Overview on AES67

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Topics:

- What is AES67?
- Shortcomings from a system perspective
- AES67 in the real world: sample applications
- RAVENNA & AES67?
- Other important industry work

AES67-2013 Standard for Audio Applications of Networks:

High-performance Streaming Audio-over-IP Interoperability

AES67

published on September, 11th, 2013

AES Standard for Audio Applications of Networks - High-performance Streaming Audio-over-IP Interoperability

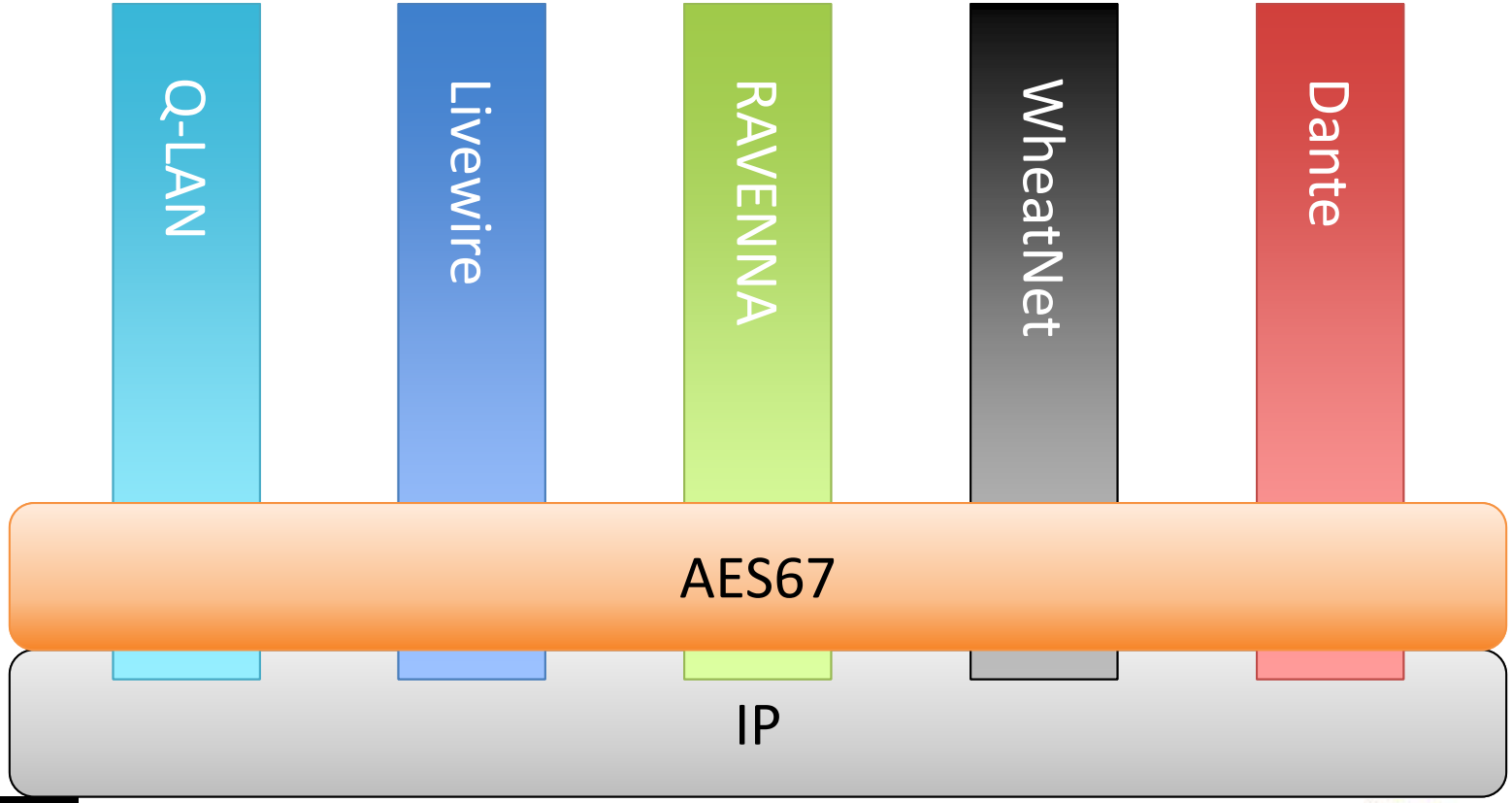
Scope:

