RAVENNA 2020 Webinar Series

(The "Remote" Sessions)

RAVENNA takes it to the Cloud –

Intercontinental Remote Production Demo utilizing RAVENNA & AWS

Tue, Dec 15, 2020 - 15:00 h (CET)

Bill Rounopoulos & Angelo Santos, Ross Video

Nicolas Sturmel, Merging & Claudio Becker-Foss, DirectOut

Your Host

Andreas Hildebrand, RAVENNA Technology Evangelist

- more than 25 years in the professional audio / broadcasting industry
- graduate diploma in computer science
- R&D, project & product management experience
- member of AES67 TG and ST2110 DG

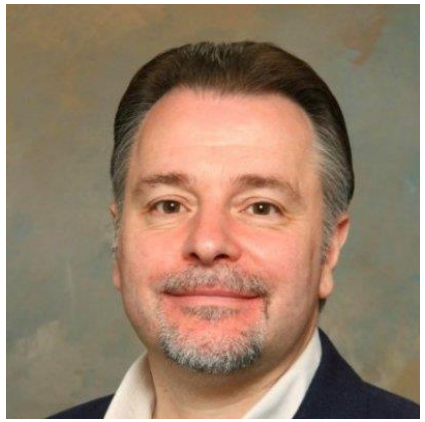
ALC NetworX GmbH, Munich / Germany

- established 2008
- R&D center
- developing & promoting RAVENNA
- Partnerships with > 40 manufacturers

RAVENNA

- IP media networking technology
- designed to meet requirements of professional audio / broadcasting applications
- open technology approach, license-free
- fully AES67-compliant (*built-in*)

Today's Presenters



Bill Rounopoulos

Business Development Manager,
OEM & Partnerships

Ross Video, Canada

brounopoulos@rossvideo.com

Angelo Santos

Solutions Architect,
IP Solutions and Signal Processing Gear

Ross Video, Canada

asantos@rossvideo.com

Today's Guests

Nicolas Sturmel

Media Network and Interoperability Expert

Merging Technologies, Switzerland

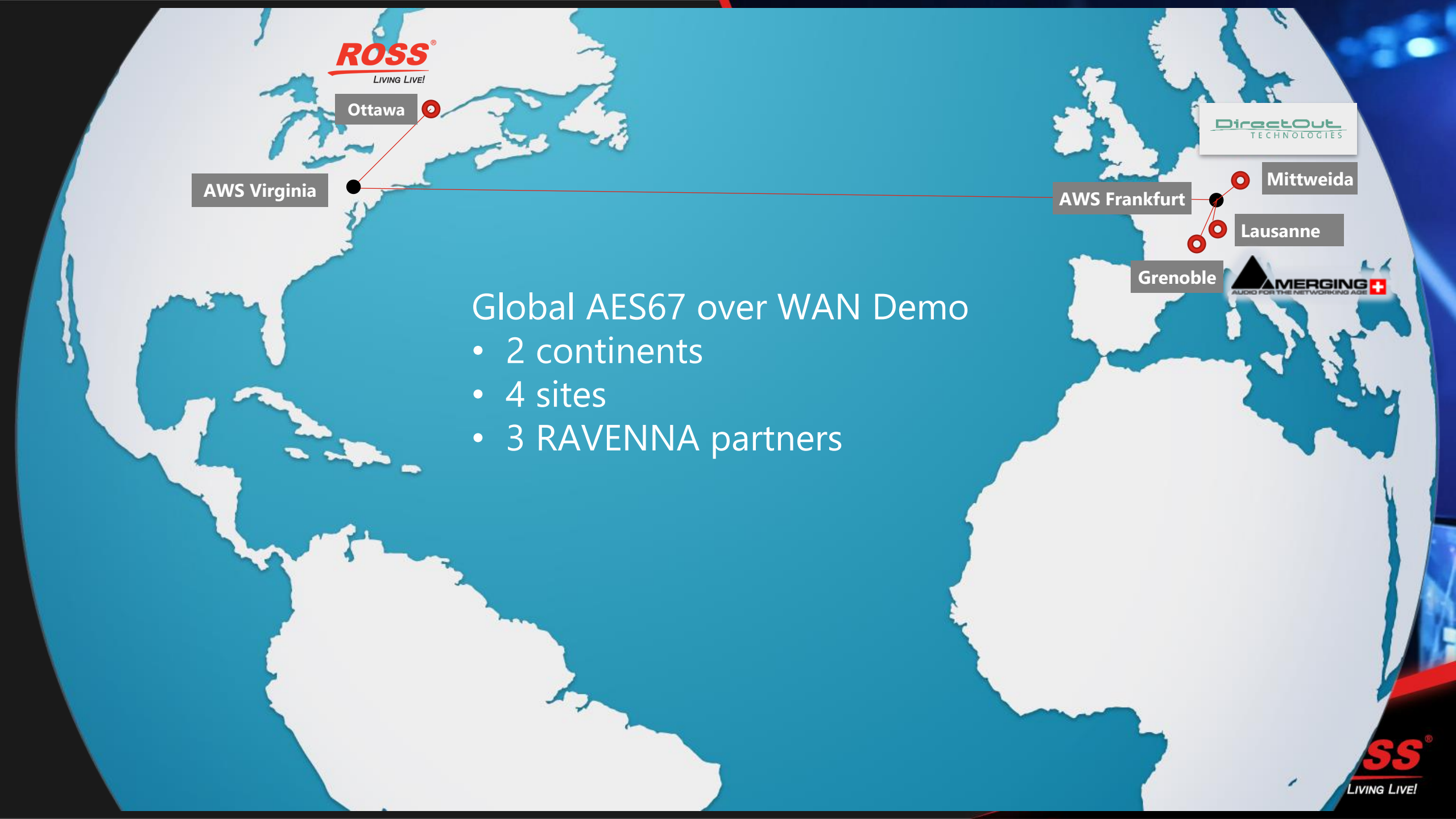
nsturmel@merging.com

Claudio Becker-Foss

CEO/CTO

DirectOut, Germany

claudio.becker-foss@directout.eu


ROSS
LIVING LIVE!
Ottawa
AWS Virginia
AWS Frankfurt
DirectOut
TECHNOLOGIES
Mittweida
Lausanne
Grenoble
MERGING
AUDIO FOR THE NETWORKING AGE
Global AES67 over WAN Demo
• 2 continents
• 4 sites
• 3 RAVENNA partners
LIVING LIVE!

