adds additional frame rates (nominal 96, 100, 120 fps) to ST 2048-1 to satisfy user requirements and bring production image formats in line with existing distribution formats.

Status: The amendment passed FCD ballot 2015-08-28 with 5 comments to resolve. All comments have been addressed; one remains to be resolved.

RDD Project: New RDD 36: Apple ProRes Decoder

This project will produce an RDD that documents Apple ProRes decoding functionality and Apple ProRes video bitstream. It will contribute sample ProRes bitstreams and the resulting images, as well as a reference decoder.

The reference decoder is C code and it will be part of the balloted RDD as a zipped SMPTE Element. This software decodes ProRes elementary streams.

Status: The RDD passed ST Audit on 2015-10-26. SMPTE HQ is in the process of preparing the document for publication.

RDD Project: Draft RDD 34: Sony Low Latency Video Codec within an IP Network Environment

This RDD describes a codec scheme implemented in Sony equipment that supports a degree of compression whilst providing low latency and high picture quality.

Status: The RDD passed ST Audit on 2015-08-31. The document is in the publication queue and the project will be closed.

RDD Project: IntoPIX TICO lightweight Codec used in IP Networked or SDI infrastructures

This document defines a lightweight compression scheme to support multiple HD and UHD streams on 10G IP networks or 3G-SDI infrastructure. A 2-part document is proposed:

PART 1: TICO lightweight compression

PART 2: TICO mapping for SDI & IP infrastructures



Status: The Document passed RDD ballot on 2015-11-26 with 92 comments to resolve. Comment resolution is underway.

Film Technology Committee (20F) chaired by David Schnuelle

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.

Topic: TC-20F documents published in the last quarter

Digital Cinema Technology Committee (21 DC) chaired by Dean Bullock and Mike Radford

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.

Topic: TC-21DC documents published in the last quarter

Topic: Facility List Management projects

These two projects are being managed in one DG

DG Project: Revision of ST 430-7 – Facility List Message

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's example schema has been completed and the document will be posted for pre-FCD-ballot review.

DG Project: New Document ST430-15 - Facility List Message Exchange Protocol

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 will be posted for pre-FCD-ballot review.

Topic: Stereoscopic Subtitle / Timed Text projects

DG Project: Revision of ST 428-7: D-Cinema Distribution Master - Subtitle

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: The project group has discussed the requirement and the revised draft is in progress.

DG Project: Revise ST 429-2: DCP Operational Constraints

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

Status: The revised draft was ready for pre-FCD-ballot review, awaiting completion of the ST 429-5 revision. However, there is consideration of changing the scope of this project to integrate ST 429-13 into ST429-2 and adding the “HFR” frame rates; see Other 21DC business, below.

DG Project: Revise ST 429-5: Timed Text Track File

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 has completed pre-FCD-ballot review with no comments and ballot will be initiated..

Business Impact: Compatibility and Interoperability



DG Project: Digital Cinema XML Constraints

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

Status: The group has reviewed the draft document. It has received a request that the canonical form should be used in order to solve some issues that have been identified.

Topic: D-Cinema Operations; Encryption

SG Project: D-Cinema Crypto Evaluation (FIPS Revisions)

This project examines the impact of changes to the FIPS encryption algorithm (deprecation of old random number generator).

Status: 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 (KDM) that are noncompliant to SP 800-56B as “deprecated” through 2017, and “disallowed” thereafter. Non-compliance will prevent Media Block FIPS certification.

DG Project: Revision of ST 430-1: Key Delivery Message

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

DG Project: Revision of ST 430-2: Digital Certificate

This project will amend ST430-2 to allow devices to identify their ability to process MIC payloads in KDMs (as required by the ST 430-1 revision).

Status of above 2 projects: The DG has reached general agreement on two KDM KeyTypes and definitions, and D-Cinema Digital Certificate role table changes. The revised ST 430-1 document was submitted to the DG 2015-11-30 together with a draft liaison to DCI on the topic. The DG will meet to discuss these drafts before year-end.

DG Project: Amendment to ST 429-6 MXF Encryption for TC-35PM

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 DG received an additional request from US Library of Congress to make changes to support AS-07 (archive format). This topic was discussed in the TC meeting and there seemed to be a



preference for the Library of Congress to normatively reference ST 429-6 in their own document, rather than changing it. For now, the original amendment work will continue.

