



INTRAPLEX PRODUCTS

AUDIO CONTRIBUTION AND
DISTRIBUTION



Intraplex® Products

Audio encoding and IP transport solution for Studio to Transmitter Link (STL) and Studio to Studio Link (SSL) applications



IP Link 100 /100P*/200*/200A

Audio, Digital FM MPX Over IP



IP Link MPXp * - Analog & Digital

FM MPX Over IP

- 1.64 Mbps for AES 192



Intraplex® IPConnect

Reliable IP Gateway

LiveLook



Real-time network performance monitoring

Ascent

8-16 channels AoIP platform. Supports AES3, Analog and AES67 channels. Support SRT protocol with encryption



T1/E1 and IP Multiplexer

- Voice, Data, Program Audio Mux
- CM30 card replaces CM5 (T1) or CM7 (E1)
- CM30 provides an easy transition from TDM to IP



HD Link – 950 MHz STL

- 5 Watts of power
- Redundant IP Path
- LDPC channel coding



IP LINK CODEC FAMILY



IP Link Codec Family



- 1 full duplex stereo channel
- 16 – 48 Khz Audio, AES 192 (Digital MPX)
- 100p add display and GPS timing

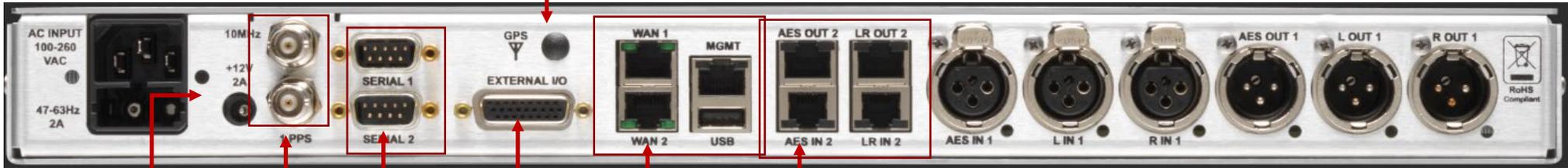
- 2 full duplex stereo channels
- 16 – 48 Khz Audio, AES 192 (Digital MPX)
- 200A replaces 2nd channel with AES67 (AoIP)

- Point to Multipoint with 12 unicast and multicast stream
- DSP based Coding Algorithms: AAC (LC,HE,HEv2,ELD), MPEG (II, III), Opus, G722, Linear, E-aptX
- All models support AES67 input source. IPL 200A supports AES67 output with native PTP
- Internal and external GPS timing for SFN and MFN (except IP Link 100)

