

Introduction to AES67

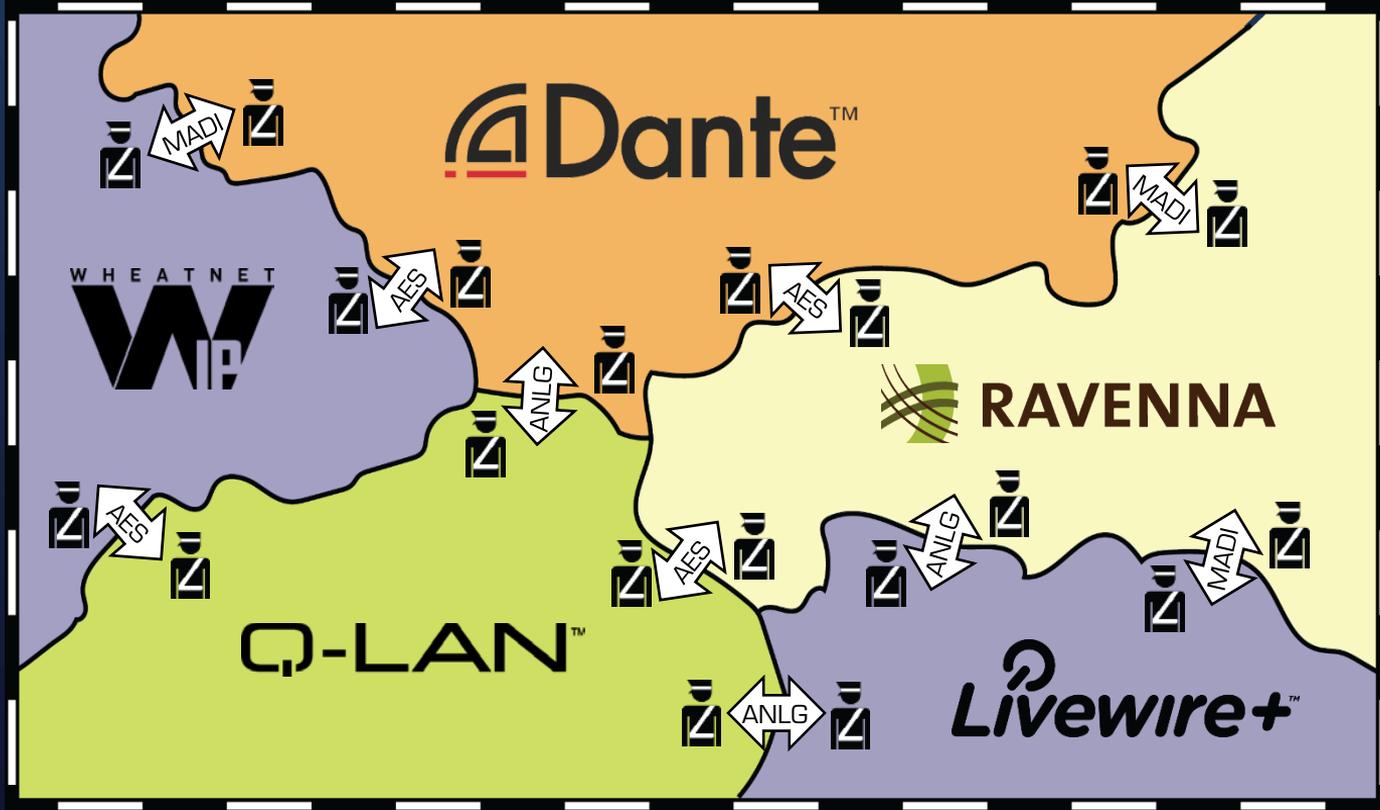


Patrick Killianey
Network Applications Engineer









AES Standards Board

The Original Goal:

- Common Interchange Format
- ~~“Another Network”~~



A Word Processing Analogy...



