nautel

AM/FM Radio Transmitters

JUST ADD AUDIO

GV²

HD Radio®

Digital AM & FM

Agenda

- 60 sec intro: GV2: Just Add Audio
- How we got here:
  - Your challenges
  - Innovation
  - Made for Radio Standards
  - Collaboration
- Deeper dive: GV2: Just Add Audio
- Demo
- Q & A

Jeff Welton
Sales Manager - Central USA

Phil Schmid
CTO

John Whyte
Head of Marketing &
Product Strategy

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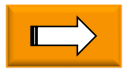
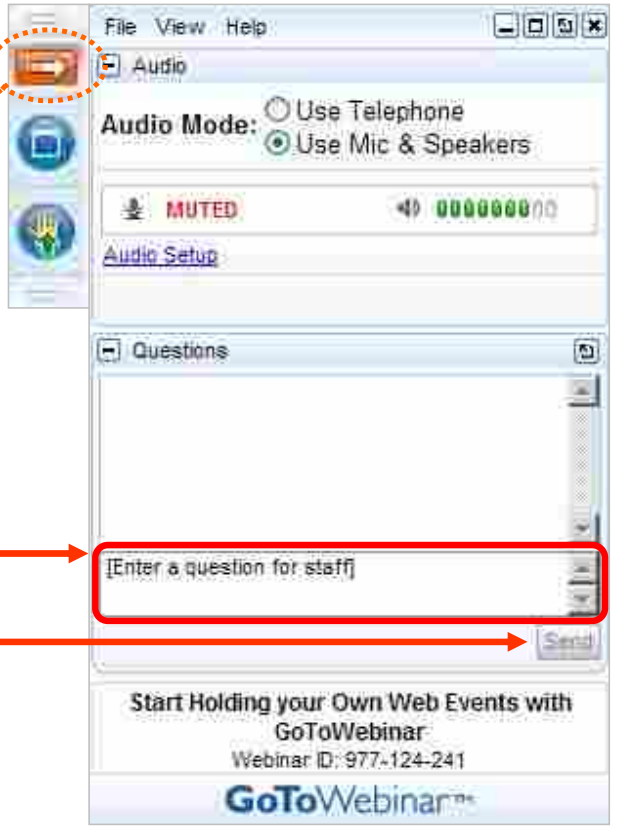
Q & A

Click on  *to open/close webinar panel*



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Remember: The completion of a Nautel webinar qualifies for ½ SBE re-certification credit, identified under Category I of the Re-certification Schedule for SBE Certifications.

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HD Radio®
Digital AM & FM

Audio In

RF Out

Everything Else Is Inside GV²

Audio Processing

Gen4 HD Radio

"No external boxes, GPS or time alignment required"

Industry 1st

FM+HD Modulation

FM+HD Locked

How we got here:

- Customers, Challenges, Technical Opportunity, Collaboration
- Apply new technologies, reduce complexity, drive out costs
- Passion for digital radio

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Digital Radio matters more than ever

- >95 Million HD Radio cars
- Opportunities:
  - Auto Dashboard Presence
  - Other opportunities
    - Podcasts/Streams On-Air
    - Ethnic broadcasting
    - Leased channels
    - Sports coverage
- Over 2400 HD Radio stations
  - but vast majority are still Analog only
- Challenging for many:
  - Too complex? Too expensive? ROI?

Cheaper, Easier, More Flexible Air-Chain Solutions

How we got here:

Gen3 2008

How we got here:

Nautel Accelerated Innovation path

- Software Based Air Chain
- Flexible, Cost-effective Solutions
- Investment protected
- Standards Based

Applications

- Audio processing
- Codecs

Flexible

1st Gen4 2017

- Software based

Gen3 2008

11 years

Fixed-box Gen4 platforms

- Shipping in 2019
- Fixed box approach
- FM-HD Blend correction

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Gen3 2008

11 years

1st Gen4 2017

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Applications

- Collaboration Telos Alliance
- Virtual Audio processing
- FM-HD Blend elimination
- Implementation flexibility
- Based on:

"Made for Radio" Standards

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Future advanced features

Fixed-box Gen4 platforms

- Shipping in 2019
- Fixed box approach
- FM-HD Blend correction

DEEPER DIVE:

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How did HD Radio get so Complicated?

Codec TX

IP STL

Codec RX

FM Audio Processor

MPX

Studio

Transmitter

FM was “relatively” simple

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How did HD Radio get so Complicated?

Codec TX

IP STL

Codec RX

FM Audio Processor

HD1 Audio Processor

MPX

E2X

GPS

Studio

Transmitter

HD1 needs **audio processor**, **exporter**, and **exgine** card

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How did HD Radio get so Complicated?

Codec TX

IP STL

Codec RX

Studio

Transmitter

FM Audio Processor

HD1 Audio Processor

Diversity Delay Correction

GPS

MPX

E2X

Reactive **FM/HD1 Time Alignment** is required

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How did HD Radio get so Complicated?

