

Communicating with the Artist

By: Alan Hardiman

An intercom system that uses AES3 digital signal throughout the signal chain

The introduction of copper and fiber-optic digital audio networks over the past decade has brought many advantages and conveniences to the field of sound production, chief among them the streamlining of cabling infrastructure and reduced installation and maintenance costs. In new facilities, audio systems are being designed around digital audio networks from the bottom up, while owners and managers of existing facilities contemplating an audio system renovation can piggyback onto their existing computer networks with sometimes only slight modifications to effect the transport of audio and other data over one cable. Designers have a wide variety of systems to choose from, including CobraNet from Cirrus Logic, Peavey's MediaMatrix, Harman's HiQnet, Yamaha's mLAN, Aviom's A-Net, Riedel's RockNet,

EtherSound from Digigram, BSS Soundweb, and Optocore.

Digital audio networks deliver the performance advantages of digital audio—low noise and distortion—while radically simplifying signal routing issues. Perhaps nowhere is this seen more clearly than in the world of intercoms, where any number of potentially hundreds or thousands of signal sources must be instantly routable to any other number of potential destinations within the same matrix, with audio alerts and/or visual tallies being simultaneously activated at various nodes in the matrix.

The current state-of-the-art of digital audio matrix intercom technology is represented by Riedel's Artist, ClearCom's Eclipse, and RTS's ADAM systems. Riedel's Artist is further distinguished by its use of AES3 digital audio throughout the signal chain to

the user panel, according to Sascha Kneider, Riedel's technical manager.

"In other systems, the audio is being routed and mixed digitally in the mainframes, but, when it goes to the panels, it's all analog. So they need analog lines back and forth to the panel, as well as an additional data line, to carry the key information. We use AES3 digital audio throughout," Kneider says.

By embedding control information in the user bits of AES3 digital audio words, the Artist eliminates the need for a separate control line back to the panel, further simplifying wiring and infrastructure requirements. "The intelligence—the key presses and the content of the display of the key—goes with the user bits of the AES3 signal, so we don't need an additional data line. The 48kHz, 16-bit broadcast-quality digital signal to the panel is compatible with all other digital equipment, which means you could route the signal through your audio router, or embed it in video and then connect the panel to it on the other side. So we never leave the digital domain unless we need analog in an output; then, of course, we put an analog interface card in the frame for that purpose, and, of course, there are A-D and D-A converters in the panel for the intercom microphone and loudspeaker as well as the analog in- and outputs at the backside of the panel," he explains.

With the Artist, Riedel has expanded its digital matrix intercom system into an advanced communications platform using proprietary hardware interfaces to include analog and wireless subsystems, public telephone networks, ISDN lines, and



Artist 1016E desktop control panel with 16 keys.

VoIP (Voice over Internet Protocol) networks all under the control of its Director configuration software, a Microsoft Windows-based graphical user interface.

The modular approach

A typical Artist system consists of a number of matrix frames connected on a dual-redundant fiber-optic backbone to form a masterless, non-centralized, distributed intercom matrix. Three frame sizes are available, providing matrix sizes from 8 x 8 up to 1,024 x 1,024 ports. The system accommodates a maximum of 128 frames (“nodes”) within a single fiber network. The distributed architecture allows frames to be located near intercom stations to reduce additional wiring requirements beyond the fiber network.

“Artist is unique in that you can grow a system by connecting frames in a fiber-optic ring. There is no difference in having two 32-frames or a single 64-frame. It would be logically the same system, so it allows you to distribute audio with the system by having two smaller frames in separate locations—you don’t have to home-run all the cables to the main equipment room,” Kneider says.

A Riedel Artist system was incorporated into the recent audio renovation at General Motors Place in Vancouver (see L&SA, January 2009), in which all audio, computer, and intercom traffic is carried on an Optocore fiber-optic digital audio network that rings the entire facility.

“At GM Place, we have one node down in the main equipment room and one up in the TV studio. In the next phase, the broadcast facility

could get a Riedel system, and we would just extend the fiber ring to grow the system without going through the hassle of creating tie-lines or trunk lines, because it’s not a second system, it’s the same one, only larger,” he explains.

Matrix frames are populated with controller and client cards, all the same size and all hot-swappable. Client cards are available in six versions: one GPI card and five cards for different audio formats or interconnection modes, each accommodating eight audio channels. Two of the five permit connection to Artist control key-panels on individual 75-ohm BNC coax connectors or individual RJ-45 connectors; a third provides for interfacing digital audio to consoles or other equipment on RJ-45 connectors. A fourth client card provides eight transformer-balanced analog four-wire intercom ports on RJ-45 connectors, and the fifth is an eight-channel MADl client card, cascadable to 64 channels on one MADl stream, that can be used either to connect audio and control data to remote panels or connect multi-channel audio to audio routers on optical or coax MADl connectors. A VoIP client card will soon be available

for the matrix frame to permit local interface with a VoIP network.

