Wheatstone
WHITE PAPER

The Business Case for the Intelligent Network

How WheatNet-IP improves the efficiency and economics of radio facilities

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Introduction

AoIP networks have been in use in the radio industry for over 10 years now. Two years ago, we introduced WheatNet-IP, or what we call the "Intelligent Network," designed to take advantage of newer technology and improve performance over older AoIP systems.

Are these just incremental improvements? Yes and no. WheatNet-IP will run faster, and be easier to set up and manage than older systems. But WheatNet-IP offers far more than just advances in speed and efficiency. We also designed it with an eye toward the future: with the ability to accommodate what radio facilities will need to thrive economically in the years ahead.

Right now, a variety of business models are being tested at stations all over the country that are looking for ways to replace declining traditional ad revenues. Whether the new revenue comes from streaming a signal over the Internet, creating second HD channels, sponsoring content for local events, or any other possibility, each approach will bring new requirements for the AoIP networks that support them.

As you will soon read, WheatNet-IP has been designed to support the new revenue generating opportunities both right now and in the future. In many ways, as we advocate for our system, we are also advocating for the future business success of your organization.

Three new technologies

With the introduction of WheatNet-IP in 2008, three new technologies were introduced to the radio AoIP market. WheatNet-IP was the first AoIP network for radio with:

1 – Distributed intelligence architecture, known more simply as an "intelligent network"

2 – Gigabit speed (ten times faster than older systems)

3 – Advanced local routing and control features

In the pages that follow, we will explain, in non-technical terms, what these features are, and how they can improve the operational efficiency and economics of a radio station.

What is “distributed intelligence” architecture?

Before the introduction of WheatNet-IP, radio AoIP networks were designed with centrally controlled architecture. The access points of the network, also called “nodes,” were controlled from a central point, typically through a computer. The computer directed the nodes as needed, controlling all of the devices on the network, such as consoles, microphones, STLs, etc.

The difference between a network that is “centrally controlled,” and one with newer “distributed intelligence” architecture, is in where the core intelligence and control are located, and how they communicate with the rest of the network. On the next page we contrast both types of networks.

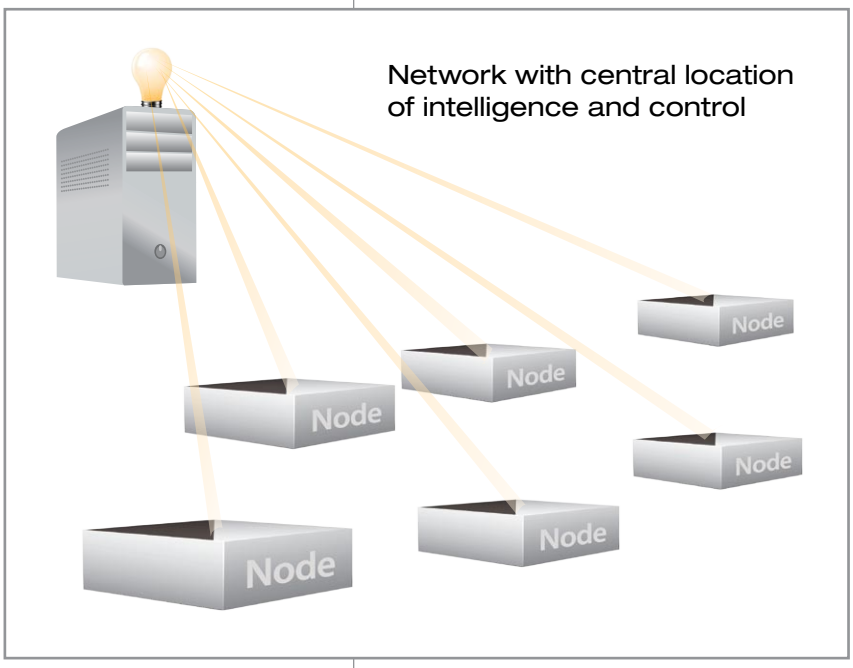


FIG. 1

Central Intelligence Architecture

This is the design many older AoIP networks have. The core intelligence and control are located at a central point, illustrated by the light bulb. The yellow lines indicate the lines of communication and control between that central point and the nodes, the points where all devices (such as microphones, consoles, and STLs) are connected to the network.