Codec TX

Codec TX

Codec TX

Codec TX

Studio

IP STL

Codec RX

Codec RX

Codec RX

Codec RX

Transmitter

FM Audio Processor

HD1 Audio Processor

Diversity Delay Correction

GPS

HD2 Streaming Processor

HD3 Streaming Processor

HD4 Streaming Processor

MPX

E2X

HD2-4 need processors, more STL capacity

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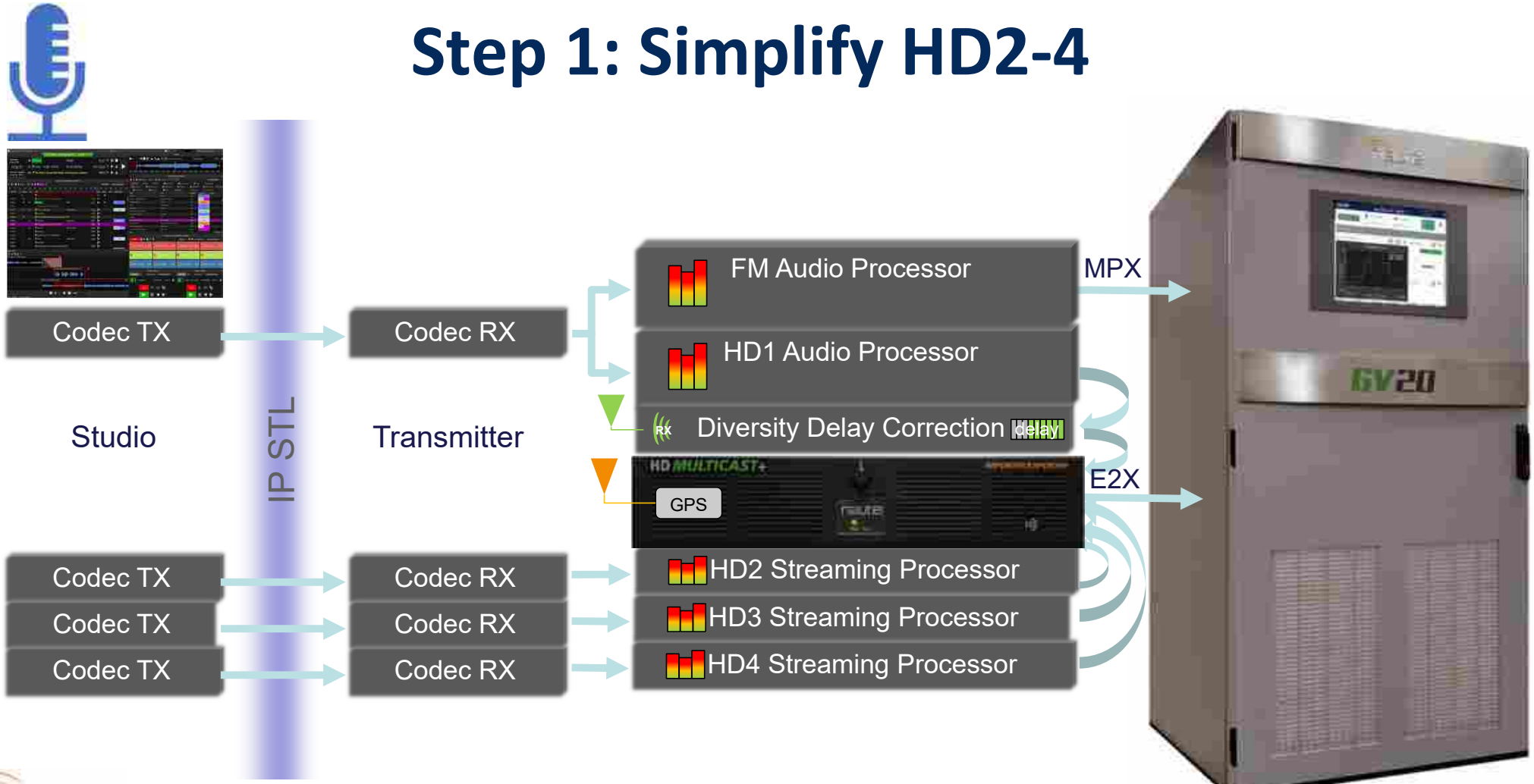
Step 1: Simplify HD2-4