- **Interoperability guidelines** for professional, low-latency audio over campus and local area IP networks **using existing protocols wherever possible.**
- Excludes:
  - Non-IP networking
  - Low-bandwidth media
  - Data compression
  - Low-performance WANs and public Internet
  - Video (should provide good basis for follow-on video project)

Goal:

- Technology providers may choose to implement interoperability as a special mode, or transition to it as their native mode

AES Standard for Audio Applications of Networks - High-performance Streaming Audio-over-IP Interoperability



AES67 technology components

Discovery	Not specified
Connection Management	SIP (unicast), IGMP (multicast) + ???
Session Description	SDP (RFC4566, RFC7273)
Encoding	L16/L24, 1..8 ch, 48 samples
QoS	Differentiated Services
Transport	RTP / UDP / IP, unicast & multicast
Media Clock	48 kHz
Synchronisation	IEEE 1588-2008 (PTPv2)

Discovery & Connection Management in AES67

- Discovery: excluded, but several possibilities mentioned (i.e. ZeroConf, SAP and others)
  - Discovery enables enumeration / registration devices & streams
  - Announces protocol / location (uri) for SDP data
- Connection management: SDP, IGMP (multicast), SIP (unicast)
  - SDP data required for connection setup and stream description
  - SDP transport: unicast - SIP, multicast - no protocol specified (assuming manual means available via device-specific UI)
- Real-world problem:
  - different discovery methods used by various systems
  - No common method for (multicast) SDP exchange
  - Lack of means for manual read-out / entry of SDP data

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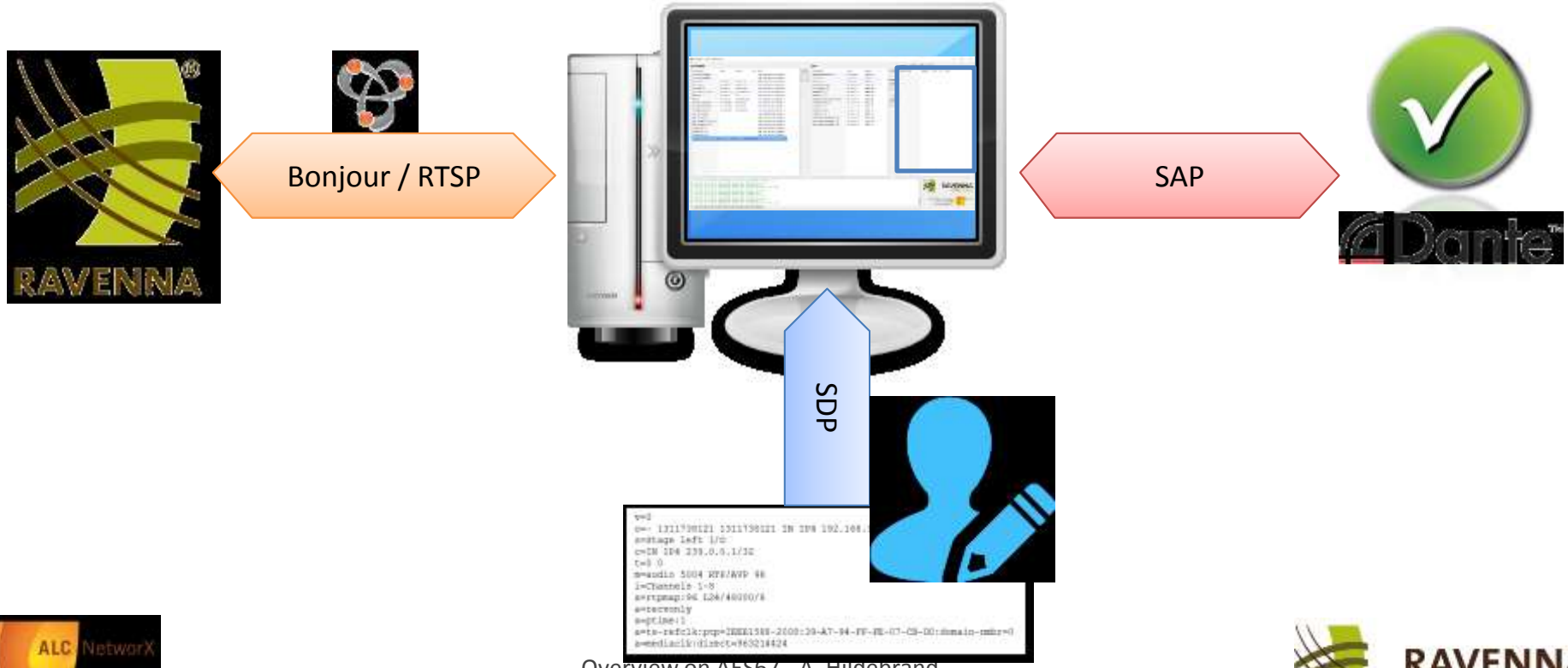
- Real-world problem:
  - different discovery methods used by various systems (i.e. mDNS vs. SAP)
  - No common method for (multicast) SDP exchange
  - Lack of means for manual read-out / entry of SDP data
    - ⇨ **No simple interoperability!**

