



Standards Quarterly Report

March 2015

Result of SMPTE® Standards Committee Meetings
2-5 March 2015 in San Jose, CA
Hosted by Altera



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
2-5 March 2015
San Jose, California, USA
Hosted by Altera

Nine SMPTE Technology Committees and fourteen subgroups scheduled meetings at this round, hosted by Altera, 2-5 March. There was also a demonstration of technology used to test implementations of SMPTE's Seamless Protection Switching of SMPTE ST 2022 IP Datagrams (SMPTE ST 2022-7); there is a proposal that these techniques could be adapted for use in a plugfest for SMPTE's new network-based media synchronization standards.

Around 80 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 150+ active projects is in the [detailed account](#), below.

New Projects started in the last quarter

- New Registered Disclosure Document: intoPIX TICO Lightweight Codec used in IP Networked or SDI infrastructures [Details](#)
- Revision of ST 2034-1:2014 - Archive eXchange Format (AXF) — Part 1: Structure & Semantics [Details](#)
- New Standard ST12-3: HFR Time Address for the Ancillary Data Space [Details](#)
- Five 1-year review projects on IMF:
 - Revision / Amendment of ST 2067-5: IMF Essence Component [Details](#)
 - Revision / Amendment of ST 2067-3: IMF Composition Playlist [Details](#)
 - Revision / Amendment of ST 2067-2: IMF Core Constraints [Details](#)
 - Revision / Amendment of ST 2067-20: IMF Application 2 [Details](#)
 - Revision / Amendment of ST 2067-21: IMF Application 2 extended [Details](#)
- Revision of Registered Disclosure Document RDD26: MXF OP-1b for AVC with chunk audio [Details](#)
- New Recommended Practice RP 2059-20: Local Time Specification for ST 2059 [Details](#)

Two revision projects on Media Device Control:

- Revision of Standard ST 2071-1: Media Device Control – Framework (adding URI Fragment) [Details](#)
- Revision of Standard ST 2071-2: Media Device Control – Protocol (Edit XSD and WSDL for project adding URI Fragment) [Details](#)
- Amendment of Standard ST 338: Format for Non-PCM Audio and Data in AES3 - Data Types (add AC-4 and MPEG-H code points) [Details](#)
- New Standard ST 2041-4: Format for Non-PCM Audio and Data in AES3 – MPEG-H [Details](#)



High Dynamic Range (HDR) Video Projects This topic has gained importance with the recognition that the next step beyond HDTV requires improvement in more than just pixel-count. Improvements to parameters such as color gamut, displayed dynamic range, frame rates, electro-optical transfer function all contribute to the improved viewing experience that is needed to justify launching new services.

SMPTE has a Study Group that is compiling a report on the High Dynamic Range Ecosystem. In the Study Group meeting this time, a plan to complete the work in time for IBC was presented.

SMPTE has another project defining Content-Dependent Metadata for Color Volume Transformation of High Luminance and Wide Color Gamut Images. This group's draft Standard has advanced well in the last quarter.

A set of three related SMPTE HDR projects are nearing completion:

- ST 2084 - High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays is published
- ST 2086 - Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut Images is published
- ST 2085 - Color Differencing for High Luminance and Wide Color Gamut Images" has reached Standards Committee Audit – the last stage before publication.

[Details](#) of all the HDR projects.

Interoperable Mastering Format (IMF) Over the last 4 years, this Working Group has been developing a large suite of documents defining a master set of file-based elements that can be used to create formats for downstream distribution using multiple composition playlists.

Another four of the group's Standards documents have been published this quarter, making a total of 11 published IMF documents.

Ongoing work in the group includes a further Standard on a Mezzanine Film Format as well as a Sample Material Interchange group that has organized IMF plugfests – the next one due at the end of March. The plugfest work has helped to identify improvements that are needed in the IMF Standards and 1-year revision / amendment work is starting on 5 of the documents.

[Details](#)



Network – based Synchronization for the Professional Broadcast Environment

Two documents defining a system for using synchronization packets on a data network to achieve media synchronization are very close to publication. The documents suffered a slight setback in the last quarter in order to make improvements to cater for timecode payloads, particularly supporting the “daily jam” function when the daylight saving period ends.

One document defines the behavior of the master, “ST 2059-2: Precision Time Protocol SMPTE profile for time and frequency synchronization in a professional broadcast environment” and the other defines the behavior of the slaves “ST 2059-1: The SMPTE Epoch and generation and alignment of interface signals”, allowing them to create any synchronized video, audio or timecode signal.

The system uses a SMPTE profile for the Precision Time Protocol (IEEE 1588 v2) that provides acceptable lock-up time, jitter and accuracy whilst providing metadata that allows timecode generators to make adjustments for time discontinuities such as leap seconds and daylight saving during “daily jam”.

Both documents are at Standards Committee Audit – the last stage before publication. [Details](#)

There is further related work drafting Engineering Guidelines and a Recommended Practice. [Details](#)
Consideration is being given to organizing plugfests for ST 2059-1 and ST 2059-2.