PURPOSE

We embarked on this proof-of-concept demo to answer the following questions:

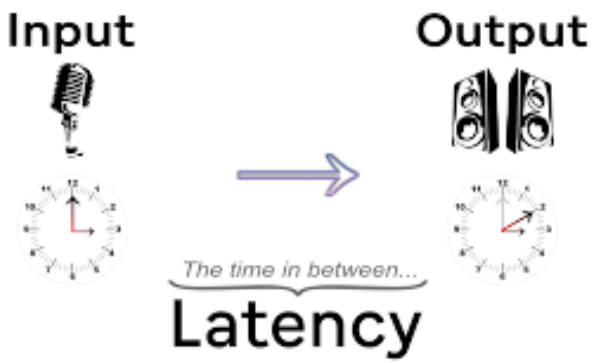
- Can RAVENNA / AES67 traffic be sent over the public infrastructure?
- Across long distances?
- And maintain interoperability between companies?
- How?
- What challenges need to be overcome?

SOME BACKGROUND ON RAVENNA & AES67

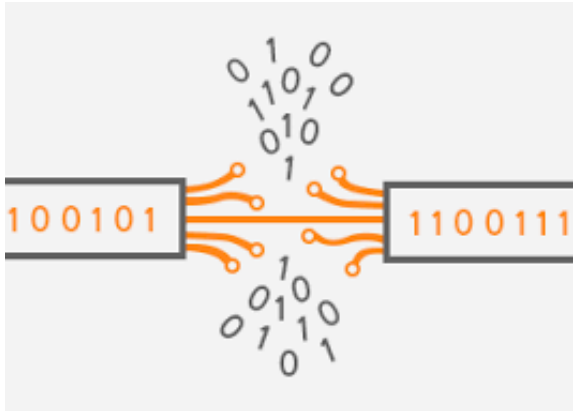
- Designed for local area networks synchronized to PTP that don’t drop packets
- Now used over long distances in WAN applications across private dedicated infrastructures usually between sites connected by fiber (even though it was not contemplated by the standard)
- Public or “best-effort" networks tend to be congested and suffer from packet loss and increased latency due to re-transmissions

PUBLIC INFRASTRUCTURE CHALLENGES

Latency and Packet Jitter



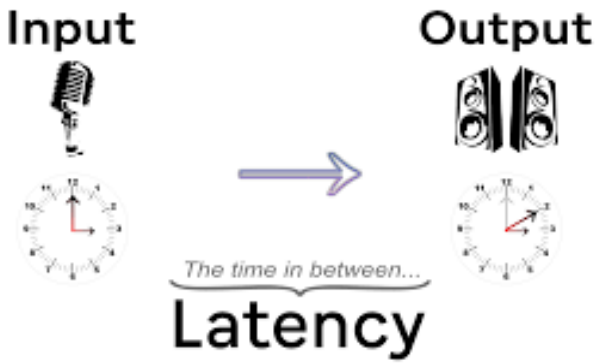
Packet Loss



Timing and Synchronization

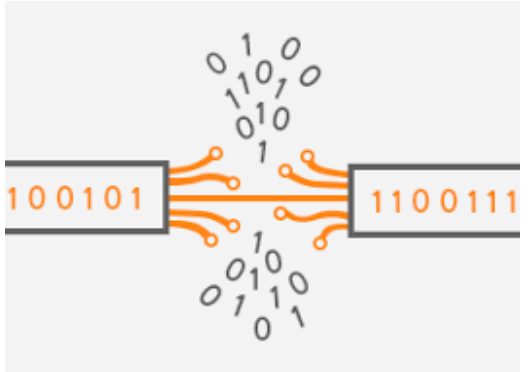
CHALLENGE: LATENCY AND PACKET JITTER

- RAVENNA receivers are designed to handle increased packet jitter & latency
- Large buffers along with other techniques can compensate for added delay
- RAVENNA specifies receiver buffers must handle a minimum delay of 20 msec; AES67 only requires 3 msec, but also recommends 20 msec
- Most well-designed RAVENNA solutions have even bigger buffers
- The AES Standard Committee working group SC-02-12-M is focused on AES67 over WAN; a key recommendation is to increase the buffer size within devices
- Solutions can also be manually tuned to the network delay



Increased latency of the public network can be handled by RAVENN

CHALLENGE: PACKET LOSS



Leverage transport protocols designed for reliable transmission of media over lossy networks with low latency and high quality

- Secure Reliable Transport (SRT)
  - Open source protocol developed by Haivision and backed by the SRT Alliance
- Zixi
  - Widely used proprietary solution developed by company of the same name
- Reliable Internet Stream Transport (RIST)
  - An open source, open specification protocol intended to be more reliable than SRT and an alternative to proprietary solutions like Zixi, VideoFlow, Qvidium etc.

We are using SRT for the proof-of-concept demo but any of these will work

CHALLENGE: TIMING AND SYNCHRONIZATION

- At each location, a PTP GM running SMPTE 2059 profile is synchronized to GPS
- The equipment at each site is locked to PTP locally
- PTP packets are not sent across the WAN as this is not currently practical (packet jitter is too high)
- AWS Time Sync Service is used and is delivered over Chrony locked to GPS

Since the PTP GM at each location and AWS Chrony are GPS-locked, synchronization is maintained across the WAN

HIGH IMPACT EFFICIENCY

Easily scales in cost effective manner on off-the-shelf hardware

Uses DashBoard, making it simple to deploy and control applications

CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

softGear

NORTH AMERICA- SOFTGEAR PLATFORM

- S/W-based signal processing
- Modern OS-level virtualization architecture
- On-prem, private cloud, future public cloud use
- Ross and 3rd party microservices
- Quickly scales in cost effective manner
- Easy migration and redundancy
- Ultimate flexibility

nielsen DOLBY orban DashBoard

ROSS Living Live!

