

STUDIO PROJECT PLANNING GUIDE

EVERYTHING YOU NEED TO KNOW FOR MAKING YOUR STUDIO PROJECT A SUCCESS

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THE WHEATSTONE PROJECT

Every studio project is a partnership of products, people, and purpose.

Our products: Wheatstone makes more than 200 interconnected studio devices and AoIP elements, all engineered, manufactured, and supported under one roof in the U.S.

Our people: We know broadcast and we know studios. Our sales engineers can design the most efficient studio facility that's right for you. Our skilled factory specialists can deliver the product you need, when you need it, to meet critical project timelines. Our systems engineers can pre-configure and commission your system for hassle-free installation. And our support technicians can be there to help with any issues long after you've installed the last cable.

We are all in, now and in the future. Wheatstone's team of R&D engineers is leading in cloud innovation to deliver a more cost-effective, flexible broadcast operation.

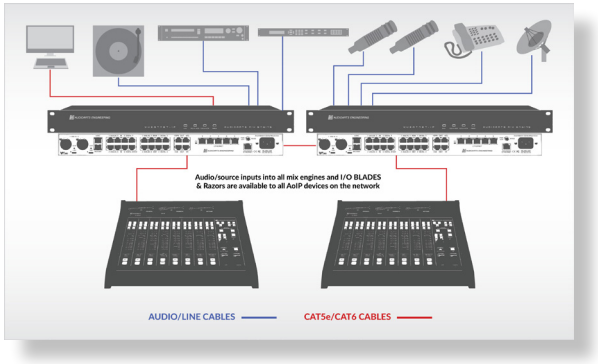
Our purpose: We've been a broadcast partner and studio equipment manufacturer for more than 40 years. Every inch of our factory and everything we do is for the betterment of radio and television operations. Today, there are Wheatstone studios operating in every major city, market and continent around the globe.

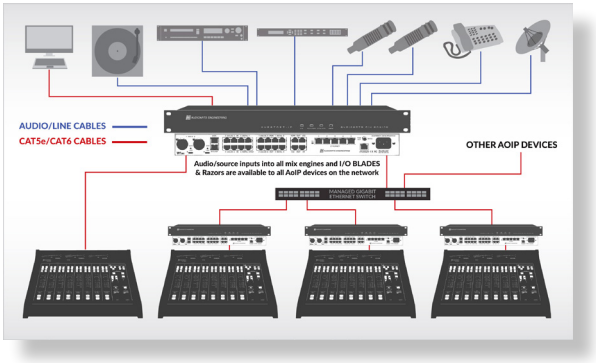
NO STUDIO TOO SMALL. NO STUDIO TOO BIG.

Wheatstone does it all, from single-station studios to large multi-studio, multi-station complexes with a million cross-points and dozens of mixers, talent stations, and elements connected across a region.

Complete IP audio networked studios, from initial planning and custom manufacturing to final commissioning and everything in between. Our studio pros can help you create your ideal studios.

Built to last. All consoles, AoIP devices and software apps are engineered, manufactured, and supported by our factory in New Bern, N.C. where we live. We build them broadcast tough to last. The buck stops here.



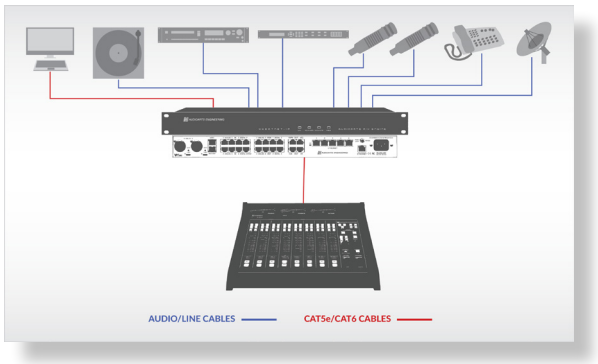


Right AoIP, all the time. Everything you need now or ten years from now. WheatNet-IP is the only AES67 compliant AoIP ecosystem combining logic control with routable audio tools such as utility mixers, audio processing, streaming encoders and embedded CPU as part of the AoIP native environment.

Your studios, your way. Console surfaces, talent stations and unlimited virtual interfaces to choose from. Customize your AoIP system for your studios now, and add on appliances, elements, and virtualization later.

AoIP anywhere, any device. Local, regional or global. Tablet, phone or existing mixing desk. Unlimited user interfaces, configurations, and third-party add-ons. WheatNet-IP touches everything.

Plus, analog to AoIP in one. For smaller studio projects, we offer the DMX console surface with Blade Engine I/O that has IP audio networking and mixing in one, Ethernet switch included. Just add CAT6 cable (actually, we can include that too…)



JOIN THE WHEATSTONE NETWORK

Manufacturing, engineering and end-to-end studio support backed by your number-one AoIP partner with thousands of studios in operation around the globe. In 2020, Wheatstone won an Emmy for “development of synchronized multichannel uncompressed audio transport over IP networks" which led to the implementation of the AES67 standard.

