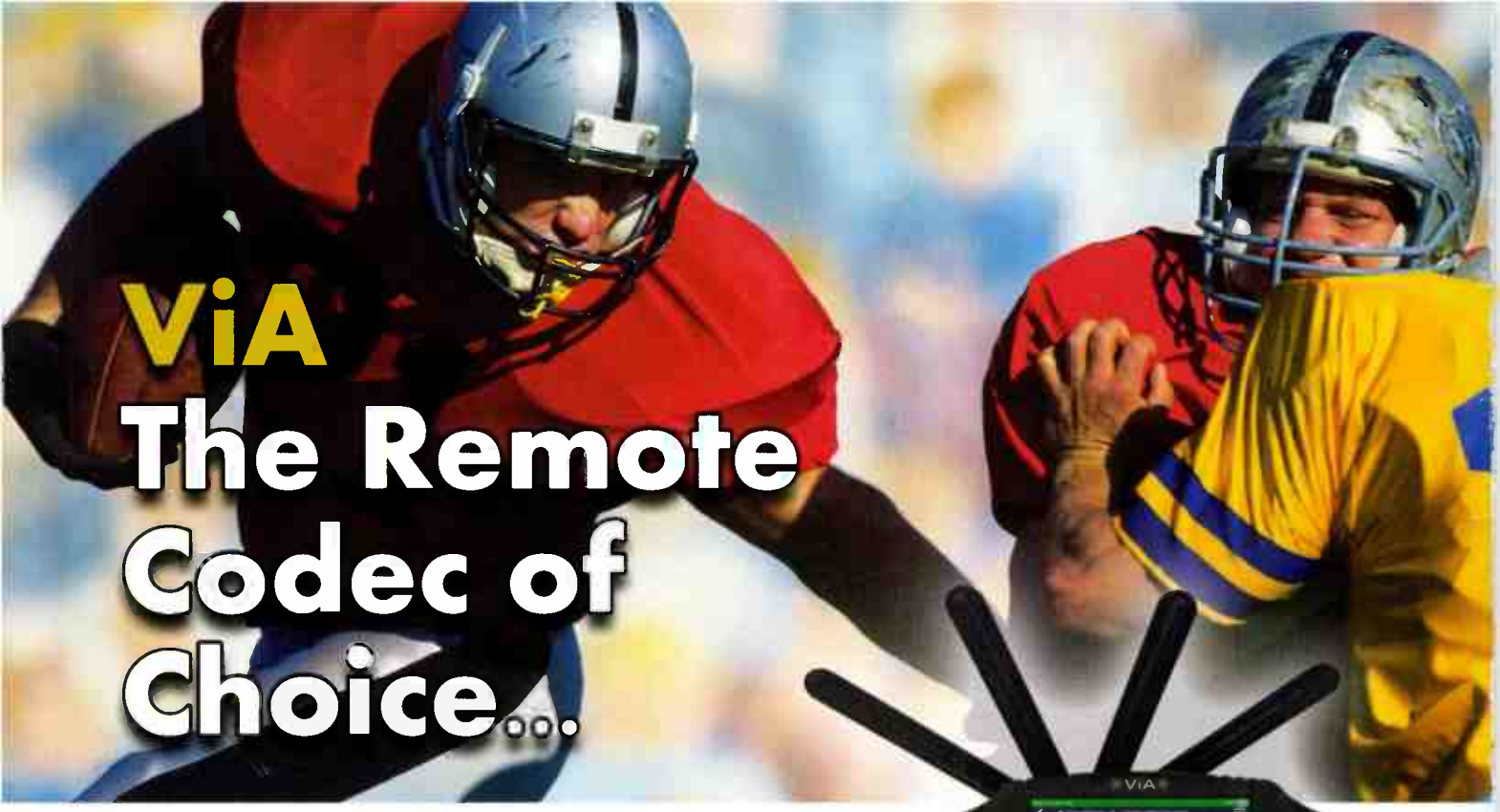
RADIOWORLD

2021 Source Book & Directory

Annual Reference Guide and Supplement to Radio World

FUTURE



ViA
The Remote Codec of Choice...

The ViA now supports 7 IP interfaces:

- Internal module supports 2 SIM cards for Telco diversity
- Supports built-in Wi-Fi (no USB modem required)
- Connect 2 air cards and 2 Ethernet connections
- Rock solid IP connections with primary and redundant streams using SmartStream PLUS
- Control remotely from anywhere with the Cloud Codec Controller (sold separately). Watch the video

https://youtu.be/S1WZ6TacYDI

((ViA))

Wi-Fi
Built-in

Tieline
The Codec Company

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An Industry With Staying Power

Here is your Radio World 2021 Source Book & Directory, a technology resource for professionals in the radio broadcast and new digital audio industries.

Our industry has never seen a year like the one just concluded. Media companies and their engineers, managers and other employees not only had to deal with the great public health crisis, including their own personal safety and that of their families; but they had to reinvent workflows on the fly. Remote broadcasting took on a crucial new role. National and regional conventions were cancelled; virtual events became ubiquitous. Businesses cut back and paused to assess their core missions.

As a new year approached, the promise of vaccinations brought cautious hope that coming months would see more stability and eventually a return to in-person daily life. Yet it seems likely that many facets of our business, including events, workflows and facility planning, may have changed permanently.

Like the rest of the global economy, our industry's suppliers have been challenged. Radio World exists in part to bring buyers and sellers together, and we believe in the importance of a vibrant technology marketplace. We salute the manufacturers and service providers who have traveled this difficult year with us and who continue to support this industry.

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 21. A cross-index helps you find companies by type of product or service, starting on page 16. On pages 4 to 15, sponsors highlight key products in the Profiles in Excellence section. And starting on page 33 are sponsored reprints of stories that appeared in Radio World in recent months.

Our thanks to the companies listed, in particular those that advertise in Radio World. They make it possible for us to serve you.

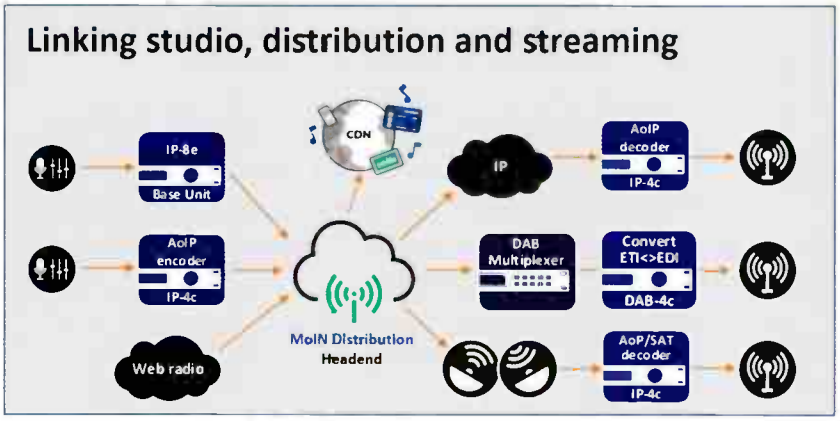
Paul McLane
Editor in Chief

How may we serve you better?
Email me at *radioworld@futurenet.com*.

Future Visions of Audio Solutions

Who is 2wcom Systems? We are a broadcast technology-driven company in Flensburg (Germany), which is in direct neighborhood to Denmark. 75% of our crew are engineers. This comes along with a very concentrated knowledge for developing Audio over IP, MPX over IP, DAB, SAT and FM/RDS soft- and hardware solutions. Worldwide customers benefit from our long-time experience.

We contribute to the success of our customers by providing high-quality equipment and first-class customer service. Right now, harmonization of old and new transmission technologies is crucial, especially since nobody can ignore the advantages, that IP based multimedia network systems offer. Hence, solutions are mandatory to link studio, distribution, and streaming.



To support broadcasters in these times of rapidly evolving technologies, our team of engineers developed the 4audio series. A broadcasters "Swiss Army Knife" combined with "Quality made in Germany", designed for studio or transmitter links, streaming, and the multimedia working methods. Its heart is a Linux based, embedded software which allows for flexibility in system design, whether the need is for hardware, software to run on VM or in the cloud, or remote-control. The software is 100% developed by 2wcom, hence no struggles with third-party open-source software.

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

All devices provide facilities for audio interfaces, transport, transcoding, streaming, or synchronization. Robustness mechanisms by source, stream, and error correction assure to overcome even stressful conditions. The solutions support all standards for Audio over IP interoperability. Also, compatibility is increased by considering the different frame sizes of audio codecs (AAC profiles, OPUS). As a conclusion, the supported protocols and audio formats keep the independence of each studio and enable to forward the contributions to the headend. The on-demand scalability of all features allows for easily managing a wide range of broadcast applications (Studio2WAN, SIP network, MPEG TS multiplexing, synchronized playout, FM2TS gateway…).

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

The MoIN Multimedia over IP Network software just says hello to the networks and connects them in a friendly manner. MoIN follows the same technical concept as the 4audio IP boxes. It fulfills various use-cases in the studio, in distribution or in streaming. The software consists of several containers that can be run separately and isolated to achieve good scalability and reliability of the system. Bringing up a container is done in 5 seconds, and the software allows the activation of up to 512 channels. MoIN can be easily adapted to any studio environment. Besides, the transcoding facilities of the software allow the direct feeding of distribution systems such as DAB+, IP, or satellite respectively.

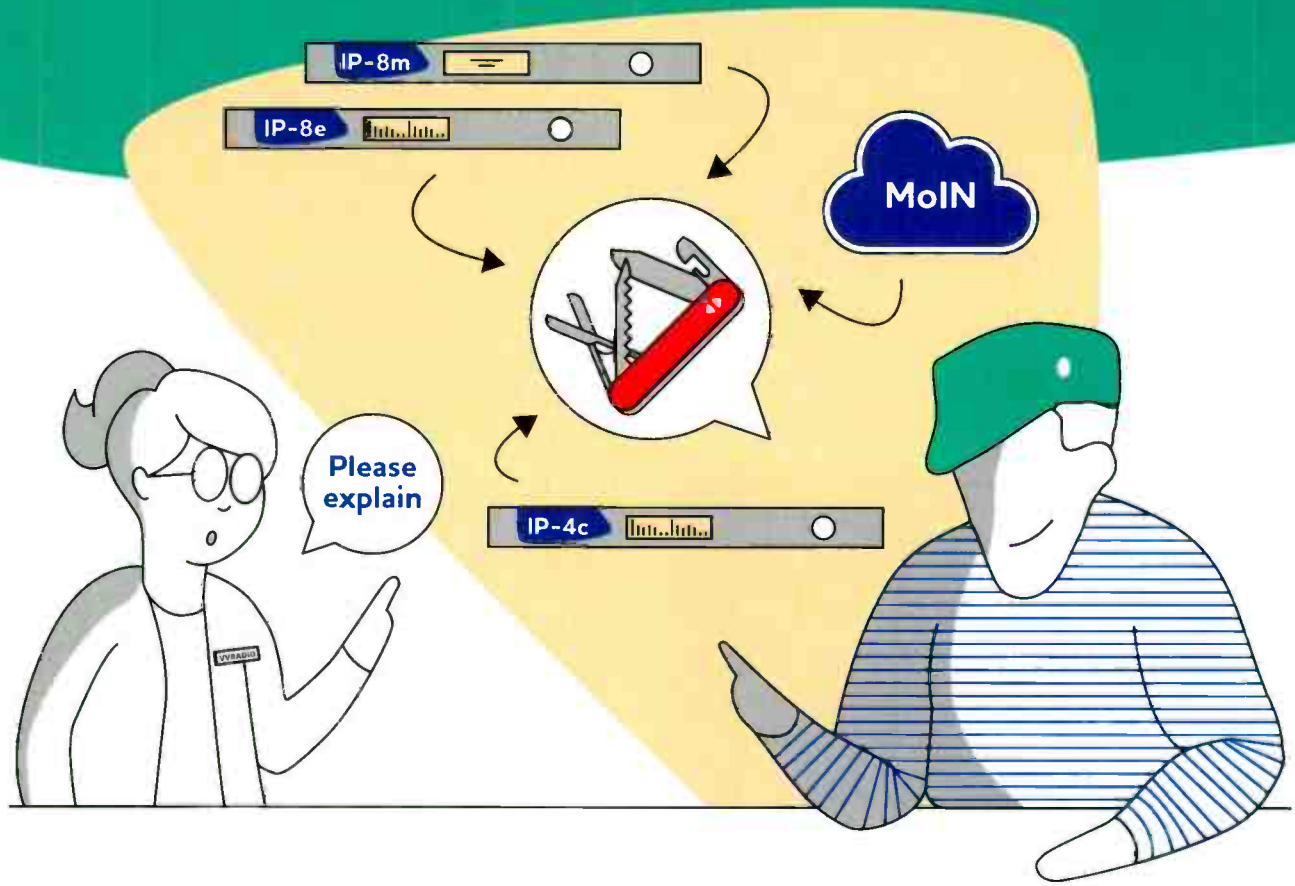
Thank you for your time. Please contact Berry, Sönke, Mark, and Anke for more information or to meet and greet the IP, DAB, and MPX 4audio family members: *sales@2wcom.com*