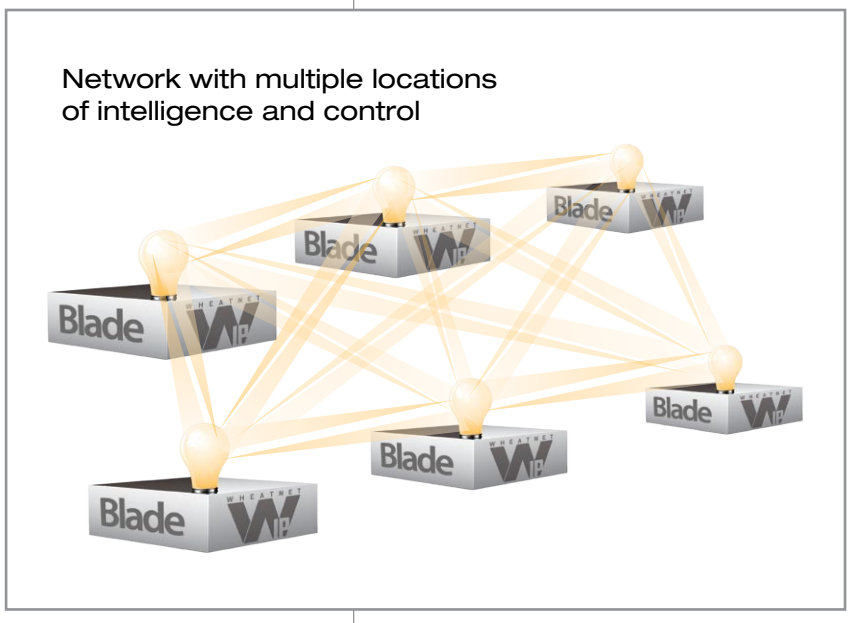


FIG. 2

Distributed Intelligence Architecture

With this design, the core intelligence and control of the system are "distributed" to each node, which in the WheatNet-IP system is called a "Blade." Because each Blade has its own intelligence, there is no central point of control, and no computer required for operation. Each Blade is aware of itself and its own location, as well as the location and configuration of all the other Blades in the network. It can function on its own, and interact with and make adjustments to any other Blade. Each Blade is also smart enough to schedule events and make decisions on its own. This illustration shows the lines of communication and control between the Blades as they communicate and affect each other directly.

The three new technologies built into the WheatNet-IP system can greatly improve the operational efficiency and revenue of a radio facility. We will now take a closer look at some of the ways that each technology can add directly to the bottom line at your station.

NEW TECHNOLOGY ONE: Distributed intelligence architecture, also known as an "intelligent network"

Business Benefit 1: Your engineering staff will spend less time on busywork, and more time on engineering.

Because our network has local intelligence, it can eliminate time-consuming steps during the initial system set up, or any time your staff adjusts or modifies your network. For example, with older systems, every time you add an access point or node, its IP address must be hand-entered. With the WheatNet-IP network, each Blade (or what we call our super-smart nodes) is self-aware, so it already knows its own IP address. And since each Blade communicates with all the others in the network, when a new Blade is added to that network, all the other Blades know its IP address within seconds. TIMESAVER: You don't have to hand-enter any IP addresses because the network immediately knows it.

While entering one IP address may not take a lot of time, on a large network the time needed for this task adds up quickly. Even on smaller networks, consider that this is not just about set up; every time you expand, modify, or add components to your AoIP network, this same piece of busywork needs to be done.

Finally, some report that the real benefit is in eliminating the possibility of human error in an industry where fewer senior engineering staff are responsible for more and more functions. Looking ahead a year or two, this task of hand-entering IP addresses could become even more time-consuming. Estimates reported on Wikipedia state that sometime between 2011 and 2012, the pool of unused IP addresses will be exhausted. At that time, the current standard governing IP addresses, IPv4, will be replaced with IPv6. With this change, new IP addresses will move from the current 32 bit configuration to one with 128 bits, making the task a lot harder.

Here is another example of how WheatNet-IP eliminates busywork: Your engineers will no longer be required to enter a list of network content streams and prioritize them. Why not? Because WheatNet-IP runs at a full Gigabit speed, 10 times faster than older systems. With a faster system, all audio gets to where it needs to go without the need to enter streams and prioritize them. As a result, this entire step is skipped, not just during set up, but any time a change is made.

By eliminating these and other steps in the set up and ongoing management of your network, we have made it easier and faster to set up and run. This can be a big advantage.