Discovery & Connection Management in AES67

- Problem solver #1: ***RAVENNA-2-SAP Converter***
  - Converts selected or all RAVENNA announcements into SAP and vice versa
  - Provides full SDP read-out and manual entry through UI

RAVENNA-to-SAP Converter



Discovery & Connection Management in AES67

Disco

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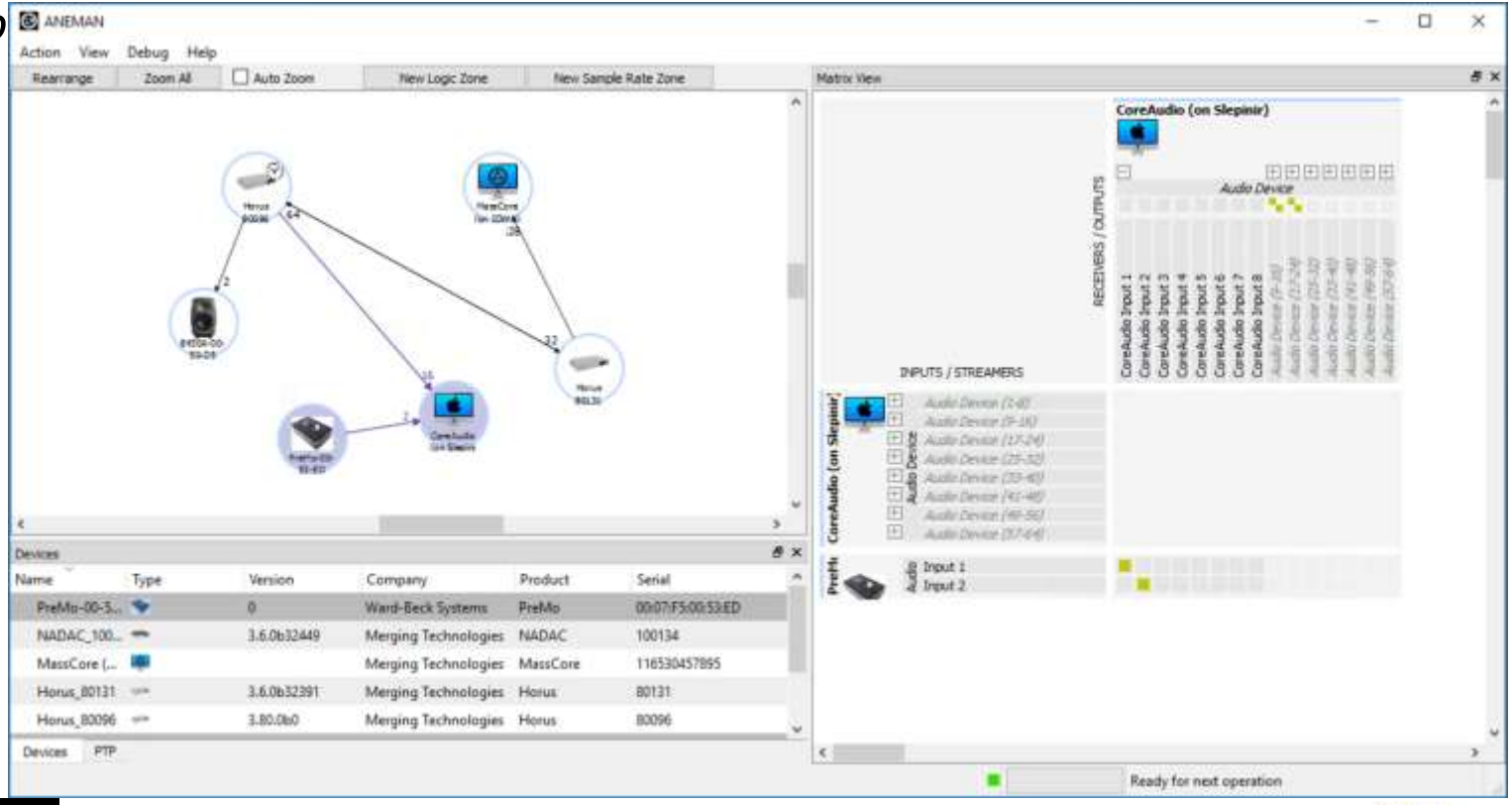

