

Connectivity

Options Abound For Moving Audio Down The Pipe

by Wayne Dolnick

With a big enough budget, and the ability to solicit different bids on an audio system, consultants will offer varied opinions on everything from amplifiers and speakers to the FOH console and the correct sound curve settings. One thing you will not hear any dissension on is the need to move sound inter-connected via Ethernet streaming data. While it is not the only way to go, if you are using the same amps, want to have the option of possibly having the board talk to all components in the system, and think it would be an advantage to allow for computer control, remote site monitoring, and want to save money on running heavy gauge copper, read on.

Peak Audio, a division of Cirrus

Logic, has an architecture called **CobraNet** networked digital audio, that most of you have heard of or worked with from audio hardware companies like Electro-Voice, QSC, Harman, or one of the approximately 30 others. This has become in some ways the de-facto standard of audio transmission. A CobraNet module is a digital audio network interface, with the ability to supply eight, 16 or up to 32 simultaneous channels of distributed audio at 48 to 96 kHz sample rate, quad synchronous via serial I/O ports. Ethernet speeds are 100BASE-TX 100 Mbps, redundant secondary 100BASE-TX for fault tolerance full duplex, bi-directional and IEEE 802.3u compliant. These modules can be integrated within signal

processors, mixers, amplifiers and self-powered speakers. They include a studio-grade, low-jitter clock source (<1 ns) and latency of between 1.33 and 5.33 ms over a digital network, with monitoring LEDs and firmware upgradeability and configuration options. Latency is about 8 ms with use of A/D D/A converters. While everyone would want to secure the 1.33 ms rate of latency, tradeoffs will be apparent. Cirrus recently added to the strength of CobraNet with the DSP Conductor graphical programming tool, which depending on the module originally used, would allow for drag-and-drop audio algorithm steps and give the system real-time tuning, allowing accelerated control of the signal path from audio processors to microphones. Integrating these features on an IC, CobraNet is now at an economical scale and a viable option for houses of worship and sports facilities, small offices and even home automation. Co-existing on an Ethernet cabling system with other data, CobraNet should be considered before looking at dedicated, digital audio systems.



Electro-Voice's Net-Max

So why one brand of hardware as opposed to another if they are using the same connectivity architecture? What must be noted of technology developed by hardware and/or software OEM firms for license is how the product is implemented and what resulting functionality the gear manufacturer has taken advantage of, and what was left off.

QSC maintains support to address the needs of the installer or operator with a dedicated, market specific staff. Called **QSCControl.net**, the latest platform from QSC allows for control, processing and monitoring via a GUI of the BASIS, RAVE and DSP QSC platform devices. A patented technology that QSC employees in its BASIS system measures power entering the driver and limits the amount based on the thermal signature. With power limiting in place, mean time between failure of a loudspeaker is maximized.

One of the advantages of the newer BASIS system is allowing for monitoring of the I/O. Within the BASIS platform the 722az, for example, allows the integration of BASIS, next-generation RAVE and DSP products to be networked together and controlled via one software interface. Audio performance on paper is exceptional, with a D/R of more than 112 dB at -60 dB (AES-17), THD+N less than 0.009 percent and a typical frequency response of 20-20 +/- 0.2 dB, the end result should be sweet music. QSC also allows for the use of third-party control systems.

Electro-Voice's IRIS-Net and **Net-Max** provide a solution for control and integration of CobraNet within a single software shell and hardware platform to extend the features and benefits provided by CobraNet to the entire signal chain and audio system. Unlike other shells, IRIS-Net has been designed from its initial start in 1999 as a comprehensive integrated software interface for control, supervision, routing and DSP of all aspects of an audio system with five distinct ways to exchange data for its remote control and configuration.

"It is far easier to integrate exist-
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» MARGIN BUILDERS

Though some installers might be reluctant to place Cat-5 cable over pulling copper, the long-run advantages should be looked at when the choice is being considered. In a system with multiple amplifiers and processing throughout a facility, pulling heavy gauge cable will run up expenses in labor, materials and time. A system using CobraNet requires less costly Cat-5 or fiber optic cable to hub a main system as well as branches, with large potential savings in a large facility, and the additional advantage of monitoring. In the long run, less time pulling cable will be more time for other things.

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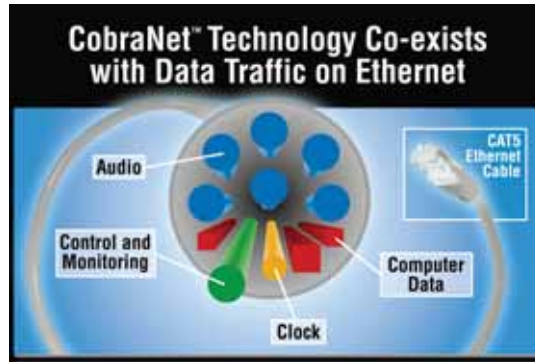
ing legacy products into IRIS-Net and even to conduct supervision of key functions," said product manager for NetMax, Gary Fisher. Additionally, the high level of audio fidelity is a benefit of the NetMax, with the N8000 offering a dynamic range of 115 dB. From analog input to analog output the total latency is 2.29 ms, and is fixed and constant. The N8000 has a response of 20 Hz to 20 kHz +/- 0.5 dB, a dynamic range of 115 dB and THD+N of <0.005%.