HIGH IMPACT EFFICIENCY

Flexible AES audio-over-IP conversion wherever you want it
Cost effectively and effortlessly satisfy your AES audio IP conversion needs

CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

COMPACT AES67/ 2110 TO AES3 AUDIO BRIDGE

AES 16.16 16 AES3 channels in/ out

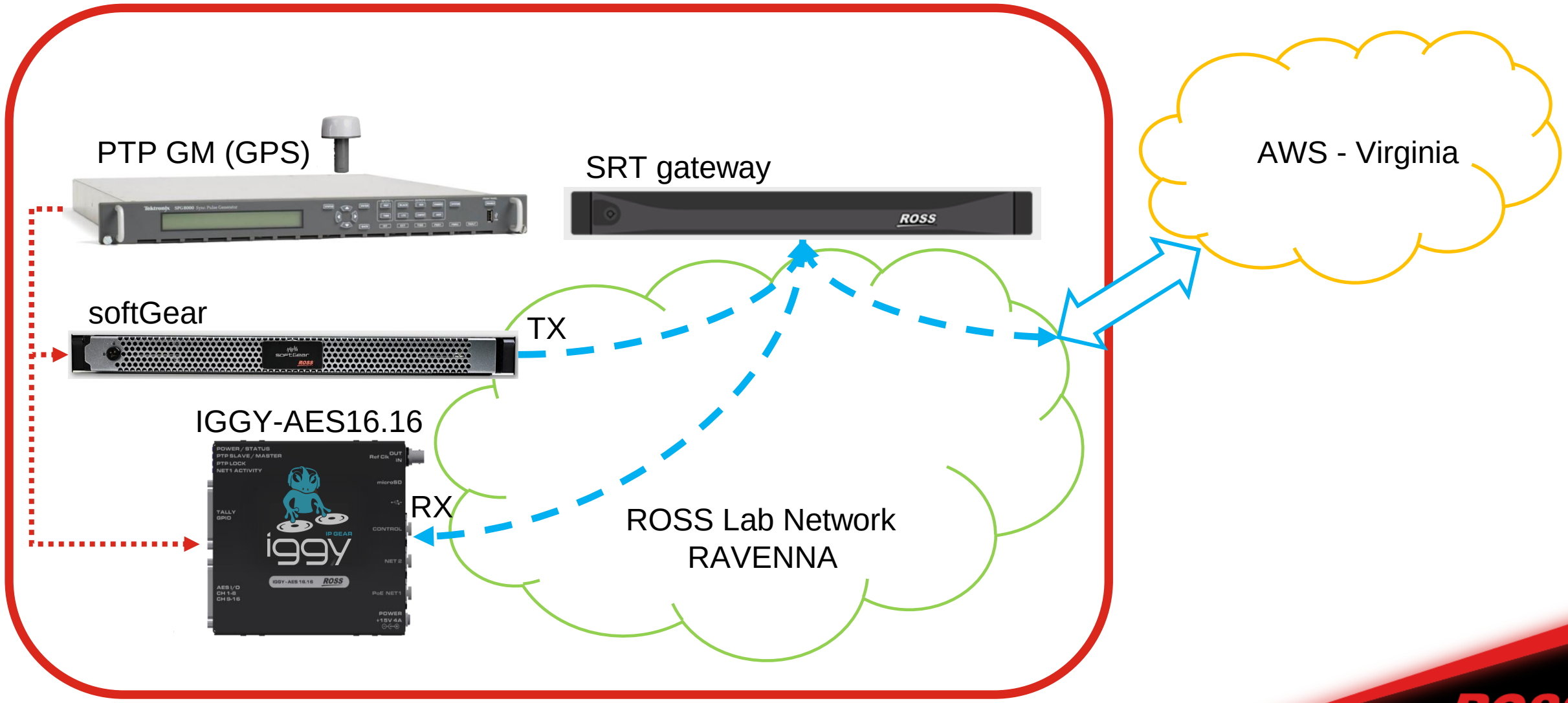
- IP Bridge that adapts to any environment
- Unparalleled channel density
- Broad interoperability
- Robust, w/ redundancy in its DNA

EMBER+ RAVENNA AES67 built-in Now with ST2110! networked media NMOS open specifications TSL

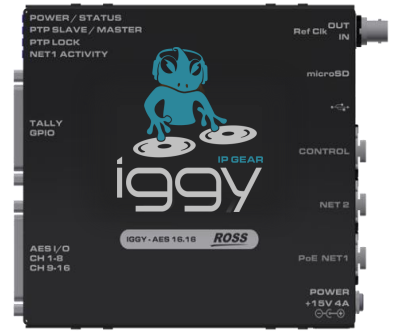
ANEMAN Audio Network Manager DashBoard

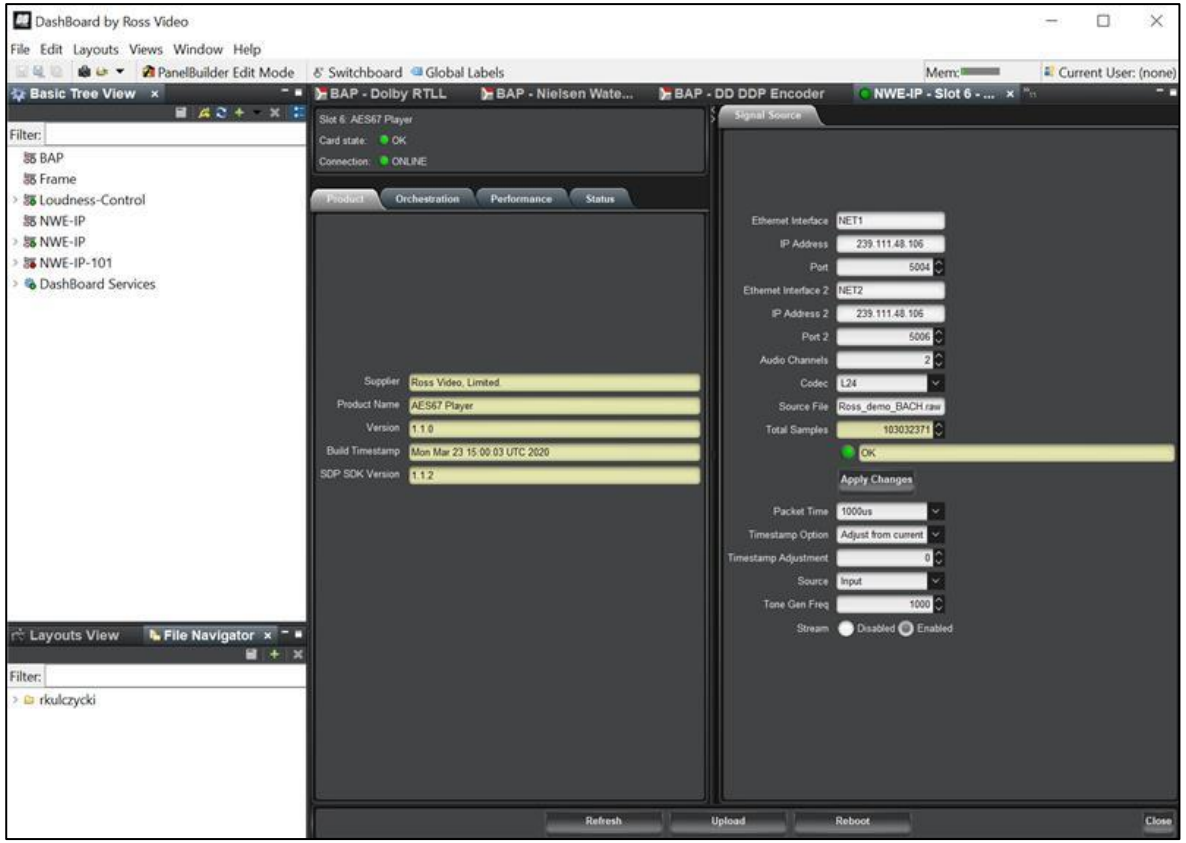
ROSS LIVING LIVE!

