

1 DESCRIPTION

The ASI6585 is a professional PCI sound card designed for use in an Axia Livewire™ IP-audio based radio broadcast facility. Livewire™ is an innovative technology used to transmit low-delay audio over switched Ethernet. For further information on Axia's Livewire, visit their website at: <<http://www.axiaaudio.com/livewire/default.htm>>

Providing up to 16 play streams that are mixed to 8 stereo outputs and 16 record streams fed from 8 stereo inputs, the ASI6585 features AudioScience's unique "anything to anywhere" mixing and routing.

A choice of uncompressed PCM, MPEG layer 2 and MP3 is available for both recording and playback. All compression is handled by an on-board floating point DSP, allowing the host computer to focus on other tasks.

DSP based functionality includes MRX™ multi-rate mixing technology that allows streams of different sample-rates and formats to be mixed.

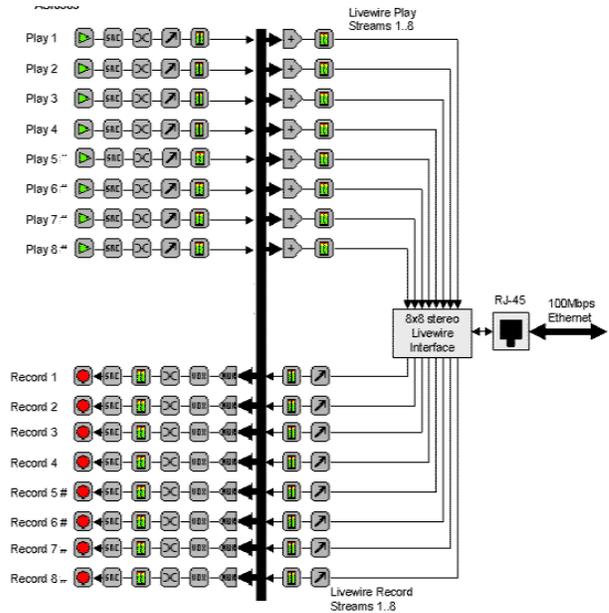
TSX™ time scaling provides compression/expansion of any or all playback streams in real time with no change in pitch.

For emerging surround sound applications, SSX™ mode allows multichannel streams of up to 8 channels to be played, recorded and mixed.

2 FEATURES

- 4, 8, 12 or 16 streams of mono or stereo playback into 8 stereo Livewire streams
- 4, 8 or 16 streams of mono or stereo record from 8 stereo Livewire streams
- Formats include PCM, MPEG layer 2 and MP3 with sample rates from 8kHz to 96kHz
- MRX™ technology supports digital mixing of multiple stream formats and sample rates
- TSX™ time scaling allows compression/expansion of play streams by up to +/-20% with no pitch shift
- Two SSX™ streams for multichannel record and playback.
- Short length PCI card format (6.6 inches/168mm)
- Up to 4 cards in one system
- Windows 2000/XP/Server 2003/7 and Linux software drivers available

ASI6585 – 8-play mode



- Key:
- Record Stream
 - Play Stream
 - Input/Output
 - Volume
 - Level
 - Mixer
 - Multiplexer
 - AES/EBU Tx/Rx
 - Meter
 - Sample Rate Converter
 - Channel Mode
 - Clock Source



3 SPECIFICATIONS

LIVEWIRE INPUT/OUTPUT

Type	100BaseT Ethernet
Connector	RJ-45
Precision	24bit PCM
Sample Rate	48kHz (Livewire sample rate)
Network Interface Latency	750 microseconds
Control Protocol	R/UDP, HTTP/HTML

SIGNAL PROCESSING

DSP	Texas Instruments TMS320C6713@300MHz
Memory	8MB
Audio Formats	8 bit unsigned PCM 16 bit signed PCM 24 bit signed PCM 32 bit floating point PCM MPEG-1 Layer 2 MPEG-1 Layer 3 (MP3) (MPEG Layer-3 audio coding technology licensed from Fraunhofer IIS and THOMSON multimedia)