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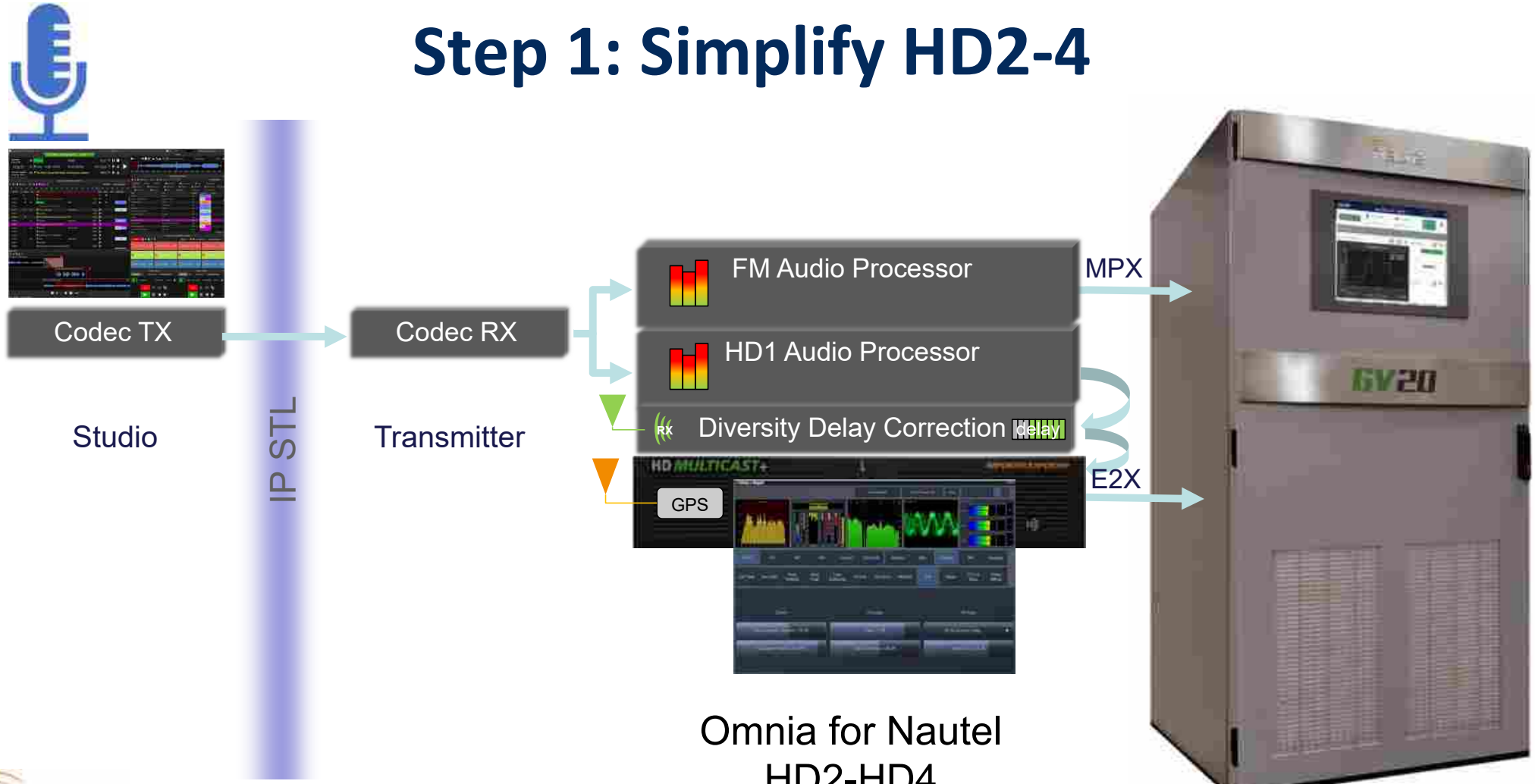

Omnia for Nautel
HD2-HD4

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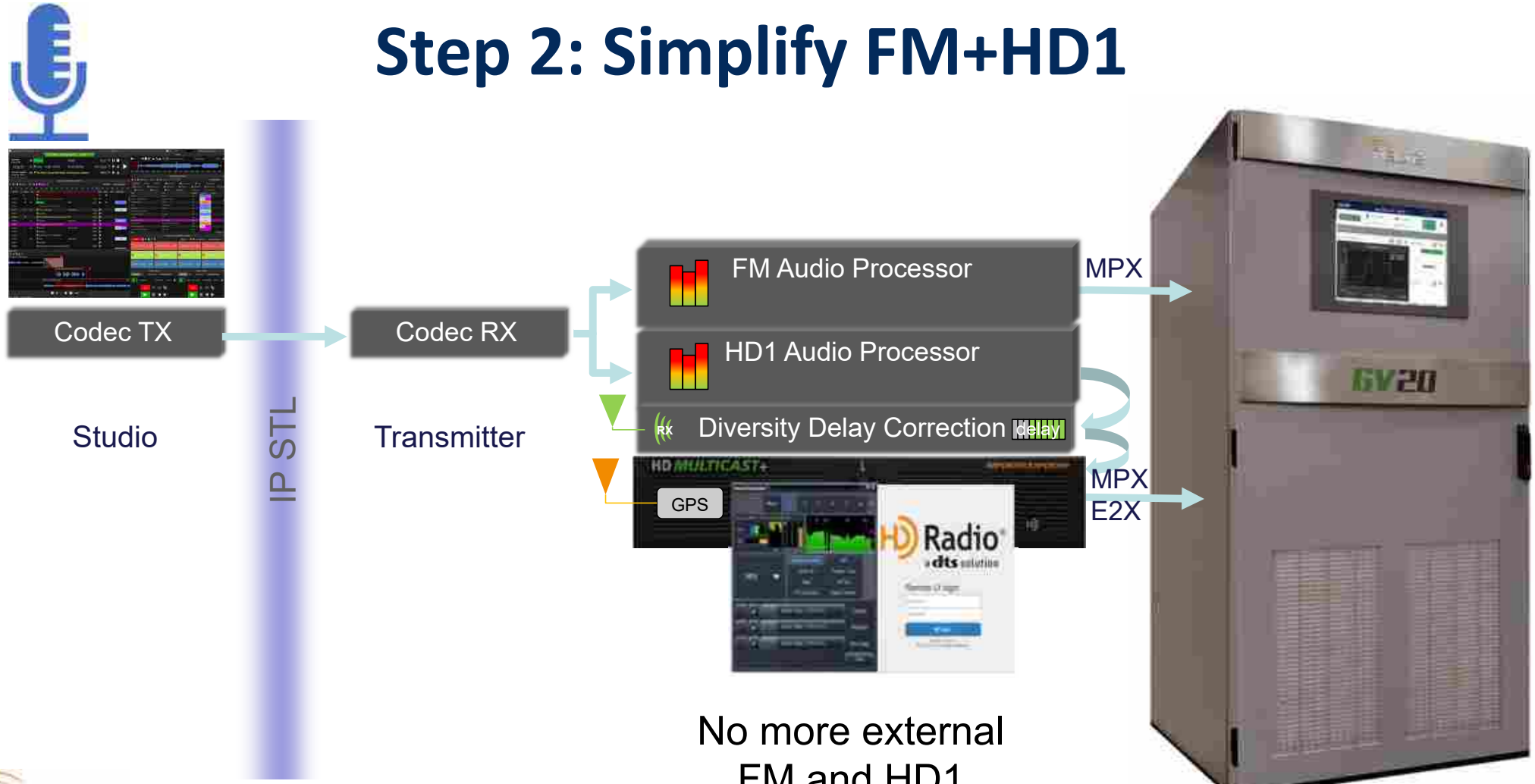
Step 2: Simplify FM+HD1



