AudioScience

CobraNet®

ASI2202
TWO CHANNEL COBRANET® INPUT/OUTPUT DEVICE

1 DESCRIPTION

The ASI2202 is a professional audio device designed for use in the installed sound and entertainment markets.

Using Cirrus Logic's CobraNet®[1] technology for streaming audio over Ethernet, the ASI2202 provides 2 channels of CobraNet receive and transmit. The ASI2202 can be connected to any CobraNet compliant device.

AudioScience provides ASIControl, an application that allows CobraNet routing connections to be set up between the ASI2202 and any other compliant CobraNet device on the network.[2]

Note: This datasheet reflects ASIControl installed via driver 4.04 or later as certain functionality and the ASX interface is available in driver 4.04 or later.

2 FEATURES

- Two balanced, mono, analog inputs

- Two balanced, mono, analog outputs

- Inputs support both line in and microphone levels

- Phantom power available on inputs

- User selectable input levels

3 BLOCK DIAGRAM
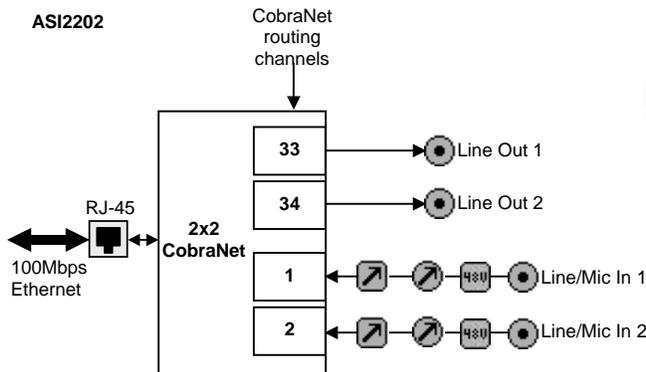
Key:

[↗] Level: 0, +14, +21 dBu, using front panel DIP switches

[↗] Variable Gain

[48U] Phantom power, using front panel DIP switches

[●] Input/Output

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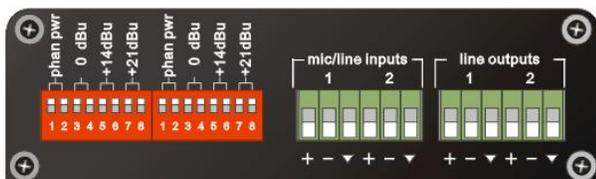
[1] CobraNet is a registered trademark of Cirrus Logic.

[2] ASIControl should be installed via AudioScience driver 4.04 or later. ASIControl should always be available during the ASI2202 installs.

Audioscience

4   SPECIFICATIONS

COBRANET INPUT/OUTPUT	
Type	100BaseT Ethernet
Connector	RJ-45
Precision	16, 20 or 24bit PCM
Sample Rate	48kHz
Latency	1.33, 2.66 or 5.33ms
Control Protocol	SNMP

ANALOG INPUT/OUTPUT	
Type	Balanced
Connector	Terminal block
Input Level	0dBu, +14dBu, +21dBu via DIP switches
Input Impedance	Line (14/21dBu): > 8k Ω balanced
	Mic (0dBu): > 10k Ω balanced
Output Level	+7dBu fixed
Output Impedance	110ohms balanced
Dynamic Range [1]	Input: >90dB
	Output: >90dB
THD+N [1]	Input: <-80dB
	Output: <-76dB
Frequency Response	Input: 20Hz to 20kHz +/- 0.4 dB
	Output: 20Hz to 20kHz +/- 0.1dB
Phantom Power	Equal to the DC power supply
Sample Rate	48kHz

GENERAL	
Dimensions	6.25" x 5.75" (with flange) x 1.25" (156mm x 148mm x 36mm)
Weight	1 pound, 2 ounces, 510grams
Operating Temperature	0C to 70C
Power Requirements	External 15-48 VDC, 5W

NOTES	[1] – Dynamic Range and THD+N measured using a +0dBu 1kHz sine wave sampled at 48kHz and A weighting filter.

