
AUDIO
AES
AES
NEW YORK
PRO AUDIO CONVENTION


AIMS
Alliance for IP Media Solutions

Introduction

- Professional media networking is becoming increasingly important throughout the industry
- The advantages that IP technology can provide are now clearly recognized
- Audio networking has become firmly established in a wide range of Pro Audio and Pro AV applications
- Audio plus video networking via IP is rapidly becoming established in the broadcast industry, particularly since the publication of the SMPTE ST 2110 suite of standards

Introduction

- In recognition of these trends, last year AIMS partnered with the AES to create an Audio-over-IP Technology Pavilion here at the AES Convention
- That pavilion provided an excellent platform to promote IP media networking and to share the latest information from many of the leading experts working in this field
- This year, we have expanded the scope of the pavilion to address both audio and video networking topics

Who is AIMS?

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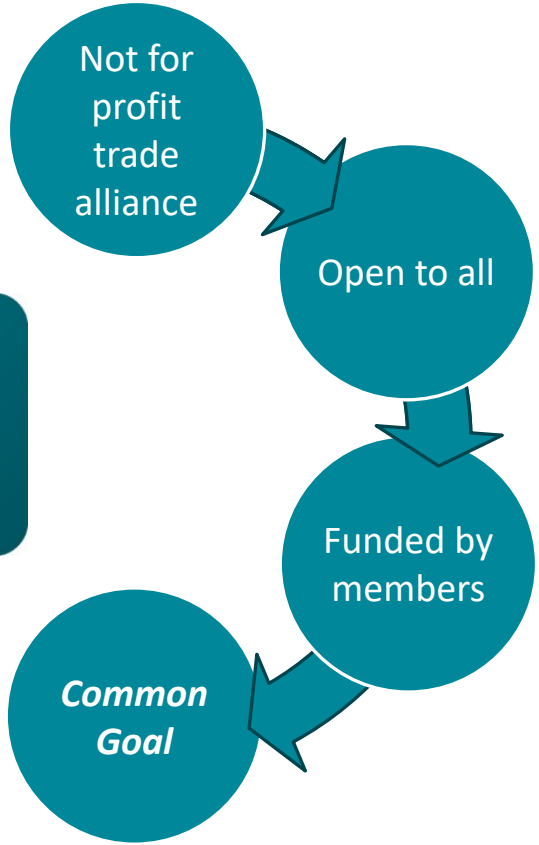

Who is AIMS?

AIMS Mission

*To foster the **adoption** of*

one set of common, ubiquitous,

***standards-based** protocols*

*for **interoperability over IP***

in the media and entertainment industry,

and professional audio/video industries.

Who is AIMS?

Background

- Established in 2015
- Merged with the Media Networking Alliance in early 2018
- Joining forces to more effectively promote adoption, standardization, development and refinement of open protocols for media over IP

Focus

- Following the merger, AIMS focus has expanded from broadcast, media and entertainment to also include pro audio and pro AV

Who is AIMS?

Members

- AIMS membership includes most of the leaders in media networking technology
- Manufacturers from the Broadcast, Pro Audio and ProAV industries
- End users are represented through many major broadcasters

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Who is AIMS?

Active Worldwide

- Promoting open standards, conducting demos and educating the industry at events around the world – US, Europe, Japan, Brazil, Australia and more
- Sponsoring IP Showcase events at NAB and IBC

Audio/Video-over-IP Technology Pavilion

Three Core Elements to the Pavilion

- AIMS Representative Product Display
- Exhibitor Pods
- Technology Pavilion Theater

AIMS Representative Product Display

- This area displays a sampling of representative products that support open standards in the AIMS Roadmap

AIMS Roadmap

SDI over IP Baseline	Audio over IP	Standardized Transport of Audio, Video, & ANC Elements	System Environment & Device Behaviors
SMPTE ST 2022-6 SDI Over IP	**AES67** Audio Over IP	**SMPTE ST 2110-10** Timing & Definitions **SMPTE ST 2110-20** Uncompressed Video **SMPTE ST 2110-21** Packet Pacing **SMPTE ST 2110-30** AES67 Audio **SMPTE ST 2110-31** AES3 Compressed Audio **SMPTE ST 2110-40** Ancillary Data	**PTP, DHCP, LLDP, DNS-SD** Network Environment **AMWA NMOS IS-04** Discovery & Registration **AMWA NMOS IS-05** Connection Management **System Resource** Critical System Parameters
SMPTE ST 2022-6	**AES67**	**SMPTE ST 2110**	**JT-NM TR-1001-1**

AES67 and SMPTE ST 2110

- Two significant open standards have emerged in the past several years to provide wide-ranging interoperability for professional media networking
- AES67 and SMPTE ST 2110 are core standards in the AIMS roadmap
- AES67 first published in 2013; updated in 2015 and 2018
- SMPTE ST 2110 suite of standards; initial sections published in December 2017
- What is the relationship between these two standards?

AES67 Standard

What was the original goal?

- “Provide a method to connect disparate Audio-over-IP systems to achieve workaround-free networked audio interoperability”

How is AES67 defined?