No more external FM and HD1 Audio Processor

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Step 2: Simplify FM+HD1

Codec TX → Codec RX

IP STL

Studio

Transmitter

MPX
E2X

No more diversity delay correction
No GPS required

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Step 2: Simplify FM+HD1

Codec TX → Codec RX

Studio

IP STL

Transmitter

Axia
xNode

Livewire

MPX
E2X

All input over Livewire
Including FM/HD1

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Step 2: Simplify FM+HD1

Studio

IP STL

Transmitter

Livewire

MPX
E2X

Back to simple

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Step 3: Introducing … GV²

Studio

IP STL

Transmitter

MPX
E2X

Livewire

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Step 3: Introducing … GV²

Studio

IP STL

JUST ADD AUDIO

Transmitter

Livewire

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Integrated HD
Audio Processing
STL solution

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Introducing GV²

Integrated
Gen4
HD Radio

New HTML5
User Interface

Integrated
Omnia for
Nautel

4 cores: FM/HD1,2,3,4

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New HTML5 AUI

Ground-up redesign

- No more Flash
- Works on mobile

New SW architecture

- Embedded Linux
- Enables virtualization
- Added SW Apps

Shipping in VX series

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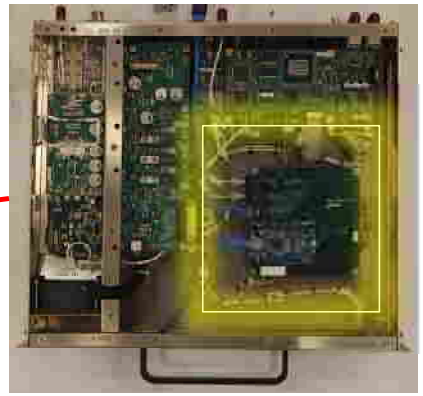
HD Radio Implementation



- New **GV controller** – already in production
- New exciter interface card in **GV exciter**
- **All Gen4 Xperi** code as SW modules

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Omnia for Nautel

Omnia.9

Multi-Band AM/FM Audio Processor

AES67 Livewire+ | Route & Monitor with Pathfinder

Unrivaled flexibility, audio integrity, and sonic impact.

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- "Undo" for audio source restoration
- Psychoacoustic composite embedder for extra loudness
- Built-in oscilloscopes, spectrum analyzers, and RTA instrumentation
- MPX composite baseband
- Phase Correction with Mono Bass reduces multipath distortion
- Two to seven bands of multi-band AGC and limiting
- Streaming engine supports Shoutcast 2 and lossless streaming
- Livewire+™ AES67

