


# Axia IP-Audio Driver

## User's Guide

**Axia IP-Audio - Version: 2.4.6.1**

 Livewire Network Card: 192.168.2.140 Intel(R) 02550 Fast Ethernet LAN

Sources (Send to Network)				Destinations (Receive from Network)		
#	Enable	Name	Channel (1-32767)	Channel (1-32767)	Browse...	Mode
1	<input checked="" type="checkbox"/>	PC 1	1481	2311	Browse...	STEREO
2	<input type="checkbox"/>				Browse...	STEREO
3	<input type="checkbox"/>				Browse...	STEREO
4	<input type="checkbox"/>				Browse...	STEREO
5	<input type="checkbox"/>				Browse...	STEREO
6	<input type="checkbox"/>				Browse...	STEREO
7	<input type="checkbox"/>				Browse...	STEREO
8	<input type="checkbox"/>				Browse...	STEREO
9	<input type="checkbox"/>				Browse...	STEREO
10	<input type="checkbox"/>				Browse...	STEREO
11	<input type="checkbox"/>				Browse...	STEREO
12	<input type="checkbox"/>				Browse...	STEREO
13	<input type="checkbox"/>				Browse...	STEREO
14	<input type="checkbox"/>				Browse...	STEREO
15	<input type="checkbox"/>				Browse...	STEREO
16	<input type="checkbox"/>				Browse...	STEREO

Keep channel active when playback is stopped

**Audio Levels**

PC audio nominal level:  -17.0 dBFS

Livewire audio nominal level: -20dBFS      Record trim: +3.0 dB

   Playback trim: -3.0 dB

Tip: Press F2 to fill in channel numbers in sequence.  
Note: You may need to restart Windows after changing device mode.



Version 2.3 for software version 2.4.6 and later, 15 November, 2006

## **IMPORTANT NOTE:**

Axia nodes are intended for use with an Ethernet Switch that supports multicast and QOS (Quality of Service). On a non-switched Ethernet hub, or a switch that is not enabled for multicast, this will result in network congestion that could disrupt other network activity. Should you wish to connect a node to a non-Livewire network for access to the web configuration interface, etc, you must first confirm that streaming is disabled as described in Section 2 page 6 “Programming the Node’s Streaming Mode”.

## **USA Class A Computing Device Information To User. Warning:**

This equipment generates, uses, and can radiate radio-frequency energy. If it is not installed and used as directed by this manual, it may cause interference to radio communication. This equipment complies with the limits for a Class A computing device, as specified by FCC Rules, Part 15, Subpart J, which are designed to provide reasonable protection against such interference when this type of equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference. If it does, the user will be required to eliminate the interference at the user’s expense. NOTE: Objectionable interference to TV or radio reception can occur if other devices are connected to this device without the use of shielded interconnect cables. FCC rules require the use of only shielded cables.

## **Canada Warning:**

“This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the Radio Interference Regulations of the Canadian Department of Communications.” “Le present appareil numerique n’emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques (de les Class A) prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.”

## **Important Safety Information**

To reduce the risk of electrical shock, do not expose this product to rain or moisture. Keep liquids away from the ventilation openings in the top and rear of the unit. Do not shower or bathe with the unit.

## **Caution**

The installation and servicing instructions in the manual are for use by qualified personnel only. To avoid Electric Shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel.

## **Electrical Warning**

To prevent risk of electric shock: Disconnect power cord before servicing.

This equipment is designed to be operated from a power source that includes a third “grounding” connection in addition to the power leads. Do not defeat this safety feature. In addition to creating a potentially hazardous situation, defeating this safety ground will prevent the internal line noise filter from functioning.

## **Ventilation Warning**

The Axia 8x8 node uses convection cooling. Do not block the ventilation openings in the side of the unit. Failure to allow proper ventilation could damage the unit or create a fire hazard. Do not place the unit on a carpet, bedding, or other materials that could interfere with the rear and top panel ventilation openings.

# Customer Service

## We support you...

### **By Phone/Fax in the USA.**

- Customer service is available from 9:30 AM to 6:00 PM USA Eastern Time, Monday through Friday at +1 216.241.7225. Fax: +1 216.241.4103.

### **By Phone/Fax in Europe.**

- Service is available from Axia Europe in Germany at +49 81 61 42 467. Fax: +49 81 61 42 402.

### **By E-Mail.**

- The address is **Support@AxiaAudio.com**.

### **Via World Wide Web.**

- The Axia Web site has a variety of information which may be useful for product selection and support. The URL is **<http://www.AxiaAudio.com>**.

## Feedback

We welcome feedback on any aspect of Axia products or this manual. In the past, many good ideas from users have made their way into software revisions or new products. Please contact us with your comments.

## Updates

The operation of the Axia node is determined largely by software. Periodic updates may become available - to determine if this is the case check our web site. Contact us to determine if a newer release is more suitable to your needs.

Our electronic newsletter has announcements of major software updates for existing products, as well as keeping you up to date on the latest Axia, Telos, and Omnia product releases. To subscribe go to:

<http://www.axiaaudio.com/news/eNews.htm>

## Trademarks

Telos Systems, Axia Audio, Livewire, the Livewire Logo, the Axia logo, SmartSurface, SmartQ, Omnia, the Omnia logo, and the Telos logo, are trademarks of TLS Corporation. All other trademarks are the property of their respective holders.



### **Axia Audio**

2101 Superior Ave. Cleveland, OH 44114 USA  
+1 (216) 241-7225  
[Inquiry@AxiaAudio.com](mailto:Inquiry@AxiaAudio.com)

### **Axia Europe**

Johannisstraße 6, 85354 Freising, Germany  
+49 81 61 42 467  
[Inquiry@AxiaAudio.com](mailto:Inquiry@AxiaAudio.com)

Copyright © 2005 by TLS Corporation. Published by Axia Audio. We reserve the right to make improvements or changes in the products described in this manual, which may affect the product specifications, or to revise the manual without notice. All rights reserved.

## Notice

All versions, claims of compatibility, trademarks, etc. of hardware and software products not made by Axia mentioned in this manual or accompanying material are informational only. Axia makes no endorsement of any particular product for any purpose, nor claims any responsibility for operation or accuracy.

## Warranty

This product is covered by a one year limited warranty, the full text of which is included in the rear section of this manual.

## Service

You must contact Axia before returning any equipment for factory service. Axia will issue a Return Authorization number, which must be written on the exterior of your shipping container. Please do not include cables or accessories unless specifically requested by the Technical Support Engineer at Axia. Be sure to adequately insure your shipment for its replacement value. Packages without proper authorization may be refused. US customers please contact Axia technical support at +1 (216) 241-7225. All other customers should contact their local representative to arrange for service.

We strongly recommend being near the unit when you call, so our Support Engineers can verify information about your configuration and the conditions under which the problem occurs. If the unit must return to Axia, we will need your serial number, located on the rear panel.

## About This Manual

This manual covers the details of the Axia IP-Audio Driver for use with computers running the Windows ® operating system. However it is assumed in this document that you are familiar with Livewire's basic concepts, as outlined in the companion Introduction to Livewire manual.

If you have not done so, please review that material first. In it we explain the ideas that motivated Livewire and how you can use and benefit from it, as well as nitty-gritty details about wiring, connectors, and the like. Since Livewire is built on standard networks, we also help you to understand general network engineering so that you have the full background for Livewire's fundamentals. After reading Introduction to Livewire you will know what's up when you are speaking with gear vendors and the network guys that are often hanging around radio stations these days.

As always, we welcome your suggestions for improvement. Contact Axia Audio with your comments:

### **Axia Audio, a Telos Company**

2101 Superior Avenue

Cleveland Ohio 44114 USA

Phone: +1.216.241.7225

Web: [www.AxiaAudio.com](http://www.AxiaAudio.com)

E-Mail: [Inquiry@AxiaAudio.com](mailto:Inquiry@AxiaAudio.com)

# Table of Contents

Warranty . . . . .	iv
Service . . . . .	iv
About This Manual . . . . .	iv
Notes From the Founder/CEO of Telos . . . . .	vi
A Note From The President of Axia . . . . .	vii
<b>Chapter 1: Introducing the Axia IP-Audio Driver . . . . .</b>	<b>1</b>
Description . . . . .	1
<b>Chapter 2: Installation and Configuration . . . . .</b>	<b>3</b>
Axia IP-Audio Driver VS Axia IP-Audio Multichannel . . . . .	3
<i>Installing Axia IP-Audio Driver 1.2.x</i> . . . . .	3
<i>Configuring Axia IP-Audio Driver</i> . . . . .	3
<i>Windows XP Firewall Settings</i> . . . . .	5
Using and Configuring the Axia IP-Audio Driver as a Playback Device . . . . .	5
<i>Mixing Multiple Devices to an Axia Playback Device</i> . . . . .	5
<i>Using Axia IP-Audio for playback/ recording to/from the Livewire LAN.</i> . . . . .	6
<b>Chapter 3: Advanced Features . . . . .</b>	<b>7</b>
The IP-Audio Driver GPIO Module . . . . .	7
<i>Starting the GPIO Module</i> . . . . .	7
<i>Loading a GPIO Profile</i> . . . . .	7
<i>Livewire Statistics</i> . . . . .	7
<i>Manual Configuration of the GPIO Module</i> . . . . .	7
USING Axia Driver WITH The Standard Windows™ Multimedia Interface . . . . .	9
<i>Setting Sources and Destinations for Software Applications.</i> . . . . .	9
<i>Setting Recording and Playback Levels</i> . . . . .	9
<b>Appendix . . . . .</b>	<b>11</b>
Explanation of the Windows GPIO Bridge Service . . . . .	11
<i>GPIO Profile File Format</i> . . . . .	11
<i>Windows Class Name.</i> . . . . .	11
<i>Sending Windows Messages</i> . . . . .	11
<i>Sending UPD messages</i> . . . . .	11
<i>Windows GPIO/TCP IP Direct Interface.</i> . . . . .	12
<i>PC NIC Card Recommendations.</i> . . . . .	13
<i>Recommended List</i> . . . . .	13
<i>NOT Recommended List</i> . . . . .	13

