



ASI5308, ASI5316, ASI6316

PCI EXPRESS COBRANET SOUND CARDS

1 DESCRIPTION

The ASI5308, ASI5316, and ASI6316 are professional PCI Express audio adapters designed for use in the installed sound and entertainment markets.

Using Cirrus Logic's CobraNet technology for streaming audio over Ethernet, the ASI5308 provides 8 channels of CobraNet receive and transmit and the ASI5316/ASI6316 provide 16 channels of CobraNet receive and transmit. They can be connected to any CobraNet compliant device and have dual redundant CobraNet interfaces.

The ASI5308, ASI5316, and ASI6316 are based on the TMS320C6713 VLIW floating point DSP connected to a high-speed bus-master PCI Express interface.

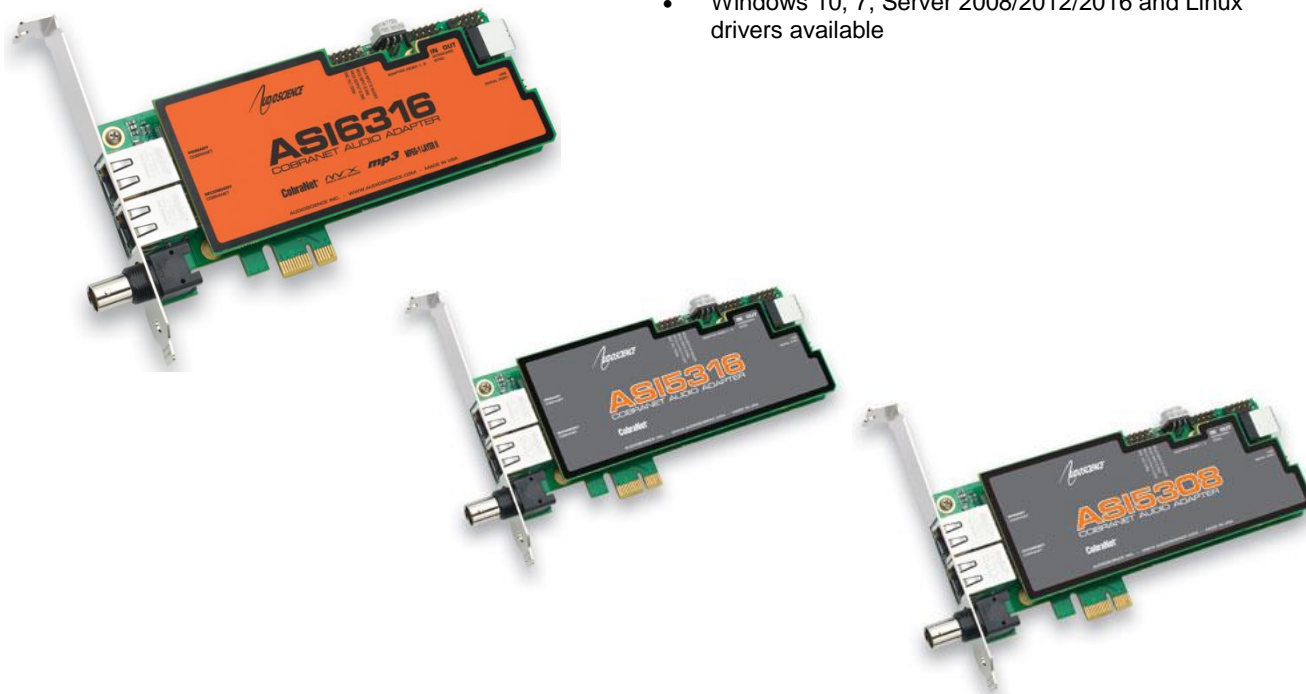
For the ASI6316 AudioScience MRX technology allows up to 16 streams of different formats and sample rates to be played, recorded, and mixed over CobraNet.

For the ASI5308/ASI5316, a choice of 16, 24, and 32bit PCM is available on all streams. For the ASI6316, a choice of 16bit PCM, MP3 or MPEG layer 2 compression is available on all streams.

AudioScience provides ASIControl, an application that allows CobraNet routing connections to be set up between the ASI5308, ASI5316, and ASI6316 and any other compliant CobraNet device on the network. Alternatively, third party CobraNet design and management software may be used.