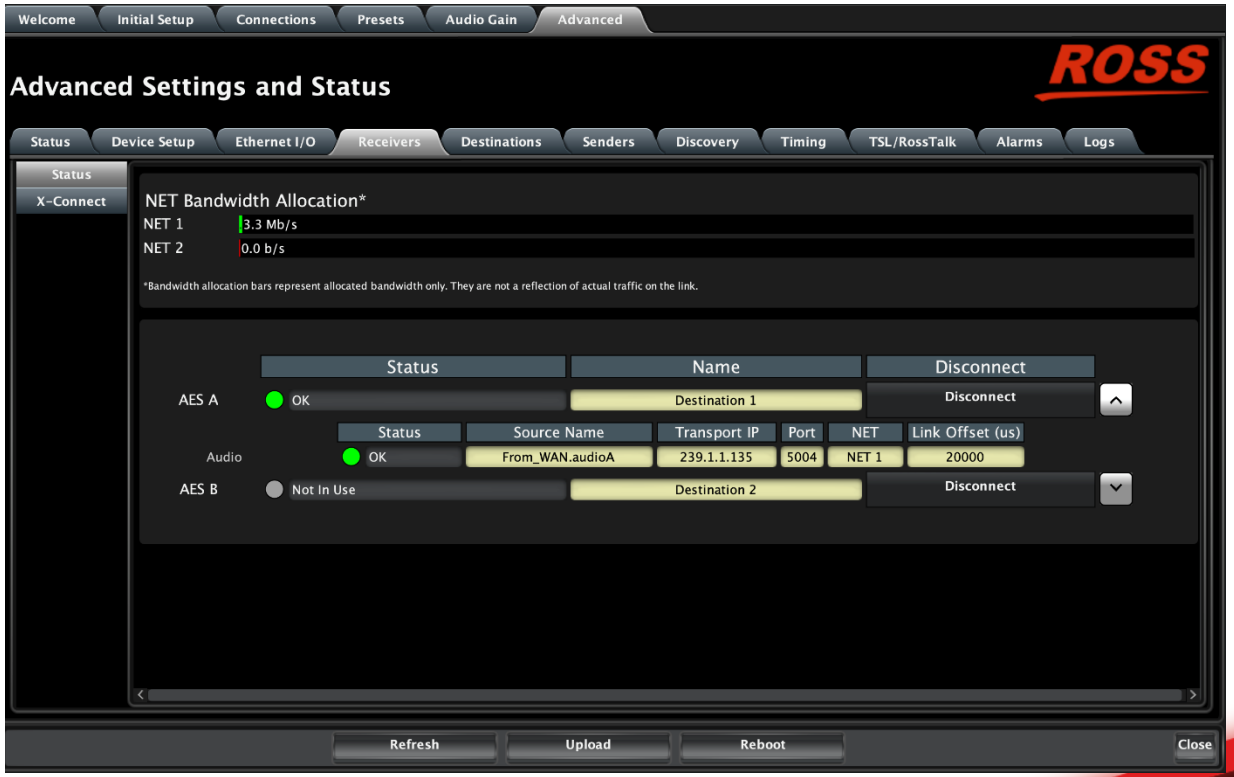
ROSS SETUP



ROSS SETUP

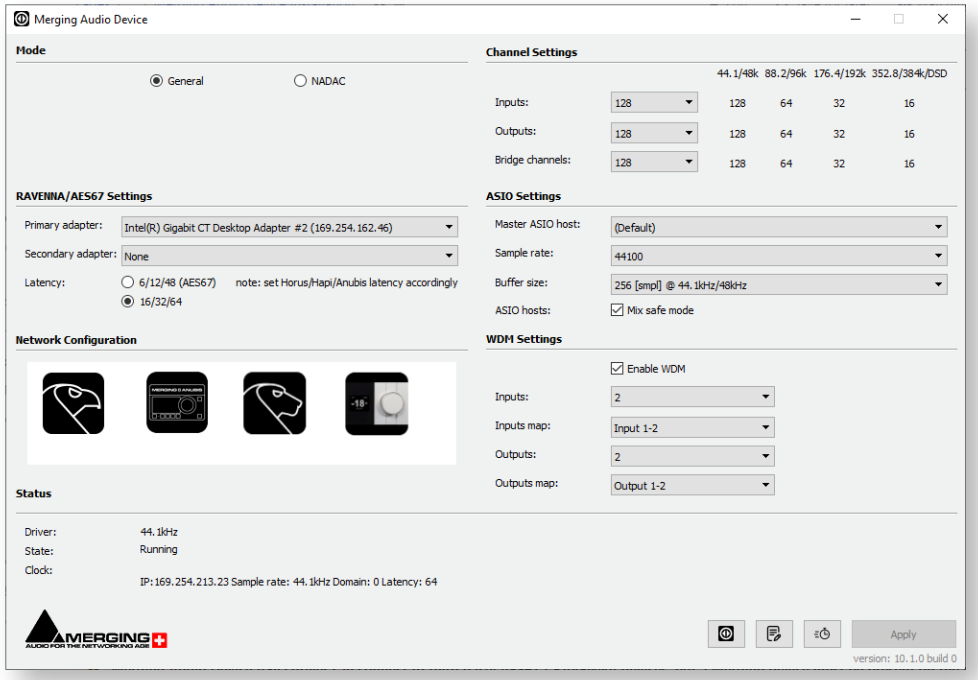






ROSS® LIVING LIVE!