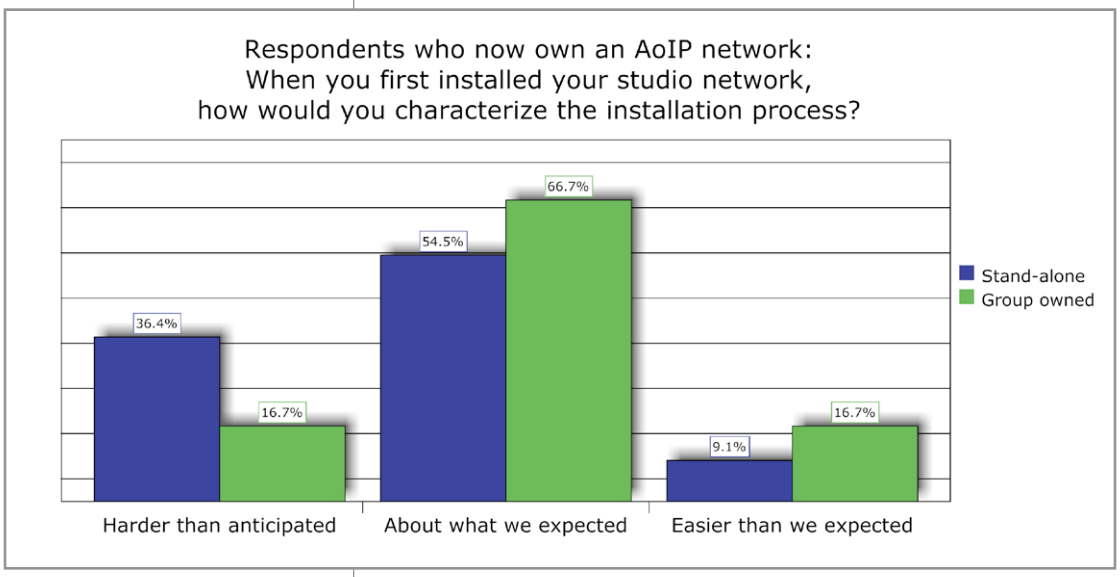


FIG. 3

The recent study by Alethea Research, "Revenue Generating Radio Technologies: A Progress Report," found that about one third of stand-alone stations that now own an AoIP network found the installation "Harder than anticipated."

As more engineering functions are taken over by junior staff members, the need becomes greater for simplicity of operation in an AoIP network. By using distributed intelligence to skip the configuration steps necessary for older networks during set up and ongoing management, your engineers will spend less time on busywork and more time on engineering. Over the lifetime ownership of an AoIP network, these skipped steps add up. As Benjamin Franklin said, "Beware of little expenses. A small leak will sink a great ship."

Business Benefit 2: Obsolescence pushed back as far as it will go

Some consider the migration from centrally controlled to distributed intelligence computer network architecture as inevitable. Why? Because this transition has happened to most computer networks in other communication industries. Although Wheatstone first introduced this architecture to the radio market in 2008, we did not invent the idea.

In the 1980s, the first intelligent network (IN) for telephone computer systems evolved, based on newly available signaling technology. Previously, telephone networks had a centralized point of control with one switch controlling an entire network. By distributing intelligence to each switch and allowing them to communicate freely with each other, a new design emerged. This new, so-called "intelligent network" offered the following advantages:

With intelligence shared between switches, networks could be made fault-tolerant, eliminating single-point failures and making the new intelligent networks far more reliable.

Because each switch was self aware, initial network set up and later modifications both became dramatically simpler.

This was the first large-scale commercial application of an intelligent network. Since that time, most communication industries have adopted intelligent networks. Wi-Fi, which connects your computer to Internet resources, is an example of an intelligent network, as are the world's cellular telephone networks and the Internet itself.

The advantages of intelligent network architecture become more critical as networks become larger.