2 FEATURES

- 8 24bit (ASI5308) or 16 24bit (ASI5316/ASI6316) CobraNet inputs and outputs on 100Mbit Ethernet operating at 48kHz with dual RJ45 connectors
- 8 (ASI5308) or 16 (ASI5316/ASI6316) streams of playback and 8 (ASI5308) or 16 (ASI5316/ASI6316) streams of record
- Formats include PCM16 (ASI5308/ASI5316/ASI6316) and MPEG layer 2 and MP3 (ASI6316)
- Dedicated Word clock Sync input and output (selectable)
- Intercard Sync to support exactly aligned channels of ASIO audio
- Serial bridge exposed as a USB header
- MRX™ technology supports recording, playing and mixing of multiple stream formats and sample rates (ASI6316 only)
- TSX™ time scaling allows compression/expansion of play streams by up to +/-20% with no pitch shift
- Low Profile PCI card allows use in 2U high rackmount computers
- Up to 8 cards in one system
- Windows 10, 7, Server 2008/2012/2016 and Linux drivers available



3 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 |

SIGNAL PROCESSING

| | | | |
|---------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| DSP | | Texas Instruments TMS320C6713@300MHz | |
| Memory | | 8MB | |
| Audio Formats – ASI5308/ASI5316 | | 8 bit unsigned PCM 16 bit signed PCM 24 bit signed PCM 32 bit signed PCM 32 bit floating point PCM | |
| Audio Formats – ASI6316 | | 8 bit unsigned PCM 16bit 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) | |
| MRX | Playback sample rates | 8 to 96kHz with 1Hz resolution | |
| | Record sample rates | 8 to 96kHz with 1Hz resolution | |
| | SRC THD+N | -110dB | |

GENERAL

| | |
|-----------------------|-------------------------------------------------------------|
| Bus | X1 PCI Express |
| Dimensions | PCI form factor – 6.1" x 3.25" x 0.5" (155mm x 82mm x 13mm) |
| Weight | 8 oz (227g) max |
| Operating Temperature | 0C to 70C |
| Power Requirements | +3.3V@1.1A |
| | |
| | |
| | |

4 REVISIONS

| Date | Description |
|------------------|----------------------------------------------|
| 29 May 2009 | Initial. |
| 30 October 2009 | Removed rogue elements from block diagrams. |
| 25 January 2010 | Added Clock Source Configurations sections. |
| 15 November 2019 | Update format and correct ASI5308 mode error |

5 DSP UTILIZATION

The ASI6xxx and ASI5xxx series of adapters have world-class audio signal processing capabilities. The algorithm complexity has increased at a faster rate than DSP processing power, resulting in a situation where not all available algorithms on a card 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

5.1 ASI6316 Rev:D, samplerate 48kHz, driver 3.12.02

Idle DSP utilization in Mode 1 = 12%, in 16-Play mode = 18%.

| Operation | Play (utilization/ device) | | Record (utilization/ device) | |
|------------------------------------------------------|-------------------------------|---------|---------------------------------|---------|
| | Mode 1 | 16-Play | Mode 1 | 16-Play |
| PCM 32 @ 48kHz | 3 | 2 | 3 | 2 |
| MPEG-1 Layer-2, 256 kbps @ 48kHz | 6 | 6 | 11 | 10 |
| MPEG-2 Layer-3, 256 kbps @ 48kHz | 11 | 11 | 30 | 30 |
| SampleRate Conversion to/from 32kHz PCM | 7 | 7 | 7 | 7 |
| SampleRate Conversion to/from 44.1kHz PCM | 6 | 6 | 6 | 5 |
| SampleRate Conversion to/from 32kHz MPEG-1 Layer-2 | 9 | 9 | 13 | 12 |
| SampleRate Conversion to/from 44.1kHz MPEG-1 Layer-2 | 10 | 10 | 13 | 13 |
| SampleRate Conversion to/from 32kHz MPEG-2 Layer-3 | 13 | 13 | 26 | 26 |
| SampleRate Conversion to/from 44.1kHz MPEG-2 Layer-3 | 14 | 14 | 31 | 32 |
| TimeScale (90%) PCM | 3 | 3 | NA | NA |
| TimeScale (110%) PCM | 3 | 3 | NA | NA |
| TimeScale (90%) MPEG-1 Layer 2 | 6 | 6 | NA | NA |
| TimeScale (110%) MPEG-1 Layer 2 | 6 | 6 | NA | NA |
| TimeScale (90%) MPEG-2 Layer 3 | 11 | 11 | NA | NA |
| TimeScale (110%) MPEG-2 Layer 3 | 11 | 11 | NA | NA |