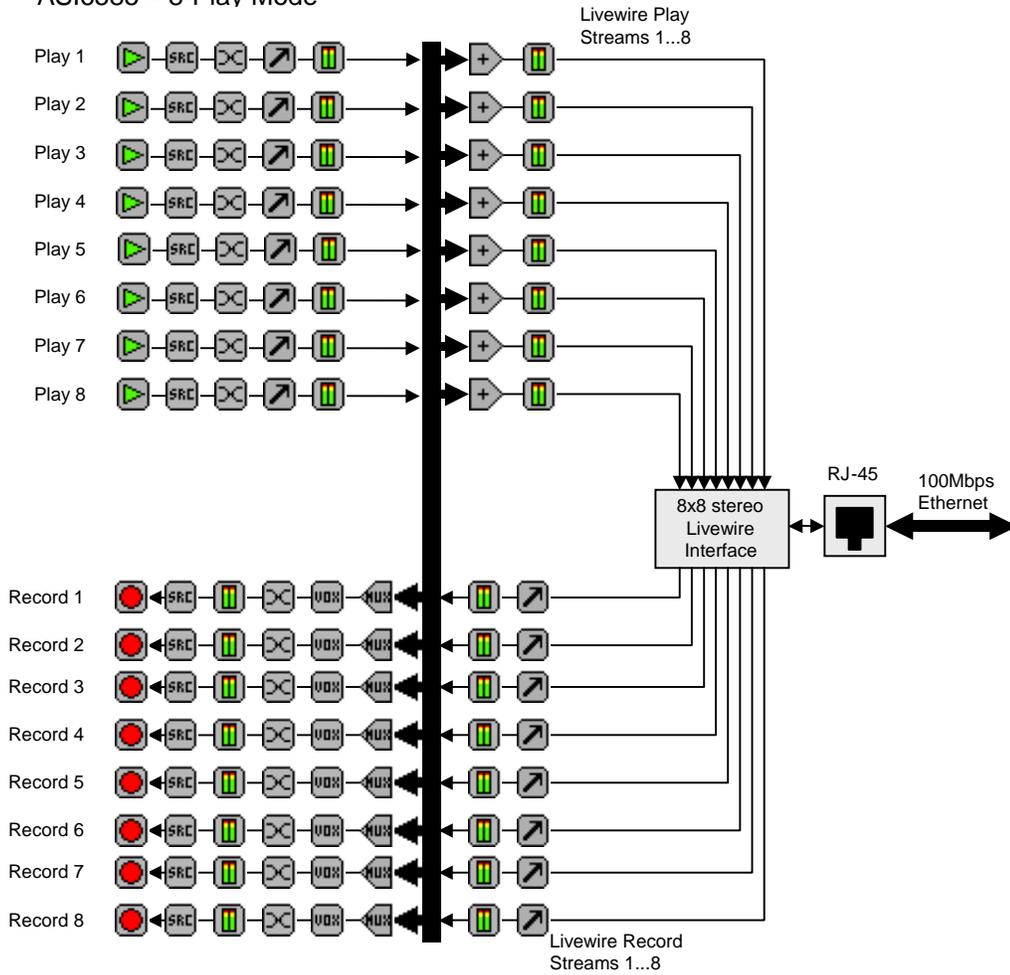
GENERAL

Bus	32bit Universal PCI (PCI-X compatible)
Dimensions	PCI short-length form factor (6.6 inches/168mm long)
Weight	8 oz (227g) max
Operating Temperature	0C to 70C
Power Requirements	+3V@1.5A, +5V @ 100mA

4 REVISIONS

Date	Description
04 April 2009	Added DSP Mips table.
05 May 2009	- Section 10; renamed "Inputs" and "Outputs" to "Stereo Livewire Inputs" and "Stereo Livewire Outputs." - Section 14: added Note about using only AudioScience recommended firmware. - Section 14.2: added Note about upgrading from firmware versions 2.5.2d_r2 or 2.3.3b → must follow information in Section 14.3.1 first.
01 June 2009	Section 12 Note: for GPIO handling, added that an extra NIC can be used.
17 November 2009	- Section 14.31: Added new firmware info; 2.5.8a_r2. - Added information to Section 14.3.3 for added clarity.
22 December 2009	- Page 1: Updated list of software drivers available. - Section 10: Added Mono mode.

5 BLOCK DIAGRAM

ASI6585 – 8-Play Mode


Key:



6 DSP UTILIZATION

The ASI6xxx series of adapters have world-class audio signal processing capabilities. The ASI6xxx algorithm complexity has increased at a faster rate than DSP processing power, resulting in a situation where not all available algorithms on an ASI6xxx can run simultaneously.

The following tabulates processing “budgets” so that problem configurations can be identified before system design is completed. The following tables assign a utilization percentage for various operations. By summing up the utilizations for the target (worst case) configuration, one can determine whether audio processing will run without causing dropouts or breakup.

6.1 ASI6585 Rev. D, samplerate 48kHz, driver 3.12.02

Idle utilization in 8-Play mode = 15%, in 16-play mode = 21%

Operation	Play (utilization/ device)		Record (utilization/ device)	
	8-Play	16- Play	8- Play	16- Play
PCM 32 @ 48kHz	2	3	3	3
MPEG-1 Layer-2, 256 kbps @ 48kHz	6	6	11	11
MPEG-2 Layer-3, 256 kbps @ 48kHz	11	11	31	31
SampleRate Conversion to/from 32kHz PCM	6	7	7	7
SampleRate Conversion to/from 44.1kHz PCM	6	6	6	6
SampleRate Conversion to/from 32kHz MPEG-1 Layer-2	9	10	13	13
SampleRate Conversion to/from 44.1kHz MPEG-1 Layer-2	9	10	13	14
SampleRate Conversion to/from 32kHz MPEG-2 Layer-3	13	14	27	27
SampleRate Conversion to/from 44.1kHz MPEG-2 Layer-3	14	14	32	32
TimeScale (90%) PCM	2	3		NA
TimeScale (110%) PCM	2	3		NA
TimeScale (90%) MPEG-1 Layer 2	6	6		NA
TimeScale (110%) MPEG-1 Layer 2	6	6		NA
TimeScale (90%) MPEG-2 Layer 3	11	11		NA
TimeScale (110%) MPEG-2 Layer 3	11	11		NA

