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Standards for Video Compression

Exactly 40 years ago in the *SMPTE Journal*, a fascinating article titled "101 Years of Television Technology"[i] outlines the history of television innovation from the earliest ideas of George Carey in 1875, through the mechanical television inventions of men such as John Logie Baird and C. Francis Jenkins in the 1920s, the commercialization of electronic monochrome television in the 1940s, the standardization of NTSC color television in 1953, and the PAL system in 1967.

Throughout this history and over the past 40 years since this article was written, there has been a constant advance in technology in order to bring the best possible experience to viewers. Early references to "high-definition color" in the late 1940s (attributed to 525 line systems) seem so outdated by today's standards of ultra-high-definition television, with wide color gamut and high dynamic range. Still, all of these advances come with a requirement for more and more bandwidth from our modern production and delivery systems.

To enable these new technologies, there has been continual progression in video and audio compressions standards. Today, many compression standards coexist in the television ecosystem—H.264/AVC and H.265/HEVC are widely deployed in the television distribution, and JPEG 2000 is widely used not only in contribution links but also as a basis for the SMPTE Interoperable Master Format (IMF) and the SMPTE Digital Cinema Master.

For more than ten years, SMPTE has been involved in standardizing video compression standards. VC-1 was the first video compression format standardized by SMPTE. Initially developed by Microsoft in 2003, it was approved as SMPTE ST 424 in 2006. BBC Research worked jointly with Dirac to develop the Dirac video codec and submitted an I-frame-only version known as Dirac Pro to SMPTE for standardization as VC-2 and was published as SMPTE ST 2042 in 2009. Avid technology developed its DNxHD codec and submitted it to SMPTE as the framework for the ST 2019 VC-3 family of standards. It was approved after a two-year testing and validation process in 2008 and 2009. In 2011, GoPro brought the core technology behind their CineForm codec to SMPTE for standardization. It was adopted as SMPTE ST 2073 VC-5 video compression standard in 2014. Over the years, these standards have been updated to address the continuing needs of the broadcast industry.

This standardization work is all being done in the SMPTE 10E Technology Committee on Essence, which is one of our largest and most active committees. Each of our ten technology committees meet face-to-face during quarterly Standards meetings; however, committee subgroups that meet regularly by web-based teleconferences do most of the work. A Meeting Outcome report is published after each set of quarterly meetings, and an Executive Summary captures some of the more notable project developments. More detailed information on the current status of the more than 120 active projects can be found in the report. Download the most recent outcome report at https://www.smpte.org/standards/meeting-reports.

UPCOMING STANDARDS MEETINGS

14-17 SEPTEMBER 2016 (Immediately following IBC)
Geneva, Switzerland
Hosted by EBU

5-9 DECEMBER 2016
Burbank, CA, USA
Hosted by The Walt Disney Co.

The meeting outcome report from each of these meetings will be posted on the SMPTE website in order to report publicly on SMPTE standards activities.

The most recent report is available for download at
https://www.smpte.org/standards/engineering-committees.

[i]Richard S. O'Brien and Robert B. Munroe, "101 Years of Television Technology," *SMPTE J.*, 85(7):457–480, July 1976.

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