IT ALL HAPPENS HERE: WHEATSTONE FACTORY

All our products are American made right here in New Bern, North Carolina, under one roof. We do it all: engineering, R&D, support and manufacturing, from machining, fabrication, and screening to printed circuit board surface mount.

Raw materials arrive in the back door and wind through the factory to be pressed, molded, wired and tested, retested, and tested again before making their way out into the world as Wheatstone products that live in studios around the globe.

Having it all under one roof lets us respond quicker to changes and gives us much better control over a volatile supply chain so that every critical project deadline is met.

YOUR SYSTEM, PRECONFIGURED AT THE FACTORY

In addition to manufacturing all the components you'll need for your WheatNet-IP audio networked facility, Wheatstone can preconfigure entire studio systems and stage them in our factory before shipping to make installation at your facility relatively easy plug-and-play.

From left to right, Aaron Farnham, Regional Director of Engineering for Bonneville, and Robert Fields, CE for Bonneville Phoenix, during a recent visit to the Wheatstone factory where complete studio systems were manufactured, configured and staged before shipping to Bonneville sites.

TEAM WHEAT

If you are building a new studio, adding on to your existing studio or combining, remoting into, or making any changes to your facility, call the Wheat Team. We can help you plot it out to the smallest detail. We work with qualified systems integrators and other experts so you get the most benefit from your new studios. One call can save you tons of time and money.

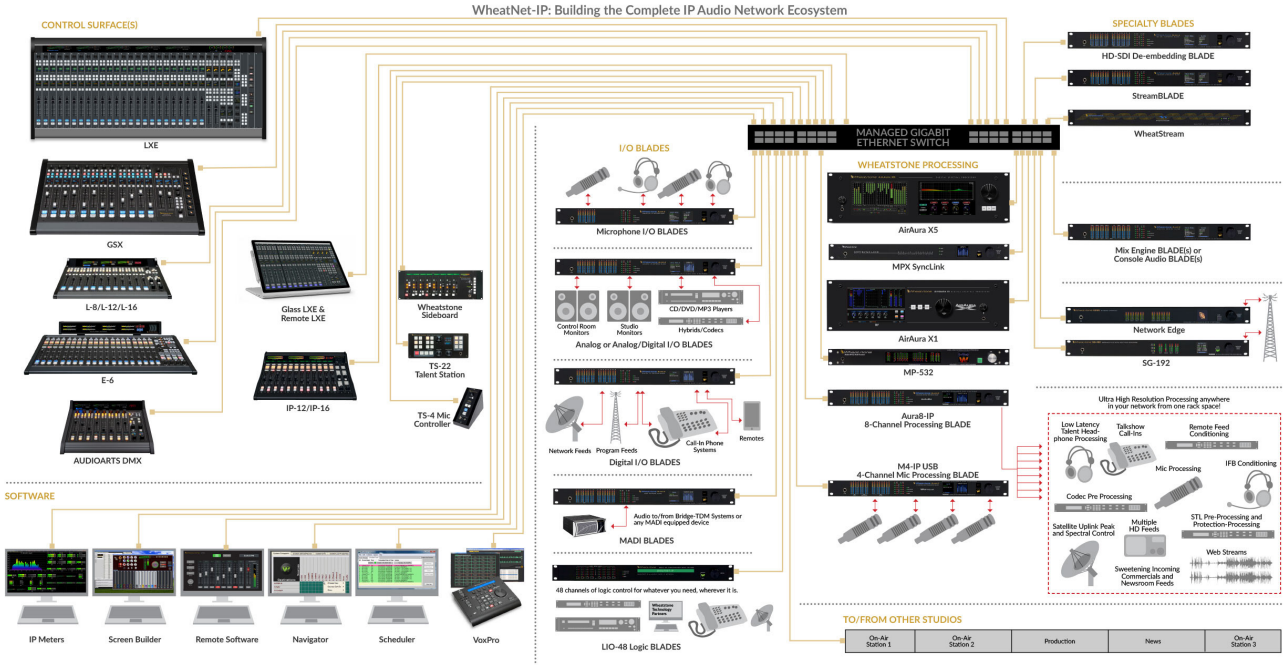
200+ STUDIO DEVICES AND AOIP ELEMENTS TO CHOOSE FROM

- Console surfaces, talent stations, button panels
- Virtual mixers and DIY custom interfaces for tablets and laptops
- AoIP routable mixing, processing and other audio tools
- Streaming appliances
- Virtual tools
- Server and cloud-ready software suite
- SNMP alerting, silence detection, automatic failover
- Online mic processing
- Remote access and control
- Complete studios running in one AoIP environment

Plus, the WheatNet-IP audio network is AES67/NMOS compatible and integrates with 160+ third-party brands, including Jelli, Eventide, Ross, Mosely, RCS/Zetta, StreamGuys, Triton Digital, MultiCAM, Tieline, Radio.Cloud, Grass Valley, and many others.