<i>Removing Axia IP-Audio Driver</i> . . . . .	13
<i>Slaving Informaion</i> . . . . .	14
<i>How To Read the Transmit (to the network) Information</i> . . . . .	14
<i>How to Read the Receive (from the netwoprk) Information</i> . . . . .	14
<i>Performance monitor.</i> . . . . .	14
Windows XP Firewall Setting . . . . .	17

<b>Specifications &amp; Warranty . . . . .</b>	<b>18</b>
Axia System Specifications . . . . .	18
<i>Microphone Preamplifiers</i> . . . . .	18
<i>Analog Line Inputs</i> . . . . .	18
<i>Analog Line Outputs</i> . . . . .	18
<i>Digital Audio Inputs and Outputs</i> . . . . .	18
<i>Frequency Response</i> . . . . .	19
<i>Dynamic Range.</i> . . . . .	19
<i>Equivalent Input Noise</i> . . . . .	19
<i>Total Harmonic Distortion + Noise</i> . . . . .	19
<i>Crosstalk Isolation and Stereo Separation and CMRR</i> . . . . .	19
<i>Power Supply AC Input</i> . . . . .	19
<i>Operating Temperatures</i> . . . . .	19
<i>Dimensions and Weight</i> . . . . .	19

<b>Axia Node Limited Warranty . . . . .</b>	<b>20</b>
---	-----------

## A Note From The Founder/CEO of Telos

It's been a tradition since Telos' very first product, the Telos 10 digital phone system, that I share a few words with you at the beginning of each manual. So here goes.

In radio broadcast studios we're still picking up the pieces that have fallen out from the digital audio revolution. We're not using cart machines anymore because PCs are so clearly a better way to store and play audio. We're replacing our analog mixing consoles with digital ones and routing audio digitally. But we're still using decades-old analog or primitive digital methods to connect our gear. Livewire has been developed by Telos to provide a modern PC and computer network-oriented way to connect and distribute professional audio around a broadcast studio facility.

Your question may be, "Why Telos? Don't you guys make phone stuff?" Yes, we certainly do. But we've always been attracted to new and better ways to make things happen in radio facilities. And we've always looked for opportunities to make networks of all kinds work for broadcasters. When DSP was first possible, we used it to fix the ages-old phone hybrid problem. It was the first use of DSP in radio broadcasting. When ISDN and MP3 first happened, we saw the possibility to make a truly useful codec. We were the first to license and use MP3 and the first to incorporate ISDN into a codec. We were active in the early days of internet audio, and the first to use MP3 on the internet. Inventing and adapting new technologies for broadcast is what we've always been about. And we've always been marrying audio with networks. It's been our passion right from the start. In our genes, if you will. As a pioneer in broadcast digital audio and DSP, we've grown an R&D team with a lot of creative guys who are open-eyed to new ideas. So it's actually quite natural that we would be playing marriage broker to computer networks and studio audio.

What you get from this is nearly as hot as a couple on their wedding night: On one RJ-45, two-way multiple audio channels, sophisticated control and data capability, and built-in computer compatibility. You can use Livewire as a simple sound card replacement – an audio interface connecting to a PC with an RJ-45 cable. But



add an Ethernet switch and more interfaces to build a system with as many inputs and outputs as you want.

Audio may be routed directly from interface to interface or to other PCs, so you now have an audio routing system that does everything a traditional "mainframe" audio router does – but at a lot lower cost and with a lot more capability. Add real-time mixing/processing engines and control surfaces and you have a modern studio facility with many advantages over the old ways of doing things. OK, maybe this is not as thrilling as a wedding night – perhaps kissing your first lover is a better analogy. (By the way, and way off-topic, did you know that the person you were kissing was 72.8% water?)

While we're on the subject of history... you've probably been soldering XLRs for a long time, so you feel a bit, shall we say, "attached" to them. We understand. But no problem – you'll be needing them for microphones for a long while, so your withdrawal symptoms won't be serious. But your facility already has plenty of Ethernet and plenty of computers, so you probably already know your way around an RJ-45 as well. It's really not that strange to imagine live audio flowing over computer networks, and there's little question that you are going to be seeing a lot of it in the coming years.

The 20<sup>th</sup> century was remarkable for its tremendous innovation in machines of all kinds: power generators, heating and air conditioning, cars, airplanes, factory automation, radio, TV, computers. At the dawn of the 21<sup>st</sup>, it's clear that the ongoing digitization and networking of text, audio, and images will be a main technology story for decades to come, and an exciting ride for those of us fortunate to be in the thick of it.

Speaking of years, it has been a lot of them since I wrote the Zephyr manual intro, and even more since the Telos 10 – 20 years now. Amazing thing is, with all the change around us, I'm still here and Telos is still growing in new ways. As, no doubt, are you and your stations.

Steve Church

## A Note From The President of Axia

20 years ago, I designed my first broadcast console for PR&E. I look back on that time with great fondness; we were building bullet-proof boards for the world's most prestigious broadcasters, making each new console design bigger and fancier to accommodate a wider variety of source equipment and programming styles. The console was the core of the studio; all other equipment was on the periphery.

Then things changed: the PC found its way into broadcast audio delivery and production. At first, PC audio applications were simple, used only by budget stations to reduce operating expenses. But soon the applications evolved and were embraced by larger stations. Slowly, the PC was taking center stage in the radio studio.

Like many, I was captivated by the PC. Stations retired carts, phonographs, open-reel decks, cassettes — even more modern digital equipment such as DAT and CD players, replacing all with PC apps. Client/server systems emerged and entire facilities began using PCs to provide most — or all — of their recorded audio. Yet consoles continued to treat PCs as nothing more than audio peripherals. I knew that we console designers were going to have to rethink our designs to deal with computer-centric studios.

During this time, traditional broadcast console companies began producing digital versions. But early digital consoles were nearly identical in form and function to their analog predecessors. It took a fresh look from a European company outside broadcasting to merge two products — audio routing switchers and broadcast consoles — into a central processing engine and attached control surface. Eventually nearly every console and routing switcher company followed suit, and a wide variety of digital “engines” and control surfaces flooded the market.

But, advanced as these integrated systems were, they still handled computer-based audio sources like their analog ancestors. Sure, the router and console engine were now integrated, but the most important studio element — the PC — was stuck in the past, interfaced with 100-year-old analog technology. The PC and console couldn't communicate in a meaningful way — strange,

considering that PCs everywhere were being networked, fast becoming the world's most popular and powerful communication tool.

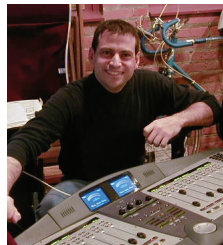
Then a group of Telos engineers developed a method of using Ethernet to network real-time audio devices, allowing computers and consoles, controllers and peripherals to interact smoothly and intelligently. Powerful, flexible networks had finally come to our studios. As with the transition from carts to computers, the benefits are many and impressive. A few networked components can replace routing switchers, consoles, processing peripherals, sound cards, distribution amps, selector switches and myriad related devices.

This deceptively simple networked system costs a fraction of other approaches, yet has capabilities surpassing anything else. The system is modular and can be used to perform discrete functions in a traditional environment. Concurrently, it easily scales to serve both the humblest and the very largest of facilities. Console, router, and computer work in harmony.

So, equipped with this new technology and countless ideas, we launch *Axia*, the newest division of Telos. *Axia* is all about delivering innovative networked audio products to future-minded broadcasters. On behalf of our entire team, I welcome you as a charter client. *Axia* is the culmination of nearly 40 man-years of some of the most ambitious R&D ever applied to the radio industry. And this is only the beginning. We have more products, innovations, and partnerships in the pipeline.

You already know your *Axia* system is unlike anything else. So it shouldn't be surprising that your new system is loaded with new thinking, new approaches, and new ideas in virtually every conceivable area. Some concepts will challenge your traditional ideas of studio audio systems, but we're certain that once you have experienced the pleasures of the networked studio, you'll never want to go back. And now, for something completely different...

Michael “Catfish” Dosch







# Chapter One:

## Introducing the Axia IP-Audio Driver

This manual is written with the assumption that you have read the Introduction to Livewire document. While the Axia Livewire technology is easy to use in powerful ways, it does represent a radical new way of thinking for broadcasters. That document will serve to get your feet wet and to orient you. We highly recommend you review that document first, before building a Livewire audio system or reading this manual.