SMPTE Compression Standards SMPTE has standardized five compression 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 system). Two Parts of the suite are published, two more are close to publication. 3 Further documents in the suite are planned. [Details](#)
A Standard is being draft to define VC-5 mapping in the MXF Generic Container. [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 MXF container document for VC-3 is also being amended. [Details](#)
- Amendment and revision to two VC-2 documents (developed from BBC’s Dirac pro system). One project adds a high quality profile for Archive and Production, the other is a clarification of a published VC-2 document. [Details](#)

Cinema Sound Systems Projects This Technology Committee has projects aimed at improving the quality of sound in conventional movie theaters, as well as standardization of new immersive, 3D, systems.

A project group is developing a Recommended Practice “Digital Cinema Sound System Setup and Calibration”. [Details](#)



A project to develop a “Calibration Reference Wideband Pink Noise Signal and Test File” is well-advanced. The aim is to have a consistent pink noise signal for applications including theater testing. [Details](#)

The Technology Committee also has 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 theatre speaker configurations. [Details](#)

Material Exchange Format – MXF This widely-used media format does not stand still and there are always projects adding features and mappings to this file-based 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

2-5 March 2015

San Jose, California, USA

Hosted by Altera

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

We encourage interested parties to contact Standards Committees 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 help 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 considered formal minutes or a positioning statement or analysis piece. Please provide your comments or suggestions at standards@smpte.org

Future Meetings

The next quarterly Standards meeting round will be held 7-10 July 2015 in Randwick, Australia and will be hosted by Randwick TAFE.

Further quarterly Standards meeting rounds are planned for:

September 2015 – Paris, France immediately following the Amsterdam IBC. Hosted by CST.

December 2015 – Atlanta, GA, USA. Hosted by Turner.



This Quarterly Report provides a detailed account of the meetings of the following Technology Committees 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 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

SMPTE ST 2080-1:2014, Reference White Luminance Level and Chromaticity for HDTV

SMPTE RP 2080-2:2014, Measurement and Calibration Procedure for HDTV Display Luminance Levels and Chromaticity

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 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 colorspace.

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

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

Status: A KAVI drafting group has been set up and a pre-FCD-ballot draft has been submitted. There are currently problems with diagrams not rendering correctly in some versions of MS Word; if it is not possible to overcome the problem quickly, a pdf version will be provided along with the Word document. This Word interop problem is being experienced with other documents.

Business Impact: Interoperability between systems

DG Project: **New 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) Includes Reference Decoder, Sample Encoder, sample bitstreams
- ST 2073-3 - VC-5 Image Formats
- ST 2073-4 - VC-5 Subsampled Color Difference Components
- Part 5 – Layers (this allows embedding multiple images in a single Bitstream; used for stereoscopic, HDR and interlaced frames)
- Part 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)
- Part 7 – Metadata (this will provide a basic set of metadata for input image format and also facilitate embedding metadata from other standards)

Status: Parts 1 and 2 are published, but Part 2 is being revised to add test materials to support Parts 3 and 4. A repository for the software and test materials is being developed with SMPTE HQ. Part 3 is awaiting publication and Part 4 has passed ST Audit, so should be ready for publication shortly.

The DG is working on Parts 5 & 6; a second draft of each has been posted.

Part 7 work will resume work on metadata originally included in Part 1. This work will follow after the VC-5 group has completed work on an MXF wrapper for VC-5 in [TC-31FS](#).

The TC-10E and TC-31FS work is proceeding in joint meetings every 2 weeks.

Business Impact: Interoperability between systems



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

This amendment 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 Part 1 revision was published 2012-08-30.

The bitstreams to complete Part 3 are awaited. It was explained that there has been reassignment of the proponent's staff on this work and progress is expected in the next quarter.

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: A drafting group has been set up for this project. Like the ST 2042-3 work above, there has been reassignment of the proponent's staff on this work and progress is expected in the next quarter.

Business Impact: Interoperability between systems

DG Project: New 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.

The DG held a meeting during this round and the latest draft of Part 3 was reviewed. Some research work was presented that identified a need for standardized spectral power distributions for display primaries to reduce the effects of diversity of human perception of color. There was discussion about whether the display surround should be illuminated with the same primaries used in the main display to reduce observed white balance conflicts between the two.



The remaining documents in the suite will follow in the above order.

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 to support interoperability and exchange between relevant processes.

Status: The document passed FCD ballot on 2014-10-28 with 11 comments to resolve. There are now just 2 comments left to resolve.

DG Project: Revision of RP 173: Loudspeaker Placements

This project will update the Recommended Practice in line with techniques adopted by the broader recording industry, as embodied by AES and ITU standards.

Status: The project has been under hiatus to allow the Chair to work on other commitments.