5 REVISIONS

Date	Description
16 February 2010	Initial release.
16 March 2010	Added more information to GPIO section.
15 April 2010	CobraNet Audio Channel Mapping section: Added Note stating if no Receiver channels/bundles are configured for the ASI2202, its default behavior is to loop Mic In to Line Out.
23 April 2010	Revised GPIO section
27 April 2010	Operation Using ASIControl section: Updated ASIControl image → 4.02 driver does not show topology view.
17 May 2010	Added that GPIO is under development. Updated format.
28 May 2010	Added Audio Connectors information. Added ASIControl image showing topology view. Added Level information.
01 July 2010	Page 1: changed footnote 2 to say ASIControl should be installed with driver 4.04 or later. ASIControl section: added GPIO section. Updated level section. Updated GPIO section to say functional with ASI2202 hardware revision B0 and later.
31 August 2010	Additional information added to GPIO section. Formatting updates.
30 November 2010	Add power usage (W) to specs Add power cable part numbers for Europe and the UK

6 CONTENTS

7 INTRODUCTION

The ASI2202 is an audio device that supports the CobraNet™ audio interface providing 2 channels of CobraNet receive and transmit.

AudioScience provides application software that may be used to set up the ASI2202. ASIControl sets up all internal features of the unit such as levels and also allows CobraNet routing connections to be set up between the ASI2202 and any other CobraNet compliant device on the network.

7.1 CobraNet Background

CobraNet is a combination of software, hardware and network protocol that allows distribution of many channels of real-time, high quality digital audio over an Ethernet network. It was developed by Peak Audio in the 1990s and is now owned by Cirrus Logic. Interoperability between CobraNet devices from different manufacturers is supported through a standard communications protocol. CobraNet compliant devices are based on a common silicon or hardware reference design from Cirrus Logic.

The Cirrus Logic website, www.cobranet.info, is dedicated to CobraNet. Wikipedia has a useful introduction to CobraNet here (http://en.wikipedia.org/wiki/Cobranet).

CobraNet delivers audio in standard Ethernet packets over 100Mbit Fast Ethernet. Switches, hubs, media converters and other gear that operate in compliance with the IEEE 802.3u specification for Fast Ethernet, will work with CobraNet. CobraNet does not support 10Mbit Ethernet varieties (10BASE-T, Coaxial) due to their limited bandwidth.

CobraNet operates at the Data Link Layer also referred to as OSI Layer 2 or MAC layer. Because it does not use the higher IP layer for audio data transport, CobraNet does not suffer from IP latency limitations. In most cases data communications and CobraNet data can coexist on the same network without QOS issues. All audio is sent inside a custom Ethernet packet whose header that tells network devices that the packet contains CobraNet audio rather than plain data. The CobraNet term for an audio packet is "Bundle". A Bundle may contain from one to eight audio channels, each channel being composed of PCM samples of 16, 20 or 24 bits in length.

7.1.1 CobraNet Routing

The whole point of network audio is to route digital audio from point A to point B. CobraNet introduces a concept called a "bundle" to define virtual audio routes from one CobraNet device to another one. A bundle is a logical collection of up to 8 channels that can be sent from on device to another. Each bundle is assigned a unique number between 1 and 9999. Bundles form the heart of the CobraNet routing capability.
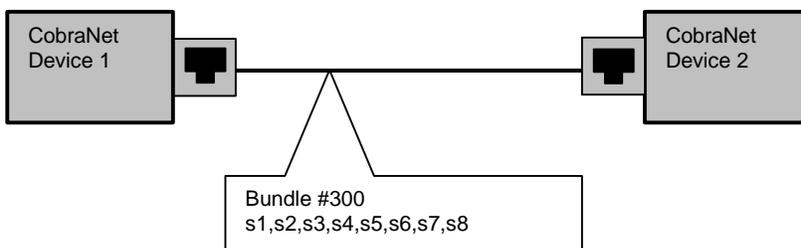
The bundle number 300 is used to describe this collection of channels coming from Device 1. s1 to s8 represent audio samples. The bundle shown above consists of 1 to 8 samples of audio each taken from different channels of Device 1.