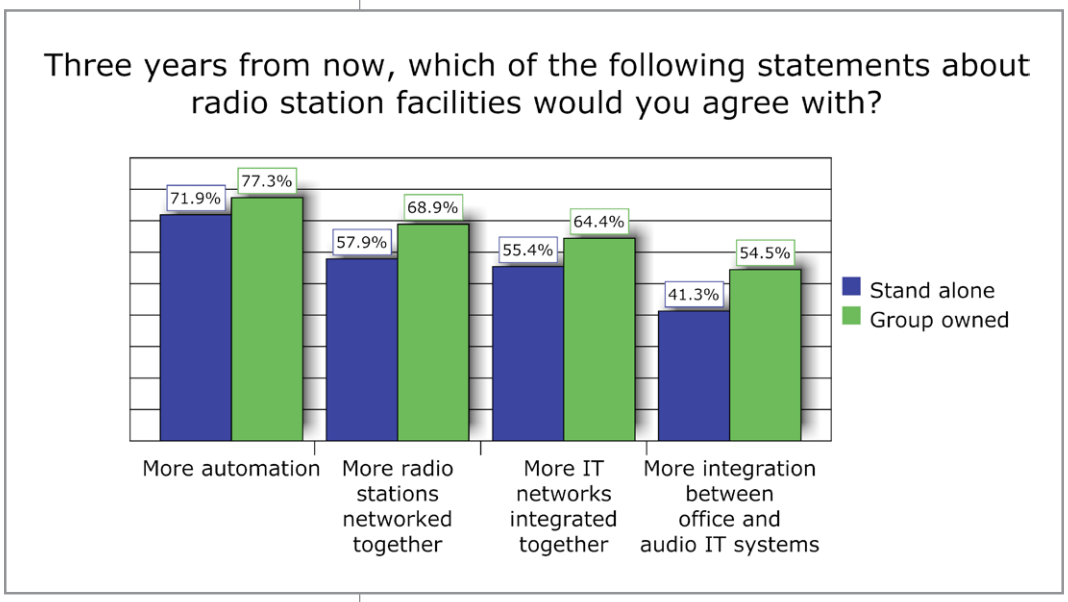


FIG. 4

How will the networks in your station(s) look in the near future? Findings from the Alethea Research study indicate there will be more networking between stations, IT networks, and even office and audio networks.

Plan ahead. Right now, centrally controlled network architecture might be fine. But in the near future, there may be compelling cost savings and efficiencies associated with integrating some of your IT systems. Having a network with distributed intelligence architecture could be important in accruing those savings.

Business Benefit 3: Far more points of recovery to avoid costly system failures

Network failures are rare but extremely costly. Because WheatNet-IP has far more redundancies, it is better able to resist catastrophic occurrences.

When the intelligence and control of a network is centralized, there is significant potential for a single point of failure to occur, which is why all such systems have a backup plan. But the WheatNet-IP network goes way beyond just "backing up," because each Blade carries the entire network configuration. As a result, there are as many points of recovery as there are Blades in the network.

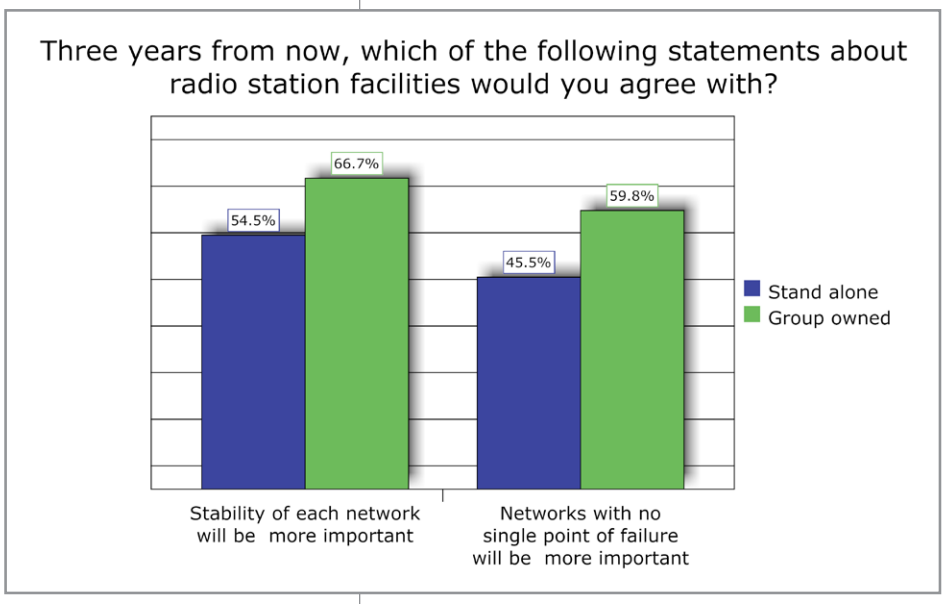


FIG. 5

Let's look a few years out. The Alethea Research study found that in three years, the stability of radio computer networks will be more important, and that networks with no single point of failure will be more important. In a more integrated IT environment, one network's failure can result in other networks failing as well.

WheatNet-IP resists catastrophic failure better than networks with just a backup plan. In a worst case scenario, if only one Blade remains operational — even if it is located in a different building or city — the entire network can be quickly rebuilt from it. From a failure prevention standpoint, an AoIP network with as many points of recovery as access points (Blades) is a very sound investment.

NEW TECHNOLOGY TWO: The network runs ten times faster at Gigabit speed

Business Benefit 4: Faster speed to take advantage of the coming business models

Why do you need an AoIP network to run at a full Gigabit? Considering that most office LANs, as well as older AoIP networks, still run at 100 Mb, or one-tenth the speed, what's the hurry?

While it is difficult to predict which business models will become tomorrow's profit centers, there are several now being developed which, if proven successful, would require greater bandwidth in the near future. One example would be integrating audio along with data into over the air radio signals. One of the first to do this, the Broadcaster Traffic Consortium, now enables radio broadcasters to transmit local traffic data and audio over an HD Radio signal.

Other data services under development include text-based information such as song titles and artist names, weather updates, movie listings, sports scores, stock quotes, school closings, and video. While there are no current data applications that would overshoot the 100 Mb bandwidth limit that older AoIP systems now have, this could change quickly. The radio tech managers surveyed in the Alethea Research study agree.

