



How AES67 & 2110 Open Standards Enable Innovation

Bill Rounopoulos

Business Development Manager, OEM & Partnerships, Ross Video

brounopoulos@rossvideo.com

Full-Stack Proprietary Technology Solutions



Pros

Proprietary technology offer advantages such as **ease-of-use** and the avoidance of interoperability issues.



Cons

But do these technologies always offer the right tool for the job?

- What if I need to manage both audio and video signals simultaneously?
- Or what if I require encryption?



Different markets have different requirements

LATENCY & SCALE



SUPPLY CHAIN
RESILIENCE



SIGNAL MIX



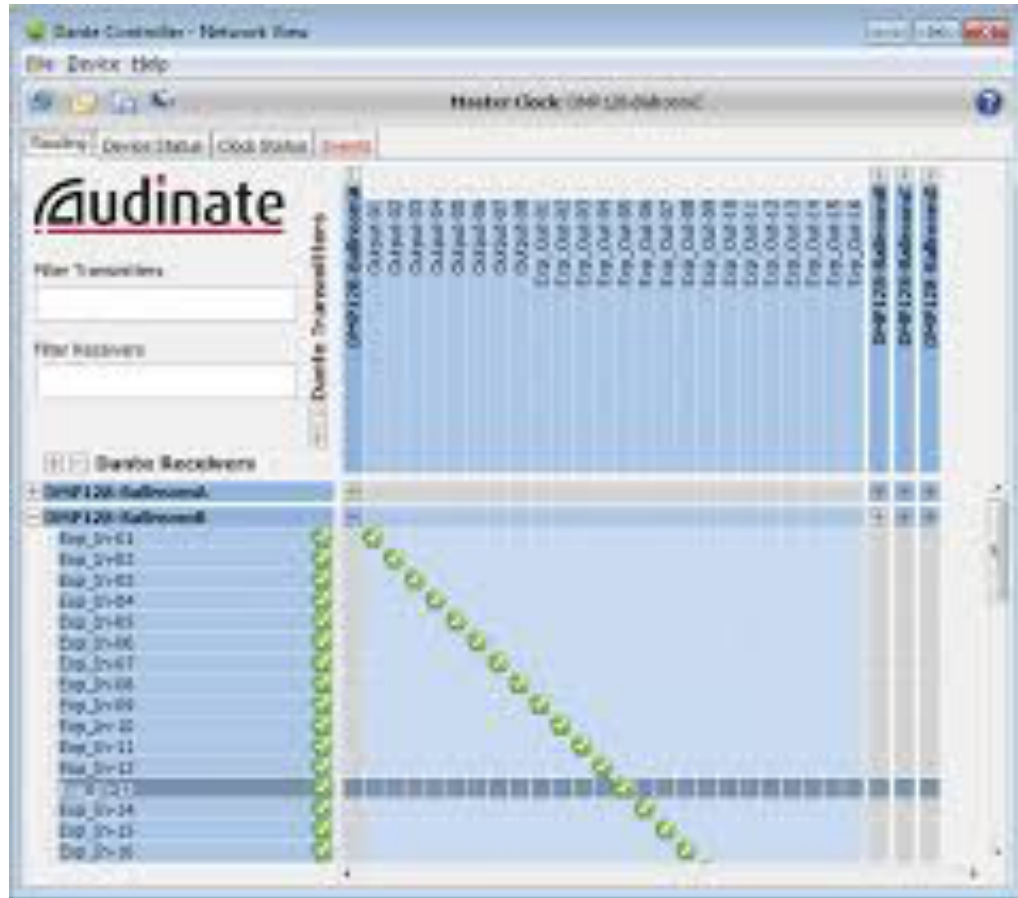
SECURITY



USER SOPHISTICATION



Is one tool always the right tool for the job?



SOLUTION: Let Free Markets Innovate

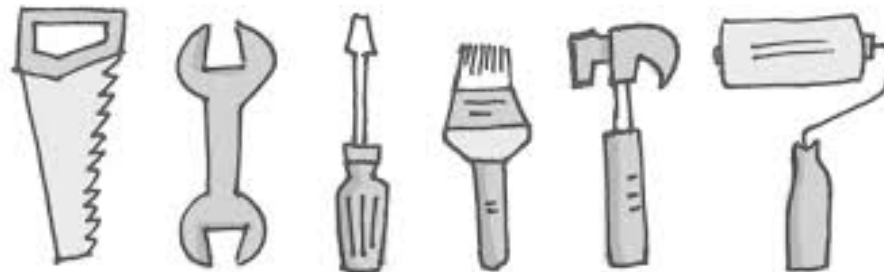
Monopolies

- Stifle Innovation
- Reduced set of applications addressed
- Benefits accrue to small number



Free Markets

- Address a wider set of needs and applications
- Drive greater innovation
- Can be counted on to develop the right tool for the job



How?

