HD Radio Update

Nautel Users Group

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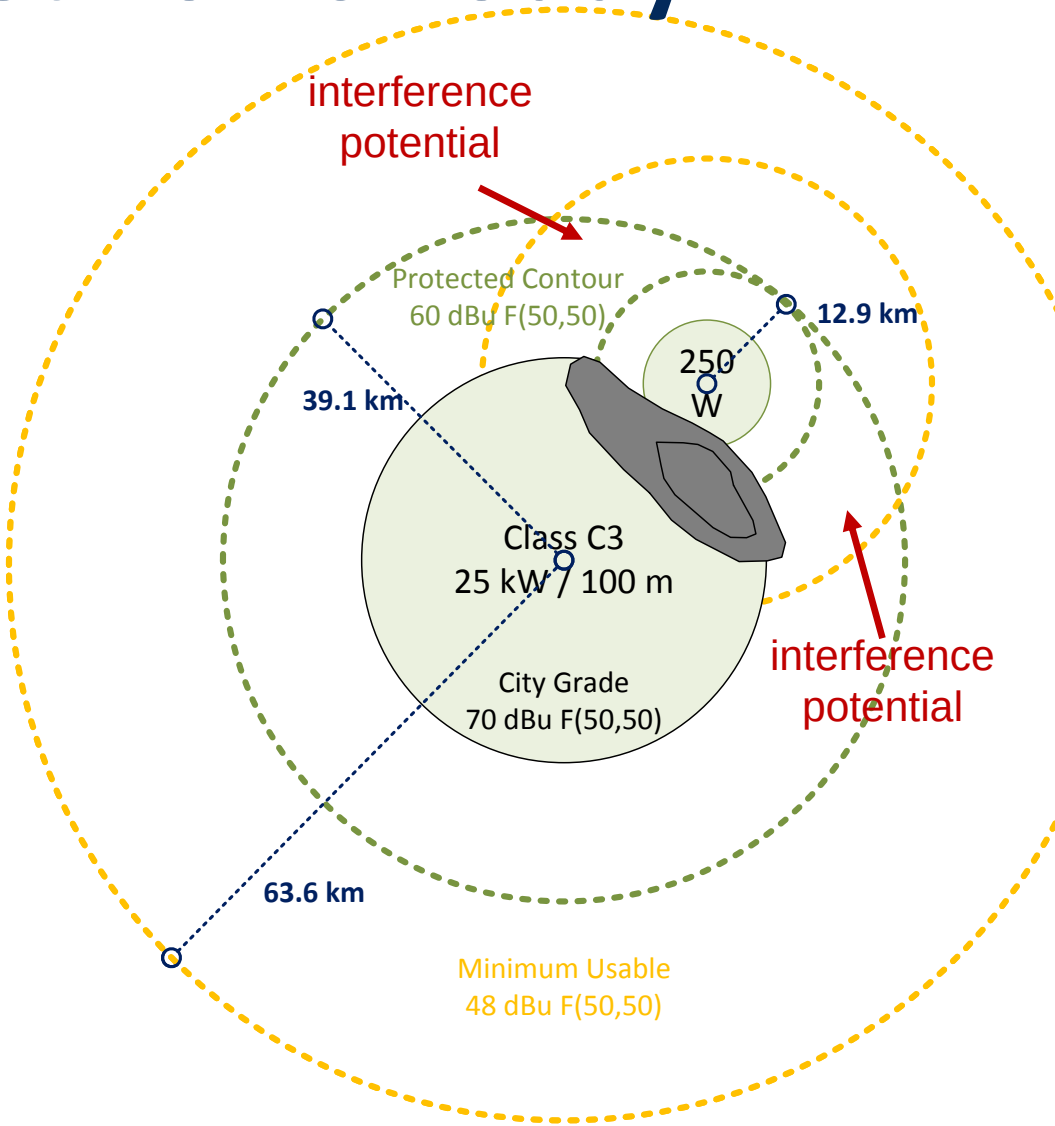
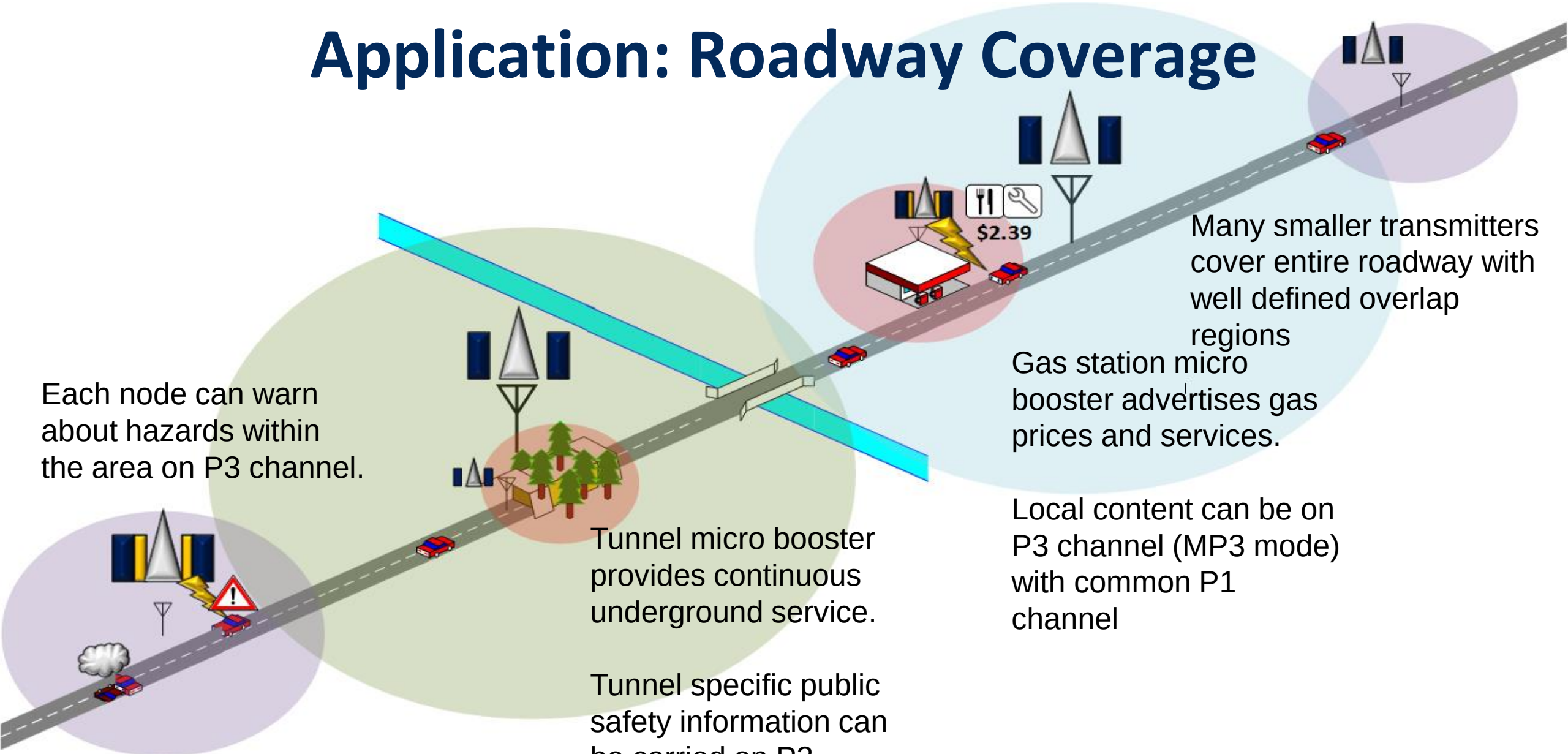
FM Single Frequency Networks Today