2wcom
www.2wcom.com

Q: Why is the 4audio IP series a swiss army knife?

A: Just because of the multitude of features!

- Runs as a box, on VMs or in the cloud
- Studio to WAN bridge
- Streaming encoder
- On-demand channels & features
- Multi-format transcoding: FM, DVB, DAB, AoIP
- Remote management
- Multi-layered redundancy
- Precise synchronization
- Phase-locked multi-channel codec



www.2wcom.com · +49 461 662830-0

Your audio. Our solution.

Working from Home

For decades, Comrex has been designing equipment to allow broadcasters of all kinds to deliver live content from anywhere. From IP audio codecs to guest interview solutions - this is what we do.

When the COVID-19 pandemic hit in spring 2020, more and more broadcasters needed to work remotely and broadcast reliably. Regardless of where 2021 takes us, we have a variety of solutions that can help you get the job done effectively.

For live audio broadcasts


ACCESS NX

ACCESS NX is our most versatile IP audio codec. It's designed to deliver high quality audio on marginal networks, so you can make the most of your home Wi-Fi. ACCESS NX is extremely portable - if you need to broadcast from your closet so no one can hear your neighbor's dog, it can go with you. Plus, it has an intuitive user interface, and it's easy to use, so you can connect with the touch of a button (even if you don't have an engineering background).

"The audio quality from the ACCESS is never compromised, even when the link is less than stellar. When bandwidth is very low, the ACCESS will increase buffer while maintaining the audio transparency."

— BRYAN HUBERT, ENGINEER FOR KCMS

BRIC-LINK II has been the codec of choice for home studios for years. It's designed to be lowmaintenance and highly reliable - once it's installed, our customers find, "it just works."


BRIC-Link II

"Our clients have no technical background, and often have no engineering assistance available We needed to engineer a plug-and-play solution that they could set up themselves, with little intervention and limited possibility for error. BRIC-Link is simple and reliable enough to form the basis of our remote kit."

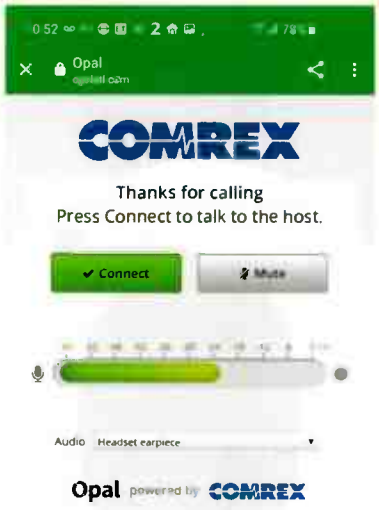
— E.C. HAMILTON

For guest interviews

Opal allows your guests to connect to you with the click of a button. They don't need to install any software, or have any special equipment. Opal will generate a link for them, which they'll open in a regular web browser; once they click "Connect", you're live. It's simple and perfect for nontechnical users - plus, you'll get high-fidelity, low delay audio that sounds much better than a cellphone.

"We do a lot of interviews with authors and artists, and we hope to use Opal for those. All they have to do is click a link to get connected. Even if they use it on their smartphone, it's going to be a much better connection than a standard telephone connection."

— JOE EMERT,
LIFE RADIO MINISTRIES



Opal App User Interface

For visual radio

For visual radio programming, LiveShot delivers high-quality video and audio over a standard internet connection. LiveShot can enable you to continue video streaming your show outside ACCESS NX of the studio.

LiveShot

"When we began video streaming the show, we purchased a Comrex LiveShot. I've now used it to broadcast the show from Denmark, Iceland, all over the United States — not to mention from my home studio."

— THOM HARTMANN,
THE THOM HARTMANN PROGRAM

COMREX

For more information, visit **www.comrex.com** or email **info@comrex.com.**

Remote access with web enabled products

WEB ENABLED

POWERFUL & AGILE

SOUND PROCESSING

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

719 DAVID IV

FM/HD Radio™ Broadcast Processor

- Streamlined 4th generation DSP-based audio processor.
- 5-bands of dynamic range compression & "Graphic EQ".
- 25 Factory presets and 20 customizable presets.
- Multilingual front panel in English, Spanish, & Portugues.

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.
- Web interface for remote control, metering, etc. SNMP support.
- Extensive data logging with graphic display. SMS/email alarm notifications.

NOVIA 272

FM Audio Processor | Stereo Gen | Dynamic RDS

- A member of the compact 1/2-rack sized, all-digital DSP-based 3 band NOVIA family of processors.
- 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.
- Versatile DSP-based design is user programmable to serve multiple broadcast applications: NRSC, AM, FM, SCA, & TIS.
- Monoaural.

www.inovonicsbroadcast.com | sales@inovonicsbroadcast.com | 831-458-0522

WHY **INOVONICS?**

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

VIEW OUR PROCESSORS ONLINE

INOVONICS BROADCAST

PROFESSIONAL REMOTE MONITORING

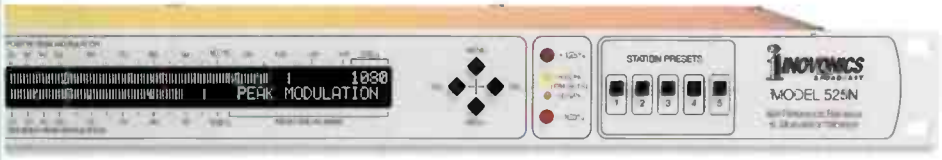
FROM ANY LOCATION. ON ANY DEVICE.

AM | FM | HD | DAB | DAB+

TAP INTO YOUR BROADCASTS THROUGH AN EASY TO USE REMOTE WEB INTERFACE WITH INOVONICS' EXPANSIVE OFFERING OF REMOTE MONITORING EQUIPMENT.

531N FM Modulation Analyzer

Direct and off-air reception. Keep a sharp eye on total RF signal performance.



525N AM Modulation Analyzer

Third generation AM Modulation Monitor designed for accurate AM readings even in the presence of Hybrid Digital (IBOC) transmissions.

INOMINI 635 FM/RDS SiteStreamer™

SOFIA 568 HD Radio® SiteStreamer+™

SiteStreamers

Compact Size with huge features.
Powerful web graphics & Internet streaming.
Dante AoIP available on all SOFIAS.

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WHY INOVONICS?

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

TRY OUR LIVE PRODUCT DEMOS!

INOVONICS BROADCAST

37 Years of Family-Owned Business and Personal Relationships with Our Customers

Who is SMARTS?

SMARTS is a family-owned company that offers a full line of products to operate radio stations. With their roots in radio and 37 years in automation and traffic and billing software development, they're one of the oldest and most experienced companies dedicated to providing you with the tools you need to serve your listeners and communities.

Skylla

Relentlessly reliable. The playout system, Skylla, is a rugged, easy-to-use, Linux-based system for Radio. Being Linux-based offers a more reliable, secure system that is less prone to viruses that Windows-based programs have to defend. Skylla contains many appealing features that are user-friendly.

- Simple and intuitive main screen layout
- Straightforward voice tracking
- Easy log edits
- Powerful, multiple search functions in Skylla catalog
- Ability to transfer from fully automated to user-assist to special events seamlessly and effortlessly
- Special events automatically transfer back to regular programming, requiring no input from the user
- Software provides "now playing" data to several RDS systems and streaming providers, no 3rd party software needed
- Software and hardware purchased together to streamline purchasing process and support needs

SecGen

SMARTS was one of the first companies to ever offer traffic and billing software. SecGen was designed and created by traffic operators with expertise in radio. Within SMARTS, it's referred to as "a traffic operator's best friend."

One of SecGen's best features is its flexibility.

- Multiple stations on one database
- One order can run on multiple stations
- Cut management that allows multiple parameters to be set and customized
- Unique user-friendly shortcuts that save you time
- Remote access
- Pre/post log information
- Verify automation logs
- Per spot rates and package billing
- EDI compatible
- Customizable setups
- Numerous report options

Working Together

Skylla communicates with SecGen to keep logs updated as programming changes, and SecGen users have the option to create logs and schedules for special events.

Support

SMARTS offers unmatched, outstanding support for all their products. The in-house support team has decades of experience with SMARTS and Radio. They develop personal relationships with their customers and train, instruct, and problem-solve together making sure you have the tools you need to serve your community.

SMARTS Broadcast Systems

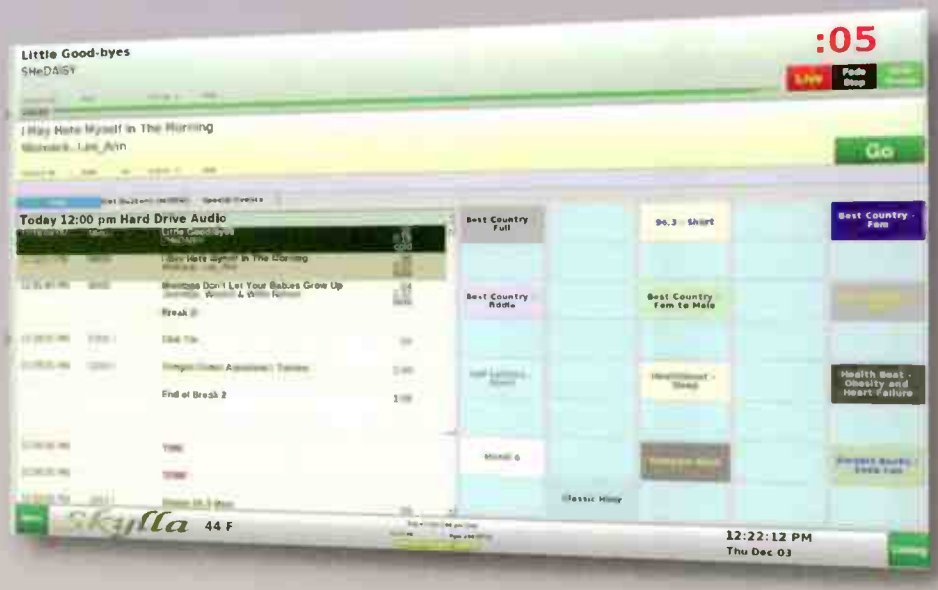
smartsbroadcast.com

SMARTS Broadcast Systems

Skylla

Relentlessly Reliable

- Feature-rich
- Full integration with Internet program providers such as LRN and BOB-FM
- Ballgame/special event automation
- Easy to use
- Designed by radio people who listen to what you want
- Experienced support people who get to know you by name



Skylla's Special Event interface, designed with the input of professional sports organizations, makes it easy to air sporting events and remotes, from youth league baseball to the World Series. Because sporting events are scheduled separately from regular programming, rainouts and cancellations require little handling returning to "your regularly scheduled programming" is a snap.

