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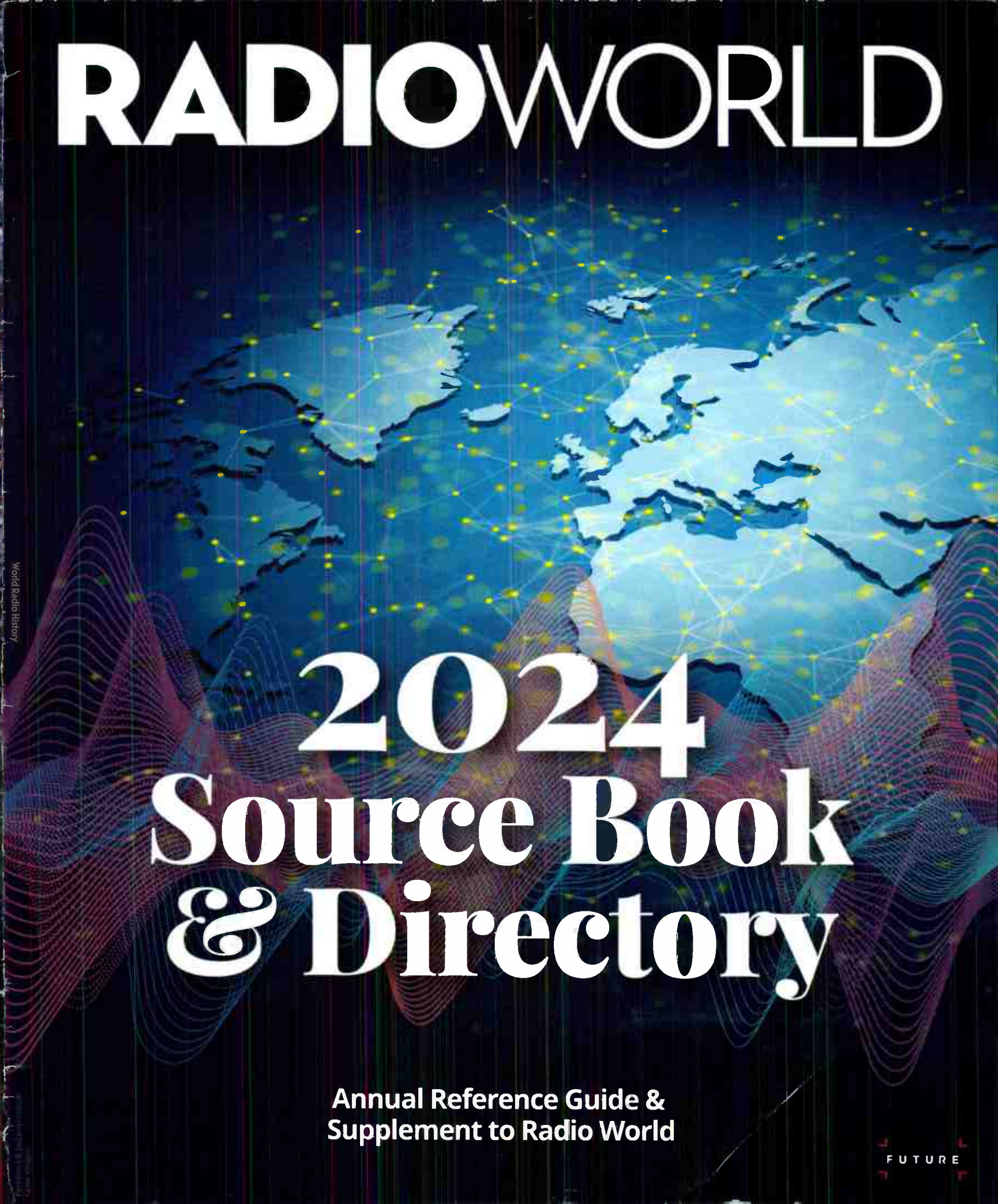

2024 Source Book & Directory

Annual Reference Guide &
Supplement to Radio World

FUTURE

World Radio History

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World Radio History

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Future's 2022 B2B Publication of the Year

December 2023
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New Year, New Sourcebook!

In a just-completed reader survey, you told us that the annual Radio World Source Book & Directory is a valuable resource. Thank you!

Here is your 2024 edition, a tool for professionals in the radio broadcasting and digital audio industries.

The listings include a number of companies that are new or less familiar, firms that provide products built around artificial intelligence and cloud technologies, which continue to grow in importance. But there are also companies whose products can help you build audio networks, process audio streams, generate analytics, manage metadata, build an FM tower system, solve a nagging studio problem ... you get the idea.

The companies listed in this directory are those that responded to our solicitations. They are the people who make or sell hardware, software and services to support our radio broadcast industry and adjacent pro-audio market segments.

Find them listed alphabetically in the Vendor & Product Directory section starting on page 20. A cross-index helps you find companies by type of product or service, starting on page 14. On pages 4 to 13, sponsors highlight key products in the Profiles in Excellence section. And starting on page 36 are sponsored "encore" reprints of stories that appeared in Radio World, on our website or in our ebooks.

Thank you, as always, for being a Radio World reader. Thank you too for patronizing these companies, particularly those that advertise in Radio World; they have made it possible for us to serve you for 47 years.

Paul McLane
Editor in Chief

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World Radio History

MaxxKonnect Wireless eliminates the wires

The new battery powered CR202 router is powerful and portable

Since 2018, MaxxKonnect Wireless has become the most recognized and trusted name in reliable, robust LTE connectivity for broadcasters. Founded by a broadcaster, MaxxKonnect is known for its friendly and helpful customer service, reliable hardware and rock-solid connections – in almost any situation – on all major US carriers.

Flexibility and Reliability

Unlike most carriers, MaxxKonnect Wireless requires no contract or commitment. Sign up for a week, a month or a year. Just need it for football season? No problem! Got a big event coming up? We've got you covered. You can activate and deactivate monthly, as often as you need to. Our customer-friendly user portal allows you to monitor your device usage, down to the day, and receive usage alerts based on pre-determined or custom-set thresholds. This keeps you informed on just how much data you're using, and helps keep you in control of overage costs. Whether you're a small station or a large company, the portal scales to allow different access levels for different types of users.

MaxxKonnect also believes in working with customers, not just with our service, but to make your broadcast or total connection successful. Wanna put our SIM in a Tieline or another portable codec? Our support department will work with you to get that set up. Need port forwarding set up on your MK router for your remote control? We'll gladly take care of that for you!

Portable, Powerful Connectivity

In keeping with our tradition of offering quality hardware for reasonable prices, MaxxKonnect has partnered with inHand Networks to launch a new, fully portable LTE router – the MaxxKonnect CR202.

The CR202 has a 4G LTE CAT6 celluar modem, to give you the speed you need – in fully portable form. A 5000mAh internal battery keeps you connected for up to 8 hours without having to worry about power adapters. And, the CR202 charges with a standard 5-volt 2-amp USB-C connection. That means no more proprietary power connectors. Unlike a standard hotspot, this full featured router has dual LAN/WAN connections, complete firewall with NAT capabilities, static routing, and a host of other robust features. And our centralized management platform gives you access to an intuitive UI that includes location data of each device.

And, like all MaxxKonnect Wireless devices, a public static IP address is included with your prioritized service. Want more information on the CR202 or any of our other wireless products? Contact MaxxKonnect today to get connected!

Contact:
Chris Roth
sales@maxx
konnect.com
205-598-1200

More Info

www.maxxkonnect.com

MAXXKONNECT WIRELESS

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MaxxKonnect

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World Radio History

Codecs for Reliable Broadcast

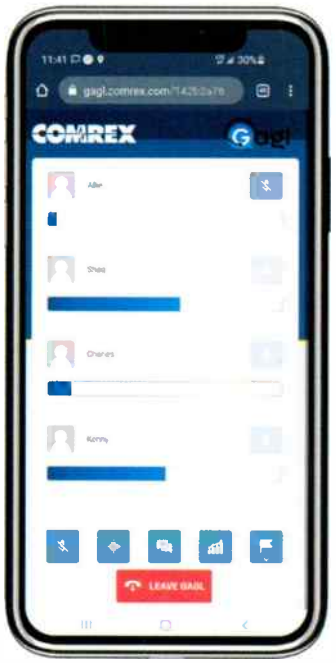
NX Generation of ACCESS

Nearly 20 years ago, ACCESS caused a massive wave in the broadcast industry with the introduction of the ACCESS family of IP audio codecs. Models like ACCESS Rack and ACCESS Portable/2USB can be found all over the world.

Now we offer our ACCESS NX Portable & ACCESS NX Rack, the next iteration of our flagship codec line, encompassing everything broadcasters loved about the older models, bolstered by technical innovations and enhancements in IP from the past two decades.

ACCESS NX Portable is the grab-and-go codec for remote broadcasts. Its two MIC/Line inputs and headphone outputs are perfect for a duo, as found in sports with a play-by-play and color commentator. An optional add-on mixer allows for up to six I/O. ACCESS NX features CrossLock VPN - our proprietary codec technology with multi-network capability, dynamic buffering, intelligent management and more.

Complementing ACCESS NX in the studio is ACCESS NX Rack, our updated rack unit that includes an HTML-5 based GUI along with AES67 compatibility. ACCESS MultiRack is the ultimate rack space saver capable of five full instances of ACCESS in a 1RU, 19" chassis. Both are industry-standard AES67 compatible, for easy integration with most AoIP systems.



Above: Gagl mobile user interface

Below: ACCESS NX Portable & ACCESS NX Rack

BRIC-Link Codecs

Designed for dedicated point-to-point links, our BRIC-Link codec line is an essential part of the broadcast toolkit. BRIC-Link codecs are known for their reliability and frequently are used in 24/7 environments. It's the "set-it-and-forget-it box" that just works.

Essentially a stripped down version of our ACCESS line, this small but mighty codec can be used for STLs, home studios, live voice-over sessions, and more. BRIC-Link line also comes with CrossLock VPN for ultra-reliability in transmission. Our current model is BRIC-Link III.

Gagl

Available for ACCESS/BRIC-Link users, Gagl is our subscription-based cloud service that allows people to connect to one of our IP audio codecs. Gagl lets remote guests and hosts connect by using their smartphone or laptop, a web browser, and a headset - so anyone can use it.

In addition to single guest use, Gagl also offers the ability to have up to five people in a Gal session. All participants can hear each other in high quality through the Opus encoder. Gagl is perfect for a morning zoo radio show, round-robin reporting, and election coverage.

Gagl is currently available for purchase. Subscriptions are $35 per month, or customers can save $70 on an annual subscription with a code from Comrex or a Comrex dealer. A free 14-day trial is available with all new subscriptions.

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More Info

Visit the Comrex website at www.comrex.com or contact the Comrex Sales team at sales@comrexcom or +1-978-784-1776. For pricing and availability on Comrex gear, please contact an authorized Comrex dealer.

