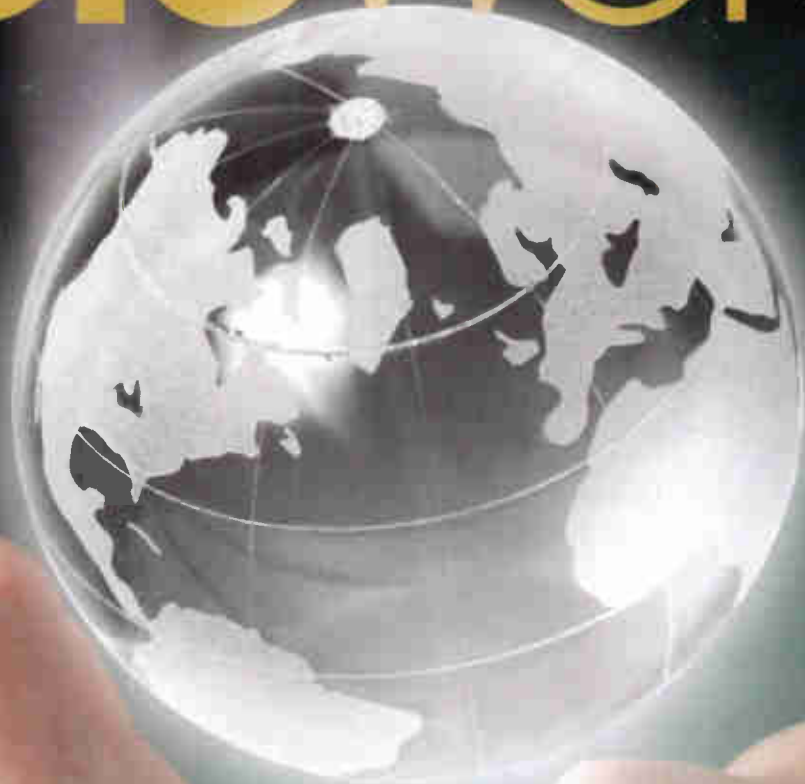


RADIO WORLD



2022 Source Book & Directory

Annual Reference Guide & Supplement to Radio World

Team Work makes the

DREAM WORK

with ViA & Gateway 4 IP Audio Codecs



Team Up with Tieline for Your Next Remote

Dream of remote broadcast possibilities when you combine the award-winning ingenuity, flexibility, and redundancy delivered by ViA and Gateway 4 codecs. With unrivalled network connectivity options, flexible multi-stream connections, and full remote control – the world is at your fingertips.

- The ViA delivers 7 IP interface options and supports mono, stereo, double mono, triple mono, or stereo plus mono.
- The Gateway 4 provides two stereo connections, or one stereo and two mono connections, or up to 4 mono connections.



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tieline.com

Tieline 
The Codec Company

International: +61-8-9413-2000
info@tieline.com
tieline.com

* The Gateway 4 codec supports 4 channels only and is not upgradable to support more channels.



These companies are here to serve you

The Radio World team is pleased to present your 2022 Source Book & Directory, a technology resource for professionals in the radio broadcasting and digital audio industries.

Radio World was founded in 1977 to cover radio engineering, technology and management issues. A key part of our mission is to bring buyers and sellers together, nourishing a vibrant technology marketplace. This directory is part of that effort.

Once again we salute the manufacturers and service providers who provide our industry with the infrastructure and the brain power to help them succeed.

As always, companies listed in this directory are those that responded to our solicitations. Find them listed alphabetically in the Vendor & Product Directory section starting on page 24. A cross-index helps you find companies by type of product or service, starting on page 18. On pages 4 to 17, sponsors highlight key products in the Profiles in Excellence section. And starting on page 36 are sponsored reprints of stories that appeared in Radio World in recent months.

Thank you for being a Radio World reader. We hope you will patronize these companies, particularly those that advertise in Radio World. They make it possible for us to serve you.

Paul McLane
Editor in Chief

THIS ISSUE

PROFILES IN EXCELLENCE

4 - 17

SUPPLIER CROSS INDEX

18 - 23

VENDOR & PRODUCT DIRECTORY

24 - 34

ENCORE ARTICLES

36 - 45

2wcom Audio Solutions Streamline System Conversion

Who is 2wcom Systems? We are a broadcast technology-driven company in Flensburg (Germany), directly neighboring Denmark. 75% of our crew are engineers, which gives our team a very concentrated knowledge base for developing IP, SAT, HD Radio, DAB, MPX and FM/RDS soft- and hardware solutions. We strive to offer our worldwide customers the benefit of our many years of combined experience. We do this by providing high-quality equipment and first-class customer service. Flexible solutions are critical in order to properly manage the conversion from traditional connections and networks to newer, frequently more economical IP based networks for contribution, distribution and streaming.

To help broadcasters manage change in these times of rapidly evolving technologies, our team of engineers developed the **4audio hardware series** and the **MoIN software series** to run on local hardware, VM or in the cloud. Both are broadcast "Swiss Army Knives" built with "Quality made in Germany." Their transcoding options, supported audio codecs, streaming protocols and standards compliance enable the broadcaster to exchange produced content easily between production, multimedia, distribution, cable/OTT networks and CDNs.

The technological heart of the 4audio and the MoIN series is Linux-based software that allows for flexibility in system design. In order to avoid struggles with third-party open-source software, the 4audio and the MoIN series is 100% developed by 2wcom and based on standards like AES67, SMPTE ST 2110, EBU Tech 3326, or NMOS. In conclusion, all 2wcom solutions support the digital transition and link distant and local sites.

4audio IP: IP-4c codec, IP-8e encoder, IP-8m phase-locked codec

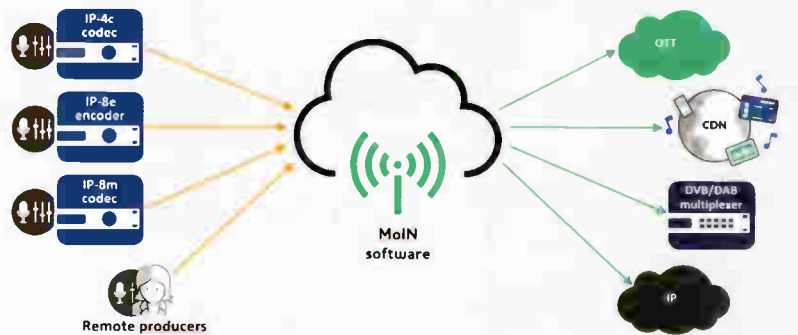
All devices provide facilities for transcoding, multiplexing, streaming, and synchronization. Robustness mechanisms can be implemented by source, stream, and error correction type to overcome even significantly troublesome network conditions. The on-demand scalability of all features allows for easy management of a wide range of broadcast applications (Studio to WAN, SIP network, MPEG TS multiplexing, synchronized playout, FM to TS gateway...).

To streamline a system conversion 2wcom solutions support all standards for Audio over IP. This enables compatibility with other Audio over IP products. Further, these solutions support the different frame sizes of audio codecs (AAC profiles, OPUS). These considerations allow for a step-by-step conversion to a 2wcom solution instead of requiring a full conversion as with proprietary solutions.

MoIN software: MoIN Studio, MoIN Distribution, and MoIN Streaming

The MOIN software system simplifies the connection of multiple networks. Whether for distribution, streaming or other applications, MOIN has the tools required to do the job reliably and efficiently. MoIN is made up of containers. Each container can be opened, closed and operated independently from the others, enabling both scalability and reliability in the system. Any of the up to 512 containers can be activated in 5 seconds to provide encoding, decoding, transcoding and network transport by IP, HLS/Icecast, and satellite. Responding to the call for virtualization and the need to connect remote and

Connecting studio, distribution and streaming



local sites, the MoIN software series has two exciting new features. The first is Kubernetes to ease the management, monitoring and robustness of containers, services and workloads across multiple physical machines. The second is the service up2talk, which connects external participants or remote producers directly into a studio network and provides audio in broadcast quality.

Thank you for your time. Please contact Berry, Sönke, Mark, and Anke for more information or to meet and greet the IP, SAT, HDR, DAB, and MPX 4audio family members: sales@2wcom.com.

For assistance in the US please contact Steve Paulson at either +1.603.305.9481 or cstvnplsn@gmail.com.

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In times of digital transitions we stay by your side

360° high quality audio solutions for Audio over IP, MPX, DVB, HDR, DAB, FM&RDS

- ▶ connecting remote producers, studio, distribution and cloud services
- ▶ multimedia approach ▶ web radio streams ▶ transcoding
- ▶ on-demand scalability ▶ standard compliance & interoperability
- ▶ TS multiplexing ▶ regionalization ▶ reliable transport
- ▶ available as hard- and software

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Current Comrex Solutions



IP Audio Codecs

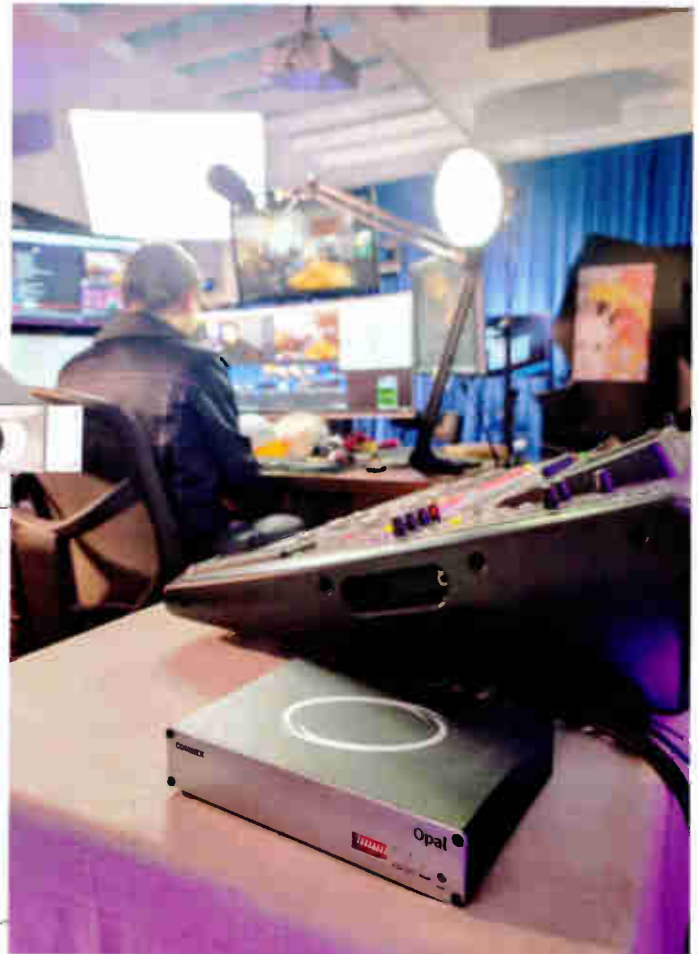
Since 2005, Comrex has been building IP audio codecs that broadcasters can rely on. Our portable ACCESS NX codec is rugged, intuitive, and easy to transport. BRIC-Link II, our basic point-to-point IP audio codec, provides rock-solid transmission, along with some surprising functions like streaming capabilities. Our AES67-compatible ACCESS NX Rack studio codec and ACCESS MultiRack multi codec are both reliable and ready to integrate into a modern studio.