This modular approach allows for system reconfiguration to accommodate facility changes at minimal additional expense. And since all audio through the system is AES3, the Artist allows for routing audio signals other than intercom, along with TCP/IP data.

“The system is fully configurable, and also the keypad panels are designed a bit more for general use—you can program whatever you like on a key,” Kneider says. “Many of our customers use it for their monitoring routing system. For example, the tape recorder operator can select the tape machine that he wants to listen to from among the sources on his Artist panel, mix it with other sources if he likes, and feed that to an external loudspeaker attached to the panel for monitoring in broadcast-quality audio. In this way, the Artist can be integrated more fully into the existing audio infrastructure than a regular intercom system.

“Using another example, our MADl cards allow us to bring in multitrack audio from the console. We can then use the system as a break-out for individual MADl channels by selecting,

“The Director software was a major contributing factor. It’s very intuitive. What I like about it is that it’s got this red-and-green color format, where red means that something’s wrong and you need to check into it, and green means that it’s a go. In the heat of the moment in the middle of a show, when you’re trying to monitor the system with your software, that kind of information is really helpful.”

say, Channels 1 through 4 from the MADI signal and routing them to a particular panel,” he says.

DSPs in the mainframe differentiate the Artist from typical audio routers, since the Artist mixes individual signals prior to routing the sum to a single destination. “That’s just the nature of an intercom system, where you can have 10 or 20 people talking to a single listener at the same time—those multiple sources must be mixed before being sent on to the particular output,” he says.

Connecting the system

Connection of matrix frames to control key-panels can be made with Cat5, coax, or fiber-optic cable. The control panels themselves come in three “flavors”: the top-of-the-line 1000 series control panel features eight-digit red LED alphanumeric dimmable display keys, individual rotary encoders for control of listen levels, and individual LED level display for each talk-key. Key panels are available in 19” rack-mount, desktop, and modular packaging with the standard complement of XLR headset connector, loudspeaker, and removable gooseneck microphone, together with three GPIs and three GPOs, two balanced audio inputs and outputs, and five dedicated function keys.

A “shift” page effectively doubles the number of keys and, as if this isn’t enough, up to six expansion key-panels can be added to the rack-mount key-panel to provide a total of 124

physical control keys.

The less expensive 2000 series control panel features smaller illuminated control keys and companion eight-digit, high-contrast, LCD displays, showing label and cross-point level for each talk key. Additional audio inputs and outputs and GPIs are available on the 2100 series. The entry-level 3000 series control panel replaces the LCD displays with write-on marker strips.

Rounding out the Artist system are rack-mount interfaces for communication with telephones, ISDN lines, digital, and analog party-lines, camera intercoms, two-way radios, and VoIP networks. “The Connect IP rack-mount panel allows us to bring a port on an IP network into the matrix, converting between AES and the compressed IP data. Connect IP is configurable to individual bandwidth requirements,” Kneider says.

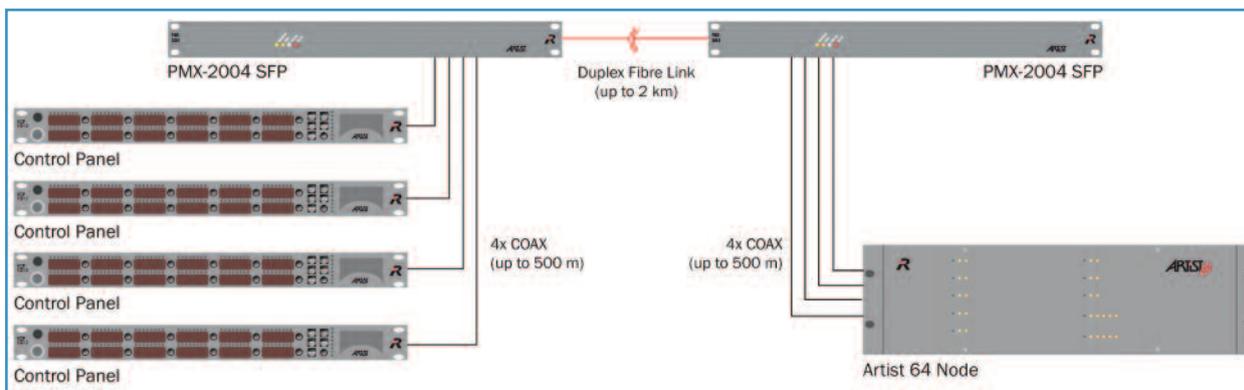
The PMX series panel multiplexers can be used to remote up to eight intercom panels from the Artist matrix at a distance up to 1.2 miles. Smaller utility-sized interfaces can be used to convert an Artist panel port from Cat5 to coax cable, allowing for connection of the system to existing infrastructure (especially useful for interfacing with remote broadcast vehicles), and from Cat5 to fiber-optic cable, permitting long-distance operation of Artist control panels as well as the bidirectional transmission of AES3 signals at distances up to 1.2 miles.