IP Link Connectors



GPS Antenna for internal receiver



Ext 12V or -48V supply

Input/Output of 10 Mhz, 1PPS

2 RS-233 Ports for RDS

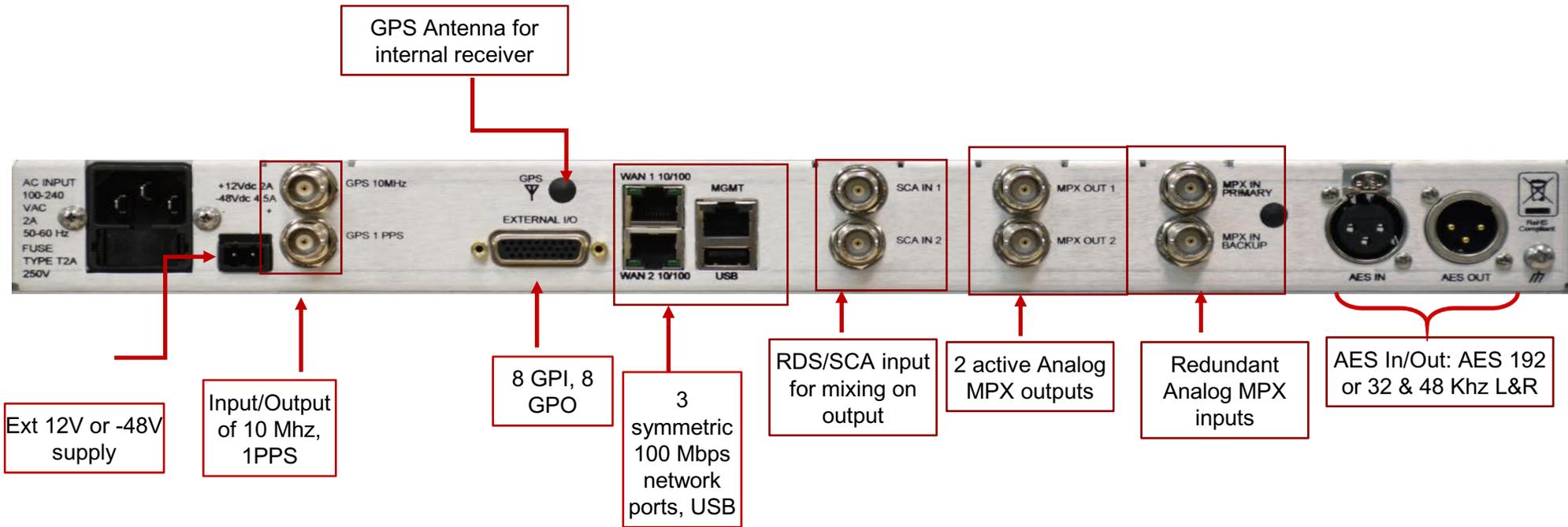
8 GPI, 8 GPO

3 symmetric 100 Mbps network ports, USB

Channel 2: Input/Output, Analog/Digital. Studio Hub connectors . 200A has Ethernet

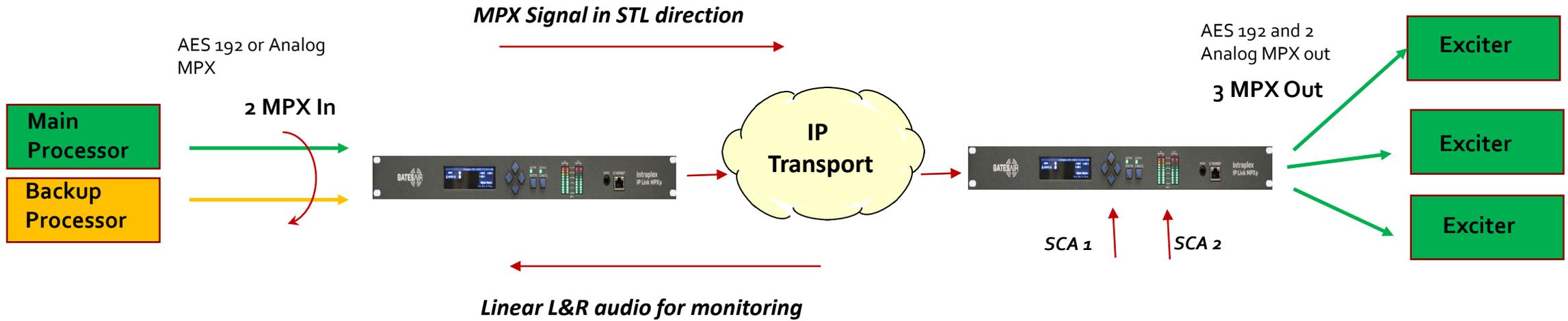
Channel 1 Input/Output, Analog/Digital

IP Link MPXp



- Single Channel, Full-Duplex FM MPX or Linear audio codec
- Dual domain – supports Analog and Digital MPX simultaneously
- Same platform features as IP Link audio codec, including GPS timing for SynchroCast

IP Link MPXp Input/output



Minimum MPX bandwidth requirement is **1.64 Mbps** – lowest among any vendor

IP Link FM MPX Summary

IP Link 100/100p/200/200A

- Only supports **Digital** MPX (AES 192)
- Minimum FM MPX Bandwidth: **3.2 Mbps**
- Fall back and return audio options: uncompressed and **compressed** audio
- IPL 200 provides capability to transport 2 different MPX streams

IP Link MPXp

- Supports **Analog** and **Digital** MPX interface
- Minimum FM MPX bandwidth: **1.64 Mbps**
- Allows mixing in local RDS at the decoder
- Provides **redundancy** for input and output
- Fall back and return audio options: uncompressed audio