Telos Alliance

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Demo:
HTML5 AUI

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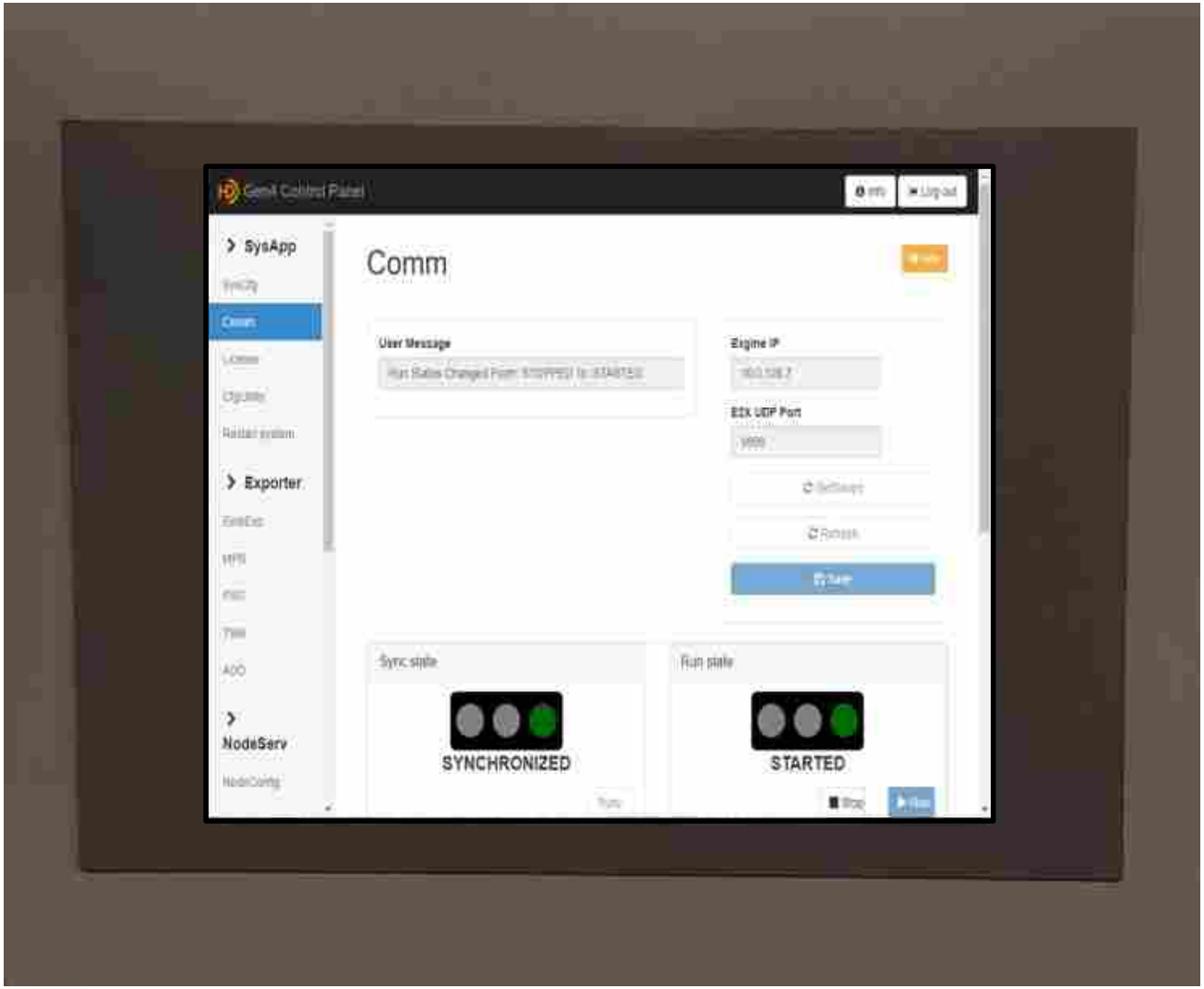
Demo:
Gen4
HD Radio



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Demo: Omnia for Nautel

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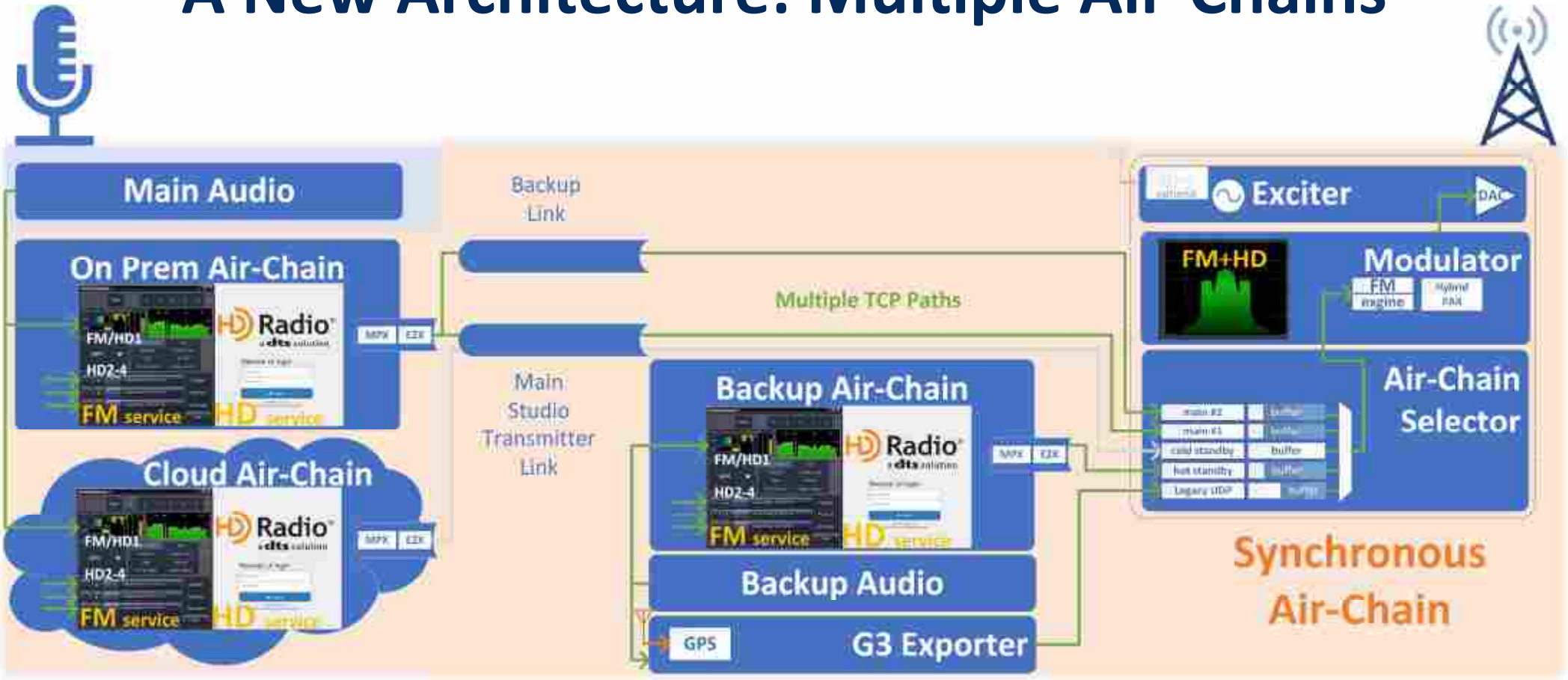
A New Architecture: Our Vision

