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# AV OVER IP: IT'S REAL, AND IT'S TRANSFORMATIONAL

MAY 2019

## JOIN THE ALLIANCE

The Alliance for IP Media Solutions (AIMS) is a non-profit trade organization founded by leading companies to foster the adoption of industry standards for the broadcast and media industry as it transitions from SDI to IP.



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# INTRODUCTION

In September 2017, the first set of SMPTE ST 2110 standards for Professional Media Over Managed IP Networks were published, launching the media-over-IP train down the tracks. Momentum has never been stronger for media organizations to migrate to IT-based technologies for packet-based signal transport over IP networks. The promised benefits – greater interoperability and flexibility, reduced OPEX, and more streamlined operations – are coming to fruition for broadcast and media organizations all over the world.

*But what does it all mean for the Pro AV industry?* A great deal since AV over IP is already transforming the Pro AV world just as it has done for the broadcast industry. There is work to be done, though, and that's where the Alliance for IP Media Solutions (AIMS) comes in.

AIMS' mission is to foster the adoption of one set of common, ubiquitous, standards-based protocols for interoperability over IP in the media, entertainment, and – yes – Pro AV industries. In December 2018, AIMS launched a Pro AV Working Group, tasked with promoting a set of media-over-IP protocols for the professional AV and installed systems markets. In this paper, we'll take a closer look at those efforts and their implications for the broader Pro AV community.

## But first, a little perspective

In the early days, the Pro AV community adopted SMPTE broadcast standards for analog audio and video that are still in use today. Those standards are the single reason that Pro AV tech vendors have been able to develop a diverse ecosystem of products addressing the basic and simple needs of presenting audio and video in A/V environments. With the digital revolution, SMPTE was once again a change agent, enabling the widespread adoption of SMPTE-standard SDI (Serial Digital Interface) signals for professional use.

Therefore, it stands to reason that the Pro AV industry would once again follow SMPTE's lead, just as it has done for many decades, and take a good look at the new SMPTE ST 2110 standards and how they might be adapted for AV over IP. The biggest reason? Interoperability. With vendors lining up to create solutions based on a solid, professional standard, installers will be able to choose from a menu of COTS IT solutions that all work together. No closed, proprietary solutions and no royalties or patents. When an organization as respected as SMPTE has put forth a standard for the next generation of audio and video, it's simply not logical or practical for industry players to pursue other IP methods.

With the help of several allied organizations, SMPTE developed SMPTE ST 2110 as a suite of standards that define how essence streams (video, audio, ancillary data) are transported in real time and in sync over IP networks. These standards are robust, scalable, extendable, and composable. Since its initial publication, SMPTE ST 2110 has been endorsed resoundingly by the greater broadcast and media industries. As such, it's an ideal foundation for continued work toward a fully featured transport and control solution for the Pro AV universe.

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## Enter AIMS

AIMS was formed in late 2015, not long before the SMPTE standards group was in committee and working on defining what would become SMPTE ST 2110 standards. As news of SMPTE's effort spread, plenty of questions popped up about IP – its practical implementation and whether vendors could achieve true interoperability. AIMS' response was to assemble over 100 companies resolved to embrace common, open standards for audio and video over IP. AIMS members have made a commitment to deliver actual, working products based on those standards.

In addition to SMPTE ST 2110, AIMS members have endorsed the AES67 audio format created by the standards group of the Audio Engineering Society (AES) and the Ethernet timing standard of IEEE 1588, which forms the nucleus of the SMPTE 2059 standard for basing timing on video frames. Also, the SMPTE ST 2110 video standard 2110-20/21 incorporates a host of standards from the Internet Engineering Task Force (IETF). It is clear that the broader industry has adopted the standards that smooth the way for video-over-IP adoption, with AIMS working to bring the manufacturing community together and ensure that we can all practically apply a common IP standard going forward.

Besides its focus on standards for the pure signal, AIMS also has a current effort underway to drive the use of common control protocols such as those of the Advanced Media Workflow Association (AMWA), whose goal is to create a common registration and discovery protocol to allow for identifying signals on Ethernet for use in connecting flows together. These specifications could have a profound impact on the Pro AV community!