SkyllaPad

SkyllaPad allows you to use a web browser to securely log in to your station and control Skylla from your smartphone, tablet, or laptop.

sales@smartsbroadcast.com

(800) 747 6278 ext 240

www.smartsbroadcast.com

Tieline Gateway Multichannel IP Codec

The Tieline Gateway is the industry's highest density DSP-powered 1RU audio codec and heralds a new era in multichannel IP streaming. It can transport multiple channels of mono or stereo audio across the Public Internet or any QoS-enabled IP network, including T1 and T3 connections and private WANs with MPLS. The Gateway streams up to 16 IP audio channels with support for AES67, ST 2110-30, AES3 and analog I/O as standard. An optional WheatNet-IP card will also be available.

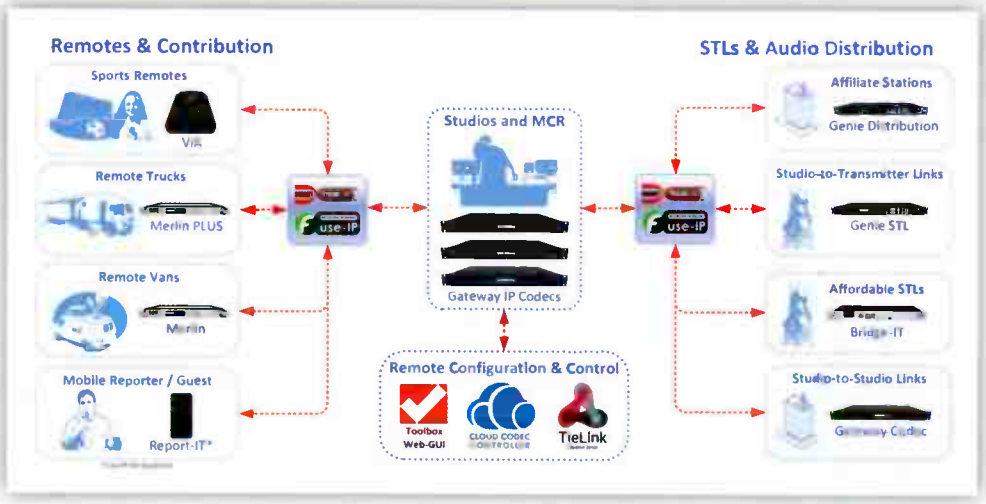
Gateway
Multichannel IP Codec

Tieline specializes in high quality and low latency audio transport over IP with adaptive jitter management and error resilient audio streaming. A comprehensive suite of encoding options is included, and the Gateway is interoperable with all Tieline IP codecs and compatible over SIP with all EBU N/ACIP Tech 3326 and 3368 compliant codecs and devices.

Gateway is configurable through an embedded HTML5 Toolbox Web-GUI interface and is also fully controllable using Tieline's Cloud Codec Controller.

Customized Broadcast Options

The Gateway replaces and supersedes the popular Merlin PLUS and Genie Distribution codecs by delivering more connection options, flexible scalability over time, as well as new IP technologies. The Gateway supports up to 16 mono channels or 8 stereo streams of bidirectional IP audio to increase efficiency and reduce rack space requirements for engineers. It is perfect for large-scale audio distribution with support for multicasting and multiple unicasting technologies. The Gateway is also ideal for managing multiple incoming remotes at the studio and can simultaneously connect to up to 16 hardware codecs, or Report-IT Enterprise smartphone app users.



Flexible and Feature-rich

The Gateway has two standard versions. One supports 8 Channels in/out (8 Mono or 4 Stereo) and the other supports 16 Channels in/out (16 Mono or 8 Stereo). The codec also supports a flexible upgrade path that allows you to buy a Gateway with 8 channels and upgrade the codec over time as needs change or your network expands.

For more information visit *www.tieline.com/gateway* or contact Tieline sales:

- For USA, Canada & Latin America contact: *sales@tieline.com*
- For Australia and International: *info@tieline.com*

Tieline®
The Codec Company
www.tieline.com/gateway

The Highest Density DSP-Powered 1RU IP Audio Codec

Stream 16 Channels from the one box

Gateway

AES67	WheatNet-IP	ST 2110-30
Ready out-of-the-box	Optional at purchase	Ready out-of-the-box

2020 PRODUCT of the YEAR NABSHOW WINNER

Includes

SIP EBU N/ACIP 3326 & 3368, Analog, AES3 I/O

WORLD WINNER BESTOFSHOW AWARDS 2019

Tieline
The Codec Company

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DTS Connected Radio: A Peek Under the Hood

DTS Connected Radio gives OEMs the tools to design a dashboard that matches their branded interior design vision and broadcasters the ability to have editorial control over the way their content gets displayed in cars. The end result is a globally consistent, visually appealing, feature-rich user experience.

Let us unpack some of the building blocks and features that make DTS Connected Radio a comprehensive solution that meets OEM requirements.

Global Coverage

Today's OEMs are no longer regional and whenever they develop an infotainment platform, they deploy it globally, with minimal customization by region. At the core of our system is the assurance of compatibility with all commercial radio standards including analog, HD Radio, DAB+ and the emerging Converged Digital Radio (CDR) system. Furthermore, we support this service in over 60 countries, delivering low latency, increased reliability and high redundancy via multiple points of presence. Access to a single, global API means also that OEMs don't have to worry about deployment by country.

DTS® Connected Radio™

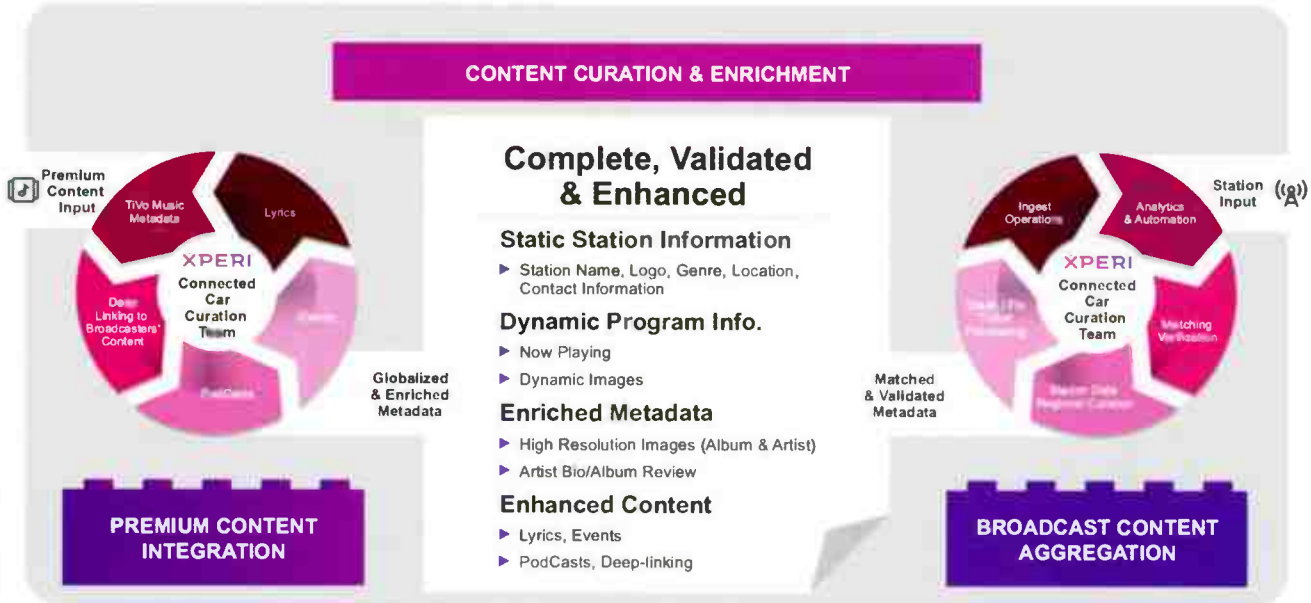
Content | Discovery | Metadata

Content is King

DTS Connected Radio takes content protection, management, accuracy and completeness extremely seriously. With more than 100 ingest data partners, a global team of data specialists and subject matter experts, we go beyond aggregating basic broadcast content and integrating premium content. There are sophisticated and proven business processes in place to ensure content validation, content curation and enrichment, as well as content harmonization, normalization and localization. We also have pioneered copyright enforcement and content moderation to comply with local legislation and mores.

From a broadcaster perspective, the benefit of our approach is that it ensures a consistent user experience for all stations across geographical regions and varied car platforms. Our system ensures all broadcaster content is protected, unaltered and delivered securely into DTS Connected Radio equipped cars.

From an OEM perspective, it leads to an enhanced user experience and minimizes or eliminates content-related liabilities.



System Security

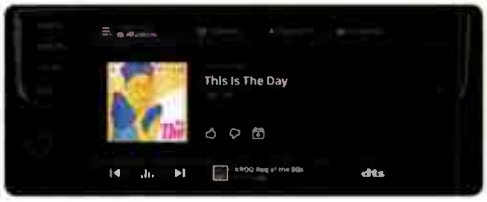
We architected DTS Connected Radio for security, robustness and responsiveness, which is a design approach that all OEMs require from any connected car solution or service. Without giving the game away, the platform's most intricate security features are constantly validated and assessed by third-party security audits and penetration testing. This is expensive and time consuming but is a welcome task in order to ensure our platform continues to meet the ever changing and rigorous OEMs security standards.

Flexible Integration and All-Around Support

Not all OEMs are alike, and end-users appreciate OEM design and the thoughtfulness that goes into a well-architected infotainment system that bears the mark of the OEM. DTS Connected Radio gives OEMs all the requisite testing, development, and deployment tools that enable a flexible integration and implementation. Furthermore, this extends beyond product development support and certification to post-deployment support and issue resolution via a 24x7x365 Global Support Organization that Xperi has built to support DTS Connected Radio's OEM and Tier1 partners.

How to Join the DTS Connected Radio Project

As 2020 draws to an end and we wrap up the 100 Years of Radio celebratory campaign, Xperi would like to invite broadcasters to contact us and continue the conversation about how we can support broadcasters large and small in the ongoing battle for in-car dash relevance and prominence. Visit *www.dts.com/in-the-car* for more.



