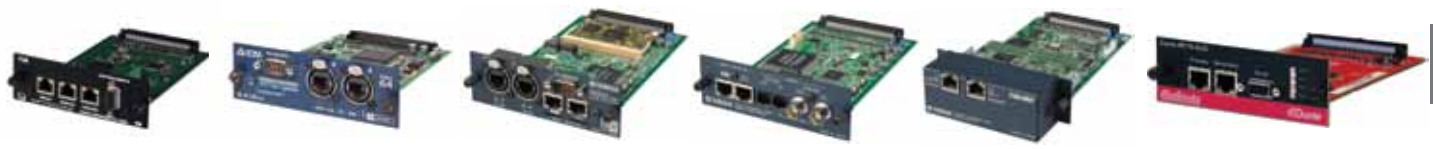

Cat5 Digital Snake Stage Boxes

By Mark**Frink**

While digital consoles have become widely adopted, many still employ copper analog snakes with XLR connectors at the ends of 100-meter multi-core "snakes," allowing various makes and models to be easily paired in Front of House/monitor combinations, especially for live concert sound applications. While an analog split is still considered a universal solution for gain-sharing between consoles, especially those of different makes, digital snakes can replace a long, heavy run of multi-core between a digital console's pre-amps and the microphones on stage — especially for front-of-house, improving sound quality and RF immunity while reducing the mass of cable required to connect them from inch-thick cables to a couple of ruggedized Cat5 cables the width of a mic cable, simplifying set-up and reducing infrastructure. Now that digital consoles have been widely adopted, it's time to take full advantage of digital snakes' benefits.

Most digital consoles provide a variety of digital networking options through the use of various add-on option cards, allowing users to customize consoles to suit a particular networking protocol.

While fiber-optic snakes can provide extremely high channel counts, traverse long distances, and their costs are coming down, Cat5-based digital snake solutions provide 32 to 64 channels over distances of up to about 100 meters using a medium that is ubiquitous and costs no more than a similar run of mic cable, allowing users to install their snake in the walls, floor or ceilings of indoor venues or trench them into the grounds of outdoor seasonal venues.

Back in the 1980s the International Organization of Standardization (ISO) created a conceptual framework called the Open Systems Interconnection (OSI) Reference Model, a seven-layer model that defines network functions. Each digital audio network can be defined by how standardized it is within this framework, and these layers are used to describe the various types of protocols and their adherence to standards.

Layer 1 protocols have only the physical layer in common and are the most customized, sharing few standards except their physical connection, their twisted-pair wires, whether connected to simple RJ45 plug or ruggedized, shielded EtherCon plugs. As they're not packet-based networks, these proprietary protocols enjoy a lower latency.

Layer 1 technologies are the most customized, and therefore can't be connected to standard Ethernet hubs or switches, so they are usually point-to-point solutions. They're used for dedicated audio transport and don't share their network with other data resources. These include most of the custom proprietary systems, including Allen & Heath's dSNAKE, Aviom's A-Net, Mackie's U-Net, Midas' AES50, Optocore's SANE and Riedel's RockNet. Some of these are simply MADI or modified MADI on Cat5.

MADI (AES10), developed by Neve, SSL and Sony two decades ago, is the lowest common denominator for multi-channel serial digital audio transmission. MADI is employed by dozens of pro audio manufacturers, including Allen & Heath, Avid, DiGiCo, Innovason, Optocore, Soundcraft, Stagetec, Studer and Yamaha, allowing interconnection of digital consoles of different makes, or multi-track recording feeds to be easily made. The original 1991 specification provided 56 channels and 24 bits at 48 kHz. Several proprietary Cat5 digital snakes are customizations of MADI employing additional pre-amp control. The 2003 revision allows up to 64 channels at 48 kHz, or 32 channels at 96 kHz but recommends co-axial BNC connections instead of Cat5. DiGiCo has just released a pocket-sized MADI-to-USB adaptor, called UB MADI.