WHEATNET-IP AOIP ECOSYSTEM DIAGRAM

Click to view enlarged image



Team Wheat can plot out the details and save you tons of time and money.

THE COMPANY WE KEEP

More than 60 third-party brands interface directly into the WheatNet-IP audio network, from playout and production automation systems to camera control and IP audio codec distribution.

If we don't have what you need for your WheatNet-IP audio network, we have connections to those who do. Explore our technology partner page for ideas and additions to your WheatNet-IP audio network.

See our technology partner page >>

EIGHT SMART STUDIO TRENDS

1 **Home is where the studios are.** You already know that spare bedrooms are being turned into studios. But did you know that studios also are being turned into home-like settings? The Bridge (90.9) in Kansas City is just one example of how stations are adding courtyard entertainment and living room-like studio spaces with WheatNet-IP routing, control, and automated cameras throughout.

2 **Virtual is real.** It's everywhere and on every device, from multiple screens in the control room to tablets on the ballfield. WheatNet-IP touches everything, from home to studio, tablet to console surface, and from New York to London.

3 **AoIP is the rising tide lifting all boats.** AoIP has been a part of larger station groups for some time. But now stations like student-run CFAK-FM in Quebec are going AoIP with fully contained, IP audio networked DMX consoles and saving a boatload on wiring and other costs associated with an analog alternative.

4 **Studios are downsizing as the cost of real estate rises.** Consider Great Eastern Radio, which rented out half of its three-story building in New Hampshire by consolidating its eight stations into a new studio space that takes up a little over a floor. The regional broadcaster went with "glass" consoles in some studios and created codec gateways throughout, all managed, controlled and routed through WheatNet-IP audio networking.

5 **TOC rooms occupy a smaller footprint.** Broadcasters are using what space they do have for voiceover booths and other workspaces, not for racks of equipment. Audio codecs now occupy the same I/O unit in the rack room along with audio processing and other apps, thanks to our new Blade 4.

6 **No more Windows® updates or PCs.** Rows of PCs are being replaced by Linux AoIP streaming appliances. As part of its WheatNet-IP audio networked studios, Great Eastern Radio is managing metadata, processing and provisioning for 16-plus streaming instances through one RU Streamblade appliance, with capacity to spare.

7 **Help wanted.** Short-staffed stations are leaning more on technology partners such as Wheatstone for everything from initial project planning and AoIP system pre-configuration to commissioning and ongoing support.

8 **It's all in the AoIP.** Everything from mic processing to streaming appliances and automation integration is now part of one native AoIP environment. All this and more is in WheatNet-IP, making it possible to scale operations by show or by region or even for eventually offloading part or all of your operation to the cloud.

Go From Analog to AoIP in One Click

Our DMX console surface with Blade Engine I/O has IP audio networking and mixing in one, Ethernet switch included. Just add CAT6 cable (actually, we can include that too…)

CASE STUDY

BONNEVILLE ON BEING YOUR OWN SYSTEMS INTEGRATOR

Bonneville and Wheatstone share something in common besides consoles and a love of the broadcast industry.

We both practice vertical integration, the short meaning of which is to own every critical piece of your organization rather than contracting it out to other companies.

In other words, if we can do it ourselves, we will.

For Wheatstone, this means machining your own chassis along with a million other parts and details under one manufacturing roof in New Bern, N.C.

For Bonneville, it means becoming their own systems integrator for its most ambitious studio project yet.

Instead of contracting out to a systems integrator, the group put ownership and control of the project in the hands of regional and market CEs and then combined their collective skills for standardizing studios across the entire group.

San Francisco

Salt Lake City

Its Salt Lake City location was the first market to go all in with WheatNet-IP in 2018, with Bonneville Regional Director of Technology Aaron Farnham leading the project under the guidance of Senior VP of Engineering Scott Jones. Then came Denver, San Francisco, Sacramento, Seattle, and finally Phoenix, affecting all 22 stations in six markets.

They dealt with all the usual bumps along the way, plus a few new ones – like, a pandemic. Bonneville's recent CBS/Entercom merger acquisition also added more logistics, and more stations, to the project. Two of the six locations required drastic downsizing, one required a move to an entirely new facility, and all six locations went through a major overhaul as they converted from a hodge-podge of studio consoles, automation and routing systems to RCS Zetta automation and WheatNet-IP networking (with L-8s, DMXs and LXE consoles/touchscreen interfaces and networked-in talent stations).