From the above table:

ASI6316 in 16-Play mode, 4xMP2 playback (all at 44.1 kHz) = idle + 4x6% = 18% + 24% = 42%.

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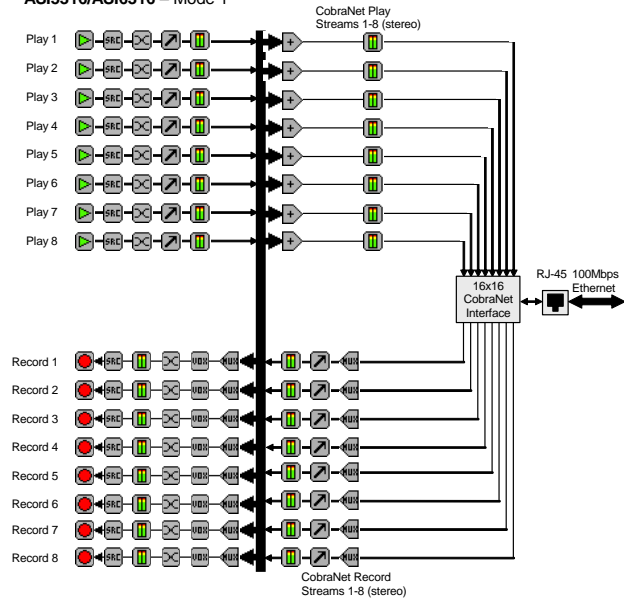
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7 BLOCK DIAGRAMS