To create an FM+HD transmitter receiving ***ALL its modulation content*** *over a* ***synchronous IP link*** *all the way back to a* ***cloud based air-chain*** *or* ***changeover*** *to a* ***backup air-chain****.*

Software Air-Chain

IP link: FM + optional HD

A New Architecture: Multiple Air-Chains



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Air-Chain Integrated Transport

FMHD1-HD4

HD1-HD4

Studio Automation

Audio Processing

HD Radio Coding

HD1
HD2
HD3
HD4
PSD
Album Art
Station Logo

Exporter 2 Exgine (E2X)

L+R audio
19 kHz Pilot
L-R audio
RDS
(67 kHz SCA)

Composite (MPX)

MPX | E2X | MPX | E2X

FM+HD Modulation

FM+HD Locked

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Fixed FM-HD1 Delay across Change Overs

HD Radio blending creates a graceful ***crossfade*** into the new air-chain

- Receiver buffers 4.5s of HD audio
- Blends into the new FM signal
- An integrated transport fixes FM HD1 delay
- No GPS required

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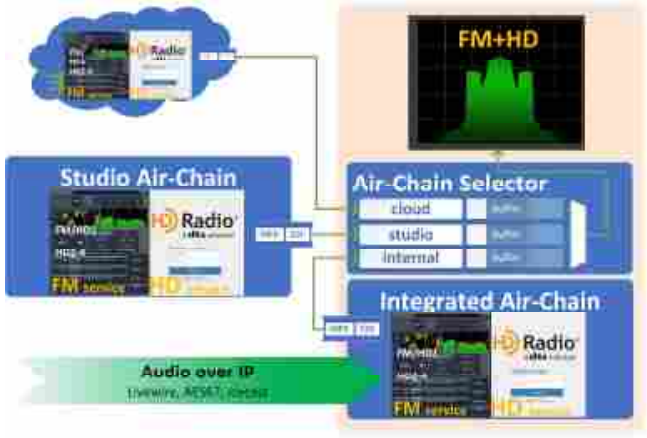
Demo: Air-Chain Selector and Blend Lock



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KVSC Field Trial April 15, 2022

KVSC, St. Cloud, MN:
First transmitter fully sourced by the Cloud.