Figure 1. Illustration of a CobraNet bundle going between 2 CobraNet devices.

The above figure illustrates a bundle of audio being sent from one CobraNet device to another. Device 1 is transmitting the CobraNet bundle, while Device 2 is receiving it. In this case, both devices need to be set to bundle 300 for the audio link to be made. The CobraNet mechanism for transmitting bundles uses "transmitters". Similarly, the mechanism for receiving bundles uses receivers. Each CobraNet device has several transmitters and receivers and so can simultaneously send and receive audio channels using several different bundle numbers. This capability supports audio links between many different CobraNet devices.

7.1.2   ASI2202 CobraNet Audio Channel Mapping

Before further discussion of CobraNet transmitters and receivers, terminology useful for specifying audio channels within a bundle needs to be introduced. Somewhat obviously, these channels are called the Audio Routing Channels. On an ASI2202, audio routing channels 1 and 2 map to line out 1and 2 respectively. Line/mic 1and 2 map to audio routing channels 33 and 34.
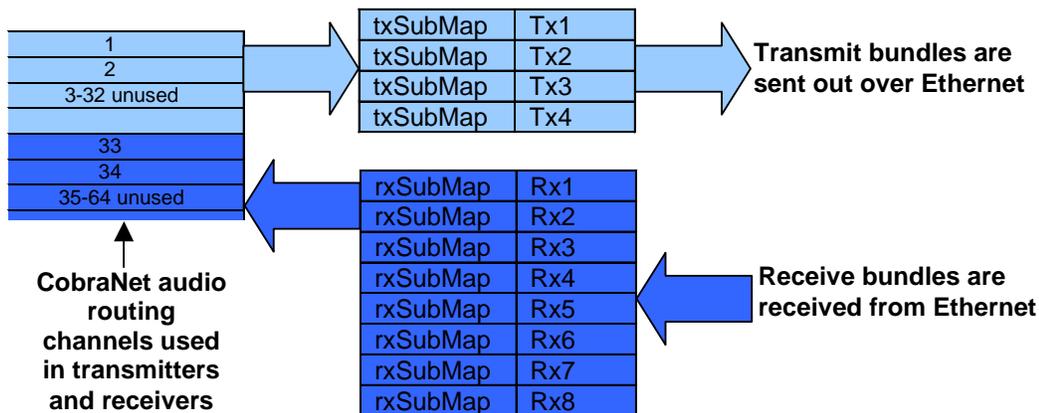
Figure 3. Mapping of ASI2202 inputs and outputs to CobraNet channels.

NOTE: If no Receiver channels/bundles are configured for the ASI2202, its default behavior is to loop Mic In to Line Out.

7.1.3   CobraNet Transmitters

A CobraNet transmitter is a logical entity in the CobraNet interface that has the ability to send a bundle of audio samples on the CobraNet network. CobraNet devices typically have multiple transmitters. The ASI2416, for example, has 4 transmitters. An incomplete list of transmitter routing variables follows:

- txBundle – this variable specifies the bundle number to transmit. A value of 0 indicates that the transmitter is disabled.
- txSubMap – a sequence of up to 8 audio routing channel numbers that specify which audio samples should be placed in the bundle. A value of 0 indicates an unused slot in the bundle.
- txSubFomat – a sequence of format specifiers that define how many bits per sample are placed in the bundle.
- txSubCount – the number of channels in this bundle.

7.1.4 CobraNet Receivers

A CobraNet receiver is a logical entity in the CobraNet interface that has the ability to receiver a bundle of audio samples from the CobraNet network. CobraNet devices typically have multiple receivers. The ASI2416, for example, has 4 receivers. An incomplete list of receiver routing variables follows:

- rxBundle – the number of the bundle to receive. This should be the same a bundle number being transmitted somewhere else on the network. A value of 0 indicates that the receiver is disabled.
- rxSubMap – a sequence of up to 8 audio routing channel numbers that specify where incoming bundle samples should be routed.

