Interfacing Comrex NX Rack and MultiRack with Livewire AoIP Systems

Livewire is an Audio-over-IP (AoIP) system developed by Axia. Livewire is in use in many studio audio environments worldwide. While the Livewire protocol is proprietary, Axia has introduced an enhancement called "Livewire+AES67". This enhancement supports a mode that allows inter-operation with devices that support the AES67 AoIP standard available in Comrex NX Rack and MultiRack audio codecs. This document provides a guide on how to set up a Comrex and Livewire system to talk to each other.

Unlike most AES67 compatible products, Comrex codecs utilize both transmit and receive AoIP drivers. Each of these operate independently and must be set up separately.

MORE ABOUT LIVEWIRE

To inter-work with Livewire devices, the device that will send audio to the Comrex codec and the device to receive audio from the Comrex codec must have firmware to support AES67 (not all do). Check the manual and the firmware level of your devices to make sure AES67 is supported.

Livewire supports sending GPIO signals for contact closures. In AES67 mode, these signals are not supported.

Livewire supports Unicast and Multicast delivery of streams. *Comrex codecs support only Multicast operation, so this is the only mode possible when inter-working with Livewire.*

CLOCKING

All AoIP systems require a network clock to synchronize audio within their systems. Generally, one device on the network will function as the Master clock, and all others operate as Slaves to it. Comrex codecs do not contain a Master clock, therefore must find a Master clock within the network to lock to.

Many Livewire capable products incorporate the ability to deliver a Master clock. Selection of which device will deliver the Master clock is done by configuring the individual Livewire devices to be clock Masters or Slaves.

Livewire natively delivers a Master clock that is not compatible with AES67. You can configure many Livewire devices to deliver the native Livewire clock and an AES67 Master clock (Livewire calls this PTP/IEEE1588 ARB Clock Class 248).

DISCOVERY

AES67 does not define a method of advertising and discovering AoIP streams. This is the way AoIP streams are found and routed within the network. Livewire uses a proprietary signaling protocol for this function, but also supports the Ravenna discovery protocol, which is one of the methods supported by Comrex codecs, along with SAP.

Livewire AES67 capable products also allow stream information to be input and extracted manually, bypassing the discovery process entirely.

SETTING UP A LIVEWIRE DEVICE FOR AES67

For the purposes of this guide, we've connected to an Axia Livewire 4x4 analog node running firmware 2.1.2d. The firmware shipped with this node required this update.

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Since Livewire doesn't natively deliver an AES67 compatible clock to your network, you will need to decide whether you want to install a stand-alone PTPv2 clock source, or have your Livewire device deliver one. Axia notes that PTP clocks delivered from their products are not tied to a reference, so may be subject to inaccuracy when compared to stand-alone sources.

Log into your Livewire device and access the user interface web page. Under Advanced Options, choose "Synchronization and QOS". The top option in this page allows you to define your clock source. If you'd like this device to master your AES67 clock, choose one of the options that includes "PTP IEEE 1588 ARB Clock Class 248", and specify if it also masters or slaves to a Livewire clock. If you already have an AES67 compatible Master clock on your network, choose one of the options that includes "PTP IEEE 1588 slave only" and specify if it also masters the Livewire clock (on a primary or secondary basis). Leave all other values in this page at either the AES67 or (if no AES67 option exists) the system defaults. Your page should look like the one below. Click "Apply".
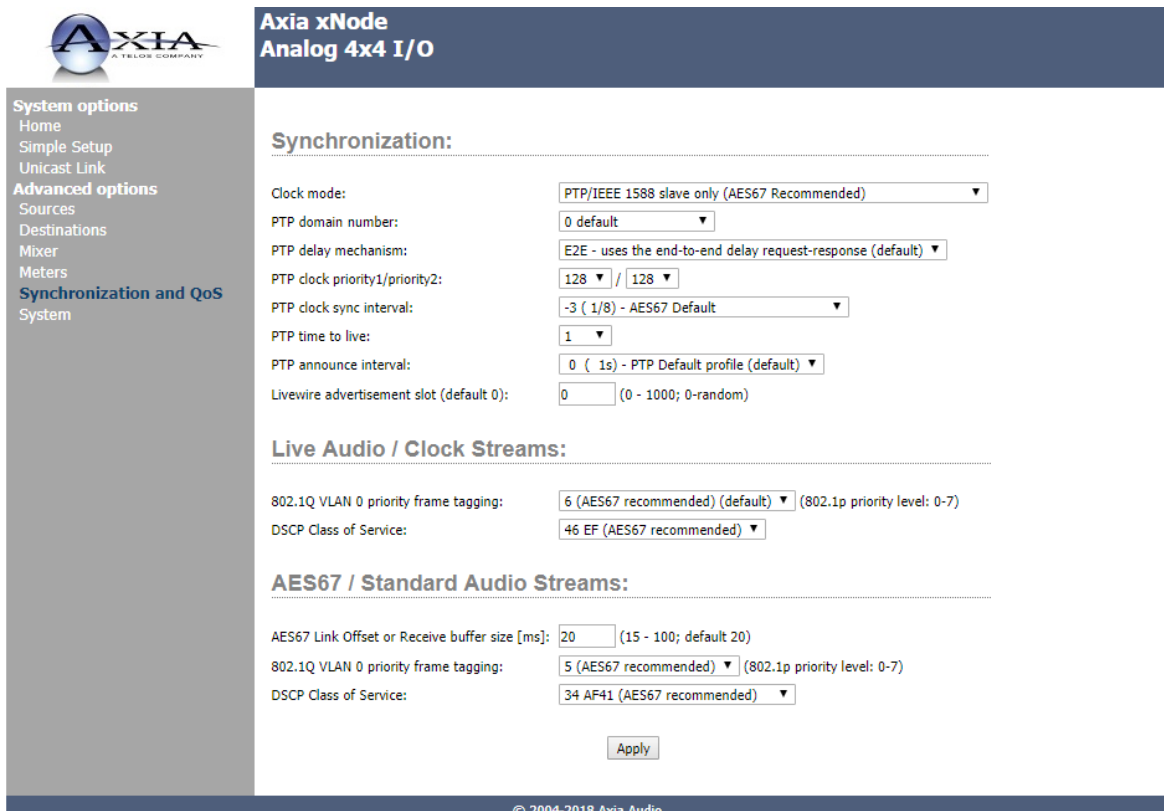

