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AES67 and ST2110-30 Interoperability in Real Life

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What this session is about

- Brief introduction of AES67 and ST2110
- Closer look into AES67 mandatory and extended features
- What information do I need to configure my streams
- Tools for Stream Setup
- Tools for Troubleshooting
- AES67 and Dante

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AES67

AES67

AES67-2018 Standard for Audio Applications of Networks:
High-performance Streaming Audio-over-IP Interoperability

- Goal: Find a common ground to exchange audio (media) between devices of different brands with proprietary IP implementations
- Out of Scope: discovery and connection management

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SMPTE ST2110

Professional Media Over Managed IP Networks
Suite

- -10 – System Timing and Synchronisation
- -20 / -21 – Video
- -30 / -31 – Audio
- -40 – Ancillary Data
- …

ST2110 -30

- Audio Transport over IP
- Synchronised with Video via PTPv2
- Refers to AES67-2018 as format to transmit PCM audio
- A few constraints apply
  - See AIMS Whitepaper „AES67 / ST 2110 Commonalities and Constraints“ https://www.aimsalliance.org/white-papers/

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AES67 Recap

- What does the standard mandate?
- What has been implemented?

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AES67 – What is mandatory?

- Samplerate: 48kHz
- Packet time: 1ms
- PTP v2 Synchronisation
- IGMP v2 (v3 for ST2110)
- QoS DSCP Markings
  - Clock: EF
  - Media: AF41
  - Anything else: DF (Best Effort)
- Audio Encoding: 16 and 24 Bit
- Channel Count: 1-8 Channels per stream
- Multicast and Unicast
- SDP
- SIP (Unicast)

AES67 – What else is possible?

- Samplerates: 96 kHz, 44.1 kHz
- Packet times: 125µs, 250µs, 333µs, 4ms
- More than 8 audio channels per stream (e.g. 64ch)
- IGMP v3 (automatic fall-back to v2)
- Discovery (RTSP, Bonjour, SAP) not scope of the standard but can be added on top of AES67

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Format, sampling rate	Packet time	Maximum channels per stream
L24, 48kHz	125 microseconds	80
L16, 48kHz	250 microseconds	60
L24, 48kHz	250 microseconds	40
L24, 48kHz	333-1/3 microseconds	30
L24, 96kHz	250 microseconds	20
L24, 48kHz	1 millisecond	10
L24, 48kHz	4 milliseconds	2

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L24, 48kHz	4 milliseconds	2

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AES67 – What do I need to set up a stream?

```
v=0
o=- 1 2832056294 IN IP4 192.168.1.210
s=AES67 1
t=0 0
m=audio 5004 RTP/AVP 97
i=Stream 1
c=IN IP4 239.69.0.1/128
a=rtpmap:97 L24/48000/8
a=sync-time:0
a=clock-domain:PTPv2 0
a=framecount:48
a=recvonly
a=mediaclk:direct=0
a=ts-refclk:ptp=IEEE1588-2008:00-1D-C1-FF-FE-0E-67-16:0
a=ptime:1
a=maxptime:1
```

AES67 – What do I need to set up a stream?

```
v=0
o=- 1 2832056294 IN IP4 192.168.1.210
s=AES67 1
t=0 0
m=audio 5004 RTP/AVP 97
i=Stream 1
c=IN IP4 239.69.0.1/128
a=rtpmap:97 L24/48000/8
a=sync-time:0
a=clock-domain:PTPv2 0
a=framecount:48
a=recvonly
a=mediaclk:direct=0
a=ts-refclk:ptp=IEEE1588-2008:00-1D-C1-FF-FE-0E-67-16:0
a=ptime:1
a=maxptime:1
```

- Multicast IP: 239.69.0.1
- Destination Port: 5004
- Encoding: L24 (24 Bit)
- Samplerate: 48000 (48kHz)
- Channel Count: 8
- Payload ID: 97
- Packet time: 48

AES67 – How do I get the SDP into my device?

- Manually
- RTSP (e.g. RAVENNA)
- SAP (e.g. Dante)
  - Dante Controller does not provide means to manually enter stream information
- NMOS