### Description

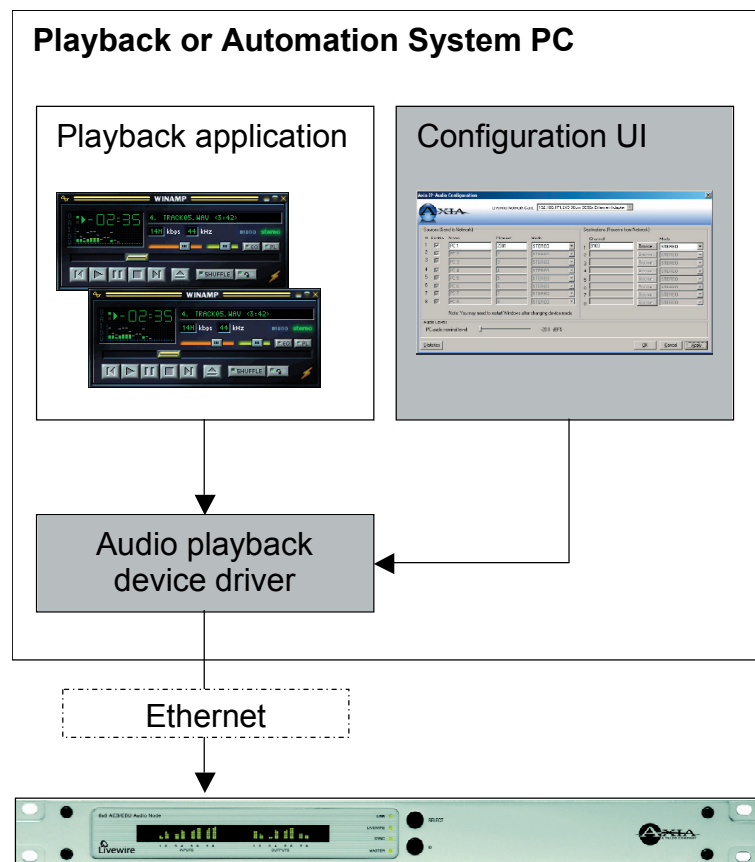
The Axia IP-Audio Driver is the software interface between your PC audio applications and the Livewire network. It provides the following functions:

- Software interface for audio “sources” to be sent to the Livewire network from PC/Windows audio applications, such as delivery systems and other audio players.
- Software interface to receive audio from the Livewire network to “destinations” on the PC/Windows system such as audio editor applications.
- A ‘GPIO’ function to convey “button-press” data from the Livewire network to “destination” applications, such as when a control surface fader start button commands PC/Windows-based audio player to start playback (OEM version only)

Axia IP-Audio Driver for Windows allows integrating Windows multimedia system with an Axia Livewire audio network. There are wide variety of applications where Axia nodes devices and the Windows software are used together.

Axia Nodes can be simply used as high quality remote 8-channel audio input/output devices, see Scenario 1. Or, Livewire technology can completely eliminate audio input/output devices by simply allowing multiple computers to send audio over the Livewire network, see Scenario 2. In both cases the Axia IP-Audio Driver interfaces through Windows to appear as an audio input/output device(s).

This software package also contains GPIO module that allows controlling any application from Smart Surface or Element console (Supported in only the OEM version only.).



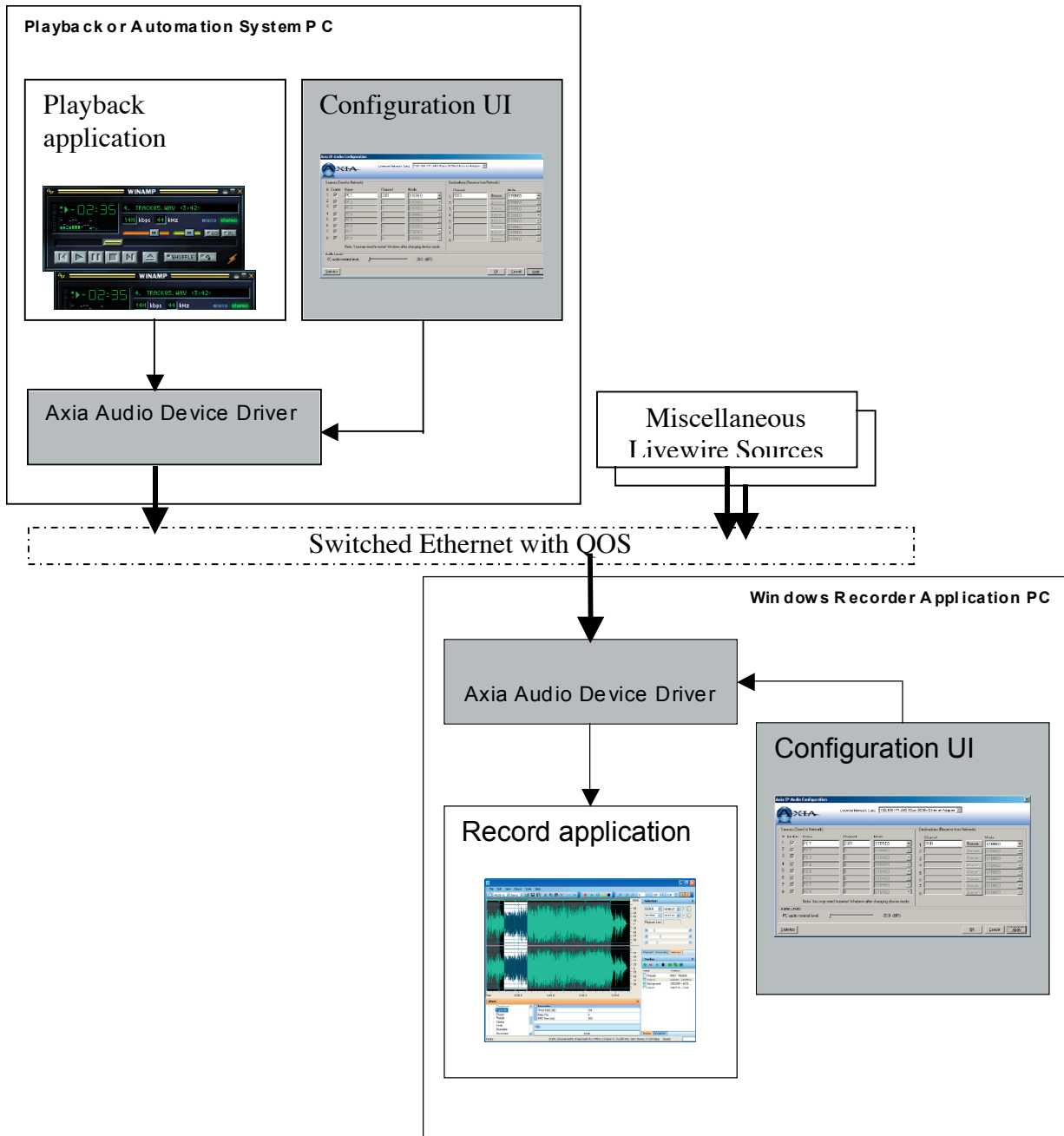
Scenario 1: Axia node as a remote sound card

In this example a remote Axia node acts as a sound card, permitting audio input and output to the computer from the node:

Scenario 2: Automation and/or Recorder PC (no sound card required)

In this scenario an Automation System places a Livewire stream on the Livewire audio network. This stream is available on the network and can be monitored by Axia nodes or an Axia IP-Audio Driver-equipped PC, as shown below.

The driver provides all software components needed to record and play Livewire streams using standard recording software for Windows.



# Chapter Two:

## Installation and Configuration

*Here's the nitty gritty.*

### Axia IP-Audio Driver vs Axia IP-Audio Multi Channel

The Axia IP-Audio Driver version supports emulates a single sound card, with one stereo (or surround) audio output device and one stereo (or surround) audio input device. This version is suitable for typical playback or recording applications. Axia IP-Audio Multichannel (OEM version) emulates 16 sound cards\*, with one stereo (or surround) audio output device and one stereo (or surround) audio input device per “sound card”. It is intended for more complex professional applications. Other than the number of inputs the two drivers are the same. The following information applies to both drivers, with the understanding that the number of inputs and outputs is different as mentioned above.

\* Emulates 8 Sound Cards on a Windows 2000 installation due to Windows OS limitations on sound devices.

### Installing Axia IP-Audio Driver

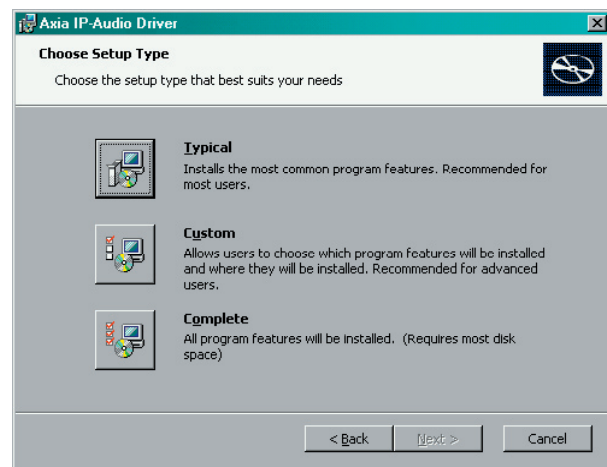
The Axia IP-Audio driver supports the following OS platforms:

- Microsoft Windows 2000 Pro
- Windows XP. (See appendix for XP firewall issues)

If you are running a recent version of the operating systems, or have installed the latest “service pack” from Microsoft, installation will go smoothly. In the rare case where the installer gives an error message, indicating that the installer is outdated, when installation is attempted, then you must install the latest service pack from Microsoft. Alternatively you can download the required Microsoft Installer 2.0 from <http://www.microsoft.com/downloads/>.

To install the Axia IP-Audio driver follow these steps:

1. Double-click the executable file to start the installation process. Use NEXT button to proceed with the installation.
2. Choose the desired installation. Typical is recommended and should be used. It will install Axia IP-Audio driver, Livewire terminal and GPIO modules.
3. You will be prompted for license number and license key. This information can be found in the CD-case in which your installation disk was delivered. Enter this information and press ENTER to proceed with the installation. Once installation is complete, proceed to configure the driver as described in the next section.