Expert Tip: Just about every new studio facility can be downsized these days to take advantage of real estate, electrical, and hardware cost savings. Your Wheatstone sales engineer can suggest ways to downsize and still add on new workflows.

As an interesting aside, Wheatstone's DIY approach to manufacturing was one of the reasons why Bonneville standardized on WheatNet-IP audio networking and consoles across all six markets. "We couldn't have foreseen COVID happening or the supply chain issues that followed, but back then one of the deciding factors to go with Wheatstone was knowing that products weren't being sent to us from overseas. We liked the idea that Wheatstone manufactured everything in-house and we liked that scalability…we knew it could probably affect how we scale on a project like this," said Farnham.

In fact, he added, "Wheatstone was the only manufacturer at one point still producing products. I waited nine months for a shipment from one vendor, but when I called Jay (Tyler) and said 'I need three consoles and a handful of Blades,' they had it here in no time."

The engineering team officially wrapped up the corporate-wide project in early 2023 but the benefits of being their own systems integrator are ongoing.

"By building that knowledge base within Bonneville, we've been able to share ideas and share resources as one engineering team. This also gives market engineers ownership of their facilities. That was one of the big motivations for keeping integration in-house," said Jason Ornellas, Regional Director of Technology for Bonneville International.

San Francisco

Denver

Both Ornellas and Farnham are quick to point out that not every broadcast group can or should be their own systems integrator, just like not every manufacturer has the collective resources to manufacture products under one roof. “There are some really good integrators out there. But for us, with our corporate culture evolving away from silos to being one big team, we wanted to get that sense of ownership. We wanted to grow our engineering team so we could make changes ourselves when we needed to, without having to call in an integrator later,” commented Ornellas.

All of which will help Bonneville adapt in the future but came with a huge learning curve up front. Check back here as we follow how that curve played out as six market CEs and two regional engineers, under the leadership of their corporate engineer, renovated more than 100 studios for 22 stations in six Top 25 markets over a four -and-a-half year time frame. [To be continued...]

Wheat News is featuring a series on Bonneville’s journey detailing their successful six-market studio project, and we hope you’ll come along with us by subscribing to our monthly newsletter. Click subscribe below.

Subscribe to Wheat News

BEWARE OF LITTLE EXPENSES

"A small leak can sink a great ship." These words by Benjamin Franklin are as relevant today as ever, especially when it comes to those little expenses that can add up in a typical studio project.

Wire creep: the console. Cabling and wiring costs can creep up on you, especially if you haven't thought beyond the sticker price of a console. A standalone digital or analog audio console will always require more in wiring than an IP audio console. You're looking at a tenth the cost to hook up an IP routed audio console compared to what it costs to connect up a prewired standalone console. That's easily several thousand dollars for AES audio cabling with the necessary punch blocks versus a few hundred dollars for inexpensive, off-the-shelf CAT cable (even with adapter and interconnects) to route audio and control into and out of a WheatNet-IP audio network console.

Expert Tip: AoIP scripting and virtualization apps can be affordable options for adding on new functions and features at any time. Be sure to ask your Wheatstone sales engineer about these as well as cloud software that you can use to extend the usefulness of your WheatNet-IP at any time.

Wire creep: the facility: Then there's the maze of wires that can easily fill an entire wall in the engineering or rack room. We estimate it costs a minimum of $6,000 to wire together a 64x64 patch bay. You eliminate the wall of wire by going with IP audio networking, the access units of which collect and distribute all the audio I/O and logic virtually throughout the facility instead of physically through a patch bay.

By connecting routing, mixing and studio control through Ethernet cabling, AoIP opens up accessibility and gets rid of outdated wiring and layers of audio infrastructure. One common upgrade is to drop an I/O Blade at various mic or talent workstations in the studio and run a cable back to a central rack room. Another is to connect the wall of plug-in mics and other auxiliary XLR devices to the control room using one WheatNet-IP high-density I/O Stagebox One and a cable.
Read the full story >>

6 COMMON STUDIO GOTCHAS

Workers were nearing completion of a 47-floor skyscraper in Spain when someone noticed that there were no elevators to the top. It turns out that the builders added 27 floors as an afterthought and forgot to include elevators past the 20th floor! An epic project fail, definitely. But even everyday "gotchas" can add up. Here are common studio mistakes to avoid, according to Inrush partners Mike Dorris and Brian Sapp, who have been bitten by the gotcha bug more than once as system integrators for some fairly complex studio projects (including Wheatstone's largest contract to date involving more than 245 studios in 32 U.S. markets, the majority deliverable in a few months).