All of our codecs run on CrossLock, our proprietary suite of reliability tools. CrossLock

enables the simultaneous use of multiple networks to increase bandwidth. Networks can be bonded for stronger connections, or for redundancy fallback. With its adaptive management engine and error concealment and congestion avoidance techniques, CrossLock makes broadcasts even more reliable.

IP Video Codecs

Our CrossLock technology was originally developed for LiveShot, Comrex's bonded IP video solution. Designed for use in field broadcasts, LiveShot is able to make use of even the most challenging 3G/4G, Wi-Fi, and satellite networks to maintain a secure and stable connection. Used by TV stations, networks, sports franchises, and government organizations for a wide range of applications, LiveShot is ideal for streaming low-latency broadcast quality audio and video from anywhere internet is available. It's also used in visual radio applications.



Studio Telephone Interfaces

Comrex has been building telephone interface products for decades. As methods of guest contribution continue to evolve, we've released VH2, our two-line VoIP phone hybrid. For those who need to replace POTS couplers, EarShot IFB is a VoIP system that delivers live audio feeds to up to 30 callers, great for listen lines and complicated remote setups..

Opal is an IP audio gateway designed to make interviews easy. A guest can open a link in any common web browser, and be immediately connected in full-duplex high-quality audio. There's no need to install anything, and the user interface is simple and intuitive.

Introducing Gagl

At the end of 2021, Comrex will be releasing Gagl, a new cloud-based remote contribution solution. Gagl delivers conferenced audio from multiple contributors to Comrex hardware IP codecs in high quality. Perfect for a round-robin reporting program or for a "morning zoo" radio show, Gagl can support up to 5 simultaneous connections at once.

Gagl allows between one and five users to send and receive audio from computers and smartphones - no need to install apps or use any special equipment. That audio is conferenced (if more than one user), and delivered to a Comrex hardware codec (such as ACCESS or BRIC-Link, usually in a studio).

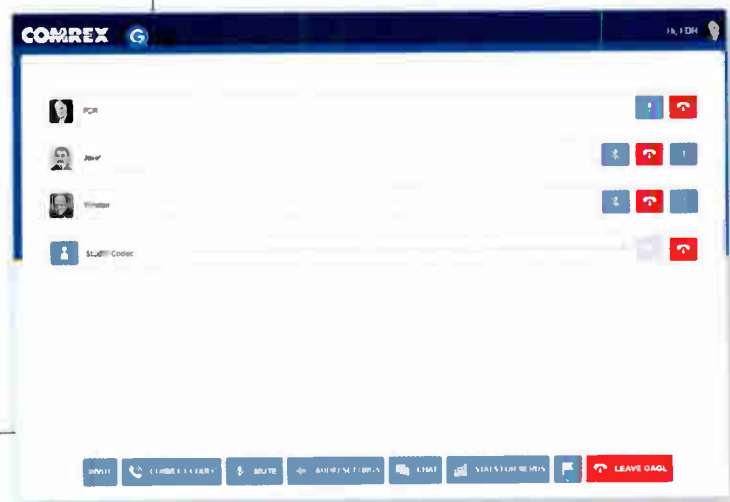
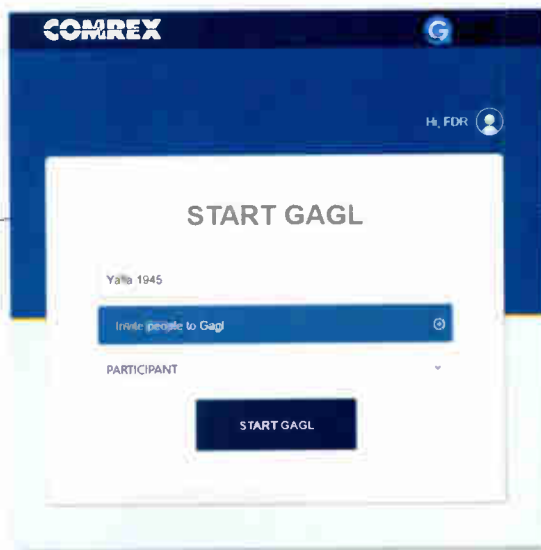
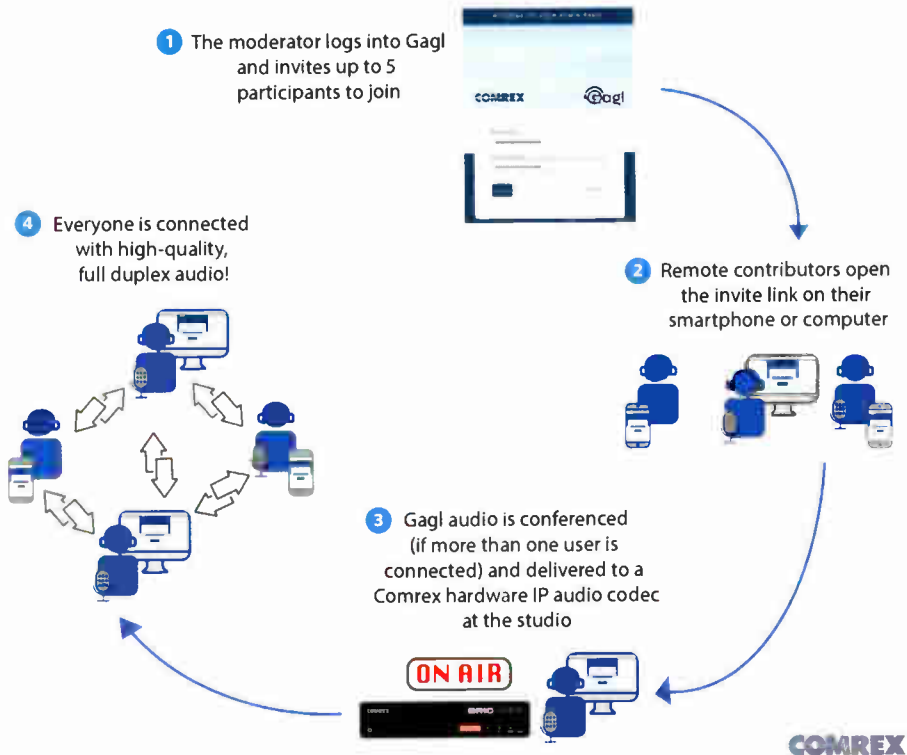
All participants can hear other participants and the codec "send" audio back to them.

Gagl was designed from the ground up with audio in mind. It doesn't send video at all, meaning it requires less Internet bandwidth and therefore has higher stability. It uses the well regarded Opus audio encoder and a bitrate that delivers excellent voice and music quality. It also delivers audio directly to your Comrex codec with all the stability enhancements, prograde audio connections and features that you've come to expect from our hardware.

Gagl can be the entire hub for a round-robin reporting program. It can run an entire morning zoo radio show. Latency is low enough for call-in talk radio. Or it can simply be a portal for a single contributor to connect back to the studio over a computer or smartphone.



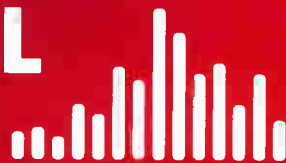
How does Gagl work?



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Remote access with web enabled products

SOUND PROCESSING

All-digital audio processing for AM / FM airchain, general overload protection, and production.



NEW 719N DAVID IV

FM/HD Radio™ Broadcast Processor



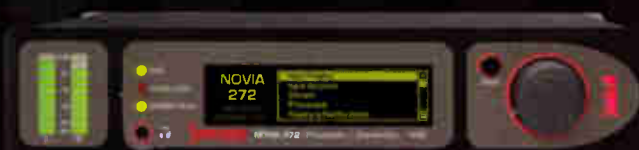
- Streamlined 4th generation DSP-based audio processor.
- 5-bands of dynamic range compression & "Graphic EQ".
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JUSTIN 808

FM/HD Radio® Alignment Processor



- Unique single box solution to maintain time alignment between analog FM & HD1, with precise alignment to within 23 microseconds (± 1 sample). 100% automatic.
- Extensive data logging with graphic display. SMS/email alarm notifications. SNMP support.



NOVIA 272

FM Audio Processor | Stereo Gen | Dynamic RDS



- Models are available for FM, AM, & Dual Mode Stereo.
- 5-bands of dynamic range compression & "Graphic EQ".
- Analog, AES-digital, Streaming IN/OUT. Simple set-up with 10 factory presets and 10 customizable presets.



INOMINI 223

Multimode Audio Processor

- An audio processing powerhouse in a small package.
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- Monoaural.

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- Three-year Factory Warranty.
- Quick to install. Easy to Program.
- Quality after sales service.



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MONITORS
ONLINE



What's your SIP address?

