



An Argument for Open IP Standards in the Media Industry
Alliance for IP Media Solutions
December 2015

The Alliance for IP Media Solutions Supports VSF TR-03.

The broadcast and media industry's transition from Serial Digital Interface (SDI) to Internet Protocol (IP) as the primary means of moving signals between and through facilities is upon us. With it comes the promise of increased agility and system scalability that can help broadcasters develop new business models and remain competitive. While there's no longer a question as to whether or not a transition is necessary, opinions are quite varied as to the pace and level of priority a broadcaster should be placing on the transition. A key impediment in moving the industry forward, however, is the fact that multiple competing approaches to the transition are being introduced to the market, further complicating an already daunting decision.

SDI has served for years as the common language of uncompressed video in broadcast facilities, enabling any piece of equipment to connect with any other equipment that also supports this standard, irrespective of the supplier. The Alliance strongly feels that the broadcast industry must maintain this approach of utilizing a single, standardized interface for transmission of video, as it transitions from SDI to IP, to ensure that widespread signal transport interoperability continues.

IP is an inherently flexible protocol, but that same flexibility creates risk if technology suppliers are not fully aligned. The rationale for common standards is obvious: interoperable solutions based on widely accepted, open standards have driven the industry's growth and success for decades by accommodating broadcasters' current needs and ensuring they are prepared for future advancements. An IP technology infrastructure based on open standards provides broadcasters with the maximum agility and flexibility to adjust business models, capitalize on new revenue opportunities, and add new capabilities and services without having to constantly rebuild their workflows – while having the freedom to build best-of-breed networks.

A Roadmap to Open Standards IP Media Solutions

Fortunately, the broadcast industry has a strong technical roadmap for IP that can deliver the same level of interoperability as SDI. The 74-member Video Services Forum (VSF), with the support of organizations such as SMPTE and the EBU, has developed a series of recommendations for achieving a standards-based approach to IP. VSF's approach has been tested, validated and supported by more than 30 broadcast equipment suppliers and broadcasters who came together to find a solution that leads to true interoperability. This thorough vetting process assures broadcasters that VSF's system represents the best foundation for IP migration.

This SMPTE/VSF roadmap can be described in three phases:

- **SMPTE 2022-6.** This most widely implemented standard in the industry is recommended for continued use and adoption as a baseline for interoperability. Companies that support this standard include Sony, Grass Valley, a Belden Brand, Imagine Communications, SAM, Nevion, Lawo, Axon, EVS, Trilogly, Genelec, Tektronix, Harmonic, Advantech, Evertz and more.
- **VSF TR-04.** VSF TR-04 is a technical recommendation to use two existing standards: SMPTE 2022-6 for video with embedded audio and AES-67 for separate IP addressable audio streams.



In VSF TR-04, AES-67 effectively operates as the “discrete audio” equivalent in IP. AES-67 is already in use by numerous audio companies including Lawo, Riedel, Axia, Wheatstone, Audinate, Yamaha, LiveWire+, Q-Sys, and Dante. The combination of these two standards into a VSF Technical Recommendation (VSF TR-04) gives the broadcast industry a clear path to separately addressable IP audio in a commercial off-the-shelf (COTS) IP switch that will not require additional conversion from a proprietary IP standard to MAD1. With interoperability tests beginning in February of 2016, and with the accessibility of AES-67 technology given as a proven standard, broadcast vendors will begin deploying VSF TR-04 systems in the first half of 2016.

- **VSF TR-03.** This is the final step in the seamless evolution of standards. TR-03 is the transport of uncompressed elementary stream media over IP. TR-03 is very much about essence and separating out the media type, whether video, audio, metadata or timing events. VSF TR-03 improves upon VSF TR-04 by replacing the SMPTE 2022-6 portion of VSF TR-04 with an improved method of distributing video data. With SMPTE 2022-6, the entire video stream must first be de-packetized and then the audio signal must be de-embedded from the SDI stream. When processing is completed, the audio must be re-embedded in the SDI before the SDI signal can once again be packetized. With TR-03, audio, video and metadata are individually packetized into separate IP streams. Only the packets containing audio samples are required to be de-packetized before they are processed, and then re-packetized back into an IP stream. Not only does this process remove the need for audio embedding and de-embedding, it also greatly reduces the volume of packet traffic that needs to be routed to the audio processor. As an added benefit, only the active video pixels of TR-03 need to be packetized, thereby reducing the amount of network traffic generated by uncompressed video. The format of the audio stream is still AES-67. Video is packetized using RFC 4175, which has been a standard since 2005 and is widely used today. Again, because these technologies are well understood, it is projected that systems using VSF TR-03 will be available in 2016.

