Society of Motion Picture and Television Engineers
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SMPTE Standards Quarterly Report

As a result of SMPTE Standards Committee Meetings
5-9 December 2011
Hosted by The Walt Disney Studio
Burbank, CA USA

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.

In 2011, SMPTE completed 41 standards and has more than 100 standards-related efforts underway.

We encourage interested parties to contact Standards Committees to learn more about specific activities. Go to www.smpte.org/standards for more information.

The SMPTE Standards Quarterly Report provides highlights of activities and decisions that took place at the December 2011 series of SMPTE Standards Committee meetings. It is a snapshot in time and should not be considered formal minutes nor a positioning statement or analysis piece.

The Executive Snapshot provides highlights of just a few activities and decisions. For further details of work at the specific Standards Committee level, refer to the sections in Detailed Summary, which includes details as well as the business impact of those decisions.

We look forward to establishing this regular report following each quarterly standards meetings as a method by which we can effectively communicate recent activities. Provide your comments or suggestions at standards@smpte.org

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

Thanks to Dr. Hans Hoffmann, SMPTE Engineering VP, the Technology Committee Chairs, and Paul Treleaven for their input in this report.

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Executive Snapshot Highlight

Archival

- **Archive Exchange Format (AXF).** An Archive Exchange Format will provide the basis for standards that let archive systems exchange content independent of their physical media or their vendor of origin. SMPTE has made good progress on an AXF standard and is meeting on a weekly basis to accelerate a draft that can be sent out for balloting.

Broadcast

- **Captioning Of Video for Internet Use***.* Following the success of the SMPTE 2052 Timed Text standard the Society of responding to requests from the industry for further work related to the ATSC captioning standard, CEA-708. This work is being done with key international partners and representatives of the hearing-impaired community.

- **BXF Version 2.0.** As part of the update to this highly popular traffic standard SMPTE has elevated the revised Broadcast Exchange Format to Draft Publication status.

- **3 Gbit/s Studio Interfaces – Stereoscopic 3D.** SMPTE has elevated to draft publication an SDI standard for stereoscopic images carried on a single 3 Gbit/s interface.

Cinema

- **Image Interchange Format (IIF).** The Academy of Motion Pictures Arts and Sciences (AMPAS) has brought its IIF work to SMPTE for standardization. The technical balloting is complete and the work now goes to the Standards Committee for a final audit prior to publication.

- **DCDM Subtitling.** Work is well underway to develop support for stereoscopic positioning of timed text and sub-pictures. SMPTE has adopted an accelerated schedule with the intent of having a consensus draft ready for the March 2012 technical committee meeting.

- **High Frame Rates for 3D and 2D D-Cinema Applications.** The SMPTE study group overseeing this effort has made good progress. In fact, it has divided its work to manage a quick response to the feasibility of high frame rate playback on existing hardware and a longer-term effort to characterize promising technologies for best-case high frame rate playback on current and future platforms.

Post Production

- **Fixed Pixel Matrix Reference Display Standards**. CRT-based reference monitors have practically disappeared from the market and users need fixed pixel matrix reference display standards. SMPTE is working to develop them in a timely manner.

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Detailed Summary of December 2011 Meetings

Essence Technology Committee (10E):

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: Fixed pixel matrix reference display

- Users have requested standardization work in SMPTE on new fixed pixel matrix reference displays since CRT-based reference monitors have practically disappeared from the market.

- Status: the group has agreed on a roadmap of documents to be developed and has re-organized itself to ensure that those documents can be developed in a timely manner that reflects the needs and requirements of both manufacturers and end users alike.

Impact: Professional displays that comply with the final SMPTE documents will allow consistent assessment of image quality.

Topic: Image Interchange Format (IIF)

- The Academy of Motion Pictures Arts and Sciences (AMPAS) produced advances in image exchange work, known as Image Interchange Format (IIF). This work has been brought to SMPTE for due process standardization to facilitate interoperable industry solutions. It comprises standards documents for Academy Color Encoding (ACES), Academy Printing Density (APD), and Academic Density Exchange Encoding (ADX).
Status: all three documents have successfully completed Technical Committee (TC) balloting and review and will be passed to the Standard Committee for final audit prior to publication.

Impact: This work will enable interoperability between systems and facilities, particularly in the post-production environment.

