

# Radio World

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GUEST COMMENTARY

## IP: The Power of Data Packets

*What's Good About the World of Internet Protocol Is Great for Radio*

by Kirk Harnack

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IP — Internet Protocol — in its various dialects is now an all-pervasive technology. It's a business enabler like no other single technical standard. And, despite the name, most IP-transported data never crosses the Public Internet. IP blazes across Local Area Networks — within an office suite, university campus or within a radio station.

Every industry has tried and used proprietary technologies and protocols. These are usually one-off solutions, designed for (and usually only useful for) solving narrow problems. But within every field of endeavor, proprietary technologies, especially involving communication and real-time data transfer, are giving way to IP/Ethernet systems. Rather than clinging to the comfort and security of narrow, made-to-order systems, we see and hear of CTOs and COOs installing new systems that work together by virtue of standards. Broadcast facility infrastructure is primed for this transition as well.

Standards-based technologies in radio broadcast facilities will hand you tangible benefits, both now and with every format or studio change ahead.

### Perspective

One person's view of a given tech will often be different from another. It depends on perspective — including the perspec-

tive that only exposure and experience provide. Conversely, a lack of exposure or experience narrows one's perspective. Sometimes we call it "fear of the unknown." We rationalize that we know how to do something the old way; the tried and true way — the way we've always done it.

We may even think we fully understand a technology (such as IP/Ethernet). Perhaps we read a book about Local-Area Networks (LANs), or installed a network a few years back, and we're "aware" of the shortcomings of some networking protocol or equipment. This often persuades us that our previous experience is fully applicable today.

But, as broadcast engineers, we're expected to stay apprised of dozens of technologies. And more than any other, network technology is changing — fast.

### Old-school, leading-edge

*Internet Protocol* was ratified as a data communication standard in 1981, over 25 years ago. And the convenient and ubiquitous Ethernet connection scheme is now over 30 years old.

But just because these partner technologies have been around a while doesn't mean they're ready for retirement. To the contrary: every fiscal quarter, venture capital firms are investing billions of dollars in Ethernet and IP-based technologies. Every year the number of wide-ranging applications of IP/Ethernet grows dramatically. And, while maintaining backward compatibility for standardized functions,

new capabilities are added to power new business applications.

It's fair to say Ethernet and IP — as data transport and routing technologies — are the most solidly based, widest-ranging and most-researched and -implemented communication schemes ever used.

### IP for profit

Universities, research institutes and the U.S. military started the IP revolution using our tax dollars. Today, it's largely our disposable dollars that fund development of IP-based applications and networks.

How many products that touch your life now depend on IP/Ethernet? The business world, and indeed our own daily routine, relies on data acquisition and transport — and IP/Ethernet handles nearly all of it.

Worldwide standards, including those comprising IP and Ethernet, give rise to real benefits. Equipment designed to communicate using IP/Ethernet is by definition interoperable. Whether the equipment is a cash register, a fetal heart monitor or a remote missile launcher, its control and reporting data can be easily routed using IP/Ethernet. And thanks to Ethernet switches and routers, these packets of data travel anywhere we direct them.

So what does the ubiquity and success of IP in the corporate world have to do with radio station facilities? It demonstrates the reliability, economy and effectiveness of IP and related technologies. The corporate world's embrace of Ethernet and IP further demonstrates that proprietary, one-off technologies are often best replaced with systems that use worldwide standards to which manufacturers

design and build equipment that plays well with others.

Interoperability is king, and standards rule.

### For broadcast

Computers and the networks to which they're connected have the useful ability to emulate other technologies.

It was said a couple decades ago, "In the future, we won't have cameras; we'll have computers that take pictures. We won't have radios; we'll have computers that pick up and play radio stations. We won't have telephones; we'll have computers that handle audio and make phone calls."

Some forward-thinking inventors also said, "We won't have dedicated audio routing switchers and consoles; we'll have networks that route audio and computers that mix audio."

But don't we already have computer networks in our radio stations? Indeed we do. It's been over 10 years for some stations. They've been moving traffic logs, music schedules, audio files and "as-played" data among PCs for some time. However, the on-air audio — both contributory content and Program audio — is still handled by proprietary systems.