New 21DC Business

A request was made to the TC Chairs to change the scope of the ST 429-2 DCP Operational Constraints revision project (see above) to integrate ST429-13 Operational Constraints for Additional Frame Rates, and add the “HFR” frame rates from ST428-11 Additional Frame Rates (AFR Levels 7,8,9) to ST 428-1. The proposal includes the following three specific tasks:

- (1) - Integrate [SMPTE ST 428-11] D-Cinema Distribution Master — Additional Frame Rates for D-Cinema into [SMPTE ST 428-1] D-Cinema Distribution Master — Image Characteristics and [SMPTE ST 428-2] D-Cinema Distribution Master — Audio Characteristics.
- (2) - Integrate [SMPTE 429-13] D-Cinema Packaging — DCP Operational Constraints for Additional Frame Rates into into [SMPTE 429-2] D-Cinema Packaging — DCP Operational Constraints. The latter, 429-2, is currently open for revision.
- (3) - Add the 96, 100 and 120 fps HFR frame rates, published in ST428-11:2013 to D-Cinema Packaging — DCP Operational Constraints.

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.

Topic: TC-24TB documents published in the last quarter

DG Project: Draft ST 2064 suite of documents on A-V Sync Measurement and Assessment

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 passed ST Audit 2015-10-08 and are in the publication queue. Work on the Engineering Guideline continues. It will be followed by Part 3.



Business Impact: Improved quality of experience and interoperability between systems

DG Project: New Document: Open binding technology for persistent content identification in A/V essence

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. This work had its foundations in a Technology Committee report, “Open Binding of IDs to Audiovisual Essence Report”, available [here](#). The group’s focus is on carrying Ad-ID and EIDR identifiers, though it might be possible that others could be added later.

- a) **Status:** The group continues to hold 1 / 2 telecons per week. It has almost completed work to finalize the test plan and then work on robustness testing from the 4 current proponents will begin, using typical television test content that has been obtained from various broadcasters.

Drafting of the Standard is due to start in the New Year. It has been identified that an RP dealing with utilization of the ID will also be needed.

DG Project: Revision of Closed Captioning suite documents

This project is a straightforward updating of references for documents ST 333:2008, ST 334-1:2007, ST 334-2:2007, and RP 2007:2007 that cover carriage of CEA-708 (and CEA-608) closed caption data over various interfaces.

Status: ST 334-1 and ST 334-2 are published.
Revised ST 333 and RP2007 working drafts are underway.

DG Project: Revision ST 2010: VANC Data Mapping of ANSI/SCTE 104 Messages

This project is a straightforward updating of references.

Status: A working draft revision was posted for pre-ballot review some while ago and comments were received, primarily editorial. Additional detailed editorial comments have recently been received and they will be addressed with help from the commenter in an update to the working draft.

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.

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

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 is in the publication queue, expected shortly. The one remaining task for the group is to offer a script for a DCP packaging of the signal configured for use in B-chain calibration and tuning; a draft has been sent to the TC Chair. A member of the group has produced open-source pink noise C++ code.

DG Project: Draft RP xxxx: Digital Cinema Sound System Setup and Calibration (“B-chain Modern Calibration Procedure”)

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 decided in a meeting on July 30, 2015 that the section on microphone placement needed further revision before release to real world testing. An ad hoc group was tasked with revising this section; this was completed mid 2015-10.

The current draft of the document is undergoing “real world” testing by commercial technicians. Any comments received will be addressed in a final editorial pass before the document goes to ballot in 2016.

WG Project: Interoperability of Immersive Sound Systems in Digital Cinema

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) is currently concentrating on the work of the following drafting groups:



DG Project: Digital Cinema Immersive Audio Renderer Baseline Expected Behavior

This new project has been set up to develop an EG on the baseline expected renderer behavior, followed by an RP defining a testing procedure.

Status: The group has held four meetings since 2015-10-01.

DG on Immersive Sound Model & Bitstream

This group's initial focus is on Metadata Definitions. Work is underway on a Bitstream Specification. Three input documents were originally submitted – Dolby Immersive sound bitstream, DTS MDA bitstream and a Dolby Lossless Audio codec. More recently, a document from Blue Ripple Sound has been submitted.

Status: The group has completed its Metadata Specification Working Draft; it may not be progressed to Committee Draft pending harmonization with the Bitstream Specification and Renderer Baseline Expectation EG and RP work.

The Bitstream Specification group has decided to base its first draft on the Blue Ripple Sound contribution.