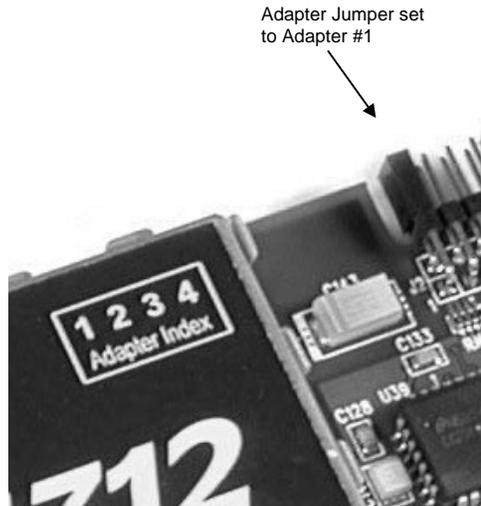
From the above table, an ASI6585 in 8-Play mode: 4xMP2 playback (all at 44.1 kHz) =
 idle + 4x6% = 15% + 24 % = 39%.

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8 HARDWARE INSTALLATION

1. Make sure your computer is turned off.
2. Install the Adapter in an empty PCI slot. The adapter supports 5V or 3V PCI slots as well as PCI-X slots
3. Make sure the Adapter Jumper is set to adapter index 1 (factory default)



4. Plug a CAT6 Ethernet cable from your Livewire network into the RJ45 jack on the card bracket.
5. Turn on the computer and let it boot. Under Windows 2000/XP a dialog box will pop up informing you that the computer has detected a new Multimedia Audio card. Cancel out of this dialog box.

8.1 Multiple Adapters

When installing two or more adapters in the same computer, make sure they have the adapter jumper set to unique numbers. For example if you are installing two adapters, the 1st one would be set to Adapter#1 and the 2nd to Adapter#2.

Different adapter types can coexist in the same computer, for example an ASI6585 and ASI6520 will work correctly. Different adapter types still require unique adapter numbers.

9 SOFTWARE INSTALLATION

NOTE: You will need driver 3.08.00 or later for the ASI6585

9.1 Windows 2000/XP

The first thing you need to do is decide what type of driver you need for the ASI6585. There are two types of drivers for Windows: The WAVE driver and the WDM driver. Typically this will be decided by your application. For any application that uses DirectSound, use the WDM driver.

9.1.1 WAVE Driver

Download the file named ASIWAVE_XXXX.EXE from www.audioscience.com and run it (_XXXX is the version number). After it has run, reboot your computer and the ASI6585 will be operational. If you have the case off the top of the computer, you will be able to see two blinking LEDs on top of the card indicating its DSP is running and communicating with the driver.

Now go back to www.audioscience.com and download the ASIMIXER application from the Applications section. Unzip the executable to a directory of your choice and run it.

9.1.2 WDM Driver

Download the file named ASIWDM_XXXX.EXE from www.audioscience.com and run it (_XXXX is the version number).

After it has run, reboot your computer and the ASI6585 will be operational. If you have the case off the top of the computer, you will be able to see two blinking LEDs on top of the card indicating its DSP is running and communicating with the driver.

From the Windows Start menu, navigate to Start->Programs->AudioScience and run the ASIControl program.

9.2 Linux

The latest Linux driver can be downloaded from the AudioScience website – www.audioscience.com

9.3 Adobe Audition 2.0/3.0

Adobe Audition works well at a sample rate of 48 kHz (the base Livewire sample rate). Sample rates other than 48 kHz (32 and 44.1) require driver version 3.10 or later and the ASI6585 must be set to 4-Play mode.

10 ADAPTER MODES

**NOTE: Driver 3.08.00 or later is required for 4-, 8-, 12-, and 16-Play modes.
Driver 4.02.00 or later is required for Mono mode.**

The ASI6585 supports five adapter modes, 4-Play, 8-Play, 12-Play, 16-Play, and Mono. A restart of the machine is required after changing from one mode to another. The mode setting is saved on the adapter's EEPROM and will be used to configure the adapter's mixer after reboot.

Using ASIControl (installed with driver), select the Mode by clicking on "ASI6585" in the left-hand pane of ASIControl and selecting the mode in the Adapter_Mode box in the right-hand pane. A reboot is then required.