Microsoft®
Word



Corel®
WordPerfect®



Google
Documents

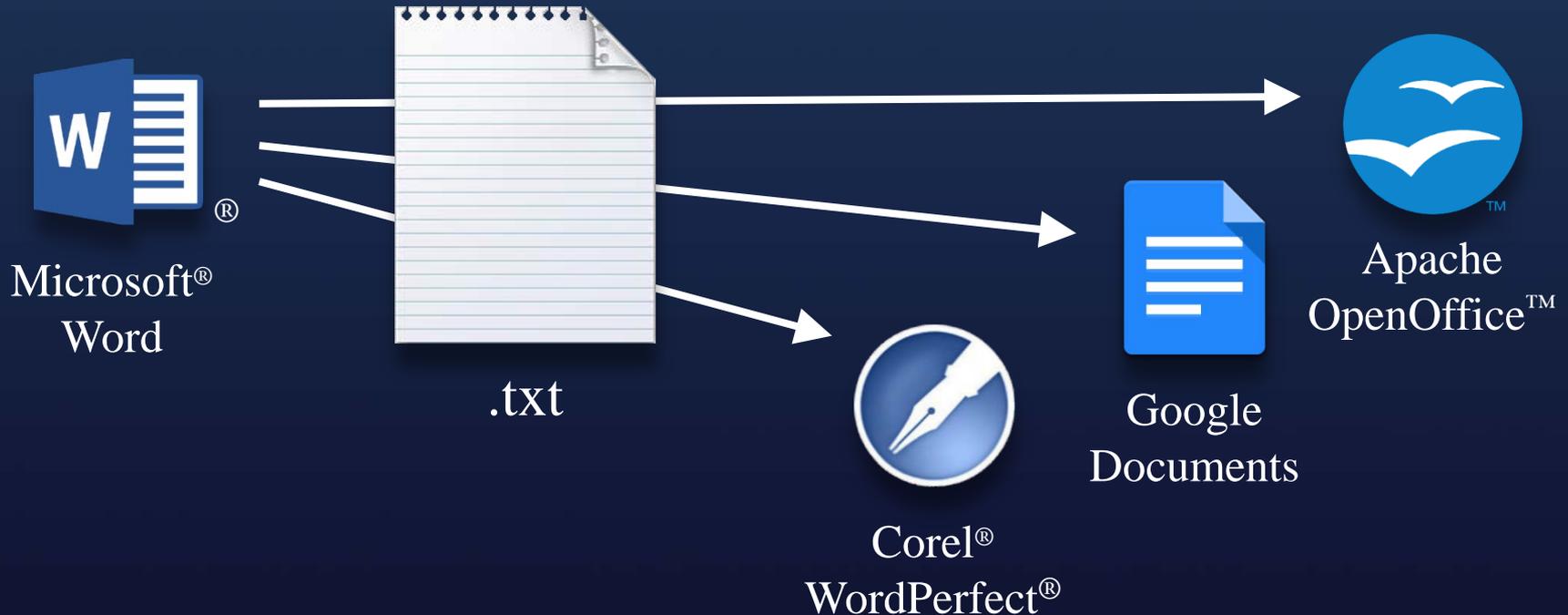


Apache
OpenOffice™

A Word Processing Analogy...



A Word Processing Analogy...



AES Standards Board

“New Highest Common Format”

- AES67
- MADI
- AES/EBU (aka AES3)
- Analog





Media Networking Alliance

Promoting the Adoption of AES67

ALC NetworX GmbH

Archwave Technologies, B.V.

ARG Electrodesign

Attero Tech, LLC

Audio-Technica

AVA Networks, LLC

British Broadcasting Corporation (BBC)

Bosch Security Systems, Inc.

Calrec Audio

Cymatic Audio

Digigram

DirectOut GmbH

Dongguan 3G Audio Technology Co., Ltd.

Focusrite Audio Engineering

Genelec

Harman Professional

Lawo Ag

Merging Technologies

NTP Technology

Ningbo Soundking Electronics

QSC, LLC

Riedel Communications, GmbH & Co. KG

Shure Incorporated

Solid State Logic

Suzhou Fortune Technology Co.