### Configuring Axia IP-Audio Driver

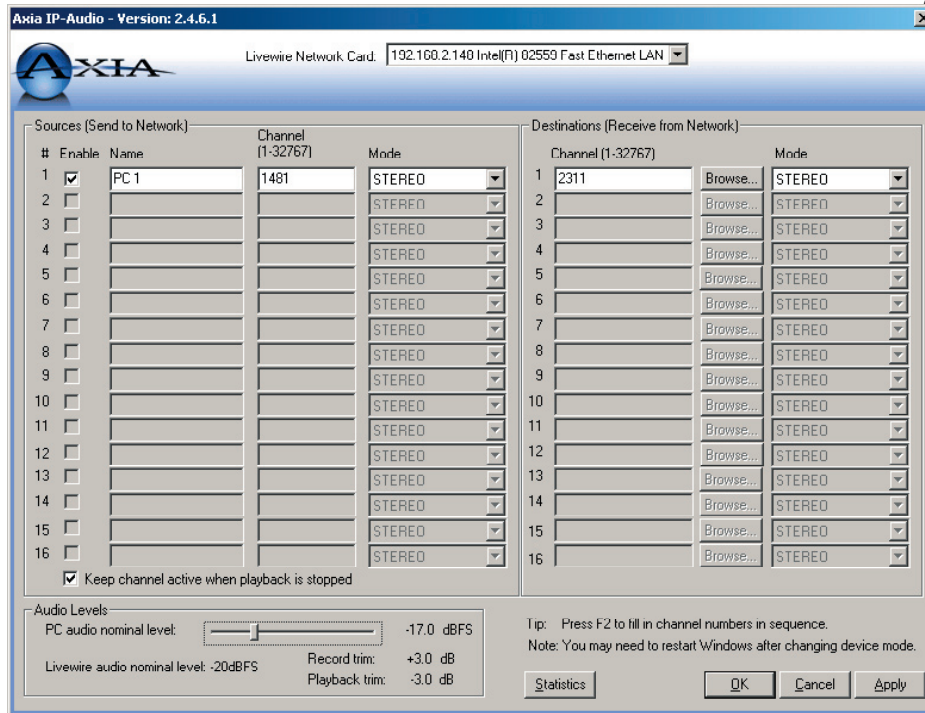
After all files are installed on your system, Axia IP-Audio Configuration window will appear, as shown below (you can access this configuration screen at any time from the Control Panel):

**To configure the Axia IP-Audio driver follow these steps:**

1. If your computer has multiple Network Interface Cards (NICs) installed make sure that network card connected to the Livewire audio LAN is selected from the pull down menu Livewire Network Card.
2. For the Multi-Channel driver enable as many devices as you intend to use. Note: Single Channel version permits only one input and one output audio device.
3. GPIO – (only on Multi-Channel driver install) This

button allows configuration of the GPIO module that allows sending and receiving commands to control the console and fire events on the PC. If you will be interfacing software on this computer to be remotely controlled by an Axia audio mixer control surface

fader LEFT to change the nominal level more towards the actual nominal level of the Axia network. For adjusting input and output levels individually to the PC application use the Windows Volume controls/Mixer options.



KEEP CHANNEL ACTIVE option. This option is to eliminate truncating of audio from certain playback applications that could result in pops and clicks of the audio when monitored. This will keep the stream from the PC actively sending a valid stream even when the playback device is NOT playing, hence it will send a stream that is silent audio. Typically enabled for those PCs using an On-Air automation system.

Click on the OK button to accept your settings and enable the driver. You can return to this window and customize your settings

(such as the Smartsurface) you will need to configure this. For more on this see section 3.

4. Statistics – This button opens a window with packet counters and other information that may be used to verify that Livewire driver works properly. This is described more fully later in this manual. For now you can leave the default settings
5. PC Audio Nominal Level – The slide fader adjustment is a global setting for both input and output levels. It is used only as a one time trim setting and denotes the NOMINAL Operating Level of the audio into and out of the PC. Axia Devices operate at a NOMINAL -20dBFS level. The default setting of -8dBFS implies that the audio from the PC is very high. This would increase the input audio by 12dBFS to the PC and decrease the output of the PC audio to the Axia network by 12dBFS in order to obtain the -20dBFS nominal level. If your PC audio out appears too low on nodes or on a console, slide the

from the Control Panel.

---

**DEEP TECH NOTE:** Livewire channel is an abstraction simplifying user setup. The channel number is translated to multicast addresses for internal use (239.192.0.0/13 range for Stereo Audio, 239.194.0.0/13 for Surround) . The user need only assign a Livewire Channel. For more on this see the document Introduction to Livewire.

---

By default, the source is configured to send audio to Livewire channels 1 (1 though 8 for the Multi-Channel driver). For simple applications those settings do not have to be changed unless you have another device assigned with those channel numbers. More complex Livewire networks you should consider changing the channel numbers to a unique higher range.

One port of a Livewire Analog or AES 8x8 node can be connected to the PC as an audio output device. For the

Multi-Channel driver all 8 output ports can be configured to receive audio on channels 1 through 8 by default and can be configured from the front panel. Individual inputs and outputs can be assigned non-contiguous channels using the Axia node's browser interface. See Introduction to Livewire for more on channel assignments.

## Windows XP Firewall Settings

Installation to Windows XP requires some added firewall settings to work properly even if the firewall is DISABLED. XP still does filtering of ports as a security measure. This version will automatically enter the required Firewall settings in XP. If you need to manually enter exceptions to ports, or verify the installation of the exceptions, the list of port requirements are below:

Navigate to My Network Places and view the available network connections. Select the NIC interface used by the Livewire Driver and enter the PROPERTIES of the NIC. Go to the FIREWALL Settings of the NIC and go to the EXCEPTIONS tab:

The following ports will need to be exempted from being blocked:

Livewire Advertisement	4001	UDP
Livewire Advertisement Req	4000	UDP
Livewire Clock	7000	UDP
Livewire Source Allocation	2060	UDP
Audio Streams	5004	UDP

Example of settings can be seen in the Appendix..

## Using And Configuring The Axia IP-Audio Driver As a Playback Device

Configure your player application to use Axia IP-Audio Output device 01.

---

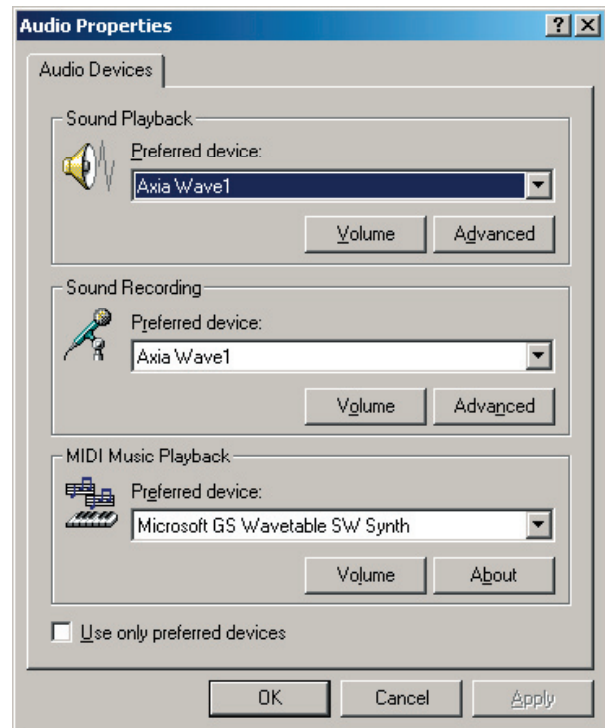
**Note:** Standard version allows only one input and one output audio device.

---

Most playback applications use a drop down menu to list all available audio output devices; simply choose

from the list. If you are using Axia IP-Audio Multichannel you can configure up to 16 player applications to simultaneously stream audio to the Livewire LAN.

You may also want to specify one of Livewire Axia IP-Audio Output devices as the “preferred device” in



Windows Sound and Multimedia Properties control panel, as shown below.

Once you start playback on the selected Axia IP-Audio Output device, the driver will start generating stream of network packets to one of Livewires 32767 channels, as configured above. Livewire nodes configured to receive audio on that channel will receive the audio data. If the lowest (bottom) segment of the output audio meters are illuminated this indicates that the stream is present, even if the audio source is currently silent. For more on Livewire Channels see the document Introduction to Livewire.

## Mixing Multiple Devices to an Axia Playback Device

Windows provides for mixing multiple sources to a



specified playback channel when more than one application uses the same Audio Device. Also the LW driver Line input can be mixed to the LW driver Line output to allow monitoring of recorded audio. Standard tools can be used to control the mixing, such as the Windows™ mixer application. See Setting Recording and Playback Levels in Section 3 for additional information.

## Using Axia IP-Audio For Playback/ Recording To/From The Livewire LAN

Make sure that your player application is configured to use Axia IP-Audio Input device 01 (or 01 – 08 for Multi-Channel driver). Many recording applications use a drop down menu to list all available audio output devices; simply choose from the list.