Other 25CSS Business

The TC Chair gave notice that work on Loudness in the cinema environment is expected to start in the TC in 2016.

Metadata and Registers Committee (30MR) chaired by John Hurst

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.

Topic: TC-30MR documents published in the last quarter

DG Project: EG 2061: Glossary of Stereoscopic 3D Terms

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

Status: There was no report. However, pre-DP review has been underway in the TC.



Business Impact: Understanding and common use of terms

Topic: UMID Projects

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

SG Project: Application of the Unique Material Identifier (UMID)

The UMID is standardized in ST 330 and RP 205 covers application of UMIDs in Production and Broadcast Environments. This SG is studying ways to make the UMID more useful, particularly in Material location across various systems. The SG is preparing two reports:

- Study Report on UMID Applications Part 1 (UMID Application Principles, Best Practices) - complete and submitted to HQ.
- Study Report on UMID Applications Part 2 (Additional Technology that needs Standardization)
 - Part 2.1: UMID Resolution Protocol, UMID-based Program Package Exchange – approved 2014-06
 - Part 2.2: UMID Applications in MXF

Status: The SVP indicated that the report produced by this SG is targeted for publication before Christmas 2015. New work is proposed for ST 330 extensions in the report; see project proposal below.

DG Project: UMID Resolution Protocol

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

Status: An initial strawman draft was submitted to the DG on 2014-12-05. There has been no further progress in the last quarter.

DG Project: New Standard ST 2102: SMPTE Core Metadata Set

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 ST 2012 draft has been updated in the light of pre-FCD review comments and it is hoped to finalize it for ballot during a meeting on 2015-12-14.

Business Impact: Potential foundation for Metadata



SG Project: Metadata Strategy

This review of the role of the TC started in the 2012-03 meeting round, examining how the focus of the TC should expand beyond the registration of metadata and towards standardizing metadata schemes and XML projects.

Status: No progress (30MR10 ballot comment resolution and online register work has taken priority).

Topic: Register Structure Document Projects

There are several SMPTE standards defining the structure of various metadata registers defined by ST 336: Data Encoding Protocol Using Key-Length-Value. They are all being updated to include new requirements such as including xml symbols. Four of these updates are now published:

- ST 335:2012 Metadata Element Dictionary Structure
- ST 400:2012 SMPTE Labels Structure
- ST 2003:2012 Types Dictionary Structure
- ST 395:2014 Groups Register Structure

DG Project: Draft ST 2088: SMPTE Essence Element Key Register Structure

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

Status: The draft has been revised to address DG comments and submitted to the TC Chair to initiate 2 week pre-FCD-ballot review.

DG Project: Revision ST 336: Data Encoding Protocol Using Key-Length-Value

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

Status: The DG has reviewed a draft incorporating comments from the previous telecon. One further comment was received. It was part of a proposal to change a number of 30MR documents to permit 12-byte labels as well as 16-byte labels, see ~~proposed document~~ revision projects below. No action will be taken on the ST 336 revision until a decision on all affected documents has been made.

WG Project: Metadata Definition

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. There has been a move to the use of xml to represent the registers.



Status: The four registers in xml form (for the first time) passed FCD ballot on 2015-05-18 with 13 comments to resolve. A pre-DP review was held on a revised comment resolution draft and no comments were received. A DP elevation vote was held at the TC meeting; the vote passed. The draft will proceed to ST Audit.

The individual register projects below will not be updated while the transition work is in process, and it is likely that they will be replaced or amended by the new process.

DG Project: Update Metadata Element Dictionary Contents (RP 210)

DG Project: Update Metadata Labels Register Contents (RP224)

DG Project: Create and Update Groups Register Contents

For some while, an informal Groups Register has being maintained.

DG Project: Create and Update Types Register Contents

For some while, an informal Types Register has being maintained.

DG Project: Create and Update Essence Element Register Contents

The group will create a register of SMPTE ULs for use as essence keys and process requests for register additions, modifications and deprecations.

Other 30MR Business

12 Byte ULs

Two document amendment projects have been proposed:

[ST 335 Amendment project](#)

[ST 2003 Amendment project](#)

The proposal is for these two documents to support 12 byte labels as well as 16 byte labels. It was identified that this proposal would affect more documents (e.g. ST 336, see revision project above) and it was decided that an analysis should be carried out in the Metadata Definition WG.