7.1.5 CobraNet Sample Rate and Latency

The CobraNet sample rate supported by AudioScience's CobraNet devices is fixed at 48kHz with three latency modes of 5.33ms (default), 2.67ms, or 1.33ms.

7.1.6 CobraNet References

This document is not intended to be an expansive guide to CobraNet networking and routing. AudioScience's CobraNet devices adhere to the CobraNet standard through the use of off-the-self CobraNet silicon from Cirrus Logic. More detailed CobraNet information is available from them.

The following links may be helpful:

CobraNet Info:
http://www.cobranet.info/en/support/cobranet/

CobraNet Discovery:
http://www.cobranet.info/dispatch/forms/sup/boardreg/breg/BregController.jpf

Audio Routing Primer:
http:// www.cirrus.com/en/pubs/appNote/CobraNet_AudioRoutingPrimer.pdf

Hardware manual and programmer's reference:
http://www.cobranet.info/en/support/cobranet/developer/tech_data_sheet.html

Switched networks and redundancy:
http://www.cirrus.com/en/support/cobranet/design/switched_networks.html

8   CONNECTORS

8.1   Ethernet Connection

There is one RJ-45 Ethernet jack on the rear of the ASI2202 for connecting to a CobraNet network. Plug a CAT-5 or better (CAT-5e, CAT-6, etc.) network cable (required for 100baseT Ethernet operation) into the ASI2202's RJ-45 connector. Plug the other end of the network cable into the CobraNet switch. The cable length between the ASI2202 and a network switch should not exceed 100 meters (328 feet).

8.2   AC Power

The ASI2202 comes with an external 48V DC power supply "brick". This power supply operates with AC voltages from 100 to 240VAC, 47 to 63Hz.

Use only an AC power source with a protective earth ground.
The ASI2202 has no power switch. Detach the AC power cord to remove power to the ASI22022.

8.2.1   Power cord options

The ASI2202 power supply contains an IEC320-C8 socket for the AC power cable. Different world regions are accommodated using specific power cables with the an IEC320-C7 plug on one end a region specific plug on the other. Upon request, AudioScience can supply the following region specific power cords:

Part No.	Region	Description
CBL2101	UK	AC power cord, IEC 320-C7 to BS1363A, 6 feet
CBL2102	Europe (excluding the UK)	AC power cord, IEC 320-C7 to CEE 7/16, 6 feet

8.3 Audio Connectors

The ASI2202 has terminal blocks for connecting to audio inputs and outputs.

8.3.1 Line outputs

The 2 balanced line outputs can be connected to an external device by wiring the external device to the terminal block connector labeled "line outputs." Use the silk-screened **+**, **-**, and ▼ (ground) indicators as guides.

8.3.2 Mic/Line In

The mic/line input terminal block supports balanced operation as either a line in or a microphone input.

Line input configuration is as follows:
- Wire balanced line signals to the terminal block using the silk-screened **+**, **-**, and ▼ (ground) indicators as guides.
- Select the maximum line input level using the DIP switches. This is sometimes called trim level.

Maximum line input level DIP switch settings:

0 dBu

+14 dBu

+21 dBu
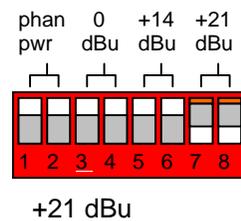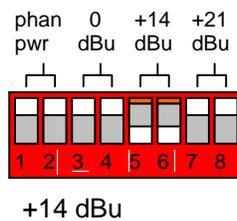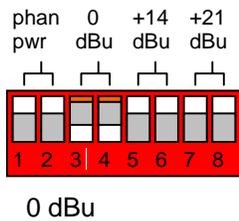
Microphone input configuration is similar to line input configuration. The steps are as follows:
- Wire balanced microphone signals to the terminal block using the silk-screened **+**, **-**, and ▼ (ground) indicators on the back panel as a guide.
- Select the maximum input level to be 0 dBu.
- Optionally turn on phantom power – this requirement depends on the type of microphone connected.
- Adjust microphone input gain using ASIControl (vXXXX or later).
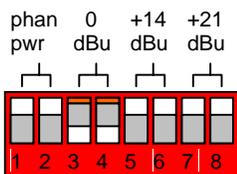
Mic input without phantom power
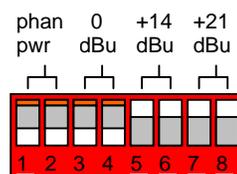
Mic input with phantom power

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8.4 GPIO

NOTE: ASI2202 hardware revisions B0 and later is required.

GPIO pins are available on the ASI2202 Female DB15 and are assigned as follows.
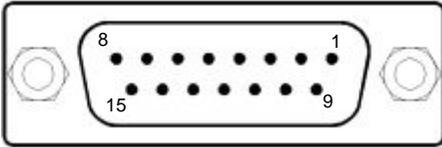
RLY1A	pin 13
RLY1B	pin 5
RLY2A	pin 11
RLY2B	pin 4
OPT1	pin 9
OPT1GND	pin 1
OPT2	pin 10
OPT2GND	pin 2

8.4.1 Outputs

The GP outputs consist of two relays. The current through each relay should be limited to 500mA.
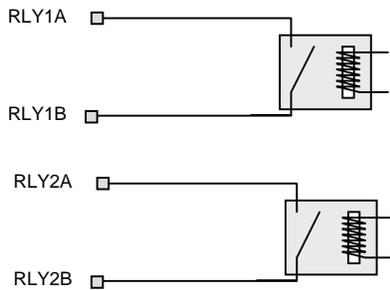
8.4.2 Inputs

The GP inputs consist of two opto-isolated inputs.
The following diagram shows the connections required if an external switch is connected.
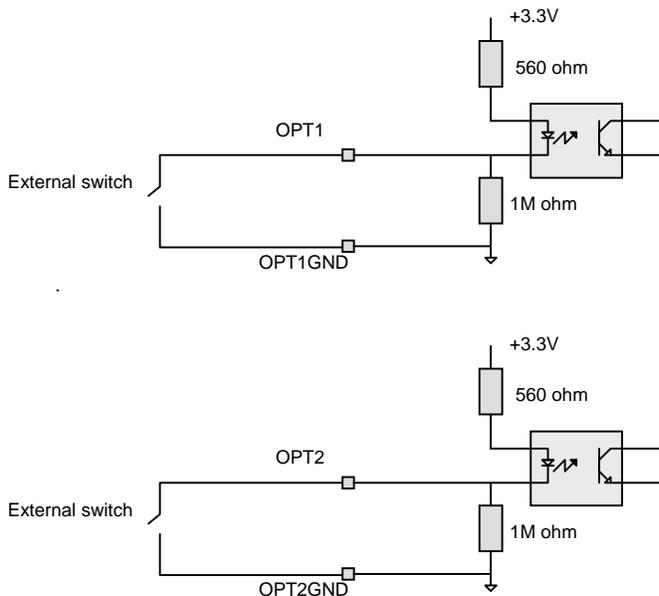
The opto inputs on the ASI2202 can only be used to switch the audio route of the microphone input audio. The routing operation is enabled and disabled using ASIControl.

A typical use case would be for the opto input to be connected to a push-to-talk button that would cause the mic input to be routed to the line out whenever the button was pressed.

9   CABLES

The ASI2202 is connected to a CobraNet network using a standard Ethernet cable. The Ethernet cable is not supplied with the ASI2202.

10 SOFTWARE INSTALLATION

The software application ASIControl is used to control the ASI2202 and set up its CobraNet interface. To get ASIControl, the AudioScience audio driver needs to be installed on the computer; ASIControl is automatically installed at the same time.