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Gagl

audio subscription service from Comrex for remote contribution

& BRIC-Link III

a winning combo

for getting the whole team together

(free 14-day trial available with all new Gagl subscriptions)

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HD Radio Modulation Monitors

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- Measures FM/HD1 Diversity Delay.
- Dante AoIP AES 67; Remote listening stream; SNMP support.

541 FM Modulation Monitor

- 4th generation with all digital architecture.
- DSP signal analysis of total RF transmissions.
- Dante AoIP AES 67; Remote listening stream; SNMP support.

526* AM Modulation Monitor

- 4th generation with all digital architecture.
- DSP signal analysis with a menu-driven touch-screen display.
- Dante AoIP AES 67; Remote listening stream; SNMP support.

*Shipping Q2 of 2024

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WHY INOVONICS?

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

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INTRODUCING THE 677

EAS TRIPLE TUNER

AM | FM | NOAA

Powerful features in a compact half-rack design.

EAS Emergency Alert System

Inovonics' 677 Triple Tuner incorporates the latest DSP-based technology for a fresh new design in EAS Receiver Monitors. Fully tested and ready to go after an exhaustive Beta testing program in the field with respected Radio Engineers in the industry.

The all-digital 677 has three discrete and independent receivers for any combination of AM, FM, or NOAA reception and monitoring. Each receiver has off-air antenna inputs and balanced monaural XLR outputs.

REAR PANEL I/O

677 FEATURE HIGHLIGHTS

- Easy front panel set-up via jog wheel with LED readout and metering.
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- Selectable remote listening by Web Stream.
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- Three-year Factory Warranty.
- Quick to install. Easy to Program.
- Quality after sales service.

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AXIA®

The Ultimate Mixing Machines

XR | SR

QUASAR

The Axia® Quasar™ family represents the ultimate in AoIP broadcast mixing consoles, putting the power and features you need to create your best content right at your fingertips. Whether you choose the scalable, flexible Quasar XR or the streamlined, cost-effective Quasar SR, you know you're getting the Ultimate Mixing Machine.

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Axia Quasar™ XR AoIP Console

The top-of-the-line Quasar XR delivers top-shelf features. Motorized faders. Extensive metering on every channel display and adjacent to each fader. Four programmable user keys per fader. An info-packed high-resolution touchscreen. Scalable up to 64 faders to handle even the most complex program requirements. Quasar XR is ready to tackle any task from Master Control to OB deployments - and everything in between.

Axia Quasar™ SR AoIP Mixing Console

Quasar SR delivers all the power, ergonomics, and star appeal of its big brother but with a streamlined design. Scalable from 4 to 32 faders. SR is perfect for any radio control room, production room, or interview studio. Premium-quality faders. Confidence metering. A programmable user key on every channel strip. Plus that big, beautiful touchscreen. Quasar SR is a standout value for any application.

Quasar Soft Remote Mixing Solution

Unlock Quasar's remote capabilities with Quasar Soft, the optional, customizable remote control software that works with any HTML-5 capable browser. Generate up to eight control pages and configure them to display any of Quasar's 64 input channels, plus your choice of a streamlined monitor control or full-featured master console control. The included Quasar Cast remote monitoring software lets you instantly audition any Livewire stream in your network via the same browser.

Quasar Engine

Bulletproof mixing and signal processing for Quasar XR and SR surfaces. A native AoIP device using Livewire+ / AES67, it's cost-effective, too. Quasar Engine is modular, starting at 16 channels of stereo audio, scalable to 64 channels, allowing you to perfectly balance cost and capabilities. It includes 4-bands of fully parametric EQ, powerful dynamics processing, true peak limiting on Program, Record, and Phone buses, four surface layers, automixer, and much more.

Quasar Engine RPS

Quasar Engine RPS makes it possible to create a standalone mixer without the need for an actual mixing surface thanks to the included browser-based Quasar Soft and Quasar Cast software. It's perfect for small studios, backup facilities, or as a cost-effective backup to a main hardware console. Engine RPS can also be used to remotely control a physical Quasar XR or SR surface.

Mic / Headphone Control Module

Provides talent with remote control of mic on/off, mute, and talkback functions, plus headphone monitor source selection and volume adjustment with source display.

GPIO Accessory Module

Provides remote control of mic on/off functions including mute and talkback. Mounts conveniently in tabletops or turrets.

Mic In / Headphone Out Module

Optional one-fader-wide module mounts directly in your Quasar's frame to add convenient talkback input and headphone output connections.

Quasar SmartKey Module

Two-fader-wide surface module for Quasar XR and SR surfaces adds as many as four blocks of six programmable user keys each. Program each key with user-defined text using Axia Pathfinder Core PRO software.

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World Radio History

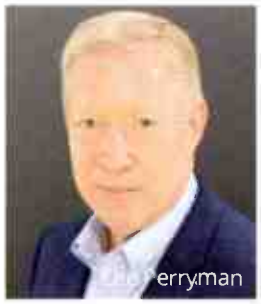
DTS AutoStage dashboard helps map success for RadioAlabama

"I can tell a better story because I've got evidence," says Lee Perryman

DTS AutoStage is a hybrid radio platform from Xperi Corp. that combines linear over-the-air broadcast with IP-delivered content and two-way connectivity.

Usage data is free to broadcasters when they integrate their "now playing / live data," streaming URLs and static data like logos and slogans with Xperi. The Broadcaster Portal provides data about listener engagement with a 24-hour delay. For example, daypart analytics are available, program performance data including the most popular format and content, as are listener "heat maps" that can inform broadcasters about their audience's geographical location in relation to shopping locations and other businesses.

Award-winning broadcast owner RadioAlabama uses the portal. We talked with President/CEO Lee Perryman.



Describe your business.

Lee Perryman: I have 11 stations operating under the RadioAlabama brand in east central Alabama. We are in unrated, unmetered markets. There's no Nielsen data to buy even if we wanted to.

We're in the shadows of Birmingham, Montgomery and Columbus, Ga., which has been a challenge because advertisers and agencies that buy based on books ignore us. They think they can cover us by buying Montgomery, Columbus and Birmingham. They would ask "Who's listening?" and we couldn't tell them other than showing our streaming data.

DTS AutoStage has been a game-changer. I can create a graphical heat map in an instant, showing who's been listening and where they're listening over X number of days. It shows listening along highways and where they're conglomerated in offices; I can show the times of day they're listening. And it's real data, not something that came out of a fake diary that somebody was paid $1 to write something down in, something that may or may not have been true.

I can take those 11 heat maps, throw them all on one big map of Alabama and show where my listenership is occurring as a group. It makes me look better and bigger, which I know I am.

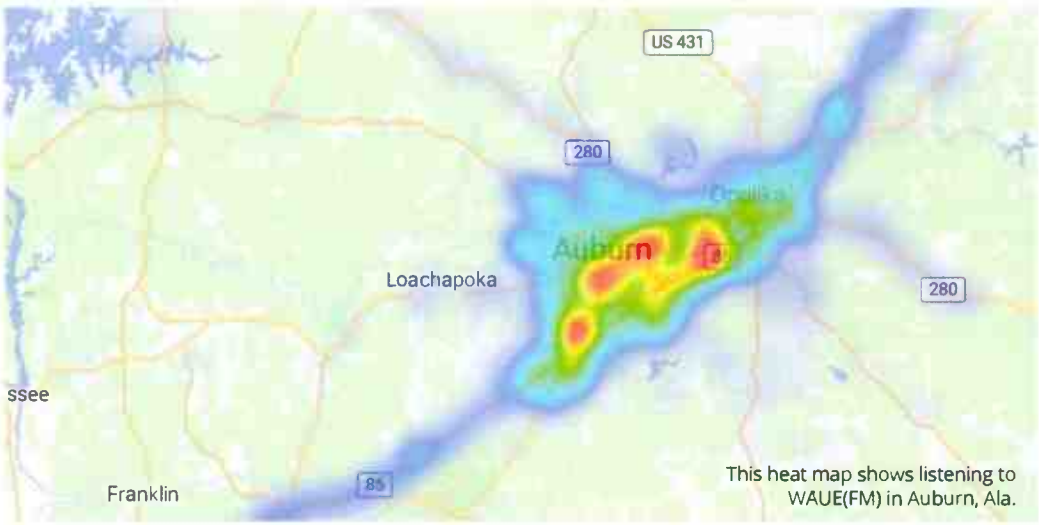
What kind of conversations are your staff having with clients?

Perryman: We put together one-sheeters about each of our stations. Our salespeople can pull one out and say, "I've got a station that is technically not in the Montgomery market, it's 38 or 40 miles north. Nielsen actually says we're in Birmingham. But these heat maps show that there is a preponderance of listening in downtown Montgomery, in the capitol and the government buildings."

We have a tremendous number of listeners but have never been able to make a dent in that market. Now we can show what we always knew but couldn't prove: There's listenership there.

We pair Xperi's analytic data with information from SecureNet about our streams. We can show that not only are people listening to the radio but they're listening to our streams in that area, which is representative of the consumption of our content in that market.

When we look at the outskirts of our market, we're seeing evidence that people were listening on the radio but their listenership continues outside of our on-air range. The car took them along with the stream, without them having to consciously make a decision to switch to the stream. The listening experience is improved for commuters outside of our direct on-air area.



This heat map shows listening to WAUE(FM) in Auburn, Ala.

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dts

AutoStage

Make your station the star of the dashboard.

Take control of your content, and partner with DTS AutoStage.

DTS AutoStage Broadcaster Portal

Gain access to unprecedented insights and listener behavior.

It's free to join: dts.com/autostage

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 and are listed only if they checked a given category.

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Acoustics First Corp.
Auralex Acoustics Inc.

ANTENNAS (FM/AM), FEEDLINE & WAVEGUIDE
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Digital Radio Mondiale
IEEE Broadcast Technology Society
NATE: The Communications Infrastructure Contractors Association
National Association of Broadcasters
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StreamS/Modulation Index LLC
Super Hi-Fi
Vizrt
WideOrbit
winMedia
Win-OMT Software Inc.
Xytech Systems

BUSINESS/ FRONT-OFFICE SERVICES

Futuri Media
Granite Telecommunications LLC
Inrush Broadcast Services
Marketron
TruNorth Consulting
Xytech Systems

CAPTIONING & TRANSCRIPTION

ElevenLabs
ENCO Systems Inc.