IP Link Key Capabilities

■ Network Reliability/Security

- 3 network ports
- Hitless packet recovery using **Stream Splicing technology** (Combination of FEC and duplicate Time/Network diversity streams)
- **Source switching** at decoder (automatic or manual switching between 3 sources)
- Built-in firewall with packet authentication
- Reliability and alignment for GPIO and PAD data

■ IPConnect - IP Gateway

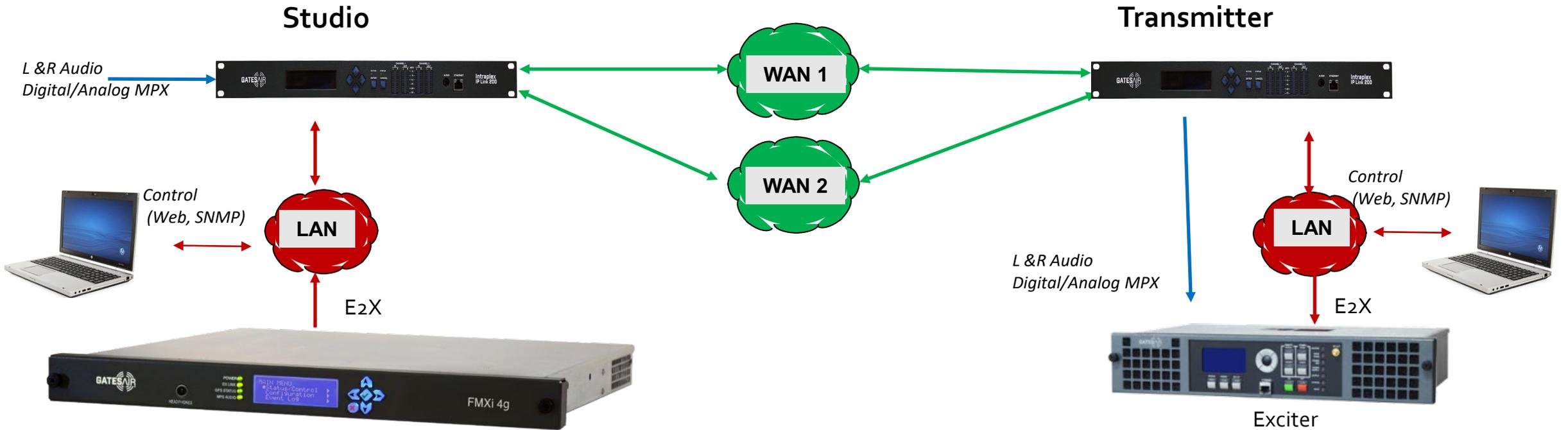
- Provides reliable tunneling of external IP data packets
- Use cases: HD Radio (E2X), EDI

■ Single Frequency Network / **Content Sync**

- **SynchroCast®** - Patented technology to provide precision delay (1 usec) of audio at all times
- **Content Sync (New!!)** – New feature key to enable content sync within 1 msec across Multi-Frequency Network.



