RSS Digital Snake

The concept of a digital multicore or 'snake' is certainly not a new one and anybody who has ever had to lug and string a large analogue multicore around will generally agree that it's one form of aerobic exercise that you could easily live without. **JON THORNTON**

THE RAPID UPTAKE of digital consoles for live production has been accompanied by a variety of digital snake and remotely controlled mic preamplifier solutions. For those still firmly in the analogue domain as far as mixing is concerned, there has been little choice in terms of a straightforward, robust solution that just plugs and plays.

Enter, from the slightly unexpected quarters of Roland, the RSS Digital Snake. In its simplest form, the system has three main components — the S-4000S 40-channel I-O modular rack, the S-4000H Front of House unit, and the S4000R remote controller. Starting with the bulkiest component, the S-4000S (which for the sake of clarity I'll refer to as the stagebox from now on) is a 6U rackmount. Most of the front panel is taken up with a series of I-O modules. The standard system ships with eight SI-AD4 modules, each of which provides four balanced inputs on XLR connectors, giving 32 inputs in total. Each input features a wide range preamplifier, capable of dealing with signal input levels from -65 to +10dBu. Each input also features three LED indicators, showing the presence of phantom power, signal and clipping (after A-D conversion). Two SO-DA4 modules are also

provided as standard, giving a total of eight balanced outputs at line level — again on XLR. The rear panel is given over chiefly to three substantial cooling fans, mains input, and a DC power input connector for use with an optional external power supply.

Effectively then, what you get is a 32-channel microphone preamplifier, coupled with 32 channels of A-D conversion. The heart of the Digital Snake system, though, lies in the transmission protocol developed by Roland. Based on Ethernet technology, and dubbed REAC (Roland Ethernet Audio Communication), this allows for the transfer of up to 40 channels of digital audio (24-bit/96kHz) down a single Cat5E cable. Transmission is bi-directional, and maximum cable length is 100m, although this can be easily extended by using standard Ethernet switches as 'repeaters' up to a maximum of 500m using four switches. Crucially in live applications, system latency is low with device-to-device latency being around 0.4 milliseconds. Two REAC ports are provided on the front panel of the stagebox — one as the main connection, and the other as a redundant backup (of which more later).

Connection between the stagebox and the Front of House (FOH) unit is via a heavy duty Cat5e crossover

cable. Roland supplies these as options on diminutive little cable drums, terminated in very rugged Neutrik EtherCon connectors. If ever you need confirmation of the advantages of such a system, you certainly get it as you saunter along carrying two of these drums under one arm — that's 200 metre's worth of multicore!

The FOH unit is functionally the mirror image of the stagebox, giving 32 balanced analogue outputs and eight analogue inputs — so in essence the system is a 32 up/8 down multicore. Remembering that mic preamplification is performed at the stagebox, the inputs and outputs on the FOH unit appear at line level in blocks of eight on 25-pin D-Sub connectors, so break-out tails will usually be needed although this does make the unit less bulky than the stagebox. Two thoughtful touches are the provision of cable tie-bars in front of each of the D-Sub connectors, and the pin-outs for them are silk-screened to the front panel of the unit (after all, the chances of finding the manual in an emergency are probably going to be slim). Both the stagebox and the FOH unit have a Mute All button, which if pressed for more than a second or so will mute all inputs or all outputs respectively.

The final piece of the jigsaw is the S-4000R remote control. This plugs into a 9-pin remote port on either the FOH unit or the stagebox, and it can quite happily be hot-swapped between the two. The remote unit allows gain levels, phantom power and pad switching to be set for each of the input channels, in addition to providing metering for each of the channels. Operation is straightforward enough — a channel is selected with a rotary knob, its number appearing on a numeric display. A rotary encoder then allows gain setting, and buttons select pad or phantom power for the channel. Signal level for the channel (in dBFS post A-D conversion) is monitored via an eight-segment LED bargraph, while an overview of signal present and clip is provided for all channels via an LED matrix at the top of the unit. It's also possible to link channels together so that adjustments can be made in stereo pairs, and up to 10 complete snapshots of the settings can be stored and recalled.