- Interoperability Standard for high performance Audio-over-IP networks
- Based on existing and trusted IT standards
  - This ensures compatibility with existing network infrastructure
  - Also allows coexistence with other IT data

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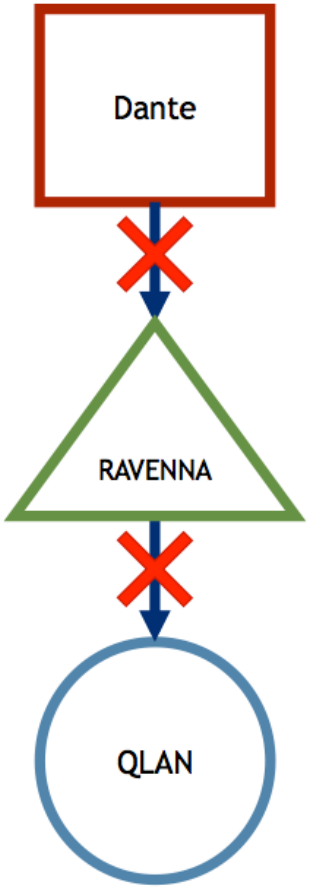
Problem Statement

- Audio-over-IP (Networked Audio) provides simpler and better connection between audio equipment
- Coupled with many advantages, one clear challenge presented itself: **Compatibility**
- While each Audio-over-IP solution offered in-system connectivity, there was no standard to provide inter-system connectivity