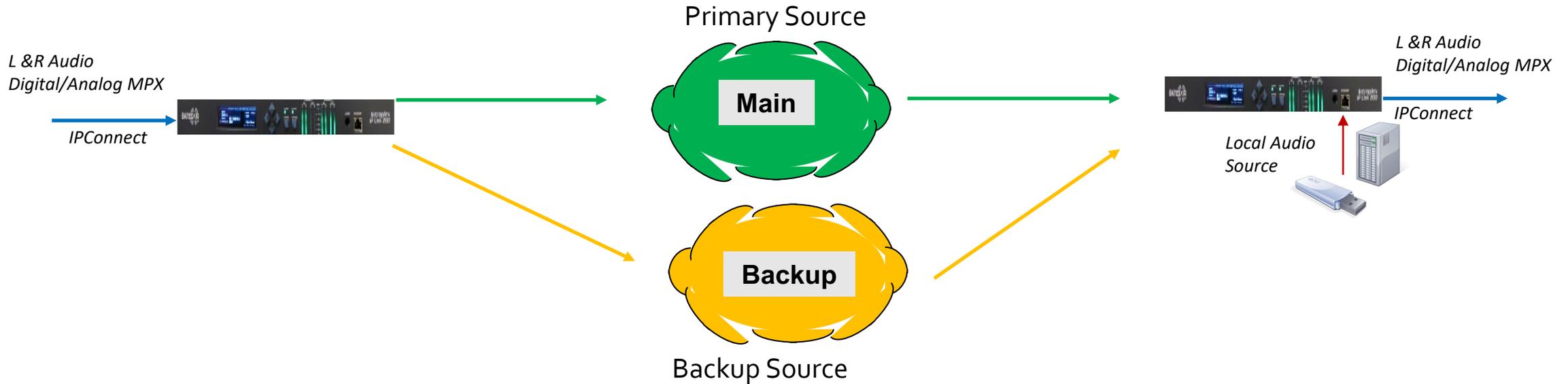
Stream Splicing – Typical Topology



- Two network ports are used for Stream Splicing across WANs, the 3rd port is connected to LAN
- Stream Splicing provides “hitless” protection for Audio and FM-MPX signals
- IPConnect uses Stream Splicing to provide “hitless” protection for E2X, EDI or any IP traffic



Source Switching at Decoder



- Automatic or commanded switching between Primary, Secondary and backup at the decoder
- Secondary or Backup network can be on-demand LTE connection, typically public internet or 950 MHz RF STL.
- Works with Audio, FM-MPX and IPConnect streams

Other Integrated Features

- **Multi-encoding** – channel content can be encoded simultaneously with different formats. Primary use case: Main / Backup network switchover
- **Icecast / ShoutCast** transmit and receive
 - Automation interface support (Audio vault, Enco)
- **EBU R128** for Audio Leveling and Loudness
- **Dynamic Initiator** - Automatic connection setup for NAT traversal
- Internal and external alarm logging via SysLog and SNMPv3 traps
- 1+1 and N+1 redundancy



Upcoming IP Link Products – IP Link 100e



- AoIP Plug-in card for Flexiva
- **Full duplex:** AES3 input and output
- **AoIP Formats:** Linear, Compressed, AES67 and Icecast
- **Three GigE Network ports** for reliability and security
- **Reliability:**
 - **Stream Splicing, Primary, Secondary and Backup** audio source switching
 - Supports Secure Reliable Transport (SRT) with encryption for security
 - USB playlist as backup
- 4 In/out GPIO. RS-232 port



Upcoming – IP Link 100c



- Compact half RU hardware
- **Full duplex:** AES3 input and output
- Optional: **Mic** level input
- **AoIP formats:** Linear, Compressed, AES67 and Icecast
- **Three GigE Network** ports for reliability and security
- **Reliability:**
 - **Stream Splicing, Primary, Secondary and Backup** audio source switching
 - Supports Secure Reliable Transport (SRT) with encryption for security
 - USB playlist as backup
- 4 In/out GPIO. RS-232 port



ASCENT



Ascent Overview



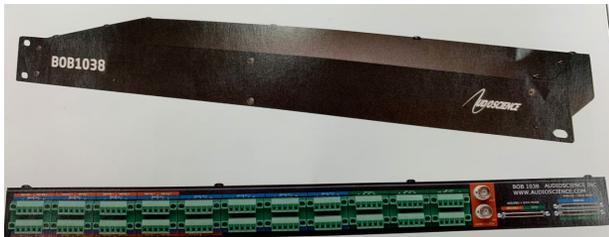
- Multi-channel Audio Over IP codec supporting 8 to 16 stereo channels
- Built on the technology foundation of Intraplex IP Link codec platform. Same Web look and feel
- Interoperable with IP Link codecs
- Software platform: Ubuntu Linux Server (16.04)
- Hardware: Intel i7-4 Core CPU
- Release 1 is now available