Topic: Projects on Systems for High Dynamic Range and Wide Color Gamut

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 held a 1 ½ -hour meeting during this round. HDR Technology Proposals from the BBC, Philips, Technicolor and NHK have already been submitted and a further submission from Disney on tone mapping was presented this time. There will be “one-pagers” from each of these submissions in the report. The SG’s report is underway and a timeline was presented aiming at having the report completed in time for IBC. A sub-group has also developed a glossary of HDR/WCG terms.

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

This project will develop multi-part standards for specifying the semantics and representation of content-dependent metadata needed for color volume transformation of high dynamic range and wide color gamut imagery to smaller color volumes (e.g. BT.709 or Digital Cinema) in mastering applications.



Status: This group met during this meeting round. It has made significant progress in its first quarter and a draft document was reviewed. The group has noted that there is no “default” HDR to SDR transform in the absence of dynamic metadata, and that such a default transform is out of scope of this project. This is being brought to the attention of the HDR Study Group for consideration in the migration section of their report.

DG Project: New Document: ST 2084 - High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays

The scope of this project is to define an expanded luminance range for next-generation entertainment content and to define a new Electro-Optical Transfer Function (EOTF) based on a human perceptual model.

Status: This document is published and the project is closed.

DG Project: New Document: ST 2085 - Color Differencing for High Luminance and Wide Color Gamut Images

The proposal is analogous to the transform from RGB to YUV, but in XYZ color space, allowing sub-sampling of the color difference channels.

Status: This document has just started ST Audit, closing on 2015-03-25.

DG Project: New Document: ST 2086 - Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut Images

The metadata is designed to convey both the color gamut and the dynamic range of the display used for mastering.

Status: This document is published and the project is closed.

Business Impact of ST 2084, 2085, 2086: A number of companies are proposing a “Next Generation” vision for delivering an enhanced viewing experience to the home. These three projects contribute to this vision.

SG Project: Integer and Fractional Frame Rate Conversion

The aim of this project is to determine whether practical high-quality conversion can be achieved, in real-time as well as in non-real-time, that could enable discontinuing the use of higher fractional frame rates - in particular, between UHD TV video at an integer frame rate of 120 fps and UHD TV and HDTV at conventionally used lower fractional frame rates.

- **Status:** The SG sent out its “Request For Information” to organizations that are aware of the performance available from conversion technology in January 2015. At this meeting, it was reported that responses had been received from 6 organizations. A technology demonstration has been



organized for Wednesday, March 18, 2015 at FOX Studios in Los Angeles. RFI respondents are invited to attend to discuss their responses & conversion technology in an open forum.

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

The project scope is to document the “Television Lighting Consistency Index (TLCI)” and the “Television Lighting Matching Factor (TLMF)”. The introduction of 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 regards to color reproduction for Television.

Status: The draft RP 2093 document is well-advanced, but the document editor is experiencing problems between versions of Microsoft Word – particularly regarding the use of mathematical formulae.

DG Project: New Document: ST 2092-1 - 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 2092-1 document is almost ready to be posted for its 2-week pre-FCD-ballot review.

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, rather than designing the best possible test signal for critical examination of the production chain.

Status: The DG continues to review the draft RP 219-2 and resolve comments. The DG Chair believes that the document will be ready for ballot before the July meeting round.

DG Project: Draft RDD: Apple ProRes Decoder

This project will produce an RDD that documents the Apple ProRes decoding functionality and the 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 DG met during this meeting round. There was discussion about the best way to provide the sample elementary bitstreams; one idea that is being investigated is to wrap the bitstreams on a .MOV file and provide a simple tool to extract the elementary stream from the QuickTime file. When this issue is resolved, it is expected that the RDD ballot will be initiated.



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 which supports a degree of compression whilst providing low latency and high picture quality.

Status: The project Chair expects the draft document to be available by the end of March 2015.

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 project was approved in the last quarter. Drafting work is continuing on Part 1. Feedback from implementers will be incorporated in Part 2. Identification of the format in 3G-SDI and SMPTE 2022-5, -6 is being considered. Also, carriage within MPEG-TS.

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

SMPTE RP 91:2014 (Revision of RP 91-2002), Specifications for 70-mm Projector Alignment and Screen Image Quality Test Film

SMPTE RP 155:2014 (Revision of RP 155-2004), Reference Levels for Analog and Digital Audio Systems



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, layout, projection, reproduction, and related topics.

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

SMPTE ST 429-9:2014 (Revision of SMPTE 429-9-2007), D-Cinema Packaging — Asset Mapping and File Segmentation

DG Project: Stereoscopic Subtitle and Timed Text Rendering

This DG will revise SMPTE standards as recommended in “Stereoscopic On-Screen Text – Study Group Report” version 1.2.