CobraNet, EtherSound and Roland's REAC are all Layer 2 Ethernet-compliant and can be used on standard Ethernet data switches, though EtherSound and REAC require their own dedicated network, as they use a proprietary scheme for network (pre-amp) control, while CobraNet uses standard data networking methods and can share its network with other Ethernet functions. All have advantages in larger "structured" installations, where implementation involves co-existing with a facility's IT department. Being the oldest, CobraNet has the largest installed base and the most licensees.

Dante supports Gigabit Ethernet, allowing high channel counts and is considered Layer 3. It uses UDP for audio transport and IP for audio routing over Ethernet, referred to as UDP/IP over Ethernet. It is the first IP over Ethernet solution that meets performance requirements of professional Audio/Visual (AV). Designed with clock synchronization, Quality of Service (QoS) and media transport priority, it is AVB-ready. The three core AVB standards being drafted for Ethernet networks are Timing and Synchronization for Time-Sensitive Applications, Forwarding and Queuing for Time-Sensitive Streams, Stream Reservation Protocol (SRP), all designed to give AV traffic priority on AVB Ethernet networks.

In the following Buyers Guide we look at stage box solutions for Cat5 digital snakes.

Allen & Heath GLD-AR2412 & AR84

Protocol: dSNAKE
Resolution: 24/48
Physical I/O: 24 x 12 plus 8 x 4 expander
Physical size: 3RU x 8.1 inches deep
allen-heath.com

Avid Stage 48

Protocol: Ethernet AVB
Resolution: 24/48
Physical I/O: 32 x 16
Physical size: 4RU x 18 inches deep
avid.com

Aviom 6416m

Protocol: Aviom A64
Resolution: 24/48, 24/96 or 24/192
Physical I/O: 16 plus passive split on 2x DB25
Physical size: 3RU x 12 inches deep
aviom.com

DiGiCo D-Rack

Protocol: proprietary RJ45
Resolution: 24/48
Physical I/O: 32 x 16
Physical size: 7RU x 7 inches deep
digico.biz

Focusrite RedNet 4

Protocol: Dante
Resolution: 64 x 64 @ 48kHz, 32 x 32 @ 96kHz**:**
Physical I/O: 8 XLR mic-pres x 8 LO (DB25)
Physical size: 2RU x 10 inches deep
focusrite.com

Innovason SR-16 Mini Stage Box

Protocol: EtherSound
Resolution: 24/48
Physical I/O: 16 x 8 & 8 (DB25)
Physical size: 2RU x 12.8 inches
innovason.com

Mackie DS3232

Protocol: U-Net
Resolution: 24/48 or 24/96
Physical I/O: 32 x 32
Physical size: 6RU x 9 inches deep
mackie.com

Midas DL251

Protocol: AES50
Resolution: 24/48 or 24/96
Physical I/O: 48 x 16
Physical size: 5RU x 16 inches deep
midasconsoles.com

Optocore X6R-TP

Protocol: SANE (& Ethernet)
Resolution: 24/48
Physical I/O: 8 x 8 or 16 x 0 plus 8 x 8 AES (DB25)
Physical size: 1RU x 8 inches deep
optocore.com

QSC I/O Frame

Protocol: Q-Sys
Resolution: 24/48 or 24/96
Physical I/O: 4 modular cards: 16 analog or 32 AES
Physical size: 1RU x 15 inches deep
qscaudio.com

Riedel RN.101.10

Protocol: RockNet
Resolution: 24/48
Physical I/O: 16 x 8 or 8 x 16
Physical size: 3RU x 3.5 inches deep
riedel.net

Roland S-4000S

Protocol: REAC
Resolution: 24/96
Physical I/O: 32 x 8
Physical size: 6RU x 13.2 inches deep
roland.com

Soundcraft Compact Stage box

Protocol: MADI (CAT5)
Resolution: 24/48
Physical I/O: 32 x 16 or 48
Physical size: 4RU x 14.7 inches deep
soundcraft.com

Whirlwind CONNECT DS168T

Protocol: CobraNet
Resolution: 24/48
Physical I/O: 16 x 8 plus 1x AES & 1x S/PDIF
Physical size: 3RU x 11 inches deep
whirlwindusa.com

Yamaha SB168

Protocol: EtherSound
Resolution: 24/48
Physical I/O: 16 x 8
Physical size: 3RU x 14.4 inches deep
yamaha.com