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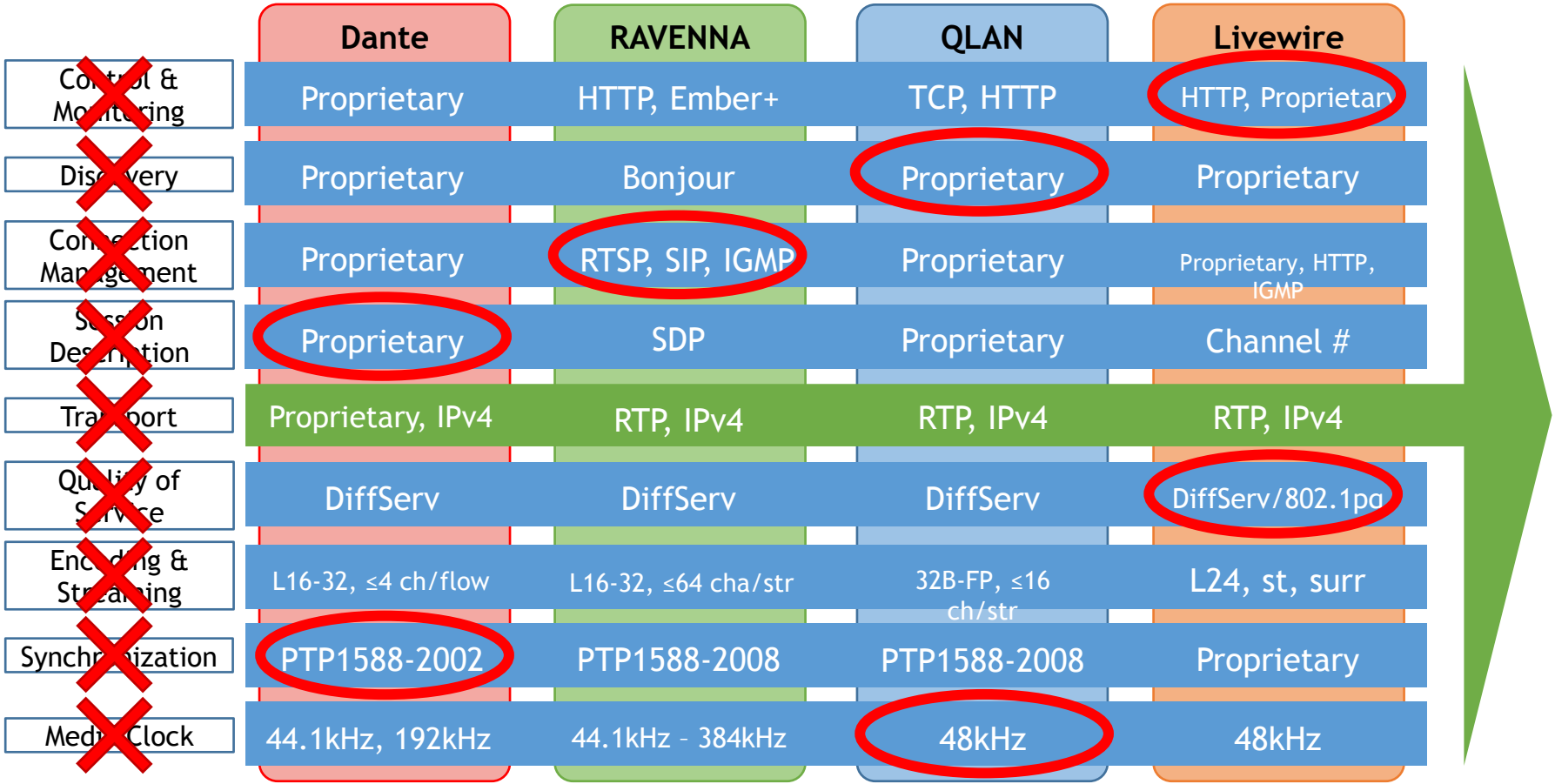
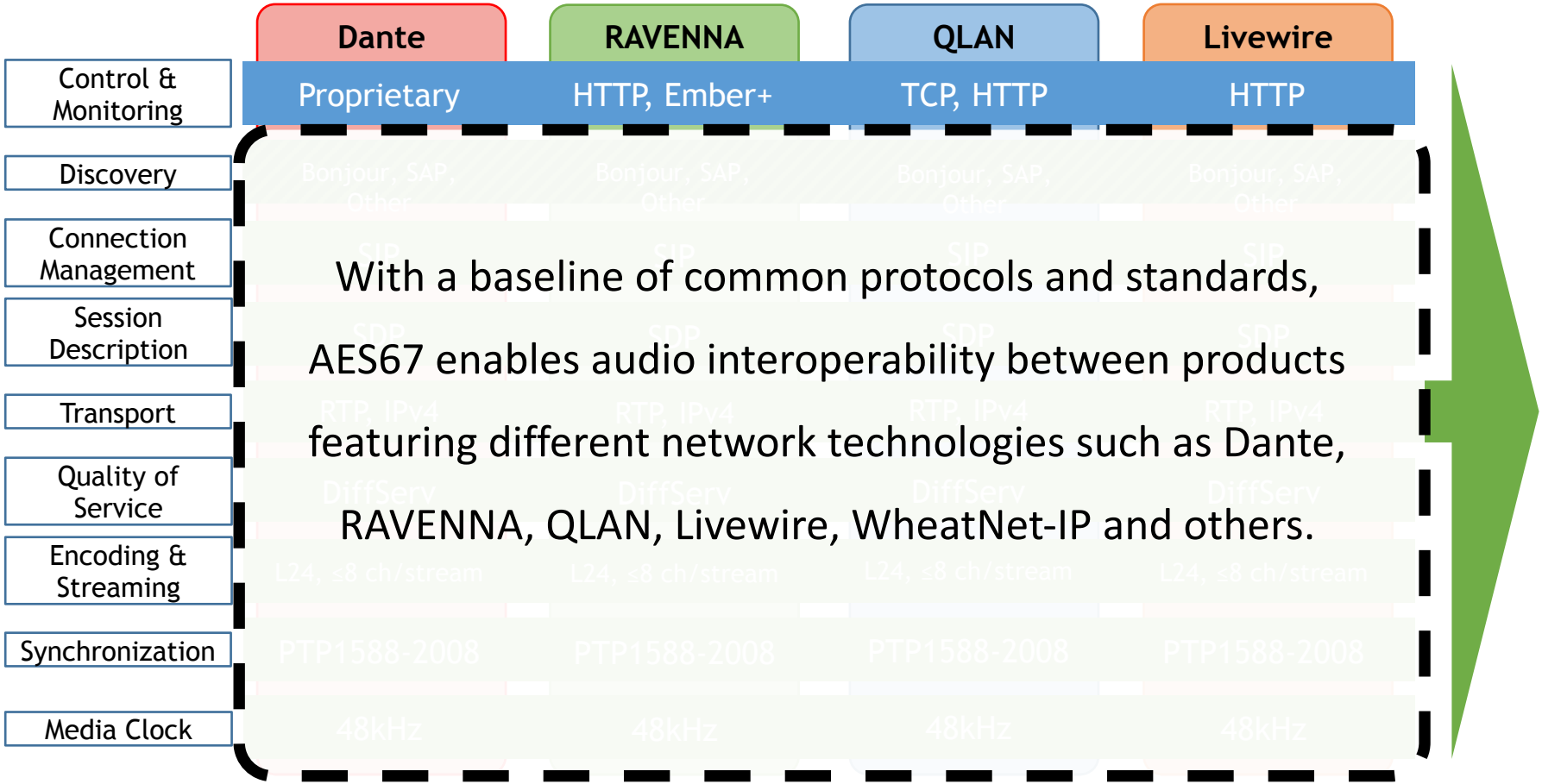
The Road to Incompatibility…