SVSi

Swedish Radio AB

The Telos Alliance

TOA Corporation

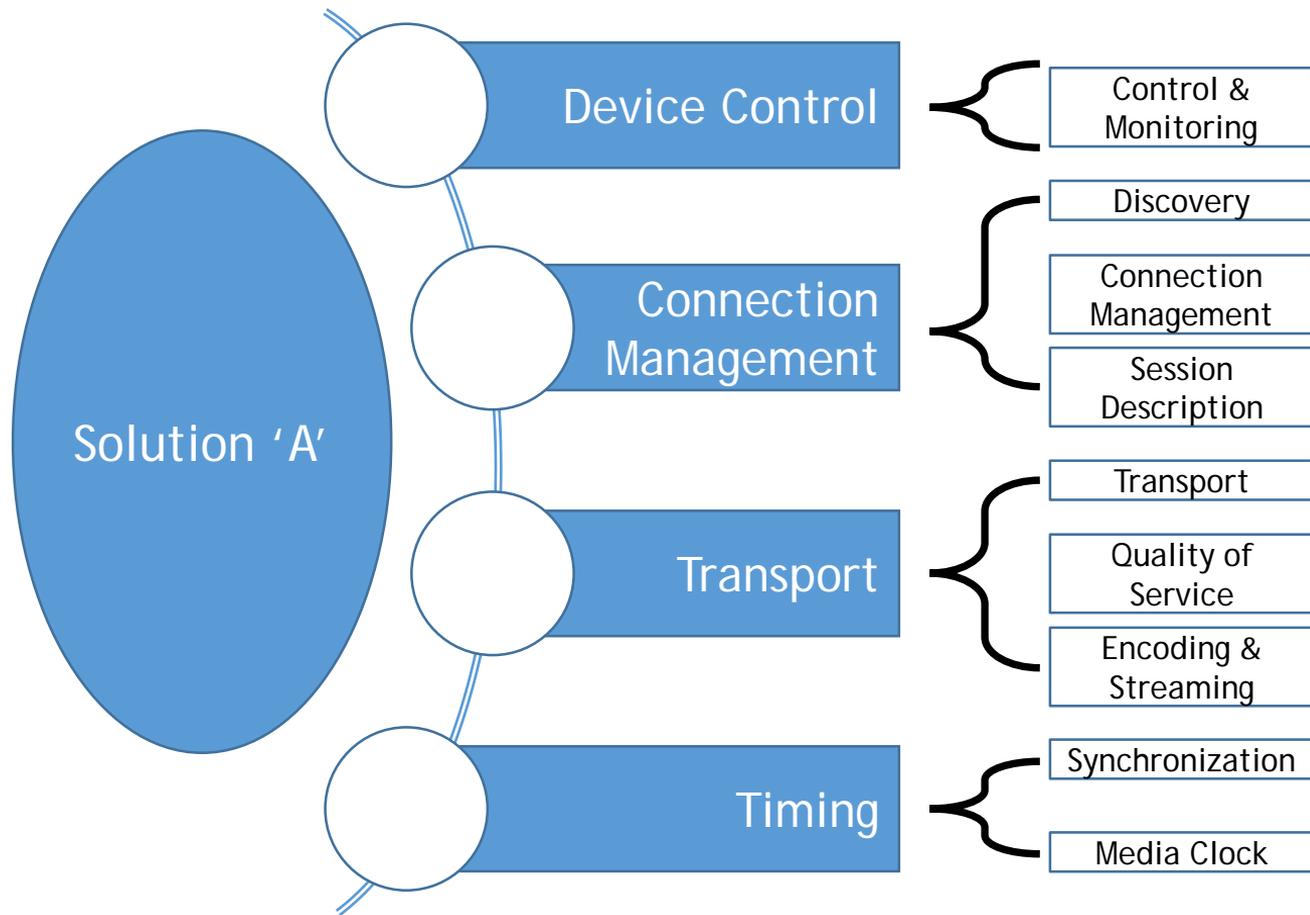
Walt Disney Imagineering

Ward-Beck Systems

Wheatstone Corporation

Yamaha

What's in a Networked Audio solution?



The Road to Incompatibility...

	Dante	Ravenna	QLAN	Livewire+
Control & Monitoring	Proprietary (Dante Controller)	HTTP, Ember+	TCP, HTTP	HTTP, Proprietary
Discovery	Bonjour, SAP	Bonjour	Proprietary	Proprietary
Connection Management	Proprietary, IGMP	RTSP, SIP, IGMP	Proprietary	Proprietary, HTTP, IGMP
Session Description	Proprietary	SDP	Proprietary	Channel #
Transport	Proprietary, IPv4	RTP, IPv4	RTP, IPv4	RTP, IPv4
Quality of Service	DiffServ	DiffServ	DiffServ	DiffServ/802.1pq
Encoding & Streaming	L16-32, ≤16 ch/flow	L16-32, ≤64 cha/str	32B-FP, ≤16 ch/str	L24 , int, surr
Synchronization	PTP1588-2002	PTP1588-2008	PTP1588-2008	Proprietary
Media Clock	44.1kHz - 192kHz	44.1kHz - 384kHz	48kHz	48kHz