Proposed ST 330 Revision Project

The Chair of the UMID SG (see above) gave a presentation on revision work that had been identified in the drafting of the SG report. It was decided that the TC Chair will issue a formal project review.



File Formats and Systems Committee (31FS) chaired by Thomas Bause Mason and Pierre Lemieux

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.

Topic: 31FS Publications in last quarter

Topic: 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

DG Project: New Document: ST 377-2 - KLV-encoded extension syntax (KXS)

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 recently resumed.

Status: All comments had been resolved by the last meeting and the DG Chair had uploaded the revised draft for pre-DP review. The DG has been waiting for the 30MR registers ballot resolution to confirm the ST 377-2 labels; this has now happened and this project will proceed to pre-DP-ballot review.

DG Project: Revision ST 380: MXF Descriptive Metadata Scheme 1

The current document has been reviewed and it was identified that some changes are required.

Status: Work has started and the DG Chair expects the document to have completed pre-FCD-ballot review by the next meeting.

DG Project: Revision EG 42: MXF Descriptive Metadata

Changes that arose during ST 380 revision have been incorporated in the EG 42 draft.

Status: This revision closed ST Audit on 2015-07-26 and is in the publication queue.



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

Status: This document passed FCD rebalot on 2015-08-13 with 10 comments to resolve. All have been addressed, awaiting commenter response.

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

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 2015-10-23. It has 11 comments to resolve.

SG Project: MXF Timecode Mapping and Labeling

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: The SG has started its documentation. It held a meeting during this round and made further progress; this work will be incorporated in the draft in 2016-01.

DG Project: New Document: RP 2092-2 - Ad-ID Digital Ad Slate for MXF

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: The document passed FCD rebalot on 2015-08-05 with 37 voter comments; all have been resolved. Some pre-DP-ballot review comments from the TC-30MR registry editor were received and are being considered by the proponents.

DG Project: New Standard ST 2073-10: VC-5 Mapping into the MXF Generic Container

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 passed FCD ballot 2015-06-08 with 8 comments to resolve. All comments are resolved. A meeting is being arranged to confirm the requested ULs with the 30MR registry editor, then the document will be ready for pre-DP review.

DG Project: Revision of ST 2019-4:2014 (Mapping VC-3 into the MXF Generic Container)

This project will add support for image resolution independence.

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



Topic: Archive Exchange Format (AXF)

This Working Group (31FS-30) will define 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.

Part 2 will cover "External Uses of XML Schema".

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

WG Project: ST 2034-1: Archive eXchange Format (AXF) - Part 1: Structure & Semantics

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 planned revision was complete, but new input requesting symbolic lists in the file tree has been received. Completion of the document revision is expected in the 2 weeks following the meeting round.

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

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: A new document editor has been found, so the work can resume now that the Part 1 revision is nearing completion.

DG Project: ST 2001: XML Representation of SMPTE-registered Data (Reg-XML)

ST 2001 is about representing instances of SMPTE-registered data in XML.

There are two Parts: ST 2001-1: Mapping Rules (includes 2 schemas)

ST 2001-2: AAF and MXF data (includes an XML meta-dictionary and schema)

Status: Part 1 was published 2014-Q2. An issue about missing xml elements was discovered soon after publication. The corrected draft of Part 1 passed ST Audit on 2015-07-26 and the document is being proof-read for publication.

Part 2 was published 2014-Q3.



Other TC-31FS Business

[Proposed DG Project](#) ACES Codestreams in MXF

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.

[Proposed RDD Project](#) MXF OP-1a Interoperability Specification for Panasonic AVC-ULTRA Codec

AVC-ULTRA is the comprehensive codec name of Panasonic implementations of AVC-Long GOP and AVC-Intra VBR codec.

[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.

Topic: 32NF Publications in last quarter

[WG Project: SDI Interfaces](#)

This 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.

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

The **business impact** of all WG 32NF40 work items concerns interoperability between systems.

[DG Project: New document suite SMPTE 2076: Stereoscopic 3D \(S3D\) Production Timing and Synchronization](#)

The suite of four documents that were FCD balloted (ST 2071-1 Camera Systems, ST 2071-2 Live Production Systems, ST 2071-3 Physical Layer for Video Transport, EG 2071-4 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 rebaloted.

Status: RP 2076-1 passed FCD ballot 2015-04-09 with 33 comments; all have been addressed and work continues on resolving 3 remaining comments.

EG 2076-2 has been updated to reflect comments from its 2 week review and has now been posted to TC-32NF for FCD Ballot.