Topic: Video compression standards in SMPTE

- VC-2 video compression: revision of the SMPTE mezzanine video compression standard (based on BBC's DIRAC pro) has started; a new Profile will be added to address Archiving and Production applications.

- Status: the Ad Hoc Group (AHG) has completed development of the new profile and the document is currently in Final Committee Draft (FCD) ballot.

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Impact: Standardized compression formats with clear Intellectual Property Rights (IPR) will allow enhanced interoperability among multiple vendors and enable educated business decisions.

- VC-5 video compression: standardization of the Cineform video compression algorithm is well underway. A working draft is currently in development within the AHG.

Impact: Standardized compression formats with clear IPR will allow enhanced interoperability among multiple vendors and educated business decisions.

- **New work:** VC-3 video compression: revision of the SMPTE VC-3 video compression standard (based on AVID's DNxHD technology), has started; this new work has been undertaken by SMPTE in order to ensure that the SMPTE VC-3 compression standard includes support for 4:4:4 processing in line with current industry practice.

Impact: Standardizing enhanced capabilities ensures that SMPTE standards remain relevant to the industry.

Topic: Stereoscopic 3D
- The Stereoscopic 3D Frame Compatible Packaging and Signaling document (ST 2068) is progressing very well towards a first ballot. This document is important to ensure 3D interoperability between equipment and software products from multiple suppliers.

- Disparity Map Representation for stereoscopic 3D – which is targeted at live 3D production – has completed its drafting stage and is now ready for technology committee ballot.

Impact: Supports the market acceptance of 3DTV and development of interoperable systems with new features.

Further Topics:
- Revision of Key Video signal - SMPTE RP 157
- Revision of 720p Image Formats - SMPTE ST 296
- Revision of SDTV component video coding - SMPTE ST 125

Film Technology Committee (20F):
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 did not meet during this session.

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Digital Cinema Technology Committee (21 DC):

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: Revision to ST 428-7 "DCDM Subtitle"

- Development of support for stereoscopic positioning of timed text and sub-pictures is well underway, with substantial agreement on a draft proposal. Revision of the standard, to improve descriptions as needed for comparable results among the various implementations, is ongoing. The group is adopting an accelerated schedule with the intent of having a consensus draft ready for the March 2012 technical committee meeting.

Impact: This work will result in improved fidelity of subtitle rendering between systems and run-time rendering of subtitles for stereoscopic programs, as is currently available for 2D systems.

Topic: High frame rates for 3D and 2D D-cinema applications

- The study group has met twice and is making good progress. Efforts are being split to manage both a quick response on the feasibility of high frame rate (HFR) playback on existing hardware and a longer-term effort to characterize promising technologies for best-case HFR on current and future platforms.

Impact: Enables HFR presentation in currently deployed hardware and provides guidance and standards to be used by the designers of next-generation HFR-capable systems.

Topic: User-definable channel labeling for DCP audio

- TC 31FS has completed work on the data structures needed to complete this project. The channel labeling ad-hoc group is now completing work on the documents needed to implement this feature in the DCP.

Impact: New audio channel arrangements can be precisely labeled in a DCP without the need for additional standards development for each proposed arrangement.

Topic: Alignment of DCP encryption with NIST standards

- The group has recommended a single change, the implementation of a new NIST-approved random number generator for DCP Track Files. The group has begun the process of examining the approved algorithms with the intention of choosing one to be implemented as a standard some time in 2012.

Impact: Maintains the security of the D-cinema system by providing approved alternatives to older algorithms.

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Television and Broadband Media (24TB):

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: SMPTE Timed Text applications

- Development of a standardized method for conveying CEA-708 captions to distributors of Internet content and/or the consumer. Following the success of the SMPTE 2052 Timed Text work, further work is requested by the industry on CEA-708 applications. This work is being done in liaison with key international partners and representatives of the hearing-impaired community.

- RP 2052-10 (CEA-608 mapping) has been amended to correct several typographical errors in the Unicode symbols.

- The standard 1-year review for new documents (2052-1 and 2052-10) is anticipated to start in January.

Impact: Ensures the availability of closed captions when television content is delivered through the Internet.

Topic: Lip sync

- Lip sync problems are the source of the many customer complaints, thus important for broadcasters. SMPTE is addressing lip-sync issues by defining standards documents for audio and video synchronization measurements using fingerprinting. SMPTE is liaising with many other organizations around the globe (i.e., ATSC, DVB, ARIB) and helping to achieve an end-to-end solution.