Dante Controller - Network View

File Device View Help

Master Clock: Y002-MailHall-Mixer-Mon-QL1

Routing Device Info Clock Status Network Status Events

Dante

Filter Transmitters

Filter Receivers

Dante Transmitters

- TAGA4054
- Y001-Shure-ULXD4D-40b0eb
- Y001-Yamaha-CL3-FoH
- Y001-Yamaha-CL3-MY16
- Y002-MailHall-Mixer-Mon-QL1
- 239.67.245.214 @ 1000010-0703a:1:16
- 239.69.61.1 @ Crystal Out 1&2
- 239.69.70.1 @ Media Player
- 239.69.83.6 @ Kirks LAV
- 239.69.83.8 @ Axia Music
- 239.69.111.112 @ AES67-TX-2
- 239.69.111.113 @ AES67-TX-1
- 01
- 02
- 239.192.3.64 @ Channel 832
- 239.192.3.65 @ Channel 833
- 239.192.3.66 @ Channel 834

Dante Receivers

- TAGA4054
- Y001-Yamaha-CL3-FoH
 - 01 - Lav Martin
 - 02 - Lav Pat
 - 03 - Lav Andreas
 - 04 - Lav Kirk
 - 05
 - 06
 - 07
 - 08
 - 09 - Q-LAN L
 - 10 - Q-LAN R
 - 11
 - 12
 - 13 - Ravenna L
 - 14 - Ravenna R
 - 15 - Livewire+ L
 - 16 - Livewire+ R
- Y002-MailHall-Mixer-Mon-QL1

P: ■ Multicast Bandwidth: 4Mbps ■ Event Log: ■ Clock Status Monitor: ■

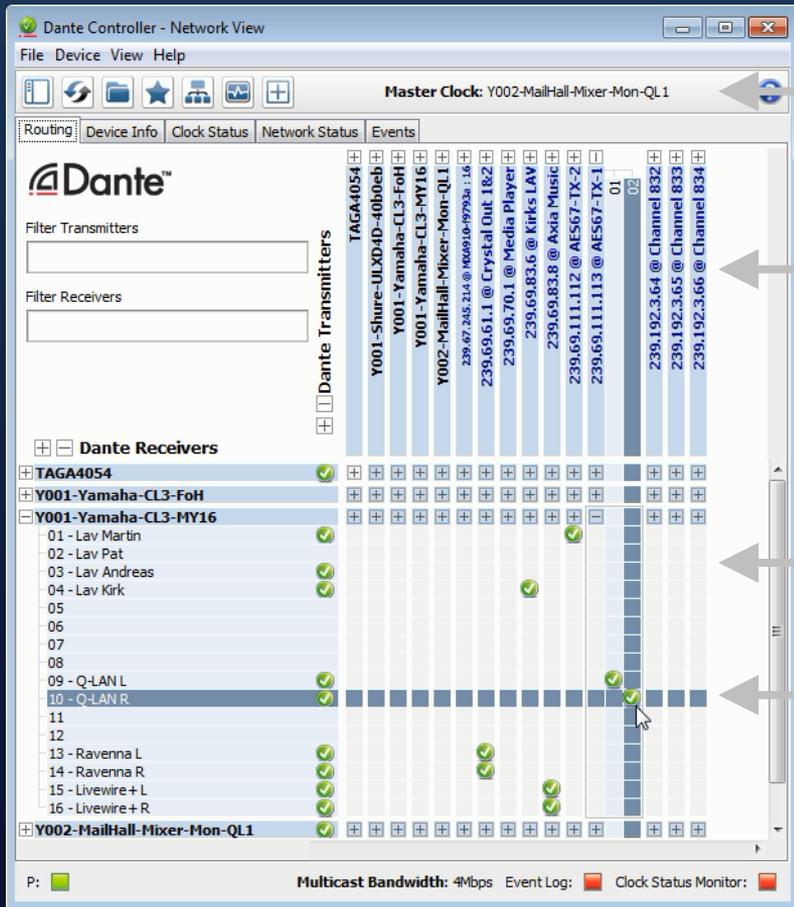
Word Clock:
PTPv2 (IEEE 1588-2008)



Connection Management:
SDP (RFC 7273)



Audio Transport:
IGMP v2, RTP (RFC 3550, 3551)



