Routing systems are nothing new in the broadcast industry. Source routing systems can be used for virtually all tasks in the radio studio facility, such as configuring a transmission chain, expanding available sources on the mixing console (x-selector), or creating a monitoring selector.

The user often needs to route program source as well as the General Purpose Input (GPI) and General Purpose Output (GPO) signals used for remote control and signaling. Traditionally, router control and user access is done through dedicated hardware panels.

Equipment manufacturers have their own philosophy behind routers and router control. Often the end user is stuck, unable to help themselves without “re-programming” help from the manufacturer. System changes or expansion, if possible, often have a price tag attached.

A LARGE PROJECT

Recently, I was involved in the design and setup of Axia digital studio systems for 21 radio stations. Our company was hired to configure and commission 42 studios and 21 Master Control rooms.

At first, it looked quite like a simple project – just repeat the same configuration 21 times. We discovered, though, that this would be quite a demanding project, as every station had its own “personality” and way of doing day-to-day radio business.

Fortunately, Axia’s Ethernet-based Livewire system is so simple by nature, so no additional hardware routing equipment is required. Studio system installation and configuration with Axia is extremely quick and simple.

SIMPLE SETUP

The Axia system is based on only a few key components, which are very easy to configure and use. After screwing all equipment into the racks, all you need to do is configure the system to connect your audio devices to the Axia audio nodes, which you can do with pre-made cables. There are no punch blocks, jumper leads, or patch bays, which helped us to keep the hardware portion of 21 station installations pretty much the same!

I like to say that there is a “punch tool” hidden inside each Axia node in the shape of a web-based (HTTP) configuration page, which also provides a precise record of the connections and configuration of the studio equipment. All sources that are connected to Axia are available to be “terminated” on any destination in the system. The Axia Livewire node is actually routing hardware, and you can route to any node output (destination) from any node input (source) in the facility.

With the Axia system audio nodes are spread across the facility as required, there is no centralized main frame, so wiring is extremely simple and localized to individual studios, or even an individual rack. An added benefit is that there is no problem with ground loops.

EASILY EXPANDABLE

The routing system can be configured simply for current needs. If, in the future, you need to connect additional equipment, just add an additional node to the system. Or if the audio equipment is already equipped with a Livewire interface, simply plug it in to the network.

Axia audio nodes are available in different 8x8 configurations. Inputs can be a choice of balanced stereo analog lines, AES/EBU, or mono microphone. All outputs are balanced stereo lines, except in the case of the AES/EBU node where, naturally, all inputs and outputs are AES (or EBU).

If you need to connect General Purpose Input/Output (GPO) there is a node designed specifically for this purpose; eight GPO ports each with five logic inputs and five logic outputs (on/off logic, opto isolated). GPO can be routed independently or assigned to an audio source and routed together with the audio.

ROUTING

Routing is truly distributed and, from an expansion point of view, linear. No complicated mainframes or expensive x,y configurations. Redundancy is also native to the system as system sources are spread across individual nodes; a fault on an individual node will not affect the other nodes in any way.

Router control and user interface is provided through a separate cost effective software system called PathfinderPC. PathfinderPC is a suite of client-server applications that talks to the Livewire network’s individual Axia nodes and is able to dynamically configure many system parameters, including the source-destination route.

PATHFINDERPC – PROBLEM SOLVER

Every radio station’s technician experiences some kind of demand from their program director to provide systems which will give the station some technical edge over the competition, or help them to achieve some tasks more efficiently – and they usually want it yesterday.

As techs, we usually prefer to find an off-the-shelf “black box” solution, but often end up trying to design and make our own black box to sort out our problem. Sometimes our automation system or mixing console manufacturer can help us eventually and, given enough financial incentive, make both our PD and our accountant very unhappy.

I have discovered that it is possible to meet 90% of these demands simply by configuring the studio system using PathfinderPC – and with literally no budget expense. How often during an installation have you come up against a brick wall where you needed to create some special logic or special pulse to control some device? The insidious black box used to be the only solution, but not any longer.

PATHFINDER CONTROL

PathfinderPC contains a relatively simple method of creating conditional events which may be scheduled. In this way we can configure and schedule our routing system to carry out complicated tasks.