FIGURE 1 LIVEWIRE USER INTERFACE

Next you will Open the Comrex Codec Web-based user interface page, and navigate to the Network Manger section. You must be sure the Ethernet interface used (typically the secondary) has a valid IP address on your AES67 network.

The default settings of these ports are to use a DHCP server. If you require static addressing (or you have no DHCP server on your network) you must apply static settings here; using a reserved IP address on your AES67 LAN. **Note: When configuring the AES67 port for static operation, the DNS server field must not remain blank. A DNS server address (such as 0.0.0.0) must be entered here, althouth it does not need to be a valid address.**

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FIGURE 2 ETHERNET PORT SETTINGS

You now have an AES67 compatible Master clock on your Livewire network. Continue with the Web-based control page on your Comrex codec and select the "System Settings" Tab. If not done already, enable AES67 operation under that section, as described in the manual. Leave all other AES67 settings at their defaults, as shown. Look for the PTP clocking status to show "locked".

FIGURE 3 AES67 SYSTEM SETTINGS

Livewire offers a default PTPv2 Master clock domain of 0. This is the default of Comrex codecs. If not locking, check that the clock domain is set to 0 under the PTP clocking options on the Comrex codec.

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CREATING AN OUTGOING AES67 STREAM FROM A COMREX CODEC

Once AES67 is enabled on the codec and the clock is "locked", AES67 outgoing stream(s) are automatically created to the default Multicast node address. Outgoing streams carry a label taken from the Unit Name setting under the System Settings->Connections section of the user interface.

You'll need to set your outgoing Multicast address to one within the range of your Livewire network. Still under AES67 settings, navigate to the "Outputs" section and select the outgoing stream you wish to change. (NX Rack has only one output, MultiRack has five).
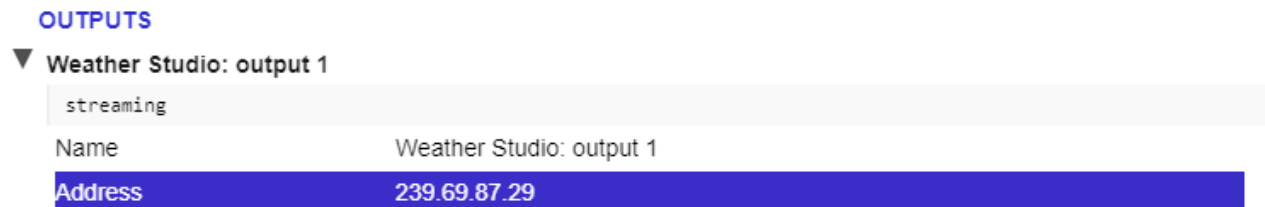
OUTPUTS

▼ Weather Studio: output 1

streaming	
Name	Weather Studio: output 1
Address	**239.69.87.29**

FIGURE 4 OUTPUTS

Set the "Address" field to an address within the 239.x.x.x range. Click "apply" then disable and re-enable AES67 mode on the codec to initiate the stream to the new address.

The stream should now be discoverable and routable within the Livewire network. Comrex AES67 streams will always appear as 48KHz sampled 24-bit two channel streams. Codec connections that are received as mono will deliver identical audio to both AES67 channels.