- SFNs are typically used today to address coverage shortage due to terrain obstruction.
- **FM Booster stations** are treated as **"fill-in" translator stations** on the **same** frequency as the main station.
- Booster protected contour must be contained within primary contour.
- Interference potential exists in overlap region.



Application: Roadway Coverage



Each node can warn about hazards within the area on P3 channel.

Tunnel micro booster provides continuous underground service.

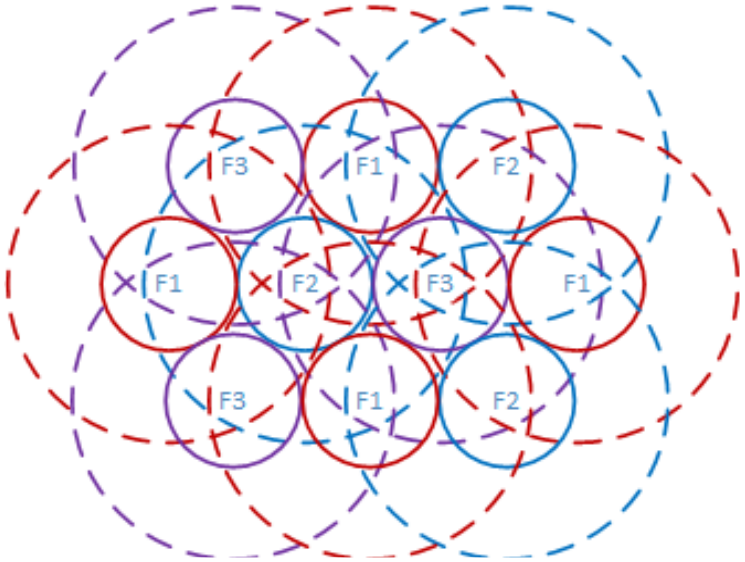
Tunnel specific public safety information can be carried on P3 partitions

Many smaller transmitters cover entire roadway with well defined overlap regions

Gas station micro booster advertises gas prices and services.

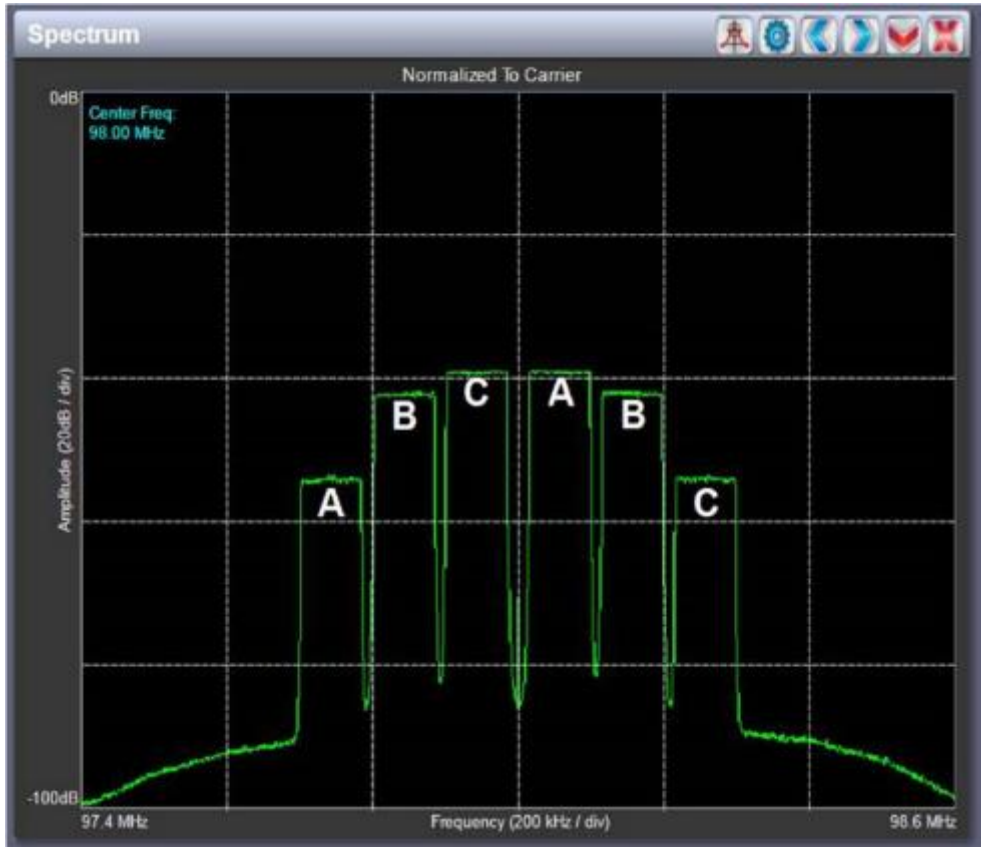
Local content can be on P3 channel (MP3 mode) with common P1 channel