Using ASIMixer, select the Mode by clicking on the Mode box dropdown arrow. The Mode box is located in the Line Out 1 panel. A reboot is required.

The following table shows the number of record, input, and output streams, as well as the mixing capabilities of the four adapter modes:

	4-Play Mode	8-Play Mode	12-Play Mode	16-Play Mode	Mono Mode
Record Streams	4	8	4	16	16
Stereo Livewire Inputs	4	8	4	8	16
Stereo Livewire Outputs	4	8	4	8	16
Mixing Capability	Full	Full	Full	Restricted	Full

11 LIVEWIRE SETUP

1. The ASI6585 contains a fully functional Livewire interface. By default the static IP address of this interface is set to 192.168.1.182. To access the Livewire interface, run your favorite web browser and enter <http://192.168.1.182>.
2. A dialog will pop-up requesting user name and password. The default username is “user” and the password is blank (i.e. there is no password).
3. The ASI6585 is set to 8-play mode. This can be changed to 4-play mode if needed using the ASIControl application (installed with driver)
4. Livewire Sources:

Source			Streams	Inputs
#	Name:	Channel:	Mode:	Gain [dB]:
1	SRC 1	18201	Fast Stereo	0.0
2	SRC 2	18202	Fast Stereo	0.0
3	SRC 3	18203	Fast Stereo	0.0
4	SRC 4	18204	Fast Stereo	0.0
5	SRC 5	18205	Fast Stereo	0.0
6	SRC 6	18206	Fast Stereo	0.0
7	SRC 7	18207	Fast Stereo	0.0
8	SRC 8	18208	Fast Stereo	0.0

Apply

5. Livewire Destinations:

Destinations				Outputs	
#	Name:	Channel:	Type:	Load:	Gain [dB]:
1	DST 1	18401 <SRC 1@ASI6585Test>	From source	hi-Z (default)	0.0
2	DST 2	18402 <SRC 2@ASI6585Test>	From source	hi-Z (default)	0.0
3	DST 3	18403 <SRC 3@ASI6585>	From source	hi-Z (default)	0.0
4	DST 4	18404 <SRC 4@ASI6585>	From source	hi-Z (default)	0.0
5	DST 5	18405 <SRC 5@ASI6585>	From source	hi-Z (default)	0.0
6	DST 6	18405 <SRC 5@ASI6585>	From source	hi-Z (default)	0.0
7	DST 7	18406 <SRC 6@ASI6585>	From source	hi-Z (default)	0.0
8	DST 8	18407 <SRC 7@ASI6585>	From source	hi-Z (default)	0.0

Apply

NOTES:

1. The meters on the Meters page are currently non-functional. This will be fixed with a firmware upgrade to version 2.5.2d_r2 or later.

11.1 IP address recovery

In the event that the IP address of an ASI6585 is unknown, a combination of the ASI6585 MAC address and bootps.exe can be used to set the IP address back to a known state. The following steps detail setting the IP address back to the default shipping IP address and netmask:

1. Look on the back of the orange faceplate (the daughterboard) of the ASI6585 and record the MAC address printed on the white, AudioScience part number label. This example uses 00:60:2B:06:D1:DA.
2. Download bootps.exe software from the Axia website:
<http://www.axiaaudio.com/downloads/files/bootps.exe>
3. To set the ASI6585 adapter IP address, from a Cmd prompt go
 - `bootps -m 255.255.255.0 -set 00-60-2b-06-d1-da/192.168.1.182`

Typically, the ASI6585 does not need to be restarted for the new IP address to be “active”. In the event that the PC cannot connect to the new IP address, try rebooting the PC that has the ASI6585 in it. If the new IP address still does not work, run bootps.exe a second time.

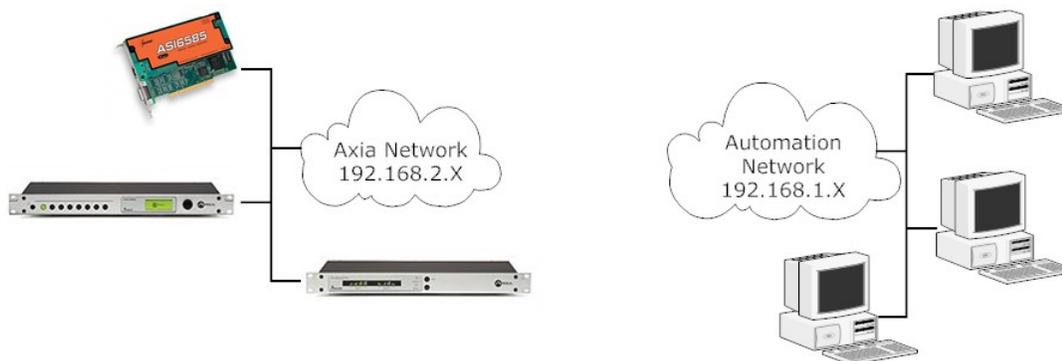
12 GPIO

Note:

- **GPIO functionality requires firmware version 2.5.2d_r2 or later.** See Section 14.2 for a link to current firmware.
- **GPIO handling on an automation network requires either an extra NIC in the PC (see Section 13.1) or Axia’s PathfinderPC Router Control Software (see Section 13.4).**

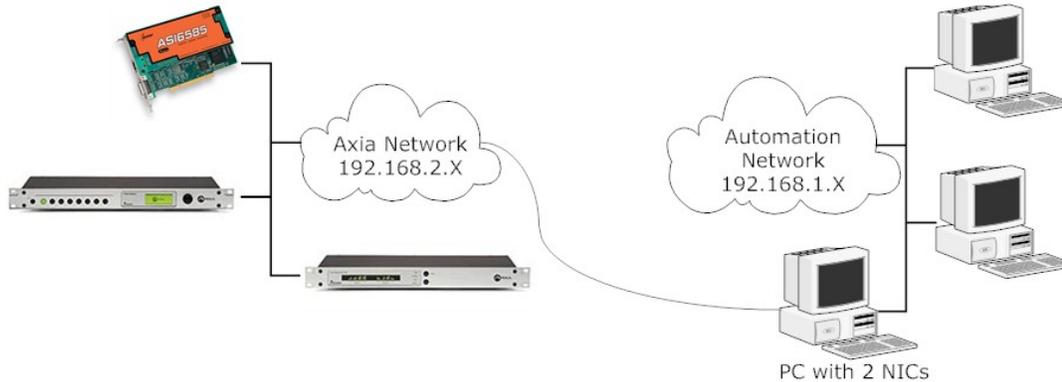
The ASI6585 supports 8 channels of “virtual” GPIO. In this manner is it similar to the Axia IP audio driver. The GPIO is comprised of 8 GPIO inputs and 8 GPIO outputs. The GPIO states can be viewed from the device’s web interface and controlled via telnet. See Axia documentation for the command set used to control GPIO.

13 AXIA NETWORK TO AUTOMATION NETWORK ROUTING OPTIONS



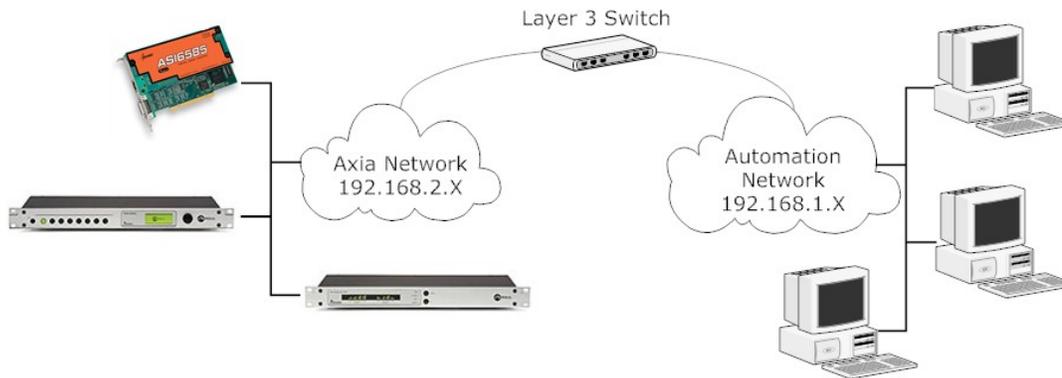
Since the ASI6585’s network interface is not directly accessible from the automation network PC, a network path from the automation network PC to the Axia network containing the ASI6585 should be implemented. The following sections outline the possible approaches. In all the descriptions that follow the Axia network is assumed to support IP addresses in the 192.168.2.xxx range, while the automation network supports IP addresses in the 192.168.1.xxx range. One of the 4 options listed below may be used.

13.1 Using an extra network card in the PC



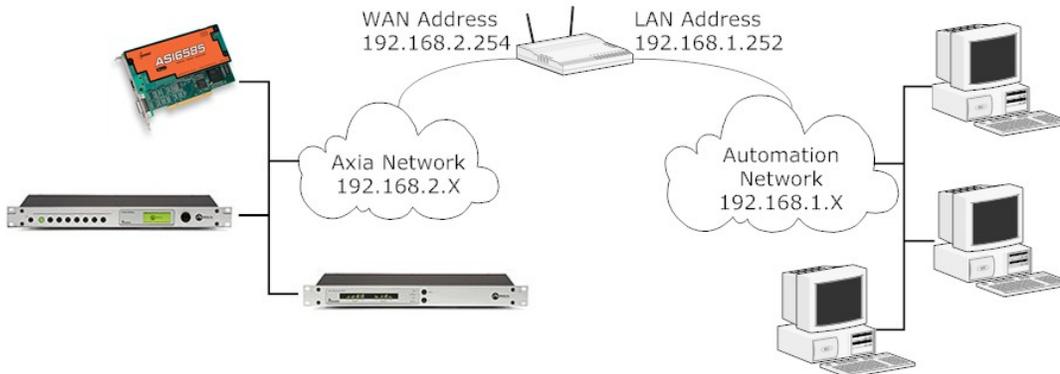
The simplest option is to add a second network card to each automation PC and assign it an IP in the Axia device IP range and then connect it to the Axia switch. The automation PC will now be able to Telnet to any Axia device in the Axia network. The automation PC does not need to have the Livewire IP driver installed to telnet to the ASI6585. The downside of this approach is that every PC that wishes to access the Axia network must have an additional network card installed and an extra port is consumed on the Axia router.