CLOCKS & TIMERS

Axel Technology
Densitron
ESE
Novus Power Products LLC
RAM Systems

CLOUD SERVICES FOR RADIO

2wcom Systems GmbH
Barix
Broadcast Pix
Broadcast Radio Ltd.
Cirrus Streaming
CleanFeed
Comrex
CP Communications
Digigram
Fidelity Media Inc.
Inrush Broadcast Services
International Datacasting/ Novra Group
Jutel
Nautel
On-Hertz
Radio.Cloud
SoundNodes
SoundStack
StreamGuys

CODECS, HARDWARE/ SOFTWARE

2wcom Systems GmbH
AEQ
AETA Audio Systems
Audio Codecs Ltd.
AVT Audio Video Technologies GmbH
Axel Technology
Barix
Bay Country Broadcast Equipment Inc.
Broadcast Bionics
Broadcast Supply Worldwide
Broadcasters General Store
CleanFeed
Comrex
DEVA Broadcast LLC
Digigram
Factum Radioscape
Ferncast
GatesAir
In:Quality
International Sales Team
On-Hertz
Prodys
Qbit GmbH
SCMS Inc.
SIPitPRO Ltd.
Sonifex
StreamS/Modulation Index LLC
Synthax US
Telos Alliance
Thimeo Audio Technology B.V.
Tieline
Vizrt
WorldCast Systems

CONNECTED CAR SOLUTIONS

Quu Inc.
Xperi

CONNECTIVITY

Audio Codecs Ltd.
Comrex
DaySequerra Corp.
Granite Telecommunications LLC
In:Quality
LinkUp Communications Corp.
MaxxKonnect Group

CONSOLES, MIXERS, CONTROL SURFACES

AEQ
AngryAudio LLC
Arrakis Systems
Axel Technology
Bay Country Broadcast Equipment Inc.
Broadcast Radio Ltd.
Broadcast Supply Worldwide
Broadcast Tools Inc.
Broadcasters General Store
Calrec Audio
Densitron
DHD audio GmbH
JK Audio
Lawo Inc.
Logitek
Mandozzi
On-Hertz
Progressive Concepts
Radio Systems Inc.
RAM Systems
SCMS Inc.
Sierra Automated Systems
Sonifex
Telestream
Telos Alliance
Vizrt
Wheatstone Corp.
Yellowtec

CONSULTANTS (TECH), CONTRACT ENGINEERS, INSPECTIONS

Au Contraire Software Ltd.
Broadcast Depot
Cavell, Mertz & Associates Inc.
CP Communications
DNAV
Doug Vernier Telecommunications Consultants
E2 Technical Services
Hatfield & Dawson Consulting Engineers
Inrush Broadcast Services
JMS & Associates Inc.
Kintronic Labs Inc.
Lightner Electronics Inc.
MaxxKonnect Group
NATE: The Communications Infrastructure Contractors Association
National Federation of Community Broadcasters
Naztec International Group LLC
Nova Electronics
Over The Air RF Consulting LLC
QCommunications LLC
Summit Technology Group
Technical Services Group
V-Soft Communications
Xenirad

CONTENT SYNDICATION & FORMATS

Cipolla Analytics LLC
K.M. Richards Programming Services
RadioMusic.com
RTI Media Inc.
Syndication Networks Corp.

DEALERS & DISTRIBUTORS

305 Broadcast Inc.
Broadcast Depot
Broadcast Supply Worldwide
Broadcasters General Store
DM Broadcast
DNAV
International Sales Team
Lightner Electronics Inc.
MaxxKonnect Group
Naztec International Group LLC
ProAudio.com
RadioDNA
SCMS Inc.
Synthax US
Telsat Srl
Transcom Corp.

DIGITAL AUDIO EDITING & PRODUCTION

Burli Software Inc.
CGI Deutschland B.V. & Co. KG
CTP Systems

World Radio History

Supplier Cross Index

DHD audio GmbH
ElevenLabs
Eventide Inc.
Lynx Studio Technology Inc.
Netia
PreSonus Audio Electronics Inc.
Rogue Amoeba Software
SoundStack
Wheatstone Corp.

DRONE-BASED SERVICES
Cavell, Mertz & Associates Inc.
Dielectric
NATE: The Communications Infrastructure Contractors Association
Over The Air RF Consulting LLC
QCommunications LLC

ELECTRONIC & ELECTRIC COMPONENTS
American Amplifier Technologies
DAC System
Densitron
Energy Transformation Systems (ETS)
Global Security Systems/Alert FM
Kintronic Labs Inc.
meduci LLC
Shively Labs

EMERGENCY ALERTING, EAS & CAP
AudioScience Inc.
Digital Alert Systems
Global Security Systems/Alert FM
Gorman-Redlich Mfg. Co.
Paravel Systems LLC
Sage Alerting Systems Inc.

ENGINEERING & ALLOCATION SERVICES/SOFTWARE
Cavell, Mertz & Associates Inc.
Doug Vernier Telecommunications Consultants
Global Security Systems/Alert FM
Information Station Specialists
RadioLand App
SoundStack
Technical Services Group
V-Soft Communications

EQUIPMENT RENTAL & LEASING
CP Communications
Information Station Specialists
Naztec International Group LLC
Technical Services Group

EQUIPMENT REPAIR
Leembruggen Audio Service

FACILITY DESIGN & ARCHITECTURE
Auralex Acoustics Inc.
DNAV
Global Security Systems/Alert FM
Inrush Broadcast Services
JMS & Associates Inc.
Naztec International Group LLC
Nova Electronics
Paravel Systems LLC
Public Media Engineering
Russ Berger Design Group
Second Opinion Communications Inc.
Summit Technology Group
Technical Services Group
V Three Studios LLC
Walters-Storyk Design Group
ZTransform

FURNITURE FOR RADIO; RACKS
Cabinetworks Unlimited LLC
Graham Studios
RAM Systems
Studio Technology

GROUND SYSTEMS & LIGHTNING PROTECTION
Information Station Specialists
Nova Electronics
Xenirad

MANAGED SERVICES
LumenServe Inc.
Marketron
MaxxKonnect Group
NeoGroupe
StreamGuys
Super Hi-Fi
TruNorth Consulting
ZTransform

METADATA PRODUCTS & SUPPORT
Fidelity Media Inc.
Inovonics
NPR Distribution Services
Quu Inc.
RadioDNS
StreamGuys
Xperi

MICROPHONES & MIC ACCESSORIES
5BWindscreens.com
Audio Codecs Ltd.
Audio-Technica
Audix
CEntrance
Electro-Voice
Heil Sound
Henry Engineering
Movo
MXL Microphones
PreSonus Audio Electronics Inc.
RAM Systems
Ultimate Support Systems
Yellowtec

MUSIC PRODUCTION LIBRARIES
Benztown
RadioMusic.com

NEWS & NEWSROOM PRODUCTS/SERVICES
AdCellerant
Auralex Acoustics Inc.
Broadcast Radio Ltd.
Burli Software Inc.
Cipolla Analytics LLC
Densitron
JK Audio
Netia
RadioNewsAI
RCS
Telestream
Vizrt
winMedia

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A Powerhouse of Tuning Precision in a Single Rack Unit!

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- All-in-One Monitoring: From AM, FM, HD Radio to NOAA, all your tuning needs in a single form factor.

Upgrade to the ASI2816 Now!

THE AUDIO I/O COMPANY.

World Radio History

Supplier Cross Index

PODCASTING PRODUCTS & SUPPORT
2wcom Systems GmbH
Arrakis Systems
Auralex Acoustics Inc.
Broadcast Bionics
Broadcast Depot
Burli Software Inc.
Centrance
Cirrus Streaming
Comrex
DHD audio GmbH
DJB Radio Automation Software
ElevenLabs
JK Audio
Progressive Concepts
SoundStack
StreamGuys
StreamS/Modulation Index LLC
Tieline

POWER PRODUCTS GENSETS, UPS, SURGE
Henry Engineering
Sine Control Technology Inc.

PROGRAMMING, RESEARCH & RATINGS
Audience
Cipolla Analytics LLC
Grace Broadcast Sales
K.M. Richards Programming
ServicesRadioMusic.com
RCS
RTI Media Inc.
SoCast
Syndication Networks Corp.
Tracy Johnson Media Group

PUBLICATIONS
Radio World
Teak Publishing

REBUILT TRANSMITTER TUBES
CPI

RECEIVERS
DaySequerra Corp.
DEVA Broadcast LLC
Gorman-Redlich Mfg. Co.
Inovonics Inc.
International Datacasting/ Novra Group
IZT
meduci LLC
Qbit GmbH

REMOTE FACILITY CONTROL & MONITORS
22HBG
Bay Country Broadcast Equipment Inc.
Broadcast Devices Inc.
Broadcast Tools Inc.
Burk Technology
Calrec Audio
CircuitWerkes
DAC System
Davicom
Elenos Group
Novus Power Products LLC
Sine Control Technology Inc.
Sine Systems
SuiteLife Systems
Transcom Corp.
WorldCast Systems

RF ACCESSORIES, CONNECTORS, TUBES
Aldena Telecomunicazioni Srl
Altronic Research Inc.
Ampegon Power Electronics AG
Austin Insulators Inc.
Coaxial Dynamics
CPI
Delta Meccanica Srl
Electronics Research Inc. (ERI)
Kathrein Broadcast GmbH
Kintronic Labs Inc.
Myat Inc.
Propagation Systems Inc. (PSI)
R.V.R Elettronica Srl
Tunwall Radio LLC
Xenirad

RF FILTERS, COMBINERS, CUSTOM COMPONENTS
Alan Dick Broadcast Ltd.
Altronic Research Inc.
Ampegon Power Electronics AG
Bext Corp.
Broadcast Electronics Inc.
Coaxial Dynamics
Delta Meccanica Srl
Dielectric
Electronics Research Inc. (ERI)
High Sound
Jampro Antennas Inc.
Kathrein Broadcast GmbH
Kintronic Labs Inc.
LBA Technology Inc.
Myat Inc.
OnAir Medya Communication Ltd.
Propagation Systems Inc. (PSI)
RFE Broadcast
R.V.R Elettronica Srl
Telsat Srl
Tunwall Radio LLC
Xenirad

RF MONITORING
2wcom Systems GmbH
Aldena Telecomunicazioni Srl
Broadcast Devices Inc
Burk Technology
DAC System
Davicom
DEVA Broadcast LLC
Dielectric
Electronics Research Inc. (ERI)
Factum Radioscape
Gorman-Redlich Mfg. Co.
Hatfield & Dawson Consulting Engineers
Inovonics Inc.
IZT
meduci LLC
Over The Air RF Consulting LLC
SoundNodes
Sourcerer LLC
SuiteLife Systems
V-Soft Communications
WorldCast Systems

SALES DEPARTMENT SOLUTIONS
AdCellerant
Adthos
Aiir
AllMediaDesk
Audience
Barometer
Frequency
Futuri Media
Grace Broadcast Sales
International Sales Team
Marketron
Quu Inc.
SoCast
StreamGuys
Veritone
Waymark
Wedel Software
Xytech Systems

SATELLITE & INTERNET DISTRIBUTION
CP Communications
Dawnco
International Datacasting/ Novra Group
NPR Distribution Services (NPRDS)
Qbit GmbH
Radio.Cloud
SoundStack
Syndication Networks Corp.