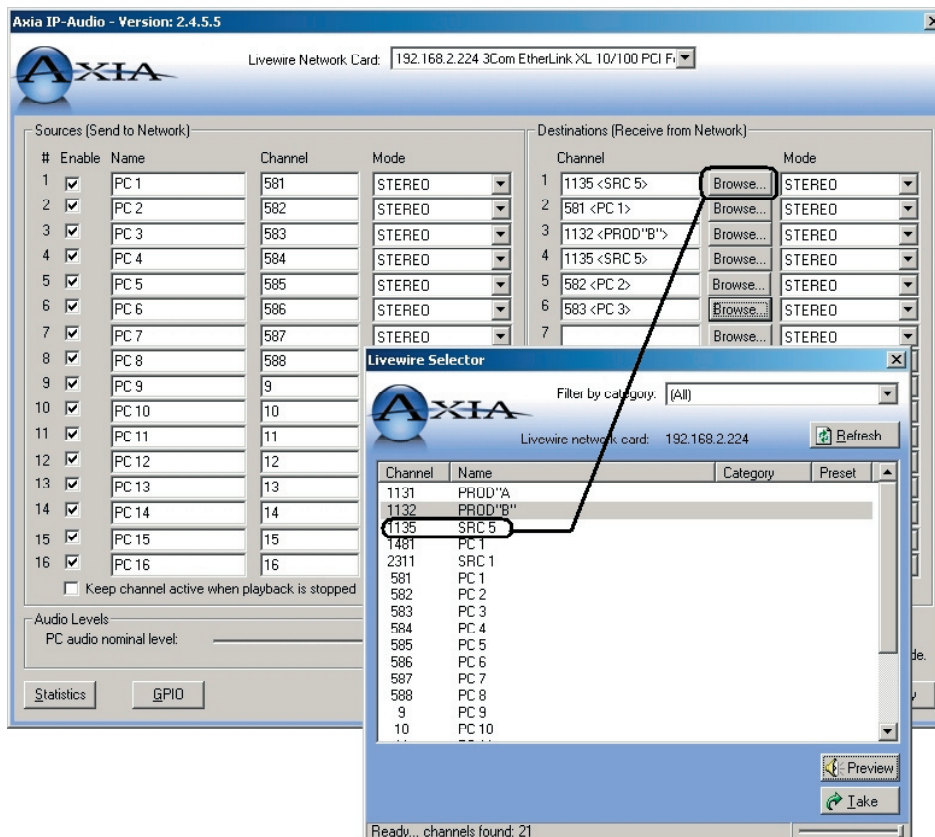
You may also wish to specify one of the Axia IP-Audio Input Devices as the preferred “Sound Recording” device in Windows Sound and Multimedia Properties control panel, as shown above. This specifies the Axia IP-Audio Input device for recording on applications that

do not allow input device selection.

If you have not already done so, Configure Destination Channel with the desired Livewire channel number from which the Audio Input device will receive audio.

To do so, click on the Browse button and a Livewire Selector window will appear as shown below, allowing you to choose a source stream.

When you start recording, the Axia IP-audio driver will pick up the designated Livewire stream from the audio network.



# Chapter Three:

## Advanced Features

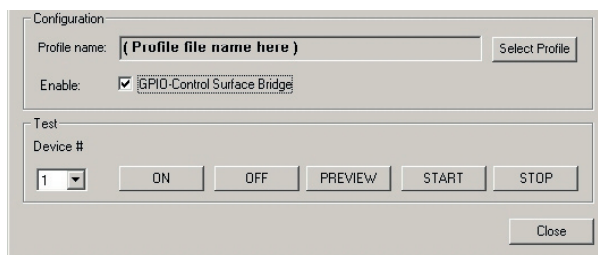
Information on the GPIO function, Livewire performance statistics, using standard players to listen to Livewire streams, and how the driver interacts with standard Windows™ devices.

### The IP-Audio Driver GPIO Bridge Service

Clicking on the GPIO button from the Axia IP-Audio Configuration screen permits configuration of the GPIO module. (Only available on the OEM Multi-Channel Driver) This allows remote devices such as the SmartSurface or Element consoles to send commands to applications on the Windows™ computer running the Axia IP-Audio Driver. This is a one-way communication between Axia consoles and the LW driver. If you will be interfacing software on this computer to be remotely controlled by an Axia audio mixer control surface you will need to configure this option.

### Starting the GPIO Module

Pressing the GPIO button the above screen will display. Using a profile from your software vendor enter



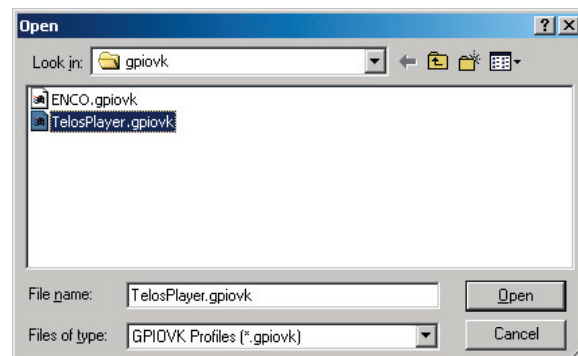
the location of the file in the appropriate field. If you do not have one we have a couple of profiles archived on our FTP site. Contact our Support department for help downloading these files. Text versions of these files are found in the Appendix of this manual.

To activate the GPIO component place a check mark to ENABLE the GPIO bridge application. Leaving this option enabled will start this program automatically when Windows starts. Clicking the Close button will close the Configuration Window while leaving the GPIO module running.

### Loading a GPIO Profile

If the manufacturer of your PC software is an Axia partner they will have provided you with a GPIO profile to configure the GPIO module for you. To load a profile:

1. Click on the Select Profile button. A standard Open file dialog will be displayed, as shown below
2. Using the usual Windows procedures locate the GPIOVK file (on the manufacturer's CD-ROM for example) then click on OPEN.



For more information regarding the GPIO Bridge service see the Appendix at the end of this manual.

### Livewire Statistics

Playback applications send audio data to the Axia IP-Audio driver. The driver packages the audio into Livewire audio packets and sends them out the selected network interface to the Livewire LAN. Livewire Statistics window provides counters for all Livewire Output and Input devices.

To assure reliable low-delay audio delivery, Livewire provides synchronization between terminals. The Axia IP-Audio Driver receives clock information from hard-

ware nodes on the Axia Livewire LAN (you must have at least one Hardware node on the network). To make sure the Axia IP-Audio driver is on-line and receiving this synchronization (e.g. the driver's PLL is locked) check that the Synchronization Lost value is not incrementing in the Livewire Statistics window. When the clock signal not available, this value will increase and the Packets Received value will STOP.

Additional information is made available to you in order to troubleshoot the connection of the driver to the network. Jitter value must be below 50 ms. Higher values of Jitter can indicate problems with the hardware or the driver.

**TxPkts-** Transmitted Packets to the Axia Network. When local audio is streamed to the network TxPkts counter will increment at 200pkts/s rate.

**TxEr-** Transmitted Errors to the Axia Network. TxErr counter should never increment. If it does, there are some serious performance problems with Windows system or network hardware or software stack.

**RxPkts-** Received Packets from the Axia Network. RxPkts shows receive packet count. It should be

200pkts/s when receiving Standard Streams, and 4000pkts/s when receiving Livestreams. Note the difference in packet rate. Some systems may have performance problems with receiving Livestreams.

**RxBytes-** Received Bytes from the Axia Network.

**RxUr-** Received UnderRuns from the Axia Network. Notes malformed packets received.

**RxOr-** Received Overruns from the Axia Network. Notes malformed packets received.

**RxSeqErr-** Received Sequenced Errors from the Axia Network. Every time Livewire streams starts to receive a new Livewire channel, new packet sequence will be coming into the receiver. You will see RxSeqErr incremented once. It should not increment while receiving a constant stream.

It is normal to see an occasional error in the Errors columns but excessive errors on these indicate a serious problem. Examine your networking cabling or suspect a problem with your NIC card. Not all NIC cards are created equal. See our list of currently approved and blacklisted NIC cards in the Appendix. For additional

Livewire Statistics										
Slaving information:										
Adjustment:	144	Jitter [ms]:	22							Clear
Synchronization lost:	1	Jitter must be <50ms. Higher values indicate presence of hardware or drivers preventing system from performing real-time operations.								
Packets received:	7647									
#	TxPkts	TxEr	RxPkts	RxBytes	RxUr	RxOr	RxSeqErr	RxState		
1	0	0	0	0	0	0	0	buffering (0 bytes)		
2	0	0	0	0	0	0	0	buffering (0 bytes)		
3	0	0	0	0	0	0	0	buffering (0 bytes)		
4	0	0	0	0	0	0	0	buffering (0 bytes)		
5	0	0	0	0	0	0	0	buffering (0 bytes)		
6	0	0	0	0	0	0	0	buffering (0 bytes)		
7	0	0	0	0	0	0	0	buffering (0 bytes)		
8	0	0	0	0	0	0	0	buffering (0 bytes)		
9	0	0	0	0	0	0	0	buffering (0 bytes)		
10	0	0	0	0	0	0	0	buffering (0 bytes)		
11	0	0	0	0	0	0	0	buffering (0 bytes)		
12	0	0	0	0	0	0	0	buffering (0 bytes)		
13	0	0	0	0	0	0	0	buffering (0 bytes)		
14	0	0	0	0	0	0	0	buffering (0 bytes)		
15	0	0	0	0	0	0	0	buffering (0 bytes)		
16	0	0	0	0	0	0	0	buffering (0 bytes)		



troubleshooting tips using the LW Statistics Window see the Appendix.

## Using Axia Driver With The Standard Windows™ Multimedia Interface

Livewire sources (e.g. audio sources on the Livewire Network) are mapped to Sound Playback devices. To Windows, the Axia IP-Audio driver appears to be just like any other Sound Playback Device. Playback applications use these devices. They may have a way of selecting a Playback Device or they may simply use the Preferred Device selected in the Windows Sounds and Multimedia Properties control panel.

Livewire destinations (e.g. audio software capable of accepting audio on the Livewire enabled computer) are mapped to Sound Recording devices. Miscellaneous recording, audio editing and logging applications use those devices to determine the audio source to be recorded. These may have a way of selecting a Sound Recording Device or they may simply use the Preferred Device selected in the Windows Sounds and Multimedia Properties control panel.