13.2 Using the virtual network and routing capabilities of a Layer 3 switch



A single port of a Layer 3 managed switch can be used to connect between the Automation and Axia networks. On the switch the port should be assigned to its own VLAN and then non-multicast routing enabled between the Automation VLAN and the Axia LAN.

13.3 Adding a hardware router



In the case where the Axia LAN switch does not support Layer 3 protocols, an external router can be added between the Axia and Automation networks. Axia outlines approaches for doing this [here](#) and [here](#).

We have had success performing the following steps on a LinkSys WRT54G router.

1. Disable wireless.
2. Set the internet (WAN) to static IP of 192.168.2.254.
3. Set the Local IP (LAN) to 192.168.1.252.
4. Disable DHCP
5. In Advanced Route set the operating mode to "Router"

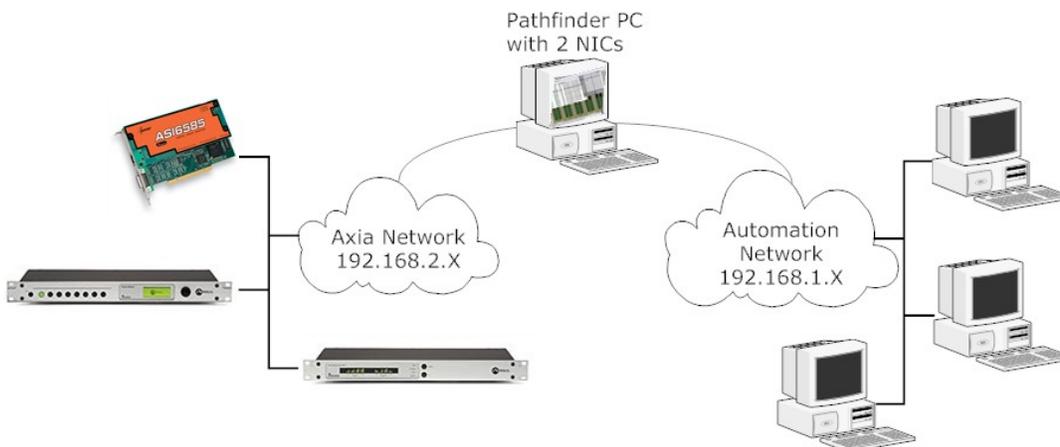
Plug the Automation LAN into one of the 4 LAN ports and the Axia LAN in to the WAN port. On the automation PC use

```
C:\>route add 192.168.2.0 mask 255.255.255.0 192.168.1.252
```

to set up route to the Axia network.

You should now be able to ping and or telnet to the Axia devices as if they were on your local network.

13.4 Using PathFinder



Run Axia's PathfinderPC Router Control Software (see <http://www.axiaaudio.com/components/default.htm#Pathfinder> for more information) on a PC somewhere on the network so that GPIO information from the Livewire network can be handled on the automation network. Axia can provide more information of the exact components and configuration required to form the required connection.

14 LIVEWIRE FIRMWARE UPDATES

NOTE Please note that any attempt to load the Axia AES, Analog, GPIO, Microphone, or Router Selector Node firmware (found on Axia's website) onto an ASI6585 will render the ASI6585 inoperable and it will need to be sent back to AudioScience for repair. Use only the AudioScience recommended firmware.

The ASI6585's Livewire interface has two internal memory "banks" for storing the Livewire firmware. Each bank contains room for a complete version of the firmware. This approach allows a software update download to be completed and checked without danger of making the unit inoperable if the download were to be incomplete or corrupted. It also provides an easy way to try a new software version and still return to the old version.

The software version in each bank is displayed from the System web page. The lower half of this screen, shown below, shows the current firmware versions and allows you to select what version will be used at startup. To change banks simply click in the "radio button" for the desired bank and then click on Apply.

IMPORTANT! The node will reboot after you click Apply if you change the software version. This will result in loss of audio locally, and at any unit using the local sources.