1 Soundproof for shrinkage.

"Most studio builds now are downsizes, as more can be done with less equipment," said Sapp. Whereas you might have had 24 studios in the old place, you're now likely to be downsizing to 16, 14, even 12 studios and eliminating all that surrounding free space as well, he said. "That's a big gotcha because no one really thinks about soundproofing for that smaller space until the studio is well under construction, when they suddenly notice that they can hear everything happening down the hall," explained Dorris. He suggests soundproofing as much as your budget and space can afford, ideally during the construction stage instead of after the fact. And if you can spring for studio grade doors, all the better. At the very least make sure doors are well sealed so sound doesn't travel down the hall and to the studio next door, said Sapp.

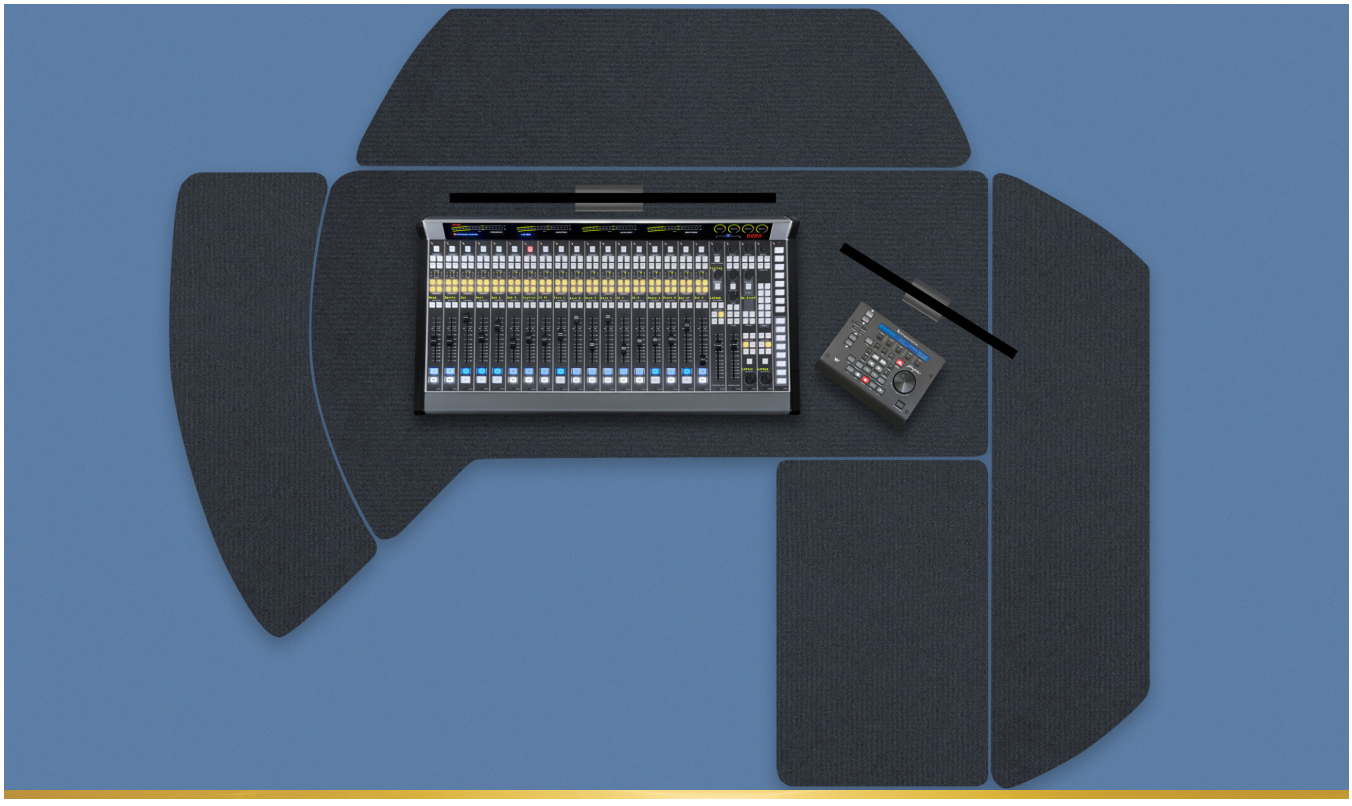
2 Pay attention to HVAC vents.

"I think we all know not to put the vent above the microphone. But you'd be surprised how often that happens because HVAC vents are one of the first things they put down, before they put in the ceiling tile grid," said Sapp. "It really comes down to bringing in an architect you can trust and calling out STC ratings between rooms and determining how much noise you can expect from the HVAC," added Dorris.