DG Project: New Document: SDI Audio Track Allocation Signaling

This project will define a signaling mechanism, likely to be carried in Vertical Ancillary Data Space, that provides serial digital interfaces with a means to clearly identify the configuration parameters of any given SMPTE ST 299-1 or -2 embedded audio track.

Status: The DG Chair noted that the ITU-R recently published Recommendation BS.2076 – Audio Definition Model. This recommendation may prove sufficient in addressing the audio metadata ‘gaps’ issue raised by this Drafting Group.

The DG Chair has circulated the information to the DG reflector for review and comment. As a result of that review further meetings may be called in the new year.

DG Project: New Document: EG on SDI Interfaces

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 2015-07 meeting that initial focus would be on HD and UHD SDI interfaces.

Status: This group has met 4 times since the September face-to-face meeting in Paris. Ongoing bi-weekly meetings will resume 2nd week 2016-01. A straw man WD document is being put together. A table of interface standards and related picture formats has been developed for inclusion in the document.

DG Project: Revision of RP 184: Specification of Jitter in Bit-Serial Digital Systems and Revision RP 192: Jitter Measurement Procedures in Bit-Serial Digital Interfaces

Status: Both document revisions are now in the publication queue.

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

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



Status: The group has held five telecons on RP198 since the September meetings. The revision is essentially done with the descriptions of the patterns for each supported mapping, though a table to list the correct line number range for the Level B mappings is still needed.

DG Project: ST 2036: UHD TV Multi-link 10Gb/s interfaces

The DG is working on 2 documents:

ST 2036-3 revision to constrain original document to UHD TV1 formats up to 60Hz carried in a 10-bit container and include colorimetry signaling.

ST 2036-4 covering UHD TV1 @ 100Hz / 120Hz and UHD TV2 24Hz to 120Hz carried in a 12-bit container.

Status: ST 2036-4 and the amended ST 2036-3 are now in the publication queue.

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

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.

Status: A new draft document (v1.1) was posted to the DG after the September meeting round for review and comment. The document includes information on the carriage of signals defined in ST 2036-4, however that document normatively defines its own connector and does not allow alternative connectors. A telecon with related parties is planned for the week of 14th December to resolve this issue.

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

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 quarter to focus effort on the 10E project; the transport work will now resume. Two Drafting Projects have been set up (both projects are at the proposal stage):

Drafting Project ST 2100-2: Coding and Transport Of Haptic-Tactile Essence in AES3

At the 2015-09 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 2015-09 meeting, it was decided that this group may confine its attention to the use of VANC space for carriage.



DG Project: CWDM optical interface for multi-link SDI

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

Status: The group held a meeting during this round. All recent changes to the document have been reviewed and agreed. Document editing is progressing well and the group plans to have a new draft within two weeks. The next meeting is scheduled for 2016-01-11.

WG Project: Video Over IP

This Working Group (32NF60) was established to handle projects related to IP transport of media. The WG has produced the 7-Part ST 2022 suite of standards.

Status: The group currently has no projects and is waiting for assignment of ST 2022-x family 5-year reviews. See below for some proposed work that is likely to be assigned to this group.

WG Project: New Document suites: Ultra HD SDI Interfaces

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, 12Gb/s and 24Gb/s.

Status: Many FCD ballot comments on Part 11 and Part 12 affected both ST 2081 and ST 2082 documents. Of the total 87 comments, 56 are resolved. To resolve a further 14 comments, a new project "[10E 2160-line and 1080-line Production Image Formats for Digital Cinematography - Additional Frame Rates](#)" was started. It has passed FCD ballot and is in comment resolution. Also (not related to the ballot), an [amendment project](#) to correct the jitter specification in ST 2081-1 and ST 2082-1 is underway in the ST 2081 suite DG; the DG is reviewing the first draft. Two timecode-related comments will be resolved by referencing the new ST 12-3 standard. Other progress is covered in each of the projects below.

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

This project is developing 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)

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

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

There are also 3 documents (like -10, -11, -12) planned for stereoscopic content and a multi-stream mapping document (multiple 1.5G and 3G over 6G).



Status: ST 2081-11 passed FCD ballot 2015-03-09 with 13 comments to resolve.
ST 2081-12 passed FCD ballot 2015-03-09 with 26 comments to resolve.