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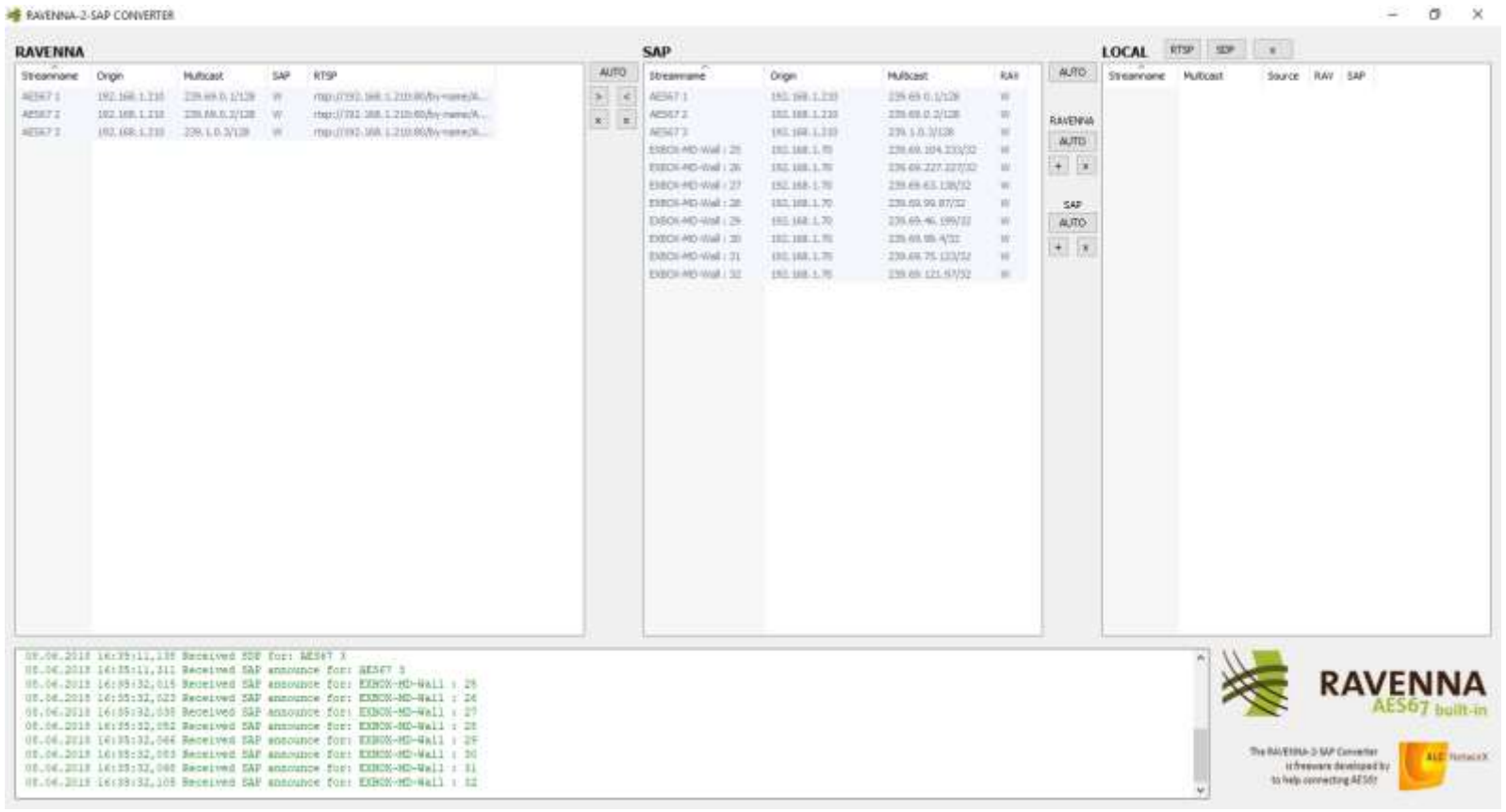
RAV2SAP



