IPMX & Live Production

Andrew Starks

IP SHOWCASE

Audio Engineering Society · AIMS Alliance for IP Media Solutions · AMWA Networked Media. Working. · EBU · SMPTE · VSF Video Services Forum

Open standards AV over IP for Pro AV built on existing broadcast standards: ST 2110 & NMOS

What does Pro AV mean?

Pro AV is...

The market for audiovisual (AV) communication equipment used in professional, industrial, commercial, and retail environments to communicate with people.

We're all just video now…

Facility Offices

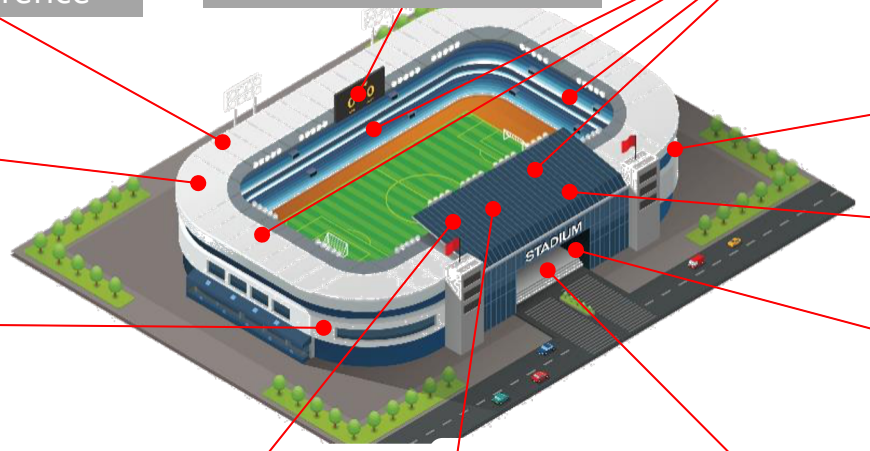
Conference

Giant Vision

Isle Monitors

Locker

Locker Room



Food

Security

OB Truck

TV

Video Assisted

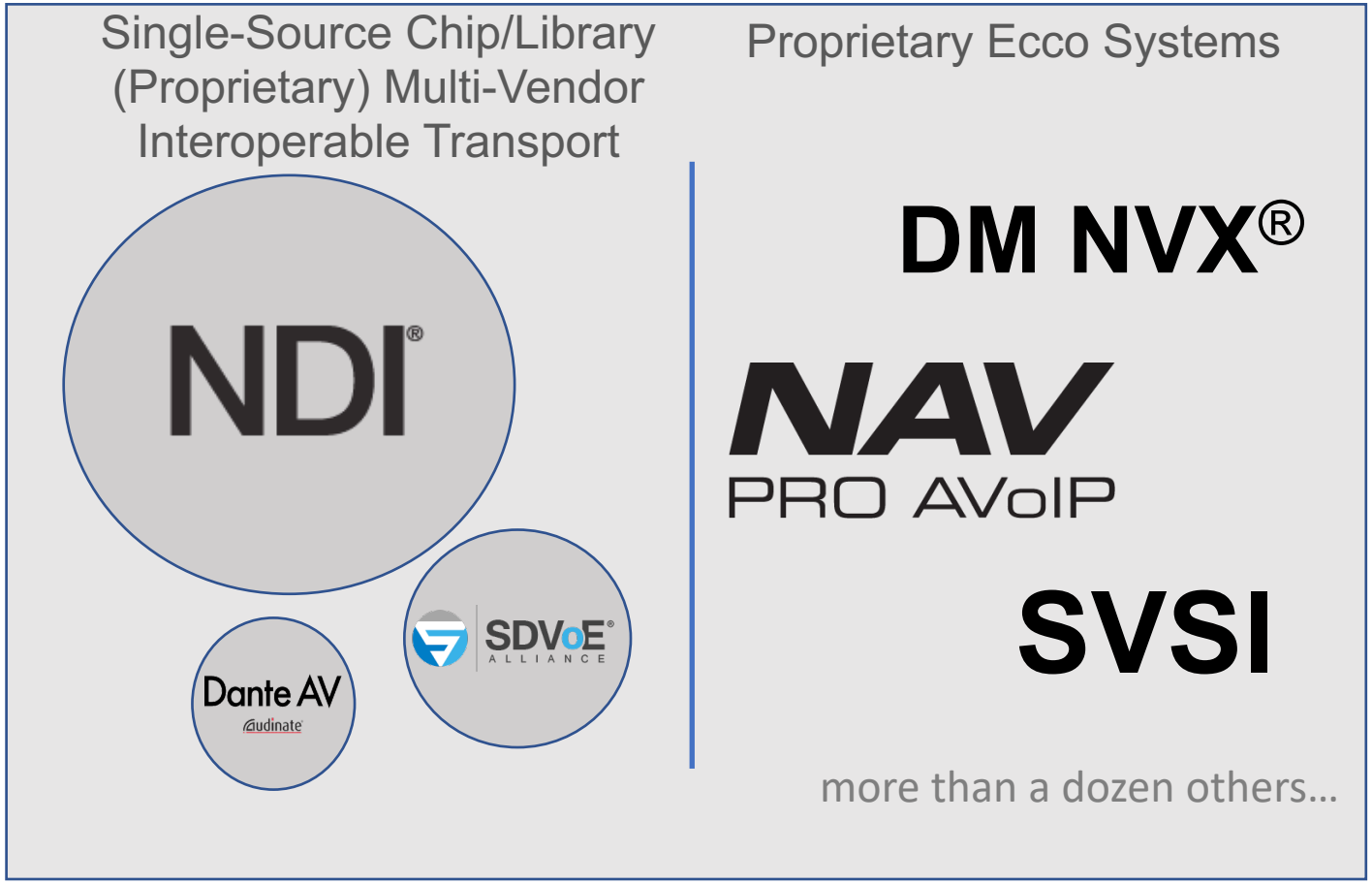
Ticket

Currently in Pro AV…

- Excellent Quality
- Low latency
- Stable Operation

…and incompatible

- Discovery
- Connection
- Transport



Built on Existing Standards

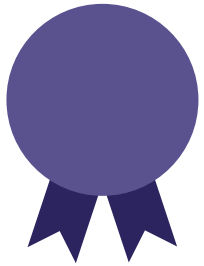