The AES67 & 2110 ecosystem features multiple vendors innovating using core networking technology from multiple suppliers, such as Ross Video, Embrionix, Merging, Archwave or their own internal solutions.



Analogy: Linux vs. Windows OS

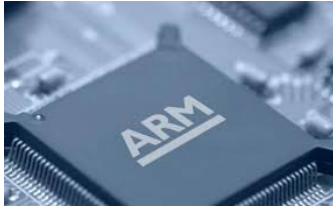
- 25 years ago, when Linux was still in its infancy, it was hard to use and limited in capability.
- But it was open and free to innovate
- Who guessed then how Linux would evolve?



Linux Innovation in Action



US ATC 24,000 flights/ day



50% of global fin. transactions



85% of smartphones



Top 10 Supercomputers



AES67/ 2110 Innovation Examples

AES67/ 2110 Innovation WAN Latency



The Challenge:

- Broadcasters want to transport audio across a continental network
- Network latencies up to 80msec

Innovation:

- Implementation of a network latency compensation mechanism leveraging the larger WAN buffers in fully compliant AES67/ 2110-30 solutions
- Handles up to 500msec of latency



Innovation: Uncompromising Performance



C | A | L | R | E | C



The Challenge:

- Quickly transition very wide product range to IP
- Help navigate the complicated multi-format IP Landscape in audio (Dante, AES67, AVB, ...)

Innovation:

- Highest-performance, robust and extremely flexible ST 2110 audio networking solution
- 512 channels, 96kHz, 125 μ s packet time and up to 80 channels per stream

Innovation: 128 x 128 Dante to ST 2110 Router



The Challenge:

- Support a standards-based SMPTE ST 2110 solution on existing products.

Innovation:

- Fully compliant AES67 ST2110 solution that drops into existing hardware
- 64 channels/ 8 streams, 125 μ s packet time, NMOS IS-04, Dante/ SAP
- Enabled 128 x 128 Dante to fully compliant AES67 ST 2110-30 router in 1RU

AES67/ 2110 Innovation Live Video & Audio in POU box



The Challenge:

- Transport audio with live video and metadata on same wire over IP network

Innovation:

- Another example of full ST 2110 in action: video and audio on same wire
- Key enabler is AES67 PTP synchronization based on 1588v2 that utilizes time stamping



AES67/ ST 2110 Innovations

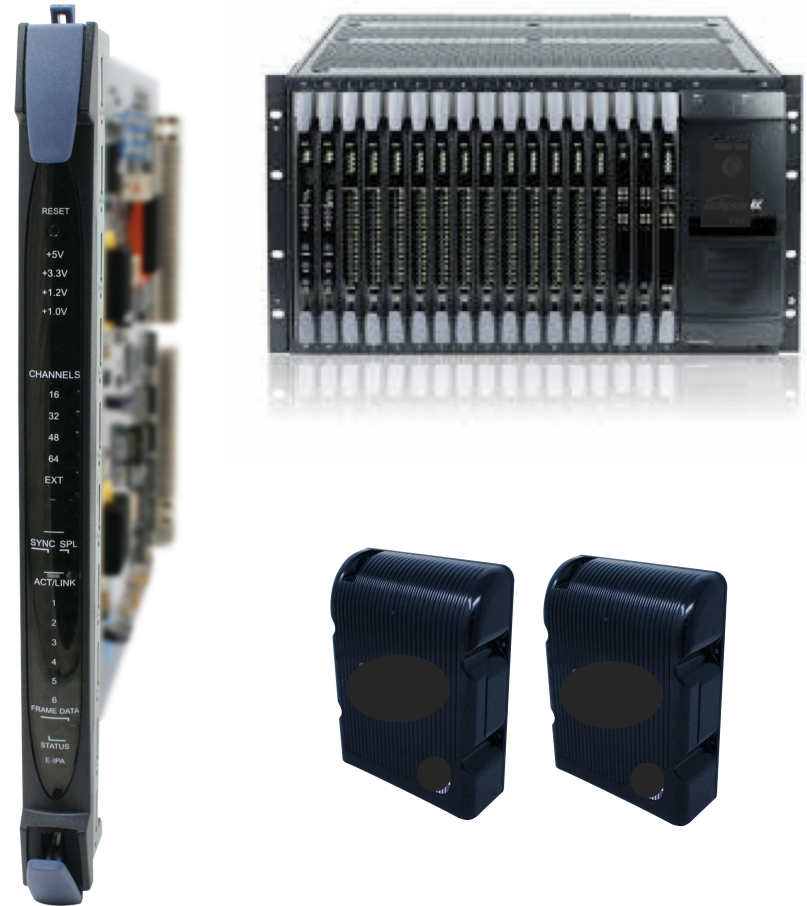
Customizable UI and Workflow

The Challenge:

- An standards-based AoIP solution with open control that is customizable to fit unique workflow

Innovation:

- Open JSON API allowing the use of the customer's UI and control system
- Addition of specific clock signals enabled better internal synchronization of wireless equipment



Innovation: Greater Integration & Lower System Cost



 **YELLOWTEC**



The Challenge:

- Address more markets with support for LW+, Ravenna, Ember+
- Need small port count AES67 ST 2110 solution with open control
- Replace expensive AES67 partner box w/ solution that supports MADI



Innovation:

- Integrated solution with open control supporting LW+, Ember+, Ravenna
- MADI to AES67 ST 2110 bridge for easy integration into their existing product

AES67/ 2110 Innovation Centralized Audio Controller

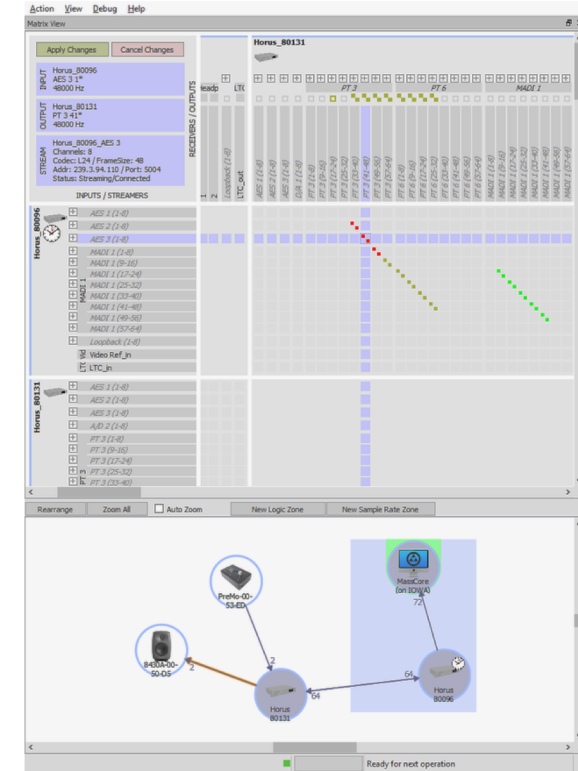


The Challenge:

- A simple and open centralized audio network manager that is protocol agnostic.

Innovation:

- ANEMAN a simple, open and free controller created by Merging & Digigram
- Works w/ any manufacturer via plug-in
- ANEMAN engine framework will be fully open-sourced to drive further innovation



Innovation: Broadcast-Ready Audio Converter



**STUDIO
TECHNOLOGIES
INC.**



The Challenge:

- Address a new market by expanding reach of products into broadcast.
- Requirement for a standards-based 2110 solution that Audinate was not going to supply.

Innovation:

- Fully standards compliant 16-channel AES67 ST 2110-30 RAVENNA-based solution via SoC that supports flexible glitch-less redundancy

Innovation: Futureproofed Roadmap via Standards



ZIGEN



The Challenge:

- Need for a cost-effective, low channel count audio networking solution as a value-added feature that works with video now and in the future

Innovation:

- AES67 ST 2110 standards based 8-channel solution that works with video (HDMI) today and is ready for video and audio over IP in the future

Innovation: Unparalleled performance & flexibility



STUDER
by HARMAN



The Challenge:

- High performance, robust yet flexible AoIP solution running AES67/ ST 2110/ RAVENNA/ NMOS
- Support for variable sample rates and data formats including 32-bit AES/ EBU

Innovation:

- 512 ch. 64 streams, 125 μ s packet time, glitch-less stream and port redundancy (4 x 10GE)
- 16, 24-bits /sample including 32-bit transparent mode for AES transport configurable per stream & not limited to audio but can carry video and control data too.

Innovation: Broad AoIP Interoperability

The Challenge:

- A proven audio networking solution based on open technologies that seamlessly interfaces with existing customer broadcast equipment

Innovation:

- A broadly interoperable AES67 ST 2110 AoIP solution that natively works in multiple environments: Dante/ SAP, RAVENNA, NMOS, LW+, EmBER+, and Dashboard
- Same technology used by partner OEM developers
- No supplier lock-in



AES67 ST 2110 Low Latency Virtual Sound Card Development Platform

The Challenge:

- AES67 ST 2110 solution all in software on a COTS server for centralized audio processing

Innovation:

- AES67 ST 2110 AoIP solution in Linux running on a COTS platform supporting 256 channels requiring a single low-end Intel Xeon core.
- End-to-end latency of ~ 1 msec making centralized audio processing a reality for OEM's
- Natively supports multiple protocols: NMOS, RAVENNA, Dante/ SAP, EmBER+





Thank You!

Bill Rounopoulos

brounopoulos@rossvideo.com