Returning to the Livewire device's web interface, navigate to the Destinations menu under Advanced options.
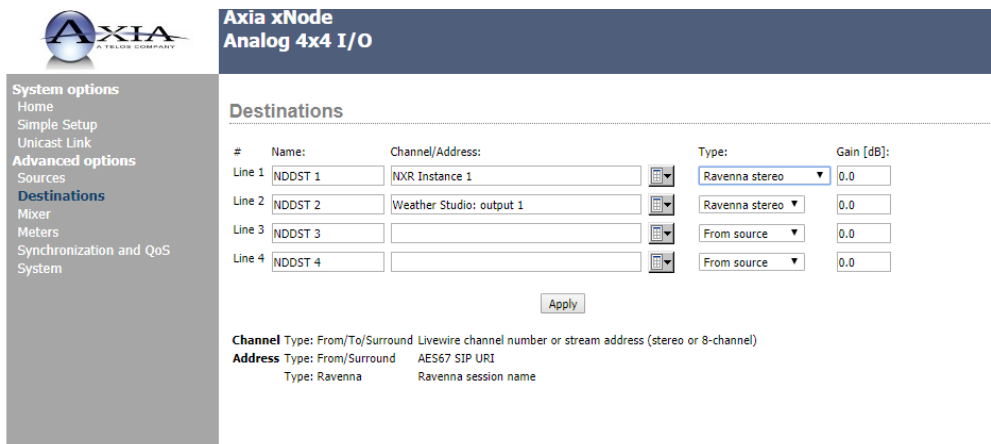
Axia xNode
Analog 4x4 I/O

System options
Home
Simple Setup
Unicast Link
Advanced options
Sources
Destinations
Mixer
Meters
Synchronization and QoS
System

Destinations

#	Name:	Channel/Address:		Type:	Gain [dB]:
Line 1	NDDST 1	NXR Instance 1	▦▾	Ravenna stereo ▾	0.0
Line 2	NDDST 2	Weather Studio: output 1	▦▾	Ravenna stereo ▾	0.0
Line 3	NDDST 3		▦▾	From source ▾	0.0
Line 4	NDDST 4		▦▾	From source ▾	0.0

Apply

Channel Type: From/To/Surround Livewire channel number or stream address (stereo or 8-channel)
Address Type: From/Surround   AES67 SIP URI
            Type: Ravenna   Ravenna session name

FIGURE 5 DESTINATIONS MENU

Choose one of the input destinations to send your Comrex stream to. Click the "list" icon next to the Channel/Address field. This will produce a listing of all discovered streams on your network. Comrex streams will appear under the "Ravenna" tab. Select the Comrex stream you just created, and set the "type" field to "Ravenna Stereo". Click "Apply".

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If this is the first time you've interfaced a device to your Livewire network that uses Ravenna discovery, you might have issues. This is because while Ravenna discovery is compatible with Livewire, we have found that some networks block it from working successfully. If, under Livewire, you're able to choose the Multicast stream from the Comrex codec but no audio is transferred, you may need to enter the Multicast address manually. To do this, type the Multicast output address from your Comrex settings into the Channel/Address field on your Axia device. Set the "Type" field back to "From Source". Click "Apply" to save these settings.
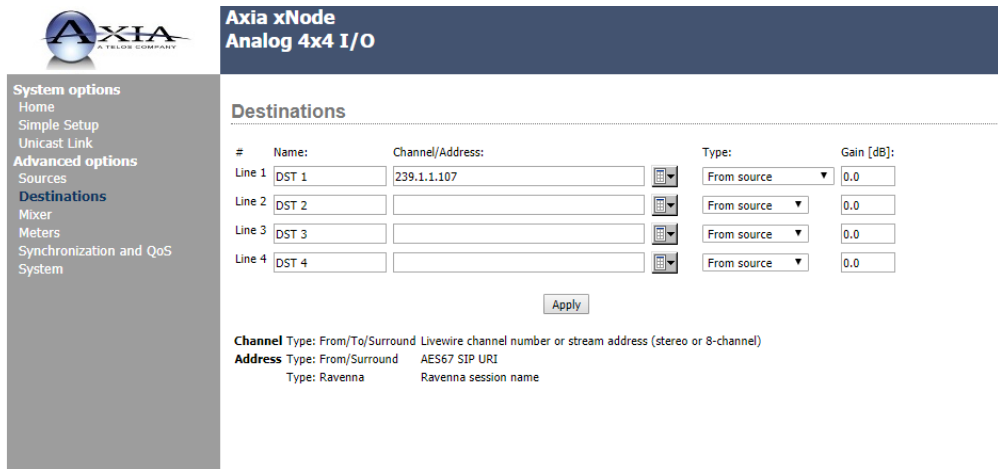