Impact: A standardized approach enhances the end-user experiences by avoiding lip-sync issues.

Topic: Miscellaneous document maintenance

- In response to industry input, several television-related documents are undergoing revision:
  - ST 096, "for Television — 35- and 16-mm Motion-Picture Film — Scanned Image Area "
  - ST 2035, "Audio Channel Assignments for Digital Television Recorders"
  - EG 32, "Emphasis of AES/EBU Audio in Television Systems and Preferred Audio Sampling Rate"
  - RP 2027, "AVC Intra-Frame Coding Specification for SSM Card Applications"

- Due to a conflict with practices being updated in the core MXF standard (ST 377-1:2011 with amendments), ST 2016-5 "KLV Coding for Active Format Description, Bar Data and Pan-Scan Information" has been withdrawn from publication.

Impact: Manufacturers and users of these documents will have improved and enhanced information for better interoperability.

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Metadata/Registries (30MR):

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.

Note: The 30MR committee is at the moment discussing its strategic direction on Metadata and future standardization tasks (i.e., schema, XML, semantic WEB)

Topic: Metadata registers

- The Metadata Types register has progressed to draft publication. It will be published at the same time as a revised Metadata Elements register, which was previously completed. Together, these documents provide updated provisions for registering SMPTE metadata and add the facility to register items identified by text symbols as well as SMPTE universal labels, allowing the registers to support XML-based applications.

Impact: Metadata is essential to automated workflows and a pre-requisite to achieving the potential efficiencies and cost savings of these workflows.

File Formats and Systems (31FS):

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: Material Exchange Format (MXF)

- Several documents in the MXF document suite have been approved and are now on their way to final process auditing and publication:
    - The amendment 1 to the MXF SMPTE Standard 377-1:2011.
    - The amendment 1 to Standard 382M:2007 (mapping AES3 and Broadcast Wave Audio to MXF).
    - MXF Multichannel Audio Labeling Framework to be published as SMPTE 377-4:2012.
    - The 5-year review of SMPTE 385.

- Other MXF related documents making good progress as well:
    - The Amendment 2 to 377-1:2011 is expected to go to ballot shortly.
    - Technical details are being worked out on Mapping of EBU t3264 Subtitle into MXF Generic Streams.
    - Comment resolution is being finalized on Low Latency Streaming of MXF in real-time applications.
    - Stereoscopic 3D in interleaved MXF for TV is getting ready for ballot.

Impact: The various efforts on MXF are key enablers for interoperability and cross-vendor support of content exchange and processing in file-based workflows and in all media-related applications.

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Topic: Archive Exchange Format (AXF)

- Good progress being made by the group, which is meeting on a weekly basis to accelerate development of a Committee Draft that can be sent out for ballot.

Impact: The work on an Archive Exchange format will provide the basis for standards that facilitate interoperable content exchange between archives, independent of physical media or archive system vendor.

Topic: Image Interchange Format (IIF)

- The Academy of Motion Pictures Arts and Sciences (AMPAS) produced advances in image exchange work, known as Image Interchange Format (IIF). This is the work related to the file formats.

Impact: Provides interoperability between file-based motion image production systems

- Container for ADP_ADX Data: a constrained version of DPX (SMPTE 268) is on its way to the DP ballot, the final step before publication.

- Image Container File Layout: strawman document in development for ballot planned for 2012 Q1.

Network/Facilities Infrastructure 32NF:

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: 3 Gbit/s studio interfaces

- Various new and existing (e.g., SMPTE ST 425 series) 3 Gbit/s interface standards enable the interchange of real-time uncompressed image formats for HD and beyond (including cinema formats) as well as stereoscopic 3DTV. ST 425-2, which standardizes serial digital interface for stereoscopic images that can fit on one 3 Gbit/s interface, was elevated to draft publication.

Impact: This work is relevant to all areas of real-time and uncompressed content- exchange applications in the professional domain. With these standardized interfaces, the industry can build interoperable products and users can define real-time production systems with functioning workflows.

Topic: 10 Gbit/s interfaces and mapping of Ultra High Definition

- Revision is underway to standards for this optical interface, which is used for the interchange of real-time uncompressed image formats for 4K cinema and 4K and 8K UHDTV formats.