SMPTE
VSF
AMWA
AIMS

2018
Pro AV WG Starts
ST2110 + NMOS +
additional functions

Integrated Systems Europe
IPMX
IP MEDIA EXPERIENCE

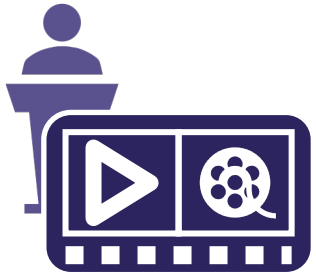
IPMX brand launched at
ISE 2020 Show
(Feb 2020)

What does Prov Need?



A Real Standard

Cloud & Premise



Presentations & Productions

Economical for Today

Ready for Tomorrow

The Basics

Established

ST 2110 and NMOS:
Thousands of deployed devices

Open API

Registration & Discovery,
Registry or P2P, Control

Video

SD → 32K, JPEG-XS, EDID/HPD
Compression, Uncompressed

Security

Oath2, HTTPS, and HDCP 2.3

Transport

Multicast & Unicast,
Based on ST 2110 (Elementary)
UDP, RTP, 1-100+ GbE

Timing

Optional PTP, Asynchronous
and Synchronous

Audio

AES 67, Common Pro AV &
Consumer Formats

Control

USB/KVM, CEC, Serial,
GPIO Extension

JT-NM Pro AV Roadmap

(not official, see official version on the JT-NM website)