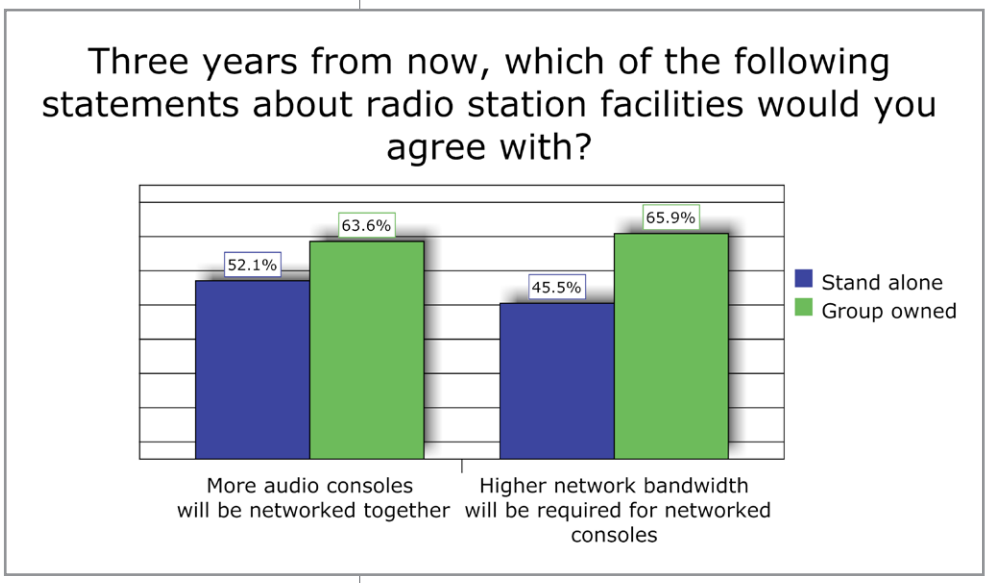


FIG. 6

The Alethea Research study found that over 65% of engineers at group owned stations believe that three years from now, higher bandwidth will be required for networked consoles.

Currently there are only two speeds which AoIP networks operate at: 100 Mb or 1 Gb. Given what could be coming, it pays to invest in the fastest system possible to prevent being locked out of new revenue-producing opportunities without a costly upgrade.

Business Benefit 5: Prevents latency to eliminate skipped commercials and avoidable engineering costs

Latency, or audio delay, is created in an AoIP network when the speed of the network cannot keep up with the distribution requirements, thus adding a delay in the audio delivery. This often annoys on air talent when the audio delivered to their headset has a slight delay over the words they are speaking. But the same process can cause havoc with station automation systems. A small delay can cause an automation system to miss an audio stream, skip playing a commercial, or drop a satellite feed.

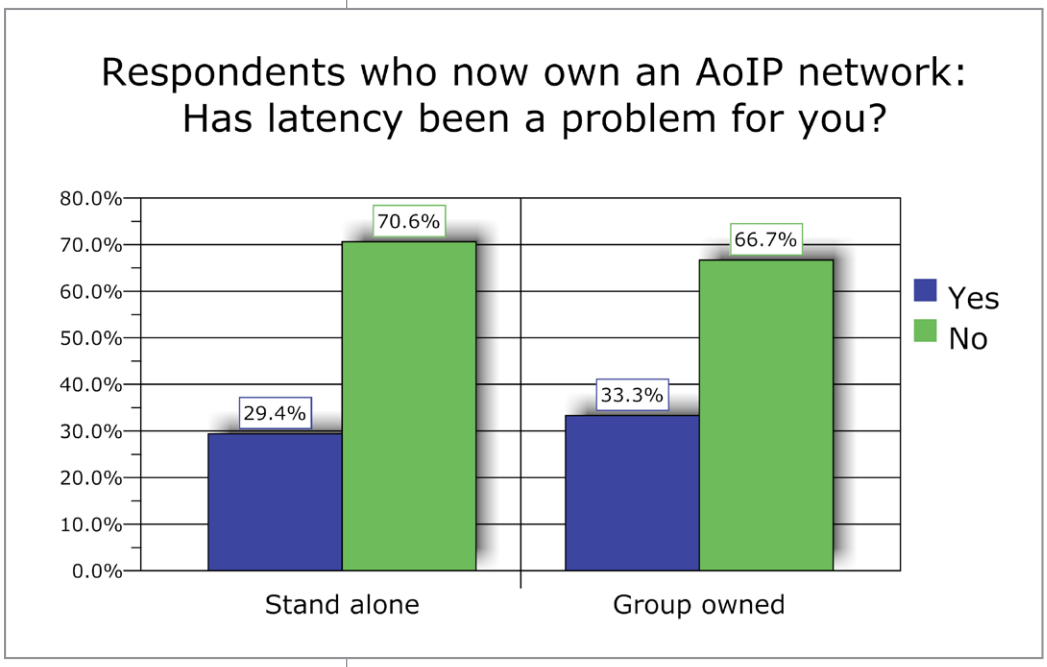


FIG. 7

Respondents to the Alethea Research study who now own an AoIP network report that a third (33.3%) of group owned stations and 29.4% of stand-alone stations have had latency problems with their AoIP network.