7.1 ASI5316/ASI6316 Mode-1

ASI5316/ASI6316 – Mode 1

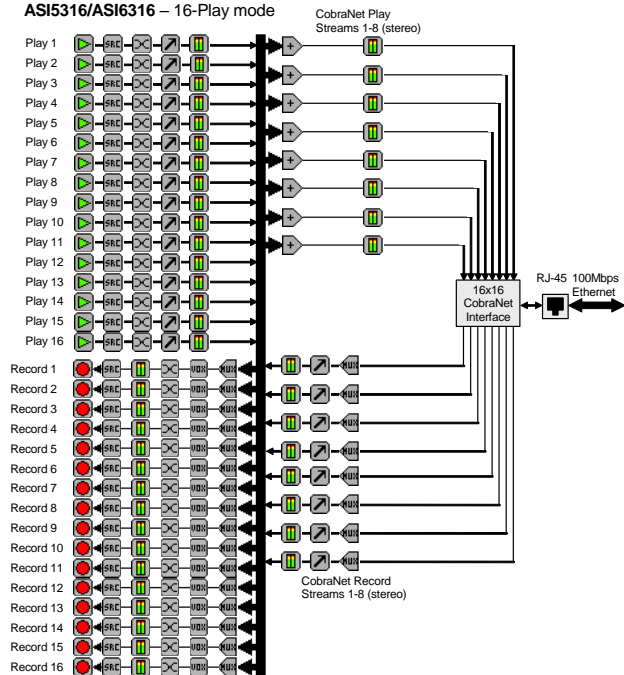


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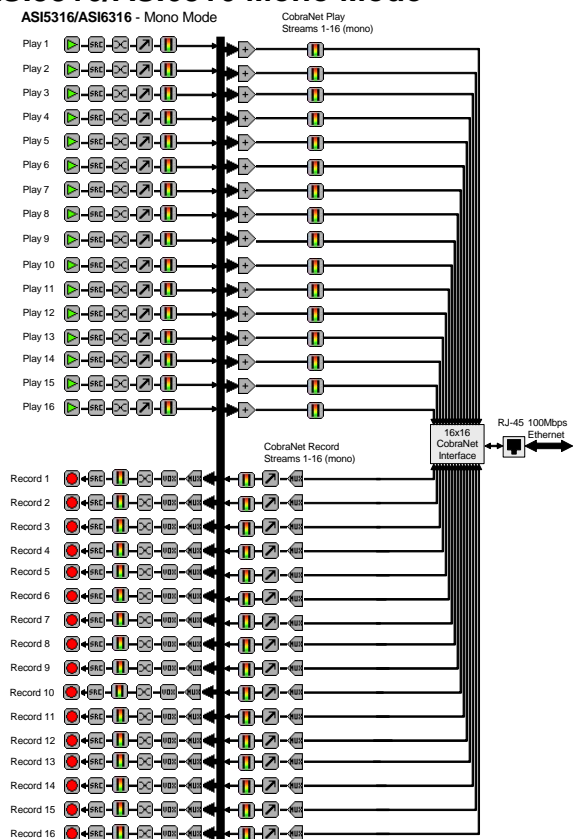
- | | |
|-----------------------|-----------------------|
| Play Stream | Mixer |
| Sample Rate Converter | Record Stream |
| Channel Mode | Voice Operated Switch |
| Volume | Multiplexer |
| Meter | |

7.2 ASI5316/ASI6316 16-Play mode

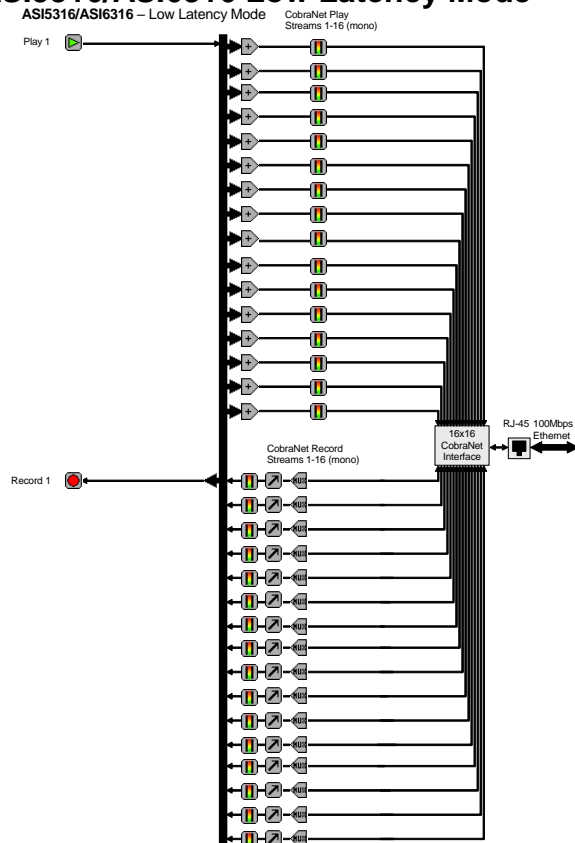
ASI5316/ASI6316 – 16-Play mode



7.3 ASI5316/ASI6316 Mono Mode



7.4 ASI5316/ASI6316 Low Latency Mode



8 COBRANET INTRODUCTION

The ASI5308/ASI5316/ASI6316 are PCI audio adapters that support the CobraNet™ audio interface providing 8 (ASI5308) or 16 (ASI5316/ASI6316) channels of CobraNet receive and transmit.

The ASI5308/ASI5316/ASI6316 features a powerful Texas Instruments 32bit floating point DSP that allows sophisticated switching and mixing.

AudioScience provides application software that may be used to set up the ASI5308/ASI5316/ASI6316. ASIControl sets up all internal features of the unit such as levels also allows CobraNet routing connections to be set up between the ASI5308/ASI5316/ASI6316 and any other compliant CobraNet device on the network.

8.1 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.