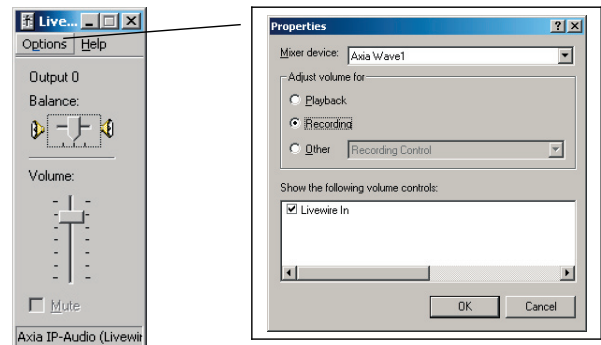
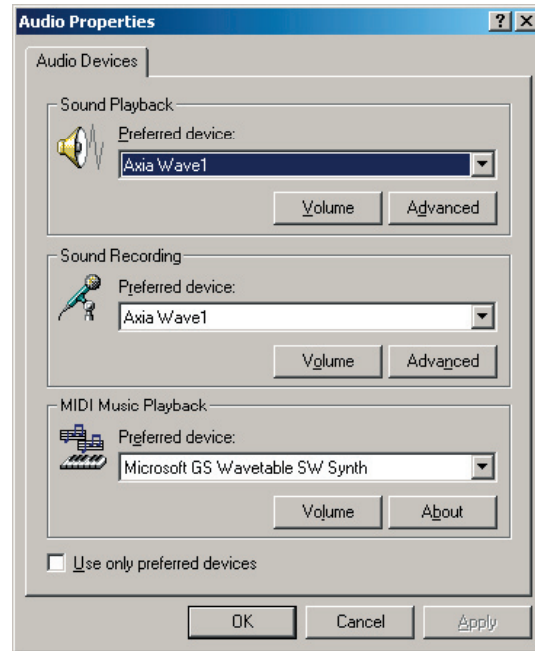
### Setting Sources and Destinations for Software Applications

Often playback or recording software have their own custom dialog used to assign playback and recording devices. If they do not, the default settings for Sound Playback and Sound Recording devices can be configured using the Windows Sounds and Multimedia Properties Control Panel.

### Setting Recording and Playback Levels

Windows also offers tools for setting Playback and Record levels. To adjust these audio levels the, standard Windows Mixer application can be used, see below. Note that the mixer can only display Record or Playback at a given time. To change between these two functions choose options/properties to select Playback or Record-

ing for the Adjust volume for option as shown below. Some software chooses not to support the standard Windows Multimedia interface. You won't be able to use this software with Livewire without modification. Please contact your software vendor.





# Appendix:

*Here are a few useful bits of information we think might prove useful.*

## Explanation of the Windows GPIO Bridge Service

The Axia GPIO hardware unit is a device that provides a number of physical GPIO ports with 5 input and 5 output pins each for sending and receiving commands. The OEM Windows driver provides a separate GPIO port associated with each audio device hence it supports 16 ports. When the Axia Driver is used with Smart Surface or Element, the meaning of the GPO pins is defined in the control surface manuals, in the GPIO section. Automation systems should use “Line Source” type or “Computer Player” type.

Virtual GPO pins can control the automation system via the GPIO Bridge Service. The GPIO Bridge Service is a one way communication service designed to provide a simple user interface to accept the incoming logic commands from the Axia network to help to translate commands to customer’s or OEM PC applications in order to initiate events on the PC. The Bridge service cannot send messages FROM the PC back to the Axia Network.

## GPIO Profile File Format

The following technical information on sending Windows and UDP message is included for OEM’s developing GPIO Profiles for interfacing to their software packages.

### Profile File Format

These are ASCII test files.

## Windows Class Name

If you wish to send Windows™ messages the profile must contain a line that determines Window Class Name of the automation system main window. See WINCLASS= in example below.

## Sending Windows Messages

The file must contain a line that determines Window Class Name of the automation system main window. See WINCLASS= in example below.

Every event is represented by string in format DEV<d>.<e>, where <d> is audio device number (0-7), and <e> is event number (0-4) as specified in example below.

Example:

```
# Event constants:  
# 0 ON  
# 1 OFF  
# 2 PREV  
# 3 START  
# 4 STOP
```

```
WINCLASS=TPlayerMainForm
```

```
DEV0.3      MSG=0x40A      WPARAM=0  
LPARAM=1  
DEV0.4      MSG=0x40A      WPARAM=0  
LPARAM=0  
DEV1.3      MSG=0x40A      WPARAM=1  
LPARAM=1  
DEV1.4      MSG=0x40A      WPARAM=1  
LPARAM=0
```

```
[...]
```

## Sending UDP messages

The file must contain a line that determines destination UDP port (UDP\_DSTPORT=<port>).

Every event is represented by string in format DEV<d>.<e>, where <d> is audio device number (0-7), and <e> is event number (0-4) as specified in example below.

Example:

```
# Event constants:
# 0 ON
# 1 OFF
# 2 PREV
# 3 START
# 4 STOP
```

```
UDP_DSTPORT=2002
```

```
DEV0.3    COMMAND="<DADCMD><ID>99
999</ID><COMMAND>play pbk1</COMMAND></
DADCMD>"
```

```
DEV0.4    COMMAND="<DADCMD><I
D>99999</ID><COMMAND>stop pbk1</COM
MAND></DADCMD>"<DADCMD><ID>99999
</ID><COMMAND>next pbk1</COMMAND></
DADCMD>"
```

## Windows GPIO/TCP-IP Direct Inter- face

The Axia GPIO hardware unit is a device that provides a number of physical GPIO ports with 5 input and 5 output pins each for sending and receiving commands. The OEM Windows driver provides a separate GPIO port associated with each audio device hence it supports 16 ports.

When the Axia Driver is used with Smart Surface or Element, the meaning of the GPI and GPO pins is defined in the control surface manuals, in the GPIO section. Automation systems should use “Line Source” type or “Computer Player” type.

Virtual GPO pins control the automation system. Automation system can use virtual GPI pins to deliver GPIO events to Axia network.

Note that the GPIO Bridge Service only listens for the incoming messages and is not bi-directional. If the Windows application can connect directly to port 93 of

the local PC then bi-directional communication can be available and you don’t have to use the GPIO Bridge service.

## Connection

Client application opens TCP/IP connection to Axia server running locally on the PC and NOT to the Axia console. That server accepts connections on port 93.

## Commands

**ADD GPO** - Enables indications of GPO pin changes. Those are control messages for the automation system.

**ADD GPI** - Enables indications of GPI pin changes. Those are control messages sent from the automation system. This is useful when multiple clients control one GPI port.

**GPI <state>** - Automation system emulates input pin state changes. A GPIO event will be sent to Axia network. Note: client must send LOGIN command before issuing GPI.

**LOGIN** - Enables commands that change state of the device from client. Required before GPI.

**BEGIN .. END** - Define a block of commands that are sent at the same time. It is optional. Client can use them to optimize user interface updates for example, by delaying refresh operation after receiving BEGIN, until END is received.

State of GPIO port is encoded using character string containing: ‘l’, ‘L’, ‘h’, ‘H’, ‘x’ letters. The meaning of those symbols is the following:

l	steady low state
L	pin changed state from high to low
h	steady high state
H	pin changed state from low to high
x	can be used in GPI commands where pin state is not supposed to change

GPIO contact closures are active low. This implies that application typically would react to state changes from high to low – symbol ‘L’.

As the GPIO has 5 pins the state of each pin is expressed by two characters and the case of the character., eg:

```
C:\WINNT\system32\telnet
BEGIN
GPO 1 11111
END
GPO 1 HHHHH
GPO 1 LhhLh
GPO 1 lhhHh
GPO 1 HLhhL
GPO 1 h1hhH
GPO 1 LHhLh
GPO 1 lhHhH
```

In the case below shows Pin 1 of GPO port 1 changing from state of steady LOW to HIGH:

```
C:\WINNT\system32\telnet
BEGIN
GPO 1 11111
END
GPO 1 H1111
```

## PC NIC Card Recommendations

The Axia LW Driver requires a reliable network interface. Ethernet receive errors and dropped packets will result in audio discontinuities. If possible, please use a network card that we have in our “recommended” table. Avoid older Ethernet cards and controllers. Lots of them exhibit performance problems. Note that some Ethernet controllers supporting Gigabit Ethernet are less expensive than network cards using 10/100 chips. Gigabit Ethernet cards are more flexible and can be used with 10/100 networks as well.

It is important to check quality of your other networking equipment: Ethernet switches and cables. Please refer to “Troubleshooting Problems with Livewire Input and Output” for additional information.

### Recommended List (As of August 2006)

- Controller/Adapter {Comments}
- 3Com 3C905CX-TX-M {no comments}
- Intel PRO/1000 with 82541 {Tested Ethernet controllers integrated with motherboards/Tested PWLA8391GTBLK PCI Ethernet adapter}
- Linksys LNE100M {Driver Date: 7/5/2002 by Linksys Driver version: 3.10.0.343}
- SMC1244TX-1 with Realtek RTL8139 controller {Driver date: 7/1/2001 by Microsoft Driver version: 5.398.613.2003}

### NOT Recommended List (As of August 2006)

- Controller/Adapter {Comments}
- 3Com 3C905C-TX {Drops receive packets}
- Intel PRO/100+ M w/Chip GD82559 {Drops receive packets}
- Intel PRO/100 M w/Chip GD82551QM {Starts dropping receive packets after couple of minutes}
- DLink DGE-530T rev A1 {Drops receive packets, known to lock up PC}

If you have any additions to either list please email Axia Support with the make/model/rev/driver version and any comments you have. An updated list will eventually be posted on the Axia website as customers add to the database.

## Removing The Axia IP-Audio Driver

1. Launch the Add-Remove Programs Control Panel.
2. Select Axia IP-Audio Driver, and click “Remove”.

**All Components Installed In Your System Will Be Removed Automatically**

## Troubleshooting Problems With Livewire Input And Output Using The Livewire Statistics Window

Use Livewire Statistics window to see input/output streaming statistics. This window can be opened from the Front Panel -> Axia IP-Audio configuration window: Statistics button.

This window can be also opened by executing the following command: ‘rundll32 axiawow.cpl,AxiaStat’.