"Xperi is committed to a strong, prominent future for broadcast radio in connected cars. We've built this platform to ensure broadcasters retain control over the user experience and their content is secure and protected. We welcome broadcasters from around the world to join us as we revolutionize radio in the connected car."

— JOE D'ANGELO, SVP, BROADCAST RADIO

XPERI®

+1-408-321-6000 | *broadcast@xperi.com* | *www.xperi.com*

SUPPLIER CROSS INDEX

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

ACOUSTIC AND BUILDING MATERIALS
Acoustics First Corp.

ANTENNAS, FEEDLINE AND WAVEGUIDE
Alan Dick Broadcast Ltd.
Aldena Telecomunicazioni Srl
Ampegon Power Electronics AG
Austin Insulators Inc.
Bext Corp.
Burk Technology
DB Elettronica Telecomunicazioni
DAC System SA
Dielectric LLC
Electronics Research Inc.
High Sound
Information Station Specialists
Jampro Antennas Inc.
Kintronic Labs Inc.
LBA Technology Inc.
meduci LLC
Micronetixx Communications
Myat Inc.
Nova Electronics
OMB America
OnAir Medya Ltd.
Progressive Concepts
Propagation Systems Inc.
SCMS Inc.
Shively Labs
Telsat Srl
Transcom Corp.
Tunwall Radio LLC

APPS
22Hbg Srl
ENCO Systems
Futuri Media
Securenet Systems/
Cirrus Streaming
Xperi

ASSOCIATIONS AND ORGANIZATION
Audio Engineering Society
Association of Minnesota
Public Educational Radio
Stations (AMPERS)
Community Radio Inc.
National Association
of Broadcasters
NATE: The Communications
Infrastructure Contractors
Association
National Federation
of Community Broadcasters
Society of Broadcast Engineers

AUDIO ACCESSORIES
Angry Audio
Arrakis Systems
AudioScience Inc.
Audio-Technica U.S. Inc.
Broadcast Tools Inc.
Calrec Audio
CircuitWerkes
DaySequerra
DHD audio GmbH
Electro-Voice
Energy Transformation Systems
Henry Engineering
Inovonics Inc.
JK Audio
Modulation Index LLC
Neutrik USA Inc.
Paravel Systems LLC
StudioHub
Titus Technological Laboratories
Yellowtec USA

AUDIO DELAYS — PROFANITY AND DIVERSITY
25-Seven Systems,
A Telos Alliance Co.
Axia Audio, a Telos Alliance Co.
Eventide
Logitek Electronic Systems Inc.
Orban Labs
Sonifex Ltd.
Telos Alliance

AUDIO DISTRIBUTION, BETWEEN LOCATIONS
2wcom Systems GmbH
AVT Audio Video
Technologies GmbH
Barix
Bohn Broadcast Services
Comrex
Digigram
GatesAir
GeoBroadcast Solutions
Granite Telecommunications
Lawo AG
Moseley Associates
OnAir Medya Ltd.
Sonifex Ltd.
Thimeo Audio Technology
Tieline, the Codec Co.

AUDIO LOGGERS
Broadcast Software International
Burli Software Inc.
DM Broadcast
ENCO Systems
Eventide
OPNS
Summit Technology Group
WinMedia

AUDIO PROCESSING, ON-AIR
25-Seven Systems,
A Telos Alliance Co.
Axia Audio, a Telos Alliance Co.
Axel Technology
Broadcast Warehouse Ltd.
BSW
BW Broadcast Ltd.
Calrec Audio
CGI DaySequerra
DEVA Broadcast LLC
High Sound
Kline Consulting Group LLC
Logitek Electronic Systems Inc.
Netia
Nextkast Radio
Automation Software
Omnia Audio
On-Hertz
OPNS
Orban
Telos Alliance
Thimeo Audio Technology
Titus Technological Laboratories
Wheatstone Corp.

AUDIO PROCESSING, PRODUCTION
Axel Technology
BW Broadcast Ltd.
Calrec Audio
CGI DaySequerra
DM Broadcast
Eventide
ESE
Inovonics
JT Communications
Modulation Index LLC
Netia
OmniPlayer
Orban
PreSonus Audio Electronics Inc.
Thimeo Audio Technology
Wheatstone Corp.

AUDIO ROUTING AND DISTRIBUTION WITHIN A FACILITY
2wcom Systems GmbH
AEQ Broadcast International Inc.
Angry Audio
Arrakis Systems
AudioTX
Bohn Broadcast Services
Broadcast Tools Inc.
DaySequerra
DHD audio GmbH
Digital Alert Systems
Energy Transformation Systems
ESE
Glensound
Henry Engineering
Lawo AG
Logitek Electronic Systems Inc.
On-Hertz
Sonifex Ltd.
StudioHub
Telos Alliance
Wheatstone Corp.

AUTOMATION, STORAGE AND LOGGING
AEQ Broadcast International Inc.
Arrakis Systems
Axel Technology
Broadcast Electronics
Broadcast Software International
Burli Software Inc.
dcsTools.com
DJB Radio
DM Broadcast
Elenos
ENCO Systems
Jutel Oy
Music 1 Inc.
Netia
Nextkast Radio
Automation Software
OmniPlayer
OPNS
Paravel Systems LLC
Radio Workflow Inc.
RCS
Smarts Broadcast
Summit Technology Group
WideOrbit
WinMedia

CLOUD SERVICES FOR RADIO
2wcom Systems GmbH
Barix
Burk Technology
Burli Software Inc.
Digigram
ENCO Systems
Granite Telecommunications
Jutel Oy
Kline Consulting Group LLC
Marketron Broadcast Solutions Inc.
OmniPlayer
On-Hertz
OPNS
Orban Labs
RCS
Securenet Systems/
Cirrus Streaming
StreamGuys
Tieline, the Codec Co.
WideOrbit
Xperi

CODECS, HARDWARE AND SOFTWARE
25-Seven Systems,
A Telos Alliance Co.
2wcom Systems GmbH
AETA Audio Systems
AEQ Broadcast International Inc.
AVT Audio Video
Technologies GmbH
Axia Audio, a Telos Alliance Co.
Barix
Bohn Broadcast Services
Broadcast Bionics
BSW
Comrex
DEVA Broadcast LLC
Digigram
GatesAir
JK Audio
Modulation Index LLC
Omnia Audio
On-Hertz
Orban
Synthax US
SystemBase
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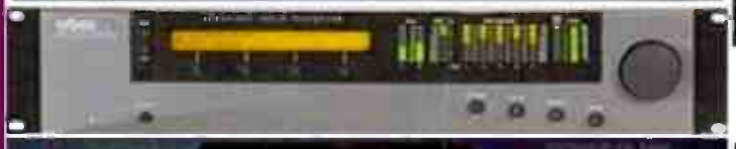

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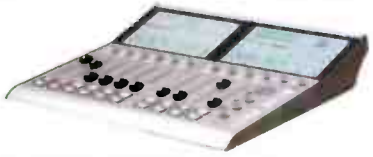

The DHD.audio SX2 is a super-flat table-top modular audio mixer and controller for radio, audio-workstation and other broadcast applications. It incorporates dust-protected professional-grade motorized faders plus 10.1 inch multitouch screens. The core processor supports up to 24 faders and I/O interfaces in 1U.

DHD.audio
DIGITAL BROADCAST TECHNOLOGY

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PRINCESS ANNE, Md. — Once a two-station NPR based in Salisbury, Md., Delmarva Public Media expanded to a three-station group in January through a collaboration with WESM(FM), a local public station based in southern Maryland.

While WESM still broadcasts limited NPR programming, Delmarva Public Media has become an independent public radio group, with each station establishing a unique programming identity.

The three stations share some common technology platforms that, while mostly used autonomously, can also be used collaboratively across the three stations. This includes ENCO's DAD radio automation and production system, which has long been the automation choice at WESM and sister stations WSCL(FM) and WSDL(FM).

Like most public radio stations, WESM has syndicated and independent programming coming into the station over multiple platforms. Some of these programs, such as "The Red Rooster Lounge," have long been manually downloaded — an often time-consuming and confusing process.

Thankfully, the recent addition of ENCO's enConveyor automated file download utility to WESM's DAD immediately solved this problem.

enConveyor not only automatically downloads these programs off of FTP and other websites, but it automatically places these programs in the proper folders. enConveyor is a fire-and-forget application that eliminates the operations manager eternal anguish of, "Did I remember to load that show?" while driving home from work. It also reduces the workload burden for our nontechnical staff, now that they only have to look at the enConveyor program to confirm that all programming is in the proper folders.

enConveyor runs within DAD as a standalone module, which makes it easy to add to existing systems. It runs in the background, which eliminates any danger of turning off the application accidentally. Once downloaded, enConveyor assigns the audio to the correlating cart number, and overwrites the content from the previous week. When everything is where it should be, the operator simply adds the programming to the playout schedule.

ENCO in the studio with Delmarva Public Media show host Yancy Carrigan.

DAD is used across four locations at WESM: the on-air host station, two production studios, and a central computer running automation by the transmitter. We use DAD in the production studios to record underwriting messages, weather reports and other short-form interstitials that are subsequently uploaded to FTP. enConveyor again provides value here by adding these into the appropriate playlists upon recognizing the upload.

FURTHER SOLUTIONS

While enConveyor was added in the past several months, DAD's feature set runs deep and we continue to benefit from other ENCO applications.

This includes ENCO's Scheduling Wizard program, which specifically creates playlists for our syndicated programming. That application also interoperates with our Marketron traffic and billing system, which allows our traffic operators in Salisbury to send underwriting messages to WESM.

The Scheduling Wizard merges these messages into our DAD system, and most importantly, has eliminated the longstanding WESM process of creating playlists by hand, again saving us time and money. It's an excellent example of how we can share ENCO's workflow benefits across all three Delmarva Public Media stations.

DAD's general ease of use is noteworthy. DAD is known for its colorful and legible interface, and our on-air hosts can easily switch between several customized mini-arrays for playing out show promos, public service announcements and other content. We have a small staff, and our hosts find it helpful to click from one page of mini-arrays to another to quickly find what they need, rather than searching through extensive libraries.

We have consistently updated our DAD system at WSCL(FM)/WSDL(FM) over the years, and we have taken that philosophy to WESM. Beyond enConveyor, we've purchased the Weatherology application from ENCO.

Like enConveyor, this is a module that will silently run in the background and ensure that weather reports are consistently accurate and up to date. Weatherology will automatically receive and schedule forecasts within DAD, so there will be no more reports of sunny weather when it's raining outside.

DAD has been a technical win for all three stations while helping us change the way we work. Our workflows are simpler, our cost savings are up, and we are covering a much larger underwriting territory with WESM in the mix. And in the COVID-19 era, ENCO provides the flexibility to record underwriting and other content from home, and drop it into an FTP site where enConveyor once again does its magic. DAD has ensured that our operation continues uninterrupted, without added effort.

For information, contact Mark Stewart at ENCO Systems in Michigan at 1-248-827-4440 or visit **www.enco.com**.

Sports Pods Are Ideal for Play-by-Play

Another Henry Engineering blue box that does the simple things right

BY **TOM WHITE**
Digital Media Instructor/
Athletics Video Producer
Morgan County High School

MADISON, Ga. — Prior to teaching, I was in radio. During that time products from Henry Engineering were everywhere. We used a ton of different tools depending on what we needed and they all seemed to be Henry Engineering. From analog to digital conversion to cough boxes, we used them all.