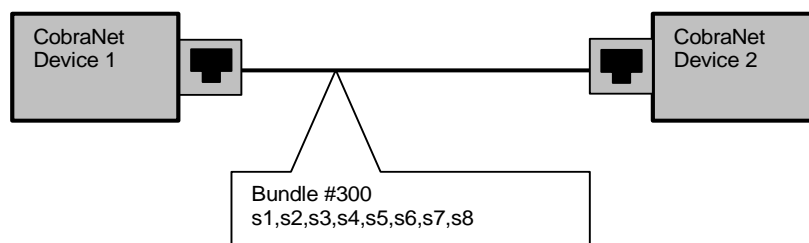
The Cirrus Logic website, www.cobranet.info, is dedicated to CobraNet. Wikipedia has a useful introduction to CobraNet [here](http://en.wikipedia.org/wiki/Cobranet) (<http://en.wikipedia.org/wiki/Cobranet>).

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.

8.1.1 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 one 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.

8.1.2 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, Cirrus calls these channels ‘audio routing channels.’

On an ASI5316/ASI6316, CobraNet audio routing channels 1-16 map to the ASI5316/6316’s line out 1-8 and CobraNet audio routing channels 33-49 map to the ASI5316/6316’s line in channels 1-8. Routing channel 1 maps to line out 1 left and routing channel 2 maps to line out 1 right and so on, and routing channel 33 maps to line in 1 left and routing channel 34 maps to line in 1 right and so on. (The ASI5308 follows the same logic but with half as many channels/line ins/line outs.)

When placed in mono mode, CobraNet audio routing channels 1-16 map to the ASI5316/6316’s Player channels 1-16 and CobraNet audio routing channels 33-49 map to the ASI5316/6316’s Record channels 1-16. (The ASI5308 follows the same logic but with half as many channels/line ins/line outs.)