Riedel’s Director graphical user

interface is used to monitor and configure the Artist matrix intercom system using familiar drag-and-drop routines, and to diagnose problems if necessary. Users at multiple PCs running Director software can control and monitor the system from various locations on the network simultaneously, and each can access and reconfigure the entire system, depending on the level of user rights at that PC. Failure of any (or all) of the PCs does not affect the system, because the system runs stand-alone and all configurations are stored within the system’s matrix frames.

Director also permits programming key-panel function keys; for example, changing IFB program source assignments, or populating conferences and assigning talk or listen-only rights to various conference members. Add-ons, such as the “partial files” software module, extend Director’s functionality to permit storing system configurations for later recall for different types of productions. The “master control room” add-on not only integrates all conferences under one software umbrella, but also provides an integrated scheduler for pre-programming regular conferences, such as daily pre-production conferences.

“Settings for the DSP in each panel are configured using the Director software when the panel is initially set up; for example, to mix the intercom signal with any auxiliary audio input or output, or to adjust a filter and compressor-limiter for





“In other systems, the audio is being routed and mixed digitally in the mainframes, but, when it goes to the panels, it’s all analog. They need analog lines back and forth to the panel, as well as an additional data line, to carry the key information. We use AES3 digital audio throughout.”

increased intelligibility in noisy environments. Similarly, the microphone output can be processed prior to being sent on from the panel to the matrix. In the Director GUI, when you click on a panel, it shows up on the right side of the window with four tabs for configuration, live state, remote control, and audio patches where you configure the panel DSP and audio I/O,” Kneider explains.

Riedel’s newest software release, trunk navigator, enables individual Artist intercom systems to be connected to a central trunk master and controlled via a WAN connection, dynamically allocating system audio traffic over either digital audio trunks (via ISDN, VoIP or digital leased lines) or analog trunks (via analog land lines) between the Artist intercom systems. The software provides a redundant design enabling the software to run on two computers simultaneously and switch seamlessly from one computer to the other in the case of failure. Trunk navigator allows the trunking of up to 40 Artist intercom systems, resulting in a maximum system size of 40,960 users.

Putting the Artist to use

One of the design goals of the General Motors Place audio system renovation was to have all audio, intercom, and IP

data on one dual redundant fiber-optic ring, according to Fred Michael, president of Rocky Mountain Production Services, who installed the new sound system. “From the mix position, which itself is movable, the operator can look at his console computer, his Optocore network and wireless microphones up on the 600 Level, and the Riedel intercom system software, and execute commands on that software via the Optocore network,” he says.

Regarding the choice of Riedel’s Artist digital matrix intercom, he says, “The Director software was a major contributing factor. It’s very intuitive. What I like about it is that it’s got this red-and-green color format, where red means that something’s wrong and you need to check into it, and green means that it’s a go. In the heat of the moment in the middle of a show, when you’re trying to monitor the system with your software, that kind of information is really helpful. If you have an operating Riedel system that’s all set up and running, and you want to go online with your PC to see what’s going on, when you connect and launch Director, it immediately indicates the current status of the system. If there’s a node that should be in the matrix but isn’t, it’s indicated in red, so right away you know something’s going on there. It may or may not be

something you had intended, but at least the software is alerting you to it. And that’s really valuable. When I tried the RTS software, I just looked at it and said, ‘I need someone to sit down and tell me how to use this.’ I didn’t even know where to start because it was using arcane terminology—it wasn’t obvious. It didn’t even come close. In our world of event production, things have to be as obvious as possible,” Michael says.

“Of the three leading intercom manufacturers that I know—and that includes Clear-Com and RTS—Riedel is the only one that has one platform that allows you to interface any coms source and make it work inside that platform so that everybody is on the matrix. Nobody else has really integrated it to the point where it all becomes just part of a single intercom system. For example, let’s say you’ve got regular Riedel intercom with several people on belt packs and some on producer stations; you’ve got two-way radios, wireless intercom, and a producer in another city who wants to be on the channel. Riedel has all the bits and pieces necessary to bring all those people into the matrix. They’ve got the interface boxes worked out, and everything is controlled by the software. To me, Riedel just seems to be the most advanced,” he says. 📶