This SMPTE/VSF-based interoperability roadmap will be fully realizable in 2016 with system implementations from multiple companies.

Proprietary Solutions Pose Considerable Risk

In contrast to this broad, open standards-based Alliance, a few suppliers have pursued a path that proposes proprietary implementations. Such proprietary efforts increase the cost for both suppliers and broadcasters, limiting broadcasters’ options and adding complexity when building an IP infrastructure for the future. Proprietary solutions will ultimately slow the adoption of common standards for transmission of media over IP in a broadcast facility, as has been the case multiple times in our industry’s past. For example, the development of common tape formats (MS, SX, Beta, P2, XDCAM), and file exchange formats (GXF, MXF Op1A, MXF OpAtom, etc.) have been hampered by the separate, and sometimes contradictory, development of multiple standards.

In any new technology field, there will be proprietary alternatives to a widely-accepted technical roadmap. However, the issue in rapid technology transitions, like those happening today in broadcast relative to IP, is selecting the *right* technology. For every proprietary-to-standard success story, there are many more failures: Sony Memory Stick, Sony Betamax, and IBM OS/2. These attempts at standardization of proprietary technology almost inevitably fail because the technology was not adequately architected for next generation requirements and did not gain sufficient backing of the industry.



To ensure that broadcasters do not experience similar outcomes by selecting proprietary IP interoperability technologies, the Alliance for IP Media Solutions suggests and promotes that the SMPTE/VSF interoperability recommendations offer far better future capabilities, flexibility, and interoperability than any of the proposed proprietary alternatives.

This is especially true when comparing VSF TR-03 with proprietary IP technologies based on the MPEG-2 Transport Stream (TS) format. VSF TR-03 is well suited for software/virtualization implementations, supports a much richer set of audio capabilities (e.g., object audio support and larger channel counts in one stream), and supports non-proprietary methods of network timing, discovery and control. MPEG2-TS was developed over 20 years ago to provide a direct mapping of data packets into transport for DVB and Ethernet, without IP. When MPEG2-TS was migrated into the IP packet, it was done by adding a layer of encapsulation. In addition, MPEG2-TS uses two layers of headers, PES and ES, which must both be sifted, and the TS packet is 188 bytes long. This all adds up to TS technology delivering significantly reduced efficiency and flexibility relative to VSF TR-03.

The Future Is Now

Given the support behind the SMPTE/VSF roadmap, its significant advantages in areas such as virtualization, latency, compression performance, flexibility and robustness, and the fact that full system implementations will be available in 2016, there is significant risk to broadcasters in taking any other alternate approach to IP technology infrastructure.

Does this mean broadcasters cannot implement an IP system until VSF TR-03 is available? The answer is “no” for these reasons:

- Multiple suppliers can build SMPTE 2022-6 based implementations today, and all suppliers support 2022-6. Even in production environments, where the ability to treat audio separately from video is critically important, suppliers offer capabilities for this in 2022-6 based systems
- Because most companies use field-programmable gate array (FPGA) technology and have provisioned FPGA space for the SMPTE/VSF roadmap, AES-67 support in the first half of 2016 can simply be “flashed” into products during an upgrade, enabling separate routing of audio in an L3 COTS IP switch
- Due to the fact that the video format of VSF TR-03 (RFC 4175) is computationally lighter than SMPTE 2022-6, those same FPGAs can be flashed to deliver future VSF TR-03 capability as well

By supporting the principles of the Alliance and following the SMPTE/VSF roadmap, both Broadcasters and suppliers alike can feel comfortable investing in IP solutions and innovations today – and the industry overall will have a real opportunity to save cost, avoid interoperability headaches, and implement a true common language for replacing SDI.