That's the question on the lips of talk radio producers around the world, as the cords are cut on the last few ISDN lines.

One company that has helped to make this transition easy, is In:Quality, with its range of products and services, which allow high quality SIP calls across the internet.



"With the In:Quality SIP codecs, we give the talent the box and equipment, tell them to push the button for whatever station they're on, and go from there."

Brad Beahm, KHAS, RadioWorld Nov 2021

The sip.audio service from In:Quality, can be used with hardware codecs from a range of manufacturers, to allow calls to be made from one codec to another, using the Opus codec, which most such devices and apps now support.

The service is compatible with ipDTL, which offers the same functionality, but in a web browser.



In:Quality has also developed its own range of low cost SIP codecs, which again, uses Opus, and can call any other SIP enabled device, using a simple touchscreen interface. The USB SIP Codec is designed to be used with a USB microphone (with headphones connected), whereas the XLR SIP Codec - as the name suggests - has XLR ports.

"We see Opus and SIP as the future of interoperability in our industry"

Steve George, iHeartMedia, RadioWorld Aug 2019

"One of the biggest issues during COVID, was the inability to scale our codec fleet. Services like ipDTL are certainly paving the way."

Dan Jackson, SCA Australia, RadioWorld Jul 2020



Remotes have never been this easy.



Axia Quasar AoIP Mixing Consoles

The Ultimate Mixing Machines

Axia Quasar™ AoIP consoles are the ultimate AoIP Broadcast Mixing Consoles, putting the power at your fingertips for next-level content creation. Including XR and SR models—the Quasar family offers broadcast engineers and less seasoned board operators alike boundless production possibilities, modularity, scalability, and workflow flexibility.

Tap into the power of AoIP with Axia Quasar, our sixth-generation of AoIP consoles and the industry-standard in mixing excellence. Powered by mature and sophisticated AoIP technology from Telos Alliance—the inventor of AoIP for broadcast—Quasar is designed for steadfast reliability with no single point of failure.

Quasar XR AoIP Console

With the introduction of the Quasar v2.0 Major System Update, the original flagship Quasar console becomes 'Quasar XR'. In addition to increased scalability and modularity, v2.0 also introduces Quasar Soft and Quasar Cast remote control and monitoring solutions, delivers full integration with Telos Infinity® IP Intercom products, and numerous other powerful features. This advanced scalability addresses new workflows and gives broadcasters more flexibility when it comes to the number of channels they need in their Quasar Engine, starting at 16 channels and scaling up to 64 channels.



Quasar SR AoIP Console

If you like Fusion, you'll love Quasar SR—which is comparable to the Fusion console in both price and feature set but also delivers all the power, ergonomics, industrial design, and star appeal of our flagship Quasar XR console. Quasar SR is not reserved for the most knowledgeable broadcaster but is approachable to any board operator thanks to its streamlined surface design. Quasar SR fader modules are non-motorized, there are fewer, larger, and easier-to-reach buttons on each channel strip, and features confidence class metering.



Quasar Engine

The Quasar Engine provides bulletproof mixing console signal processing for Quasar surfaces and is a must-have for the operation of your XR or SR surface. Allowing you to pay only for the number of channels you need, the Quasar Engine is modular, starting at 16 channels and scaling up in blocks of 16 channels.

Quasar Soft

Our customizable remote solution lets you control your Quasar surface from a web browser. Quasar Soft comes standard with Quasar XR consoles and is an optional upgrade for Quasar SR consoles. Included as part of the license, Quasar Cast is a remote monitoring solution that lets you listen to any Livewire stream in the network.



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SR

THE POWER OF SIMPLICITY.



 **QUASAR**

When power and control collide, content creation elevates.
Mix in simplicity, and you've got intuitive, revolutionized workflows.
Introducing Axia® Quasar™ SR AoIP console. Advanced utility and beauty
with a streamlined surface design allow any user from a seasoned pro
to a guest operator to create with ease.

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Tieline Gateway Delivers AoIP Interoperability

Tieline believes in IP interoperability within the broadcast plant, to expand options and simplify workflows when integrating software and hardware from vendors supporting different protocols.

Customized Solutions, Award-Winning Codecs

Tieline's Gateway and Gateway 4 codecs are often 'edge' devices in IP networks bridging between the AoIP broadcast plant, other studios (inter-studio links), production facilities and live events. Interoperability delivers greater flexibility when integrating IP audio streams into the broadcast plant from a range of sources. Gateway and Gateway 4 codecs embrace both proprietary and open standards and protocols across LANs, WANs and the public internet, with simple monitoring and control.

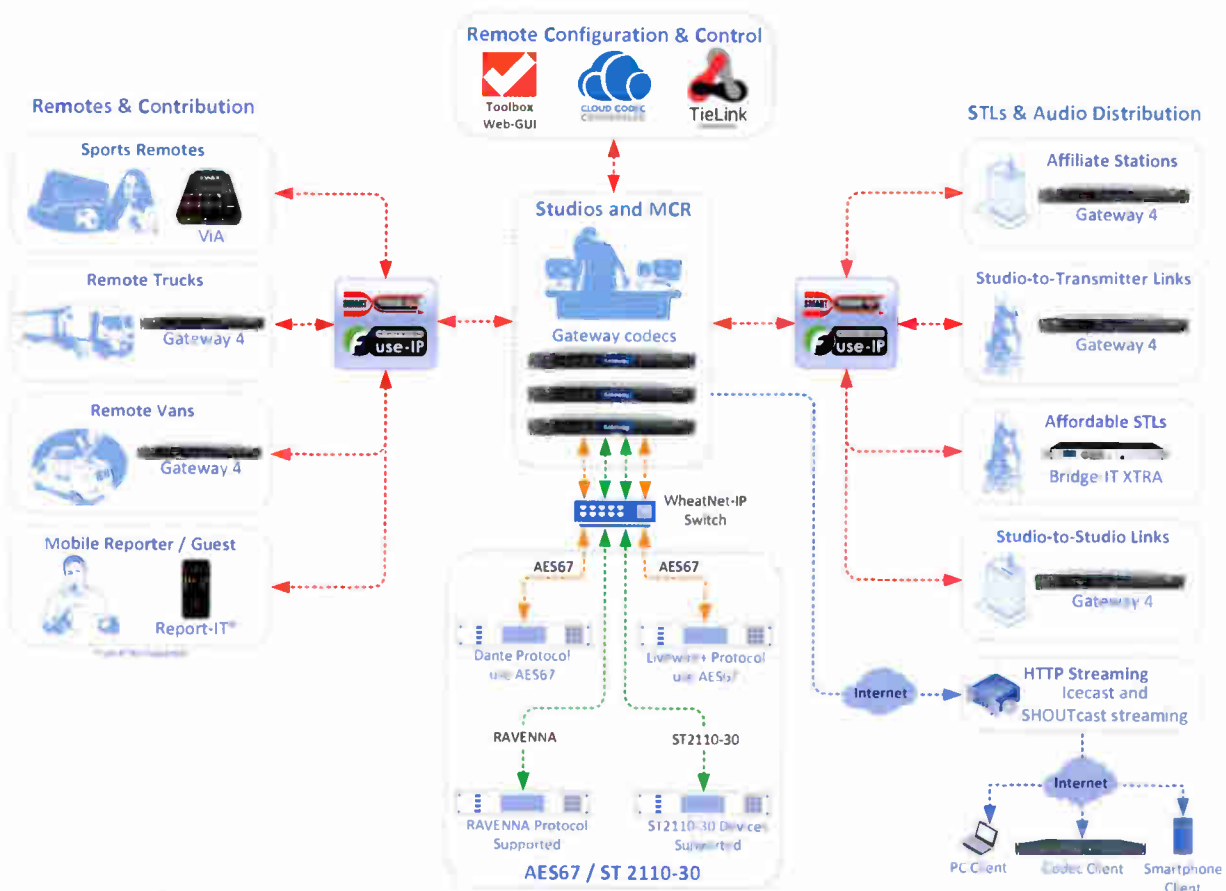
More Standards, More Powerful Solutions

When planning your next AoIP project, remember Tieline talks the language of AES67, ST2110-30, ST 2022-7, RAVENNA, NMOS IS-04 and IS-05, Ember+, and options like WheatNet-IP. Gateway codecs support up to 16 mono or 8 stereo channels with AES3 and analog supported. Plus, you can multi-unicast, multicast, stream up to 8 channels of phase-aligned audio for surround sound solutions, plus HTTP streaming is included as well. We future-proof your investment with simple and free software updates to deliver new technology as it develops.

With innovative and wide-ranging standards-based technology, it's no surprise Tieline is at the heart of major global broadcast networks. Contact Tieline today and take your network to the next level.

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Connect Anywhere, Anytime

Codecs for Remotes, STLs and Audio Distribution

— Audio Distribution & Multiple Remotes —

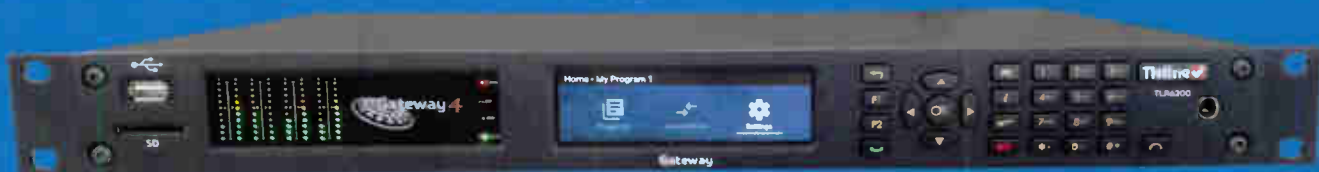
Gateway



16 channels with AES67, ST 211C-30, NMOS, RAVENNA, AES3 & analog I/O, plus optional WheatNet-IP.

— STLs & Remotes —

Gateway 4



4 channels with AES67, ST 211C-30, NMOS, RAVENNA, AES3 & analog I/O, plus optional WheatNet-IP.

