



By Alan Lamshead

Standards for IT/Networking

Two years ago, I wrote about the SMPTE's initiatives in developing standards for the all-IT facility. In the intervening two years, a lot has transpired, but there is still much work to be done. The industry demand to transition these infrastructures based on purpose-built broadcast equipment using SDI interfaces to IT infrastructure and packet networks (Ethernet, IP, etc.) is ongoing. Fundamental to this transition is the user demand for interoperable, open systems that allow mixing and matching of products from different vendors to meet users' needs. There is a strong sentiment, both in the user and manufacturer communities, that managing this transition from traditional infrastructures is critical.

In order to help accomplish this undertaking, SMPTE, the European Broadcasting Union (EBU), and the Video Services Forum (VSF) co-sponsored the Joint Task Force on Networked Media (JT-NM), which began its work in March 2013. In September 2015, the three sponsors announced the release of the JT-NM Reference Architecture (RA) v1.0 document; a collection of models, best practices, and frameworks intended to facilitate interoperability in networked media systems. In this first version, the RA focuses on three foundational frameworks. The foundational frameworks provide our industry with a common, interoperable approach to how devices and services are uniquely identified, discovered, and how their capabilities are registered. The RA also provides a timing model supporting precision time protocol (PTP) and SMPTE 2059 Standards. These frameworks are building blocks that will enable networked media to deliver new workflow possibilities. The RA is available at <https://www.smpte.org/standards/reports>.

Concurrent to the Task Force work, SMPTE undertook its own study of professional media systems network architecture. This study group is seeking to identify and describe the requirements and characteristics of well-designed Professional Media Networks and make recommendations pertaining to the identified requirements, including but not limited to, media-related quality of service, network access control, device discovery, and security. The report titled "Beyond the Digital Conversion: The Integration of Information Technology and Professional Media," is available on the SMPTE website at <https://www.smpte.org/standards/reports>.

One key requirement highlighted by the report was the ability to perform facility-wide media/data realtime streaming so that realtime audio, video, ancillary data, and metadata can be synchronized and/or multiplexed together or sent separately, and that the quality of service

users have come to expect with traditional serial interfaces can be achieved over the network. Crucial to the successful networked plant is the requirement to have facility-wide timing methods to keep multiple audio, video, and data streams in the same transport in sync (lip sync); to keep multiple media streams synced together (link sync); and to keep streams and end points synced to a common timing reference where required (nodal sync).

To solve these problems, in April 2015, SMPTE specified a new synchronization system based on alignment to the SMPTE Epoch and a PTP profile specifically for the synchronization of audio/video equipment in a professional broadcast environment, which is based on the IEEE 1588-2008 Network Time Protocol. Two initial documents in a larger suite are the foundation for the synchronization system: "ST 2059-2: Precision Time Protocol SMPTE Profile for Time and Frequency Synchronization in a Professional Broadcast Environment" defines the behavior of the master and "ST 2059-1: The SMPTE Epoch and Generation and Alignment of Interface Signals" defines the behavior of the slaves, allowing them to create any synchronized video, audio or time code signal.

Another key requirement received was the desire by users to have the signal formats inside the packet-based media networks of the future television plant to be well documented through the use of open and interoperable standards. Many initial implementations of professional media systems relied on the use of SMPTE ST 2022-6 technology to packetize existing SDI payloads. However, one of the shortcomings of this method is the difficulty of separately manipulating video, audio, and metadata due to the encapsulation methods involved. Several alternate methods have been proposed, and are the subject of current SMPTE projects. SMPTE is currently in the process of approving RDD 37, documenting the carriage of uncompressed video and audio over MPEG-2 Transport Stream. SMPTE has recently approved a project to develop a set of standards specifying the carriage, synchronization, and description of separate elementary essence streams (video, audio, ancillary data) over IP for the purposes of live production. The resulting standards will be based on VSF Technical Recommendations TR-03 and TR-04.

The next few years will be filled with change for the media industry. And I believe that relevant SMPTE standards will help guide this transition from traditional infrastructures, through hybrid systems to an all-IT-based infrastructure. Stay tuned!