The screenshot shows the Dante Controller software interface. At the top, it displays 'Dante Controller - Network View' and 'Master Clock: Y002-MailHall-Mixer-Mon-QL1'. Below this are tabs for 'Routing', 'Device Info', 'Clock Status', 'Network Status', and 'Events'. The main area is divided into 'Dante Transmitters' and 'Dante Receivers'. The transmitters list includes TAGA4054, Y001-Shure-ULXD4D-40b0eb, Y001-Yamaha-CL3-FoH, Y001-Yamaha-CL3-MY16, Y002-MailHall-Mixer-Mon-QL1, 239.67.245.214 @ 1000010-0703a:1:16, 239.69.61.1 @ Crystal Out 1&2, 239.69.70.1 @ Media Player, 239.69.83.6 @ Kirks LAV, 239.69.83.8 @ Axia Music, 239.69.111.112 @ AES67-TX-2, and 239.69.111.113 @ AES67-TX-1. The receivers list includes TAGA4054, Y001-Yamaha-CL3-FoH, Y001-Yamaha-CL3-MY16 (with sub-items 01-16), and Y002-MailHall-Mixer-Mon-QL1. A grid of connection points is visible between these devices, with green checkmarks indicating active connections. At the bottom, status indicators show 'Multicast Bandwidth: 4Mbps', 'Event Log', and 'Clock Status Monitor'.

Word Clock:
PTPv2 (IEEE 1588-2008)

?

Connection Management:
SDP (RFC 7273)

Audio Transport:
IGMP v2, RTP (RFC 3550, 3551)

Dante Controller - Network View

File Device View Help

Master Clock: Y002-MailHall-Mixer-Mon-QL1

Routing | Device Info | Clock Status | Network Status | Events

Dante

Filter Transmitters

Filter Receivers

Dante Transmitters

TAGA4054	Y001-Shure-ULXD4D-40b0eb	Y001-Yamaha-CL3-FoH	Y001-Yamaha-CL3-MY16	Y002-MailHall-Mixer-Mon-QL1	239.67.245.214 @ 1000010-070301:16	239.69.61.1 @ Crystal Out 1&2	239.69.70.1 @ Media Player	239.69.83.6 @ Kirks LAV	239.69.83.8 @ Axia Music	239.69.111.112 @ AES67-TX-2	239.69.111.113 @ AES67-TX-1	01	02
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Dante Receivers

- TAGA4054
- Y001-Yamaha-CL3-FoH
- Y001-Yamaha-CL3-MY16
 - 01 - Lav Martin
 - 02 - Lav Pat
 - 03 - Lav Andreas
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 - 09 - Q-LAN L
 - 10 - Q-LAN R
 - 11
 - 12
 - 13 - Ravenna L
 - 14 - Ravenna R
 - 15 - Livewire+L
 - 16 - Livewire+R
- Y002-MailHall-Mixer-Mon-QL1

P: ■ Multicast Bandwidth: 4Mbps Event Log: ■ Clock Status Monitor: ■



Discovery (SAP)

What Does AES67 Say About Discovery?

(4) Discovery Methods are Acknowledged;
SAP is one of them.

(0) Discovery Methods are Explicitly Required.



Discovery

AES 67

SAP

Manual



RAV2SAP.exe

RAV2SAP Utility

Discovery:

Translates between Bonjour and SAP discovery; allows manual creation of announcements.



Audio Flow:

Audio does not flow through the utility – audio passes directly between audio endpoints.



The Native Network Solution Benefits

A Single Utility and Design Viewpoint

No need to learn “design conventions” for each platform.

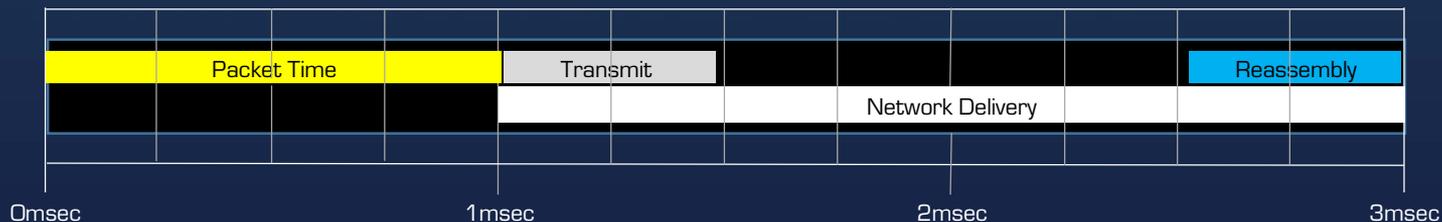
Lower Latency Performance

AES67 default is 3msec. Dante defaults to 1msec, safely achieves 0.25msec or less.