### **Slaving information:**

Synchronization is an essential part of Livewire system. A clock is distributed to all devices in the network, including the Windows Driver. Problems with the synchronization will cause audio dropouts.

Packets Received counter should increment all the time. If it does not, it means that: There is either no clock master on the network (all Axia Nodes are set as slaves-only)

A firewall is stopping clock stream (UDP port 7000 must be opened)

Multicast forwarding does not work in the network segment

Synchronization lost counter should only increment when the system starts, when the clock master changes, or some other network related changes are made. If it increments more, it may indicate some problems with the PC system clock or other network problems.

### **How to read the transmit (to the network) information:**

When local audio is streamed to the network TxPkts counter will increment at 200pkts/s rate.

TxErr counter should never increment. If it does, there are some serious performance problems with Windows system or network hardware or software stack. Check if your network card has 100Mbit full-duplex connection established to the Ethernet switch.

### **How to read the receive (from the network) information:**

RxPkts shows receive packet count. It should be 200pkts/s when receiving Standard Streams, and 4000pkts/s when receiving Livestreams. Note the difference in packet rate. Some systems may have performance problems with receiving Livestreams.

If there is no receive packets and the receiver is configured properly, there may be a firewall setup on the PC, which blocks the audio stream: UDP port 5004 should be opened.

Every time Livewire streams starts of receiver is set to receive a Livewire channel, new packet sequence is coming into the receiver. You will see RxSeqErr incremented once.

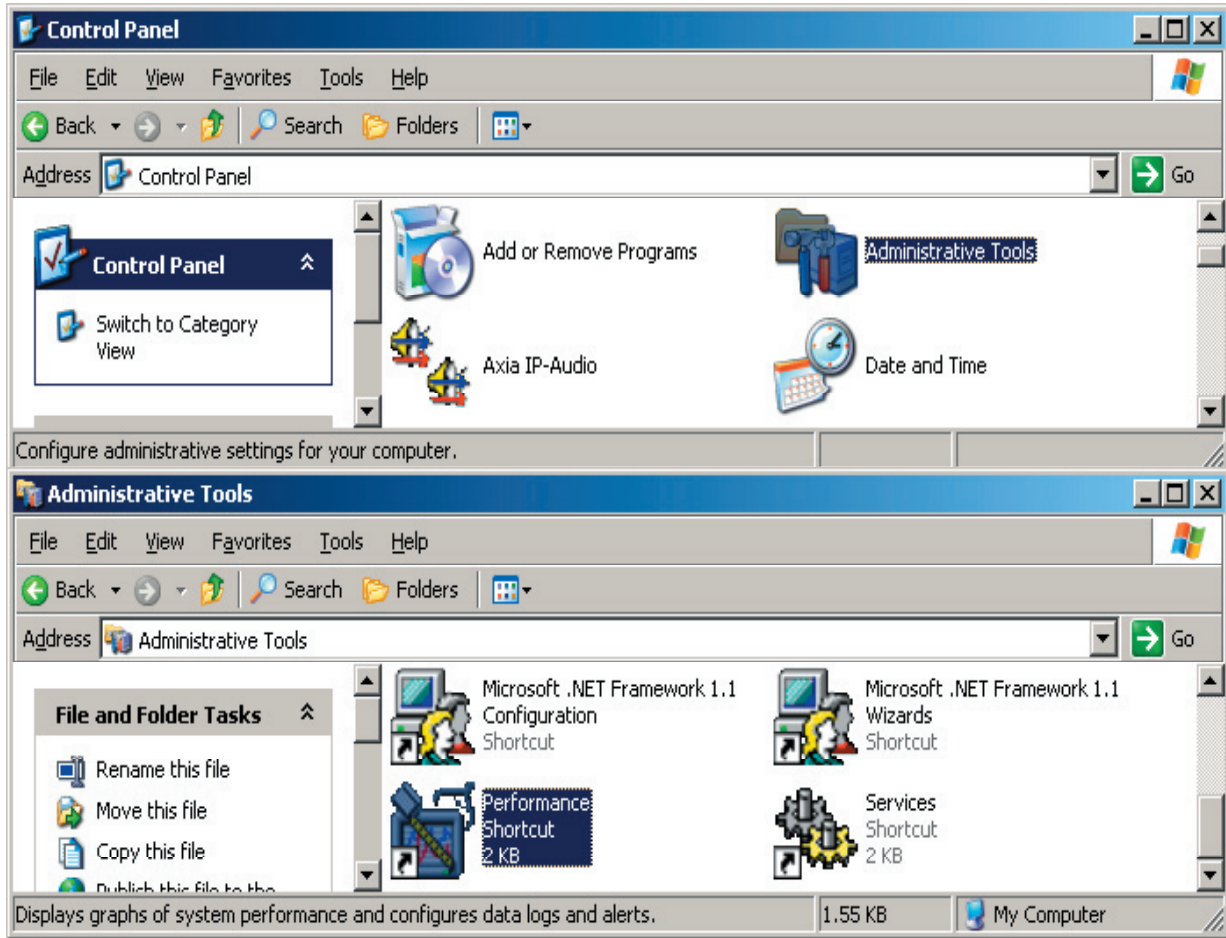
RxSeqErr counter should never increment during continuous stream receive. If it does, it means that there is a problem with the network and packets are dropped. This can be a bad Ethernet cable connected to the transmitter device, the receiver PC or anywhere else or network card. Check if your network card has 100Mbit full-duplex connection established to the Ethernet switch.

Dropped packets can be also caused by performance problems originating from bottlenecks in the PC motherboard and network card hardware or software. It is always good to check the CPU utilization to make sure the PC is running at a reasonable load level.

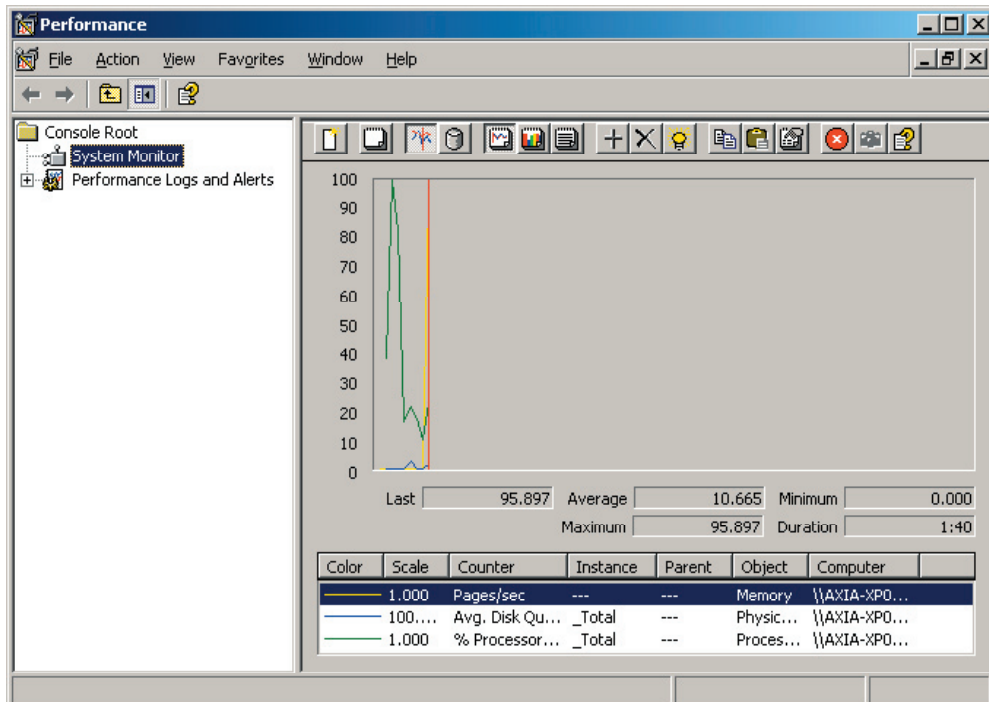
### **Performance Monitor**

Additional troubleshooting information can be obtained using Performance Monitor. This is a standard Windows tool, which allows reading statistical information from the system and drivers.

To access the Performance Monitor you can get to this thru the Administrator’s Tools within your Control Panel. See the next page for examples.

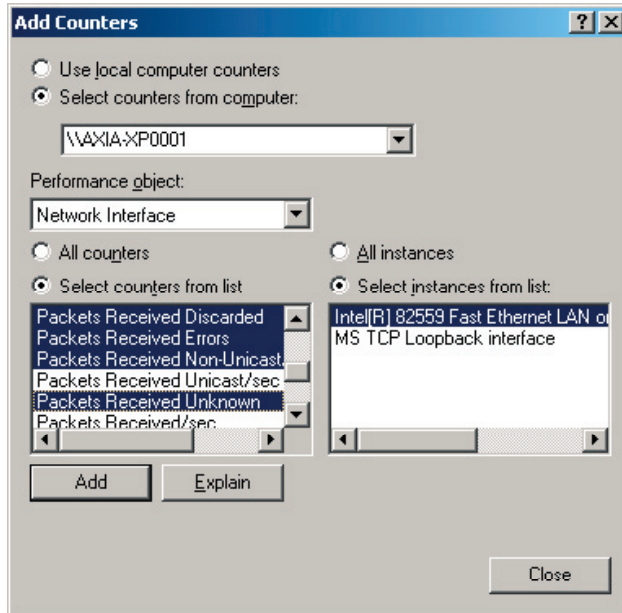


You will get this window:





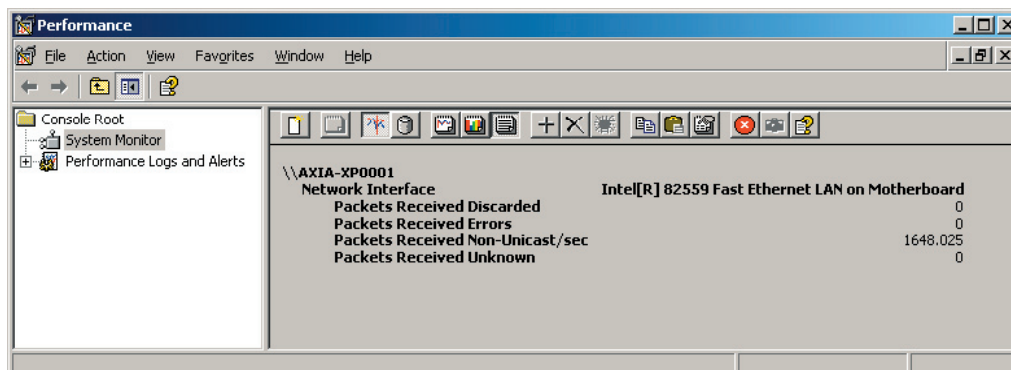
Place your mouse cursor within the graph window and right click to bring up some options. Select ADD COUNTERS and select all the Error counters related to Ethernet interface being used by Axia driver.