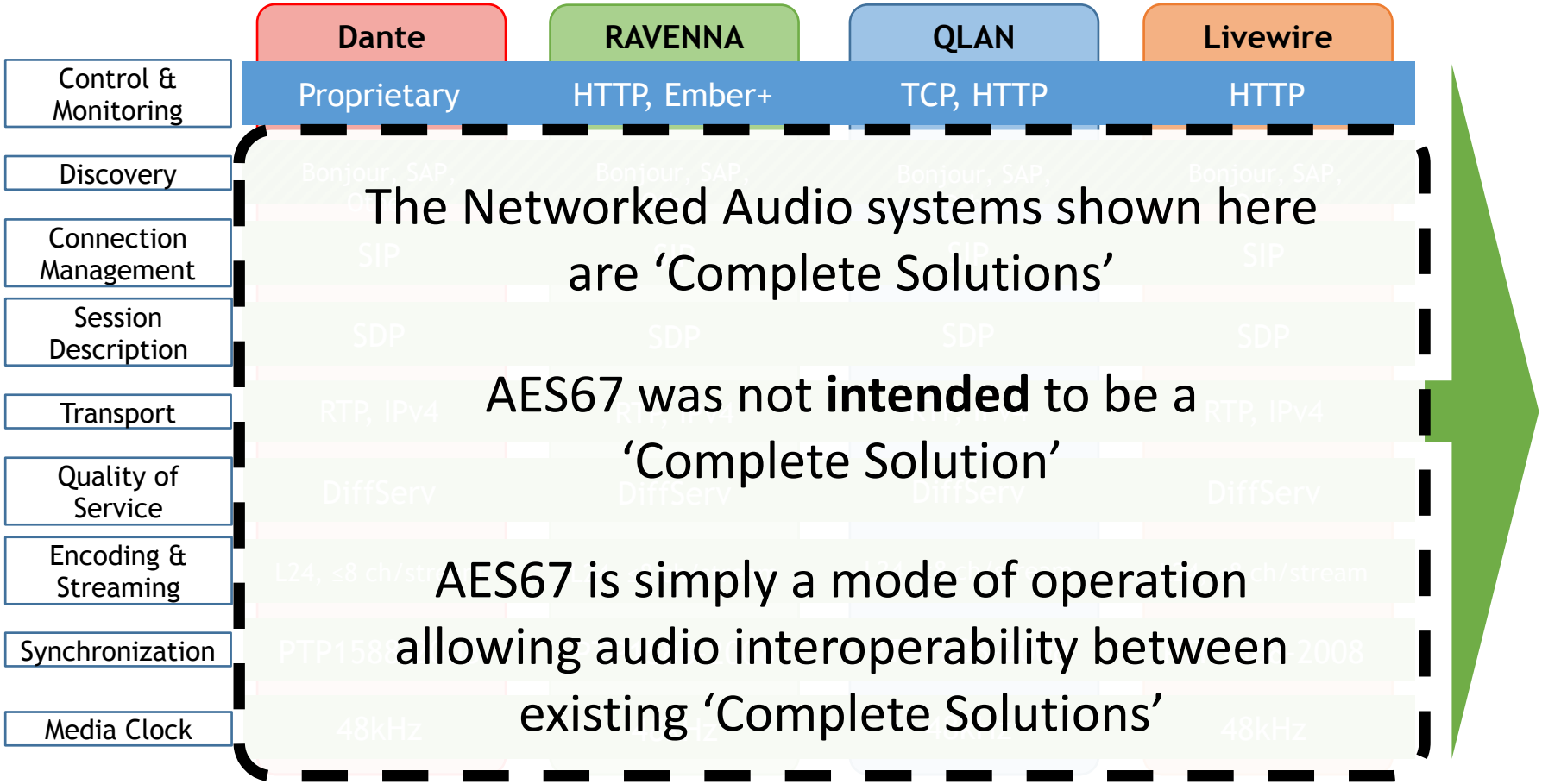


AES67 Compatibility Mode

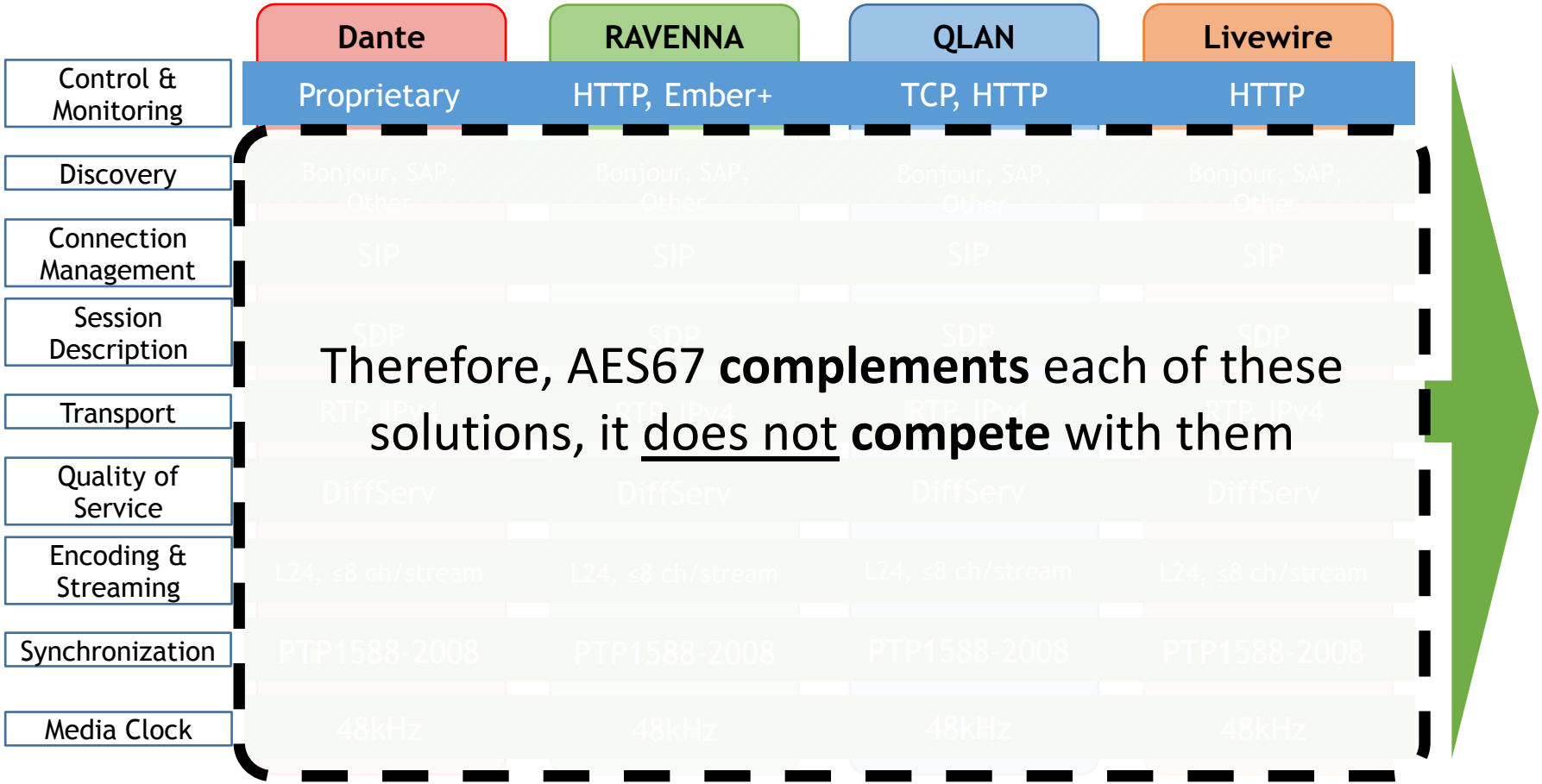
AES67 Compatibility Mode



AES67 Compatibility Mode



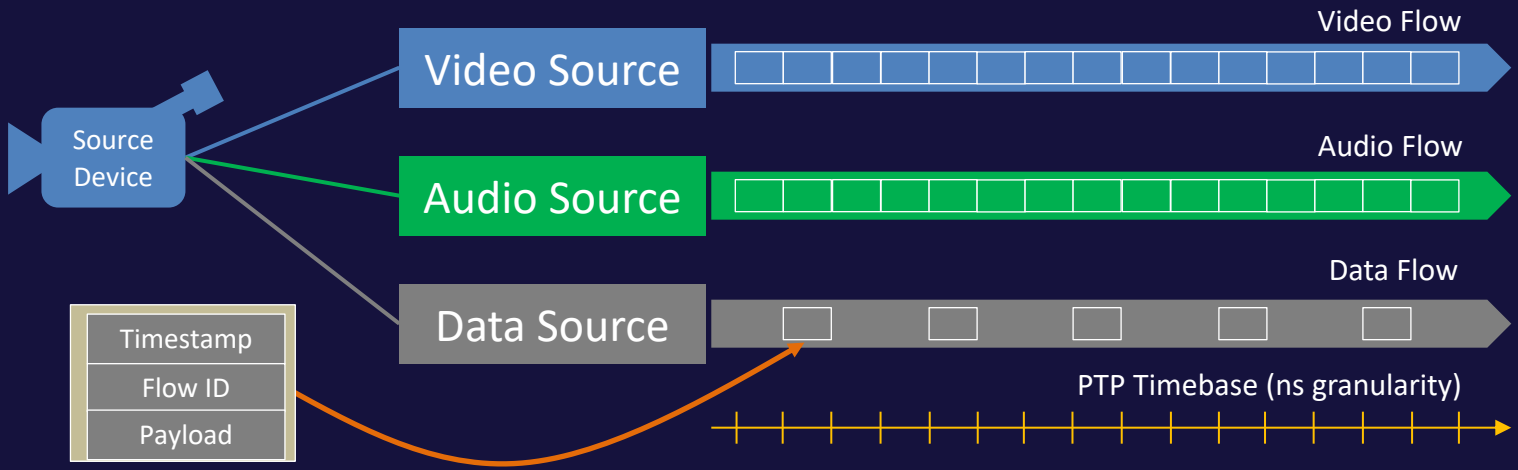
AES67 Compatibility Mode



AES67 Enables Disparate Networked Audio Solutions to Talk to Each Other

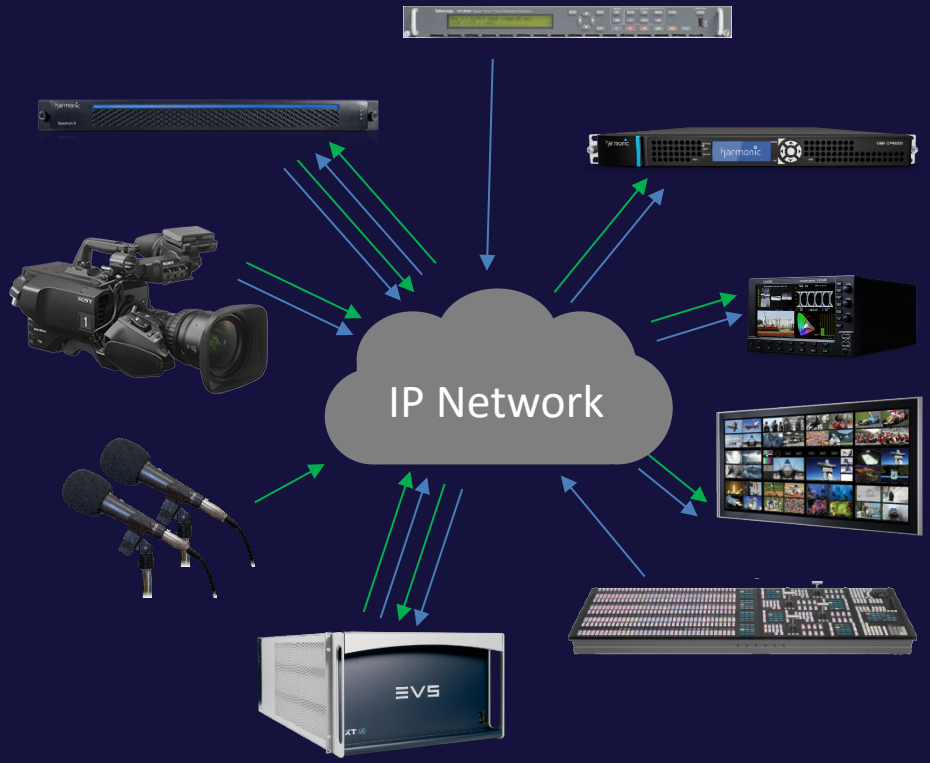
What is SMPTE ST 2110?