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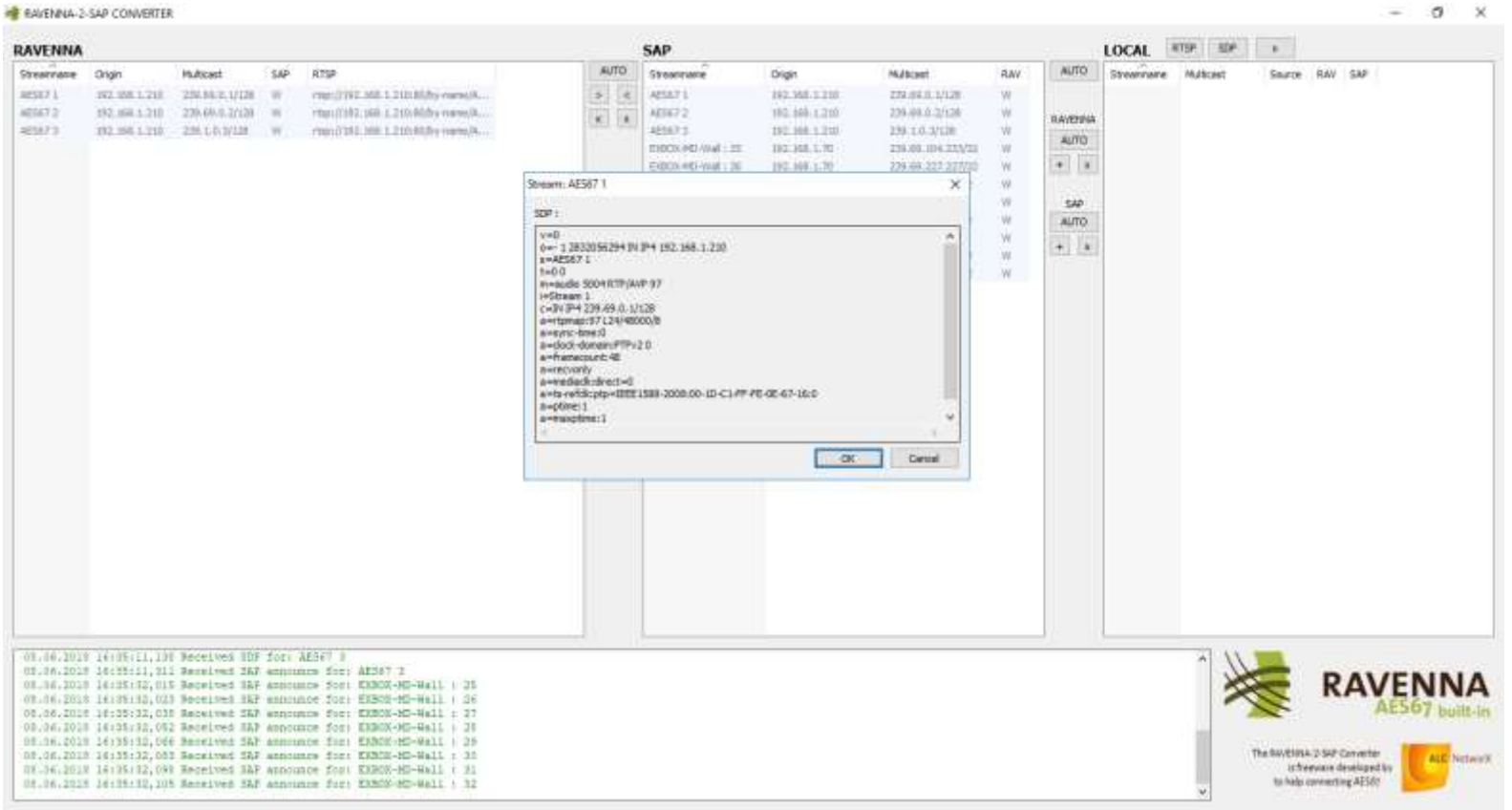
RAV2SAP – SDP view



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Troubleshooting – What, if it does not work?

- Check stream configuration
  - Is it really AES67 compliant?
  - If it is different from the mandatory set, does the device support it?
- Check Multicast IP
- Check Destination Port
- Check Payload ID
- Check Stream Delay
- If it still doesn‘t work -> Wireshark!