SCHEDULING/ TRAFFIC & BILLING
Broadcast Radio Ltd.
Fidelity Media Inc.
Marketron
MusicMaster
Radio Workflow
RCS
Smarts Broadcast
SoundNodes
Wedel Software
WideOrbit
winMedia
Xytech Systems

SIGNAGE
Richard Tell Associates
Sprite Media Inc.
Titus Technological Laboratories

SOCIAL MEDIA TOOLS
22HBG
Aiir
AllMediaDesk
AVRA
Broadcast Bionics
Cirrus Streaming
Mediaproxy
NeoGroupe
Sprite Media Inc.
Telestream

SOFTWARE FOR ENGINEERING & MAPPING
Aldena Telecomunicazioni Srl
Au Contraire Software Ltd.
DAC System
GeoBroadcast Solutions LLC
RadioLand App
SuiteLife Systems
V-Soft Communications

SPEAKERS & HEADPHONES
Audix
Genelec
PreSonus Audio Electronics Inc.

STL & RPU/ MICROWAVE
(See also Audio Distribution, Between Locations)
Barix
Bay Country Broadcast Equipment Inc.
Bext Corp.
Broadcast Electronics Inc.
Comrex
Elenos Group
GatesAir
Moseley
OMB America
Over The Air RF Consulting LLC
RFE Broadcast
SCMS Inc.
Thimeo Audio Technology B.V.
Tieline
Transcom Corp.

STREAMING
22HBG
2wcom Systems GmbH
AdCellerant
Ad Insertion Platform Sàrl
Auddia
AVRA
Broadcast Radio Ltd.
Cirrus Streaming
CleanFeed
Comrex
CP Communications
DEVA Broadcast LLC
Fidelity Media Inc.
Inovonics Inc.
International Datacasting/ Novra Group
Lawo Inc.
Mobile Viewpoint
Movo
Orban
Qbit GmbH
Quortex
RCS
SoundStack
StreamGuys
Summit Technology Group
Telestream
Tieline
Vizrt
Wheatstone Corp.

STUDIO SUPPORT, SIGNALING, AIR LIGHTS
AngryAudio LLC
Densitron
Henry Engineering
Paravel Systems LLC
Sprite Media Inc
StudioHub
Titus Technological Laboratories
Yellowtec

STUDIO/ TRANSMITTER LINKS
(See Audio Distribution, Between Locations)

SUBCARRIER, RDS, DATACASTING
Broadcast Devices Inc.
Inovonics Inc.
Orban
Thimeo Audio Technology B.V.
Xperi

SYSTEMS INTEGRATION & FACILITIES
Broadcast Partners
Burk Technology
DB Elettronica Telecomunicazioni
DM Broadcast
DNAV
E2 Technical Services
Inrush Broadcast Services
Lightner Electronics Inc.
MaxxKonnect Group
Naztec International Group LLC
Public Media Engineering
RadioDNA
Russ Berger Design Group
Second Opinion Communications Inc.
Summit Technology Group
Technet Systems Group
Technical Services Group
Walters-Storyk Design Group
ZTransform

TELCO INTERFACES & BROADCAST PHONE SYSTEMS
AEQ
AVT Audio Video Technologies GmbH
Broadcast Bionics
Broadcast Tools Inc.
CircuitWerkes
Comrex
In:Quality
JK Audio
NeoGroupe
Sierra Automated Systems
Telos Alliance

TEST & MEASUREMENT, ANTENNA MONITORS, ANALYZERS
Aldena Telecomunicazioni Srl
Audix

World Radio History

Supplier Cross Index

Broadcast Depot
Coaxial Dynamics
DAC System
Davicom
ESE
Factum Radioscape
Gorman-Redlich Mfg. Co.
IZT
LBA Technology Inc.
Mediaproxy
Myat Inc.
Novus Power Products LLC
NTI Americas Inc.
Rohde & Schwarz GmbH & Co. KG
RTW
Sourcerer LLC
Tunwall Radio LLC
WorldCast Systems

THERMAL SERVICES & INSPECTIONS
Cavell, Mertz & Associates Inc.

TOWERS & TOWER SERVICES/HARDWARE
Alan Dick Broadcast Ltd.
American Amplifier Technologies
Austin Insulators Inc.
Broadcast Depot
Electronics Research Inc. (ERI)
FM Services
FullWave Towers and Broadcast
Ice Krackers Inc.
Kathrein Broadcast GmbH
LumenServe Inc.
Nova Electronics
Novus Power Products LLC
Phillystran
Shively Labs
Telsat Srl

TRANSMITTERS, TRANSLATORS & EXCITERS
305 Broadcast
ABE Elettronica
American Amplifier Technologies
Ampegon Power Electronics AG
Aqua Broadcast Ltd.
Armstrong Transmitter Corp.
Bext Corp.
Broadcast Depot
Broadcast Electronics Inc.
Broadcast Partners
Broadcasters General Store
Burk Technology
CircuitWerkes
DB Elettronica Telecomunicazioni
Digigram
Elenos Group
GatesAir
GeoBroadcast Solutions LLC
Information Station Specialists
International Sales Team
IZT
Nautel
Nova Electronics
Novus Power Products LLC
OMB America
OnAir Medya Communication Ltd.
Progressive Concepts
RFE Broadcast
Rohde & Schwarz GmbH & Co. KG
R.V.R Elettronica Srl
SCMS Inc.
Telsat Srl
Transcom Corp.
Tunwall Radio LLC
WorldCast Systems

USED EQUIPMENT
Bay Country Broadcast Equipment Inc.
Transcom Corp.

VIDEO FOR RADIO
AdCellerant
AEQ
Audinate
AVRA
Axel Technology
Broadcast Bionics
Broadcast Pix
Broadcast Supply Worldwide
Broadcasters General Store
CGI Deutschland B.V. & Co. KG
Comrex
ENCO Systems Inc.
Hardata
InSoft LLC
Movo
MultiCAM Systems
Sprite Media Inc.
Telestream
Vislink
winMedia

WEATHER PRODUCTS, SOFTWARE, ALERTING
Gorman-Redlich Mfg. Co.
RTI Media Inc.
Summit Technology Group

WIRE, CABLES, CONNECTORS & CABLE MANAGEMENT
Neutrik Americas
StudioHub
Telsat Srl

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MADE IN THE USA

World Radio History

Vendor & Product Directory

This section is an alphabetical listing of industry suppliers. To find companies by product category, see the Supplier Cross Index. (Suppliers, did we miss you? Email radioworld@futurenet.com so we can send you the request next year.)

22HBG
info@22hbg.com
www.22hbg.com

2wcom Systems GmbH
+49-461-66-28-30-0
sales@2wcom.com
www.2wcom.com

305 Broadcast Inc.
+1-305-200-3322
sales@305broadcast.com
www.305broadcast.com

5BWindscreens.com
+1-800-959-3343
eric@5Bwindscreens.com
www.5bwindscreens.com

ABE Elettronica
+39-0363-35-10-07
mail@abe.it
www.abe.it

Acoustics First Corp.
+1-888-765-2900
+1-804-342-2900
info@acousticsfirst.com
www.acousticsfirst.com

Ad Insertion Platform Sàrl
+41-21-601-00-75
info@adinsertplatform.com
www.adinsertplatform.com

AdCellerant
+1-303-250-8210
info@adcellerant.com
https://adcellerant.com

Adthos
+1-212-203-0396
welcome@adthos.com
www.adthos.com

AEQ
+34-91-686-13-00 (Spain) or
+1-954-581-7999 (U.S.)
sales@aeq.es
www.aeq.eu

Aeta Audio Systems
+33-1-41-36-12-00
sales@aeta-audio.com
www.aeta-audio.com/en

Aiir
+1-212-500-1144
hello@aiir.com
http://aiir.com

Alan Dick Broadcast Ltd., a Jampro Co.
+44-1242-820-976
sales@alandickbroadcast.com
www.alandickbroadcast.com

Aldena Telecomunicazioni Srl
+39-02-90390461
aldena@aldena.it
www.aldena.it

AllMediaDesk
+1-512-271-2556
hello@allmediadesk.com
www.allmediadesk.com

Altronic Research Inc.
+1-870-449-4093
billie.heenan@altronic.com
www.altronic.com

American Amplifier Technologies
+1-916-978-1899
sales@americanamptech.com
www.americanamptech.com

Ampegon Power Electronics AG
+41-58-710-44-00
info@ampegon.com
www.ampegon.com

AngryAudio LLC
128 Holiday Ct., Ste. 118
Franklin, TN 37067 USA
+1-615-763-3033
answers@angryaudio.com
www.angryaudio.com
Products/Services: Angry Audio makes the gadgets and gizmos that solve difficult studio problems for professional broadcasters and podcasters, including the popular Bluetooth Gadget, Failsafe Gadgets, studio signal lights and controllers, and the exciting new Chameleon audio processors for streaming and mic processing. Problems disappear when you get Angry.

Aqua Broadcast Ltd.
+44-203-411-0387
info@aquabroadcast.co.uk
www.aquabroadcast.co.uk

Armstrong Transmitter Corp.
+1-315-673-1269
kevin@armstrongtx.com
www.armstrongtx.com

Arrakis Systems
+1-970-461-0730
sales@arrakis-systems.com
www.arrakis-systems.com

Au Contraire Software Ltd.
+1-303-489-3454
cris@aucont.com
www.aucont.com

Auddia
+1-303-995-3036
contact@auddia.com
https://auddia.com

Audience
info@aptivada.com
www.audience.io

Audinate
+1-503-224-2998 (ext. 6)
See website
www.audinate.com

Audio Codecs Ltd.
+44-7770-945695
jonny@audiocodecs.co.uk
www.audiocodecs.co.uk

Audio Engineering Society
+1-212-661-8528
www.aes.org

AudioScience Inc.
+1-302-235-7109
salesasi@audioscience.com
www.audioscience.com

World Radio History

Audio-Technica
+1-330-686-2600
Contact page: www.audio-technica.com/en-us/contact
www.audio-technica.com

Audix
+1-503-682-6933
info@audixusa.com
https://audixusa.com

Auralex Acoustics Inc.
+1-800-959-3343
support@auralex.com
www.auralex.com

Austin Insulators Inc.
+1-905-405-1144
sales@austin-insulators.com
www.austin-insulators.com

AVRA
+1-305-599-3100
sales@avra.tv
www.avra.tv

AVT Audio Video Technologies
+49-911-5271-0
info@avt-nbg.de
www.avt-nbg.de/en

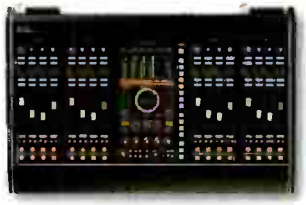
Axel Techology Srl
+39-051-736555
www.axeltechnology.com

Axia Audio
See Telos Alliance

Barix
Contact page: www.barix.com/contact
www.barix.com

Barometer
info@thebarometer.co
www.thebarometer.co/landing

Bay Country Broadcast Equipment Inc.
+1-410-335-3136
sales@baycountry.com
https://baycountry.com



Axia Quasar™ SR
AoIP Mixing Console

Quasar SR delivers modern mixing power, flexibility, economy – and it looks great too! Scalable from 4 to 32 premium-quality faders, with confidence metering, dynamics, and a striking touch-screen control center, Quasar SR is a standout value for any radio application.