- Standard for transport of video, audio and data over IP networks primarily for broadcast applications
- Video, audio and data carried as independent flows



What is the Role of SMPTE ST 2110?

- Flexible alternative to SDI for real time systems
- Enables greater flexibility for contribution, production and playout workflows



SMPTE ST 2110 Suite of Standards

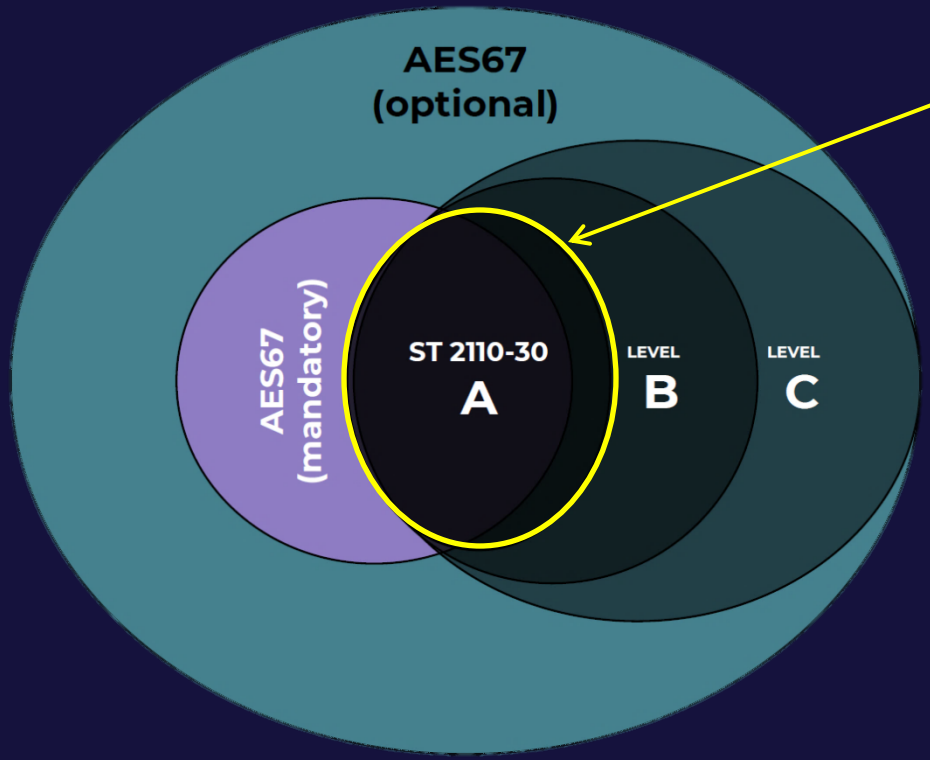
SMPTE ST 2110-10	Timing and definitions – SMPTE ST 2059 aka PTP
SMPTE ST 2110-20	Uncompressed active video – RFC-4175 transport of video
SMPTE ST 2110-30	Uncompressed PCM audio – AES67 transport of audio
SMPTE ST 2110-40	Ancillary data – IETF ANC 291
SMPTE ST 2110-21	Video Sender Traffic Shaping for uncompressed video
SMPTE ST 2110-22	Carriage for compressed video over IP
SMPTE ST 2110-31	Full AES3 transport