Branded Server



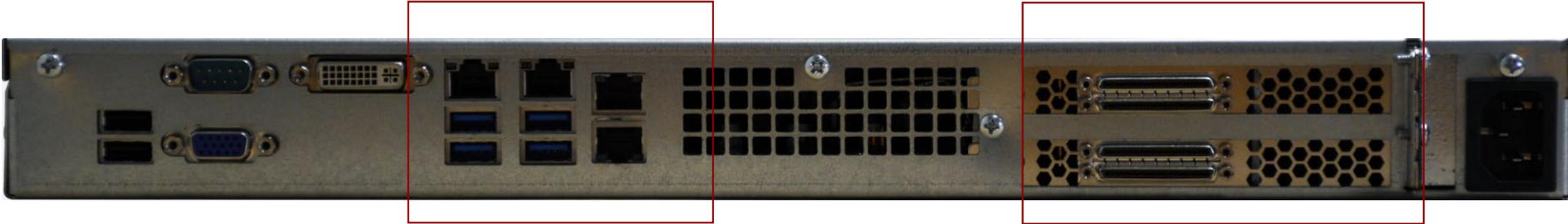
PCIe 8-ch AES/Analog Audio



8-Ch Break Out Box



Ascent Connections



4 GigE Network Ports.

2 PCIe slots to hold up to 2 8-channel AES3/Analog cards. Each Card has 16 GPI and 4 GPO contact closures

Typical Deployment Scenarios

- Studio to Studio application
 - Encode and transport of audio channels across studios
 - **Use Case:** Sirius XM will be deploying Ascent across 4 major studio to encode and transport 16 stereo channels
- Distribution
 - Ascent at the head-end feeding to IP Link codecs at transmitter sites or remote studios
 - **Use Case:** Wisconsin Public Radio. 5 Ascent servers at various head-end sites, will feed to 40 IP Link 200 codecs at remote studios and transmitter sites.
- Contribution
 - Ascent at the head-end receiving audio from IP Link codecs



Ascent - Release 1 Key Specifications



Audio I/O

- **AES3/Analog** audio with integrated 8-stereo channel audio card (Audio Science). Also works with standard Linux USB audio (ALSA)
- **AES67** input and output
- Sample rates: 32, 44.1, 48 KHz
- **GPIO** (16 In, 4 Out per card). Additional using external **Dataprobe**
- Combination of **16** stereo encode or decode channels
- Codecs: Uncompressed, AAC-LC, AAC-HE, AAC-HEv2, AAC-xHE, Opus, MPEG II and III
- Multi-coding

Streaming

- RTP and **SRT (with 128/256 encryption)**
- Up to **150** RTP streams per server
- **64** SRT streams per server
- Dynamic Stream Splicing with RTP and SRT
- FEC (IP Link compatible)
- Primary, Secondary and Backup sources at output channel
- Compatible payload format with IP Link codecs
- LiveLook support for monitoring

Platform

- HTTP/HTTPS – same look and feel as IP Link
- Multiple user accounts and access levels
- SNMPv3
- Front Panel Display
- 4 network ports, with ACL
- Hardened USB ports
- Field upgradable
- Extensible licensing capability

Release 1.1 – July 2020

- Ascent Media Gateway
 - Similar capabilities as IPConnect. Will support point to multi-point high bit-rate media, including ATC3 streams
- 1+1 Redundancy
- Email Notification
- Icecast streaming
- Hardware: **Ascent PLUS**
 - 2 RU
 - Redundant power supply – Hot Swappable
 - Redundant fans
 - 4 PCIe slots to support up to 32 – stereo channels