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Belar Electronics
+1-610-687-5550
www.belar.com

Switching Made Easy

SS 6.1 MLR/BNC Switcher/Router
w/ Mechanical Latching Relays

The SS 6.1 MLR/BNC is a transparent six input, one output switcher/router with BNC connectors and mechanical latching relays. The SS 6.1 MLR/BNC is perfect for passively switching MPX FM baseband or AES-3id signals. Switching is accomplished with mechanical latching gold contact relays, which means that the unit can route a signal in either direction and it will keep routing signal even after losing power. Due to the passive nature of the switching, any input level and impedance can be used. Inputs may be balanced or unbalanced, while output levels, impedance, distortion, noise, and balancing will match that of the selected input. The SS 6.1 MLR/BNC can be controlled and monitored locally via front panel controls and/or remotely with simple opto-isolated contact closure inputs and dry contact status relay outputs, as well with multi-drop RS-232 serial commands, or TCP/UDP commands over Ethernet.

Broadcast Tools is a Veteran Owned Business
Designed, Assembled and Supported
in WA State, USA.
www.broadcasttools.com

BROADCAST tools
PROBLEM SOLVED

World Radio History

Benztown
+1-818-842-4600
mp@benztown.com
www.benztown.com

Bext Corp.
+1-619-239-8462
bext@bext.com
www.bext.com

Broadcast Bionics
+44-1444-473-999
sales@bionics.co.uk
www.bionics.co.uk

Broadcast Depot
+1-305-599-3100 or
+1-813-349-2400
sales@7bd.com
www.7bd.com

Broadcast Devices Inc.
+1-914-737-5032
@broadcast-devices.com
www.broadcast-devices.com

Broadcast Electronics Inc.
+1-217-224-9600
Contact page: www.bdcast.com/contact-us
www.bdcast.com

Broadcast Partners
+31-115-683555
info@broadcastpartners.nl
www.broadcastpartners.nl

Broadcast Pix
+1-978-600-1100
Contact page: https://broadcastpix.com/contact-us-form
www.broadcastpix.com

BroadcastRadio

Broadcast Radio Ltd.
1-2 Maritime House,
Livingstone Road
Hessle, East Yorkshire HU13 0EG
UNITED KINGDOM
+44-1482-350-700 (U.K.)
+1-929-482-2700 (U.S.)
hello@broadcastradio.com or hello@broadcastradiousa.com
www.broadcastradio.com and broadcastradiousa.com
Products/Services: Broadcast Radio has been developing professional radio software for more than 25 years. Our Myriad solution is used by thousands of broadcasters around the world. We offer studio and cloud-based solutions for playout, scheduling, logging and news as well as a complete ecosystem for radio stations of all types and sizes.

Broadcast Software International
+1-888-274-8721
sales@bsiusa.com
www.bsiusa.com

Broadcast Supply Worldwide
+1-800-426-8434
sales@bswusa.com
www.bswusa.com

Broadcast Tools Inc.
+1-360-854-9559
support@broadcasttools.com
www.broadcasttools.com

Broadcasters General Store
+1-352-622-7700
sales@bgs.cc
www.bgs.cc

Burk Technology
+1-978-486-0086 (ext. 700)
sales@burk.com
www.burk.com

Burli Software Inc.
+1-604-684-3140
sales@burli.com
www.burli.com

Cabinetworks Unlimited LLC
+1-234-320-4107
info@cabinetworks.com
www.cabinetworks.com

Calrec Audio
+44-1422-842-159
enquiries@calrec.com
www.calrec.com

Cavell, Mertz & Associates Inc., a division of Capitol Airspace Group LLC
+1-703-392-9090
info@cavellmertz.com
www.cavellmertz.com

Central Coast Electronics
+1-541-992-3416
jthorusen@centcoast.com
www.centcoast.com

CEntrance
+1-833-236-8726
info@centrance.com
www.centrance.com

CGI Deutschland B.V. & Co. KG
+49-234-32406-000
marketing.mediasolutions@cgi.com
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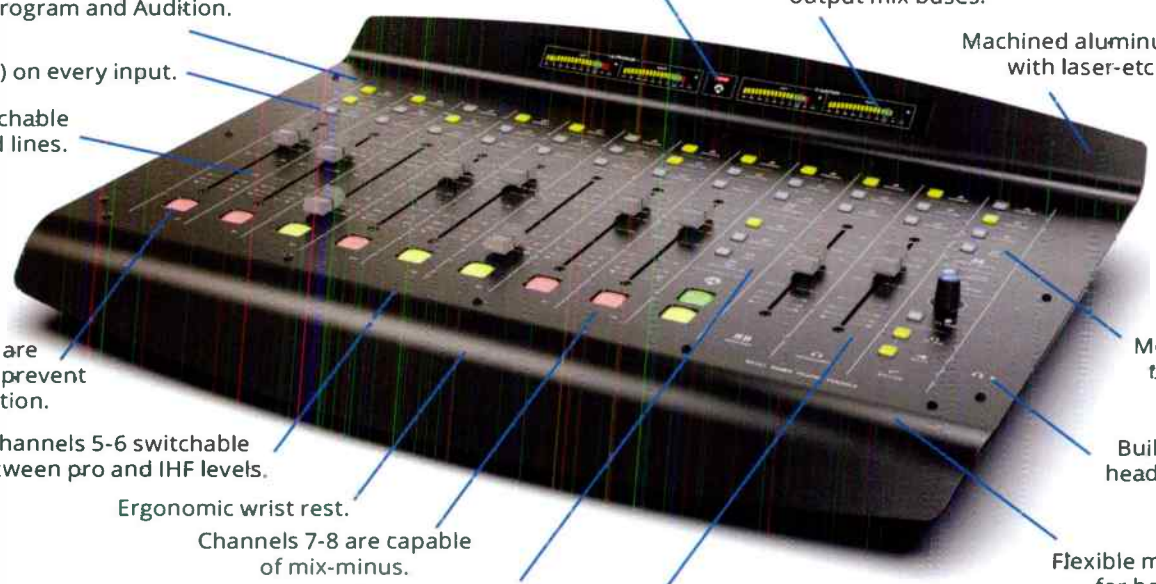

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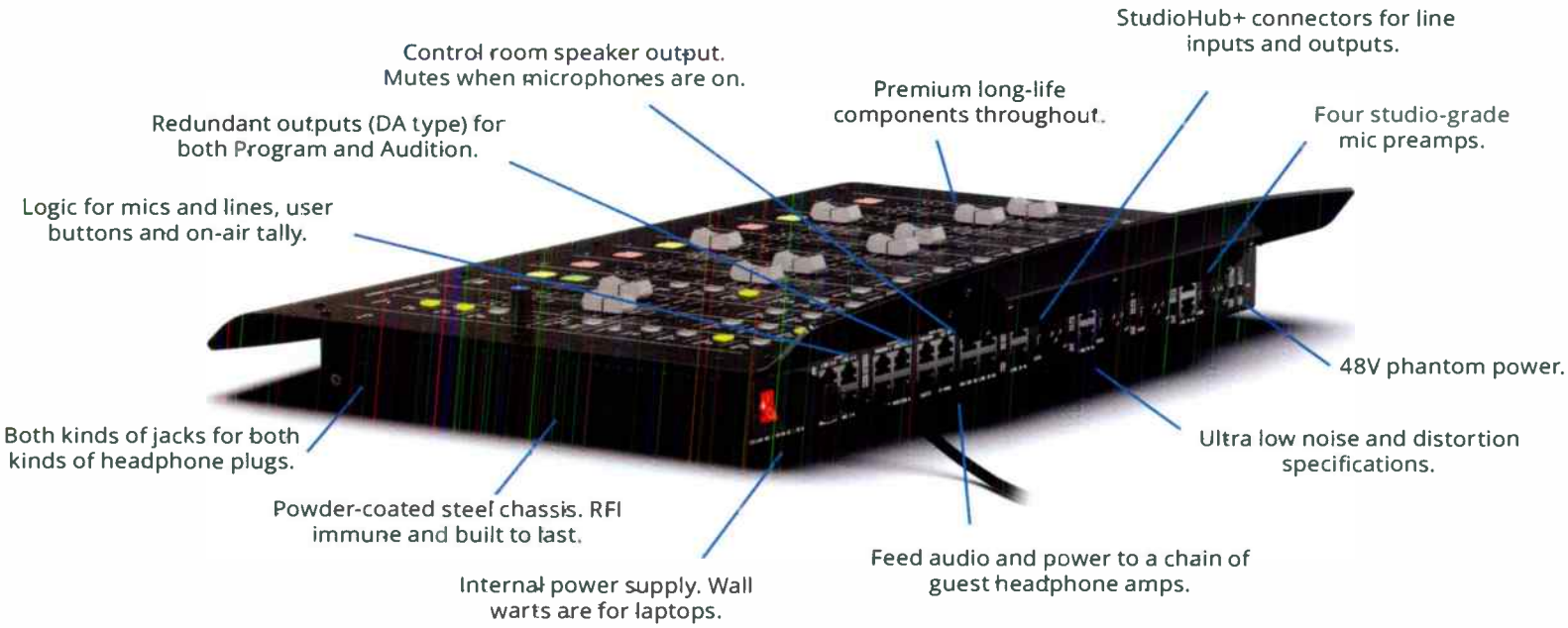

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Products/Services: Wheatstone Corp. designs and manufactures professional broadcast equipment under the Wheatstone, Audioarts and VoxPro brand names. Products include digital and analog audio consoles, audio over IP networks, digital audio editing 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: ZTransform provides planning, design, integration and launch services for some of the most recognized brands in radio, television and streaming media, including KEXP, NPG, KESQ, KEYT, KVIA and AT&T SportsNet. From specifications development through operational readiness, our experts help all stakeholders meet their objectives through optimized technology solutions and managed services.

World Radio History

Writer

Peter Burk
President, Burk Technology

Easy no-budget tips for better transmitter care

Improve your maintenance program using the versatility of your remote control

If you have transmitter sites to care for, you know each emergency means an engineer on the road and possibly lost airtime.

Remote control systems have traditionally allowed transmitter observations to be made remotely, but modern systems are capable of much more. Here are some tips to improve routine maintenance and reduce emergency calls using the versatility of a modern remote control.