— Remotes —

VIA

With 7 IP interface options, stream dual mono, stereo plus mono, or triple mono with a single touch.



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The Battle for the Dash: How Radio Can Compete Today and Win the Future

The battle for the dash will not be won in an analog world, the competition is too fierce, with more than 12 deep-pocketed services vying to displace radio from the dashboard.

The only shot radio has at staying relevant in the dash is hybrid radio, like the globally available DTS AutoStage. A part of Xperi's suite of technologies, DTS AutoStage combines traditional radio with IP-delivered content to improve radio discovery and provide richer user experiences.

A Modern UX for Radio

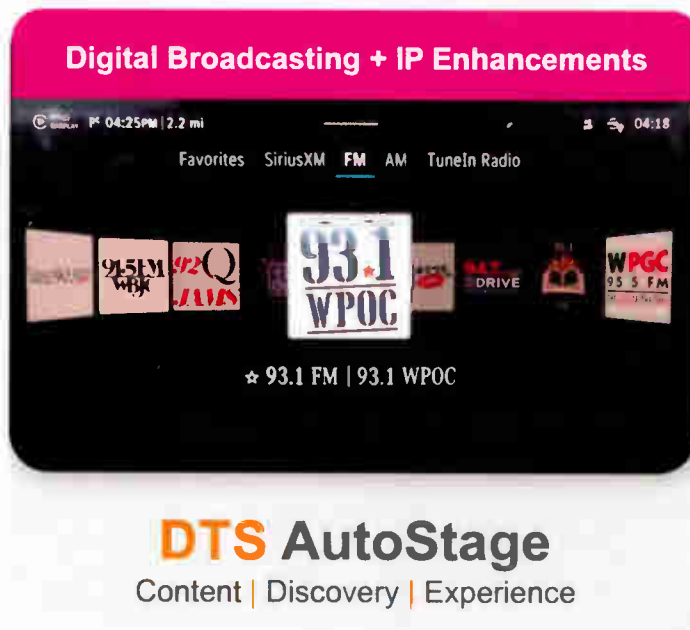
The latest DTS AutoStage implementation in the Mercedes-Benz S-Class shows what radio can become. And not a moment too soon, as AM/FM (enhanced by HD Radio and DTS AutoStage) must compete with Sirius XM and TuneIn in the radio category. DTS AutoStage levels the playing field by showcasing rich imagery, logos and artist / song level metadata that makes radio competitive in the dash against all other apps.

Radio's Collaborative Response to Big Tech

Open to all broadcasters, DTS AutoStage ensures broadcaster control and prominence, free of charge and capital investment. Designed with broadcasters, consumers, and OEMs in mind, DTS AutoStage is a global and reliable platform that enhances discovery, provides rich engagement, and exploration of new content, while feeding back valuable user insights to broadcasters.

Xperi's HD Radio technology is currently supported by about 80 million vehicles in the U.S. today and about 2,500 radio stations. DTS AutoStage is available in 60+ countries.

JOIN US TODAY



DTS AutoStage
Content | Discovery | Experience



"The battle for the dash will not be won in an analog world. The competition is no longer other stations up and down the radio dial, but 12 deep-pocketed digital audio services with a combined 900 million registered users and \$41.5 billion in revenues. Hybrid radio can help broadcasters compete and remain relevant in what's become a connected car battlefield. XPERI is your trusted partner and DTS AutoStage is THE Competitive Response for radio."

— JOE D'ANGELO, SVP,
BROADCAST RADIO

XPERI PROVIDES YOUR BEST DEFENSE AND OFFENSE

Global Hybrid Platform

Dominate The Connected Digital Dash

DTS AutoStage
Content | Discovery | Experience



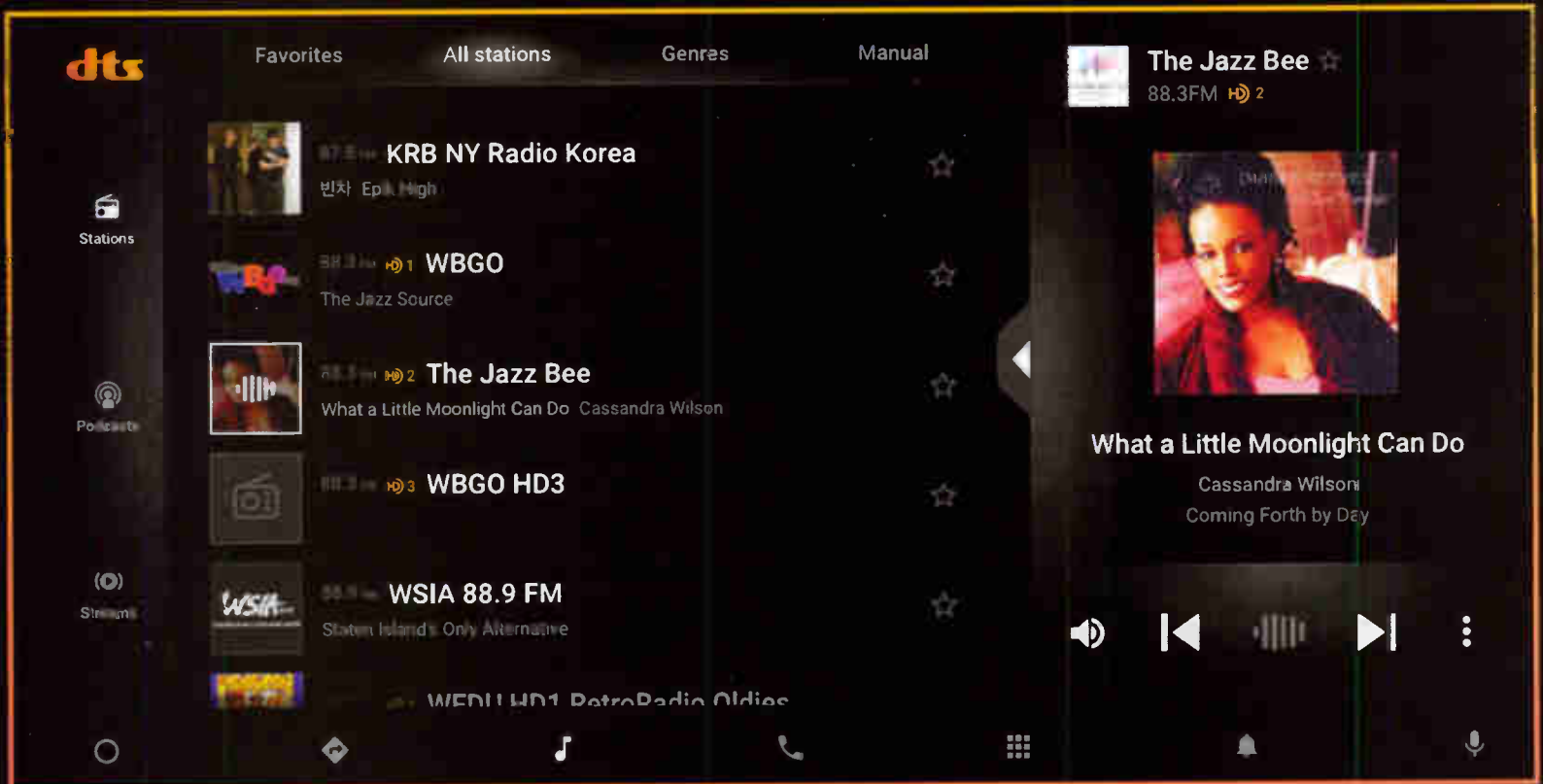
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Radio's Response Against Big Tech



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Xperi's DTS AutoStage®
redefines in-cabin media consumption
by seamlessly combining terrestrial radio
with internet-delivered metadata"

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Frost & Sullivan's 2021
North American COMPANY OF THE YEAR
in the Connected Car Media Industry

Informa Tech's 2021
Automotive Infotainment
Product / Service of the Year

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World Radio History

Supplier Cross Index

This section helps you locate suppliers of types of equipment and services. Find contact information for these companies in the Vendor & Product Directory section. This list is based on information provided by the companies, which are listed only if they checked a given category.

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Acoustics First Corp.
Phillystran

ANTENNAS, FEEDLINE AND WAVEGUIDE

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Bext Corp.
Broadcast Partners
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Information Station Specialists Inc.
Jampro Antennas Inc.
Kintronic Labs Inc.
LBA Technology Inc.
meduci LLC
Micronetixx LLC
Myat Inc.
Nova Electronics
OMB America
OnAir Medya
Progressive Concepts
Propagation Systems Inc.
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SCMS Inc.
Shively Labs
Telsat Srl
Transcom Corp.
Tunwall Radio LLC

APPS

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Aair Inc.
Cirrus Streaming
ENCO Systems Inc.
Futuri
NeoGroupe
Xperi

ASSOCIATIONS AND ORGANIZATIONS

Audio Engineering Society
Association of Minnesota Public
Educational Radio Stations (AMPERS)
IEEE Broadcast Technology Society
NATE: The Communications
Infrastructure Contractors Assoc.
National Association of Broadcasters
National Federation of
Community Broadcasters
Society of Broadcast Engineers

AUDIO ACCESSORIES & PROBLEM-SOLVERS

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Broadcast Devices Inc.
Broadcast Tools Inc.
Calrec Audio
DaySequerra
DHD audio GmbH
Electro-Voice
Energy Transformation Systems
Henry Engineering

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JK Audio
Lynx Studio Technology
Modulation Index LLC
Movo
Neutrik USA Inc.
Paravel Systems LLC
Pro Audio Interface
Sierra Automated Systems
StudioHub
Titus Technological Laboratories
Yellowtec

AUDIO DELAYS — PROFANITY AND DIVERSITY

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Axia Audio
Bay Country Broadcast Equipment Inc.
Eventide
Logitek Electronic Systems Inc.
Orban
Sonifex Ltd.
Telos Alliance

AUDIO DISTRIBUTION, BETWEEN LOCATIONS

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AudioScience Inc.
AVT Audio Video Technologies
Barix
Comrex
Digigram
DoubleRadius Inc.
Energy Transformation Systems
GatesAir
GeoBroadcast Solutions
Granite Telecommunications
Lawo Inc.
Moseley Associates Inc.
Nautel
NPR Distribution Services (NPRDS)
OnAir Medya
Sonifex Ltd.
Summit Technology Group
Systembase Ltd.
Thimeo Audio Technology
WorldCast Systems Inc.