10.1 Windows

Under Windows XP and later, get the latest driver from our website, www.audioscience.com. Select any one of the Windows drivers. **NOTE: When installing, make sure you install Network support.**

10.2 Linux

<tbd>

10.3 Restoring factory defaults

The ASI2202 can be restored to factory default settings by performing the following steps:
1. Make sure AudioScience driver version 4.02.00 or later is installed with network support enabled. The driver is available from AudioScience's website in the Download section.
2. Run ASIControl and right click on the ASI2202 and select "CobraNet Configuration" and turn off persistence. When you select OK to close this dialog you will be prompted to confirm that you want to turn persistence off.
3. Close ASIControl.
4. Power down the ASI2202 for 20 seconds.
5. Apply power to the ASI2202.
6. Start ASIControl. ASIControl will automatically send a command to the ASI2202 telling it to revert to default settings.

11 OPERATION USING ASICONTROL

Using ASIControl from driver 4.04 or later, the ASI2202 will look like diagram below.
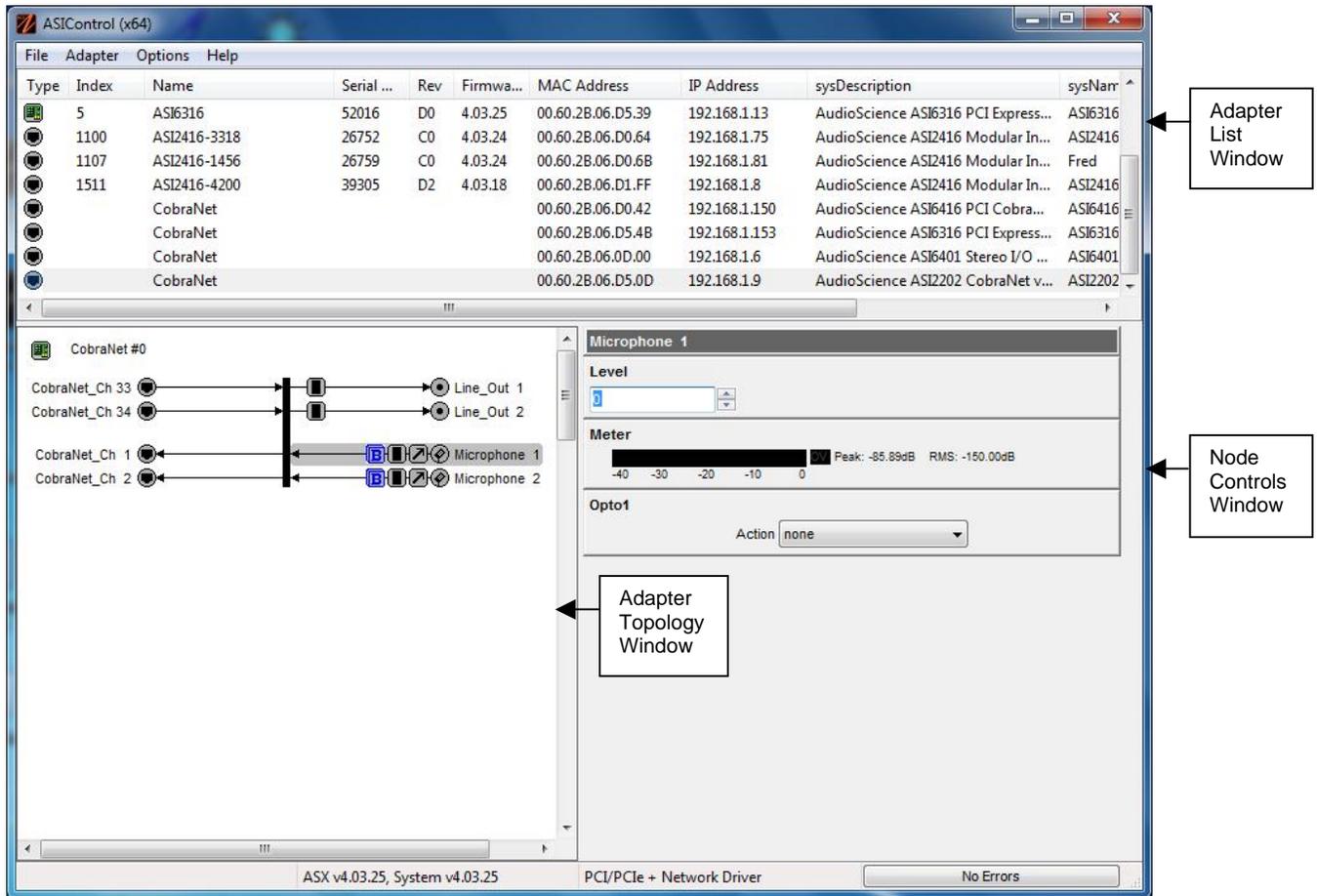
11.1 User Interface