ANEMAN
Action View Debug Help
Rearrange
Zoom All
Auto Zoom
New Logic Zone
New Sample Rate Zone
Matrix View
CoreAudio (on Slepnir)
Audio Device
RECEIVERS / OUTPUTS
INPUTS / STREAMERS
Devices
Name Type Version Company Product Serial
PreMo-00-5... 0 Ward-Beck Systems PreMo 00:07:F5:00:53:ED
NADAC_100... 3.6.0b32449 Merging Technologies NADAC 100134
MassCore (... Merging Technologies MassCore 116530457895
Horus_80131 3.6.0b32391 Merging Technologies Horus 80131
Horus_80096 3.80.0b0 Merging Technologies Horus 80096
Devices PTP
Ready for next operation

AES67 – *the "O negative" of audio networking*

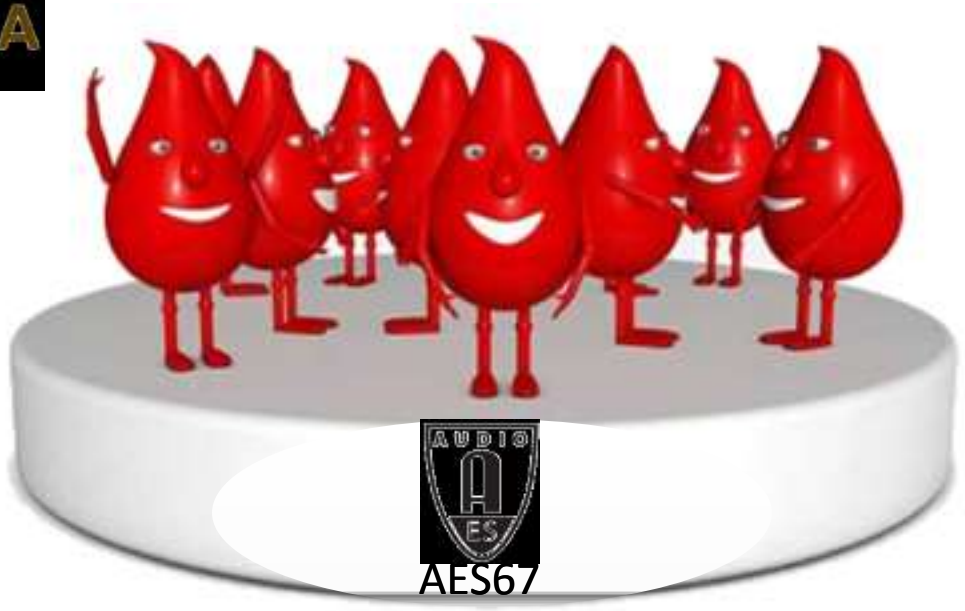
RAVENNA

WHEATNET IP

Q-SYS

Dante

AES67 Livewire+



ACIP

AES67 – *the "O negative" of audio networking*

What can it do?