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	in progress	phase 1	phase 2	
control	✅ **Discovery, Registration, Connections** NMOS IS-04 🔄 **Dynamic Connections** NMOS IS-05 & 07, Receiver Capabilities, EDID / HPD	**Network Services and Node Behavior** ProAV version of TR-1001-1 **Audio channel mapping** NMOS IS-08 **Support for Legacy Integration** ARC, CEC, IR Remotes, GPIO, RS-232 🔄 **Network addressing** IPv4/IPv6	**Training and Certification** Curriculum and AVIXA Renewal Credits **Device / Content Control** Open, public control framework **USB – HID** Registration, Discovery, and Connection with support for Touch Screens	true plug & play
media	✅ **Uncompressed Video & Audio** ST 2110-20 & 30, AES67, AES3 🔄 **Compressed Video** Open, Freely Available CODEC ✅ **Precise Timing** SMPTE ST 2110-10, ST 2059 🔄 **Simplified Timing** VSF-TRxxx, Async & Relaxed timing	**Forward Error Correction** VSF-TRxxx **ProAV Audio Formats** VSF-TRxxx	**WAN & Internet Compression** Codecs widely implemented in the AV over IP market **WAN Error Correction** Automated Return Request (RIST or SRT, tbd) **Access Services** (e.g. Closed Captioning) SMPTE ST 2110-40 or 41	full flexibility
security	🔄 **Access, Authentication & Control Encryption** NMOS IS-10	🔄 **Copy protection** HDCP 2.3, VSF-TRxxx **Content Encryption** VSF-TRxxx		secure by design

✅ **Complete** 🔄 **In Progress**

Momentum for Open Standards AV over IP SHOWCASE

2018
Pro AV WG Starts
ST2110 + NMOS +
additional functions

IPMX brand launched at
ISE 2020 Show
(Feb 2020)

- AIMS Pro AV Working Group dramatically increases promotion
- VSF and AMWA become involved in new technical specifications

MAGEWELL®
joined AIMS
(June 2020)

More general acceptance of the need for IPMX by InfoComm 2021 attendees and exhibitors
(Oct 2021)

ANALOG WAY®
PANDUIT®
joined AIMS
(Mar, Aug 2021)

Multi-vendor Interop at
InfoComm 2022
(June 2022)

intel
NETGEAR
XILINX®
joined VSF
(Feb 2022)

BARCO
joined AIMS
(Apr 2022)

Okay, what are the differences?

What about live production?

The Differences that Lower Cost

	ST 2110 (networked media NMOS open specifications)	IPMX (IP MEDIA EXPERIENCE)
2110-20 Uncompressed	**Optional, Typical**	**Optional**
2110-22 with JPEG-XS	**Optional**	**Optional, Baseline**
Precision Time Protocol (PTP)	**Required,** ST 2059-1 & 2	**Optional** reduced accuracy & request interval minimums
RTCP Sender Reports	—	**Required** for async sources
Wide Sender (-21 Type W)	**Optional**	**Required**

The Tweaks & Additions

	ST 2110 (networked media NMOS open specifications)	IPMX (IP MEDIA EXPERIENCE)
YUV 4:2:2	**Assumed**	**Required**
RGB 4:4:4	**Optional**	**Required**
Audio	**2110-30 (AES76)**	**2110-30 (AES76)**
48, 44.1 & 96 kHz audio	**Optional, Optional, Optional**	**Required, Should, Should**
NMOS (IS 04, 05)	**Optional**	**Required**
IS-11 (EDID and Dynamic Connections)	**Optional**	**Optional**
HDCP 2.3 Support (HKEP)	—	**Optional**

What does it mean for live production?

IPMX
IP MEDIA EXPERIENCE

- Supports synchronous and asynchronous sources directly.
  - Add asynchronous devices to a synchronous production and retain timing info.
  - Helps manage latency within the system.
- PTP that is easier to deploy
  - Similar to AES67 requirements. Low-cost switch and device compatible
- NMOS as the baseline control protocol grantees universal discovery and registration
  - EDID (IS-11) Support useful for like multiviewers
- KVM support is useful for supporting controller interfaces
- JPEG-XS as the baseline codec (TR-10-11 IPMX Compressed Video)
  - Near-perfect 4K60 4:2:2 over 1GbE
  - Subframe latency
  - Very low CPU/GPU usage
  - Other codecs supported
- Delivers software-friendly live production
- Retains interoperability with ST 2110

Any Questions?

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Audio Engineering Society

AIMS Alliance for IP Media Solutions

AMWA Networked Media. Working.

EBU

SMPTE

VSF Video Services Forum

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Slide no bullets

Content – no bullets.

Slide with bullets

- Bullet 1
- Bullet 2
  - Bullet 3
    - Bullet 4

Image slide

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