Application: Wide Area Coverage



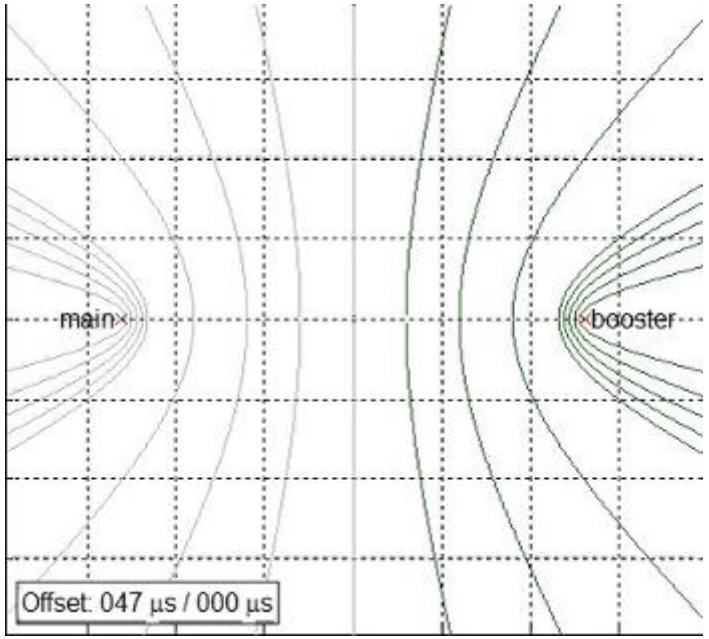
- Public broadcasters with a mandate for national, state–wide, or wide area coverage
  - Often mandated to cover almost the entire population
- Near SFN Translator network requires at least 3 channel allocations – more in difficult terrain
- Also consider adjacent channels
- SFN is spectrum efficient

Application: All Digital IBOC SFN



- Hybrid HD radio will remain limited by the FM carrier
- All Digital IBOC is ideally suited for SFN operation
- HD Multiplex combines multiple IBOC signals without the FM carrier
  - 380 kbps, 9-15 audio services
- HD Multiplex SFNs provide an **in-band DAB alternative** but using standard HD Radio receivers
  - Stations A,B, or C are optional in SFN

Single Frequency Networks for HD Radio



Broadcast Engineering and Information Technology Conference

Sunday, April 23 at 4:00pm

Room N260

Presenter: Philipp Schmid

Live Demo: Hear seamless HD Radio “hand off” from one transmitter to the next at the Nautel booth N8324.

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New HD Radio Importer

Im

Exporter 2 Exgine Link (E2X)

4th Generation HD Radio System Architecture

Importer

- Windows based 2RU
- HD2,3,4 audio capture and encode
- Program Service Data
- Artist Experience (req. automation support)
- Station Logo (req. automation support)
- Data Services (req. automation support)

Exporter

- HD1 audio capture and encode
- HD1 Program Service Data
- Integrated GPS time base (heart beat)
- FM audio capture and diversity delay

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Introducing …

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HD MULTICAST+

HD Radio IMPORTER/EXPORTER

A Look Inside the Box

A Look Inside the Box

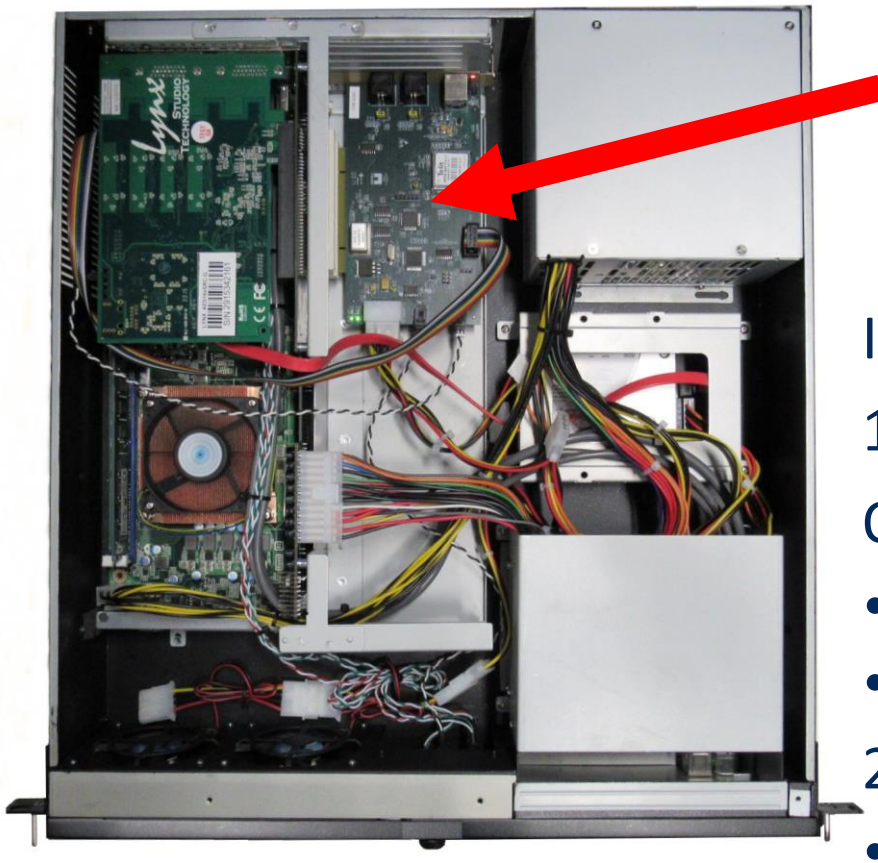
Comes with outdoor GPS antenna and feed line.