AES67 – *the "O negative" of audio networking*

AES67

ACIP

AES67

RAVENNA

AES67

RAVENNA @ Asian Games 2014

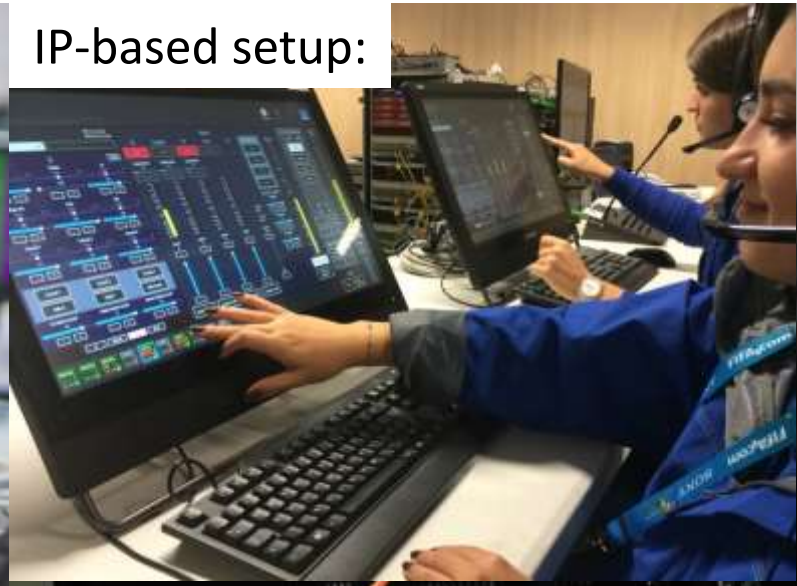
RAVENNA @ Asian Games 2014

Conventional system setup:

RAVENNA @ Asian Games 2014

The IP-based Real-Time Media Network

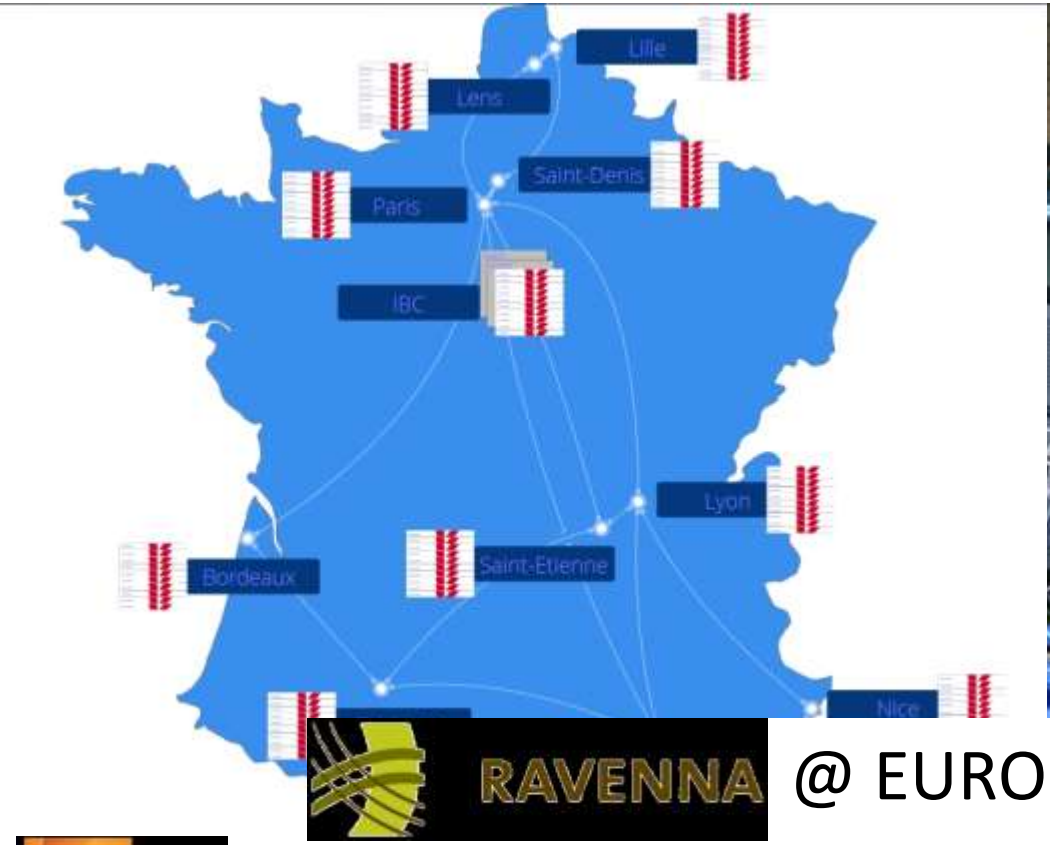
IP-based setup:



RAVENNA @ Asian Games 2014

RAVENNA @ EURO 2016

The IP-based Real-Time Media Network



RAVENNA @ EURO 2016

120x V__link4
(12 pro venue)
264x V__remote4
(19-20 per venue, 73 at IBC)
130x A__mic8
(13 pro venue)
480 video streams
~1000 audio channels
22x Arista 7150S (2 per venue, 2 at IBC)