3 Don't waste time, space and layout on studio windows that they'll never use.

Automate cameras instead. "You might get some pushback at first because most of us like to have windows, but later they'll thank you. One of the board ops of a facility we rebuilt commented that 'this is so much better. I can see everyone on the monitors right in front of me' as opposed to trying to lean over to see the producer through the studio window," said Dorris. When possible, he integrates camera automation into the WheatNet-IP audio network so that cameras pan to the guest or host position when a particular mic is on and/or a fader is up, which can then be routed to social feeds or to studios, producers, guests and talent.

The right furniture can make a difference in studio layout, cabling, and even equipment heat load. Shown is Wheatstone's Quickline modular furniture made specifically for broadcast studios.

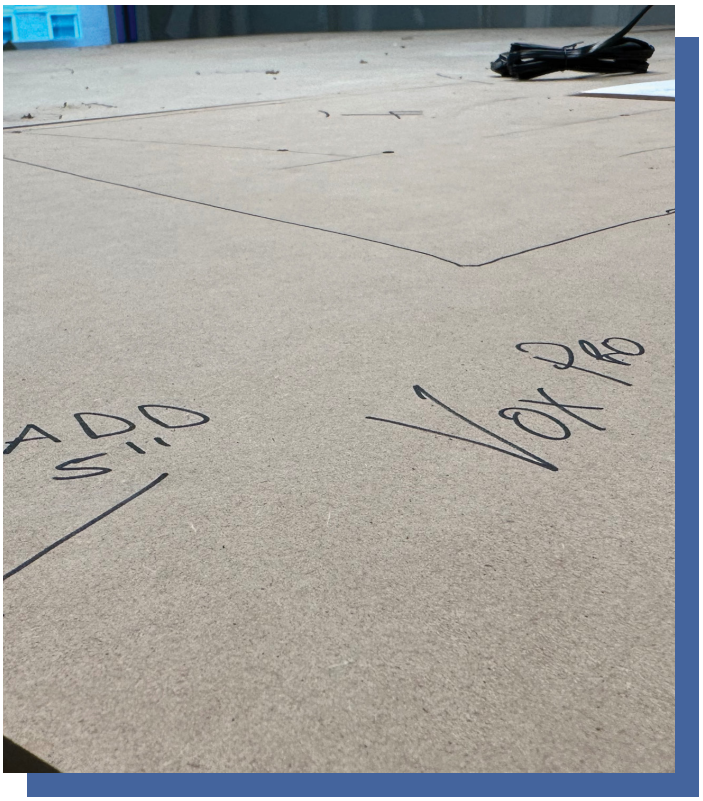


4 Dodge furniture failure.

"It is the one thing that no one really thinks about, but it totally makes a difference in how the room looks, how it's wired, and whether you can line up the electric and data cables properly," said Dorris. "Furniture even makes a difference in terms of studio equipment heat load – whether there's proper ventilation, for example," agreed Sapp. Stick to industry standard-bearers if you can or at the least, work with a furniture maker that will give you detailed drawings of the cabinetry and conduits you'll need. "Furniture is often forgotten but very noticeable when you screw it up," commented Dorris.

5 Do this before routing out holes and pulling cable: get everyone's input.

Dorris and Sapp suggest setting up a temporary counter top during initial studio fittings to allow for a virtually unlimited number of changes by talent, integrator, and architect in real-time until the most ideal layout is achieved. "The biggest gotchas come from the staff and if you're lucky, you'll be able to fix it in time," commented Dorris. "If you don't know, you can't fix it. And even if you know and it's too late, you can't fix it," agreed Sapp.



6 Assume nothing. Question everything.

What's the voiceover workload? How many and how often are live shows broadcast? How many mics and what type per studio? Maximum budget? Any station acquisitions on the horizon? The answers to these and other questions will feed into the pre-documentation, which will then feed into the equipment list that determines how much cable between rooms, how many racks you need in the TOC, what the UPS load needs to be, and all those details that make up the scope of the project. "What happens is all of that starts driving what you purchase and what you need to do and soon, the two refine each other so that you can catch a lot of things on paper first before they become real issues," said Dorris.

DID YOU KNOW?

Wheatstone can help put a preliminary equipment budget together for you. Our sales engineers can offer tips based on our experience with thousands of studios over the years that will help you avoid surprises and make sure you've thought of everything you will need.

SURPRISING USES FOR AOIP BLADES

Oh, the places they go and the things that they do!