14.1 Saving Bank 1 Software

Software is always downloaded to bank 1 (the secondary bank). Downloading software (see below) will overwrite the software currently in this bank, if any. If you wish to save the software currently residing in bank 1 you can save it by moving it to bank 0 as follows:

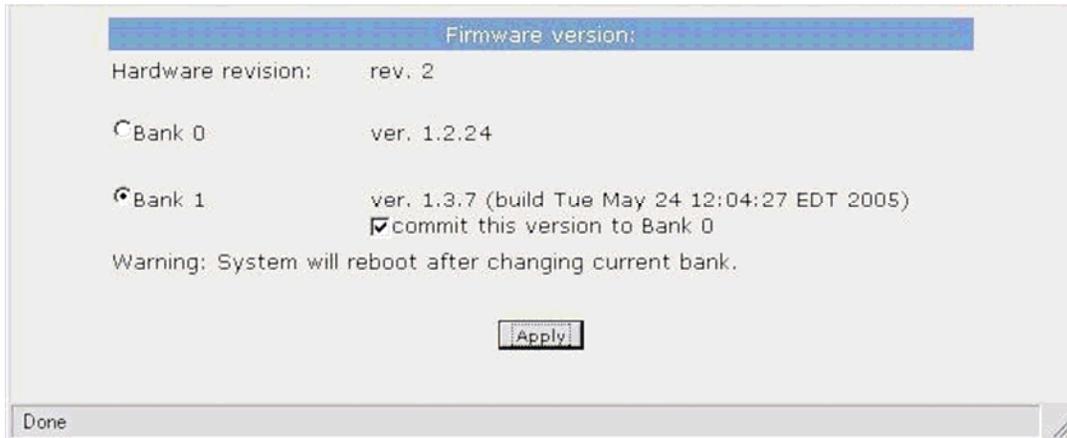
1. Click on "Commit this version to Bank 0" box (see picture below). (If the Commit checkbox is not showing, select Bank 1 and click Apply to bring it up.)
2. Click on Apply. The node will now reboot.

14.2 Downloading new software

NOTE Before downloading new software, please read Section 14.3.1 first. You will need to follow those steps first if you are upgrading from firmware versions 2.5.2d_r2 or 2.3.3b.

A new software version can be downloaded into Bank 1 as follows:

1. Visit http://www.audioscience.com/internet/products/cobranet/asi6585_fw.htm to download the firmware to your computer (this should be the computer that you will use to access the ASI6585's web page). Your local computer operating system should display a prompt to permit you to choose where you wish to locate the downloaded file. You can choose any convenient location, just be sure to note the drive and location where the file is to be saved.
2. Open a web browser and connect to the ASI6585 to be updated. Enter the complete path and file name for the firmware file or click on the Browse button to locate the file. Once the proper path and filename are displayed, click on Apply to download the file.
3. A successful download will be indicated by the new version being displayed in the Bank 1 field. If the download were unsuccessful the field for Bank 1 would be blank.



14.3 Firmware Release Notes

14.3.1 Version 2.5.8a_r2

ChangeLog (from Axia)

Version 2.5.8a (patch 2009-09-09)

Selector: Fixed output volume jump. When the volume knob was used, load and out gain settings were ignored.

Version 2.5.7a (patch 2009-02-24)

Advertisement daemon protected from crashes caused by invalid input messages.

Version 2.5.5a (patch 2009-01-08)

GPIO Node: Fixed memory leak in gpior. Memory leak was occurring every time connection to remote snake end point failed. Memory leak was increasing as long as the invalid endpoint was configured causing GPIO message processing to stop.

Optimized channel list processing: building advertisement database and updating Router Selector front panel scroll list.

Version 2.5.4a (patch 2008-12-22)

Optimized channel list processing: building advertisement database and updating Router Selector front panel scroll list.

Version 2.5.3a (patch 2008-08-07)

Fixed HEAD request processing in the WEB server. In previous versions, processing HEAD was causing server crash and audio glitch.

Added additional security checks to processing BOOTP responses to avoid accepting incorrect network mask and packets from DHCP servers. Some DHCP servers would respond to BOOTP requests sent by nodes leading to unusable network mask configuration.

Fixed: Accepting new IP parameters from BOOTPS was deleting the hostname.

Version 2.5.2g (release 2008-07-15)

Livewire master priority factory default changed from 0 (disabled) to 3. This change makes initial node configuration easier. Users who do not use the mode switch on the front panel and used the WEB interface to do the entire configuration tend to forget to enable the mastership on the QoS page resulting in having no clock in the network. The new default enables the clock automatically. It is no longer safe to plug in a new node to non-qualified network.

Selector: Case insensitive channel list sort.

Fixed: WEB page title was not showing hostname if its length was maximum (12 characters).

Hostname: letters, digits, hyphen only enforced. All characters entered by user, which are not allowed are converted to the hyphens (-).

Fixed HTTP redirection problem after changing the hostname. Automatic redirection did not work in previous version and user had to click the redirection link manually.

Critical bug found in release 2.5.2f. Livewire Routing Protocol server was crashing when changing properties of a single audio destination other than DST 1. That includes audio route change command typically issued by Path Finder.