ASIControl consists of three main windows: the adapter list in the top portion of the window, the adapter topology view on the left hand side, and the node control list on the right hand side.

11.1.1 Adapter List Window

The top portion of ASIControl shows a list of all the adapters that the application has found. By default, only bus based (i.e. PCI and/or PCI Express) adapters will be shown. If the network portion of the driver is installed (by selecting "Install Standard + Networked Audio Driver" after running the driver installer) and "Local PCI(e) + Networked adapters" is selected from ASIControl's Options→Configure adapter interface, then AudioScience and other third party CobraNet devices will be shown.

Adapters are listed in order of adapter index. For bus-based adapters, this is determined by the adapter index jumper on the card. For AudioScience CobraNet devices this is calculated from the unit's MAC address. Third party CobraNet devices are listed last as they have no AudioScience index.

11.1.2 Adapter Topology Window

The left hand side of ASIControl contains the topology view of the adapter. It is essentially a block diagram of the device showing the available physical inputs and outputs on the right hand side of the black, vertical 'bus' line. On the left hand side of the bus line, bus-based adapters show player and recorder streams, while CobraNet adapters show their network connections.

Each of the inputs and outputs is referred to as a node and each Node contains one or more controls. The topology shows each control as a small icon. A non-exhaustive list of nodes follows:

Line In	Recorder
Line Out	Tuner
AES/EBU In	Clock Source In
AES/EBU Out	CobraNet In
Player	CobraNet Out

Hovering the mouse over a particular node will highlight it. Clicking on a node will bring up the controls resident on that node in the right hand control list.

There is an adapter node in the top left corner of the topology window. Clicking on this will show adapter-specific controls and properties on the right hand side.

Not all adapters have all nodes.

11.1.3 Node Controls Window

The right hand side of ASIControl shows the controls associated with the selected node in the topology view. The controls are arranged, from top to bottom, in order of audio signal flow, i.e. the audio signal can be viewed as entering the node at the top control and leaving at the bottom control. Controls may be used to either manipulate the audio as it passes through the node, or report back control status information.

For a comprehensive listing of controls and how to operate ASIControl, please see the ASIControl manual available from www.audioscience.com and also installed by the driver. Not all adapters have all controls.

11.2 Controls

11.3 Level

The levels for the adapter's analog line_outs and line_ins can be adjusted using the level control.
In the example below, the Line_Out 1 node in the topology view of ASIControl has been selected. Its Level will show up on the right side of ASIControl. The same is done for a Line_In to see its Level.
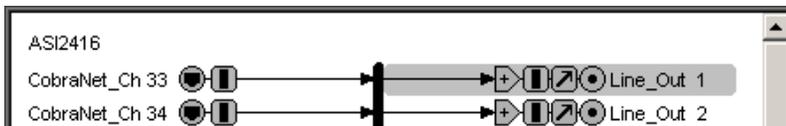
Figure 1. Using ASIControl to select Line_Out 1.