FIGURE 6 DESTINATIONS MENU - FROM SOURCE

RECEIVING AN INCOMING AES67 STREAM TO A COMREX CODEC

First you must create an AES67 compatible stream on the Livewire device that will feed the Comrex codec. In the Livewire device web interface, choose "Sources" under Advanced Options.
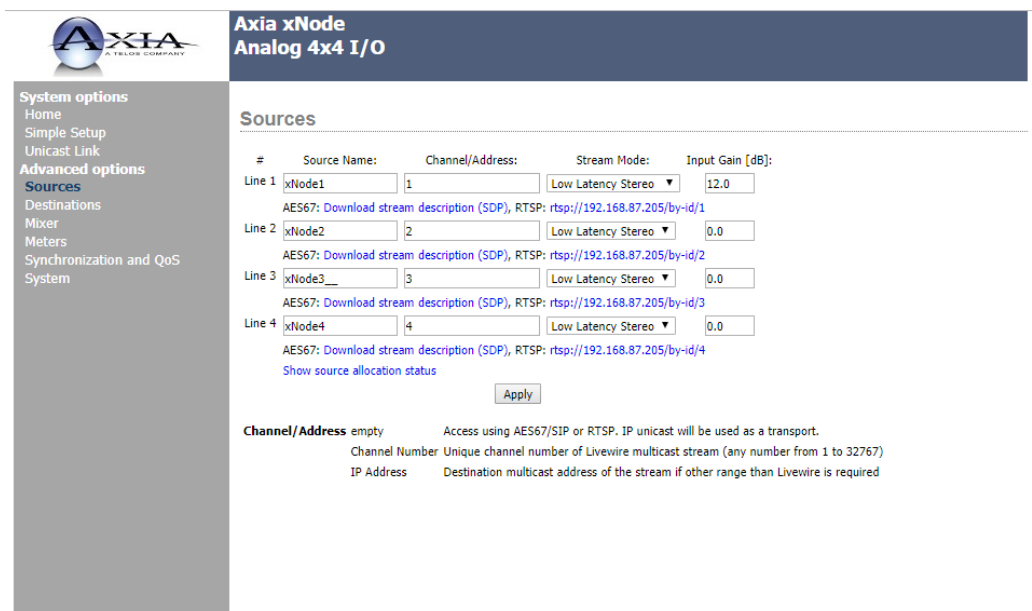

FIGURE 7 SOURCES MENU

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Set the Source Name and Channel/Address fields the way you normally would under Livewire. (The channel number should contain decimal digit(s). In the "Stream mode" option, set "Low Latency Stereo" to the outgoing stream you are sending to the Comrex codec.

Log into the Comrex web-based interface. Under the System Settings Tab, expand the AES67 options, and select the input you wish to assign (NX Rack has one, MultiRack has five). Find and select the "Source" entry under your desired input.
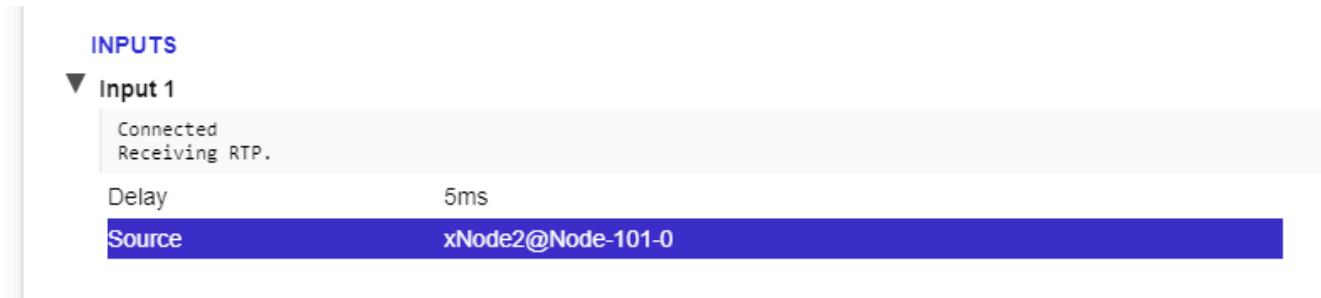
FIGURE 8 INPUTS

On the right side of the page, a pull-down menu will appear. This will display all detected streams on your network. Choose the name of the AES67 stream you've created in the previous step, and choose "Apply Settings". The codec will now be locked to that incoming stream, and the status message under the selected input should read "Receiving RTP".

If the status does not read "Receiving RTP", or if the incoming stream has distortion or drop-outs, you may need to adjust the "delay" setting under the affected input. This adjusts the amount of buffer used by the AES67 receiver. The default is 5mS, and you can increase or decrease it to fixed values in the pull-down menu.

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