Virtual Channel Expression

M1 / M2 / M3 * 100

Mathematical operators:	+ - * / MOD
Logical operators:	AND OR NOT XOR
Functions:	SIN COS TAN LOG10 LN SQRT
Equality:	= <> < <= > >=
Parentheses:	()
Meter values:	M1 - M256
Meter values with offline state:	MM1 - MM256
Status values:	S1 - S256
Status values with offline state:	SS1 - SS256
Raise relays:	R1 - R256
Lower relays:	L1 - L256
Macro variables:	V1 - V256
Constant values:	Any real number

Virtual channels add meaning

Virtual channels can take data from other channels and synthesize new data mathematically. Each virtual channel uses an equation to process this data in real time. These channels can be logged and used for alarms and to trigger macros and notifications just as regular channels. Here are a few classic examples, but you can probably think of more:

It's getting hot!

Knowing the heat rise in your transmitter is important. Two temperature probes can give you a way to measure the rise in temperature in your transmitter. Simply use a virtual channel to subtract the input temperature (or even the room temperature) from the exhaust plenum temperature. Stack probes make it easy to pick up the temperature in a closed plenum. The virtual equation is simply M1 – M2.

Is your efficiency sufficient?

A sudden drop in transmitter efficiency means trouble. Look at the other readings to determine a possible cause. If it suddenly gets better, you likely have a faulty meter sample.

The formula for efficiency we are all familiar with is Power Out divided by Power In. The input power is final volts times current, so efficiency simplifies to P Out / E / I. (If this simplification doesn't make sense, try it on paper.) Assuming the first three metering channels, Fig. 1 shows the equation.

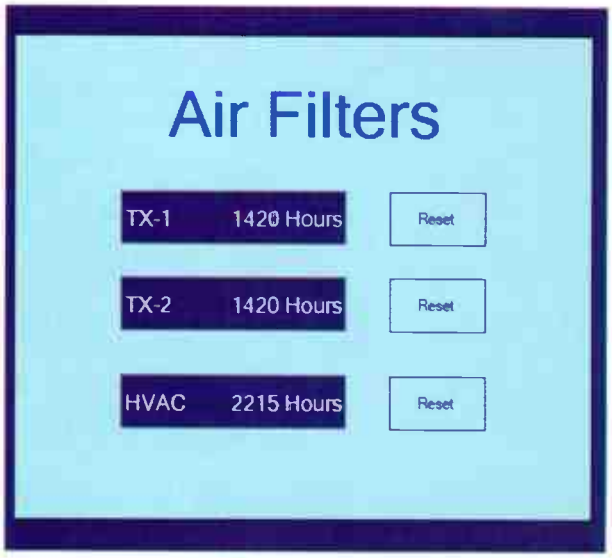
Set this virtual channel to alarm if too high or too low, and make sure you add it to the log.

It's been a while

Just how long have those air filters been in there? Set up a virtual channel for each such item and assign it to a timer. Elapsed hours can be accumulated and can trigger a warning if overdue. As shown in Fig. 2, a command button for each can be used to reset the timers when the maintenance is performed.

Straight as an arrow

Ever have a sample that isn't linear? Here is a fix.



Top
Fig. 1: Equation for virtual channel showing efficiency.

Right
Fig. 2: Custom view showing hour meters with resets.

More Info
http://burk.com

World Radio History

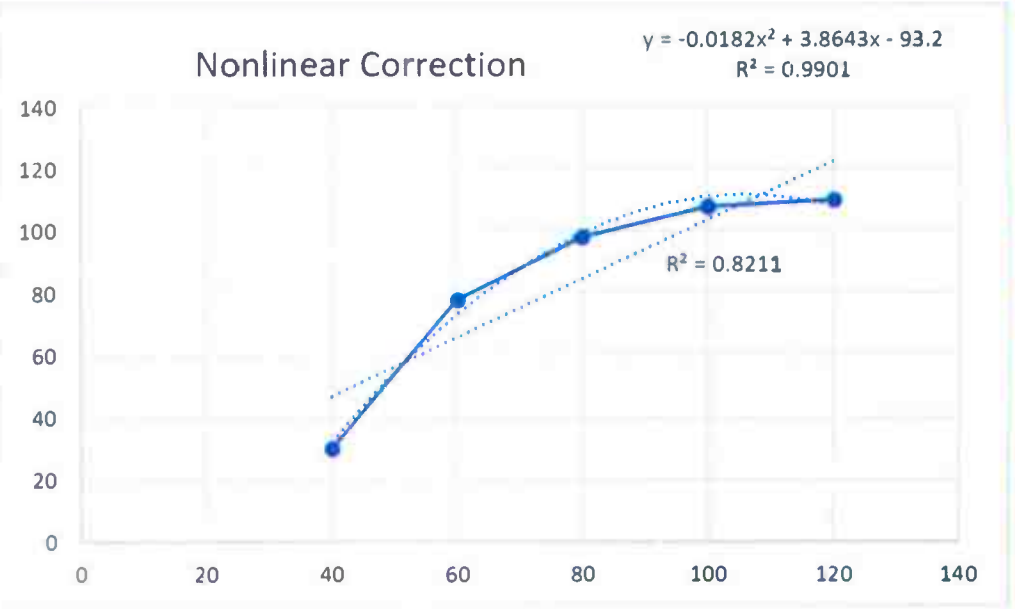
Measure across the needed range and record actual and indicated values. You'll need at least three points, but more is better.

Now put the actual and measured values in a graph in excel as shown in Fig. 3. Try different degrees of polynomials and pick the lowest order that gives you a good R squared value.

In this case a second order polynomial works well. The equation for Channel M1 becomes:

.0182 * M1 * M1 + 3.864 * M1 – 93.2.

Voila. A transfer function that is linear.



APIs add data

There are many data sources that are not physically connected at the site but are available through an Application Programming Interface (API).

The obvious example is a source of free weather information such as weather.com. This can provide a virtual weather station that represents the conditions in a radius of about 1,500 meters of your site. Good enough to know when to automatically turn on the deicers. Add 0.35 degrees per 100 feet of antenna height. It's 7 degrees colder at 2,000 feet!

Burk has an app note available that explains how to use APIs.

Alarm on low VSWR

That's not a typo! Most engineers alarm on high VSWR, as well you should, but there is also a reason to alarm if the meter sits on the left peg. A VSWR indication of near-perfect may look comforting, but it is likely a faulty sample. To assure VSWR protection, alarm if it is too good to be true.

Don't miss a beat

If you are lucky enough to have an auxiliary transmitter, you should already be switching to it automatically when the main transmitter fails.

It is important to test the aux regularly, but you don't need to get out of bed to do it. Schedule a flowchart or macro to run the text on a regular basis.

Test on-air with the same sequence as your normal recovery. You will be testing the complete backup chain so recovery in a real failure will be smooth. Let your routine tell you about the test in the morning.

Mr. Pearson and his coefficient

Most of us diligently keep transmitter logs, but what do you do with the data? There is a lot of interesting information in there if you dump the log data into Excel and start digging.

Ever wonder if AC line voltage affects power out? Does the STL signal fade on warm days? How does tube age affect efficiency? Those are the kinds of questions that you can answer with a stack of logs and the Pearson correlation coefficient.

In Excel, fill two columns with the values to test and put "PEARSON(Array1,Array2)" in another cell as shown in Fig. 4. The answer will be between –1 and +1, with zero indicating no correlation and one representing a perfect correlation.

D2 =PEARSON(Line_V,Fwd_Pwr)

	A	B	C	D
1	Line V	Fwd Pwr		PMMC
2	212.2	9505		0.00989
3	213.5	9467		
4	217.5	9470		
5	216.5	9520		
6	229.0	9529		
7	231.4	9547		
8	213.7	9502		
9	230.2	9482		
10	219.6	9484		

Top
Fig. 3: Spreadsheet graph used to calculate transfer function for non-linear input.

Above
Fig. 4: Calculation of Pearson Correlation Coefficient showing no correlation.

Continuous improvement

If your system has been in place for a few years, there are improvements that you can make to avoid future down time. Call your equipment suppliers or check the web for the latest updates.

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World Radio History

DAD gives college students a boost

ENCO system modernizes broadcast and production for Clark Atlanta

Students at Clark Atlanta University, a liberal arts college with approximately 4,000 students in Georgia's largest city, have long enjoyed access to broadcast and production opportunities through work study, internships and extracurricular programs.

The Department of Mass Media Arts offers students practical experience in journalism, multimedia production and radio through an on-campus cable TV station, student streaming radio station and four production suites.

The university recently invested in technology upgrades for WSTU, the online student-led radio station, and all four production suites to establish a modernized infrastructure and workflow across all locations. That includes a Dante network that will move between the studios and allow students to record audio for WSTU programming and course projects.

Among the upgrades is a new ENCO DAD automation system.

Dr. Brian Bentley, Clark Atlanta University's associate dean of arts and sciences and professor of mass media arts, said, "We wanted a more modern automation system that also offered a quick learning curve for students, and that we could have ready for the fall semester. The ease of use was immediately clear, beginning with the user interface."

He and a colleague spent day one bringing music into the system and arranging it into different categories. "We can do a lot more with our production workflow now and with better efficiency."

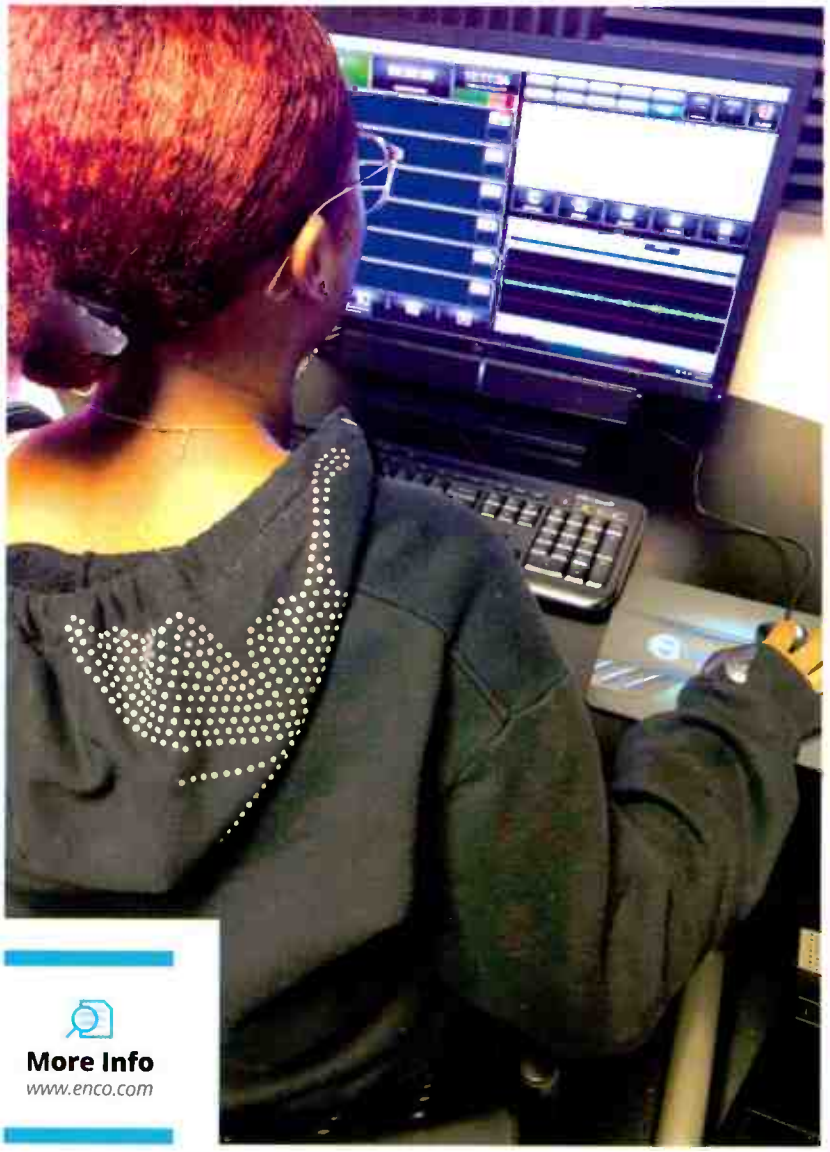
Bentley said that the upgrades represent efforts to make WSTU "more visible" on campus.