Documents affected:

- Revise ST 428-7: D-Cinema Distribution Master - Subtitle (Published) A request has been received from Japan Digital Cinema Forum to revise ST 428-7.
- Revise ST 429-2: DCP Operational Constraints
- Revise ST 429-5: Timed Text Track File

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

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

Status: At the last TC meeting, a colorspace issue was debated. The published document has specified a PNG/Text colorspace of sRGB for 5 years but some implementations have used XYZ colorspace. To help resolve the issue, the DG developed questionnaires for Mastering Houses, Server Manufacturers, Projector Manufacturers and Studios. The results are mostly still under review. This document will wait for ST 429-5 to be ready before going to ballot.

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

This revision project will address issues that arose during the 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: There has been no update to the draft in the last quarter.

Business Impact: Compatibility and Interoperability



DG Project: New ST 430-14: Aux Data Sync Signal and Transfer Protocol

Project Scope is to develop standard(s) for the transmission and synchronization of Aux Data from a Media Block to one or more Processors in a D-Cinema system.
Applications include Immersive Sound and control for Motion Systems, e.g. motion chairs.

Status: The document closed FCD ballot on 2014-12-24 with 15 comments to resolve. At the TC meeting, there were 3 comments left to resolve; they are now all resolved.

Topic: Facility List Management projects

These two projects are being managed in one DG that has held 3 telecons since the last meeting round

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 group is currently reviewing a draft document. There is discussion about whether the revised version should continue to be based on ETM and/or whether it should maintain a method for establishing providence.

DG Project: New Document - 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: A strawman document has been submitted. Discussion has yet to start as the group has been focused on the 430-7 revision.

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

SMPTE ST 334-1:2015 (Revision of SMPTE 334-1-2007), Vertical Ancillary Data Mapping of Caption Data and Other Related Data

SMPTE ST 334-2:2015 (Revision of SMPTE 334-2-2007), Caption Distribution Packet (CDP) Definition

SMPTE ST 2031:2015 (Revision of SMPTE 2031-2007), Carriage of DVB/SCTE VBI Data in VANC



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

Status: The group has held weekly meetings through January and February 2015 to work on closing the remaining comments on Parts 1 and 2. Most comments are now resolved (though they need acceptance on KAVI). When these parts are ready for Draft Publication, work will get started on the file binding document, Part 3. The scope and contents for an additional EG are being considered.

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 SG report, available [here](#).

Status: The group is developing a Request for Proposals (RFP). It is also developing a test plan. It is currently focusing on the need to simultaneously carry Ad-ID and EIDR identifiers, though a few others that fit into a pre-allocated payload size could be added later.

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.
ST 333 and RP2007 are delayed.

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

This project is a straightforward updating of references.



Status: A draft revision was posted for pre-ballot review about a year ago and comments were received about editorial style that would require some restructuring. Comment resolution is underway but delayed.

DG Project: Revision ST 2031: Carriage of DVB/SCTE VBI Data in VANC

This project is a straightforward updating of references.

Status: The document has been published and the DG will be disbanded.

DG Project: Revision of ST 96: 35- and 16-mm Motion-Picture Film — Scanned Image Area

Status: Revision work is continuing.

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.

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: The draft ST 2095-1, zipped together with a Python script to generate the pink noise, is at FCD ballot, closing 2015-04-03.

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.

Status: A major rewrite was completed and submitted to the DG in early 2015-02. Work continues on the graphics for the document. There is a dependency on the pink noise standard that is now at



ballot. It is planned that the completed document will go for evaluation by “real world” testing by commercial technicians, prior to final revision and submission for ballot.

WG Project: Interoperability of Immersive Sound Systems in Digital Cinema

This working group will identify 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 will also address 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. The working group will liaise with TC-21DC and work closely with them in the creation of these standards.

Status: This WG (25CSS-10) is currently concentrating on the work of the Immersive Sound Model and Bitstream DG, whose first draft document is “Immersive Audio Metadata”. The DG has met 3 times in the last quarter and the document is progressing well, but there is still much work to do. The next step is to define metadata values and constraints.

An AHG formed under the DG was assigned to work on Static Metadata; to identify any metadata about the mixing stage or other processes required to interpret positional metadata for the renderer. The AHG has concluded that no requirement for static metadata has been identified so far. In the next round of meetings, the WG will also be considering requirements for validating the proposed metadata set, potentially involving a testing protocol, still to be established.

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.

SMPTE RP 205:2014 (Revision of SMPTE RP 205:2009), Application of Unique Material Identifiers in Production and Broadcast Environments

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: The draft document closed FCD-ballot on 2013-10-24 with a total of 16 comments. Comment resolution is now complete. The DG Chair will inform the TC when the document can proceed to pre-DP review; it is being held until comment resolution on a related document (ST 2087 – Depth Map Representation) is complete.



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: Part 2.2 of the report is still under development. A section on Examples of UMID Apps in MXF is almost complete and a section on “The Domain of Media Identity” will be contributed soon. The study has identified desirable ST 330 extensions.

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 progress in the last quarter, but update work is expected to resume in the coming 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: It had been expected to submit this draft Standard for pre-ballot review at this TC meeting as all agreed SMPTECore elements have been confirmed as extension of Dublin Core. However, the DG decided to improve the documentation before submitting the document.