New monitor app:

GPS_Monitor

nautel **GPS MONITOR**

SATELLITES	8
HDOP	1.7
NAV VALID	YES
LATITUDE	44.5712
LONGITUDE	-63.9170
UTC	2017/5/01 14:15:16



Integrated GPS receiver

1 PPS is system heart beat

Ovenized 10 MHz Crystal

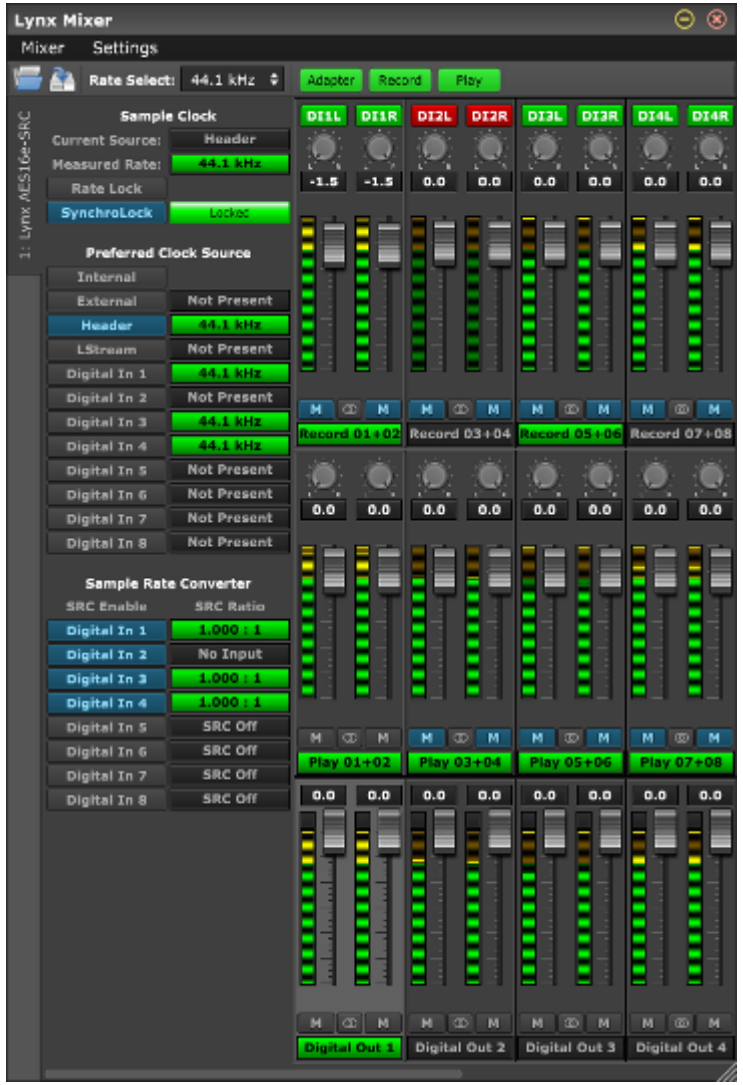
- 10 ppb temperature stability
- great holdover capability

2 External BNCs

- 10 MHz or 44.1 kHz word clock

Internal 44.1 kHz word clock

A Look Inside the Box



new GUI

Lynx AES16e PCIe card

8 audio capture and play

asynchronous sample rate converters (ASRCs)