MERGING AUDIO DEVICE



ASIO RAVENNA/AES67 driver, VM ready, with NMOS, ST2110-30 and ST2022-7 support.

networked media
NMOS
open specifications

CELEBRATING 10 YEARS
RAVENNA
AES67 & ST 2110 built-in

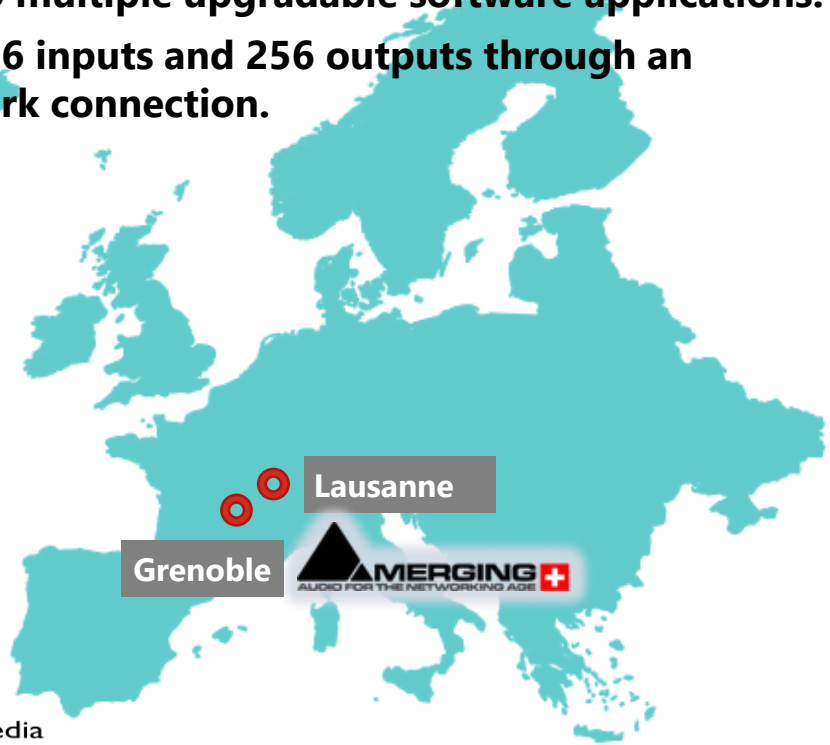
MERGING
AUDIO FOR THE NETWORKING AGE

MERGING ANUBIS

Compact AD/DA interface with 4 analog inputs (2 MicPre/Line and 2 Instrument/Line), 4 analog outputs, 2 independent headphones, GPIO and MIDI.

Internal low latency mixing engine operated through a large touch monitor giving access to multiple upgradable software applications.

I/O expandable up to 256 inputs and 256 outputs through an AES67/RAVENNA network connection.



OSC

ANEMAN Audio Network Manager

RAVENNA AES67 built-in Now with ST2110!

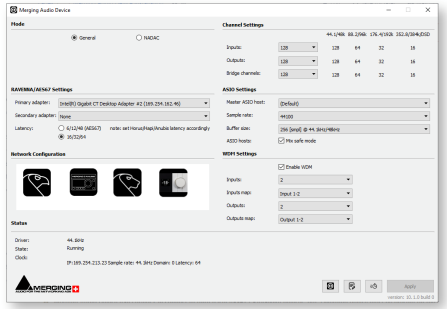
networked media NMOS open specifications

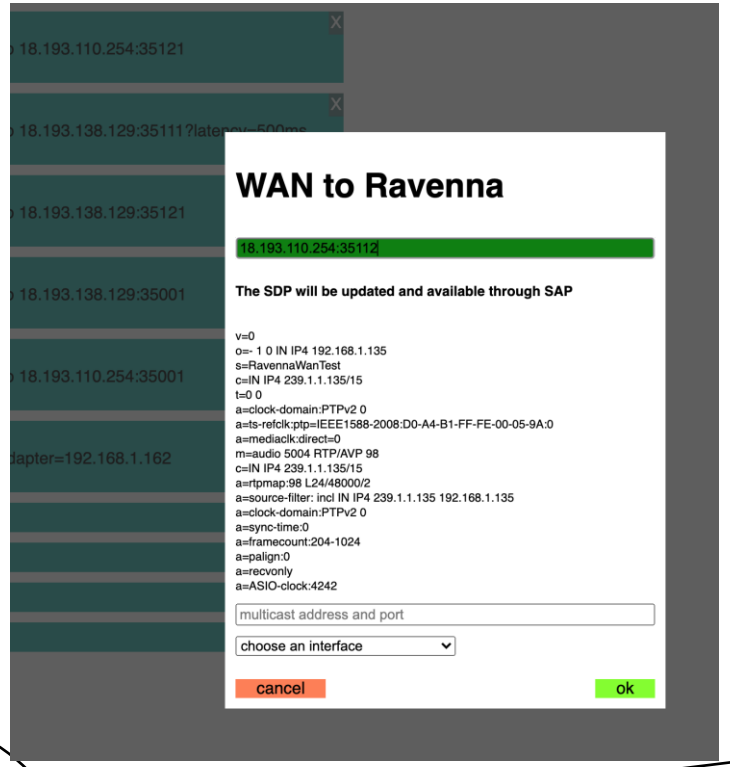
CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