AUDIO LOGGERS

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Broadcast Software International
Burli Software Inc.
DM Broadcast
OnAir Medya
Summit Technology Group
Tracy Johnson Media Group
Wedel Software
Win-Group
Win-OMT Software Inc.

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AudioScience
Axia Audio
Axel Technology
Bay Country Broadcast
Equipment Inc.
Broadcast Software International
BSW
BW Broadcast Ltd.

Calrec Audio
DaySequerra
DEVA Broadcast LLC
Eventide
High Sound
Inovonics Inc.
Modulation Index LLC
Netia
Omnia Audio
On-Hertz
OPNS
Orban
RCS Sound Software
Telos Alliance
Thimeo Audio Technology
Titus Technological Laboratories
Wedel Software
Wheatstone Corp.
Win-OMT Software Inc.

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Adthos
AudioScience
Axel Technology
Broadcast Software International
BW Broadcast Ltd.
Calrec Audio
DaySequerra
DM Broadcast
Eventide
ESE
Genelec
Inovonics Inc.
JT Communications
Lynx Studio Technology
Modulation Index LLC
Netia
OmniPlayer
Orban
PreSonus Audio Electronics Inc.
Thimeo Audio Technology
Wheatstone Corp.
Win-OMT Software Inc.

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AEQ Broadcast International Inc.
Angry Audio
Arrakis Systems
Audinate
AudioScience
AudioTX
Broadcast Devices Inc.
Broadcast Tools Inc.
DaySequerra
DHD audio GmbH
Digital Alert Systems
DoubleRadius Inc.
Energy Transformation Systems
ESE
Glensound
Henry Engineering
Lawo Inc.
Logitek Electronic Systems Inc.
Lynx Studio Technology
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AUTOMATIC CONTENT RECOGNITION

ENCO Systems Inc.
OPNS

AUTOMATION, PLAYOUT AND LOGGING

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Smarts Broadcast
StreamGuys
Summit Technology Group
WideOrbit
Win-Group
Win-OMT Software Inc.
Xytech Systems

CAPTIONING

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CLOCKS & TIMERS

ESE
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RAM Systems LLC

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Burli Software Inc.
Cirrus Streaming
Digigram
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AVT Audio Video Technologies GmbH
Axia Audio
Barix
Bay Country Broadcast Equipment Inc.
Broadcast Bionics
BSW
Comrex
DEVA Broadcast LLC
Digigram
GatesAir
JK Audio
MaxxKonnnect Group
Modulation Index LLC
Omnia Audio
On-Hertz
Orban
SIPitPro Ltf
Synthax US
SystemBase
Telos Alliance
Thimeo Audio Technology B.V.
Tieline
WorldCast Systems Inc.

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MaxxKonnnect Group

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Arrakis Systems
Audioarts Engineering
Axel Technology
Axia Audio
Broadcast Radio Ltd.
Broadcast Tools Inc.
BSW
Calrec Audio
DHD audio GmbH
DM Broadcast
Glensound
JK Audio
Lawo Inc.
Logitek Electronic Systems Inc.
Omnia Audio
On-Hertz
PreSonus Audio Electronics Inc.
Progressive Concepts
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Sierra Automated Systems
Synthax US
Telos Alliance
Wheatstone Corp.
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Central Coast Electronics
DNAV Inc.
Expert Broadcast Electronics
FullWave Tower and Broadcast
GeoBroadcast Solutions
Hatfield & Dawson Consulting Engineers LLC
JM Stitt & Associates Inc.
Kintronic Labs Inc.
Kline Consulting Group LLC
LBA Technology Inc.
Lightner Electronics Inc.
Nova Electronics
ProAudio.com
Second Opinion Communications Inc.
Shulins' Solutions
Summit Technology Group
Technical Services Group (TSG)
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CONTENT SYNDICATION AND FORMATS

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Talk Shows USA
UncompressedMusic.com

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Movo
ProAudio.com
Radio Systems
SCMS Inc.
Synthax US

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Digispot System
Lynx Studio Technology
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Wheatstone Corp.
Xperi

DRONE-BASED SERVICES

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Neutrik USA Inc.
Novus Power Products LLC
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DTS Audio
Global Security Systems
Gorman Redlich Mfg. Co.
Progressive Concepts
Sage Alerting Systems

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V-Soft Communications

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MaxxKonnnect Group
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Paravel Systems LLC
Phillystran
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CPI — Eimac Operations
DAWNco

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ECONCO
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Tunwall Radio LLC

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Coaxial Dynamics
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Dielectric LLC
Electronics Research Inc.
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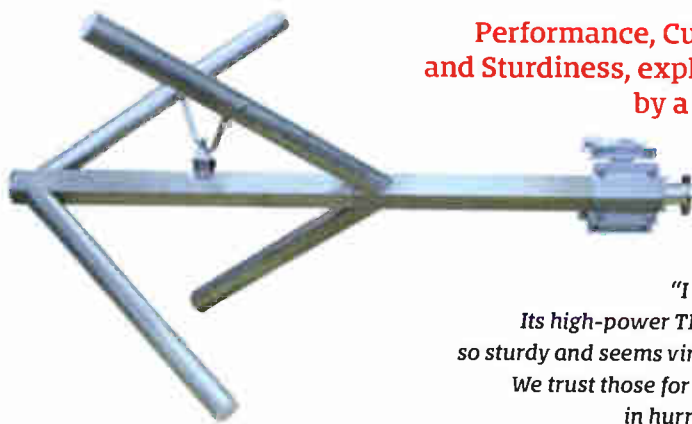
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Radio Systems
Sierra Automated Systems
SIPitPro Ltf
Telos Alliance

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Propagation Systems
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www.aiir.com

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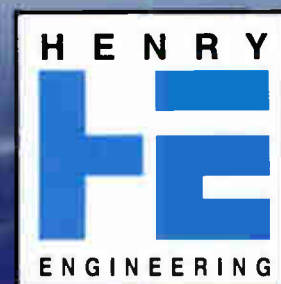
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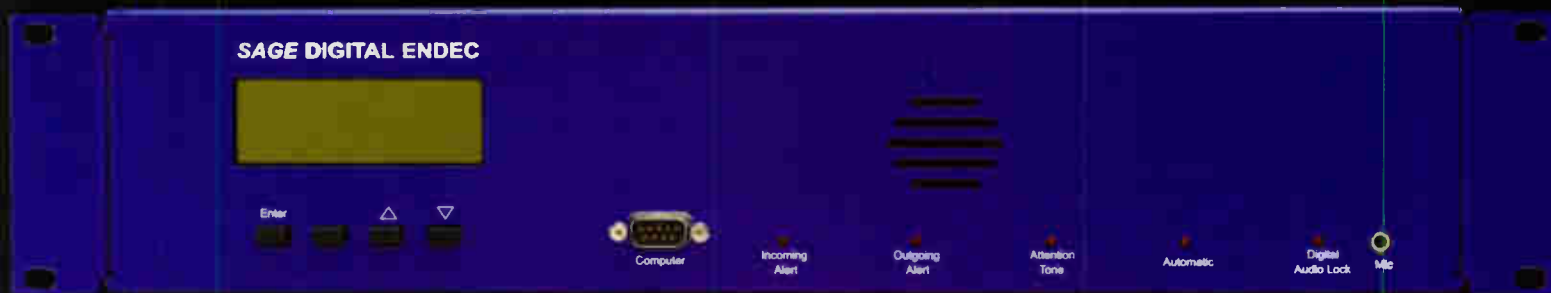
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Products/Services: Wheatstone Corp. designs and manufactures professional broadcast audio equipment under the Wheatstone, Audioarts and VoxPro brand names. Products include digital and analog audio consoles, audio-over-IP networks, digital audio editing hardware and software, signal processing for broadcast, and customizable graphical user interfaces for real-time control of audio network systems.

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Products/Services: WorldCast Systems is a global company and leading solution provider for media and broadcast, with 60+ years of RF experience. With established brands APT, Egreso, Audemat and Kybio, its solutions cover the entire broadcast chain from contribution, to AoIP/MPXoIP distribution, FM transmission, RDS broadcast, signal test and measurement, telemetry, antenna management and monitoring.

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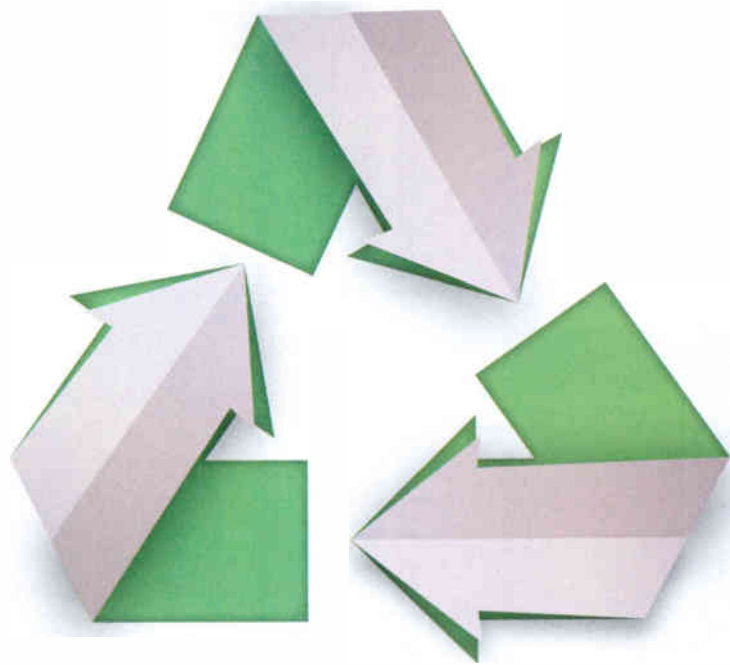
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| SWITCH 1 | |
|-------------------|--------------------|
| Current Position: | A: SWITCH 1: POS A |
| Movement State: | Switch In Position |
| Interlock Path A: | Safe |
| Interlock Path B: | Safe |
| Tx 1 Interlock: | Safe |
| Tx 1 On/Off: | On |
| Tx 2 Interlock: | Safe |
| Tx 2 On/Off: | Off |

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SWITCH 1: POS A

SWITCH 1: POS B

Broadcast Devices has ISC-200 motorized switch controller

Controls RF switches and provides control and status for up to four transmitters

The ISC-200 dual switch controller is an SNMP web-based RF switch controller with direct interface for up to two RF switches. The manufacturer calls it a plug-and-play remote control system.