Consider the things we do with computer networking that we couldn't have done just a few short years ago. Traffic and billing was an island unto itself. The music director edited a playlist on computer, but had to print it on paper for the air staff. The finance office produced P&L statements, but the advertising sales projection report was completely separate, not easily incorporated into the rest of the financial picture.

Computer networking changed all that. Now the different office, sales, programming and engineering functions can interact. As-run spot reports are available immediately. Last-minute inventory can be automatically sold and scheduled. Talent and remote equipment resources

are easily scheduled without conflict. And key-card security systems, call logging, and prize inventory management software all help station clusters run smoother, faster and more efficiently.

But IP/Ethernet can help us do still more.

Most radio stations still use single-sourced, proprietary equipment and systems to route source audio, produce programming and deliver finished audio to STL or transmitter systems. Is anything wrong with that? No, but the same flexibility and convenience we enjoy with our networked office functions aren't available using typical proprietary broadcast equipment. We engineer get the job done connecting together various pieces of equipment, but what benefits might we see if all our broadcast equipment spoke a "common language"?

What if the satellite receivers could plug into an IP-Audio network, making audio programming plus cueing information available to any other equipment on the network? What if, instead of devising, buying and installing various connection and routing schemes, we could simply

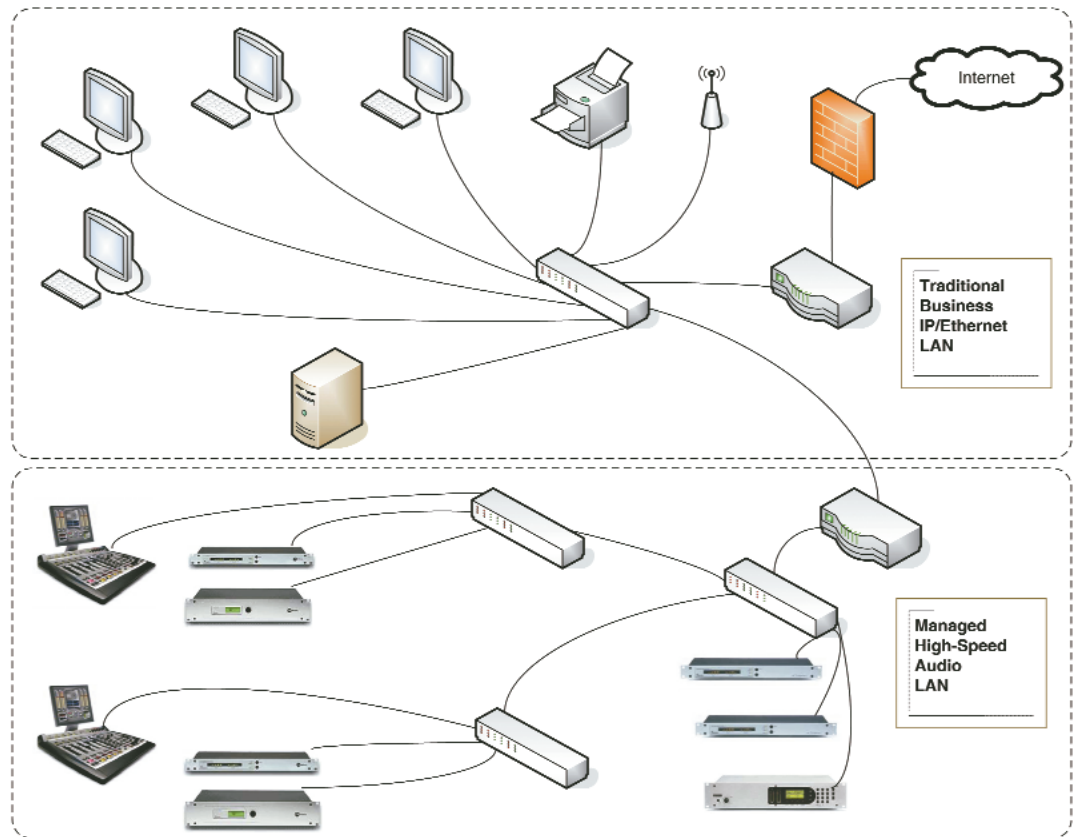
plug our network-ready broadcast equipment into a managed IP/Ethernet network, where it works with all the other gear on that same network? The advantages are clear.