Version 2.5.2f (release 2008-05-01 canceled 2008-05-01)

Added Syslog messages notifying about changes in AES inputs synchronization state, as well as AES/Analog automatic switch.

Selector: Improved Analog/AES input automatic selection logic, so the switch to analog is delayed until after the end of reset/verify cycle. This was temporary glitch in AES signal does not cause switching to analog input and long audio gap.

Selector: Bugfix: Since 2.3.4a missing or unstable AES input was causing interruptions of the analog input signal.

AES input chip restart made quicker, so a glitch in AES signal caused by a PLL synchronization loss is short.

Destinations WEB page: In surround bundle name column is hidden for consistency with Sources WEB page.

Bugfix: Nodes use Standard Streams QoS settings for audio Livestreams after changing destination.

Selector: Screen update optimization preventing flicker when operating volume control.

Selector: Front panel System screen Stream Mode terminology change from SLOW/FAST to Standard/Live.

In November 2004 (1.2.25 software) users: "USER", "axia", "AXIA" and "Axia" were added. Setting password for those results in password change operation failure. Improved software to handle old units. Possible workarounds for old units are:

1. Copy default passwd file to add missing users. From telnet: 'cp /etc/default/passwd /etc/config/'. No restart is necessary.
2. Reset unit to factory defaults. On audio nodes press and hold SELECT and ID buttons on power up. On GPIO node, telnet in, and do the following 'cp /etc/default/* /etc/config/', then 'reboot'.

14.3.1.1 Instructions on upgrading to 2.5.8a_r2

Firmware version 2.5.2e_r2 must be the current firmware version on the ASI6585 in order to upgrade to 2.5.8a_r2. If it is not, see Section 14.3.2 on installing firmware version 2.5.2e_r2.

14.3.2 Version 2.5.2e_r2

ChangeLog (from Axia)

Add adapter type information to prevent loading incorrect firmware.

14.3.2.1 Instructions on upgrading to 2.5.2e_r2

There are two steps to loading firmware version 2.5.2e_r2 from 2.5.2d_r2 or 2.3.3b:

Step 1 Setting the node type of the ASI6585

Step 2 Downloading the firmware into Bank 1 (found in the ASI6585's web interface)

The following describes how to do Step 1. Follow the information in 14.1 and 14.2 for Step 2.

Step 1

Firmware version 2.5.2e_r2 checks the Livewire node type before it loads. ASI6585 Livewire firmware versions earlier than 2.5.2e_r2 do not have the node type set correctly (2.5.2d_r2 and 2.3.3b). The following steps describe a manual method of setting the node type so that the upgrade to firmware version 2.5.2e_r2 from 2.5.2d_r2 or 2.3.3b is successful.

The node type information is stored in a file called product.id. This file must be edited so that it contains the correct node type information. This is done via a Telnet session. The steps below describe how to Telnet from Windows to the ASI6585 and edit the product.id file.

Information required before proceeding: the IP address of the ASI6585 and the username/password to access the ASI6585's web interface. The factory default settings are as follows: IP address – 192.168.1.182, username is 'user' and password is <blank> (i.e.: no password). Check to see if any of these settings for your ASI6585 have been changed.

How to Telnet from Windows to the ASI6585 and edit product.id (presumes factory default settings)

1. Click Start→Run. This opens the Run dialog box.
In the Open textbox, type **telnet 192.168.1.182** and click OK.
2. A command line window opens with a login prompt.
Type in 'user'. Press the Enter key on your keyboard.
(If you previously set a password for your ASI6585 web interface, you will be prompted for it now.)
The **/home>** prompt is displayed.
3. Type **vi product.id** and press the Enter key on your keyboard.
This opens the "product.id" document so it can be edited.
There is only one line in product.id - "liveio.r2."
4. Press <Shift><C> on your keyboard. The "2" in liveio.r2 will be replaced with a \$.
This means that the text 'liveio.r2' can now be overwritten.
5. Type **asi6585.r2** then press the <Enter> key on your keyboard to take you to the next line.
Type **ASI6585** then press the <Esc> key on your keyboard.
6. Type : then x then press the <Enter> key on your keyboard to save the changes and get back to the **/home>** prompt.
7. Type **exit** and press the <Enter> key on your keyboard.
The command line window will close.

14.3.3 Version 2.5.2d_r2

Changes:

1. Dual mono implementation.
2. Stream mode description changed from Fast/Slow to Live/Standard.
3. Added "Virtual GPIO", so automation system can use Livewire IP-only GPIO interface to communicate with consoles and GPIO nodes.
4. Added support for Livewire Sync LED.

Fixes:

1. Web based meters now work.
2. iProbe support: basic device information, audio and GPIO configuration.
3. 802.1p and TOS audio packet marking. Since 2.3.x, values set for Standard Streams were also applied to Live Streams.

14.3.4 Version 2.3.3b

Initial release

[end]