## What does AV over IP look like?

Now that existing standards and specifications from AES, AMWA, VSF, SMPTE, IEEE, and IETF are seeing broad adoption by the media and entertainment industry, the AIMS Pro AV Working Group is working to incorporate features specific to the Pro AV market. These include security, HDCP support for protected content, and IO control. The working group's approach for Pro AV mirrors AIMS' broader efforts with the broadcast/media industry – namely, to promote multivendor interoperability that will foster long-term protection of customers' investment in technology and products. Out of this work will emerge a flexible, future-proof method for meeting the video, audio, and data requirements of current and future Pro AV solutions – a framework for best-of-breed solutions.

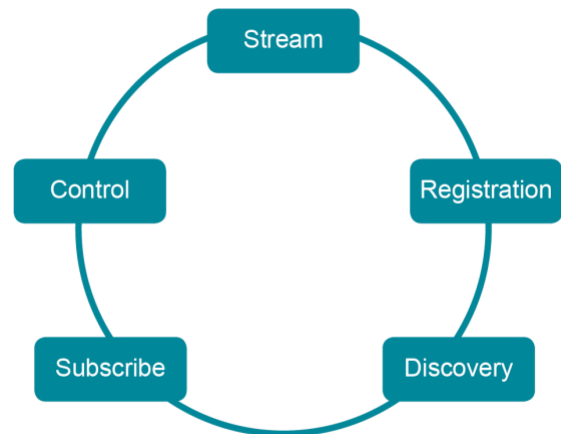
Taking a closer look, a single set of open standards and specifications for AV over IP will:

- Enable seamless transport of video, audio, and data.
- Include both compressed and uncompressed streams.
- Cover control, management, and real-time applications.
- Deliver applications that are secure and reliable with ultra-low latency.

## What is meant by AV over IP?

- Move streams (audio, video, ancillary, control) through an IP network
- Synchronized (A <-> V and also different sources)
- Low latency (<1 frame)
- Publish, discover, subscribe, stream, and control

Could be used in place of HDMI/DisplayPort/SDI.



## A case study: AV over IP in action

Shortly after the AIMS Pro AV Working Group came together in December 2018, the team decided to create a working interoperability demonstration for February's ISE 2019 show in Amsterdam. ISE was the perfect opportunity to present one of the Pro AV holy grails: a real, working prototype of the SMPTE ST 2110 standards in action on a 1 gigabit network. If the team could pull it off, they would achieve something that none of the current proprietary methods have done.

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*David Chiappini, Chair of the AIMS Pro AV Working Group*

With just over a month to go, part of which would span the busy holiday season, the working group pulled up its sleeves. First to come was a pair of KVM units demonstrating a compressed 4K implementation of SMPTE ST 2110-22 that works on gigabit Ethernet. With that in place, the team wanted to add an uncompressed component showing interoperability.

