AN INTRODUCTION TO
THE *Digital Snake*

DISCOVER THE BENEFITS OF USING DIGITAL AUDIO TECHNOLOGY

IN HOUSES OF WORSHIP AND PERFORMANCE SETTINGS

TABLE OF CONTENTS

Digital Snake

Introduction

Digital is the technology of our world today. It's all around us in the form of CDs, DVDs, MP3 players, digital cameras, and computers. Digital offers great benefits to all of us, and makes our lives easier and better. Such benefits would have been impossible using analog technology. Who would go back to the world of cassette tapes, for example, after experiencing the ease of access and clean sound quality of a CD?

Until recently, analog sound systems have been the standard for sound reinforcement and PA applications. However, recent technological advances have brought the benefits of digital audio to the live sound arena.

Digital audio is superior to its analog audio counterpart in a number of ways:

- Exceptional sound quality
- Immunity to buzzes, hums and radio interference
- Lightweight components
- Easy installation

The simplest and most effective way to begin integrating this exciting new digital technology into your facility's "sound reinforcement installation" is with a digital audio snake.

What is a Snake?

An audio snake provides the means to transfer multiple audio sources—such as microphones and electronic instruments—between the platform area and the audio mixing console. Typically, the mixing console is positioned at the rear of the hall, 100 feet or more from the platform.

Traditional audio snakes use analog technology and consist of a large diameter cable containing multiple wires. These wires—one for each channel—carry the audio signals from one location to the other. At one end of the cable is a large junction box with jacks for connecting audio sources. The other end of the cable splits into multiple plugs for connection to the mic preamps and line inputs of the mixing console.
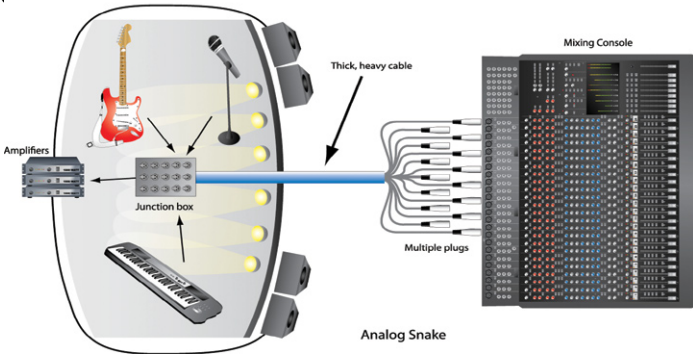
Though they get the job done, analog snakes are bulky, heavy and very expensive. On top of that, they don't always provide the best possible audio quality.

In the past, analog snakes were the only way to go. But now, thanks to new cutting-edge technology, the audio snake has been transformed for the digital age.

The Benefits of a Digital Snake

A digital snake does the job of an analog snake, but with all the benefits of modern digital technology. Even if you still use an analog console, you can gain an enormous performance increase from incorporating a digital snake into your system.

The benefit of the digital snake is that it eliminates long analog audio signal transfers and the signal degradation that always comes along with them. This is accomplished by converting audio signals to digital at the platform position, which allows them to be transferred hundreds of feet with absolutely no loss in sound quality. Since multiple digital signals can be transferred over a single lightweight cable, the enormous bulk of the analog snake's multi-channel cable is also eliminated.
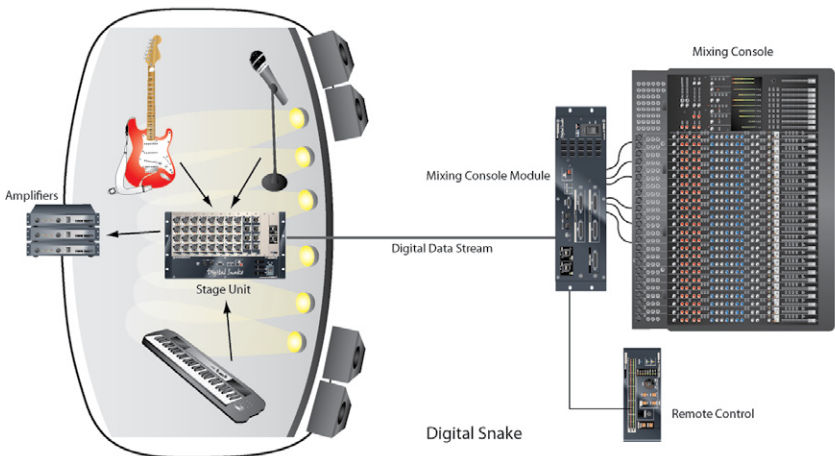
Now, let's take a closer look at the many advantages digital snakes have over traditional analog snakes.

![RSS by Roland logo]

Digital Snake Components

A digital snake system consists of four primary components:

- **Stage Unit**

  This unit provides inputs for audio sources at the platform area. Each input contains a high-quality preamp circuit with a variable gain control, allowing for the connection of any signal from microphones to instruments. There's also phantom power available on every input to provide power for condenser microphones.