Business Impact: Potential foundation for Metadata



SG Project: HQ implementation of On-line Registers

TC-30MR's metadata registers are currently spreadsheet-based and it has long been recognized that an online database is required. This SG has completed a report listing requirements for an online system and will remain available to assist SMPTE HQ with implementation issues.

Status: The SG Chair proposed that the group should be disbanded, as it has only been kept open to assist with implementation and that function is being provided now in the Metadata Definition WG; see below. It was agreed to disband the group.

Business Impact: Efficient and accurate maintenance of Universal Label assignments.

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: When there is SG consensus, the report will be submitted to the TC. There has been no progress this quarter due to intensive work in 30MR-10, below.

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 STxxxx: SMPTE Essence Element Key Register Structure

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

Status: Comments made during DG review will be incorporated in the current draft. It will then be posted for pre-FCD-ballot review. There has been no progress this quarter due to intensive work in 30MR-10, below.

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 Chair submitted a revised draft for DG review 2014-12-03, dealing with the first half of the document. There have been no comments, so the remainder will be revised in the coming quarter.

Drafting Project: RP 2092-1: Ad-ID® Identifier Representations

This document is closely associated with the [TC-31FS project](#) developing an Ad-ID “digital slate”. The two projects share a 31FS drafting group “Ad-ID Digital Ad Slate for MXF”.

Status: The document passed a DP elevation vote at the TC meeting. It will now go for ST Audit.

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.

Status: Experts within the WG have been working on a clean-up of the register data, in particular the removal of redundancy. There has been a move to the use of xml to represent the registers. Consequently, the next register contents ballot documents will be in xml form (and an xslt style sheet will be provided to permit a tabular presentation).

The WG anticipated that a one week review will start in the WG imminently and then pre-FCD ballot review will be initiated in the TC. He also gave brief details of discussions that had been held with the HQ online register developer.

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.



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

SMPTE RDD 32:2014, XAVC™ MXF Mapping and Operating Points

SMPTE ST 268:2014 (Revision of SMPTE 268M-2003), File Format for Digital Moving-Picture Exchange (DPX) Note: It was revealed at the TC meeting that significant errors have been found in this publication; a corrected version is being put together.

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.

Status: The document passed a second FCD ballot on 2013-11-17 with 70 comments. All comments have been resolved and the DG Chair has uploaded the revised draft for pre-DP review to the DG, with the intent of forwarding to the TC.

DG Project: Revision ST 434: XML representation of MXF metadata

Update ST 434 to take account of changes to ST 377-1 and other MXF documents

Status: This document passed ST Audit on 2015-02-03. However, publication is delayed while the TC Chairs check a document issue with the Document Editor.

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



Status: This DG is disbanded and the project is inactive, but at the 2014-09 TC meeting there was a proposal for the document to be stabilized and a subject-matter expert agreed to review the document for stabilization. The review concluded that the document should be revised and a revision project will be proposed.

DG Project: Revision EG 42: MXF Descriptive Metadata

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

Status: This revision is at DP approval vote, closing on 2015-03-18.

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

Status: This document failed FCD ballot (closed on 2013-05-23). The proponents have submitted the revised draft for DG review, having restructured it to remove extraneous material. It will then be submitted for TC review and a second FCD ballot.

DG Project: New Document: AAC Family Compressed Digital Audio in MXF

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

Status: The DG Chair reported that the WD is close to completion. 30MR requests have been drafted for the required ULs (Labels Register), but need to be translated into the new xml format and rechecked. Plan is to post for pre-FCD review well before the next TC meeting.

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 met during the meeting round and presented some findings to date, including the use of AMWA AS-07. The first draft of the report within the SG is expected soon and submission to the TC is expected in the next quarter.

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 underway in TC-30MR.

Status: The document passed FCD ballot on 2014-11-20 with 33 voter comments; all are now resolved and a pre-DP review package will be prepared for the TC.

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



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

Status: The draft Standard is at pre-FCD review, closing 2015-03-08. It will need the UL requests packaged with it for ballot.

[DG Project: Revision RDD 26: MXF OP-1b for AVC with chunk audio](#)

This project adds wrappings of the AVC Intra encoded video essence for additional source images: - 1080p/4:4:4 - 2K/4:2:2/4:4:4 - 4K, UHD TV1/4:2:2/4:4:4.

Status: This new project was only proposed in the last quarter and the revised document has already passed RDD ballot. It will now go for ST Audit.

[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 draft Standard is at FCD ballot closing 2015-03-11. Some comments have already been addressed.

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".

A new AXF project will:

- Prepare Reference AXF Objects
- Prepare Reference AXF Media or at least Media Structures
- Verify AXF Objects and Structures
- Develop Tools for AXF Object & Media Verification
- Develop Utilities for AXF Object Recovery on Various OS's

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: Revision to the text and to the XSD file is complete. A UML diagram has been updated but there are problems integrating the diagram into the Word document. When this has been done, the revised Standard can go for TC review and balloting can begin.