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Impact: Ultra High Definition is defined in two levels – as 4k and 8k formats for TV frame rates. This work is required for the exchange of real-time and uncompressed UHDTV images between systems in the professional domain, thus it will directly impact equipment manufacturers.

Topic: ST 2063-3D stereoscopic 3DTV real-time contribution link constraints

- ST 2063 is a new standard that defines constraints for contribution links for Stereoscopic 3D carried over compressed links utilizing MPEG-2 transport streams. This standard was elevated to draft publication.

Impact: This standard is relevant for all industries developing 3DTV contribution equipment.

Topic: 3D Production timing & synchronization

- A new project to document timing and synchronization requirements for both live production equipment and for when that equipment is linked into production systems. It specifies permissible variations in inter-eye timing for imagers as well as electrical interfaces.

Impact: This document (when complete) will be relevant for all facilities doing Stereoscopic 3DTV production.

Topic: Ancillary packet insertion rules and handling

- A new project to provide practical guidelines on the use of ancillary data packets.

Impact: This document will help to improve interoperability of devices inserting, transporting, processing, and using ancillary data packets.

Topic: Optical interfaces engineering guideline

This document is under development.

Impact: This tutorial document will help to improve knowledge needed in utilizing optical interfaces.

Time Labeling and Synchronization 33TS:

The application of the general scope as it applies to the definition of time labeling of essence and the synchronization of systems and essence in both digital and analog forms over networked and streaming transports.

Topic: Development of a new synchronizing system for video and other time-dependent equipment.

- A draft SMPTE IEEE 1588 "profile" is now available. This document needs further refinement. 33TS hopes to work with AES and possibly some other organizations so that an industry-wide model can be standardized.

Topic: Development of a time-related labeling system as a future-looking alternative to SMPTE time code.

- This group now has too many good ideas for time representations and possible Time Label contents. Agreeing on a reasonable number of simple proposals is the next work item.

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Topic: Updates to existing standards

- The following standard and engineering guidelines are being updated. One has started Final Committee Draft (FCD) ballot and the other two should start their FCD ballots this quarter.
    - EG 35 - Time and Control Code Time Address Clock Precision for Television, Audio and Film
    - EG 40 - Conversion of Time Values Between SMPTE 12M Time Code, MPEG-2 PCR Time Base and Absolute Time
    - ST 309 - Transmission of Date and Time Zone Information in Binary Groups of Time and Control Code

Impact: These standards should provide substantial business savings when implementing new production infrastructures.

Media Systems, Control and Services 34CS:

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: Control on studio equipment at network level

- The group has met regularly in the last quarter, reviewing existing implementations and laying the foundation for defining a new standard protocol.

Impact: This work will enable greater control flexibility and reduced costs of equipment and infrastructure.

Topic: BXF update, v2.0

- The Broadcast Exchange Format is under revision to Version 2.0. Final review has been completed and the version 2.0 standard is being moved to Draft Publication status.

Impact: This work, a refinement of popular traffic standard, provides facilities with higher efficiencies.

Media Packaging and Interchange 35PM:

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.

Topic: Interoperable Master Format (IMF) Working Group

- The work of this group is to develop an application-based file structure to provide multiple distribution options from a single asset. Currently several documents are in development. The time scale for developing these documents follows an aggressive meeting cycle of the responsible working group. There is broad industry support for this effort and the various Ad Hoc Groups of the IMF Working Group are moving forward rapidly with some documents. The Composition Playlist document is proceeding to Final Committee Draft (FCD) ballot and an Essence Component document is proceeding to a pre-ballot review.

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- The Working Group had started discussion about development of IMF reference software and the need for interoperability testing.

Impact: The IMF format is vital for studios, broadcasters, and content owners with multiple distribution path requirements. It will help to reduce the file format diversity in media content that should help decrease operational costs.

Topic: 3D Home Master Working Group

- The formerly know 3D home master document suite was renamed to Stereoscopic Distribution Master to more clearly describe the target of the standards effort. A decision was made to streamline this effort and combine the various updated documents created in this Working Group into one report document. This will then pass through a review period and from there be given back to the Technical Committee for submission to the Standards Committee with the intent of publishing the report.

Impact: The resulting report will help in the understanding of interoperability issues for stereoscopic 3DTV production, exchange between professional systems, and distribution. This effort to date has had a profound impact on the industry and on the development of other SMPTE S3D standards.

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