Internal 44.1 kHz word clock from GPS card

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A Look Inside the Box

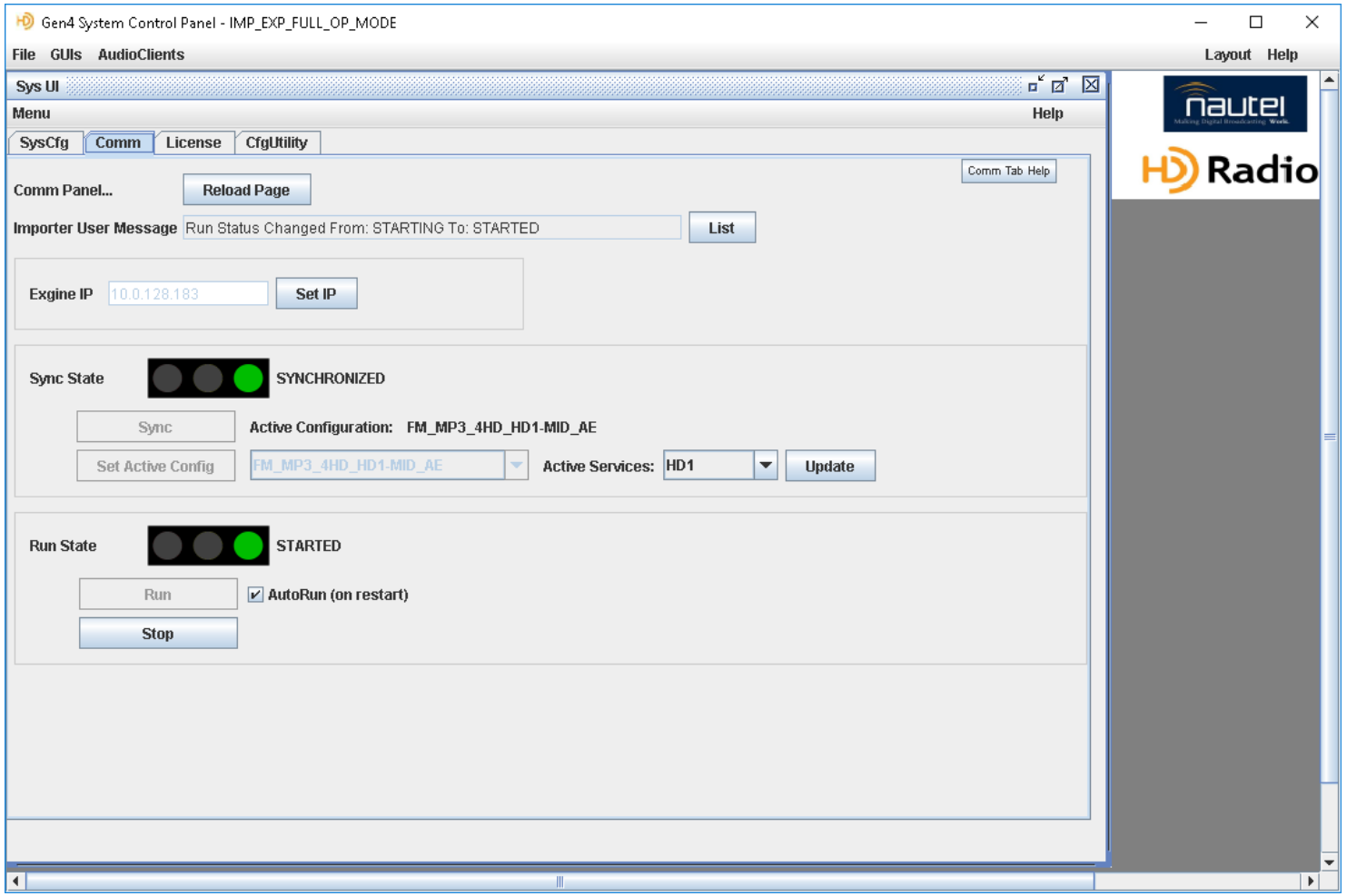
Intel Core i5-6500

6th Generation Intel Quad-Core i5 processor

Option:

Dual redundant hot swappable power supplies

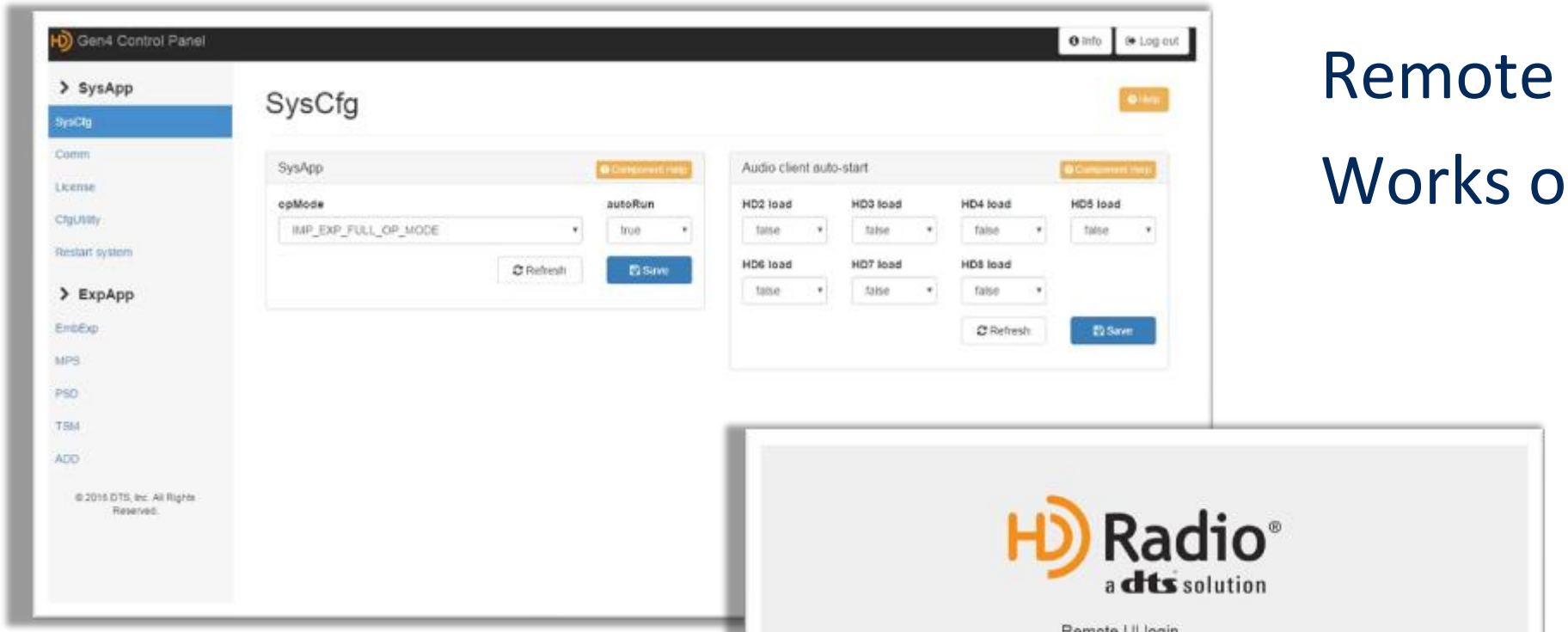
New Exporter/Importer Application



Fully functional desktop application

- exporter control for HD1
- service modes
  - hybrid MP1-MP3
  - all digital MP5-MP6
- bandwidth allocations
- audio capture clients
  - HD2,3,4
- SW Version 5.0.4