So far, so good and in the basic configuration described above, the Digital Snake is incredibly straightforward to set up and use. Audio quality is exceptionally good. I was particularly impressed by the quality and low noise of the preamplifiers and the total absence of any zipper noise when adjusting gain levels. But for serious live use there are still a number of issues that need reporting on. The first, as mentioned earlier, is latency and I can report that it is minimal. Compare input to output and sum them together and there are phase artefacts in evidence — but in general use this isn't going to be an issue. The second is build quality, and with the possible exception of the rack ears used to mount the remote panel, which flexed quite alarmingly, it appears absolutely rock solid. The review units from Roland arrived tidily packaged in flightcases, and seem eminently roadworthy, although quite weighty when stacked together. The last, and by no means the least, is system reliability.

If there is one advantage to a conventional analogue multicore, it's that if a connector or cable fails, you only lose the one channel. With a digital system, if the Cat5 cable fails it's something of a show-stopper. With this in mind, Roland has built a level of redundancy into the system, in that the FOH and stagebox can be connected together using two separate Cat5 cables. Should the primary cable fail, the system will switch noiselessly and automatically to the back-up. Sounds great in theory, and in practice it works just

as advertised. Setting up the two links and then repeatedly disconnecting and reconnecting the primary link cause no audible glitches whatsoever. And even disconnecting and reconnecting both cables, while resulting in loss of audio, didn't throw the system into meltdown. On reconnection, there was a second or so of silence, a tiny bit of digital noise, and then normal service was resumed.

But perhaps the biggest advantage of the Digital Snake system is the ability to scale it up into something altogether more complex. Getting more channels up and down is simply a case of buying additional stageboxes and FOH units. More significantly, the use of a protocol built around Ethernet means that providing splits from the stage box — for a monitor desk or broadcast feed, for example — is as simple as connecting the REAC output from the stagebox to an Ethernet switch, and then taking multiple Cat5 cables from the switch to multiple FOH units. As there is the potential for conflicting data here — remembering that the protocol is bi-directional — each unit in a system has a switch that sets it to one of three REAC modes: Master, Slave and Split. A master device can send signals to a split or slave device, and receive signals from a slave device. A split device can only receive signals from a master device; it cannot send signals back to it. So, in the scenario above, the stagebox would be the master, the FOH unit at FOH would be a slave, and another FOH unit would be a split device for a broadcast feed.

Although the REAC protocol is based around 100 BASE-T Ethernet, Roland recommends the use of 1000 BASE-T switches to minimise problems and possible added latency from the switch itself. Any

gigabit Ethernet switch that supports 100 BASE-T will suffice, although Roland has recently produced its own. Packaged as a 1U rackmount, this features two separate five-port switches enabling the use of main and backup REAC links to all devices. It also features two separate power supplies (with two separate mains connectors!) again in an effort to build the maximum redundancy into the system.

In summary, the system seems absolutely bullet-proof in terms of build and performance. Operationally it's a doddle to use, and even complex configurations don't require you to be a networking guru. Admittedly, there are some little details that could be confusing, such as using crossover Cat5 cables to connect REAC devices to each other directly but straight through cables if going via an Ethernet switch, but even this isn't rocket science.

Quibbles are very few — the flexing of the remote rack ears mentioned earlier, and the fact that all of the units, but especially the stagebox, exhibit a fair amount of fan-noise. Admittedly, this is probably not going to be a problem in live production applications but the flexibility and sonic quality of the system

actually means that using the system as a front end for live recording would be absolutely viable — or indeed any application that requires audio distribution and routing over long distances. My single biggest initial quibble was the lack of any digital interfacing — for live and other applications this could be a deal breaker for some customers. But this has been solved by the recent release of 4-channel digital input and output modules for the system (2 x AES3 connections per module).

The RSS digital snake is certainly not the only system of its type out there and part of me sighed inwardly when I saw yet another transmission protocol being touted. In terms of absolute flexibility of configuration, there are Ethersound or CobraNet-based boxes from various vendors that I'm sure can be made to solve the most complex of install briefs. But for sheer ruggedness, quality, simplicity and reliability — with absolutely no IP addressing anywhere in sight — it takes some beating. ∎

PROS Rugged and easy to use and configure; can use standard Ethernet hardware to configure complex systems; reliability and system redundancy very impressive; very quiet and clean preamplifiers.

CONS Fan noise could be an issue in some applications.

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