QSC's BASIS

The Harman Pro Group also uses CobraNet with success and recently introduced a control product to integrate its family of brands within one audio transport system, facilitating use of Plug-n-Play protocol. The HiQnet system allows for seamless audio transmission and control via CobraNet of everything from the wireless microphone systems to self-powered loudspeakers.

"HiQnet is the only control and monitor platform that is a common language and single software application, compatible with products from the microphone to the loudspeaker," explained Jim Stembel of Crown, a division of Harman Pro. "Crown integrates control, monitor and DSP processing within the amplifier. There are no intermediate controllers or bridges needed to convert to Ethernet. The advan-



CobraNet technology allows for digital audio transport via Ethernet cable that co-exists with network data traffic.

tage of using Crown amplifiers is in the integration of CobraNet and HiQnet within the same network," he continued. "By leaving Crown amplifiers in the system, you have a broad horizon for future upgrade opportunities, pulling in other Harman Pro products to communicate and share not only a common protocol, but CobraNet digital audio as well." Approximate costs are \$150 per channel, which also includes the HiQnet communication. Best latency is approximately 1.2 ms, with the worst about 5.3 ms. CobraNet now offers options to choose multiple fixed latencies. CobraNet is a transparent audio transport that does not compress or use digital algorithms to alter audio.

CobraNet is not the only choice, especially with recent introductions of digital snakes designed initially for the live market. One from RSS, a division of Roland, and one from LightViper offer products worth

looking at if you want a portable, all digital Cat-5e or fiber optic snake. Doug Swan of the RSS Group recently introduced its digital snake with support for up to 160 configurable channels, and basic configuration of up to 40 channels of 24 bit, 96 kHz audio on one Cat-5e cable with total latency about 1 ms. LightViper offers its VIS-4832, which, when used with its VIM-1832, provides a complete 32 x 8 digital-to-digital optical snake system. Control signals can be passed from front-of-house via the built-in RS-422 support using the optional DGL-422 adapter, or the optional MD-3 which provides an RS422, RS232 and MIDI control interface. Remote control signals of the preamps are sent on the same fiber cable. This might be all you need, especially in a live situation.

Now that you have a basic understanding of what Ethernet and digital audio transmission is, some of the options, it is up to you to define your needs and search for a solution to meet the goal at hand.

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For the real high-end pro, Rolls offers the MX422 Field Mixer. It features four channels of clean mic preamplification each with pan controls, phantom power, and low cut switching. Two back-lit VU meters indicate the audio levels and battery life. The stereo outputs are balanced XLR, and two headphone/earphone outputs provide monitoring.

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» EtherSound

More recent to the party using an Ethernet protocol is EtherSound, which is patented and licensed by Digigram. Introduced in 2001, EtherSound is fully compliant with Cat-5, Cat-6, and fiber optic cable use in an IEEE802.3x Ethernet standard setup. EtherSound, like CobraNet, offers open licensing, and adopters include more than a few recognizable names from the pro-audio and contracting worlds: Allen & Heath, CAMCO, DiGiCo, Digigram, InnovaSON, Martin Audio Ltd, NetCIRA by Fostex, Nexo, VTG Audio and Whirlwind.

One firm well known in contracting circles for control software, Stardraw, has implemented EtherSound to control multiple devices over networks. Unlike CobraNet, where a fixed latency is built in and can be chosen among one, two or three presets, EtherSound allows for the calculation of delay between any two devices on the network. Using standard 100T-Base Ethernet hardware, bi-directional monitoring/control and transmission of 24-bit, 48kHz audio in up to 64 channels is possible, on a single cable. Digital 24-bit PCM audio is uncompressed and can be at 44.1, 48, 88.2 or 96kHz. Like CobraNet, EtherSound

allows for multiple devices to be connected in various configurations on the network, with in this case, 60,000 devices in one daisy-chain or star pattern or a combo of both.

Adding slave modules adds less than 1.6 microseconds to the base latency of 125 microseconds at 48kHz. Working within today's corporate office structure is easy with the ability to run a system as a VLAN on an existing network.

As recently as this January's NAMM show, two recognizable names added products licensing EtherSound. Horizon Music Inc. and Rapco International, under the same umbrella, introduced EtherSound-based professional audio networking devices for portable mic/line level monitoring, and Yamaha's Commercial Audio Systems Division, was named the U.S. distributor of the AVY16-ES from Auvitrans, which is one of a series of EtherSound-compatible expansion cards, built by the French firm, including the NEXO-compatible AVY16-ES.

Like CobraNet, EtherSound has its advantages and similarly, they are both evolving and constantly adding licenses.

▶ **EtherSound...**www.ethersound.com