New Web Interface



Remote status and control

Works on mobile devices

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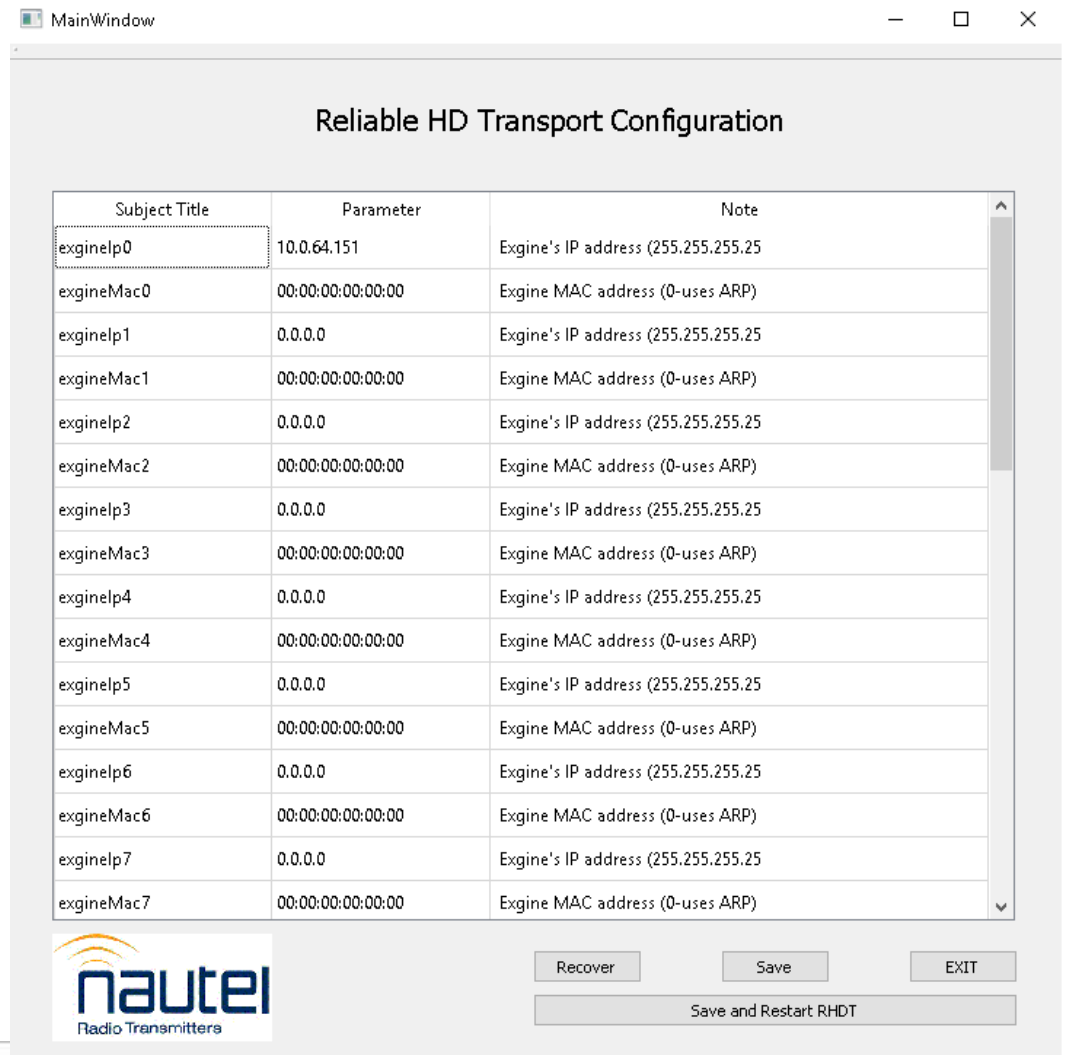
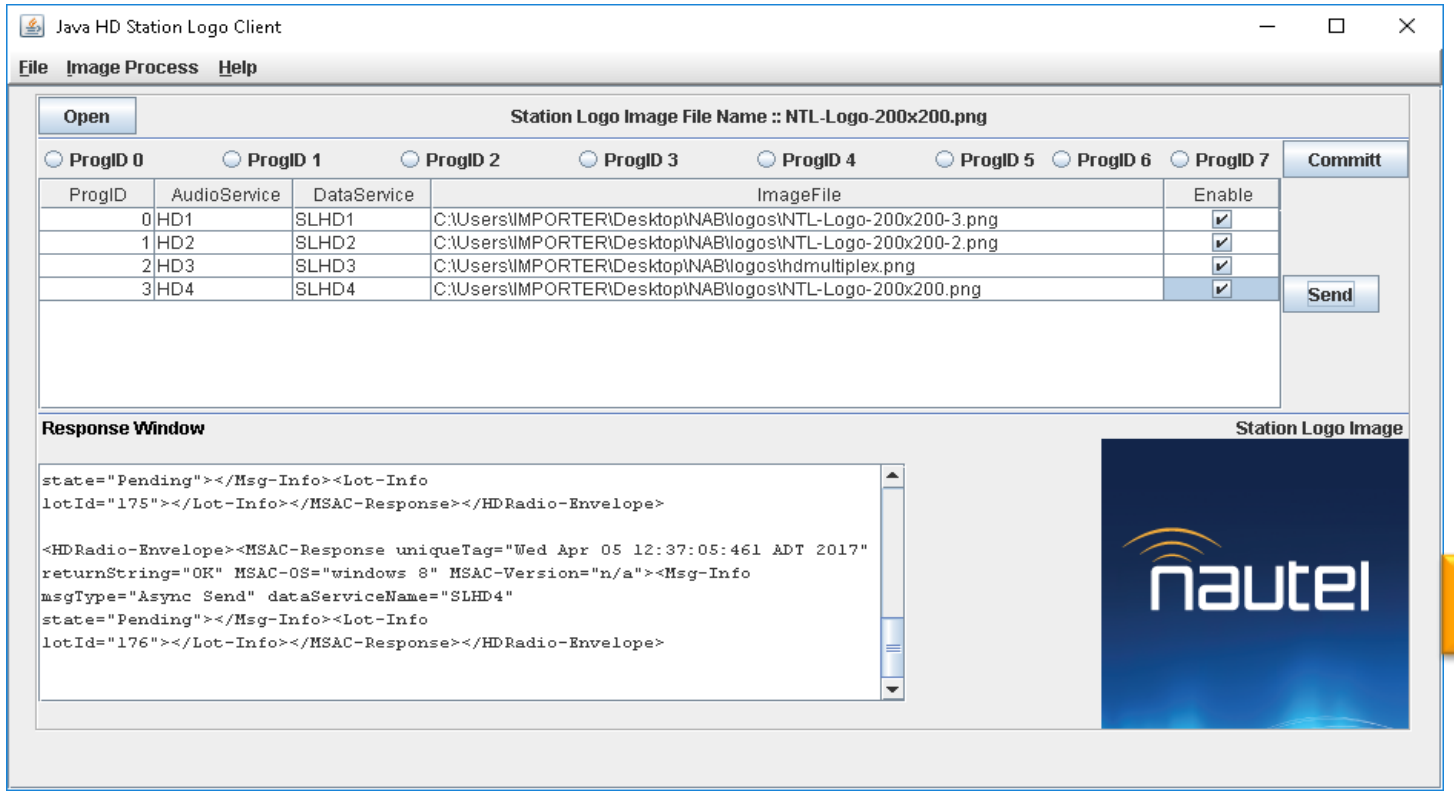
Nautel Reliable HD Transport



Nautel exclusive feature:

- Addresses packet loss in export to exgine (E2X) IP link.
- Improves exporter to exgine synchronization over remote IP links.
- Reduces link peak bandwidth requirements.
- Existing satellite link deployments

Integrated Station Logo (coming fall 2017)