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 is needed and work is suspended until a new editor is appointed.

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. A corrected draft of Part 1 is ready for DP rebalot.
Part 2 was published 2014-Q3.

DG Project: New Document: XML Schema for Audio and Related Metadata

This DG will develop an XML Schema for audio and related metadata focusing on the technical aspects and harmonizing the work with existing SMPTE audio metadata efforts.

Status: The work of this group was suspended while a gap analysis using the EBU model as a baseline was studied. This time, a joint meeting with a related [TC-32NF project](#) and other SMPTE audio-metadata-related efforts (25CSS, 35PM, ST 377-4) was held. It was decided to move all SMPTE audio metadata work to this project, whose scope will be revised. The gap analysis will be completed and additional related documents from ITU-R will be obtained.

Other TC-31FS Business

Stabilization of ST 379-1

A report was submitted to the TC comparing the roles of ST 379-1 and ST 379-2 and recommending stabilization of ST 379-1. It was agreed that the stabilize vote would be held electronically and that the “379-0” would briefly describe the reasoning and contain a persistent link to the report.



Metadata registers status

The TC-30MR Chair gave a presentation on the revised registration request format – now using xml – that has been introduced. He also offered assistance and made the TC aware of a tool for conversion of xls format > xml format .

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.

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: Amendments for UHD TV Colorimetry Signaling

This DG is drafting amendments to ST 425-3 and ST 425-5 to add Payload ID signaling for UHD TV colorimetry.

Status: ST 425-3 AMD1 and ST 425-5 AMD1 have now been posted for ST audit closing 2015-03-25.

DG Project: New document suite 2076: Stereoscopic 3D (S3D) Production Timing and Synchronization

This group is developing a document suite on 3D timing and sync.

Status: The 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".



RP 2076-1 is ready for FCD rebalot. EG 2076-2 is almost complete but requires someone to complete the SDI section(s) – the existing editor cannot continue with this work.

DG Project: 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 work of this DG has been on hold, awaiting the audio metadata gap analysis work in [TC-31FS](#). It is thought that this DG will be able to resume work shortly.

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.

Status: The group is discussing document structure. At the last meeting, it was suggested that the main topics should be:

- What are the standards?
- What image formats are carried by each interface?
- What is the payload bandwidth of each interface?
- Network or system aspects that can affect the performance of the interface.

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: The documents both passed FCD ballot on 2014-07-20 and both had 21 comments to resolve. Most comments are resolved. The DG met during this meeting round and made progress resolving 3 of the bigger issues.

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 was agreed that RP 198 – HD Check-field – is higher priority than EG34, in order to get 3Gb/s interfaces specified, and should be completed first.

Status: The focus is on RP198. Work is on hold awaiting completion of the RP 192 / RP 184 project.

DG Project: Revision of ST 297: Serial Digital Fiber Transmission System for ST 259, ST 344, ST 292 and ST 424 Signals

Scope was to revise ST 297:2006 to update only the normative references and responsible TC; now extended to include details for ST 2081 and ST 2082 projects.



Status: ST 297 will be published 2015-03-19.

DG Project: UHDTV Multi-link 10Gb/s interfaces

The DG is working on 2 documents:

ST 2036-3 revision to constrain original document to UHDTV1 formats up to 60Hz carried in a 10-bit container

ST 2036-4 covering UHDTV1 @ 100Hz / 120Hz and UHDTV2 24Hz to 120Hz carried in a 12-bit container

Status: ST 2036-4 was sent for a DP rebalot after a small change was made. The ballot passed 2015-02-26. It is now at ST Audit 2015-03-26.

The ST 2036-3 revision has not progressed and the DG Chair will review whether this work continues to be needed.



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 UHDTV systems. The system also has the following features: automatic dust protection; automatic laser source eye protection; high durability; Low maintenance; Small size.

Status: There has been no work since the last meeting round, but it will now resume to revise the draft:

- to include an additional connector variant dedicated for dual-link applications (as agreed at 2015-09 meeting)
- to include methods for identifying and coding of various interface protocols in terms of color coding and link assignment

DG Project: New Document: 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: The DG has identified that there should be support for transport of Haptic-Tactile Essence using AES3 and using SDI Ancillary Space. For AES3, it will investigate the encapsulation method defined in ST 337, ST 338.

WG Project: Video Over IP

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

Status: A new WG Chair has been appointed. He mentioned that VSF has a lot of work that is likely to come to this WG for standardization. A need has been identified to break out parts of the essence and carry them as RTP, rather than encapsulating the whole SDI interface.

DG Project: Amendment ST 2022-6: Mapping of High Bit Rate Media Signals on IP Networks

Interoperability tests have revealed minor implementation variations; this amendment to ST 2022-6:2012 will add clarification regarding RTP Timestamps

Status: There was no report.