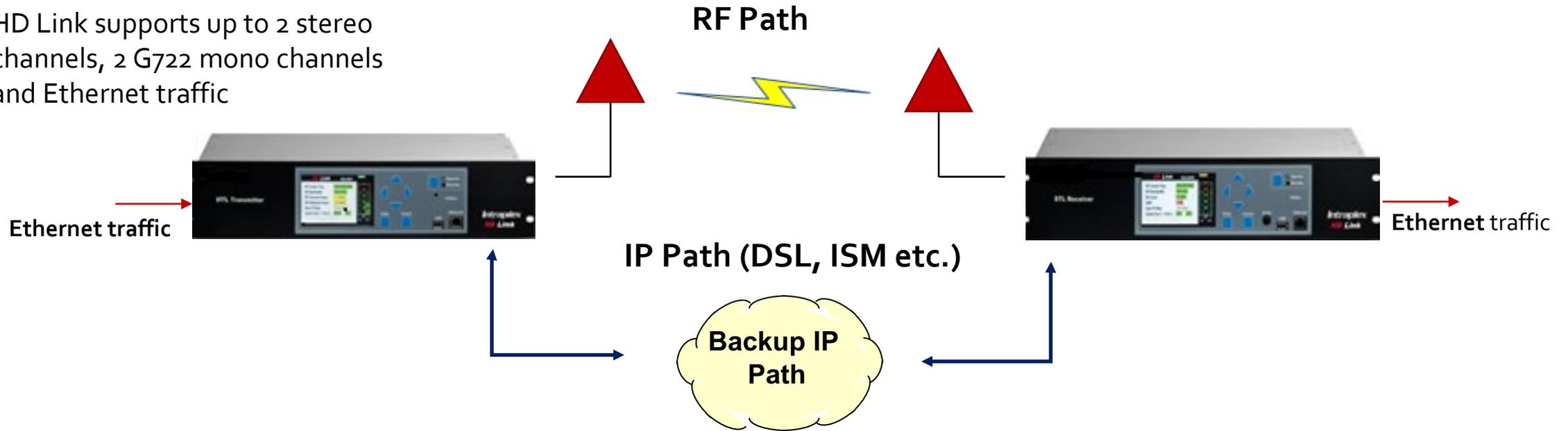


HD LINK



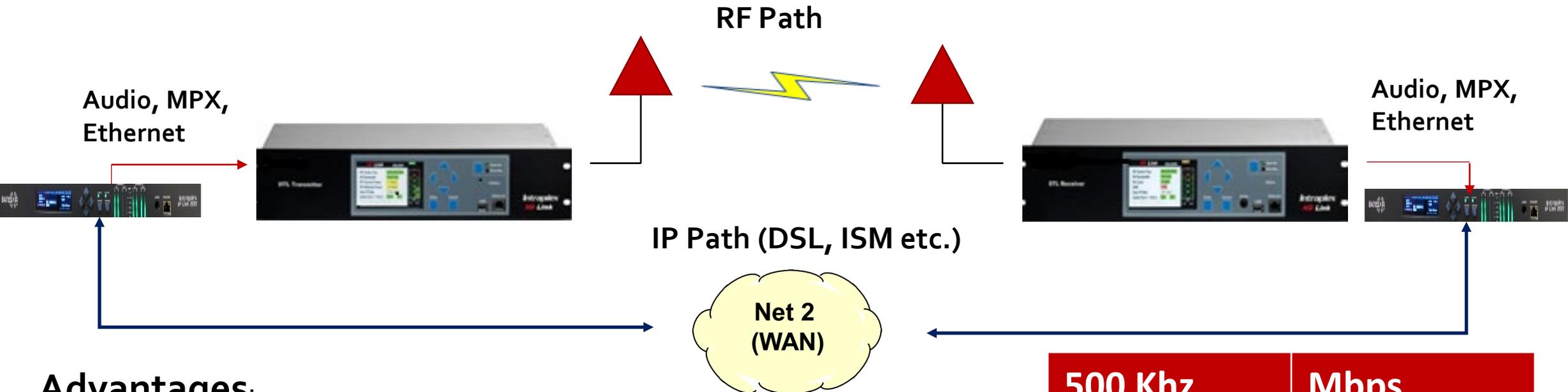
HD Link – 950 (932 to 960) MHz Digital STL System

HD Link supports up to 2 stereo channels, 2 G722 mono channels and Ethernet traffic



- Configurable modulation from 32 to 256 QAM and 5 watts of power
- 200, 300, 500 KHz bandwidth configuration
- Flexible service configuration between audio and Ethernet bandwidth.
- “IP Only” mode without any built-in audio cards, entire modem capacity is allocated to Ethernet service
- 2 Ethernet ports, one of the ports can be configured for backup IP path, in case RF path fails