  RSS S 4000 S —————

  Additionally, the stage unit features a number of audio outputs for signals sent back to the stage from the mixing console (e.g., amplifier feeds for main and monitor speakers, talkback, CD audio, etc.).
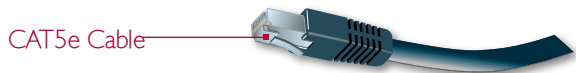
- **Mixing Console Unit**

  RSS S 4000 H —————

  The unit has outputs for the audio sources coming from the stage unit. These outputs are connected to the inputs on the mixing console. There are also a number of channels for sending audio signals back to the stage unit (these channels are sometimes called "returns").

- **A CAT5e (Enhanced Category 5) Ethernet patch cable**

    This cable carries all of the digital audio between the mixer and the platform. A digital snake takes advantage of the same reliable and inexpensive cable that's used for computer networks. Called "CAT5e," this cable is very small in diameter and lightweight. It uses connectors similar to those you use for your telephone, but a bit more robust.

CAT5e Cable

- **Remote Controller**

    A remote control unit is used to adjust each input channel's gain level and phantom power on/off status from the mixing console position or some other location. The remote can also store all of these settings so that it's easy to change your setup from event to event.


S 4000 R
Remote Controller

Improved Intelligibility

Analog snakes transmit audio signals as voltages through extremely long lengths of audio cable. Signals such as microphones are often weak to begin with—sending them through hundreds of feet of cable always results in some degree of high-frequency loss and overall degradation due to cable capacitance, inductance, and resistance.

The digital snake solves this problem by converting the analog signal to digital in the stage unit, right where the microphones and other signals are located on the platform. To optimize the signal's level before it's converted to digital, the stage unit provides gain adjustments for each input. These adjustments can be made via the remote controller and can be stored for later recall.
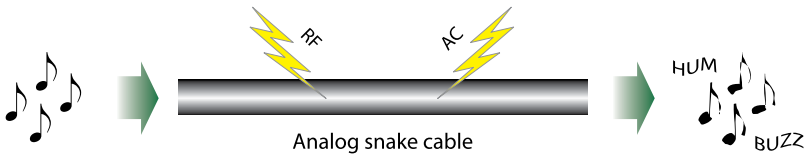

Analog snake cable

By shaping and digitizing the audio signal so near the source, superior audio quality is maintained, often with improved intelligibility over an analog snake.

Immunity from Buzzes & Hums

Analog signals are prone to hums and buzzes, as well as interference from radio frequency (RF) signals. Even routing analog cables near AC power lines can create noise. This is a real problem with traditional analog snakes, one that is increased as the snake length is increased.
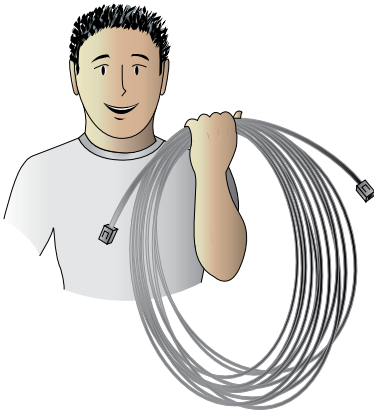

Digital snake cable
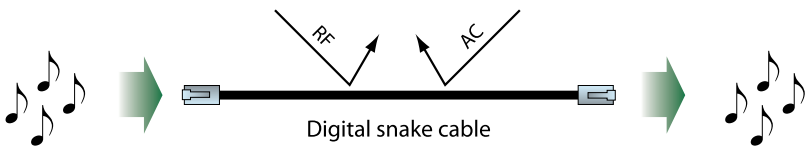
Because the digital snake transfers audio signals as digital data, it's immune to the hums and noise that often plague analog systems. As an added benefit, this can often reduce the costs associated with installing and troubleshooting an analog snake.

Lightweight and Portable

Analog snakes are bulky, heavy and hard to move around. This is compounded by the number of audio channels you need to transfer and the distance you need to send them—a 40 channel, 300 foot analog snake can easily weigh hundreds of pounds.

Digital snakes, on the other hand, are extremely easy to configure and set-up. Simply place the stage box and mixing console modules at their respective positions and connect a lightweight CAT5e cable between them—it's that easy!

The simple CAT5e cable connection is one of the most attractive features of the digital snake. Using newly-developed RSS technology, up to 40 channels of 24-bit/96 kHz digital audio can be transferred hundreds of feet on a single CAT5e cable.

Low Installation Cost

Installation costs for traditional analog snakes are very high. Besides the cost of the snake itself—which can be many thousands of dollars—there's the additional expense of installing the snake into your facility. Because of the extremely long length of the heavy snake cable, installation can be difficult, especially in existing buildings. And, as we've seen so far, all of the expense and effort of installing an analog snake isn't the best thing you can do for the quality of your audio signal.