This is one reason why WheatNet-IP was designed to run 10 times faster than older systems, assuring that any latency problems are not from the AoIP network itself.

NEW TECHNOLOGY THREE: The first AoIP network for radio with advanced local routing and control

Business Benefit 6: Quickly create diverse channels of programming with one-button reconfiguration

Many radio monetization gurus say that a station's economic success in the near future will come from the creation of more programming for distribution through more channels, be they streaming over the Internet or through a mobile app, or for a custom local event, a second HD channel, a special holiday channel, or podcasts.

To change the studio setup from the configuration needed for one of these channels to another requires changing most of the inputs, outputs, and internal resources. WheatNet-IP contains advanced routing features which can be pre-programmed with each configuration your staff will need, making a quick change from producing one form of programming to the next as easy as pushing a single button to "fire a salvo." Most of the radio business models on the horizon will require staff to create more programming for diverse channels of distribution. When staff can instantly reconfigure studios for producing different forms of content, they will be better able to efficiently create the wider range of programming needed for future financial success.

In addition, the distributed intelligence of our network enables your engineering staff to make any changes in the network locally. An engineer in studio B can quickly reroute audio from anywhere else in the network with simple controls already in place on each Blade.

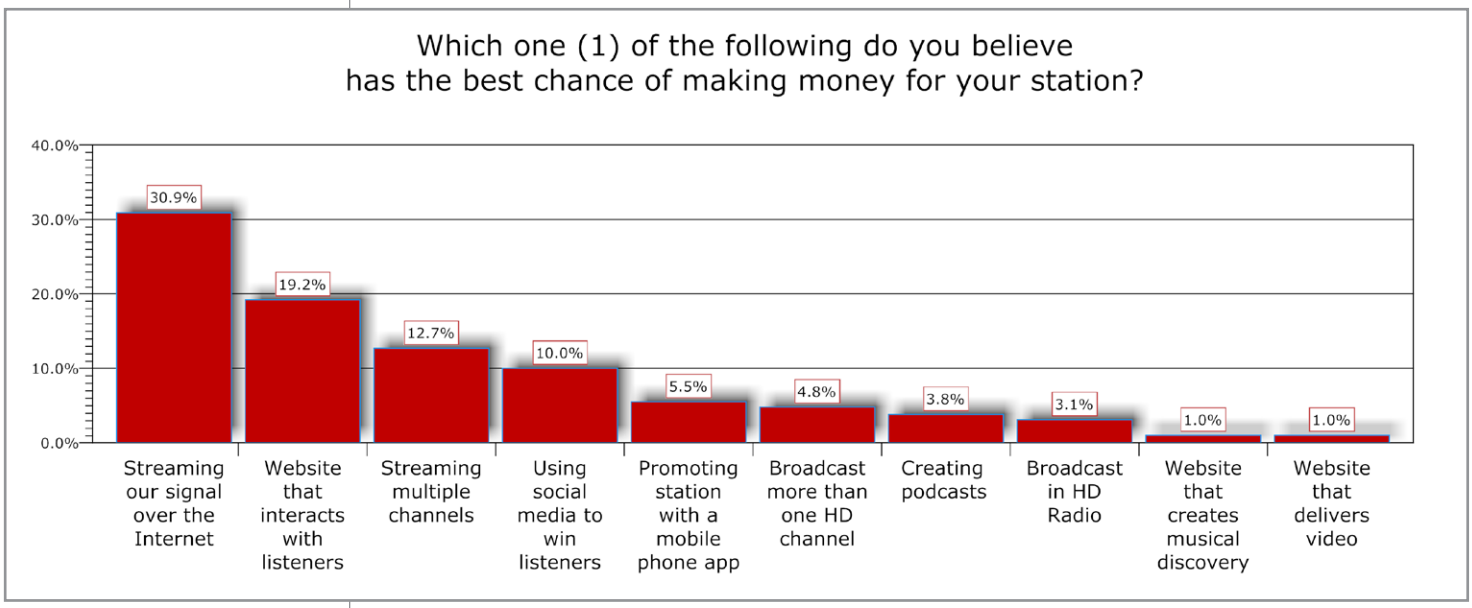


FIG. 8

The above chart from the Alethea Research study shows the variety of ways radio facilities are trying to build new revenue. Being able to rapidly reconfigure studios to accommodate different requirements gives stations the opportunity to produce more programming with fewer interruptions and less engineering time.