All-IP mode of HD Link

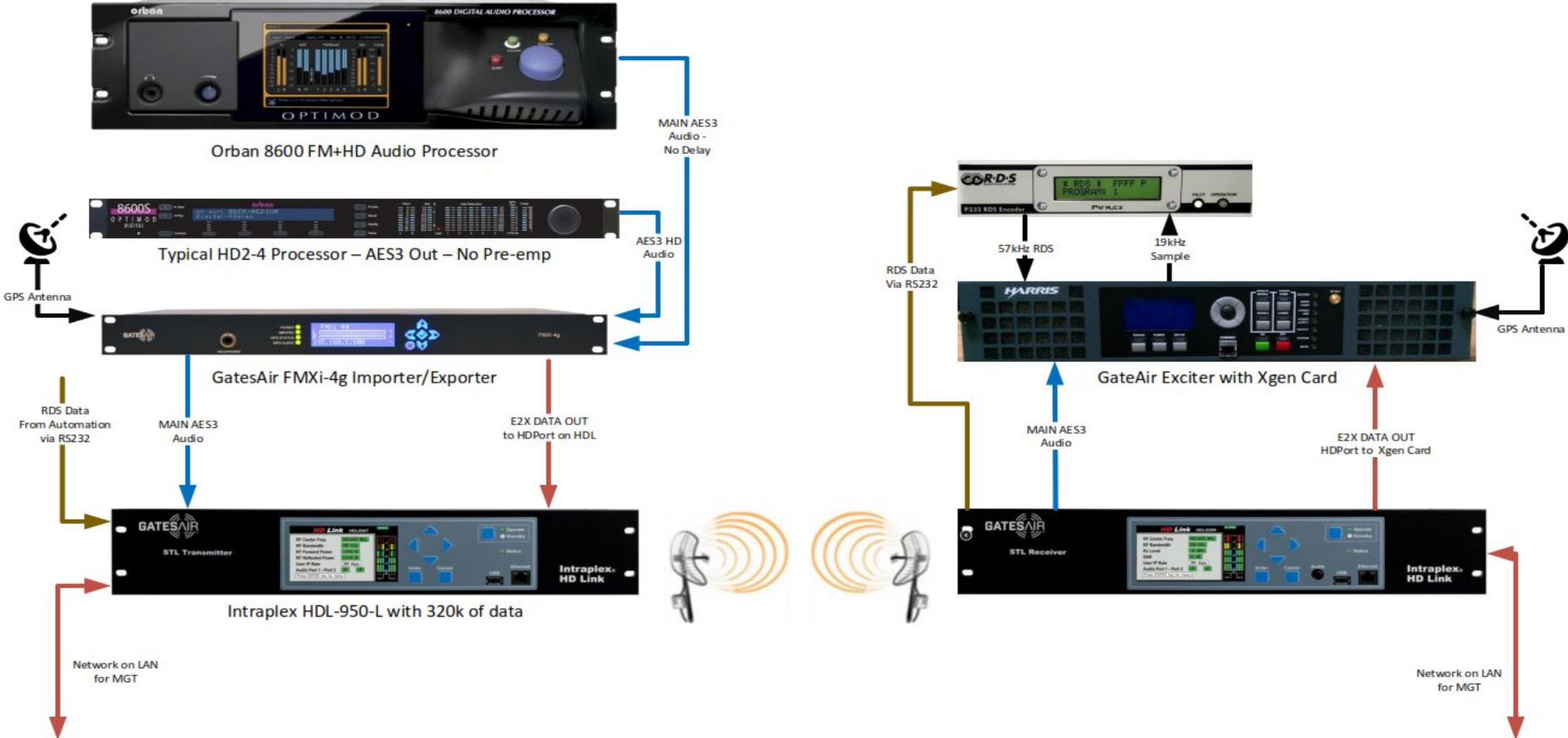


Advantages:

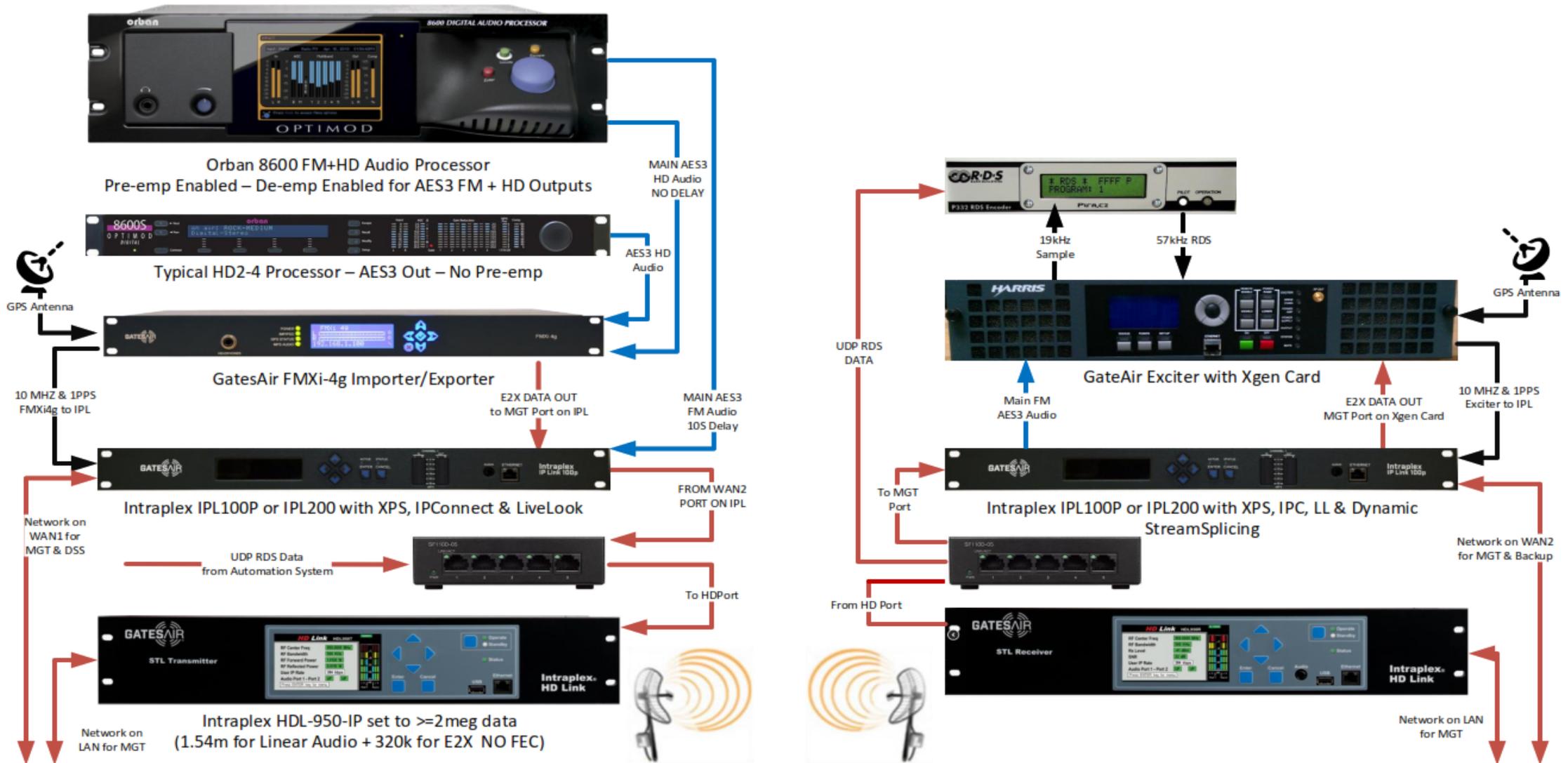
- Allows "hitless" protection using DSS
- Enables transport of **Audio** and **FM MPX** signals
- Up to **16 stereo signals** (using Ascent) can be transported
- Network 2 can be low speed, IP Link can send low fidelity backup stream
- Backup stream can be on-demand for LTE-Backup

500 Khz	Mbps
256 QAM	3.1
128 QAM	2.8
64 QAM	2.4
32 QAM	2.0

Connecting - Analog and HD using AES3–Method 1



Connecting - Analog and HD using AES3–Method 2



Connecting - Analog and HD using MPX