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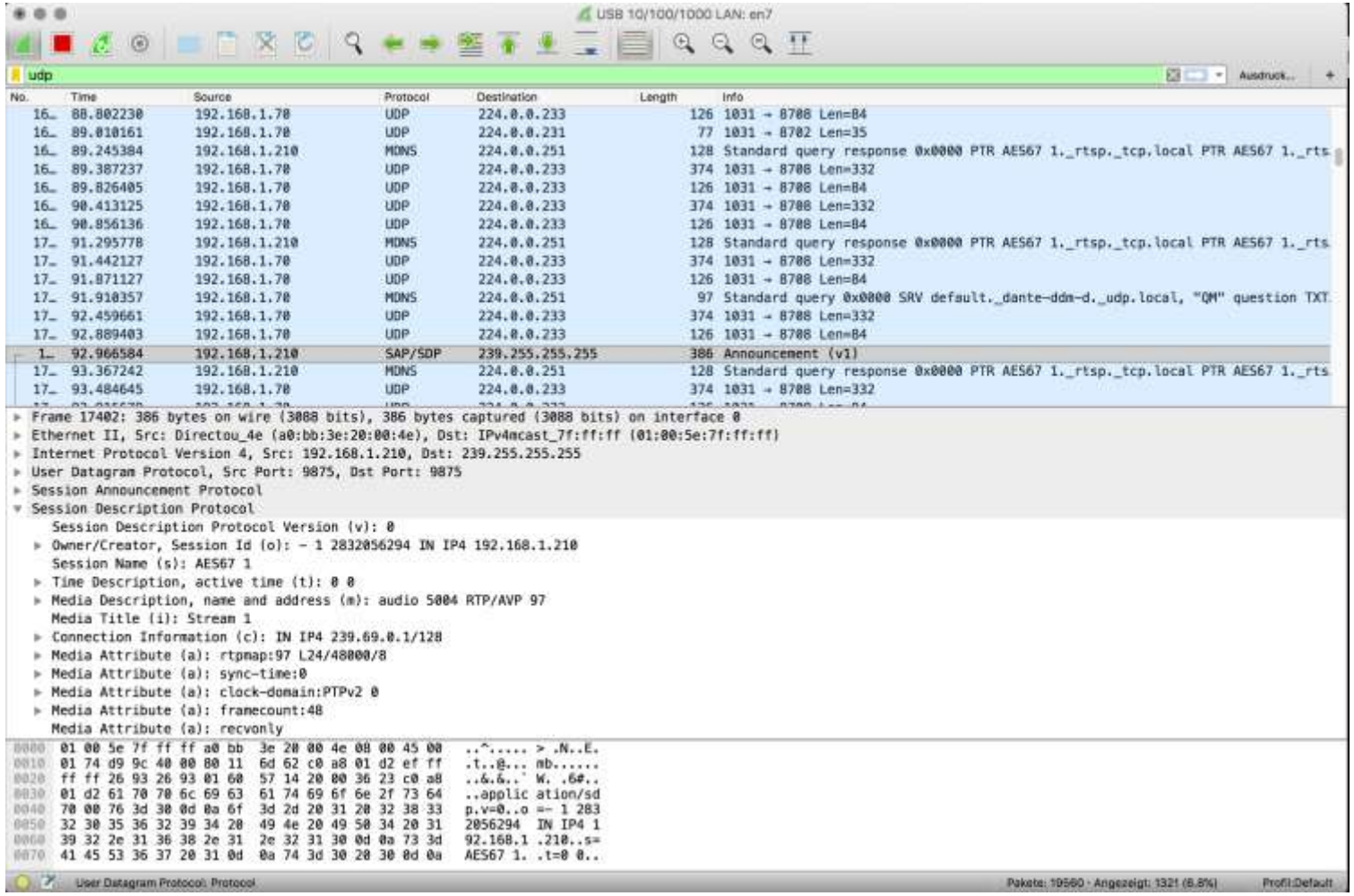

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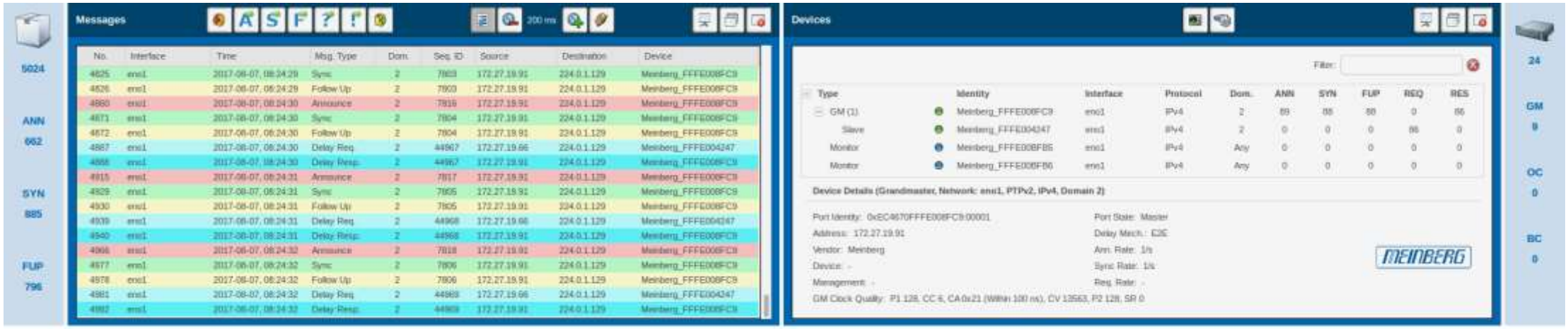
PTP Troubleshooting



www.ptptrackhound.com

AES67 and Dante

- Multicast only (no Unicast)
- Restricted Multicast IP-Range: 239.p.x.x
  Default Prefix: 239.**69**.x.x
- Encoding: L24 (24 Bit)
- Packet time: 1ms TX / 1ms, 125µs, 250µs, 333µs RX
- Non-Standard DSCP Markings
- Dante Redundancy mode not available

Implementation dependent peculiarities and pitfalls

- SDP Distribution
- Multicast Prefix
- Dynamic Payload IDs
- DSCP Markings for QoS

Standard
Clock: EF
Media: AF41

Dante AES67
Clock: CS7
Media: EF

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JT-NM Tested

- Program initiated by JT-NM, EBU and IRT
- To give documented insight into how vendor equipment aligns to ST2110
- Check out the JT-NM Tested Program on www.jt-nm.org and on the Show Floor

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Thank You

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