Advanced Control & Diagnostics

Network Health Utilities, Remote Control, Security Options, etc.

The Elements of Network Latency



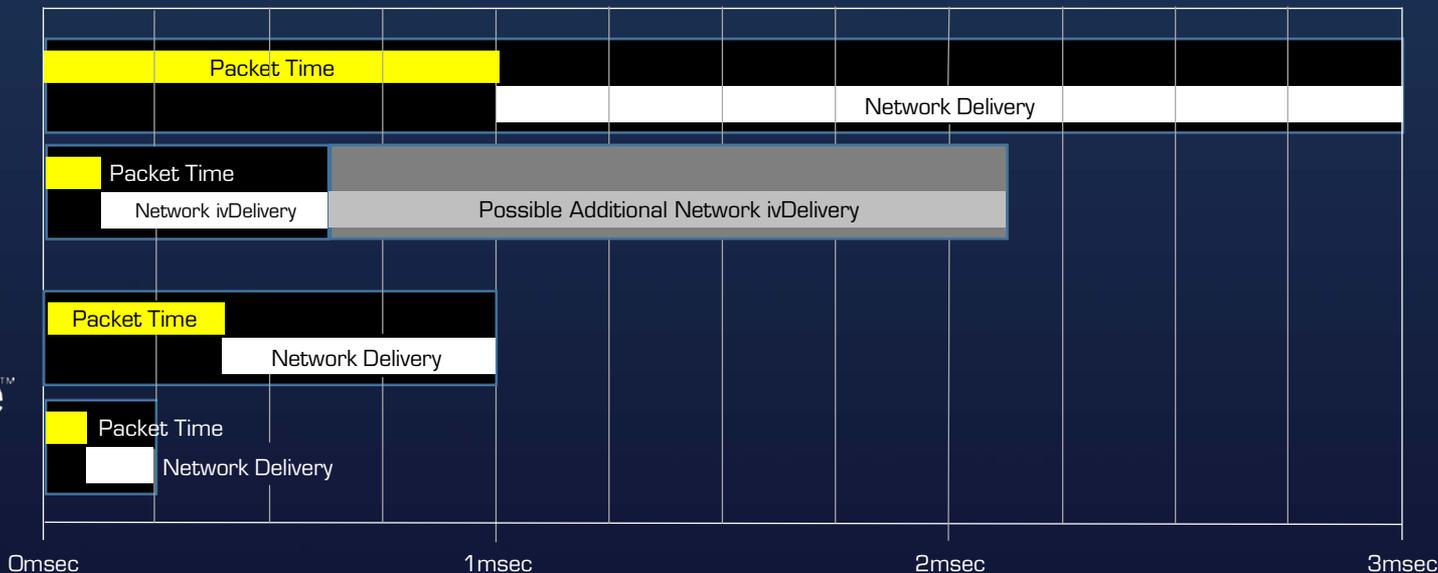
The Native Network Solution Benefits



The Elements of Network Latency

AES67

Dante™



Packet Time: 0.125 to 4msec

Network Latency: $\geq 2x$ to $17x$ Packet Time, 0.5msec to 20msec

The Native Network Solution Benefits

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A Strong Case for AES67



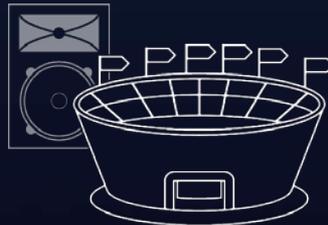
A Strong Case for AES67



TR-03 TR-04 SMPTE 2022-6
SMPTE 2110



 **Dante™**



 **RAVENNA**



A Strong Case for SMPTE 2110



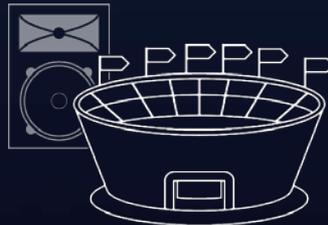
A Strong Case for SMPTE 2110



TR-03 TR-04 SMPTE2022-6
SMPTE 2110



 **Dante™**



 **RAVENNA**



A Strong Case for SMPTE 2110



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