SMPTE ST 2110-30
A CONSTRAINED SUBSET OF AES67

SMPTE ST 2110-30
A CONSTRAINED SUBSET OF AES67

CONSTRAINTS = BETTER INTEROPERABILITY (via tighter operating point definition)

SMPTE ST 2110-30
A CONSTRAINED SUBSET OF AES67

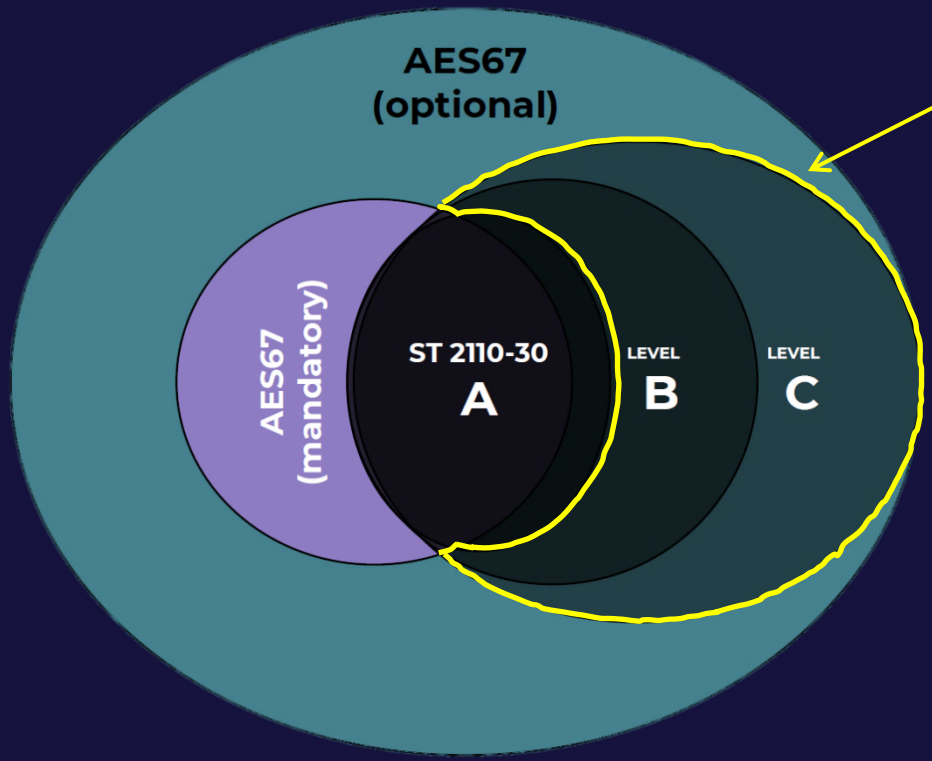


PRIMARY OPERATING POINT:

- **1 msec** packet times
- 2 & 8 channels per stream
- Common PTP operating point per AES-R16-2016
- RTP offset = 0
  (unique to ST 2110-30)

CONSTRAINTS = BETTER INTEROPERABILITY (via tighter operating point definition)

SMPTE ST 2110-30
A CONSTRAINED SUBSET OF AES67



These two operating points (ST 2110-30 Level B & Level C) both support a shorter packet time of **125 µs**, ideal for low-latency **LIVE PRODUCTION**

LEVEL B: up to 8 channels/stream

LEVEL C: up to 64 channels per stream

CONSTRAINTS = BETTER INTEROPERABILITY (via tighter operating point definition)

AES67 / SMPTE ST 2110 COMMONALITIES AND CONSTRAINTS

Explanation of the relationship between the SMPTE ST 2110 standard and the AES67 standard from the Audio Engineering Society

Updated – APRIL 2019

Audio/Video-over-IP Technology Pavilion

Pavilion Theater

- At the core of the Audio/Video-over-IP Pavilion is this theater
- Throughout the three days of the AES Convention Exhibition, AIMS will be curating a program of 20 different presentations covering a wide range of topics relevant to IP media networking
- Presentations will be made by many of the leading experts behind the development and practical implementations of professional media IP standards and specifications
- All these presentation sessions are freely available to all visitors attending the AES NY and also the NAB NY Conventions

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Theater Presentations

Standards and Specification Overviews

- **AES67 / ST 2110 / NMOS - an overview on current SDO activities**
  - Andreas Hildebrand (AIMS)
- **JT-NM Tested Program - Test Plans and Results**
  - Ievgen Kostiukevch (EBU)
- **NMOS - A General Overview of the Current State**
  - Rick Seegull (Riedel Communications)
- **NMOS Convergence**
  - Jeff Berryman (AES/AIMS/OCA/Bosch)
- **Audio Meta Data Transport**
  - Kent Terry (Dolby)
- **Introduction to AES70**
  - Ethan Wetzell (OCA Alliance)