WG Project: New Document suite: 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: The WG met during this meeting round. 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

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

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 multistream mapping document (multiple 1.5G and 3G over 6G).

Status: ST 2081-1 and ST 2081-10 are approved for publication. ST 2081-11 and ST2081-12 are both at FCD ballot, closing 2015-03-09.

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

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

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 multistream mapping document (multiple 1.5G, 3G, 6G over 12G).

Status: ST 2082-1 and ST 2082-10 are approved for publication. ST 2082-11 and ST 2082-12 are both at FCD ballot, closing 2015-03-09.

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. It had formerly been a Technology Committee, TC-33TS.

Status: The WG met during this meeting round. The main projects discussed were the two Synchronization documents ST 2059-1 and ST 2059-2, and the new HFR timecode project (see below). In addition, the WG started to consider how interoperability testing could be undertaken. The aim is to confirm that the provisions of the standards are unambiguous and that the technology does, indeed, yield the intended results.

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

DG Project: New Synchronization System



This is an “umbrella” project. The group facilitates development of a suite of Synchronization documents in drafting projects below.

Drafting Project: New Document: 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

Status: In the last quarter, it was found that a small change was necessary to the document that had been passed on to ST Audit. It was decided that the modified document would go for DP rebalot. At the TC meeting, a DP elevation vote was held; the vote passed.

Drafting Project: New Document: 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.

Status: A completed ST 2059-2 document was held from publication because a ST 2059-2 amendment [project](#) was started in order to improve the information conveyed to “slaves” implementing the “daily jam” function in ST 2059-1. At the TC meeting, a DP elevation vote for the amendment was held; the vote passed. A version of ST 2059-1 incorporating the amendment will be included in the package for ST Audit.

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.

Status: A Chair for this DG is sought (the pro-tem Chair is unable to devote enough time to get the work moving). 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](#).

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

Status: An updated draft document was submitted to the DG 2014-04-01. No progress in the last quarter.

Drafting Project: New Document: EG 2059-11 - Time Discontinuities

Status: Project initiated. No progress in the last quarter.



Drafting Project: New Document: EG 2059-12 - Facility Migration Guide

Status: Project initiated. No progress in the last quarter.

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

Status: An updated WD was submitted 2014-12-08.

DG Project: New Time Labeling System

This is an “umbrella” project. The group facilitates development of a suite of Time Labeling documents that will have drafting projects set up.

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 four label documents being developed:

- **Full-featured Time Labels** (aka “TRL”)

Status: An updated version was uploaded 2015-03-01. Two Parts have been drafted; an EG and an ST.

- **Generic Time Label**

Status: An updated version was uploaded 2015-02-27. It is now a 5-Part suite:

ST on Data Definition

ST on Transmission in Ancillary Data Space

ST on Character Representation

RP on Interoperation with Time and Control Code

RP on Time and Date Calculations

- **Date-Time Terms and Definitions**

Status: A draft was walked- through at the 2015-09 meeting but there has been no updated draft since.

- **Simple Time Label** (this one is less certain and may be considered a “Super 12-1” label)

Status: Currently no draft.

DG Project: Revision of ST 318: Synchronization of 59.94-Hz or 50-Hz Related Video and Audio Systems in Analog and Digital Areas – Reference Signals

This project has been set up to add alignment information for ST 2059-1, update references and general editorial cleanup.

Status: All comments from the 2014-10-22 FCD ballot are resolved and the document is ready for pre-DP ballot review.

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: Project has been approved.

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: This new project was approved 2014-11-17. Drafting is essentially complete and the DG Chair expects to have pre-FCD review shortly. ST 12-3 will not support legacy Binary Groups; these can still be used with the Ancillary Space provisions in ST 12-2.

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

This is an “umbrella project” to manage individual DG projects for each document.

There is a shortage of free code points for identifying non-linear PCM formats carried by AES-3. The extension mechanism will be documented in ST 337 and the extended data types will be documented in ST 338. The DG will revise or add any other documents in the family as required.

Status: The revised ST 337 and ST 338 documents are now at ST Audit - when they pass, ST 339 and ST 340 can also publish. This DG has the following Drafting Projects:

Drafting Project: Revise ST 337: Format for Non-PCM Audio and Data in an AES3 Serial Digital Audio Interface

Status: This document is at ST Audit, closing 2015-03-26.

Drafting Project: Revise ST 338: Format for Non-PCM Audio and Data in AES3 - Data Types

Status: This document is at ST Audit, closing 2015-03-26. An [amendment project](#) has been started to add AC-4 (code point 24) and MPEG-H (code point 25) see these projects below.

Drafting Project: Revise ST 340: Format for Non-PCM Audio and Data in AES3 — ATSC A/52 Digital Audio Compression Standard for AC-3 and Enhanced AC-3 Data Types

Status: This document passed ST Audit on 2014-10-12. It is pending publication, awaiting ST 337, ST 338.

Drafting Project: Revise ST 339: Format for Non-PCM Audio and Data in AES3 - Generic Data Types



Status: This document passed ST Audit on 2014-10-12. It is pending publication, awaiting ST 337, ST 338.