Business Benefit 7: Network expansion costs less because it is simplified

With control and intelligence built into every Blade, system expansion becomes simple. Each time you add a new Blade to a WheatNet-IP network, you are adding more intelligence to it. As a result, the intelligence required to manage the network never exceeds the size of your network. With this proportional expansion process, expansion is simply the process of adding more Blades and components you want attached to the network.

What kind of intelligence are you adding every time you add a Blade? A lot. Each Blade has tremendous functionality. The following chart lists what a Blade can do:

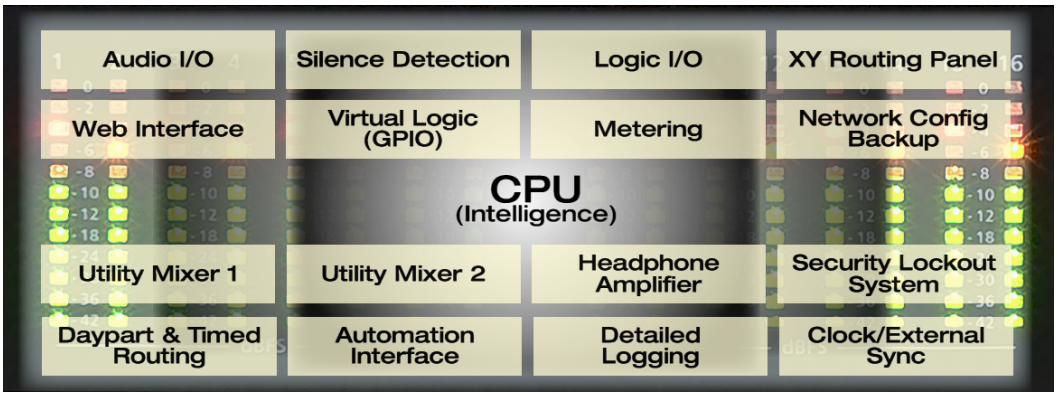


FIG. 9

The larger a system becomes, the more important having some of these functions available on a local level becomes. With WheatNet-IP, they are available to you instantly on a local level, whenever you add a Blade.

Greater functionality at no extra cost

With WheatNet-IP, we've added more functionality but no additional cost. Here's how we did it:

Some of the components of the WheatNet-IP network may cost slightly more, but they are way smarter, can do far more, and eliminate the need for external hardware that less intelligent networks still rely on. In a straight hardware comparison you will find that our Blades, which are loaded with functionality, cost more than the nodes of a centrally controlled AoIP network, which are really only input/output devices. But Blades, with their wider range of capabilities, are actually less expensive to use.

For example: If you want to add a microphone panel, a playback device, or profanity delay to a centrally controlled network, you would need to buy two network components instead of one. First, you would need a node just to carry the audio, and then a second component to handle device control, such as a GPIO node. But if a Blade were in that studio, you would not need to buy the second component, because the Blade is intelligent enough to handle both audio and device control.

Let's do some rough math: A node costs slightly less than a Blade, but it does much less. Adding additional equipment to match the capabilities of a Blade could easily double the cost. Bottom line: a system using Blades could cost as much as 50% less.

Yet we have taken the Blade's design much further. In addition to the physical logic ports, each Blade has two 8-channel utility mixers which can be used for various mixing, summing, and control functions. There are many other built-in features, all available on a local level, to add capability and future-proof your system for expansions and modifications.

These extra functions save money and reduce the complexity of the network. For example, on the next page, let's compare how WheatNet-IP can reduce the number of network components needed to build a mid-sized talk show studio.

In the comparison below we see a typical studio set up with 48 input and output channels, with logic control, talk back, and intercom functions.