During a basketball broadcast, my play-by-play guy got choked up a bit and started to cough. Before I could mute his mic (I was producing that game), he snatched his headphones off and started coughing. As you know, there are very few things as startling and amateur sounding as someone taking off a hot headset but when you have to cough, you have no choice. I started researching inexpensive solutions and found more than I bargained for.

> **We are able** to have professional-level communication and a simple user interface for our broadcasts.

Henry Engineering Sports Pod is the solution I needed. The Sports Pod is an "announcer's mini-console" that gives each announcer control of his (or her) mic and headphones. Each announcer can turn the mic on or off; talk-back to the producer; and custom-mix their headphone audio. Now my talent can not only turn their own microphone on and off but they can communicate with me off air anytime they need do.

Our previous setup required me to turn their microphone off and on as well as mute it to use back channels on the mixer for off-air communication. This is OK 90% of the time but if the talent wants something from the producer, they have to give a visual sign or some other means of communicating. Using the Sports Pod allows my air talent to simply hit the talk-back button and ask for a stat or whatever else they may need.

The unit is about the size of a small book and can sit flat or be placed on an angle with the optional desk-mount. The front panel is simple — three buttons (mic on, cough, talkback), two knobs (local and return level controls for headphone mix) and two switches that allow you to choose left, right, or center headphone channels for local and return audio.

The rear of the unit is a bit more complex but still simple enough to wire correctly in no time. There are two 1/4-inch TRS inputs and two 1/4-inch TRS outputs. The inputs are local headphone audio (main mix from the board) and return feed (IFB for producer audio). The outputs are talkback (off-air communication with producer) and headphones for the talent. There are two XLR connections (input from talent microphone/output to audio mixer). There is also a 12 V power connection on the back.

The Sports Pod as a standalone unit is an incredible asset to our broadcast plan. We are able to have professional-level communication and a simple user interface for our broadcasts. For even more convenience and total audio control, we also use Henry's SportsCaster, which combines all mixing, headphone audio distribution, and intercom functions into one comprehensive and compact 1-RU system.

The system is easy to set up. There are no problems at all getting it up and running in minutes. Henry now offers a retractable desk stand that can be folded-down for easy transport and storage.

For information, contact Hank Landsberg at Henry Engineering in California at 1-562-493-3589 or visit **www.henryeng.com**.

How AI Helps Create Natural-Looking Video

BY **STAN WALBERT**
CEO and Marketing director

MultiCAM Systems

***Radio World:** What does the term "artificial intelligence" mean for your company and its products for the radio market?*

Stan Walbert: Radio stations are now considering themselves as "content creators," and they need to be able to deliver content in the most interesting form for their audience. Nowadays that means video first, in an increasing number of cases.

Since people don't have the resources to do everything by themselves, they need to rely on AI to help create natural-looking video that engages the audience. The AI must act as a human would do to make the content interesting. The shots must look natural. What stations really need to avoid is setting up something that is boring with very few shot angles, or something where the shots are jerky in movement.

There is a big difference between dummy algorithms, macros and scripts, and AI. AI is the only one that can provide videos that make the show look natural. When you watch stations that use MultiCAM to create their visual experience, you will find you end up focusing on the video content and not the fact that it is "video for radio." That is because of the AI, because it helps the station create something that you would normally need an entire camera crew and director to create.

Our stations are content creators, no matter what format they are providing. This technology gives radio stations a major "assist" into extremely well-produced video content.

RW: How is this different from other products or technologies on the market?

Walbert: There is no other product that uses AI for visual radio. MultiCAM is the only company that uses AI for visual radio. Our AI reproduces what directors are doing when they produce live videos. This is based on our experience of being in broadcast production for over 10 years; that is how we came up with the AI for this.

Stan Walbert

RW: Give an example of how the use of this AI changes the workflow for a typical user of your products.

Walbert: With MultiCAM radio, you can create entire programs without additional staff needing to be involved in any of the day-to-day workflow. This is groundbreaking technology because it allows radio stations to compete for content creation in both video and audio areas. In the past without our technology, there may have been a static camera shot or a few camera movements. The novelty of that wears off quickly.

In my opinion, what we are producing with automated almost works better than someone being there could. The reason for this is that AI allows the cameras to respond immediately; and frankly, no human could keep up with that. AI allows the station to avoid what we call "Aquarium visual radio." This is where it is a static shot.

RW: As I understand it, your application of an AI algorithm is to choose the best camera presets based on who is speaking, and then emulating how a human operator would switch. Is that correct?

Walbert: Yes, that is exactly what we are doing.

RW: Who developed your AI algorithm? Describe the development process.

Walbert: We developed it ourselves. We spent a lot of time thinking about how we ourselves did this in our production work. For example, we would never as humans pick two shots with the same angle to follow each other. We emulated the rhythm of how a director would act, and we implemented that. We studied this extensively because we ourselves are from the broadcast production background, so we have looked at how these shots are made. We combined that with our knowledge of robotics and automation.

RW: What else should we know?

Walbert: We've probably been at this longer than anyone else in the field of visual radio and we have more installations now worldwide than anyone else. MultiCAM Systems has been working in this field for more than 10 years. Plus, we are a very engineering-driven company. That makes a big difference in the speed of which we can come up with innovations for our clients.

We are just getting started with a lot of new technologies that you will see us roll out over the next several months. We are at the very beginning of where this technology can take this industry. Wait till you see what we are coming out with next.

WCLQ Leaves Tubes Behind for Nautel NV20^{LT}

Energy and maintenance costs lower from older tube transmitter

BY **COY SAWYER**
General Manager
WCLQ-FM

WAUSAU, Wis. — Our station, WCLQ, is a noncommercial 90 kW ERP Christian station in Wausau, Wis. As a noncom that relies on a steady stream of donations to meet expenses, staying on the air with a reliable signal is crucial to us. Our old Continental tube transmitter was working fine but we were starting to bump up against the realities of keeping it operational in the long term. Our budget for tube replacement and related maintenance kept going up.

We also had an interesting situation with the transmitter — we're on a hot tower with cell antennas and periodically have to reduce our power so maintenance people can climb the tower. This requires three to six hours of lower power operation, after which we would remotely call into the transmitter to increase the power again — and sometimes this didn't work.

Even worse, almost every time we went through this power reduction cycle, we had to send our contract engineering company out to retune the transmitter. The higher engineering costs involved in retuning, coupled with the higher tube costs and our power bill for keeping those tubes lit up all added up to the decision that it was time to purchase a new, more efficient solid state transmitter.

Our engineering firm, Optimized Media Group, is led by Alex Hartman. Alex now works for Nautel but was still an independent contractor at the time of our new transmitter purchase. Our conversation about a new transmitter began a discussion on tube costs. Alex told me that in the tube market, it's "luck of the day" pricing — it can cost anywhere from $1,500 to $6,000 to replace a tube and the rebuilt tubes just aren't lasting like they used to. Back when new tubes were readily available, you could get close to 50,000 hours of life out of a tube. Now the typical life span is between 18 and 24 months.

The fact that our Continental was still working turned out to be one of the best reasons to replace it now. Alex noted that we could have an off-air situation at any time and potentially have to wait a long time for a critical part … and during that off-air time we would not be bringing in any money. Alex's comment was "The time to do this is now, while the transmitter is working fine, and not when it's a smoldering hot mess on the floor." We also discussed the potential of HD Radio operation — we aren't running HD channels yet but want to do that in the not-too-distant future. Purchasing an HD-ready solid-state transmitter and switching the Continental to a backup position made perfect sense to me.

At the Wisconsin Broadcasters' Clinic in Madison, we did some serious shopping. Nautel's NV20^{LT} quickly jumped to the top of our list. The testimonials we heard from other users were all positive and from everything I have read and heard about Nautel, it was a confident move for us. We placed our order and the new Nautel unit went on the air in October 2019. It was a smooth switchover; our total off-air time was less than five hours.

Dealing with Nautel in purchasing the new unit was fantastic. We had quality communication all around, absolutely no false salesmanship or techno-speak that I wouldn't be able to follow. They knew how to speak to me as a GM. And, they were completely up front with the transmitter costs including shipping — nothing was hidden from me; there were no surprises.

Well, there was *one* surprise. The incredible quality of the packaging was mind-boggling. That transmitter was *so* well protected when it arrived! I am really impressed with Nautel's shipping department.

We were hoping that putting the new transmitter on the air would help our coverage area, and we have been very pleased in this regard. The signal is both consistent and competitive. There is another station on our same frequency about two hours south of us and they had squeezed us out of a pretty significant listening area when they went on air. Now we're getting good reports from people in that area that they can hear us nicely.

We're excited about the new Nautel. The periodic power reductions for the cellular phone guys are not a problem at all, we just make some keystrokes on a computer via Nautel's Advanced User Interface, and the return to full power is a painless process. Because the NV20^{LT} is easily field-up-

NAUTEL Continued on **45** ➡

StreamGuys Assures Streaming Uptime for ARN

ARN finds migration a relief from infrastructure maintenance headaches

BY **JOE SEXTON**
Technology Director
Australia Radio Network/ARN

MELBOURNE, Victoria — ARN (Australian Radio Network) is one of the country's leading broadcast and on-demand audio companies, "Defining Audio" with ownership or investments in 12 radio stations nationwide plus digital entertainment platform iHeartRadio and Australia's number one podcast publisher, the iHeartPodcast Network.

We have a long history of providing our audience with the latest in streaming technology and were the first broadcaster in Australia to offer clients and listeners dynamic addressable content and interactive inventory.

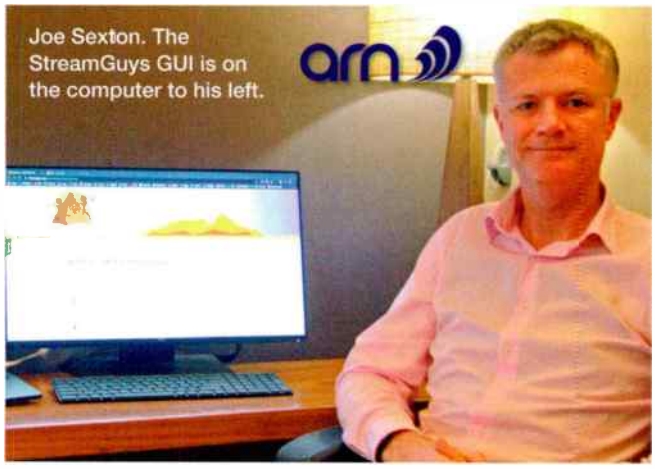
To accommodate evolving technology, we have worked with several major streaming and cloud vendors. While we learned a lot in the process, the most obvious lesson was the challenge of managing a public-facing production platform. It's not as simple as "set it and forget it." The server farm required constant maintenance, which is time-consuming — particularly when dealing with multiple vendors.

Two years ago, we made the strategic decision to migrate our services to a hybrid hosting environment. We considered moving our streaming infrastructure to our private cloud, but we wanted to explore using a managed service that had experience with dynamic audio.

Our first goal for the transition was to simplify our streaming infrastructure to prepare for the future. We had multiple vendors and legacy systems supporting our live streams, making the existing infrastructure complicated and too difficult to scale. We also needed to increase our streaming capacity to accommodate an expanding number of audio channels and ensure suitable headroom for forecasted streaming listener growth.