You can use the Graph or Report view to examine the data. You should see number of sent and receive packets corresponding to actual Axia Driver configuration.

If there are any packets with errors or discarded packets, it may indicate some problems with the network card or network cable.

You should also check statistics on the Ethernet switch for the port into which the PC is plugged into.





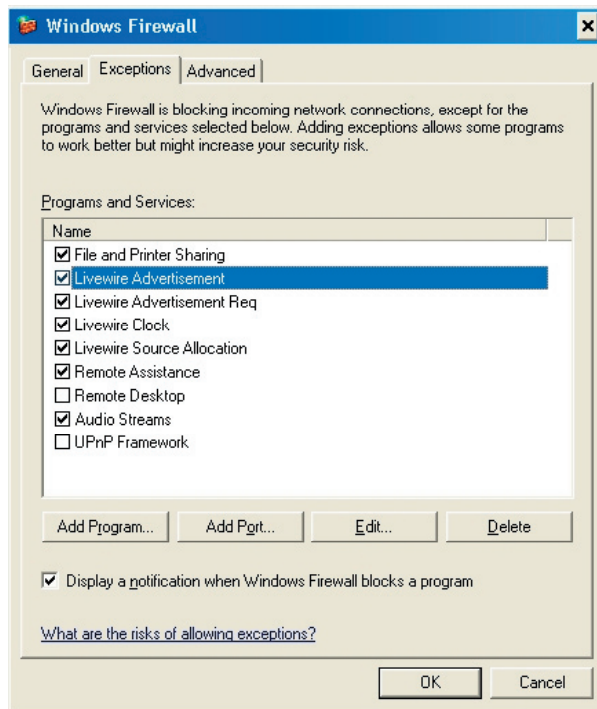
# Windows XP Firewall Settings

The latest version of LW Driver will automatically configure the XP firewall with these options. If you have an earlier version of driver you will have to do this manually.

Navigate to My Network Places and view the available network connections. Select the NIC interface used by the Livewire Driver and enter the PROPERTIES of the NIC. Go to the FIREWALL Settings of the NIC and go to the EXCEPTIONS tab as shown:

The following ports will need to be exempted from being blocked:

Livewire Advertisement	4001	UDP
Livewire Advertisement Req	4000	UDP
Livewire Clock	7000	UDP
Livewire Source Allocation	2060	UDP
Audio Streams	5004	UDP



# Specifications and Warranty

---

## IP Audio Driver System Requirements

### Operating System

- Windows 2000 Professional
- Windows XP

## Axia System Specifications

### Microphone Preamplifiers

- Source Impedance: 150 ohms
- Input Impedance: 4 k ohms minimum, balanced
- Nominal Level Range: Adjustable, -75 dBu to -28 dBu
- Input Headroom: >20 dB above nominal input
- Output Level: +4dBu, nominal

### Analog Line Inputs

- Input Impedance: >40 k ohms, balanced
- Nominal Level Range: Selectable, +4 dBu or -10dBv
- Input Headroom: 20 dB above nominal input

### Analog Line Outputs

- Output Source Impedance: <50 ohms balanced
- Output Load Impedance: 600 ohms, minimum
- Nominal Output Level: +4 dBu
- Maximum Output Level: +24 dBu

### Digital Audio Inputs and Outputs

- Reference Level: +4 dBu (-20 dB FSD)
- Impedance: 110 Ohm, balanced (XLR)
- Signal Format: AES-3 (AES/EBU)
- ES-3 Input Compliance: 24-bit with selectable sample rate conversion, 32 kHz to 96kHz input sample rate capable.
- AES-3 Output Compliance: 24-bit
- Digital Reference: Internal (network timebase) or external reference 48 kHz, +/- 2 ppm
- Internal Sampling Rate: 48 kHz
- Output Sample Rate: 44.1 kHz or 48 kHz
- A/D Conversions: 24-bit, Delta-Sigma, 256x oversampling
- D/A Conversions: 24-bit, Delta-Sigma, 256x oversampling
- Latency <3 ms, mic in to monitor out, including network and processor loop

## Frequency Response

- Any input to any output: +0.5 / -0.5 dB, 20 Hz to 20 kHz

## Dynamic Range

- Analog Input to Analog Output: 102 dB referenced to 0 dBfs, 105 dB “A” weighted to 0 dBfs
- Analog Input to Digital Output: 105 dB referenced to 0 dBfs
- Digital Input to Analog Output: 103 dB referenced to 0 dBfs, 106 dB “A” weighted
- Digital Input to Digital Output: 138 dB

## Equivalent Input Noise

- Microphone Preamp: -128 dBu, 150 ohm source, reference -50 dBu input level

## Total Harmonic Distortion + Noise

- Mic Pre Input to Analog Line Output: <0.005%, 1 kHz, -38 dBu input, +18 dBu output
- Analog Input to Analog Output: <0.008%, 1 kHz, +18 dBu input, +18 dBu output
- Digital Input to Digital Output: <0.0003%, 1 kHz, -20 dBFS
- Digital Input to Analog Output: <0.005%, 1 kHz, -6 dBfs input, +18 dBu output

## Crosstalk Isolation and Stereo Separation and CMRR

- Analog Line channel to channel isolation: 90 dB isolation minimum, 20 Hz to 20 kHz
- Microphone channel to channel isolation: 80 dB isolation minimum, 20 Hz to 20 kHz
- Analog Line Stereo separation: 85 dB isolation minimum, 20Hz to 20 kHz
- Analog Line Input CMRR: >60 dB, 20 Hz to 20 kHz
- Microphone Input CMRR: >55 dB, 20 Hz to 20 kHz

## Power Supply AC Input

- Auto-sensing supply, 90VAC to 240VAC, 50 Hz to 60 Hz, IEC receptacle, internal fuse
- Power consumption: 35 Watts

## Operating Temperatures

- -10 degree C to +50 degree C, <90% humidity, no condensation

## Dimensions and Weight

- Microphone node: 1.75 inches x 17 inches x 10 inches, 6 pounds
- Analog Line node: 1.75 inches x 17 inches x 10 inches, 6 pounds
- AES/EBU node: 1.75 inches x 17 inches x 10 inches, 6 pounds
- Router Selector node: 1.75 inches x 17 inches x 10 inches, 6 pounds
- GPIO node: 1.75 inches x 17 inches x 13 inches, 8 pounds
- Studio Mix Engine 3.5 inches x 17 inches x 15 inches, 10 pounds

## Axia Node Limited Warranty

This Warranty covers “the Products,” which are defined as the various audio equipment, parts, software and accessories manufactured, sold and/or distributed by TLS Corp., d/b/a Axia Audio (hereinafter “Axia Audio”).

With the exception of software-only items, the Products are warranted to be free from defects in material and workmanship for a period of one year from the date of receipt by the end-user. Software-only items are warranted to be free from defects in material and workmanship for a period of 90 days from the date of receipt by the end-user.

This warranty is void if the Product is subject to Acts of God, including (without limitation) lightning; improper installation or misuse, including (without limitation) the failure to use telephone and power line surge protection devices; accident; neglect or damage.

EXCEPT FOR THE ABOVE-STATED WARRANTY, AXIA AUDIO MAKES NO WARRANTIES, EXPRESS OR IMPLIED (INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE).

In no event will Axia Audio, its employees, agents or authorized dealers be liable for incidental or consequential damages, or for loss, damage, or expense directly or indirectly arising from the use of any Product or the inability to use any Product either separately or in combination with other equipment or materials, or from any other cause.

In order to invoke this Warranty, notice of a warranty claim must be received by Axia Audio within the above-stated warranty period and warranty coverage must be authorized by Axia Audio. If Axia Audio authorizes the performance of warranty service, the defective Product must be delivered, shipping prepaid, to: Axia Audio, 2101 Superior Avenue, Cleveland, Ohio 44114.

Axia Audio at its option will either repair or replace the Product and such action shall be the full extent of Axia Audio’s obligation under this Warranty. After the Product is repaired or replaced, Axia Audio will return it to the party that sent the Product and Axia Audio will pay for the cost of shipping.

Axia Audio’s authorized dealers are not authorized to assume for Axia Audio any additional obligations or liabilities in connection with the dealers’ sale of the Products.

Axia Audio’s products are to be used with registered protective interface devices which satisfy regulatory requirements in their country of use.

10-28-04 rev 0.9

11-08-04 rev 1.0 RKT

# 1490-00042-000

*World, now digital*

*Analog memories fade.*

*The future beckons!*



Axia Audio, a Telos Company • 2101 Superior Ave. • Cleveland, Ohio, 44114, USA • +1.216.241.7225 • [www.AxiaAudio.com](http://www.AxiaAudio.com)