### Advantages

Moving radio studio systems to an IP/Ethernet foundation brings three main advantages: Lower cost, flexibility and simplicity.

Compared to the worldwide IT industry, the broadcast industry is small. Broadcast equipment manufacturers often build their wares in small lots — sometimes one at a time. By contrast the IT industry enjoys fantastic economies of scale. Cisco, HP, Dell and others will build thousands of powerful, high-speed Ethernet switches in the next day or two. And many of these Ethernet switches will have far more real-time data handling capability than any digital audio router for broadcast.

The difference in cost? In round numbers, about a 10-to-1 ratio. A high-quality Ethernet switch capable of routing and distributing 200 stereo sources to 200



Visio drawing showing an audio LAN connected to a traditional business LAN.

stereo destinations costs about one-tenth of a traditional purpose-built audio routing switcher.

Other cost savings are realized, too. Broadcast facilities depend more on PC automation and playout systems. The cost advantage of connecting them with IP-based equipment becomes quickly apparent. Expensive, proprietary audio cards aren't needed in IP/Ethernet systems. Rather, a software driver moves digital audio from the play-out system to the IP network. Better still, the costly audio input and output connections of traditional audio routers aren't needed, either.

We noted that IP/Ethernet can handle all kinds of data, from telephone calls and spreadsheet files to songs, playlists and commercials. This flexibility also applies to the types of data and routing we need for a cluster of radio studios. IP packets can carry real-time stereo or 5.1 Surround audio at far better than CD quality. Those packets can also carry "contact closures" or other cueing information. Program-associated data is gaining importance for broadcasters; IP packets will route PAD data right along with the audio or elsewhere if desired.

The elegance and flexibility of IP/Ethernet owes to the fact that IP doesn't care what the data, or payload is; it only cares about getting it to the right place. That's IP's built-in routing at work. This routing, inherent to every IP packet, implies flexibility in designing an IP audio network. Manufacturers don't have to design their own routing standards and protocols; those are inherent to the very IP specs underly-

ing an IP-Audio network's design. Further implied is the freedom to make changes or additions later. Those changes or additions are low-cost and simple, owing to Ethernet's inherent scalability.

Simplicity implies using an elegant structure and the knowledge one already has to achieve a specific goal, and this certainly applies when using IP/Ethernet to route and mix audio and other data. The concepts that an engineer uses to configure a large IP-Audio system are the similar to adding a PC to a LAN.

The elegant structure of an IP-Audio network is evident both in connecting peripherals and in the network design itself. Devices such as PC playout systems, PC-based audio editors and other IP-Audio sources simply plug into the nearest Ethernet switch. Their audio inputs and outputs, as well as remote control and configuration, all appear on the IP-Audio LAN. Legacy audio equipment is easily interfaced by plugging into IP-Audio nodes — hardware interfaces that reduce wiring complexity and distance by being located close to connected equipment.

The final evidence of simplicity is in configuration and maintenance of equipment designed for IP networks. While designers *could* make IP-connected equipment cumbersome to configure, convention says otherwise. There's a design culture that expects simplicity in setup, favoring HTML graphical user interfaces (GUIs) within network-connected hardware. Hence, configuration tends to be done via Web browser using any PC or Mac on the LAN. There needn't be any

cryptic config files — just a Web-based GUI with easy point and click or fill-in-the-blank setup.

### Summary

Most in radio broadcasting agree that, within the next 10 years, all of our audio transport and routing will be over IP networks. Even those with no investment in this direction realize that IP/Ethernet will eventually replace one-off, proprietary schemes.

IP-Audio systems that are based on recognized networking standards will always be interoperable. As such, they'll easily connect and communicate with our office LAN and allow system control and audio sharing across corporate WANs or even the Public Internet, if needed.

At the backbone of IP-Audio networks is networking equipment with many lifetimes of research, development and expertise. Companies such as Cisco, HP and 3Com have invested more into their network equipment than the entire broadcast industry could hope to.

Broadcasters often use technologies from other industries. For years we borrowed many ideas and standards from the telephone companies. More recently, we've been using computers to help us run profitable stations. Now it's time to use the standards, maturity and power of real-time data networking in our broadcast facilities.

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*RW welcomes other points of view.* 