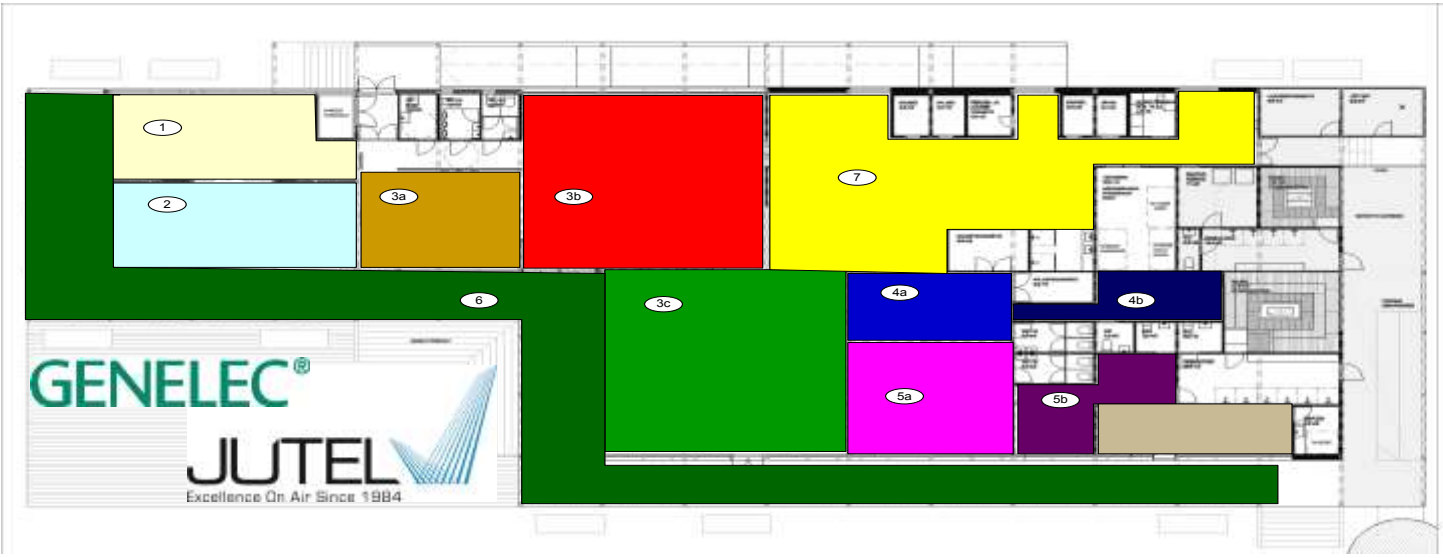
RAVENNA @ EURO 2016

The IP-based Real-Time Media Network

RAVENNA @ ESC 2015

RAVENNA @ ESC 2015

AES67 Installed Sound Pilot: Nallikari restaurant complex, Oulu, Finland:



NALLIKARI, ääniryhmät
Jutel Oy, Jki
10.12.2012

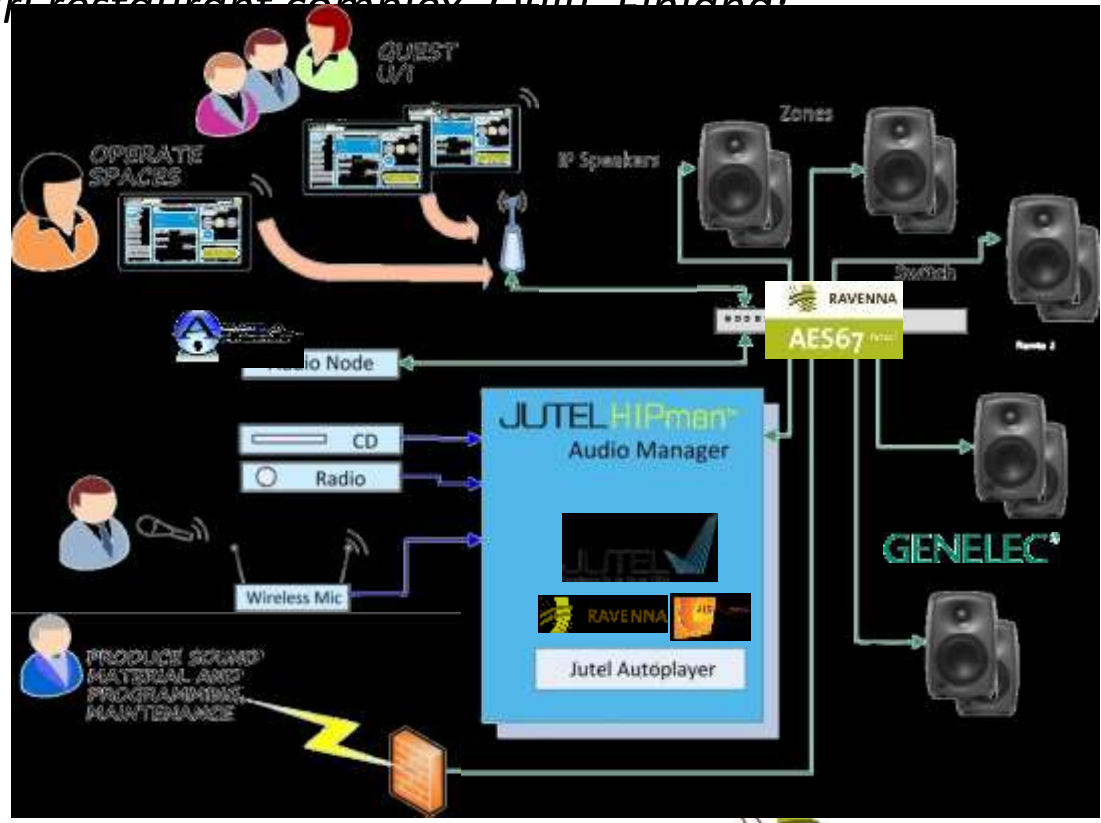
1. Ravintolakabinetti 1
2. Ravintolakabinetti 2
3a. Ravintola lounge
    3b. Aularavintola
    3c. Ravintolasali
4a. Saunakabinetti 1
    4b. Sauna 1
5a. Saunakabinetti 2
    5b. Sauna 2
6. Terassi
7. Keittiö ja henkilökunta

Lisäksi orkesteri / lavalaitteet

- Multi-zone restaurant environment with programmable background music
- Audio processing, playout, routing and remote control functions
- Wireless user control via Android tablets

AES67 Installed Sound Pilot: Nallikari restaurant complex, Oulu, Finland:

- Jutel HIPman audio management, processing & play-out system w/ RAVENNA Virtual Sound Card
- 30 IP-driven Genelec speakers
- Axia xNode for PTP GM and utility audio I/O (mic, monitoring)
- Android tabs for wireless control
- Remote maintenance access
- Common network for all services
- RAVENNA/AES67 audio streaming



The IP-based Real-Time Media Network

- 10 Neumann DMI-8 (78 digital mics)

- 2 Lawo MC²56

- 1 Merging Pyramix

RAVENNA @ ONL 2015

The IP-based Real-Time Media Network

The IP-based Real-Time Media Network

Common infrastructure for live mixing and broadcast production

1 mc²66 + 5 mc²36 consoles, DALLIS I/O systems + Nova73 router

Common access to all sources w/ integrated access rights management

Uplink to OB van

RAVENNA @ Elbphilharmonie Hamburg 2017


RAVENNA
NETWORK PARTNER
WINNERS
AV AWARDS 2017
BROADCAST/MEDIA PROJECT OF THE YEAR
LAWO
RAVENNA
AES67 built-in
ELBPHILHARMONIE

AES67 – *the "O negative" of audio networking*

Who will support it?

AES67 – *the "O negative" of audio networking*

Who will support it?