DG Project: ST 2082 suite: 12Gb/s Signal/Data Serial Interfaces

This project is developing 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)

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

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

There are also 3 documents (like -10, -11, -12) planned for stereoscopic content and a multi-stream mapping document (multiple 1.5G, 3G, 6G over 12G).

Status: ST 2082-11 passed FCD ballot 2015-03-09 with 19 comments to resolve.
ST2082-12 passed FCD ballot 2015-03-09 with 29 comments to resolve.

WG Project: Time Labeling and Synchronization

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. The main projects discussed were the 2059 Engineering Guidelines, the Time Labels projects, the PTP interoperability group and the HFR time code project.

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

DG Project: Network-based Synchronization System

The main work of this group is complete, following the publication of:

ST 2059-1: The SMPTE Epoch and generation and alignment of interface signals

This document contains:

Definition of epoch used for synchronization system.

Alignment of video and audio signals at the epoch.

Formulas for generating video, audio, ST 12 time code and ST 309 date from TAI time via PTP and additional metadata.



ST 2059-2: Precision Time Protocol SMPTE profile for time and frequency synchronization in a professional broadcast environment

This document defines the IEEE 1588 PTP profile for the SMPTE synchronization system.

DG Project: New Document ST 12-3: Time Address for High Frame Rate signals and its data structure in the ancillary data space

Project Scope: To create a standard specifying time address for HFR and its data structure in the ancillary data space. The document will specify rates of 72, 96, 100, 120 and 120/1.001 fps and it will be extensible to cover rates of up to 960 fps.

Status: Draft ST 12-3 was submitted for pre-DP-ballot review. Comments arising from the review were discussed at the WG meeting during this round. The resulting document will be posted for a second pre-DP-ballot review prior to DP vote.

DG: PTP Interoperability Testing

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 is open, but the Testing AHG and attendance at the interop meetings is subject to signing a non-disclosure agreement.

Status: The first round of testing was the week of 2015-11-09, hosted by FOX NE&O in Houston, TX. The main conclusion was that ST2059-1/2 fundamentally works as intended; the standards need only minor clarifications. It was confirmed that goals for Lock Time and Accuracy are achievable. The tests also highlighted the value of the EGs that are in development (see below). Four more Interop meetings for 2016 are being planned.

DG Project: Development of a set of synchronization Engineering Guidelines “EG 2059-1x”

This is an “umbrella” project. The 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: A Chair for this DG is sought. The four EG drafting projects below have been set up, 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](#). At the previous TC meeting, the possibility of another EG on interoperation with AES67 was mentioned.



Drafting Project: New Document: EG 2059-10 - Introduction to the New Synchronization System

Status: This document passed FCD ballot 2015-10-16 with 9 comments to resolve; resolution is underway.

Drafting Project: New Document: EG 2059-11 – Management of Time Discontinuities

Status: A WD was submitted 2015-04-20.

Drafting Project: New Document: EG 2059-12 - Systemization Considerations for using SMPTE ST 2059

Status: This document had previously been called “Facility Migration Guide”. A WD was submitted 2015-04-23; an updated version is expected soon.

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

Status: The most recent WD was submitted 2014-11-26, but it is understood that the co-authors are developing an updated version that will be posted very soon.

DG Project: New Time Labeling System

This is an “umbrella” project. The group facilitates development of a suite of Time Labeling documents.

Status: A Chair for this DG is sought (the pro-tem Chair is unable to devote enough time to get the work moving). There are currently three label document suites being developed:

Drafting Project: SMPTE 2103 Suite: Generic Time Label

Status: The following suite of documents closed FCD ballot 2015-09-21:

ST 2103-1: Generic Time Label - Data Definition

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

ST 2103-3: Generic Time Label - Character Representation

RP 2103-4: Generic Time Label - Interoperation with Time and Control Code

RP 2103-5: Generic Time Label - Time and Date Calculations

Part 1 passed with 55 voter comments to resolve. Part 2 passed with 47 voter comments to resolve. Parts 3, 4 and 5 failed to achieve numeric consensus and received 56, 44, 73 comments respectively and will be re-balloted soon.



Drafting Project: SMPTE 2105 Suite: Full-featured Time Labels (aka “TRL”)

Status: The current suite comprises:

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

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

ST 2105-3: Time Related Label (TRL) – Media Index Counts

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

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

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

The WG has been asked to review this suite of documents.

Drafting Project: RP 2104 Suite: Date-Time Terms and Definitions

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.