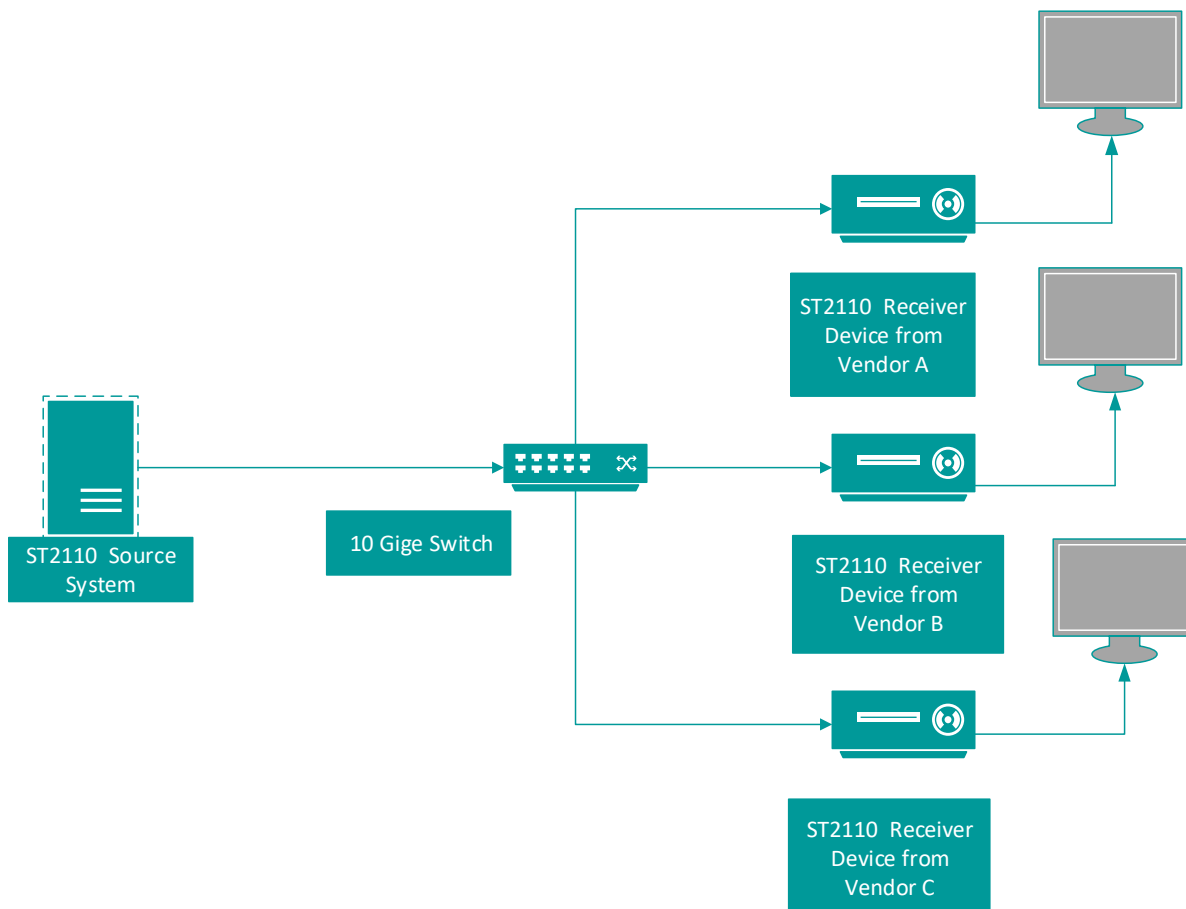
"In the normal AV-over-IP space, pulling together equipment from a few vendors to set up an interoperability demonstration in that time frame would have been unthinkable," said David Chiappini, chair of the AIMS Pro AV Working Group. "What made it even remotely possible was that we would all be using a common open standard. Many of these products were new to the market and some were not shipping at that time. Putting this demo on at ISE without testing it first

might seem very risky, but it was also part of an important point we were trying to make about the value of open standards.”

The interoperability demo consisted of a PC equipped with a SMPTE ST 2110 compliant PCIe add-in card for playing back multiple video files on 10 gigabit or 25 gigabit Ethernet and sending the resulting video and audio streams to receiving devices. One by one, other companies – including some of whom are competitors – stepped up to provide receiving devices. These included a selection of SMPTE ST 2110 receivers together with compliant network switch.

“With this demo operational, we already had a great example of one of AIMS’ most important tenets — competing companies setting aside their own interests and coming together for a common goal,” David remarked.

With less than a week to go, the team had minimal time to test the devices before they had to be shipped off to Amsterdam. Individually, each receiving unit worked, but then the moment of truth arrived – time to connect them all up at once. One by one, each receiver booted up and began playing back a video clip.



David commented, “It was exciting how little effort it took. To pull off a demo of this nature at the last minute, and with new AV-over-IP products, might normally have been called impossible. Instead, it reinforced the strongest benefits of a true open standards approach: true interoperability. And it was gratifying to witness first-hand how open standards can foster collaboration, even among competitors, and show how companies working together can achieve much more than they could have, working alone.”

## Proceeding with caution

Currently, in the broader Pro AV collective there are companies creating their own proprietary approaches to AV over IP. It’s a dynamic that echoes the earlier days of IP adoption by the broadcast and entertainment industries. Ultimately proprietary solutions gave way, through industry collaboration, to one set of open standards, which was one of the key drivers for AIMS’ formation.

The Pro AV community has traditionally been driven by a practical, collaborative approach to change, with a lot of creative companies coming together to apply a common, foundational standard. As we’ve seen in broadcast and media, a foundation of standards will bring many innovative ideas to the surface and accelerate their widespread use. Rather than proprietary protocols dominating and controlling the AV-over-IP conversation, true innovation will come from a large collective of companies who are committed to working together to advance professional AV applications. It’s these applications that will propel us forward, together.

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