"We also purchased new mixers, microphones and PTZ cameras, the latter of which will allow us to start doing video podcasts. With DAD and our Dante network at the center of the workflow, we can produce much more student programming and in different formats."

He said the school wanted to deploy technology that is used in broadcast today to help students compete better in the global job market.

Bentley's intention is to add DAD systems to each of the production rooms, which he says will allow them to record content directly into the system everywhere.

"We can even convert our analog boards to Dante, and then move content over Cat-6 network cable and straight into DAD. We're just at the starting gate with DAD, but this simplifies how our students work with both live and prepackaged content, and it is a perfect representation of how infusing the right hardware and software can really open new opportunities in radio."



More Info
www.enco.com

> **With DAD and our Dante network at the center of the workflow, we can produce much more student programming and in different formats.**

World Radio History

WJMJ adds HD Radio with sub-channels in mind

Catholic station deploys a Nautel GV5 with HD MultiCast+ Importer/Exporter

More Info
www.nautel.com

Several years ago WJMJ(FM) in Hartford, Conn., approached contract engineer and consultant Tom Ray about taking the station HD for improved outreach to the Hispanic community.

"At the station's existing site, HD operation would've been problematic," Ray said.

"We applied for a location change and were able to move the transmitter site from Burlington to Farmington. With an antenna 950 feet up the 'Channel 61 television tower,' we were able to upgrade from a Class B1 to a full Class B and, the best part, the HD signal could be operated at -10 dBc. Win-win!"

Ray said tower management had an available 4-1/16-inch transmission line that was pressurized and spec'd out. "So we needed a transmitter that would produce the required 2.14 kW transmitter power output while allowing us to produce an HD signal at -10 dBc. We chose a Nautel GV5, which had plenty of headroom and the latest Gen 4 HD MultiCast+ Importer/Exporter."

Ray has installed many AM/FM transmitters over the years. While this job was complex, he said, it also was one of the easiest.

In addition to running Hispanic Catholic programming on the HD2 signal, WJMJ runs EWTN Catholic programming on the HD3.

"Setting up and partitioning the HD signal on the MultiCast+ Importer/Exporter was relatively easy, and both HD sub-channels sound outstanding."

The station also runs programming for the visually impaired using the GV transmitter's built-in 67 kHz subcarrier generation and built-in RDS generator.

Ray said the GV5's compact size and weight gave no concern to the building's mechanical engineers. The electrical demand, and load on emergency generator, was considerably less than the five full-power HD television stations and other Class B FM located in the building.

"I am impressed with both Nautel's transmitter quality and staff I had the pleasure of interacting with. But what impresses me most is that I can get someone on the phone to help service a 25-year-old Nautel Ampfet transmitter, plus still get parts for it. That's customer service for you."

Above
Tom Ray at WJMJ

World Radio History

More virtual for Bonneville at the 100-studio mark

Scripting automates processes and leads to more touchscreens

As Bonneville engineers began to scale up to 100 new studios in six major U.S. markets, they noticed something interesting. More and more touchscreen interfaces began seeping into studios as they standardized on WheatNet-IP in Salt Lake City, Denver, San Francisco, Sacramento, Phoenix and finally Seattle, affecting all 22 stations in six markets.

In Phoenix, for example, they went with small mixer turrets for news desks. But by the time they arrived in Seattle months later, they were putting in touchscreen mixers for similar news desk positions.

What happened in between was a lot of backend scripting of the WheatNet-IP system to automate processes with switching and logic, which translated over to using touchscreens instead of fixed control panels or console surfaces in some cases.

Software applications and interfaces can fill in the gap where hardware can't, said Bonneville Regional Director of Technology Aaron Farnham.

Wheatstone's Screenbuilder for building custom screens and other software such as ReMIX remote app make it possible to route, mix and control studio elements from a touchscreen. "We're probably using 60 percent of what we have. Now that we have a working knowledge of Screenbuilder, we can fine-tune and make our systems more sophisticated," said Jason Ornellas, regional director of technology for Bonneville International.

Even the fixed LXE console surfaces for Bonneville's main on-air studios use touchscreens in place of the console meter bridge. "We now have these three-channel LXE wedges that each have their own screen that looks like a meter bridge but are actually touchscreens," said Farnham.

The Bonneville team officially completed the six-location project in early 2023, but in many ways, the project is ongoing. "I think for us, there are going to be more software applications or combining more applications and more vendor interoperability in a single box," said Ornellas.

More Info
www.wheatstone.com

Above
This studio serves KMVQ(FM) in San Francisco.

Right
Wheatstone ScreenBuilder was used to design custom screens like this one for a news desk at KIRO(FM) in Seattle.

World Radio History

Cox doesn't do Windows with WheatNet-IP

It replaced banks of PCs with Wheatstream or Streamblade AoIP appliances

Another Windows update was the last thing Morgan Grammer wanted to do when he took over engineering the replacement hardware for Cox radio's 200-plus streams as the DOE for Cox Media Group – Radio, Tulsa.

"We were looking at PC refreshes for 57 stations in 20 markets and all their HD channels plus all the on-demand channels, and we were thinking 'will this even work with Windows 11?'" said Grammer, referring to the group's legacy streaming system.

Grammer, along with Cox DOE George Corso, Miami, replaced banks of PCs with a main and backup Wheatstream or Streamblade AoIP appliance per market in most cases.

Each WheatNet-IP appliance is capable of eight channels in and 32 output streams for both MP3 and AAC encoding to redundant CDNs, and provides provisioning, metadata support and audio processing for each unique stream.

In addition to not having to worry about Windows updates, Grammer told Wheatstone that Cox stations benefit from the appliances' audio processing specifically designed for streaming.

"We can maintain the excitement that comes with radio without having to clip everything to 0 dBFS, which we don't want for streaming because the codec can really turn that into grunge," said Grammar. He added that level matching between sources is another benefit of the Streamblade/Wheatstream appliances.

"We ingest a lot of different sources from our ad partners and the last thing we want is music at one level and then deafening our listeners with an ad that comes on after," he said.

"The overarching goal was to be able to spin up channels on a whim and process them for a large variety of source material and having it sound good coming out the other end," he added.

More Info
www.wheatstone.com

Above
Morgan Grammer with one of KRMG's NAB Marconi Awards.

In fact, Cox station KRMG(FM) in Tulsa recently won its seventh NAB Marconi Award for news coverage; and as this article was being prepared, Grammer was in the process of putting up a secondary stream for breaking news as a result.

All streaming is native to the WheatNet-IP audio network used in Cox studios, with no AD/DA required, and because the AoIP appliances include the Nielsen watermark audio software encoder, that saves additional units in the rack, which is more complexity that Grammer can do without.

"That's the beauty of the box. We can keep adding more licenses and grow as we come up with more channels without having to redeploy more hardware," he said.

Inside WOSU Public Media's sparkling new HQ

The facility serves Central Ohioans with radio, TV, streaming and other media

Number One: It had to have windows.

When WOSU Public Media started planning its new five-level headquarters six years ago, the staff made its desire clear: After almost 50 years in a windowless basement, the station deserved some light.

In the spring of 2022, WOSU completed its new facility in the 15+High University District. It's a complete multimedia facility capable of TV, radio, streaming and post-production.

WOSU Public Media is owned by The Ohio State University in Columbus. Its radio services include 89.7 NPR News WOSU(FM) and Classical 101 WOSA(FM), with HD-1 and HD-2 channels on the two Columbus-area stations as well as its transmitters in several cities around the state.

Radio facilities are mostly on the second floor and consist of three air and five production rooms, a performance space with control room, a talk studio with TV capabilities (for streaming and for a show on the government channel), a newsroom editing space and an audio edit studio.

That's in addition to two TV studios with associated control rooms, editing bays and master control. "There's also a large street-facing public community studio with control room, used for all types of events, from performances to simple meetings and an audience up to approximately 120 people," Director of Technology Michael Meadows said. "It's capable of both audio and video productions for live on-air use, streaming or recorded production."

The building also has a Media Learning Lab with small podcast both, available for the WOSU Classroom department for K–12 educational services and for OSU departments and students to use.

The tech center for this entire operation contains 40 racks and associated equipment plus interconnects to the transmitter sites.

The 15+High University District is across the street from the original main gateway to campus and is being built to house university offices, the president's office and street-level retail, as well as an outdoor mixed-use space. The station is much closer to the heart of the school now, at the center of campus.

Right
The Radio Performance Studio is shown at top, with Kevin Petrilla at the console, Brent Davis playing banjo and Eric French on guitar. Below them is the tech center for the entire operation, with 40 racks and feeds to numerous transmitter sites.

Below
The new headquarters features lots of windows and prominent signage. At right, the newsroom includes radio and TV branding.

Meadows was part of the leadership group that oversaw the project, with Director of Business Operations Mary Alice Akins and General Manager Tom Rieland. Meadows led a technical team that included Manager of Radio Operations/IT Kevin Petrilla, Manager of TV Productions and Operations John Prosek, Chief Engineers Tim Kelly and Rick Hood, Senior Audio Engineer Eric French and TV Executive Producer Ben Bays.

Messer Construction put up the building, with architectural design by Meyers+Associates. RBDG Russ Berger Design Group provided studio architectural and acoustical design, while Diversified performed the integration.

Major radio components include a WheatNet-IP system with L Series and Dimension Three surfaces; Shure KSM 44A Microphones; Telos Alliance VX Enterprise Broadcast VoIP Phone System with Broadcast Bionics XScreen Call Screening software; and TBC Consoles furniture.

Continued on page 46

World Radio History

Tussas relies on WorldCast for major STL rollout

Broadcast operator conducts a massive renewal of distribution infrastructure

Among its many business operations, telecommunications firm Tusass is the national operator for radio and TV in Greenland.

At the beginning of the year, it began a massive rollout to renew its existing radio program and create a new national program, covering 70 sites in the country.