Finally, we wanted to improve our reporting and analytics, as our management, commercial and content teams had no visibility of real-time or historical data.

NZME, our iHeartRadio partners in New Zealand, had transitioned to a managed service a year before us and selected StreamGuys as their provider. After speaking with multiple potential vendors, it was obvious there was a certain "peace of mind" and assurance that StreamGuys' leadership brought to the conversation.



Joe Sexton. The StreamGuys GUI is on the computer to his left.

StreamGuys also works closely with the AdsWizz platform that we use for ad replacement and monetization, and their proposal provided the headroom we wanted for growth and a clear migration plan.

SEAMLESS MIGRATION

We commenced the migration of our streams to StreamGuys in March 2020. Their team was professional throughout the onboarding and user migration process. It is honestly the first time I've migrated so many streaming services with no noise. The "lift-and-shift" was seamless — and this was during the early months of COVID-19 when everything else was difficult.

StreamGuys now manage live streaming with midstream ad replacement for ARN's iconic Australian brands KIIS, Pure Gold and The Edge, which are all integrated into the iHeartRadio Platform. StreamGuys handles our full audio payload, including radio simulcasts, DAB+ simulcasts, iHeartRadio stations and our expanding array of audio partnerships. StreamGuys hosts our audio streams through their Australian data center and is giving 100% uptime to our listeners.

StreamGuys' SaaS suite provides flexible tools to help us monitor our operations. SGmetadata monitors what we are encoding from the studio complex to ensure that ad break replacement is being properly triggered. StreamGuys also created custom alerts in their SGalerts monitoring system that notify us of changes to our load balancing or other outages in our systems.

Our migration turned out to be perfect timing. During the pandemic, we have seen a significant increase in streaming traffic across all ARN and iHeartRadio audiences. In a relatively short time, StreamGuys have delivered multiple significant benefits — doubling our streaming capacity, adding new commercial inventory opportunities and overcoming our data visualization issues.

The operational stress of managing the server farms and day-to-day operation ourselves is not missed, and StreamGuys have proven to be a valuable technology partner. In many ways it's like they have joined the ARN technology team.

For information, contact StreamGuys in California at 1-707-667-9479 or visit www.streamguys.com.

Tieline Drives Ratings for Southern Cross Austereo

ViA codec ensures success for remote morning show broadcast from Italy

BY **GINO CANZANO**
Engineering Manager, Southern Cross Austereo, Melbourne

MELBOURNE, Victoria — At SCA in Melbourne I lead a team of very talented engineers in one of the head-end markets that service the HIT, Triple M and PodcastOne networks around Australia.

The engineering team in Melbourne is part of the wider Technology Services division and is responsible for ensuring reliable broadcast of local and networked programs, design and layout of studios, IT equipment servicing, outside broadcasts, maintenance and testing.

The "Hughesy and Kate Show" has been on-air for 17 years and is one of the flagship national shows for the Hit Network. It is broadcast over 48 stations in metro and regional markets, with a reach of more than 2.6 million listeners. Based in Melbourne, since 2017 the program has consistently been one of the top rated shows in the drive time slot. The longevity of the show, the chemistry between Hughesy and Kate, and the quality of the content produced, makes it very important to the Hit Network.

BROADCASTING FROM ITALY

Co-host Kate Langbroek had always planned to have a year away in Italy with her family. Kate and her husband decided that if they were to make the move it would need to be in 2019. After making the decision, management at Southern Cross Austereo put forward the idea of Kate broadcasting remotely from Italy, rather than losing her from the show.

Initially we expected to be hiring a studio at a local radio station in Bologna. However, it soon became apparent that Italian stations operated very differently. There were very different standards to what we were used to, plus a huge language barrier between our team and their management. Therefore, we decided to set up a studio ourselves.

The team visits Kate in Italy: Executive Producer Sacha French (rear), announcers Kate Langbroek and Dave Hughes, with Jack Lawrence, anchor of the show (front).

Whenever we approach outside broadcasts, particularly for large shows, reliability is at the forefront of our decision-making. For the Hughesy and Kate Show we needed to implement IP streaming technology that was compact and simple to use, with the flexibility of redundant IP streaming, remote access and uninterrupted power. SCA owns versions of almost every Tieline codec available and in Melbourne we primarily use the Tieline Merlin and ViA codecs. After using the ViA for multiple projects in the lead up to the Italy project, we knew without any doubt that it was the right fit for the application.

Andrea Cole from our engineering team went to Italy to set up the studio in an office space. We hired an office space from an American-Italian documentary filmmaker. Room acoustics were a challenge, however Andrea worked with the owner to build acoustic panels and make the broadcast area more useable. We decided that Ethernet LAN connections would be the most reliable option, so our world-class networking team designed a solution allowing Hughesy and Kate to feel as if they were in the same room.

SOFTWARE-DEFINDED NETWORKING

To get the remote studio onto our WAN, we installed an SD-WAN appliance attached to the fiber-connected internet router. This allowed all the devices in the room to be visible on our network and accessible like a studio in our building. Once everything was set up, we could easily access the codec remotely. Software-defined networking has come a long way in recent years, and we are using it more than ever to connect our facilities over long distances. In this case it proved an absolute winner.

Our primary fiber connection was paired with a Netgear Nighthawk LTE modem using the TIM network in Italy to provide SmartStream Plus redundant streaming over Ethernet to the ViA.

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How to Transition to AoIP in Five Steps

Tips for managing an analog exit plan

BY **RICHARD MADDOX**

The author is field service engineer for Wheatstone, Audioarts and PR&E products.

I'm often amazed at what engineers will do to keep older consoles on air.

If you're currently supporting analog and/or digital consoles designed in the 1990s and the aughts (2000–2009), I don't need to tell you of the challenges. Here are five proven steps for transitioning your facility to AoIP, whether that takes place this year or next.

STEP 1: CONVERT EXISTING WIRING ONE DEVICE AT A TIME

Almost all new between-equipment wiring uses unshielded CAT5e or CAT6 cables. These two CAT cables, which have identical specs for our uses, can be used interchangeably to connect analog audio, AES-3 audio, AoIP audio streams, Ethernet for KVMs and VoIP/SIP phones, and, of course, your facility's LAN connections. CAT6 has a thicker sheathing and tighter twists in its four wire pairs than CAT5e, which makes it more resistant to crosstalk but also slightly harder to handle. Many broadcasters have standardized on using UTP (unshielded twisted pair) CAT5e as their interconnection cable of choice.

When moving to category cables to connect up just about everything, there are two main approaches: either buy pre-made "patch cables" in various common lengths like 6-foot, 15-foot, 25-foot, etc., or buy reels of raw CAT5e cable and bags or boxes of RJ45 plugs so you can create your own custom-length cables. It really boils down to how much time you have and how much you like crimping RJ45 plugs onto cables.

Since the IT industry uses CAT5e and CAT6 cables by the truckload, the price for category cabling and plugs means your cabling cost (whether making custom length cables yourself or using off-the-shelf "bagged" cables) for an entire facility is a fraction of what it would cost to run shielded balanced audio cables around your facility.

STEP 2. ADAPT, ADAPT, ADAPT

Most audio and broadcast equipment has not transitioned to adding an RJ45 jack for their analog or AES signals, therefore you'll still need XLR or TRS plugs on your cables which means you'll need to terminate your CAT5e cabling at one end to something other than RJ45. You could solder the plugs directly to the category cable wire pairs, but that's messy and time-consuming.

An easier solution that will cost about US$20 is to use RJ45-to-XLR and RJ45-to-TRS adapters to connect new equipment using CAT5e without having to solder anything.

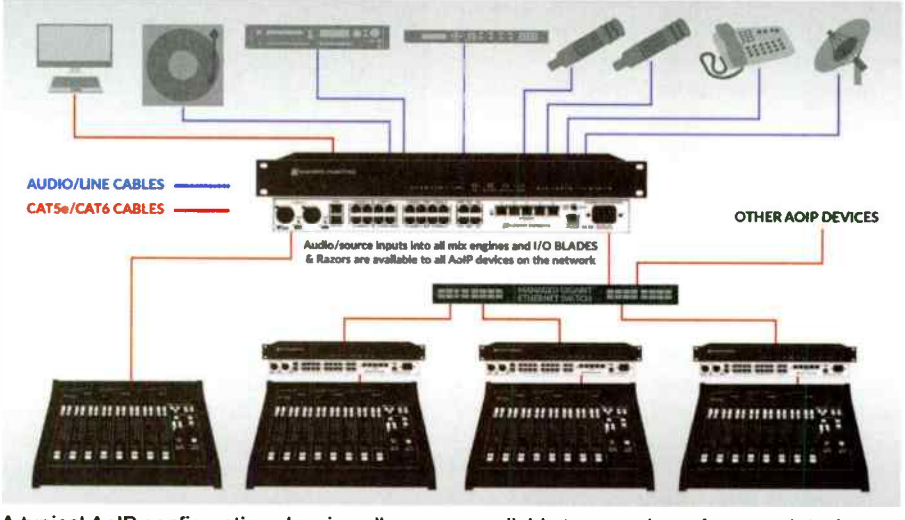
RJ45 adapters are available for just about every connector type, but not for the AMP MOD IV plugs used since the mid-90s on all PR&E consoles (except Oasis). No one makes an RJ45-to-MOD IV adapter, but there are RJ45-to-pigtail adapters, so with a bit of hand crimping of the MOD IV terminals onto the pigtails, you can roll your own MOD IV-to-RJ45 adapters.

By the way, any custom MOD IV adapter you make can be repurposed later on as an RJ45 adapter for a satellite receiver or other equipment using D-sub and other non-standard jacks.

STEP 3: ADD I/O DEVICES

You're likely already familiar with the concept of distributed I/O, where one "I/O interface box" is mounted in each rack to connect all the equipment within that rack. Each I/O box then connects to a main router using a single CAT5e cable.

An AoIP system is configured in much the same way. For example, a WheatNet Blade is an AoIP I/O box with eight stereo inputs and eight stereo outputs on RJ45 jacks to connect local signals. The Blade then connects, again using a CAT5e cable, to a gigabit Ethernet switch to network it with the other Blades in the system so any discrete local input can be streamed to any other Blade or console in the plant, and any other system signal can be streamed to any local output on that Blade.



A typical AoIP configuration showing all sources available to console surfaces and devices.

If you have a VistaMax system, or any brand of TDM router, with some spare I/O (like, say, eight unused AES ins and eight AES outs), then you're well prepared for beginning the transition to AoIP. Connecting that spare AES I/O to an AES Blade (using sixteen CAT5e cables) means you now can convert one or two studios to AoIP consoles while continuing to use your existing router.

TRANSITION Continued on **44** ➡

Radio From Home: You May Be More Prepared Than You Realize

Wheatstone Support Engineer Robert Ferguson reports in from the home studio frontlines

BY **ROBERT FERGUSON**

The author is a support engineer for Wheatstone. When this article was published in April, he said that every customer support since the middle of March had been related to COVID-19.

How many of you have bought a virtual mixer, set it up initially, and forgot about it — until recently?

You're not alone. I've talked to quite a few broadcasters who are discovering that they're far more prepared for a pandemic like COVID-19 than they thought.