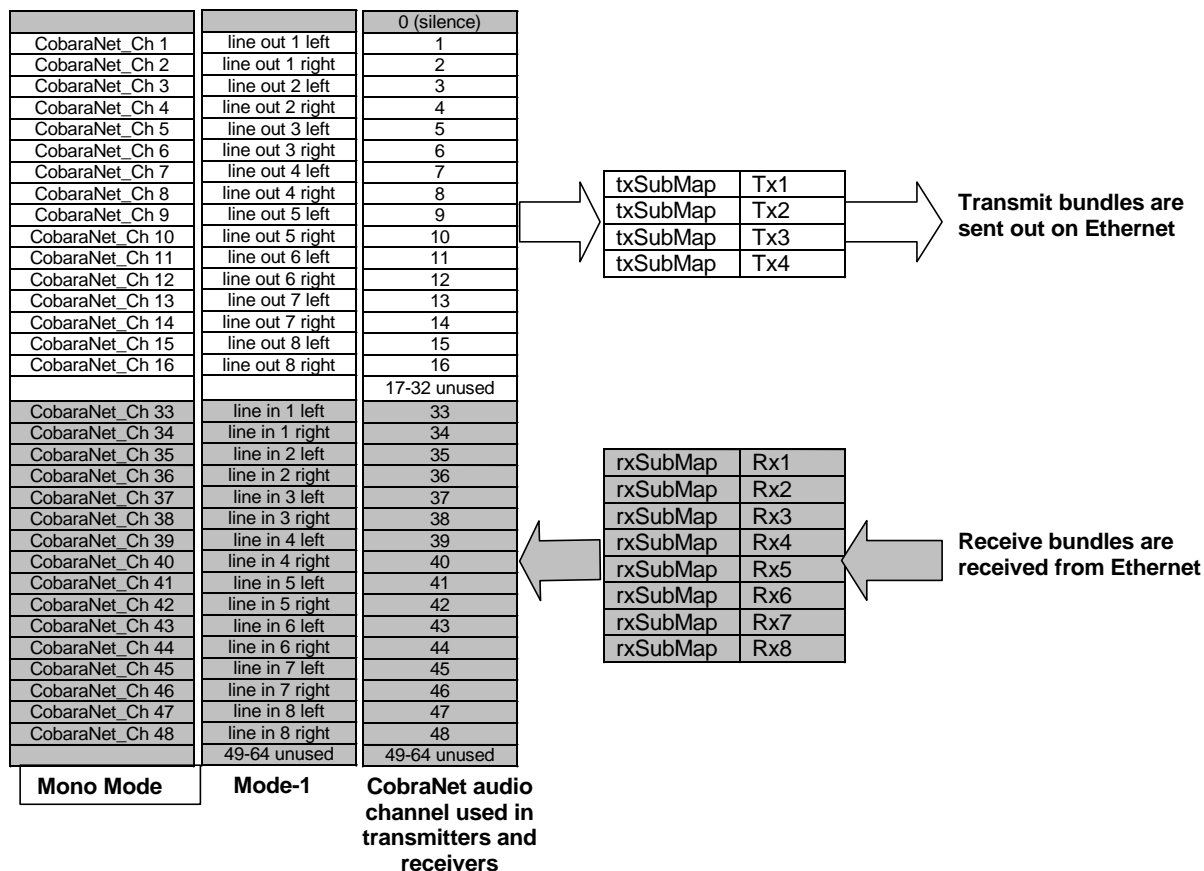


Figure 3. Mapping of inputs and outputs to CobraNet channels (the ASI5308 follows the same logic but with 8 channels)

8.1.3 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.

- txSubFormat – 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.

8.1.4 CobraNet Receivers

A CobraNet receiver is a logical entity in the CobraNet interface that has the ability to receive 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.

8.1.5 CobraNet Sample Rate and Latency

The CobraNet sample rate supported by the ASI2416 and ASI6416 is fixed at 48kHz with three latency modes of 5.33ms (default), 2.67ms or 1.33ms.

8.1.6 CobraNet References

This document is not intended to be an expansive guide to CobraNet networking and routing. The ASI2416 and ASI6416 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.jpg>

Audio Routing Primer:

[http:// www.cirrus.com/en/pubs/appNote/CobraNet_AudioRoutingPrimer.pdf](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

9 CONNECTORS

The ASI5308/5316/6316 uses standard, dual RJ-45 connectors.

10 CABLES

The ASI5308/5316/6316 is connected to a CobraNet network using a standard Ethernet cable. The Ethernet cable is not supplied with the ASI5308/5316/6316.

11 HARDWARE INSTALLATION

This section explains how to install one or more AudioScience adapters in a computer.

11.1 Setting Adapter Index – One Adapter in the PC

1. Make sure your computer is turned off.
2. PCI adapters should be installed in any empty PCI slot and PCIe adapters should be installed in any x1 (or greater) PCIe slot.
3. Make sure the adapter jumper is set to adapter index #1, the factory default. For a new card no changes need to be made. For an AudioScience adapter from another installation, check that it is set to adapter index #1.

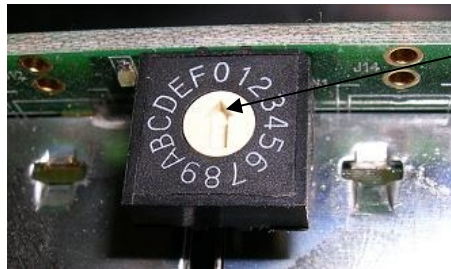
Depending on the adapter family, there are different ways of setting the adapter index.

For ASI5000 and ASI6000 families, there is an adapter jumper that must be set. The left most position represents adapter index #1.

For ASI5300, ASI6300, ASI8700, and ASI8900 families, there is a rotary switch.

NOTE: Position 0 (zero) represents adapter #1, position 1 is adapter #2, etc.

Adapter Jumper set to Adapter #1



Adapter Index switch set to Adapter #1

4. Turn on the computer and let it boot. Under Windows, a dialog box will pop up informing you that the computer has detected a new Multimedia Audio card. Cancel out of this dialog box and proceed to the software installation section of this datasheet.

11.1.1 Setting Adapter Index - Two or More Adapters in the PC

1. Make sure your computer is turned off.
2. PCI adapters should be installed in any empty PCI slots and PCIe adapters should be installed in any x1 (or greater) PCIe slots. Different adapter types can coexist in the same computer; for example, an ASI6416 and ASI8921 will work correctly if installed in the same PC. Different adapter types still require unique adapter index numbers.
3. Each adapter in the PC needs to have its adapter jumper/rotary switch position set to unique numbers. For example if you are installing two adapters, the first one would be set to adapter index #1 and the second to adapter index #2.
 - 3.1. For ASI5000 and ASI6000 families, the position to the right of index #1, when jumpered, represents adapter index #2. The next position represents #3, and the rightmost position, when jumpered, represents #4.
 - 3.2. For ASI5300, ASI6300, ASI8700, and ASI8900 families, rotate the rotary switch to indicate what position is required.