Changeover: Performed software update on idle air-chain

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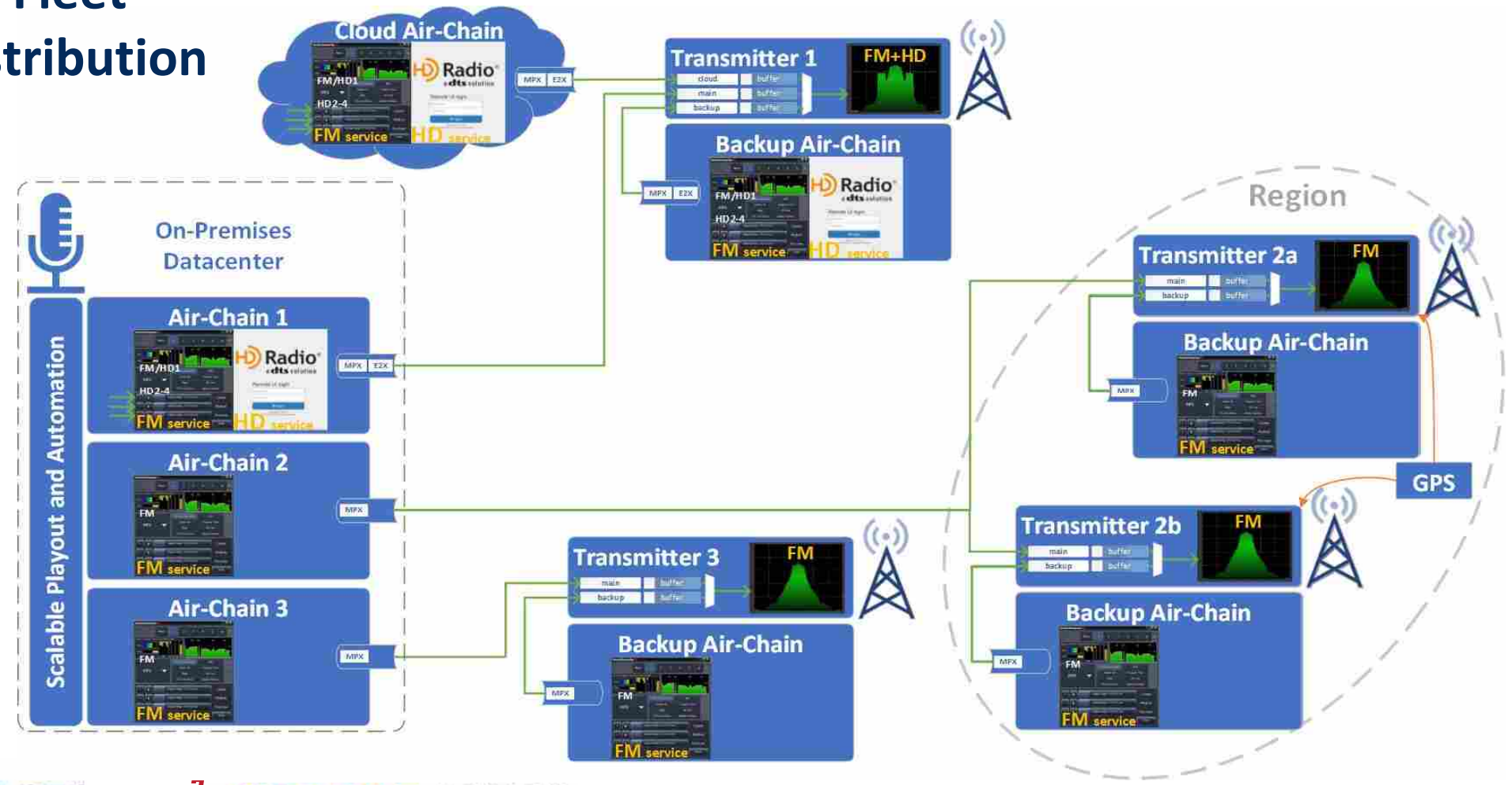
Fleet Distribution



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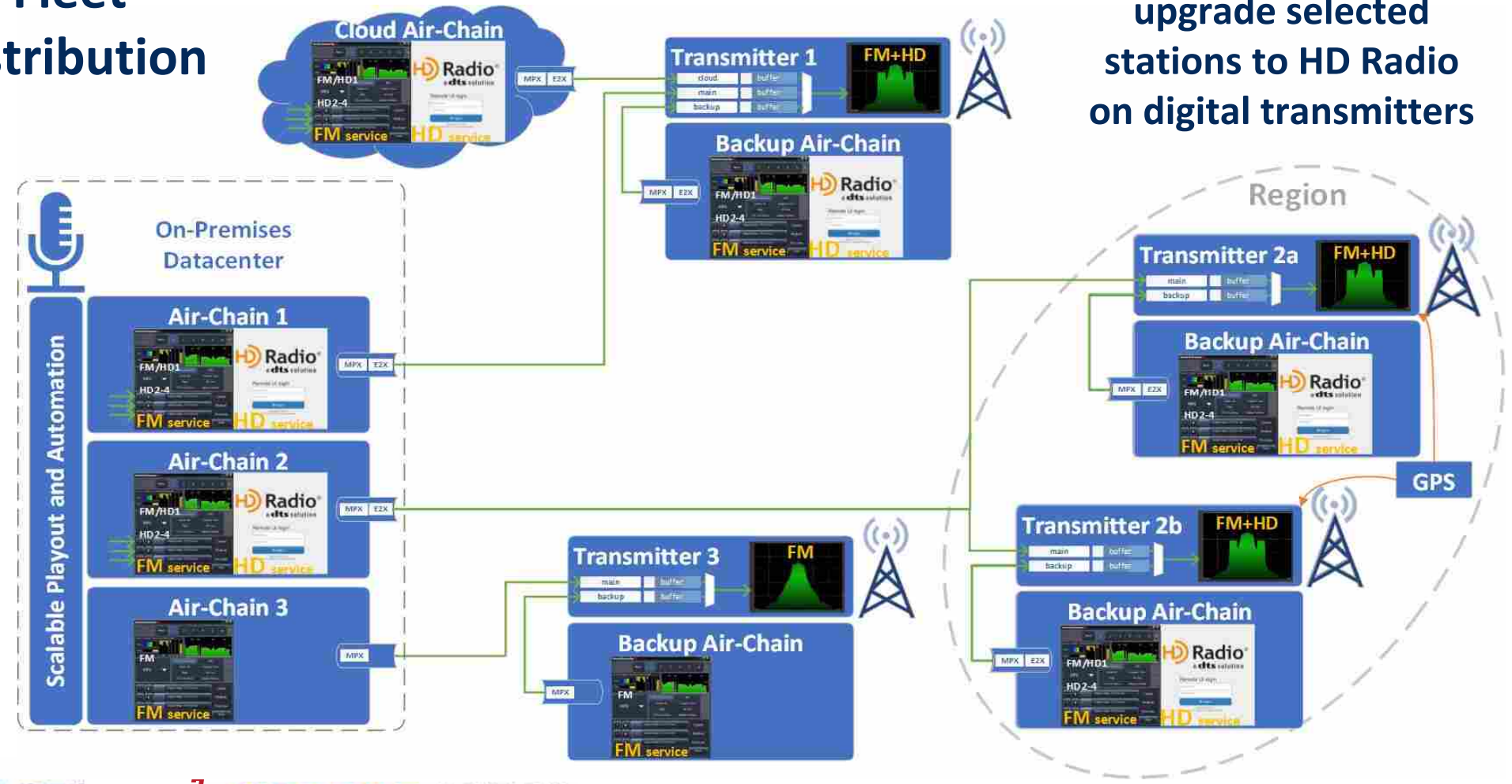
Fleet Distribution