11.3.1 Interface

Figure 2. Level displayed by ASIControl for Line_Out 1.

Level:

The level is specified in dBu. It can be adjusted by clicking the ⬆⬇ arrows or by typing values in the edit box.

The level value represents the maximum output of a Line_Out and the maximum input (before clipping) of a Line_In. For example if you wish to use a +4dBu nominal level with 16dB of headroom, you would set the level to 4+16=+20dBuV.

Consult the specification section for the range of supported levels.

11.3.2 Developer

11.3.2.1 Windows APIs
Wave/Mixer – Analog levels are controlled using mixerSetControlDetails() on a control of type signed and with the name Level/Trim.
HPI – Analog levels are controlled using the HPI_LevelSet() API.
ASX – Analog level are controlled using the ASX_Level_Set() and ASX_Level_GetRange() API.
DirectSound – TBD.

11.3.2.2 Linux APIs
HPI – Analog levels are controlled using the HPI_LevelSet() API.
ASX – Analog level are controlled using the ASX_Level_Set()and ASX_Level_GetRange() API.
ALSA – TBD.

11.3.2.3 SNMP APIs
This section applies to specific ASI adapters.

11.3.2.3.1 ASI2202

Variable	SNMP address
MIC1 level	OID : `1.3.6.1.4.1.2680.1.3.3.3.1.2.51` or stdUserInteger.51
MIC2 level	OID : `1.3.6.1.4.1.2680.1.3.3.3.1.2.52` or stdUserInteger.52

Note: stdUserInteger is defined by the CobraNet MIB (available on request from AudioScience).

ASIControl level	OID value	Operation
0	0	Applies 0 dB gain to mic input
-6	1	Applies 6 dB gain to mic input
-12	2	Applies 12 dB gain to mic input
-18	3	Applies 18 dB gain to mic input
-24	4	Applies 24 dB gain to mic input
-30	5	Applies 30 dB gain to mic input
-36	6	Applies 36 dB gain to mic input
-42	7	Applies42 dB gain to mic input
-48	8	Applies 48 dB gain to mic input
-54	9	Applies 54 dB gain to mic input

11.4 GPIO

The GPIO interface in ASIControl is located on the adapter node. Note only a few device types/configurations support GPIO.

11.4.1 Interface

GPIO

Input BitsOutput Bits
(Optos) (Relays)
☐ Bit 0 ☑ Bit 0
☐ Bit 1 ☐ Bit 1

Figure 3.   A view of 2 GPIO opto inputs and relay outputs.

11.4.2 Developer

Not all GPIO APIs are supported by every device type. See below table:

Device	WAVE – Windows	HPI - Windows	HPI - Linux	ASX - Windows	ASX - Linux	SNMP
ASI2416		●	●	●	●	
ASI2202				●		●
ASI5211	●	●	●	●		

11.4.2.1 Windows APIs

WAVE – GPIO inputs and outputs are accessed using MIXERCONTROL_CONTROLTYPE_BOOLEAN and the Windows mixerSetControlDetails() and mixerGetControlDetails() calls.
HPI – GPIO inputs and outputs are accessed using the HPI_GPIOxxx()API.
ASX – GPIO inputs and outputs are accessed using the ASX_GPIO_xxx() API.
SNMP – ASI2202 only

Variable	SNMP address
RLY1	OID : `1.3.6.1.4.1.2680.1.3.3.3.1.2.57` or stdUserInteger.57
RLY2	OID : `1.3.6.1.4.1.2680.1.3.3.3.1.2.58` or stdUserInteger.58

Note: stdUserInteger is defined by the CobraNet MIB (available on request from AudioScience).

11.4.2.2 Linux APIs

HPI – GPIO inputs and outputs are accessed using the HPI_GPIOxxx()API.
ASX – GPIO inputs and outputs are accessed using the ASX_GPIO_xxx() API.
SNMP – ASI2202 only (see above table).

<end>