MERGING AUDIO FOR THE NETWORKING AGE

MERGING SETUP

RAVENNA LOCAL AERA NETWORK





Gateway

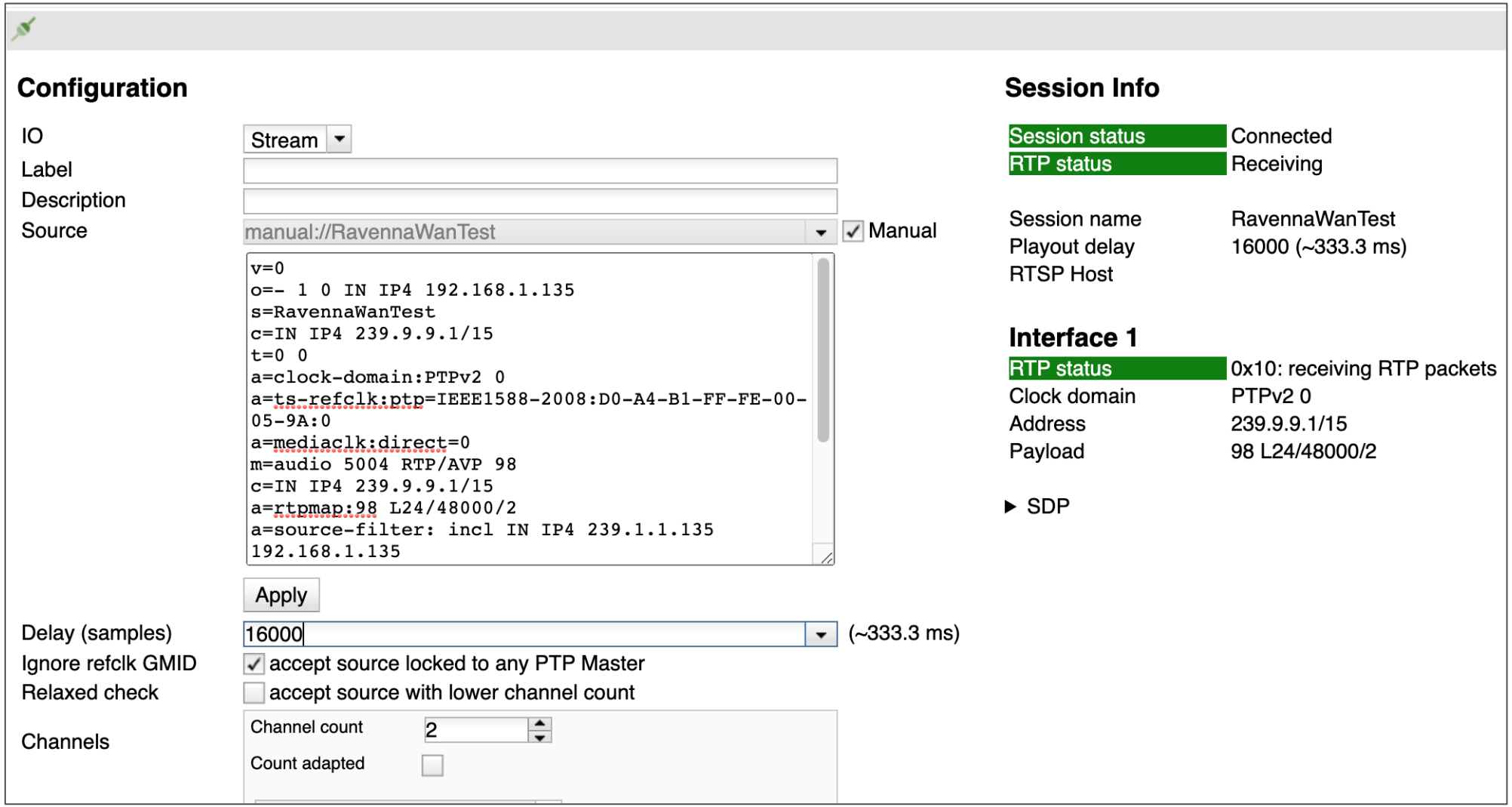
AWS Relay Server

Relay server and gateway can do SDP transport and translation

CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

MERGING AUDIO FOR THE NETWORKING AGE

MERGING SETUP



CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

MERGING AUDIO FOR THE NETWORKING AGE

DIRECTOUT EQUIPMENT

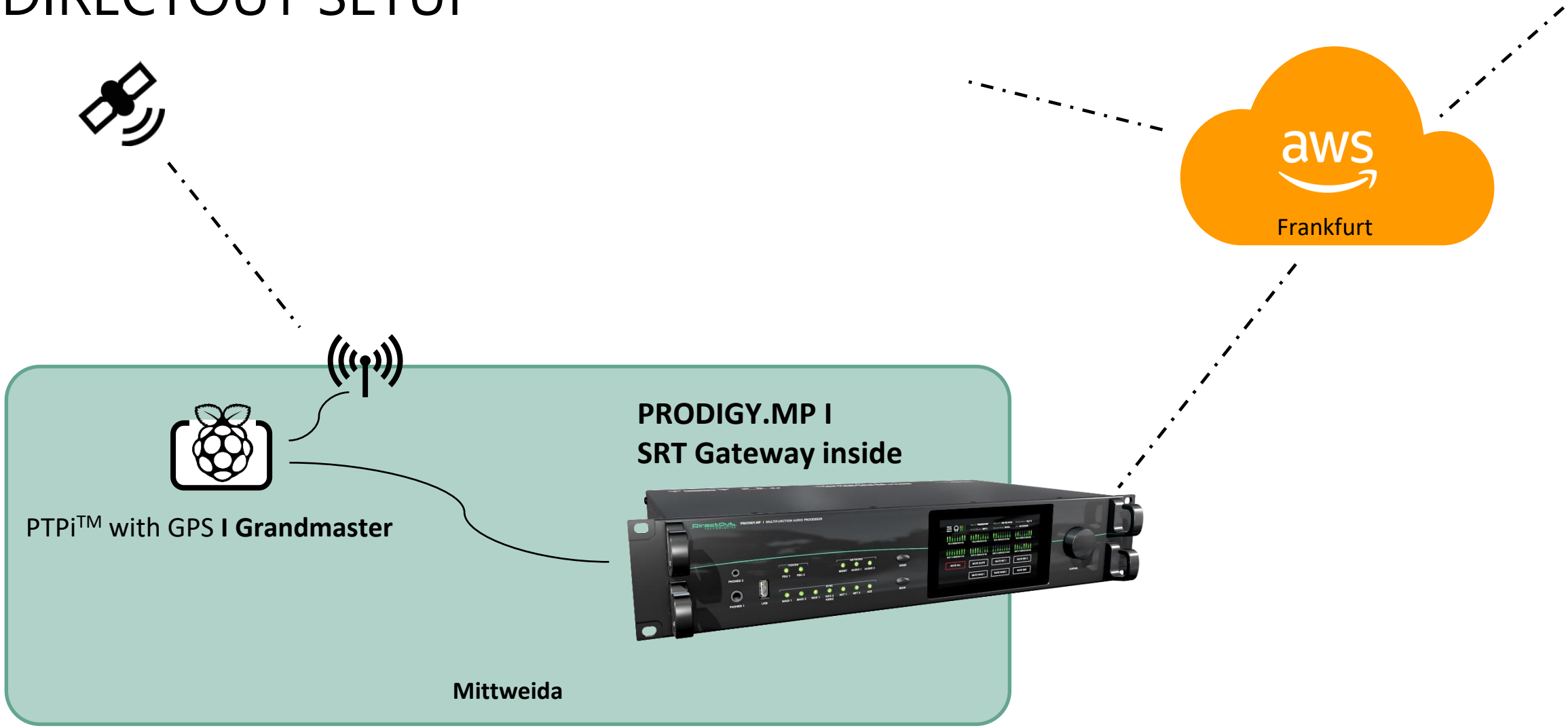
PRODIGY.MP + RAV.IO

OSC · ANEMAN Audio Network Manager · NMOS · hi HUMAN INTERFACE · EMBER+ · RAVENNA AES67 & ST 2110 built-in

CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

DirectOut TECHNOLOGIES

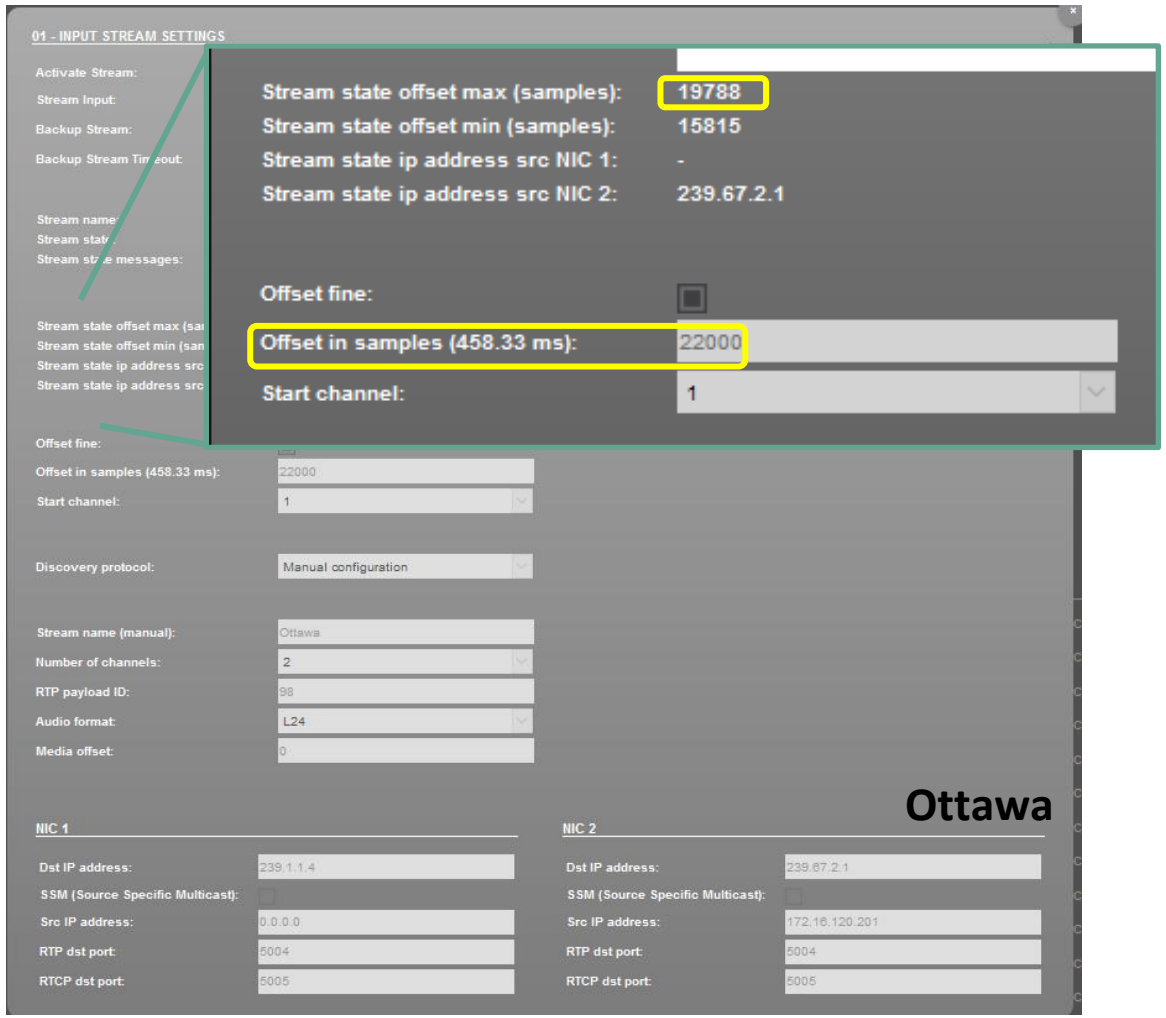
DIRECTOUT SETUP

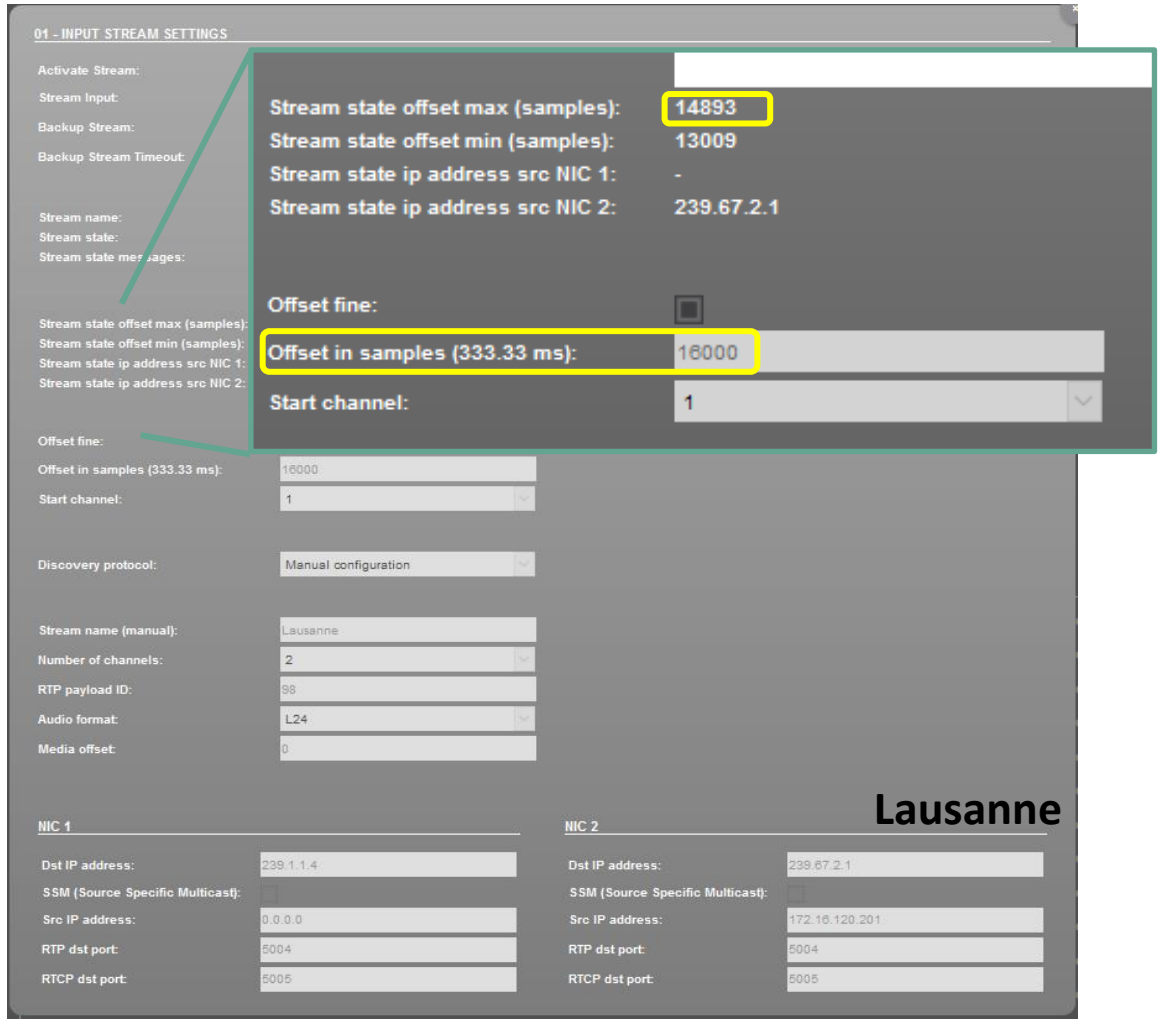


CELEBRATING 10 YEARS
RAVENNA
AES67 & ST 2110 built-in

DirectOut TECHNOLOGIES

DIRECTOUT SETUP

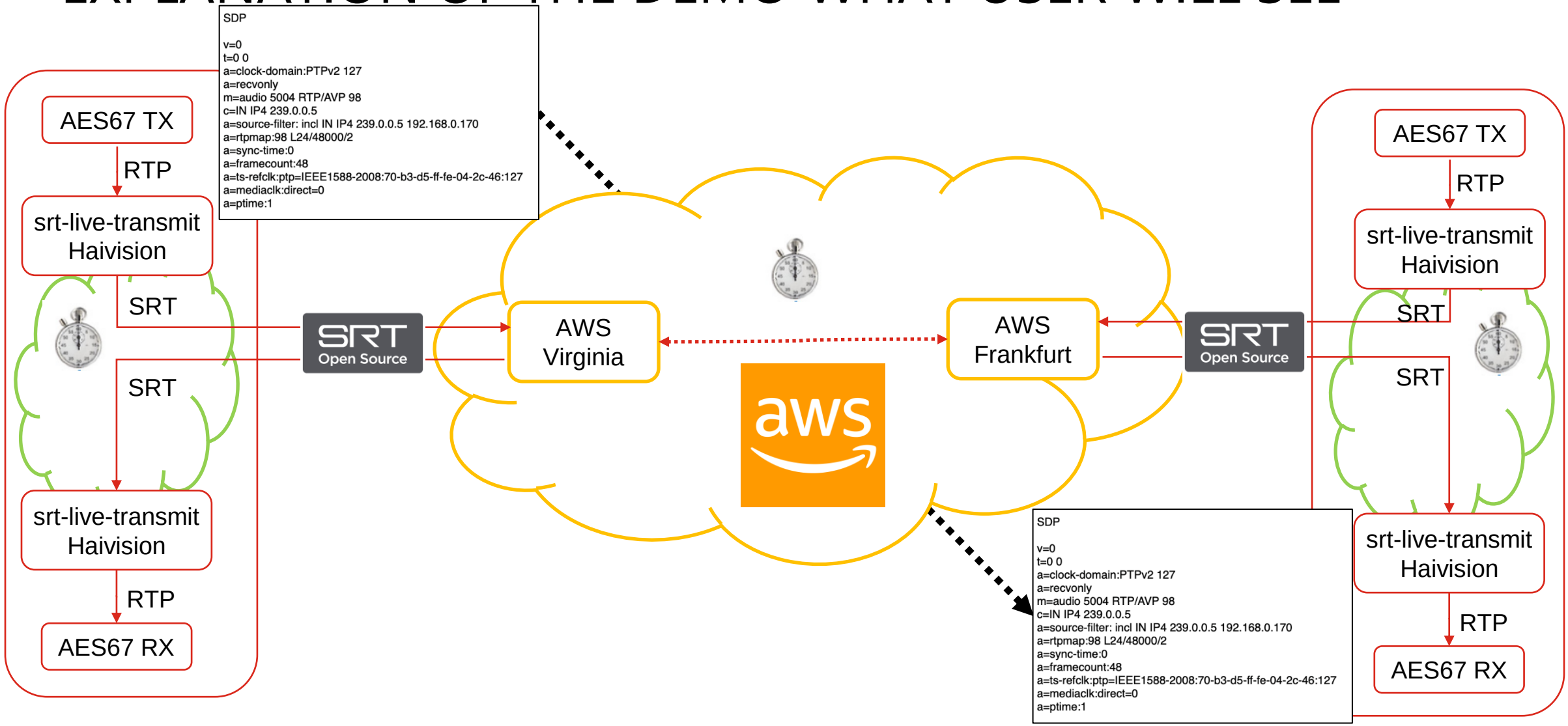




CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

DirectOut TECHNOLOGIES

EXPLANATION OF THE DEMO WHAT USER WILL SEE



CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

MERGING AUDIO FOR THE NETWORKING AGE

DirectOut TECHNOLOGIES

ROSS LIVING LIVE!

DEMO WEBPAGE

- A special version of *srt-live-transmit* is used for sending the RAVENNA payload to the local loop (on top of the regular behavior)
- Uses https://github.com/nicolassturmel/aes67-web-monitor to analyze the RAVENNA packets and stream the audio
- The audio is streamed with 1 s buffer at 16bit / 48khz, just to save bandwidth ;-)
- The rest is html and css…
- Live web site at: https://www.ravenna-network.com/using-ravenna/remote-production/

CELEBRATING 10 YEARS RAVENNA AES67 & ST 2110 built-in

MERGING AUDIO FOR THE NETWORKING AGE

DirectOut TECHNOLOGIES

ROSS LIVING LIVE!

LESSONS LEARNED

- “Local only” PTP synchronization locked to GPS works fine
- There is packet loss but this can managed via SRT
- Latency less than 1s
- Manual connections using SDP files
- Manual tuning of link-offset required
- Receivers need to have deep buffers or mechanisms to compensate for the network delay

FUTURE CONSIDERATIONS

- Transporting timing through the cloud
- RAVENNA Advertisements
- Automated handling of link-offset
- Other techniques, FEC & ST2022-7, to manage packet loss
- RIST open standard instead of SRT

More answers…

RAVENNA / AES67 / SMPTE ST 2110 Resources:

www. ravenna-network.com/using-ravenna/remote-production

www.ravenna-network.com/resources

Happy Holidays!

Contact information:

Andreas Hildebrand
ALC NetworX GmbH

ravenna@alcnetworx.de

CELEBRATING 10 YEARS
RAVENNA
AES67 & ST 2110 built-in

www.ravenna-network.com