This 1 RU product provides independent control and status of each switch. Independent interlock control for two sets of two transmitters is provided.

The controller is compatible for use with major RF switches on the market. Control voltage is selectable to 12 or 24 VDC for each switch.

BDI also offers pre-made and tested RF switch interface cables for popular RF switches. Other features include RF

safe inputs for both switches for interface to BDI's popular DPS-100D series power meters.

Other accessories include a new TX I/O module kit that provides essential connection of TX On/Off, external interlock input and TX On/Off status by Cat-5 cable runs.

GPIO is included to control and monitor position status of each switch for legacy remote control systems or local control/status panels.

The ISC-200 includes a graphical user interface for remote monitor and control via Windows 7, 8 and 10 operating systems

Above
Easy to read and operate, a graphical user interface for control and monitoring of each switch is provided.



More info
Broadcast Devices at 1-914-737-5032 or visit www.broadcast-devices.com.

Burk Arcturus serves Washington's WAMU

Complex master antenna requires muscular monitoring and control

Writers

Rob Bertrand
Senior Director of Technology, WAMU

Andy Gunn
Director of Engineering, WAMU

Early in 2020, WAMU completed its new ERI 1183-series FM master antenna system, the largest in Washington, D.C. It serves WAMU, WTOP and WPFW, and is an aux for WETA. The tower also holds separate noncombined antennas for WMMJ(FM) and a backup to WPGC(FM). (Read Radio World's 2020 article about the project at radioworld.com, search "wamu master.")

Senior Director of Technology Rob Bertrand had been part of the management group for a high-profile master antenna group in another major market, which had experienced some operational challenges over the course of its history that a modern monitoring system might have alleviated. When Director of Engineering Andy Gunn joined the WAMU team, the two set the goal of building the most robust system they could imagine.

Rob contributed his knowledge from managing the prior system and Andy brought his tenacity, creativity, and attention to detail to the project. The result was an implementation of Burk's Arcturus system of which both engineers are very proud and is a showcase of the system's capabilities.

The monitoring and control project sought to address multiple concerns from the start. Several of the stations have relatively high TPOs in the 20 to 30 kW range, so very solid VSWR monitoring is important. There are unique switching and monitoring considerations to meet some of the backup features incorporated into the antenna systems. There was also a strong desire to ensure the system would accommodate the addition of more stations in the future.

Prior experiences with esoteric failures made redundancy a significant design concern across the system. WAMU wanted dual interlock strings for each station operating in parallel so no single wire would cause an interlock issue for stations. They also added dual dehydrators, which automatically rotate duty cycle via Arcturus, and can be switched online in the event of failure.

Multiple safety features were incorporated: U-links on every transmitter input to the system as well as a key switch and controller lockout system to protect climbers on the tower. There is also a centrally located interlock bypass for when maintenance is required on the VSWR



Rob Bertrand, left, and Andy Gunn

monitoring system itself.

The Burk Plus-X VSWR fit the bill for a self-contained VSWR monitoring unit that would be fast-acting, have three-strike capability, and operate even if it lost connection to the Arcturus controller. Additional Burk Plus-X 600 and Plus-X EM32 units provide the necessary I/O to operate additional functions and monitor critical temperatures, fire, and security statuses throughout the complex.

Burk engineers collaborated with WAMU to program many macros on the Arcturus system that gives it the extensive functionality required. The sheer quantity of monitoring and control points across the system necessitated relatively complex macros, which Burk designed. WAMU also requested the ability to view key system values over the course of a year, so that operating variables across seasons could be tracked. Burk delivered multiple custom pages of monitoring and control in AutoPilot to meet all these needs. Paul Shulins and David Wing of Shulins Solutions provided integration services for the installation of the system. They were vital in thinking through the installation and making sure there were no "gotchas" in this stage.

The Arcturus system has been running reliably for WAMU and its tenants for nearly 18 months. During the initial buildout there were several challenges in ironing out final configurations, but Burk support worked with WAMU as was necessary to get everything as they wanted it to be. The wiring for the system is very complex, and the labeling and documentation for the system is similarly complex. It took a while to determine the best method to label and document the system. The complex macros required extensive testing to ensure they didn't have any unintended consequences — for instance, opening interlocks in the event of power loss to a single unit or loss of network connection between the devices. Thorough testing and final corrective action ensured the platform will be reliable and responsive to the needs of DC's largest master FM system for years to come. 🍷



Above
The Digital Alert Systems DASDEC-II platform is an FCC-certified decoder platform designed to support the Emergency Alert System infrastructure.



More info

Contact Digital Alert Systems at 1-585-765-1155 or visit www.digitalalertsystems.com.

38

DAS adds to EAS line

For remote monitoring and EAS management, Digital Alert Systems highlights its EAS-Net, Collector and HALO product set.

Using the company's EAS-Net communications protocol, DASDEC emergency messaging platforms can forward both message data and audio to the unique software-based Collector for processing/routing at one or multiple centralcast sites. The company says that whether Collector is hosted at a local server or in a cloud environment, it creates a virtual hub with DASDEC "spokes" receiving and decoding off-air signals, thereby eliminating complex remote radio streaming configurations.

The patent-pending HALO enterprise-grade EAS device management tool enables detailed monitoring of up to hundreds of DASDEC units in a virtual environment.

HALO gives multiple users access to one web-based dashboard to verify monitoring station status and network

connections, with detailed logging across hundreds of devices. Users can generate compliance reports for one or any number of devices, without the need to gather and compile logs from individual devices. All the information is readily available, searchable, selectable and reportable at the touch of a virtual button.

“ HALO gives multiple users access to one web-based dashboard to verify monitoring station status and network connections. ”

WIHS upgrades automation with ENCO DAD

Transition from a legacy deployment goes smoothly

Noncommercial, listener-supported WIHS/104.9 FM is a ministry of the Connecticut Radio Fellowship and broadcasts music plus local and national Christian programming to listeners in Connecticut, Western Massachusetts and parts of Long Island, N.Y.

I had worked at the station from 1985 to 1991, and returned last year as its general manager and chief engineer.

One of my first priorities is refurbishing all three of our station's studios. The main objective is to update our technology, but also make the studios more aesthetically pleasing.

Phase 1 of the project was the upgrade of our on-air studio, replacing everything from the furniture and flooring to the audio console. At the heart of our technology overhaul was a significant upgrade to our ENCO DAD automation and playout system.

WIHS was a long-time satisfied ENCO customer, but our DAD deployment had not been updated in many years. The software was seven major versions behind the current release, and most of the hardware it was running on was well beyond the viable lifecycle for any computer platform. I felt like we were using the old system on borrowed time.

With our announcers familiar and happy with DAD already, we decided to stay on the ENCO platform for the upgrade. I wanted all of the equipment to come from ENCO so they could fully configure and test it before shipping it to us, making it mostly "plug-and-play" when we received it. We purchased everything turnkey from ENCO, from the mice and monitors to the workstations and network switch.

Writer
Steve
Tuzeneu

General
Manager and
Chief Engineer,
WIHS(FM)



More info

Contact Sam
Bortz at ENCO
Systems in
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or visit www.enco.com.

Rather than simply replacing the systems in our previous configuration, ENCO's technical team re-architected our deployment to reduce our hardware requirements. Our old installation did not have a true server, and it had two workstations just running supporting utilities. By deploying a DAD server license on a new file server and consolidating those utilities onto it, we went from eight workstations down to five.

The upgrade went smoothly. An ENCO technician helped us migrate our existing DAD libraries to the new system and came to our station for final refinements and training.

Our staff members vary in their technical aptitude, but everybody has adapted nicely to the new system. We went on-air with our new ENCO deployment June 17, and it has made our playout extremely reliable and less prone to the usual issues associated with aging hardware.

Our station is roughly 60% programming and 40% music, and the DAD platform helps us by

making program retrieval largely automated. The combination of the DAD DropBox utility (for watch folder monitoring) and enConveyor utility (for automating FTP and web downloads) lets us efficiently get programs into our system in ready-for-air formats with minimal intervention.

We are also in the process of deploying ENCO's WebDAD for browser-based remote control of the DAD system. My intention is to be able to operate the station remotely, so I can give our on-air staff time off for major holidays or when we can't find somebody to fill a shift. With WebDAD, I'll be able to make any changes from home if needed, without requiring staff to be in the studio.

I have been pleased with both the new system and the upgrade process. The support and level of information we received from ENCO have been stellar, and we have peace of mind that we no longer have to worry about legacy equipment failing. 🙌



Writer
 Ryan
 Houlihan
 Group
 Engineering
 and IT
 Manager,
 Frontier Media



More info
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 visit www.logitekaudio.com.

Logitek brings compact AoIP to Alaska broadcaster

mixIT's size and powerful package appeal to Frontier

Frontier Media operates radio centers in Alaska and Texas, and we've had quite a bit of experience with Logitek equipment over the years.

Our move into AoIP operation began when our Texarkana radio center had a lightning strike that took out basically everything in that studio and we needed brand new everything. With that rebuild, we selected Logitek JetStream Minis and Pilot consoles.