Many are grabbing mics from the studio, and Tielines or other codec units off the remote rack and sending them home with talent so they can remotely voicetrack or broadcast their shows.

Others are using SIP software codecs such as LinPhone or OnSIP that they've installed on tablets, PCs or phones. Still others are using a combination of both. One group, for example, is setting up WheatNet-IP VoIP-AoIP multichannel appliances at the studio headend with any combination of SIP software and hardware decoders at the home studio end. As a result, it was able to deploy multiple work at home studios at once.

Codec choices range from G.722 to Opus, any of which add some lag that can be a factor for live shows (the biggest problem being that hosts talk over each other). But at 256 kbps, Opus can provide a decent amount of dynamic range and it's fairly robust — certainly not as robust as linear audio, but it's cheaper to carry that encoded audio across the internet or across a WAN than straight linear audio.

If you have a USB mic or small mixer type application with a USB audio output, you can put that to good use as well. I've talked to several who are broadcasting with these or their mobile phones temporarily. The frequency response is limited, especially on those smart phones, and the quality isn't as good as a professional mic with processing, but for doing live news, it's a quick way to broadcast remotely in near real time.

Robert Ferguson

MIXING REMOTELY

When it comes to mixing feeds, in almost all cases I recommend that this be done from the station studio where you have all the tools of the trade on hand.

Since you already have all that professional gear at your studio facility, why not remote into that facility and gain access to it? While there are ways to remote into an analog studio (more on that in a minute), it's easier with an AoIP networked studio.

If you have an AoIP console surface, you can probably use remote control software to control it. Many of the broadcasters I talk to are setting up a gateway machine somewhere in the building to protect the main network, and then remoting in through a VPN to control the console. OpenVPN is a popular open-source VPN option for creating reliable tunnels into the studio. To get around internet speed issues and dropouts that can be a problem in more rural areas, WHIZ CE Kevin Buente in Zanesville, Ohio, configured OpenVPN to bond across multiple WAN connections into the TV/radio combo's WheatNet-IP networked studio.

Remote control software for consoles and AoIP systems varies, from basic GUIs to virtual mixers like our Remote LXE client software that mirrors a physical LXE console surface. Talent is able to access and control the physical console in the facility from a Remote LXE client on a laptop or desktop at home, usually through a VPN into a gateway computer at the station studio.

We are seeing a huge increase in interest in our Remote LXE and other Glass remote client software for this purpose and for remote engineering access as well. Radio Operations Manager Tom Barclay with Georgia Public Broadcasting recently ordered a Glass E remote client for a LX-24 console mainly for remote engineering access, but he hasn't ruled out the possibility of using it for remote mixing by producers that are currently on-premise. The pubcaster keeps a board operator on-premise in its talk studio for daily shows like its Political Rewind show, which is being hosted remotely by a host in a home studio using a codec with typically two or three guest call-ins on telephone.

Overall, the trend seems to be software apps as an alternative to physical home studio gear. Apps like our remote mixing app ReMIX can be installed on a gateway PC at the station or used over a VPN connection to the WheatNet-IP network, which can be used to control utility mixers in the WheatNet-IP Blades. This is useful for broadcasters who have Blades for I/O, but do not have a surface capable of remote control. (The utility mixer output(s) can be routed to the air-chain. Assignments to the utility mixer can be made using WheatNet IP Navigator or salvos fired from logic inputs for a predefined set of inputs to the utility mixer being controlled by

FROM HOME Continued on **45** ➡

Containerization as an Alternative to Virtualization

Having several containers running separate services can help with security protection and flexibility

BY **SCOTT GERENSER**

The author is a senior software engineer at Wheatstone Corp.

Getty Images/Classen Rafael/EyeEm

One term popping up more and more in the cloud space is "containerization." If you're paying attention to the trends in cloud computing, you've probably heard about it, or at least about the most popular container platform, Docker.

Containerization is becoming a popular alternative to virtualization for running many different applications on a single machine or cloud instance. It has many of the benefits of virtualization but without some of the downsides, which makes it useful for transitioning from a fixed-location studio to a virtual operation.

Whereas virtualization involves emulating an entire machine, including the hardware and operating system, containerization involves encapsulating one or more applications and supporting files (so called "user-space" in Linux lingo) into containers that can then run on top of a single common operating system (usually Linux).

BENEFITS

For example, in a virtualization scenario, you might have a server running VMWare ESXi hypervisor software, upon which are four Ubuntu Linux virtual machines for Service X, two Red Hat Linux VMs for Service Y, and a couple of Windows 10 Server VMs to handle any Windows applications you have.

Using virtualization this way still provides big benefits over maintaining multiple physical machines. Administration is easier. Spinning up a new server or changing configurations of the individual VMs is much easier than tinkering with hardware. Communication between the VMs is very fast and efficient.

The downside, as compared to containerization, is the relatively large overhead associated with virtualization. This is because each VM is running a complete OS kernel, each with their own dedicated memory and each using up a percentage of your CPU to mostly do a lot of the same things.

Containerization, by comparison, also allows the running of a number of different isolated services on one machine, but within containers rather than full virtual machines.

Conceptually, a container can be thought of as a very lightweight, resource efficient VM. One container could host WheatNet-IP audio drivers and audio playback software, while another could host the station automation system, each totally isolated yet run off the same OS kernel.

Because each container operates independently of the others, you can avoid unintended interactions between software components and eliminate a single point of failure. Each application or container communicates with the others only through their defined APIs.

The container virtualization layer is extremely flexible and can scale up to meet rising demand for any of the services. Once you define what services are running in one or more containers, it's possible to move those containerized services between on-premise machines and the public cloud. This allows you to more easily scale services locally at your regional studio or in a cloud provider such as AWS or Azure.

And unlike with virtualization, there is no extra supervisory overhead to contend for resources, and containerization platforms are even able to run on top of virtualization platforms.

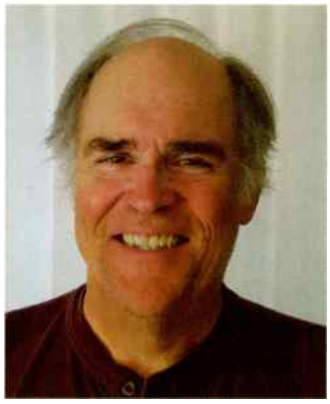
This last point is critical for long-term planning, since Amazon, Microsoft and other public cloud providers are already running hypervisor software on their cloud instances. Attempting to add your own VM hypervisor on top of a cloud provider's machine instance may work poorly, or not at all. Containers, by contrast, work well on just about all the cloud providers and instance types. Most providers even offer tools to make it easy to manage and coordinate your containers running in their cloud.

Fundamentally, containerization and virtualization are two different ways of doing the same thing. Having several containers running separate services pushed up to a cloud won't solve issues such as communication latency over the internet, but it will offer some added security protection and flexibility, and let you allocate resources more efficiently, which is the point of the cloud, after all.

WorldCast Ecreso Transmitter Benefits Iowa Station

FM 3 kW packs efficiency and range of features into compact solution

BY **STUART TELL**
Contract Engineer


Scott Gerenser

DUBUQUE, Iowa — "You are kidding! That's a 3 kW FM transmitter?"

That's what I thought when I saw my first Ecreso at an FM station about 100 miles northwest of Dubuque, Iowa. It had recently hired me for some contract engineering work. To a guy who just returned to broadcast engineering after an 18-year absence, it was a wakeup call. This Ecreso unit, built by WorldCast Systems, is known as its FM 3kW. It recently replaced the station's older main transmitter.

While I cannot take credit for the purchasing decision or its installation, I can tell you that they made a great choice. It comes as a complete, compact, 3U by 19-inch rack mount unit. Modular by design, this unit boasts an efficiency of up to 76%. It is powered by a 20 A single-phase breaker (184 VAC or higher), and can also be wired for operation on three-phase power.

When I mentioned complete, you will not only have direct-to-channel digital modulation, you can license (free testing included for 30 days) a flame-throwing five-band sound processor with your choice of audio presets to match your station's format. Experimenting with the CHR and urban format settings, I was impressed how loud and competitive this baby was, all while automatically keeping the modulation peaking at 97%.

COMPREHENSIVE SOLUTION

You can use direct AES or left/right analog in, with the optional five-band processing, or if you like your current audio processing, use the MPX input. Other features you will like are digital MPX over AES, the dynamic RDS encoder, and audio backup from an internal micro SD card player. Remote control and monitoring can be accessed via an easy to use web interface, or hard-wired to your current remote control via the standard (in the United States) GPIO board. SNMP is supported. Local control is menu driven from the front-panel screen and button keys.

What about reliability? With Ecreso's FM 3 kW you have a standard version with two, hot-swappable, power supply unit modules with a load-sharing design. In the event of a DC power supply malfunction, the other PSU keeps the FM 3 kW on the air at about 1,900 W.

If you opt for the "+1" version, you will get an extra, or third PSU and if one is lost, you can still operate at 3,000 W RF output. RF amplification is also redundant and is capable of operating even in the event of a fault. You could lose a MOSFET and still be on air at a little over half power. In fact, Ecreso is very open about these scenarios. Go to the company's website and download its tech guide titled "What Happens If?"

As rugged as this unit is, it's nice to know help is just around the corner. I have worked with Ecreso/WorldCast's Tony Peterle on a PSU software setting that needed changing. Tony said he could remotely change it, all he needed was IP access to the unit.

But this transmitter site has no network access. Tony's solution was to lend the station a 4G modem and a switch, and with a remote terminal access program on my lap top, he was able to remotely log in and change the setting. I really appreciate his help, creativity and patience.

Warranty-wise, three years; but for a small charge you can extend your warranty to 10 years. To me, with a warranty that long, Ecreso must be very confident of the equipment it is building.

The unit I am familiar with has been installed and running for about six months trouble-free. As for that older transmitter, the station's owner has new tubes for it and would like me to go through and get it ready for standby use. As reliable as the new Ecreso FM 3 kW is, I'm just not sure it will ever be needed.

For information, contact Tony Peterle at WorldCast Systems in Florida at 1-305-249-3110 or visit **www.worldcastsystems.com**.

DTS Joins the MBUX Multimedia Platform

BY **PAUL McLANE**

The DTS Connected Radio platform that Xperi has been working on for some time is coming to market and will be part of the sophisticated MBUX multimedia car platform, the company announced.

The Daimler MB User Experience, or "MBUX," is featured in the new Mercedes-Benz S-Class line.

DTS Connected Radio is a hybrid radio system that combines reception of broadcast signals with IP-delivered metadata; the company says it is now available in 48 countries. Hybrid systems provide a transition for a listener from broadcast to internet as a car drives out of range of a station OTA signal.

The company also said its content comes from 48,000 radio stations and millions of tracks, albums and artist bios. DTS believes it has the world's largest database of broadcast metadata.

It stated in the press release: "DTS Connected Radio features big beautiful art, comprehensive artist and album information and imagery, songs, playlists, content recommendations, lyrics, local events, podcasts, and more, enriching broadcasts from thousands of radio stations around the world."

Xperi General Manager of Automotive Jeff Jury described the relationship as "partnering with Daimler to help make what they call the 'Third Place' — a refuge between home and workspace — more delightful."

RADIO AS A "MUST-HAVE"

In a Radio World interview in July, Jury was asked what was notable about the MBUX system.