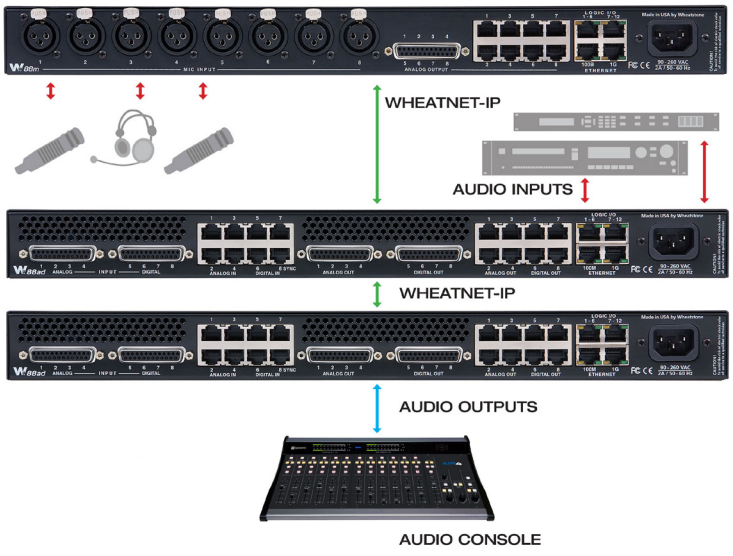
I/O Blades are the access units that form the WheatNet-IP audio network. With audio mixing, processing, logic control and IP networking all in one rack unit, Blades can also be used for a number of interesting applications. Here are just a few:

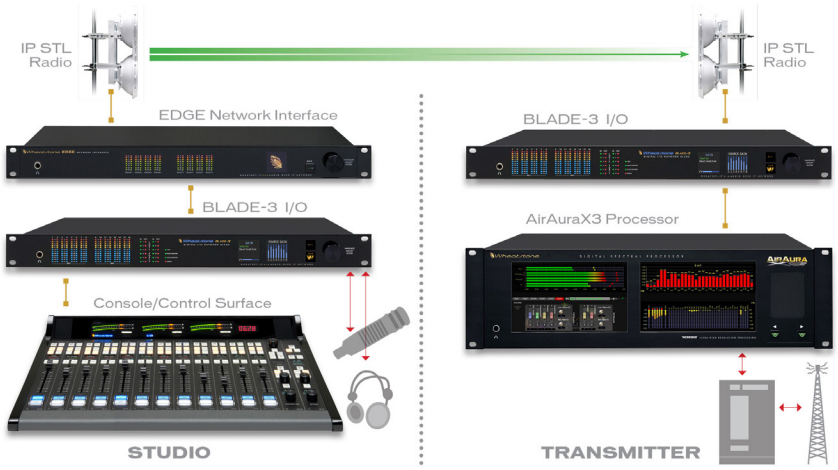
AUDIO IN THE OUTFIELD:

Quickly set up a small studio at any sports venue. All you need is a Blade at the press box as your audio interface into your mixing board and mics, and an Internet or other link to the studio. The Blade gives you audio IP routing, processing, mixing and logic controls in one box.

IP AUDIO SNAKE:

Transport audio between the production studio and a nearby performance studio using Blades at each end. Carry mic and instrument feeds from the stage area to the network over CAT6, wireless or optical fiber link. Do separate mixes live using the Blade's 8x2 stereo utility mixers or capture multitrack recordings for future mixing. No transformer splits required!



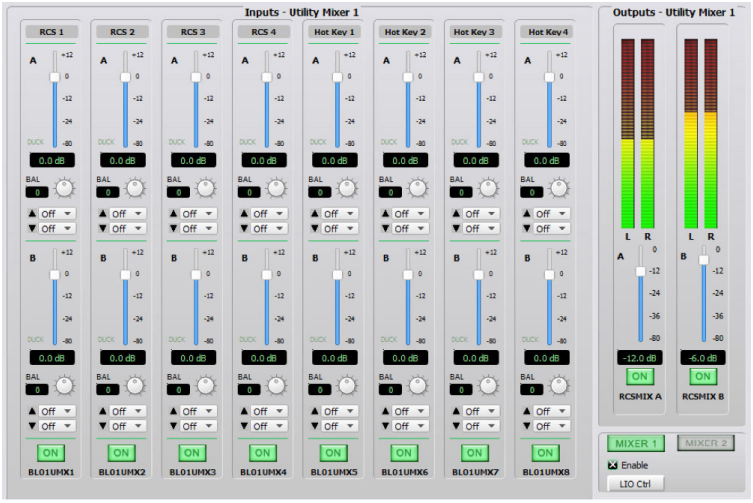


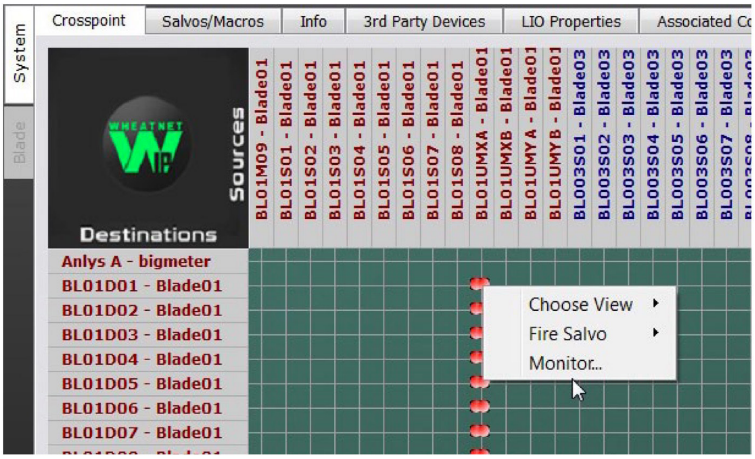
STL:

Continue IP audio from the studio to the transmitter with Blades on both ends of an IP wireless or other STL. IP radios connect to the switch on each end, which are connected to the Blade for managing audio and any devices hanging off the network. If the STL should lose connection, the Blade will not only detect silence, it can trigger the startup of playback audio that can be stored on some Blades.

MULTI-STAGE VENUES:

Place Blade I/O units in the van and on stages or throughout the field, and connect them together over fiber and CAT6 via the network switch for audio transport between them. Great for music festivals that require real-time communication between multiple stages.





IFB:

Talk to talent over your IP network. Blades networked together provide the IFB pathway, whether it's on location or in the studio. Simply change crosspoints using our NAVIGATOR software to create routable IFB throughout the facility.

Expert Tip: Wheatstone sales engineers can give you an idea of some of the commonly used AoIP components that can serve several functions in the network to build in more redundancy while reducing hardware and racks in your TOC.

THIS I/O BLADE HASN'T HAD A DAY OFF IN MORE THAN SEVEN YEARS

This Blade at Cox Media Group in Tulsa has been working for 2638 days without a single reboot.

MORE BONUS CONTENT ON STUDIO PROJECTS

Too Many Monitors in the Studio? Scripting Rushes In

The problem: Too many physical monitors in the studio. The solution: Scripting LXE or GSX console surface buttons and OLED screens for displaying what you'd otherwise put on a monitor screen. Read more >>

What If? Scripting the AoIP Studio.

Scripting your own routines for the IP audio network often starts with two of the scariest words in the broadcast engineering profession: What if… Read more >>

SS8. Essential Worker

The SS8 control module has earned the distinction of being an essential worker in studios today. This scriptable, WheatNet-IP control panel has eight switches and a scripting menu for firing salvos, establishing network crosspoints, and toggling devices on/off. Read more >>

When Your AoIP is Really a Mic Processor

You might have a WheatNet-IP audio network if your AoIP I/O unit is also a mic processor. Consider a new studio installed by RadioDNA for The Station of the Cross Catholic Media Network in Buffalo, NY, the RE20 mic of which is connected to our M4 mic processor.
Read more >>

Studios that Dare to be Different

Discover how one broadcaster is doing it their way with Screenbuilder, our build-your-own app for creating custom screen interfaces into the WheatNet-IP audio network. Read more >>

Linear Goes All the Way

It's linear audio all the way for Crawford in Chicago, which extended its studio WheatNet-IP to its transmitter site in Lansing, Illinois, using a Cambium 18GHz link.
Read more >>

Three Things You Should Know About Network Switches

Network switches are a critical part of any AoIP facility. Here are three important characteristics to look for in a network switch. See page 7 in Advancing AoIP for Broadcast eBook >>

Linear Audio and Full MPX STL

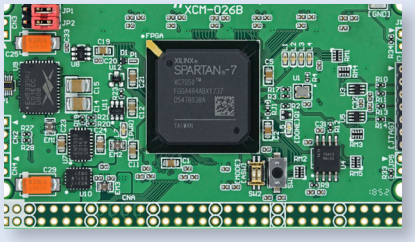
It's now possible to transport linear audio and the entire FM MPX signal, including RDS, pilot and FM/HD alignment, across high-speed links from your studio to the transmitter or data center. SystemLink is how.
Read more >>

Layer into Cloud

Spin up or down mixing, FM/HD processing and streaming instances when needed, your server or Amazon's servers. With Layers, broadcasters are now able to extend studio failover redundancy across multiple AWS or Google cloud data centers, centralize stream provisioning and processing, and replace racks of gear along with the associated engineering, maintenance, and real estate costs. Read more >>

New Twists in Supply Chain

This is a Spartan-7 integrated circuit made by Xilinx. They're hard to come by but we happen to have this one and several of its friends in inventory. This little slice of silicon is the latest in FPGAs and is a good example of how supply chain issues continue to cast a long shadow across our industry. Read more >>



IT'S ALL IN WHEATNET-IP

THE INTELLIGENT NETWORK

Studio Project Planning Guide

Wheatstone
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