This massive renewal for transmission and STL programs meant the acquisition of new Ecreso FM transmitters (for a total of 140) as well as acquiring a new network infrastructure for audio over IP transport.

Overseeing the deployment from Tussas was Project Manager Bo Christensen, who told WorldCast he was looking for robustness, all-in-one convenience, and ease of use and maintenance.

The network head end consists of one APT Frame per program including redundancy at each level; first hardware-based with dual power supply and redundant AoIP modules to send audio over IP, as well as with software redundancy thanks to SureStream streaming technology.

More Info
www.worldcastsystems.com/en/

Above
An STL antenna site in Qaanaaq in northwestern Greenland. It is one of the northernmost towns in the world.

At each transmitter site, a software-based APT IP Decoder receives the audio from a multicast server. This software IP decoder is hosted by Ecreso AiO series transmitters and is built on the source code of APT IP Codecs. Tussas also relies on WorldCast's NMS platform, Kybio, for supervision of its radio network.

This project was validated in early 2022 and deployment is now complete. It was accompanied with on-site training as well as support for the first installation.

"Tusass now benefits from redundant, highly available STL links with the best audio quality and performances on the market while maintaining a low deployment cost and reduced maintenance needs," WorldCast said in a project summary.

World Radio History

The beauty of a shorted quarter-wave stub

Xenirad calls it "the ultimate in coaxial lightning protection"

John Bisset
CPBE

The author is in his 31st year of the Workbench column. He handles western U.S. radio sales for the Telos Alliance and is a past recipient of the SBE's Educator of the Year Award.

In addition to pumpkin pie and turkey, Halloween and Thanksgiving, fall is the time of year to focus on budgets. Even if your station is one of the few that don't use a budget process, it makes good sense to prepare a list of physical upgrades that may be needed in 2022.

As you review the equipment that could use an upgrade, also consider acquisitions that can reduce your risk. A surge protector or UPS, for example, can save not only money but headaches, and you can't beat the cost/benefit ratio.

Another piece of protection equipment you may want to consider is a shorted quarter-wave stub. One can be placed on the output of an FM exciter, ahead of a tube transmitter, so that any tube arcing is shorted to ground and will not be fed into the exciter.

Our Radio World colleague Mark Persons has an interesting article on his website *www.mwpersons.com* describing its use. Select "Tech Tips" and look for "Stub Protector for FM Exciters and Transmitters" under the FM Tips column.

This concept can be used in higher-power applications, though you may not want to cut rigid line yourself.

Enter Fred Francis, an RF consultant, who manufactures tunable shorted stubs in both 1-5/8-inch and 3-1/8-inch rigid line under the company name Xenirad.

The quarter-wave shorted stub connects between your transmitter and your antenna system to short the center conductor to ground. This provides lightning protection for your transmitter. Should lightning strike your tower, the high-voltage pulse travels down your transmission line and meets the stub, where it is shorted to ground.

The stub is virtually invisible to your transmitter and offers 0 dB of insertion loss and an input VSWR better than 1.01. Return loss values are typically greater than –50 dB. Both fixed and frequency-agile models are available.

A real benefit is that the stub is maintenance-free, even after a discharge. There are no parts to replace.

The shorted stub acts as a broadband filter, and in sites where FM is collocated with AM, the latter signal is reduced by more than 30 dB.

An installed tunable stub is shown in the first image. It can be identified by the long slot, which provides fine-tuning across the FM band.

In addition to providing a DC short and broadband filtering, the stub recently was used at Black Diamond Broadcasting in Michigan by Del Reynolds, director of engineering, and his assistant Brian Brachel.

Brian was referred to Xenirad by Nautel's Jeff Welton after Brian discovered a spur on their Continental 816R-4 transmitter. The spur was located on the GPS channel at 1.575 GHz. Installation of the shorted stub knocked out the spur. This particular stub was customized using two tunable stubs, one quarter-wave shorted and one quarter-wave open to remove the specific harmonic.

Shorted stubs also can be used on STL RF links and RPUs. The Curly-Q stub shown above lists for $250; a rigid version for your STL is shown at right. These are available from distributor Broadcasters General Store. All protect the equipment to which they are connected.

Top
A 3-1/8-inch tunable stub, mounted at the transmitter output (and identifiable by the long slot at center top), diligently guards against damaging voltage spikes.

Middle
The Curly Q stub can be used on exciters and RPUs.

Right
A miniature version of the rigid stub protects the STL.

More Info
www.xenirad.com

World Radio History

A new studio in the heart of Seattle

Check out these renderings of the planned new facility of KNKX

If things go as planned, KNKX — "your connection to jazz, blues and NPR News" — will move into a new Seattle home in the Madore Building on Western Avenue by the middle of this year.

It's a neighborhood that is undergoing a massive transformation, boosted by the removal of a highway viaduct.

"The new space, situated between the Pike Place Market district and the redeveloping Seattle waterfront, will open a higher level of engagement with nearby activities and organizations," the station states on its website, "such as the new Seattle Aquarium Ocean Pavilion, the expanded pedestrian walkway along the waterfront and musical events in the Market and on the waterfront piers. The potential for partnerships with neighborhood organizations and institutions is endless."

The station — which is licensed to Tacoma and has studios both in Tacoma and Seattle — has itself been through a transformation in the past six years.

KNKX was KPLU(FM) until it was sold by Pacific Lutheran University. The original proposed sale to the University of Washington met with community resistance, and the station eventually was sold instead to a non-profit organization, Friends of 88.5, with help from a significant local fundraising campaign.

As part of that transition, it moved the Tacoma studios to a new location in 2019. Now with the Seattle lease expiring, the station plans a new facility with an on-air studio; one large and two small production rooms; a performance space and live mix studio; newsroom and offices.

Funding is coming from a "KNKX Next" campaign that hopes to raise $5.8 million. "We have real challenges with our current Seattle location," it states on its website. "In order to make the Save KPLU campaign count, we have to fund both spaces and the complex technical systems that will allow us to serve the community that worked so hard to save us now and into the future."

Continued on page 46

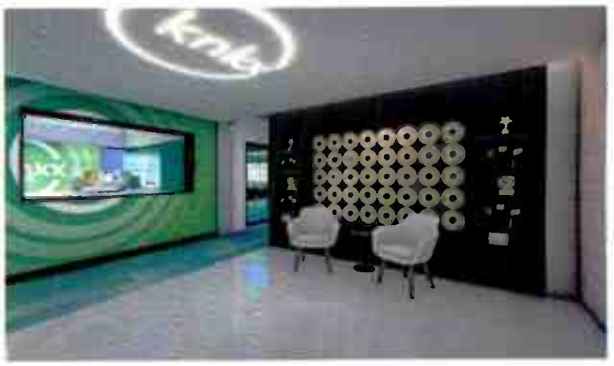
Top
Performance space.

Above
Lots of open windows will look out on the fast-changing waterfront.

Right
Broadcast booth.

Left
A station hallway.

Bottom
The planned lobby.



More Info
https://ztransform.com/

World Radio History

WOSU, continued from page 42

Automation and digital storage are on an ENCO DAD system. Multi-track performance editing and production is in Avid ProTools, with newsroom editing on Adobe Audition. Classical music scheduling is on MusicMaster while news content is done in NewsBoss. Comrex Access codecs are used for remote production and Sony robotic cameras serve the talk studio space.

"We went with a simple look for the studios," Meadows said. "We worked with RBDG to really put the focus on the acoustical needs of the spaces. Colors and designs were designed to match with other elements throughout the building.

"We worked with the architects to include callouts to our PBS/NPR brand and WOSU history. We have a whole wall that is a timeline of WOSU, which celebrated its 100th anniversary in 2022. One space is various old TV equipment used throughout the years, and there is a small space with old radios. We also have two large 'selfie spots' with Sesame Street and Mr. Rogers that visitors can take pictures with."

Above
This view of a radio talk studio in foreground and control room behind shows the open design approach of the cabinetry.

Everything is connected across the enterprise. Audio and video can be moved throughout the building and studio spaces; TV/radio and streaming content can be produced and controlled from anywhere.

The site, he said, provides a real link with the community. "Being closer to the university opens up the possibilities for productions and performances with other college departments via fiber connectivity for WOSU to provide local content either through streaming or over the air."

Also, there are windows.

KNKX, continued from page 45

The studios will feature WheatNet-IP audio infrastructure, Broadcast Electronics AudioVault and NewsBoss software, and Cabinetworks technical furniture. The architect is V Three Studios, with general contracting by Sellen Construction (which also led major projects for KEXP and KING, two other Seattle noncom stations).

The building has media roots; it served another radio station at one point (though which is unclear), and subsequently several video and audio post-production companies.

"This is a clean and modern design aesthetic going into a historic building," said Erik Utter, president of Utter Associates, the consultant, design and integration firm. "It's a clean-sheet design that needs to serve the diverse needs of news and music programming. All spaces are intended to serve different stakeholders. Automation and controls will allow seamless transitions from Seattle to Tacoma studios. Other tenants above and below require fully floating studios for acoustic isolation."

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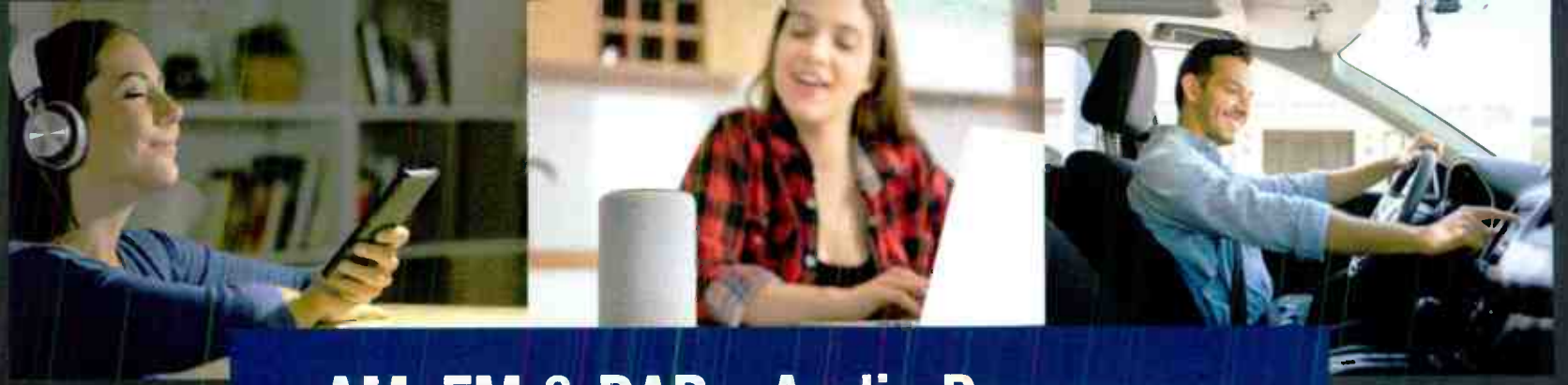

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