upgrade selected stations to HD Radio on digital transmitters



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GV²: Backup or Main

Integrated
Gen4
HD Radio

New HTML5
User Interface

Integrated
Omnia Audio
Processors (5x)
FM,HD1-HD4

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Summary

- Easiest path to HD Radio broadcasting
  - Less hardware, reduced cost & complexity
- New capabilities with more to come
  - Air Chain Selector, Blend Lock, Flexible Implementation
- Availability
  - GV² Hardware platform: Q2 orders, Q3 deliveries
  - GV² Air Chain Inside Software Load: Q4
  - Audio Processing
    - HD2-3-4 on HD Multicast+: Now
    - Full Suite Omnia for Nautel: Q3

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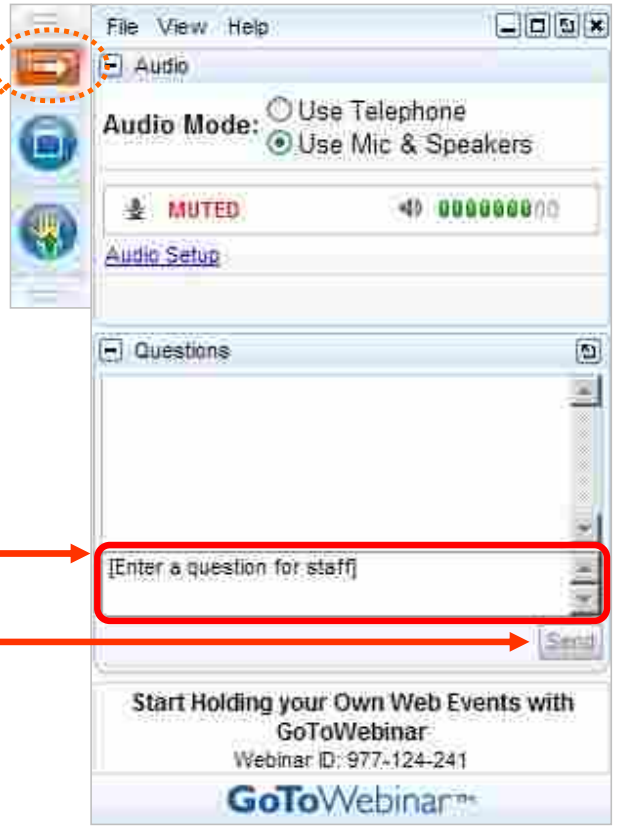
Q & A

Click on ⇨ *to open/close webinar panel*



Enter questions here

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NAB 2023

EVENTS

- **NUG@NAB**
  Radio Technology Forum
- **AUI session**
- **HD session**
- **HD Radio Event (Monday)**
- **Booth W2843**
- ***Cake!***

PRODUCTS

- **VX Series**
- **GV + HD Air Chain**
- **AUI**
- **NX**
- **NVLT**
- **SC4**

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Online Information

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

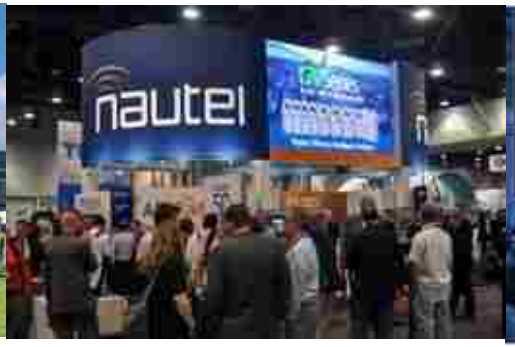
  Webinars
  https://www.nautel.com/webinars/

  YouTube
  https://www.youtube.com/user/NautelLtd

- **VX Series Product Page**
  https://www.nautel.com/vx-launch/

Thank You!

www.nautel.com

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