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

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

Status: The WG reviewed the edits. After some discussion about alternative approaches, the feeling was that the edits should remain as-is.

DG Project: Code-point Extension Mechanism for the ST 337 family

Originally, this “umbrella project” was set up to manage individual drafting projects needed to introduce a code-point extension mechanism for documents in the ST 337 family; the extension mechanism in ST 337 and 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 revised ST 337, ST 338, ST 339 and ST 340 documents are published. New Document “RDD 33 - Mapping of Dolby-E over AES3” has also published. The following Drafting Projects remain:

Drafting Project: Amendment of **ST 338: Format for Non-PCM Audio and Data in AES3 — Data Types**

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

Status: The amendment is ready for pre-FCD review in TC-32NF.

Drafting Project: **New Document ST 2101 - AC-4 Data Type**

A new document will be drafted and ST 338 data-type 24 will be requested.

Status: In the publication queue.

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

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 is approved. No further progress this quarter.

Drafting Project: **New document DTS Audio over AES3**

Status: The document failed FCD ballot 2015-10-16 because it did not achieve numeric consensus. The 5 ballot comments have been resolved and the resulting draft will be posted for pre-FCD re-ballot review.

Drafting Project: **New document Audio Metadata over AES3**

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 project was approved 2015-09-03. Parts of the metadata payload that is planned were developed by ITU and EBU and liaisons notifying these organizations of this work are planned.

SG Project: **Flow Control in Professional Media Networks**

This SG will investigate current and future professional media network management technologies, determine user requirements, transmission methods for management commands and provide



background information. It will review existing standards and specifications and identify gaps / recommendation standards development.

Status: This SG has held 5 telecons as well as a meeting during this round and continues with a bi-weekly schedule of telecons. The two main tasks are integrating contributions into the draft report and developing a questionnaire / questionnaires for users and technology providers.

DG Project: RDD Carriage of uncompressed video via MPEG Transport Stream over IP (Evertz)

The (abridged) project scope is: Outline the architecture and structure of small, simple changes to the existing broadly-used mpeg2 transport stream specification to accommodate transmission of uncompressed video over IP. Provide details on how the separate elements are launched into the network and how they are re-aligned at destination locations.

Status: The draft document is at RDD ballot, closing 2016-01-05.

Other 32NF Business

Standardization of VSF documents

The Video Services Forum has contributed VSF Technical Recommendations TR-03 and TR-04 to SMPTE for consideration and potential standardization.

TR-03 Transport of Uncompressed Elementary Stream Media over IP includes:

Uncompressed RTP payloads:

IETF RFC 4175 “RTP Payload Format for Uncompressed Video”

AES67 “AES standard for audio applications of networks - High-performance streaming audio-over-IP interoperability”

IETF draft-ietf-payload-rtp-ancillary “RTP Payload for SMPTE ST 291 Ancillary Data”

Unified timing & sync:

IEEE 1588 PTP

Description:

IETF RFC 4566 Session Description Protocol (SDP)

Announcement:

IETF RFC 2974 Session Announcement Protocol (SAP, optional)

TR-04 Utilization of ST-2022-6 Media Flows within a VSF TR-03 Environment includes:

Linkages to TR-03:

Timing/Sync

Session Description

“Studio Profile” for SMPTE ST 2022-6

“Well Formed” SDI requirement

Hooks for FEC and Seamless Merge (ST 2022-5/7)



Both documents are available on VSF website.

Media Systems, Control and Services Committee (34CS) chaired by Chris Lennon and John Footen

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.

Topic: 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 3.0.

WG Project: BXF 4.0

The bulk of BXF 4.0 is schema work. The document suite (Parts 1, 2, 3, 4, 9) has been revised to add BXF 4.0 features such as:

Live Schedule Files – OATC support; Addition of Backup Events; Ability to Exclude From EPG;

Time Code In/Out Option; Low Res Proxy URL; Format sub element definitions;

Multiple episode support; Schedule Episode number; etc.

Status: Parts 1-4 and 9 passed ST Audit 2015-10-09 and comments are resolved. These Parts are awaiting publication.

Proposed DG Project: BXF 5.0

BXF 5.0 is expected to include such things as: measurement data, QC data, file delivery parameters, trading partner registry, FIMS transfer connector, traffic instruction use cases.



Status: The BXF 5.0 project proposal has been approved, and this project is expected to begin shortly. ATSC 3.0 may require extensions to BXF for tying together distribution and this work is a candidate for BXF 5.0.