Theater Presentations

Practical Applications of Open Standards

- **Designing with Dante and AES67/SMPTE ST 2110**
  - Patrick Killianey (Audinate)
- **Audio Monitoring Solutions for Audio-over-IP**
  - Aki Makivirta (Genelec)
- **Audio in ST 2110 Facility and across WAN**
  - Andy Rayner (Nevion)
- **ST 2110 Enabled Centralized Production**
  - Lucas Zwicker (Lawo)

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Theater Presentations

Practical Applications of Open Standards

- **Bolero Wireless Intercom System in AES67 Networks**
  - Rick Seegull (Riedel Communications)
- **Reinventing Intercom with SMPTE ST 2110-30**
  - Martin Dyster (The Telos Alliance)
- **Network Automation with Google Sheets?**
  - Ievgen Kostiukevch (EBU)

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Theater Presentations

Tutorials

- **Synchronization & Alignment (ST 2110 / AES67)**
  - Andreas Hildebrand (AIMS)
- **AES67 / ST 2110 Audio Transport & Routing (NMOS IS-08)**
  - Andreas Hildebrand (AIMS)
- **How to configure a RAVENNA setup with globcon - “global control” software platform**
  - Luca Giaroli (DirectOut)
- **SMPTE ST 2110 in 60 Minutes (video replay)**
  - Wes Simpson (Telecom Product Consulting)

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Theater Presentations

Point-of-View/Advocacy

- **Innovation through Open Technologies**
  - Nestor Amaya (Ross Video)
- **AES67 and SMPTE ST 2110 - the Vulcan nerve pinch to RAVENNA?**
  - Andreas Hildebrand (RAVENNA Partners)

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Theater Presentations

Use Case Studies

- **Deploying SMPTE ST 2110 in a Distributed Campus System - North Carolina State University**
  - Cassidy Lee Phillips (Imagine Communications)
  - Tony Pearson (North Carolina State University)
- **BBC Cardiff Central Square Case Study (video replay)**
  - Mark Patrick (BBC)

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Exhibitor Pods

- Five exhibitor pods featuring a range of companies and organizations with a particular focus on professional media networking
  - ALC RAVENNA Partners
  - OCA Alliance
  - Riedel Communications
  - Ross Video
  - Telos Alliance

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ALC NetworX & RAVENNA Partners

- Pod features a demo rack with gear from various RAVENNA partners
- Audio extracted from video flows as well as the new ST 2110-31 AES3 bit-transparent stream format can be seen live in action
- A joint demonstration of real-time audio metadata (sADM) transport over SMPTE ST 2110-31 (RAVENNA AM824) with Dolby

OCA Alliance

- The OCA Alliance will discuss and educate attendees on the AES70 Open Control Architecture Standard
- Presentations on the AES70 standard will be provided along with an overview of free and commercial resources for developers
- Demonstrations will include solutions and resources that are available to developers and are provided by the OCA Alliance and its members
- Throughout the show, technical experts will be on hand to answer any questions related to AES70 and the activities of the OCA Alliance

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Riedel Communications

Showing their Artist intercom ecosystem, including the Bolero Wireless intercoms

Artist

- Frames include 32, 64, 128, and up to 1024 non-blocking ports
- Decentralized architecture with multiple built-in redundancies
- Supports NMOS IS-04/05 IP discovery and connection management
- JT-NM (ST 2110 IP compatibility) Tested
- Compatible with a wide range of signals/formats
- Blazingly fast configuration updates

Bolero

- 6 channel, DECT 1.9GHz, 10 beltpacks per antenna, works everywhere!
- Now with 3-modes:
  - Artist integrated - AES67 networked antennas to AES67 client cards in Artist
  - Standalone/Link - No matrix required! NSA adapter for 4-wires and GPIO
  - Standalone ST 2110 (AES67) - same as standalone but with AES67-networked antennas
- 250 beltpacks in Integrated mode
- Extremely easy to set-up and use

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Ross Video

- Featuring BACH™, a comprehensive set of embedded audio networking solutions enabling products to play in multiple audio networking environments, including AES67 and ST 2110 complete with open control from SAP, RAVENNA, Livewire+ and NMOS
- IGGY, family of live audio-over-IP converters, offering interoperable, flexible and robust AES67 & ST 2110 to MADI audio conversion
- IGGY also natively supports audio networking protocols such as NMOS, RAVENNA, Ember+, SAP, JSON and DashBoard

Telos Alliance

- Featuring the Telos Infinity IP Intercom in their pod
- Telos Infinity replaces outmoded matrix technology with an advanced, distributed fully AES67 compliant network solution that provides superior functionality in a simplified, more elegant form
  - 1ru 16 Key IP Master Panel
  - 1ru 20 Key IP Expansion Panel
  - Dual Channel Wired IP Beltpack
  - Analog xNode AES67 Compact IP Interface
  - xSwitch Compact Managed Ethernet Switch

Interoperability Demo

- Many AIMS members' products are connected together seamlessly exchanging audio data in an interoperability demo between several of the pods
  - ALC RAVENNA Partners
  - Riedel Communications
  - Ross Video
  - Telos Alliance


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