After seeing the advantages and possibilities of what that system can do, it had always been in the back of our minds to transition our Juneau stations to a similar setup one day.

That "day" arrived in late 2020 when we bought our first Jet67 and mixIT-12 for a new studio we were building out for a brand-new station in the Juneau center.

We completed that installation in January 2021. A couple months later we began working on a renovation of our Juneau newsroom.

Since we'd already gotten one Jet67-mixIT combination, we figured we'd keep building out our AoIP

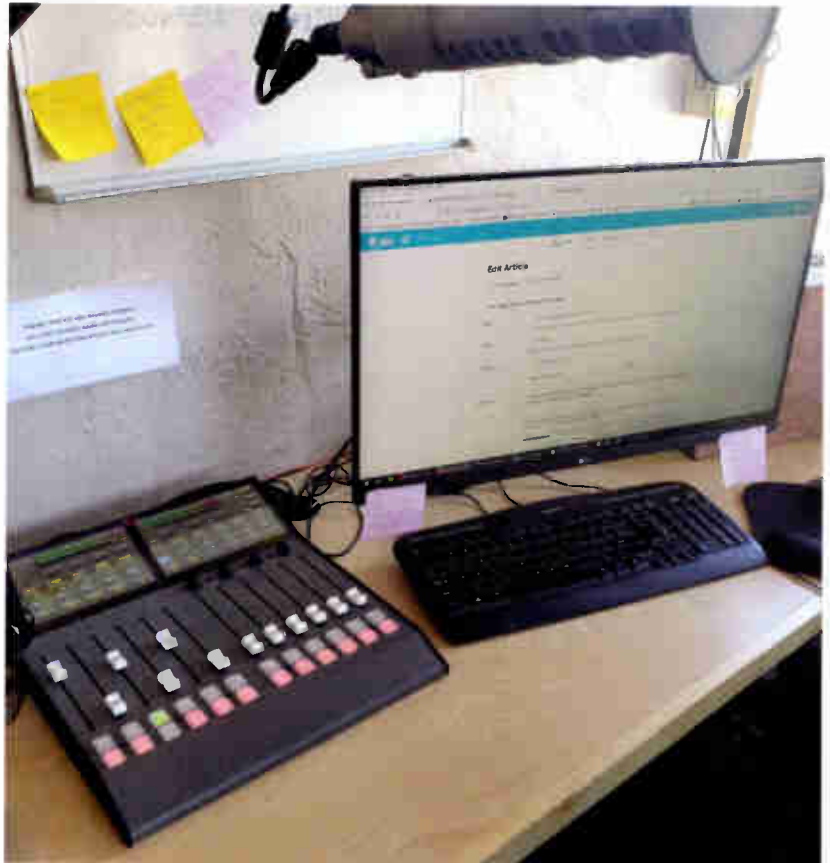
system and get another set for the newsroom. This was also the first studio I'd personally built out from the ground up. The installation of the mixIT and Jet67 in that studio was completed over one weekend in April 2021.

Both installations in Juneau went smoothly, with everything working as I had anticipated. I have experience with the JetStream Server programs, which are also used to configure the Jet67 and mixIT, so I had no major hiccups or obstacles.

Cable management is minimal in these installations because you only have to run one single Ethernet cable to the mixIT, which means you've only got one cable coming out of the table and connecting to your console, whereas with traditional consoles you might have dozens of cables coming out of your console that can be a hassle to tie all together and make it not look like a rat's nest.

With a little planning I was able to mount the Jet67 right next to the punchdown block with all its audio sources.

The mixIT packs a punch for its size. We've got mixers



that are about the same size that don't do half as much as the mixIT. We've also got mixers that can rival what the mixIT can do but they're a lot bigger, and I imagine cost a good deal more.

Getting up to 16 total analog/mic inputs, up to 16 analog outputs, plus two digital ins and outs, and four total output busses (Program/A1/A2/A3), for the price you're paying is impressive. Even if you're not yet tapping into the AoIP networking potential, for the number of inputs and output busses you're getting solid value for what you're paying.

On the control surface, all the fader sources are clearly labeled so users know what is where, and it's easy to switch sources with a couple taps on the touch screen display. Which to me is another advantage of the mixIT; for all the possibilities it offers and how complex you can make it, you can also set it up to be simple from a usability standpoint. 🍌

Above
 Frontier Media's newsroom. The Logitek mixIT fits into a small space.

KQAL's move to HD is simplified with Nautel

Upgrade went live in the fall of 2020 with a VS2.5HD transmitter

Writer

Mike Martin

Operations Manager, KQAL(FM)



More info

For information, contact Nautel in Nova Scotia at 1-902-823-5131 or visit www.nautel.com.

WINONA, Minn. — The campus radio station at Winona State University has always led the way in technology among broadcasters in Winona, Minn.

KQAL(FM) was the first radio station in the area with a website; it was the first to do online streaming; the first with a mobile app, and the first to broadcast RDS song/artist metadata. So being the first to broadcast in HD Radio was a logical step for KQAL.

Our upgrade to HD Radio operation went on air in October 2020 with a new Nautel VS2.5 HD transmitter and the new HD Multicast+ Importer/Exporter.

We have been using Nautel for a long time. KQAL's first venture with Nautel was a M50/V1 exciter/transmitter combo, we then moved up to the VS1, and when we decided to go HD it was a no brainer to stay with Nautel. The customer support, reliability and AUI are unparalleled. And our rep, Jeff Welton, guided us along every step of the way.

The HD MultiCast+ made our transition to HD easy and installation was a breeze. It is basically the standards-based version of Xperi's HD Radio software implemented on a device that uses an embedded Windows site server. This is a proven, well-supported industrial-quality OS that is used for high-availability applications ranging from bank machines to audio processors.

To put it simply, AES digital audio goes into the onboard sound card and HD Radio comes out, ready to be fed into the Nautel HD exciter. The installation manual is comprehensive yet easy to follow. The only tech support I needed y was to resolve a question about what port to use for song/artist metadata.

Before Nautel can ship any equipment, stations must have a license agreement with Xperi. Being a state university station, KQAL had to receive contract approval from the system office in St. Paul, Minn., and that process delayed us for several weeks.

But when that was resolved, things moved fast. Xperi notified Nautel of the consummated deal on a Thursday, Nautel shipped Friday and it was on-site Monday.

KQAL is an Axia Livewire plant; all sources are digital



with no analog conversions at any point, including a digital STL. The 2 RU HD MultiCast+ has everything we needed for managing our signal. It works flawlessly with Livewire; it encodes our digital channel along with data services, and it supports the Artist Experience information that we hope to use soon. The exporter brings together the digital version of the main audio stream plus the HD content and feeds it all to the VS2.5.

Our General Manager Doug Westerman teaches a "Fundamentals of Radio" course at WSU. It's a great entry to try broadcasting, putting students into the KQAL environment to learn the basics of radio at an actual station. Adding the HD capability to KQAL ensures that our students are staying on the cutting edge of radio technologies, programming and operation. It's just another "first" for a university that has been leading the way since 1858. 🎧

Above
The author with the new KQAL transmitter.

Writer

Christavus Dominice
 Founder and CEO
 Radio Free Entertainment Network Ltd.

StreamGuys provides growth platform for RFEN

CDN and SaaS tools help aggregator support broadcasters with live streaming, podcast hosting and distribution



More info

Contact Jason Osburn at StreamGuys at 1-707-667-9479 or visit www.streamguys.com.

Radio Free Entertainment Network Ltd. is a broadcast and internet streaming radio network playing the music of renowned and independent artists as well as local talk shows. We are dedicated to empowering our communities to promote educational, civic and cultural development by amplifying the voices of the traditionally underrepresented.

Its origins date to my tenure as general manager of grassroots radio station WMVU(FM), Radio Free Akron. When we decided to start broadcasting WMVU online in 2019, we chose StreamGuys as our streaming service provider at the recommendation of our engineer Blake Thompson.

With our success in streaming WMVU and my desire to bring more community to the world through music, I wanted to expand our efforts into a full-service radio network to help more people get their content out. I approached the principals at WMVU with my idea, and launched RFEN in March 2021 with co-founders Warner Mendenhall and Shuaib Meacham.

RFEN now hosts and aggregates live content from a growing roster of stations beyond the Akron area including Youth Artist Network Radio from Waterloo, Iowa; hip-hop station WJJN(FM) in Dothan, Ala.; and urban gospel station WINW(AM) in Canton, Ohio.

We use a broad range of StreamGuys solutions. In addition to delivering streams over its CDN, we use the SGplayer HTML5-based multimedia player and rely on analytics tools such as SGreports and SGmon to monitor

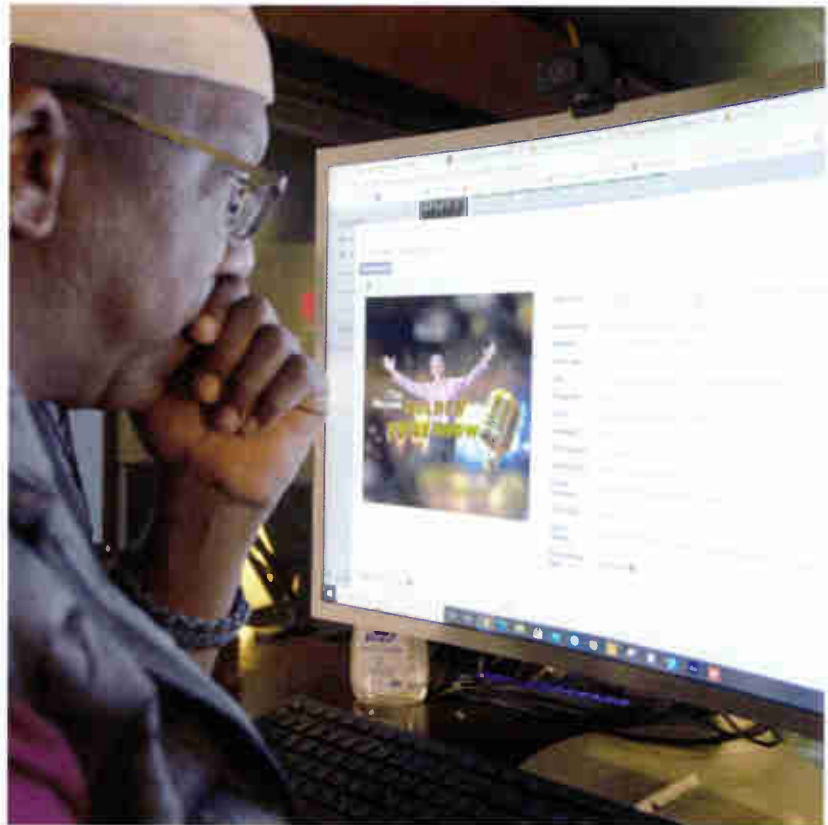


Photo credit: Thomas H. Heston

and measure our operations and audience traffic. StreamGuys created an Alexa skill for WMVU to allow the station to be accessed easily on smart speakers.