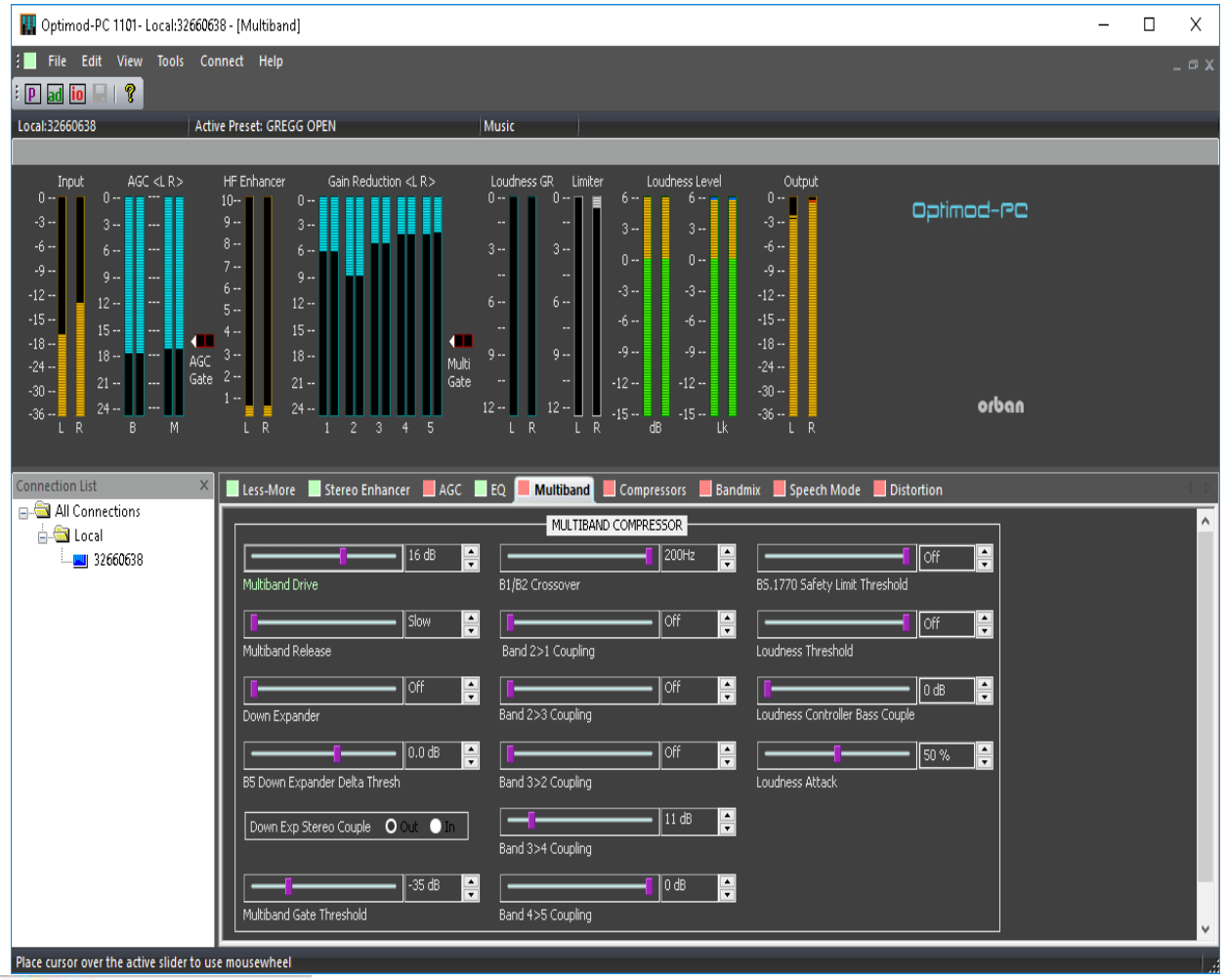


200x200 pixels

No automation support required for basic station logo

to receiver

Option: Optimod-PC 1101e for HD2,3,4

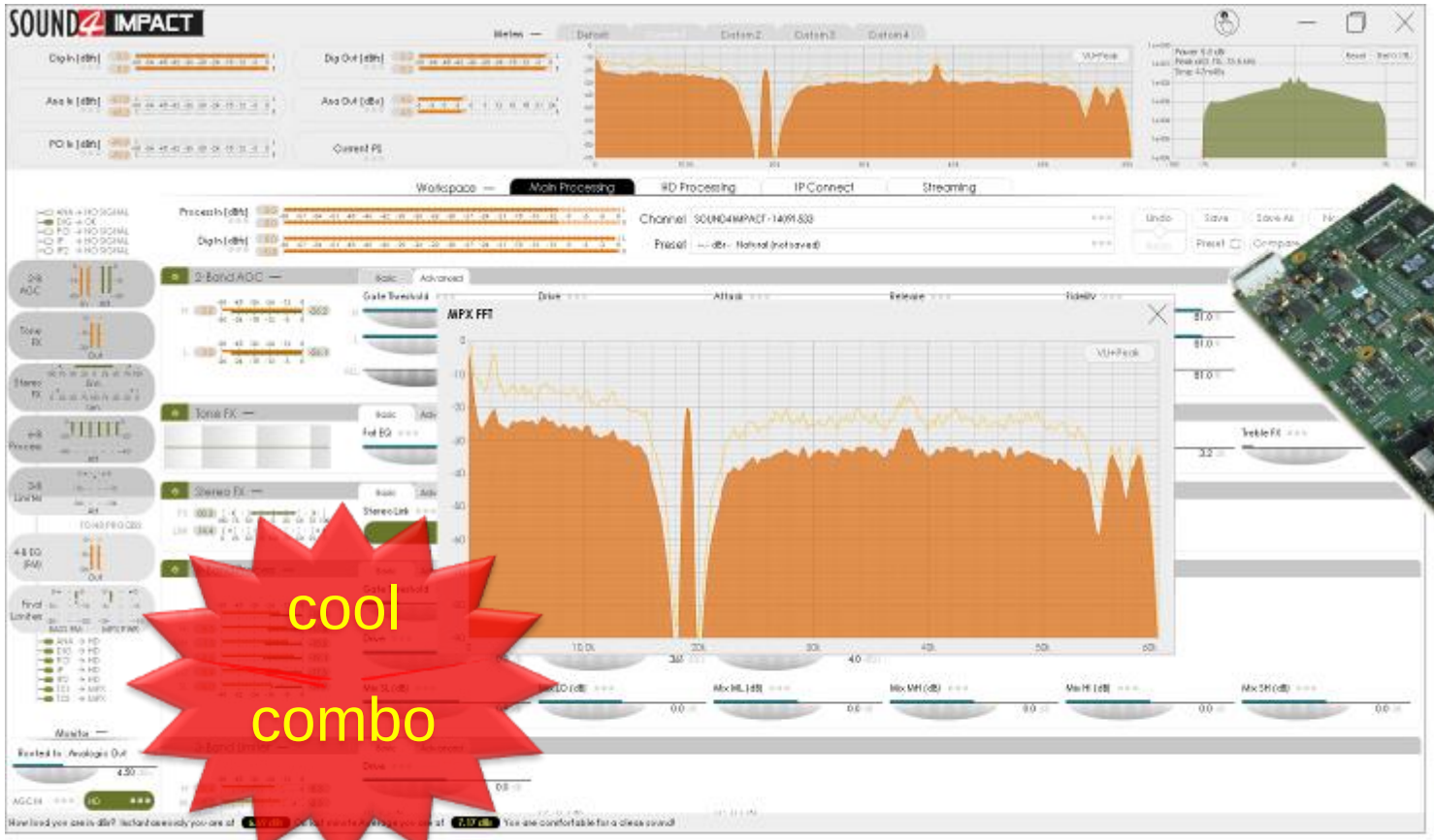


Option:

Supports up to 2 Orban Optimod-PC 1101e PCIe cards

1 processed audio plus
1 AES captured audio

Demo: Sound4 Impact FM+HD Audio Processor



- Single studio feed for FM+HD
- Ensures best HD blend experience
- Dual MPX output for transmitter