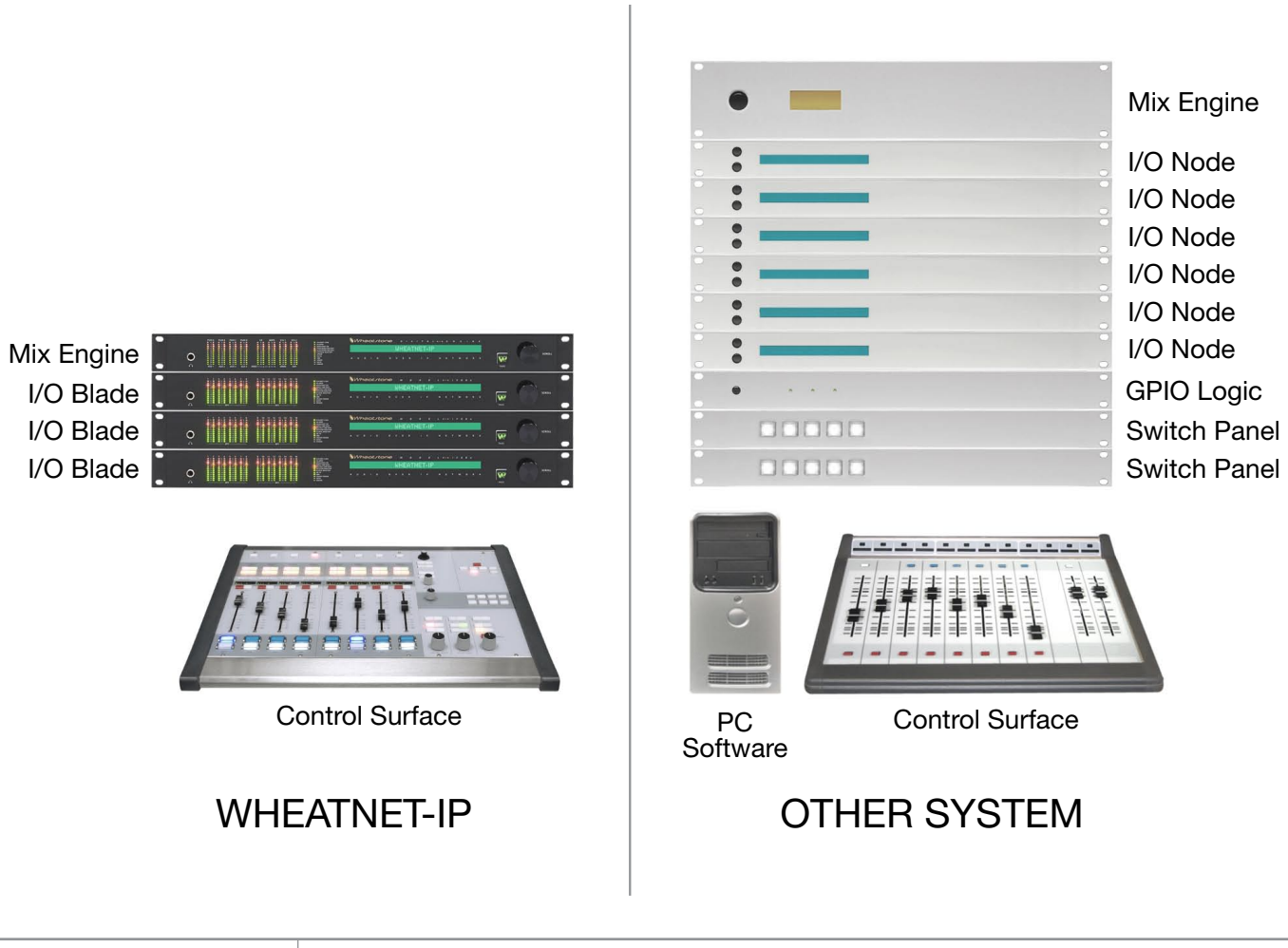


FIG. 10

Because our components are a lot smarter, you need fewer of them.

We invite direct cost comparisons. What most find is they can get all the advanced features WheatNet-IP offers, including 10 times the network capacity, future-proofed network architecture, and advanced local routing capabilities, at no more cost.

In conclusion

WheatNet-IP was not just designed to save money, it was also designed to support the future business requirements of radio facilities. While no one can predict which business models will be generating radio industry profits just a few years from now, the business models currently under evaluation carry requirements that should be considered when making an investment in an AoIP network. Here are some of those requirements:

Higher bandwidth – It is inevitable that some programming creation will require higher bandwidth in the future. We introduced the first AoIP network in radio to run at a full Gigabit speed, 10 times the speed of older systems. The best investment is in a network that supports future revenue opportunities without a costly upgrade.

Ability to create more channels of programming with fewer personnel – WheatNet-IP's advanced routing features can reconfigure studios at the push of a button, enabling staff to quickly move between creating content for different formats and channels. Investing in an AoIP network with advanced routing capabilities assures that your staff has the flexibility to handle future programming requirements.

A more stable computer network – As stations become more dependent on computer systems, the stability of any one network becomes more important since a failure in one network can affect others. When failure is not an option, the best investment is a network that has many points of recovery, such as WheatNet-IP.

A future-proofed architecture – Like it or not, computer systems of all kinds will become more pervasive and integrated in radio stations. Networks with distributed intelligence architecture are more responsive and flexible than those of older designs, making them equipped to handle the increasingly complex requirements. An investment in an intelligent network is an investment in your future.

We welcome competitive evaluation.

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