We also used StreamGuys partner SoCast to create our website and mobile app, and products such as encoders from StreamGuys partners including Videon and Telos.

While at first we focused on live streaming, we added podcast hosting and distribution at the request of our clients. StreamGuys once again made it easy for us to expand our offerings, and we use SGrecast for podcast management and publishing.

In addition to audio, we are starting to use StreamGuys services for video. We are using SGrecast to manage video podcasts and delivering them over StreamGuys' CDN.

I love the reliability, great sound and functionality that we get from StreamGuys' streaming tools and SGrecast, but the number one thing I like about StreamGuys is its customer service. I can call them at any time, and they treat me like I'm a multimillion-dollar client.

I am not an engineer, so having StreamGuys provide managed services is worth every penny in taking the technical load off me and my team. 🙌

Above
 Christavus Dominice at work with StreamGuys' SaaS tools.



Studio Technology handles Hubbard in Cincinnati

Personal service and attention to detail please Queen City cluster

Writer

Brett Patram

Director of Engineering
Hubbard Radio Cincinnati

Choosing Studio Technology to produce the studio furniture for the new Hubbard Radio Cincinnati cluster was one of the easier decisions that we made in that project.

Vince Fiola, Studio Technology's owner, made a trip in person, sitting down with the local staff and development team in the earlier

planning stages. He came up with several preliminary furniture designs based on the needs and features requested from our staff. After some revisions and tweaks, we had a solid furniture plan for the 12 studios that were to be built.

Studio Technology created 3D renderings of the studio spaces and furniture. Those renderings were helpful for the programming staff to better visualize the furniture design and how it would look spatially.

During the early stages of the building construction, Vince came back on-site and we did a walkthrough of the

studios. He took detailed measurements and marked out where cable conduit wall boxes should ideally be located. He worked directly with our architects and their CAD drawings to ensure the furniture would fit perfectly into each space.

Studio Technology also worked with our interior designer and operations manager on the specific materials, finishes, colors, etc. After the furniture was installed, we had realized we needed to make a couple additions in the on-air studios. Studio Technology was extremely helpful and consulted through what the best options would be. They made it happen.

The furniture look was superb, and its design is very functional. My team and I enjoyed working with it. Having the ample space inside to manage cabling and the overall easy cabinet access was great. The on-air and programming staff enjoy it daily because they now have a workspace that fits their needs.

We have been very pleased with the furniture from Studio Technology on this project. 🙌



Info

Contact Vince Fiola at Studio Technology at 1-610-925-2785 or vince@studiotechology.com.

Writer
Lance
McFarlin
General
Manager,
KTRL/KXTR,
Tarleton State
University

Gateway delivers flexibility for Tarleton State

Texas university turns to Tieline as a proven performer



Info

Contact Doug Ferber at Tieline at 1-888-211-6989. For international queries contact Charlie Gawley in Western Australia at 61-8-9413-2000 or visit www.tieline.com.

I manage two stations at Tarleton State University in Stephenville, Texas, and we have used Tieline's Report-IT app and iMix G3, Commander and Merlin codecs in the past.

Recently we purchased the Tieline Gateway 8 to use for sports and other remote broadcasts on KTRL(FM) 90.5 MHz and KXTR(LP) 100.7 MHz. Some Gateway channels are hooked up to a Logitek console in one studio via a JetStream Mini, and others are hooked up to the Logitek console in our other studio. Codec outputs are networked across to all three of our Logitek consoles, including a production suite.

We selected the Tieline Gateway 8 as it streamlined our setup by using a single codec for remotes on both stations. Tieline's upgrade path allows us to expand channel capabilities via software upgrades in future as required.

My "go-to"

The new Gateway 8 replaces an older Commander codec being used for remote broadcasts across our campus and community. It also replaces a Tieline Merlin in preparation for the football season here at Tarleton State.

We use the Gateway to send live audio back to the station and send station mix-minus audio to the remote site. The Gateway delivers flexibility. We can handle two sports broadcasts on both stations or be doing a remote broadcast on campus on one station, and a sports broadcast on the other.

Tieline is my go-to for remotes. Its integration with older equipment and being able to use the Report-IT app are major reasons. We replaced our iMix G3 with the ViA, and our Athletics department has done the same, so we are using Tieline ViAs for all our remotes nowadays. We will use the Commander and iMix G3 that they replaced as a backup STL.

The transition was pretty simple. Like the Gateway, our Logitek console uses RJ45 for the ins and outs. With the Merlin and Commander we had to use RJ45-to-XLR adapters, but with the Gateway we can get rid of those and go straight in/out.

The university has a fiber-based IP network, and we use AT&T hotspots to connect on-site. Our athletics team uses



AT&T and Verizon. Connections are reliable in this area, but with sports broadcasts, that can depend on where an away game is located.

Quality and functionality is the best part about broadcasting using IP codecs. When you compare codecs to a cellphone or POTS line, the overall quality difference with Tieline is undeniable.

During the pandemic we worked with a staff of three, myself and two student workers. We actually used Report-IT, along with our Commander and eventually Gateway more than ever before. It was the best way for us to put students on the air. They can download the TieServer Console and Report-IT apps on their phone and we could put them on the air in a snap.

The Tieline Toolbox Web-GUI for configuration and control is easy to use and very helpful for configuration and control. Tieline's Cloud Codec Controller is also something we plan to use for remote control of equipment. We have a lot of students and play-by-play announcers doing broadcasts who are not very familiar with the equipment, so being able to control everything remotely would be incredibly useful.

Tieline's quality is great. It is the best of any other options we have used in the past and we have had nothing but great experiences with Tieline's technical support. We have had very positive feedback from our engineer and all of the people who use the equipment on a weekly basis. They have been some of the most reliable and best working pieces of equipment we have. 🍌

Above Right
Legacy and new
Tieline equipment
in the rack.

Wheatstone MP-532 opens eyes at Leighton

Compared to the flagship X5, a few less features and a lot less dollars

Writer

Tony Abfalter

Director of Engineering, Leighton Broadcasting



More info

Jay Tyler at Wheatstone in North Carolina at 1-252-638-7000 or visit www.wheatstone.com.

ST. CLOUD, Minn. — I'll be the first in line for new audio processing if I think it can give us an edge, but only if it's truly a step up and not just the same old tech in new packaging.

We serve a predominantly young population here in the college town of St. Cloud, Minn. With 70 other stations competing for those ears, our six stations will take every advantage we can get.

I'd heard about the Wheatstone MP-532 AM/FM/HD multipurpose processor before it was officially released. The inside scoop was that Wheatstone's Jeff Keith had designed into it a new five-band "windowed" AGC, which he called Windy.

As different program material comes in, it adapts to make sure that the multiband section and the five-band limiter later on are always fed consistent audio. This, I was told, was one of the reasons why the MP-532 could deliver those "airy" highs and deeper lows we're all hoping for in the business.

It was worth a listen.

I got one of the first MP-532s and put it on our classic rock station, KZPK, K277BS/ZRock (HD2) 103.3 MHz. The installation experience was typical Wheatstone. Super intuitive, with presets that immediately gave us a much-improved sound right out of the box.

Friendly install

I'll get to the sound in a minute, but first I'd like to pause for a moment and give you a busy engineer's perspective on audio processing.

Yes, most of us like to tweak processing. But we also have a huge appreciation for a smooth installation experience. I need to get it on the air, make minor adjustments and move on in life. That's one very strong suit of this processor, its ease of installation.

To be fair, I know my way around Wheatstone processors, having owned X1s, AM-55s, FM-55s, X3s and X5s.

As easy as the setup was, this alone is not a good enough reason to invest in an audio processor. It has to sound good; that's the core mission for processing, and for radio.

So how did the MP-532 do? Impressive. Very impressive.



They weren't kidding when they said the highs would be airy and detailed and the lows would be deep. The MP-532 has the most articulation and clarity of any audio processor I've ever heard. It effectively kicked its predecessor, the FM-55, into the prehistoric dinosaur age and can hold its own next to Wheatstone's flagship processor, the X5 FM/HD processor, but with a few less features and a lot less dollars.

One nice bonus is that it is a multipurpose processor (that's what the MP is for), which means it would make an excellent backup for both my AM as well as FM stations. But, it's really too good to be a backup processor, so I have it running continuous programming on ZRock. 🎧

“ Yes, most of us like to tweak processing. But we also have a huge appreciation for a smooth installation experience. ”

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| | | | |
|----------------------------------|-----|-----------------------------|----------|
| 2wcom..... | 4-5 | In:Quality..... | 10-11 |
| Bext | 22 | MaxxKonnct Wireless..... | 23 |
| Comrex..... | 6-7 | winMedia | 27 |
| Orban Legacy Parts & Service ... | 21 | Sage Alerting Systems | 31 |
| DJB Radio | 25 | Tieline | 2, 14-15 |
| GatesAir | 19 | Telos Alliance | 12-13 |
| Henry Engineering..... | 29 | Wheatstone..... | 48 |
| Inovonics Broadcast..... | 8-9 | Xperi..... | 16-17 |

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