- Stable diversity delay shown

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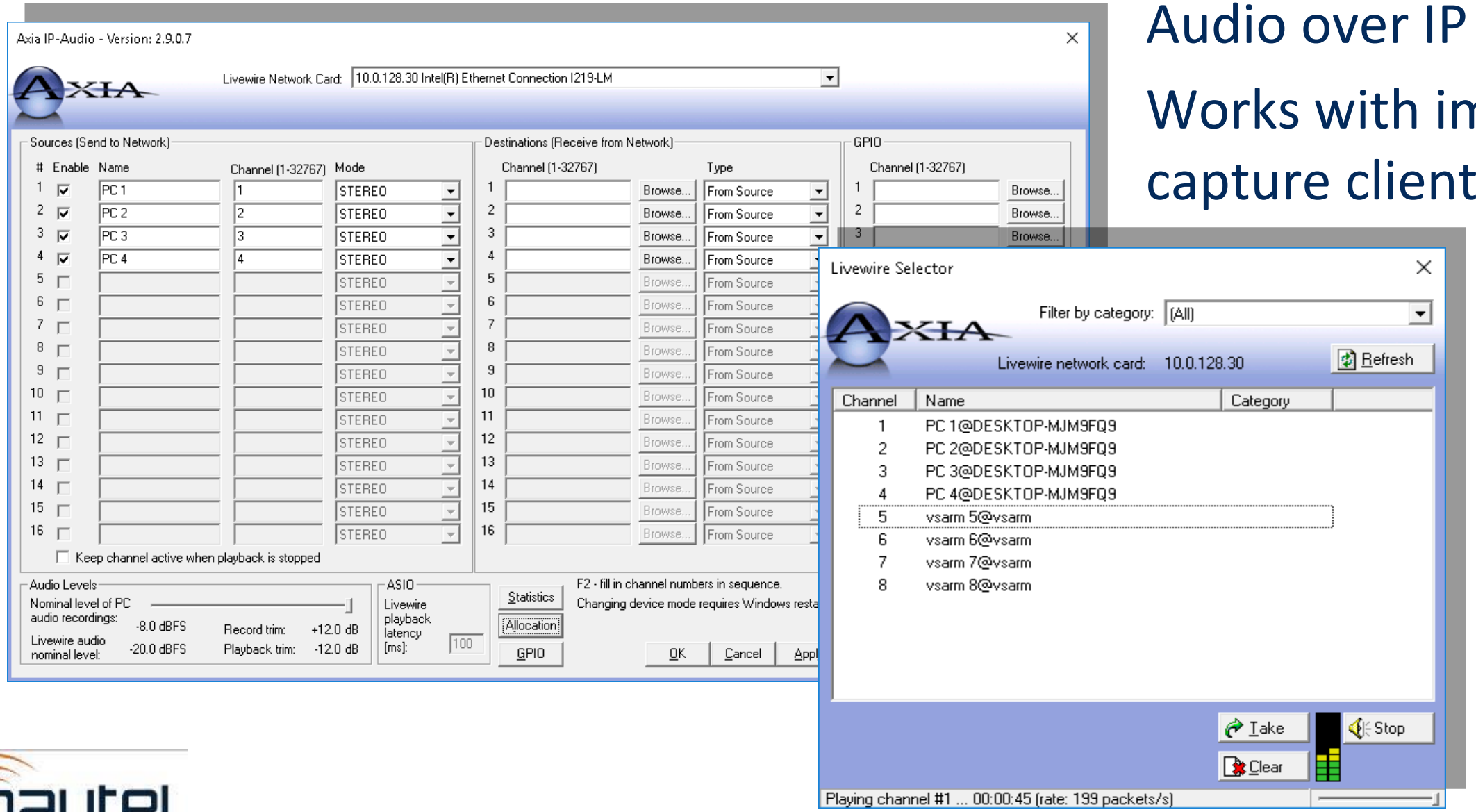
Demo: Axia Livewire



Audio over IP delivery

Works with importer capture clients

Online Information

- **Nautel Waves Newsletter**
  http://www.nautel.com/newsletter/

- **Webinars**
  http://www.nautel.com/webinars/

- **YouTube**
  http://www.youtube.com/user/NautelLtd

Thanks!

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