AES67 *built-in!*

*What is **RAVENNA**?*

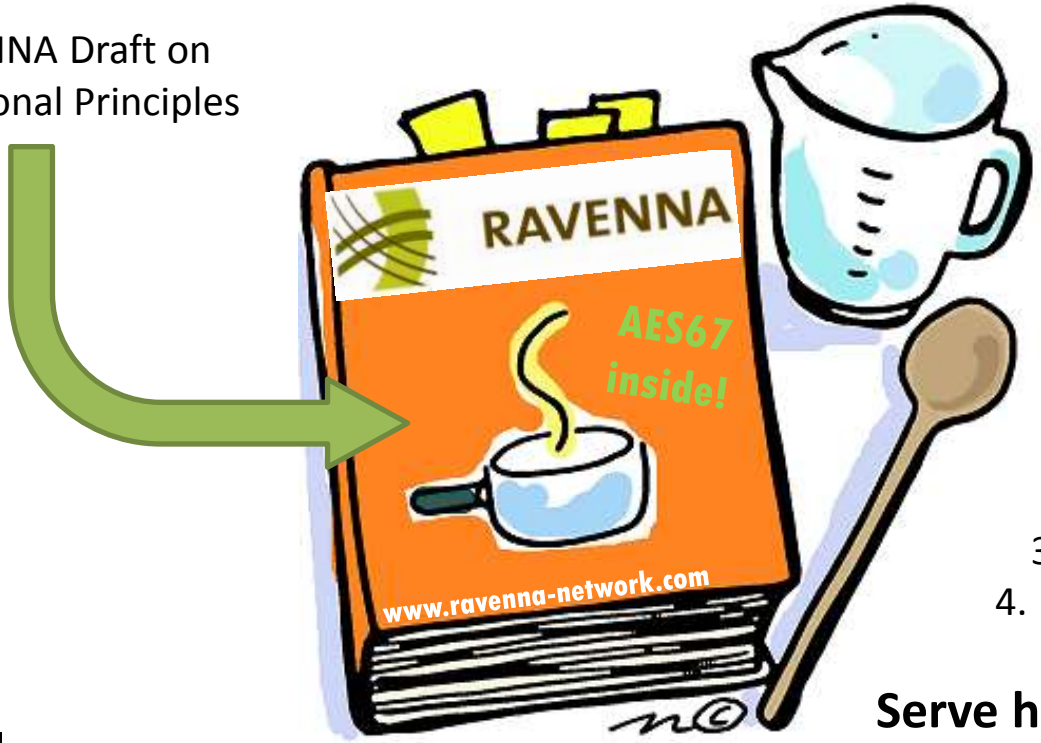
An "Open Technology" platform:

- Based on **technology** publicly **available**
  - ⇨ *No proprietary "black box" design*
- Utilizes **standard protocols**
  - ⇨ *Proven technology, widely supported*
- Designed to work on **existing networks**
  - ⇨ *No new network equipment required*
- **No** proprietary **licensing** policy
  - ⇨ No cost per channel, suits all performance needs

- Draft on operating principles **published** since June 10th, 2011

*What is **RAVENNA**?*

RAVENNA Draft on Operational Principles



Ingredients:

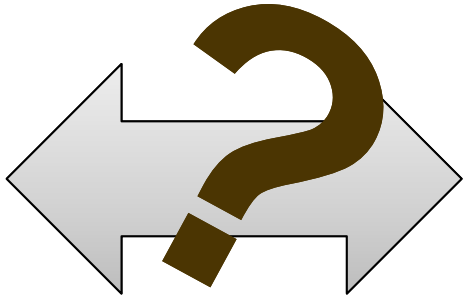
20 ml PTPv2
500 g RTP
1 pkt multicast
1 pinch of Bonjour

Cooking order:

1. Stew PTP to order
2. Add RTP
3. Mingle with multicast
4. Add Bonjour on top

Serve hot and Enjoy!

AES67



AES67

- QoS three classes
- Media Format L16/L24 PCM
- 48 Samples per packet
- 1-8 Audio channels
- Encoding 48kHz

AES67	+ RAVENNA
	+ Discovery
	+ Redundancy
QoS three classes	+ classes adjustable
Media Format L16/L24 PCM	+ AES/EBU, DSD/DXD, Video
48 Samples per packet	+ 1, 6, 12, 64…
1-8 Audio channels	+ 64, 128…
Encoding 48kHz	+ 44.1, 96, 192, 384kHz…

The IP-based Real-Time Media Network

RAVENNA	AES67
+ Discovery	
+ Redundancy	
QoS three classes	+ classes adjustable
Media Format L16/L24 PCM	+ AES/EBU, DSD/DXD, Video
48 Samples per packet	+ 1, 6, 12, 64…
1-8 Audio channels	+ 64, 128…
Encoding 48kHz	+ 44.1, 96, 192, 384kHz…

More Features

More Options

RAVENNA

AES67 built-in

Beyond?!

Other important standards / industry alliances:

AES67, AES70	Promoting adoption of AES67
ST2110, ST2059	Promoting adoption of IP standards for media industry
IP-related suite of protocols	NMOS IS-04/05/06 (D&R, connection management, network control)
Ethernet authority (802.x), PTP (1588)	Important tech docs on broadcasting (ACIP)

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