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: This document is now ready for pre-FCD-ballot review.

Drafting Project: New Document: RDD 33 - Mapping of Dolby-E over AES3

It was discovered in the Code-Point Extension project that there is no publicly-available reference document for implementation of data-type 28.

Status: This document is 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 next step will be project approval - this is not strictly needed as the project falls under the DG scope, but it was decided to go ahead with approval anyway.

Other 32NF Business

Proposal for SG on Flow Control in Professional Media Networks

A presentation was given that continued the theme of flow control / switching that was presented at the 2015-06 meeting. The proponents decided that it was best to study this topic, rather than going into Standards or RPs for network switching techniques. A report is proposed covering switching approaches, congestion control, technology overview, user requirements, standardization needs and recommendations. A project proposal will be submitted.

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: BFX 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 BFX
- RP 2021-9: Implementing BFX

It is primarily an XML-based system that standardizes exchange of Schedule, As-run and Content-related metadata. The group has an XML AHG.

Features are steadily being added to BFX and these are batched into versions. The current published version is BFX 3.0.

WG Project: BFX 4.0

The bulk of BFX 4.0 is schema work. The document suite has been revised to add BFX 4.0 new 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: The DG Chair reported that final review of the revised documents is imminent; there is a little bit of tidying up needed. The BFX 4.0 revision will affect all documents in the suite except for 2021-5, including a revision to 2021-0. The WG will turn its attention to compiling potential BFX 5.0 work items; possibly some items deferred from BFX 4.0 are candidates.

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 under development 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.

ST 2071-5: Media Device Control - RESTful Protocol – New intended project, proposal will be issued.

Status:

Parts 1, 2, and 3 were published in 2014. The revisions noted above are awaiting final feedback from FIMS.

Part 4 passed FCD ballot 2014-10-20 with 2 comments to resolve. There has been some work on the xml schemas for Part 4 to resolve one of these comments.

There are new project proposals associated with this work. Improvements to ST 2071-1 to [add URI Fragment notation](#) has been issued together with [Edit XSD and WSDL for project adding URI fragment](#) and an update to ST 2029 will take place in TC-30MR.

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

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

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

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

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



WG Project: 2067 Document 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 (nearing its 1 year review)
- 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 #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. Activity continues in the Sample Material Interchange AHG and the Mezzanine Film Format DG; see below. One year review is due on the following IMF documents (and any plugfest bug-fixes identified will be incorporated):

- ST 2067-2 IMF Core Constraints
- ST 2067-3 IMF Composition Play List
- ST 2067-5 IMF Essence Component
- ST 2067-20 IMF Application #2
- ST 2067-21 IMF Application #2 Extended

DG Project: Draft ST 2067-20: IMF Application #2, JPEG 2000

Status: Published and now opened for a [1 year review amendment / revision](#) project.

DG Project: Draft ST 2067-30: IMF Application #3, MPEG-4 Visual Simple Studio Profile (SStP)

Status: Published.

DG Project: Draft ST 2067-2: IMF Core Constraints



Status: Published and now opened for a [1 year review amendment / revision](#) project.

DG Project: IMF CPL and OPL

This group's Composition Playlist, ST 2067-3, is opened for [1 year review amendment / revision](#) project. The group has also been working on Output Profile List (OPL) documents.

Status: The set of Output Profile List documents has just been published:

ST 2067-100 IMF Output Profile List - Core

ST 2067-101 IMF Output Profile List - Common Image Definitions and Macros

ST 2067-102 IMF Output Profile List - Common Image Pixel Color Schemes

ST 2067-103 IMF Output Profile List - Common Audio Definition and Macros

DG Project: IMF Wrapping, Security & Packaging

This group has developed ST 2067-5: Interoperable Master Format – Essence Component

Status: ST 2067-5 is published. [1 Year review amendment / revision](#) project initiated.

DG Project: IMF Data (Text) Essence

Status: Adopting W3C IMSC-1 Profile as a constraint for subtitling and captioning.

DG Project: IMF Audio

Project: ST 2067-8: IMF Common Audio Labels.

Status: Published.

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 (last one on 2014-10-24 at which interoperability between 7 working systems was tested; including both HD and UHD files).

Status: The SMI held 5 meetings in the last quarter. Another plugfest is planned for 2015-03-27 at Netflix in Los Angeles.

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

DG Project: New Document ST 2067-21: Extensions to IMF Application #2, JPEG 2000

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



Society of Motion Picture and Television Engineers®
3 Barker Avenue
White Plains, NY 10601 USA
www.smpte.org

Status: Published and now opened for a [1 year review amendment / revision](#) project.

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

This standard will extend the capabilities of IMF Application #2 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: An initial draft was posted to the WG 2014-12-19. The DG Chair is addressing comments.



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Notes on this report and the SMPTE Standards Process

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).

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

'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:

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

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.*