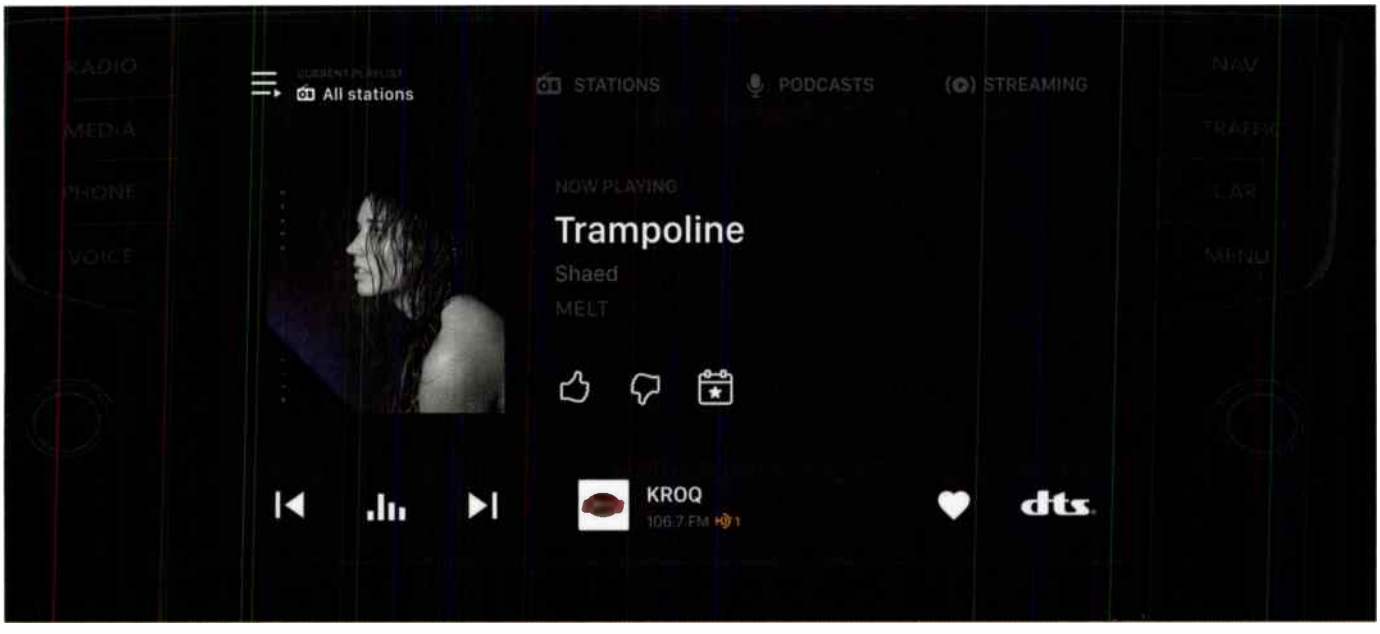
"First, Daimler [the parent of Mercedes] is not just handing over the dash to Apple or Google," he said at the time. "They are innovating for their customers. This is a great outcome for the radio industry because it means not all entertainment needs to be behind a car play or android for auto wall.

"Second, the main screen has radio as a separate icon (and apps as a separate icon). This shows that radio is compelling, and importantly, a standalone infotainment source for Daimler buyers. Again, good for the radio industry because radio is a main option, not one of many apps in the dash."

DTS highlights research that says radio remains a "must have" dashboard feature and reaches more adults 25–54 than other audio sources. Jury said those consumers want radio "to be as rich and engaging as other media platforms and experiences, particularly a mobile experience."

DTS promotes its platform to carmakers as a global one, compatible with analog AM/FM and global digital radio formats including DAB, DAB+ and its own HD Radio technology. It said the platform enables OEMs and Tier 1 suppliers to create better user interfaces without consuming a lot of data and computer resources in the vehicle.

Xperi is also the parent of DTS AutoSense, which monitors drivers and occupants; and HD Radio.



An image of DTS Connected Radio

➡ **TIELINE** Continued from **38**

Our studios can combine multiple return mixes with talkback and IFB functionality on a single mono audio source. Each day the team would do a combined segment with the "Carrie & Tommy Show." One day we had Kate in Italy, Dave Hughes in Maroochydore, Carrie at her home studio and Tommy in Darwin.

Four locations, four ViA codecs, and all sounding like they were in the same room. Days like this are pretty normal for our drive shows. We love the challenge and without the ViA or Merlin, we couldn't deliver such flexibility.

We used the Toolbox web-GUI for 90% of our configuration, which gives us great control. We can remotely adjust Kate's send/return mix, mic and headphone levels. With the ViA's built in audio processing we can deliver a clear-sounding broadcast-quality line paired with a Neumann KMS 105 microphone, which is the same mic we use in our studios. In my opinion no other mic matches its sound and with the ViA it ensured Kate's audio quality matched that of our studio.

Kate's Remote Studio in Bologna, Italy

The show has been on air seamlessly for nearly a year now. From the start Kate felt at home with the setup and was extremely happy with the result. She would continuously praise the reliability of the technology. Dave Hughes back in Melbourne said it was: "Incredible! The technology worked better than when we're in different studios around Australia."

In terms of the codec itself, there were no issues. The ViA is portable, simple to use, robust, flexible (with its multiple ways of connecting), sounds great, and has everything built into it that you need to make OBs reliable. We have used them in cars, busses, bikes, boats, beaches, bars. Doesn't matter where you are, it does the job.

There has been discussion now that we use so many ViAs in the field as to whether we even need to build studios anymore! I'm sure that would never eventuate, but we often laugh about where the future is headed with such great technology becoming available.

For information, contact Charlie Gawley at Tieline in Australia at +61-8-9413-2000 or visit **www.tieline.com.**

➡ **TRANSITION** Continued from **39**

These eight "tie lines" allow signals from the new consoles (PGM, bus-minus, etc.) to feed the existing router, and the router system to send common signals like off-air-tuners, EAS, satellite feeds, hybrids, etc. to the AoIP consoles. Having a couple non-dedicated tie lines allows one to change signals as required from one system to the other.

STEP 4: ADD AN AOIP CONSOLE OR TWO

It doesn't have to be all or nothing. Adding an AoIP console in the main studio, for example, offers a world of features, like source selection, bus-minus and audio processing on every fader, which were not available on any 20-year-old console. AoIP consoles typically cost about the same, or even less, than a 20-year-old console did when new. For example, an eight-channel AoIP console like the Audioarts DMX can be had for under $8,000, pretty much the price for a NetWave-8 console from the early '00s.

STEP 5: PLAN FOR OBSOLESCENCE

An analog exit strategy is crucial, whether you can do it all at once in a complete studio rebuild, or by updating one studio at a time.

Start by looking at all the activities that take place in your facility. Consider how you feed your air chain and your internet streams. Just about everything can be simplified by moving to AoIP. For instance, what type of playback system are you using? If it supports AoIP streaming, then you can kiss your audio cards and Bob boxes goodbye forever.

Same for your VoxPro and other PC-based audio editors. When you move to AoIP each server and PC that handles audio can be networked, using a dedicated NIC and one CAT5e cable, directly into the AoIP system. No other hardware is required beyond an available port on a network switch. Once you make the switch to AoIP, you open up so many other doors.

Adding appliances like our PhoneBlade allow you to integrate your VoIP phone system into your AoIP system. Other AoIP appliances, like our StreamBlade, give you the codec and processing tools for managing multiple streams and still other appliances can extend AoIP beyond the studio so you can connect with other studios or remote locations.

Even if you can't jump into AoIP with both feet, taking these steps will give you some, and eventually, all the benefits of an AoIP facility.

Richard Maddox joined PR&E in 1993 as digital product specialist with later stints in the Engineering, Systems Design and Customer Service departments. When Wheatstone purchased PR&E assets, he joined Wheatstone to continue supporting legacy PR&E products. He supports Wheatstone-designed products from his location in Southern California.

➡ **NAUTEL** Continued from **36**

gradable to HD Radio operation, we are now starting to plot out our HD operation ideas. We are looking into providing programming that will appeal to our full demographic and not just the younger people who like our current contemporary Christian music format.

We're getting some cost savings as well. In the few months that we've had the NV20[LT] on the air, our power bills have been consistently lower than in the same period last year. Even better, maintenance costs are going to plummet. Periodic maintenance can be scheduled rather than having an emergency visit to retune a transmitter that didn't return correctly to its full power. And, with a solid-state transmitter, swapping out modules can be done without going off-air at all!

So, to other general managers who are wondering about why to replace your tube transmitter even if it's still working … I say look at your maintenance budget, tube replacement budget and power bill, and a switch will make perfect sense.

For information, contact Nautel in Nova Scotia at 1-877-662-8835 or visit **www.nautel.com.**

➡ **FROM HOME** Continued from **40**

ReMIX). Any source on the WheatNet-IP network can be assigned to utility mixer inputs; mics, codecs, and automation playouts are the most common. With the two available program busses on the utility mixer, a quick mix-minus could also be set up to send to a codec or phone hybrid.

CHALLENGES OF BACK FEEDS TO STATIONS

Next to remote access, setting up confidence monitoring and mix-minus or bus-minus feeds for home studios make up the majority of our support calls since the pandemic started. Most of these are a simple matter of setting bus-minus assigns (all of our IP surfaces have bus-minus sends from the fader and these provide an automatic mix-minus of program content minus the source, so in most cases it's a simple fix of pairing faders to the codec.

It gets harder for some of the smaller plants that have a limited number of AoIP I/O units feeding a small console. The tricky part is how to route several home studio feeds and their respective bus-minus presets along with assigned codecs using shared hardware I/Os and faders. This can often be done in the software realm, using AoIP features like WheatNet-IP's Associated Connections that let you build a set of rules to automate some of that routing in smaller plants that are short on faders or outputs.

FOR YOU ANALOG GUYS

Analog consoles can also be remotely controlled with a little ingenuity and using the GPI/O in most any program playout or automation system. GPI/Os can be programmed to fire closure contacts that remote control the console. I recommend that you set up a gateway computer for logging into the network from the outside, and then set up a remote utility such as TeamViewer to keep your playout system secure.

Another option is to add an IP I/O unit to the analog console and then routing control and audio through that for remote access of the console.

There are as many ways to "social distance" the broadcast studio as there are ways to build a studio. The building blocks are pretty much the same as you'd find in-house — codecs, client software, surface control — and it's just a matter of putting it together with a little bit of ingenuity to get what you need.

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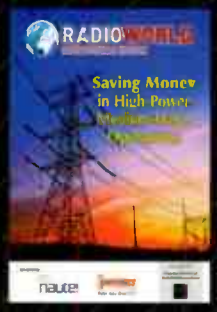

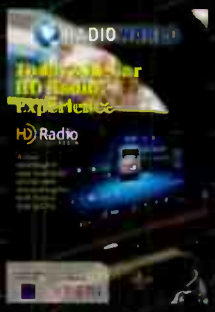

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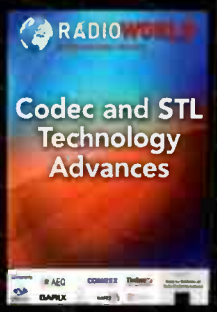

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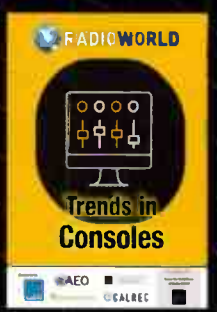

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