In fact, PathfinderPC can control most system features. Some of the more important ones include:

- Audio node source and destination routing.
- GPIO port pin-to-pin routing.
- Audio signal level, silence monitoring, and conditional logic.
- Axia Element console Show Profiles and GPIO profiles (direct Element channels x-routing is not supported yet).

- Axia IP-Audio Driver record-source routing and GPIO control.
- Virtual mixer control.

In terms of user interface, there are two client applications available; Pathfinder (which is more technical), and Pathfinder Mini (which provides access to on-screen “soft panels” that can be used by operators and studio staff).

Pathfinder is a purely software control solution; however, Axia has a number of hardware panel options which are also controlled via Pathfinder. The ones I like best are the LCD “smart” button panels whose properties can be fully controlled by Pathfinder. Combinations of “soft” (on-screen) and “hard” panels can be used.

REAL WORLD APPLICATION

A large routing selector is most commonly found in the Master Control room, where it is used for control and monitoring of the whole station infrastructure. Here we usually need to have instant access to key points in the transmission chain and in the studios. Historically, a custom panel with some kind of screen printed block diagram was made and selector buttons placed on the panel.

For our project we created two panels: one purely a status and monitoring selector panel, the second a program chain selector, which also includes a contribution network send source selector.

EASY LEARNING CURVE

With PathfinderPC, this can be done very elegantly on a standard PC with no additional hardware required. In our case, we created our own Soft Panel. A block diagram graphic was created in CorelDraw and imported into the PathfinderPC panel creator, where buttons and labels were edited and placed over the drawing – and very quickly our panel was done.

I am not a software programmer, but I was able to configure and create these complicated functions with no external help. The guys from Axia created a very good manual, with examples of how and how not to use PathfinderPC; that was sufficient for me to create and test a basic concept in one afternoon.

The Pathfinder Panel Creator is a simple visual editing tool which enables quick configuration of labels and button properties. To bring the panel to life, button logic is created using the “stacked events” in Pathfinder Server. The resulting wizards produce XML-based scripts. However, you do not need to understand XML in order to be able to use and configure events in Pathfinder Server.

(Continued on Page 40)
VIRTUAL MIXER FOR REMOTES

Another handy application is an Outside Broadcast (Remote) mixer panel. The mixer is created using three blocks of a Virtual Mixer which is part of the Axia studio mix engine. There are five mixer channels available; remote operators can turn a channel on and off, preview a channel and select a source to send to the transmission chain, all from the field.

Audio connection is via the public Internet, and a standard audio IP codec is used for the audio link. A channel’s fade-in and fade-out time can be configured in the PathfinderPC script. The remote panel is really a thin client, so even an Internet connection over cell phone can be used for activation.

A MUST-HAVE TOOL

How many times have you been called out in the middle of the night because the station was off-air, with the only solution to jump in to the car and drive in to work to fix it?

An Internet connection and PathfinderPC can help do away with that. The Pathfinder Server can be configured to detect silence, fire off a backup source and reroute it to the transmitter chain. The Pathfinder Server can also send an e-mail message when a targeted event happens.

The Pathfinder Server Stack List

Controls Editor builds logic events.

After more than one year of using PathfinderPC, I am finding it a valuable part of my tool kit. It is a great tool for quick diagnoses and for remotely returning a station to air. If you need to support multiple sites, PathfinderPC can easily be configured to remotely connect to each individual site.

Using the Pathfinder system, you can have full remote control of all routers (audio and GPIO). The system can also control third party devices such as video routers.

The list price of the PathfinderPC software is $1,095.00. Client applications can be used on as many PCs as you need with no extra cost or licenses involved. Support is excellent, and the application updates are frequent and free of charge.

PathfinderPC is a great software companion to an already versatile and flexible Axia digital routing studio system.

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Pathfinder mini-studio On-Air Selector and contribution network send selector.

No matter which method of activation is used, pushing the button on the screen causes Pathfinder to re-route a selected source to the node destination where the monitoring speakers and meters are connected. The panel in our example actually controls two outputs; one is a monitoring output in the rack, and the second is a remote monitoring output via Skype. When monitoring is done remotely, the rack room speakers can be detached from the selector.