DG Project: Media Device Control over IP

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

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

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

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:

All four Parts closed FCD ballot (Parts 1-3 are revisions of the published documents). Part 1 closed 2015-07-15 with no comments; automatically DP status. Part 2 closed 2015-07-15 with no comments; automatically DP status. These two documents will proceed to ST Audit.

Part 3 closed 2015-07-16 with 9 comments. The unresolved comments are all from one commenter who has been unresponsive to the proposed resolution. Part 4 closed 2015-07-15 with 3 comments; all comments are resolved, so the document can proceed to DP vote.

The project proposal for Part 5 is awaited.



There was an enquiry about whether ST 2071 could be used to implement an ATSC transmission system scheduler to control bitrates. The DG Chair responded that this application can be implemented now, and the details can be added to the Capability Interface Repository.

Business Impact: Interoperable Media Device Control

Media Packaging and Interchange Committee (35PM) chaired by Annie Chang

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: Interoperability between systems, cost effective exchange of master formats in file form and new functionalities.

Topic: 35PM Publications in last quarter

None

WG Project: ST 2067 Suite: Interoperable Master Format (IMF)

This Working Group (35PM-50) co-ordinates the activities of a number of DGs defining various aspects of IMF. IMF comprises a master set of file-based elements for any downstream distribution using multiple composition playlists. The master set of files is used as the input to subsequent processing that creates deliverables.

Published IMF documents:

ST 2067-2:2013, Interoperable Master Format — Core Constraints

ST 2067-3: Interoperable Master Format – Composition Playlist

ST 2067-5: Interoperable Master Format – Essence Component

ST 2067-8:2013, Interoperable Master Format — Common Audio Labels

ST 2067-20:2013, Interoperable Master Format — Application #2

ST 2067-21:2014, Interoperable Master Format – Application #2E (previously titled Application #2 extended)

ST 2067-30:2013, Interoperable Master Format — Application #3

ST 2067-100:2014, Interoperable Master Format – Output Profile List

ST 2067-101:2014, Interoperable Master Format – Output Profile List – Common Image Definitions and Macros

ST 2067-102:2014, Interoperable Master Format – Common Image Pixel Color Schemes

ST 2067-103:2014, Interoperable Master Format – Output Profile List – Common Audio Definition and Macros



Status: The bulk of the IMF standardization is complete. There are 5 projects (see below) to amend / revise documents in the suite in the light of plugfests and one-year review.

Activity continues in the Mezzanine Film Format DG - see below.

A new project has been proposed for ACES in IMF – see below.

There is also activity in the audio DG studying how “immersive audio” could be stored in IMF.

DG Project: Amend/Revise ST 2067-20: IMF Application #2, JPEG 2000

Status: All FCD comments are resolved.

DG Project: Amend/Revise ST 2067-21: Application #2E

This extension supports higher JPEG 2000 specifications including resolution, frame rates and multiple color space encodings.

Status: All FCD comments are resolved.

DG Project: Amend/Revise ST 2067-2: IMF Core Constraints

Status: At pre-DP review.

DG Project: Amend/Revise ST 2067-3: IMF Composition Playlist

Status: At pre-DP review.

DG Project: Amend/Revise ST 2067-5: IMF Essence Component

Status: At pre-DP review.

AHG Project: IMF Sample Material Interchange (SMI)

This group has been set up to facilitate interoperability testing by making sample material available online. It is also organizing IMF plugfests. Bug Tracking has been implemented and bug resolution will result in edits to the IMF standards in 1 year reviews – see: dev.imfforum.com/bugs

Status: The SMI held a plugfest 2015-10-23 at Netflix in Los Angeles. Testing included IMF Application #2 Extended.

A plugfest specifically for App#4 (see below) was held 2015-09-22/23 in Paris.

The next IMF Plugfest will be held 2016-01-22 in Amsterdam, NL, hosted again by Netflix.



DG Project: New Document ST 2067-40: IMF Application #4 Mezzanine Film Format

This standard will extend 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.

Status: The DG is resolving pre-FCD-ballot comments.

Proposed DG Project: New Document IMF App#1 ACES (for long-term archiving)

A presentation was given at the 2015-07 TC meeting for a new application document to specify ACES in IMF. The planned project is on hold, to allow the container to be established first in TC-31FS (EXR mapped into MXF).



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](#) (this revision effective from 2015-01-31). 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 in the [Project](#) word in the title.