With the convenience of simple CAT5e wiring, installation of a digital snake is far less expensive. Use the money you'll save with these lower installation costs on things that will further enhance the quality of your audio, such as better microphones, speakers and signal processors.

Additional Benefits

Besides superior audio quality, cost-effective installation, and portability, digital snakes offer some other noteworthy benefits.

- *Instant recall of input settings*

  Since input gain settings can be digitally stored as presets, you can instantly recall them at the touch of a button. This allows for extremely quick switching between frequently used audio setups, such as regular musical acts or church services. Additionally, stored default settings provide a safety net in environments where many different people run the system.

- *Pain-free expansion*

  Using a modular digital snake, you have the flexibility of configuring your snake for your exact needs. Low cable costs also allow for greater expansion in the future.

- *Signal easily split to multiple destinations*

  Digital snakes give you a simple way to "split" your audio signal without expensive and heavy transformer-based analog splitters. Using an inexpensive Ethernet switch or hub, you can route your audio to a recording setup, a broadcast station, remote truck, or alternate monitoring

position—or all of these at once. This is another way that a digital snake can save you a lot of money.
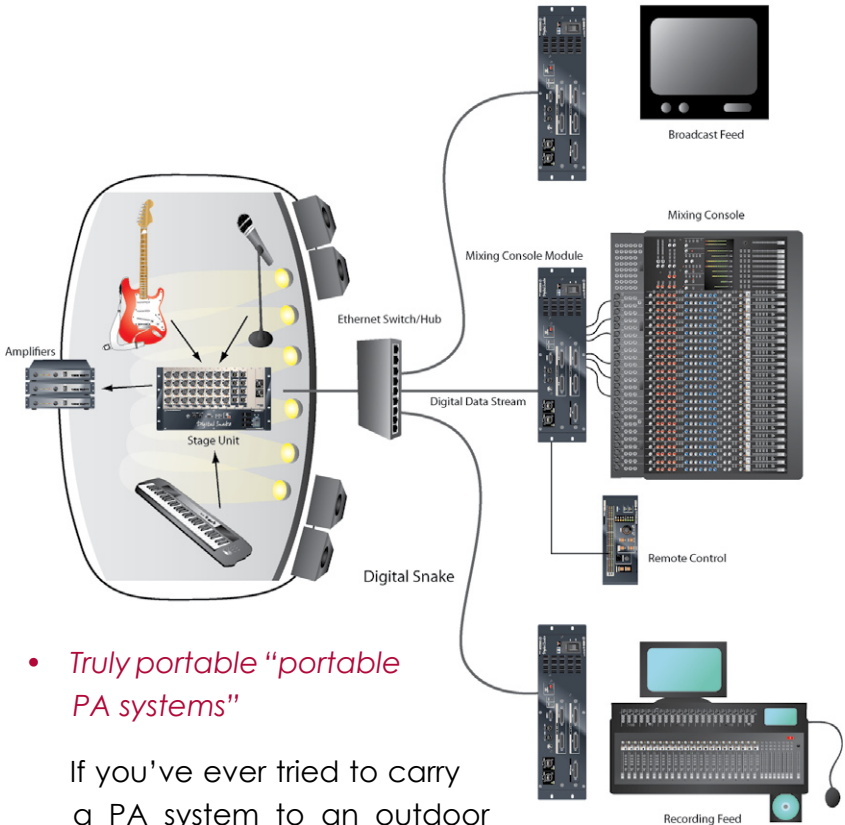
- *Truly portable "portable PA systems"*

  If you've ever tried to carry a PA system to an outdoor event or from one hall to another, you know how incredibly heavy an analog snake can be. Of course, carrying a light weight CAT5e-based digital snake is much more fun—and easier on your back!

Digital Snake Comparison Chart

Benefits	RSS Digital Snake	Analog Snake
High-quality preamps right on stage, close to mics	Yes	No
Remote-controlled preamp	Yes	No
Presets for easy channel input setups	Yes	No
Immunity to hums	Yes	No
Immunity to AC-induced noise	Yes	No
Improved intelligibility due to immunity from inductance, resistance, and capacitance audio losses	Yes	No
Simple splits of stage audio using inexpensive hub	Yes	No
Lightweight, small cable for easy installations	Yes	No
Portable, even for very long cable runs	Yes	No
Digital-ready for use with digital consoles	Yes	No

Roland System Solutions © 2005

Conclusion

As you've seen, digital snakes offer many advantages that will enhance the performance quality of your audio system. Whether you have made the leap to digital mixing consoles or are using a traditional analog mixer, your sound will improve.

The modular format of digital snakes makes it easy and cost-effective to expand the system as your needs change. And splitting the audio signals to a monitor mixer, recording or broadcast system is simple to implement... and very cost-effective.

We hope that this booklet has provided information to increase your knowledge of audio snake systems and to enlighten you to the enormous benefits digital snake systems can provide.

For more information please call Roland System Solutions at 800-994-4723 or visit our website at www.RSSAmerica.com.

RSS
by Roland