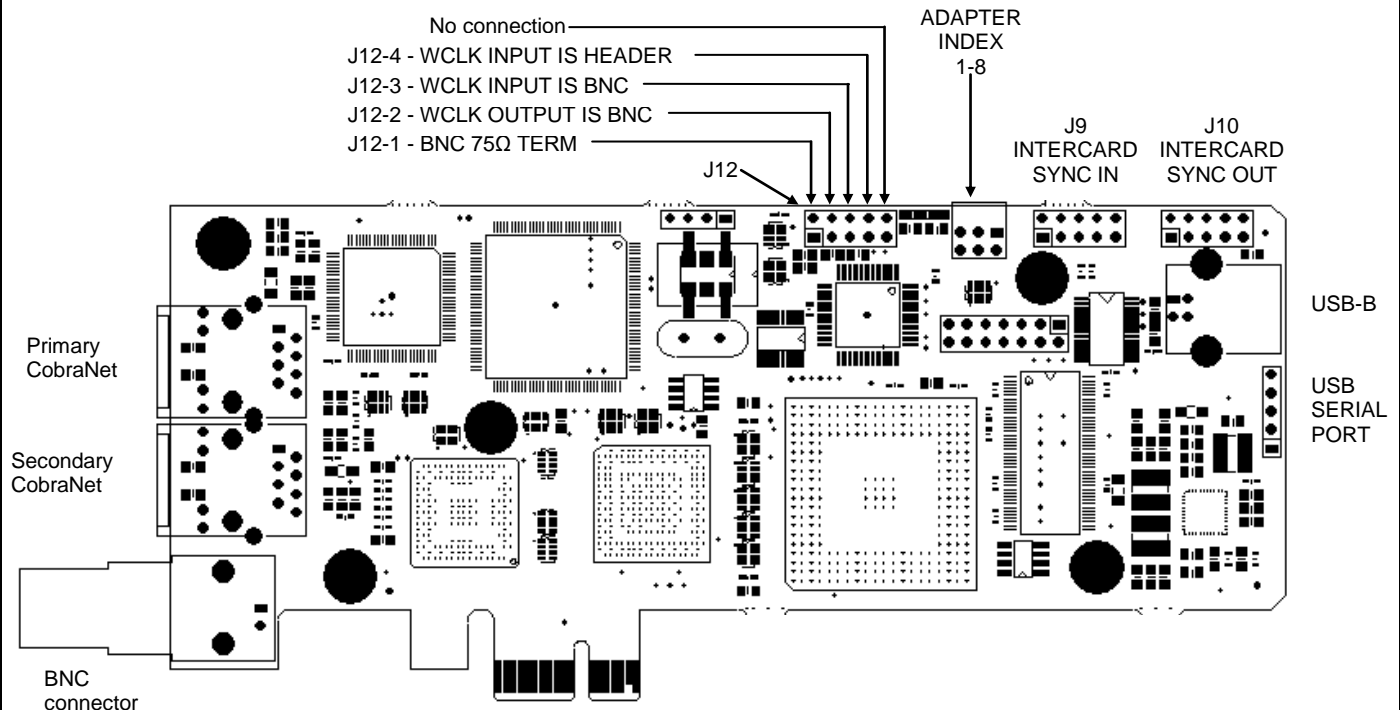
11.2 Clock Source Configuration

The ASI5308/5316/6316 can obtain its CobraNet sample clock from the following three sources:

- The CobraNet network (default)*
 - Set using ASIControl; see Section 9.1 below
 - If using BNC out, need to also jumper WCLK OUTPUT IS BNC on J12
- A word clock input through the ASI5308/5316/6316's BNC connector (ASI5308/5326/6316 is CobraNet conductor)
 - Set using ASIControl and jumpering WCLK INPUT IS BNC on J12; see Section 9.2 below
- A word clock input from an adjacent ASI5308/5316/6316
 - Set using another ASI5308/5316/6316 in the same PC and a 10pin ribbon cable, see Section 9.3 below

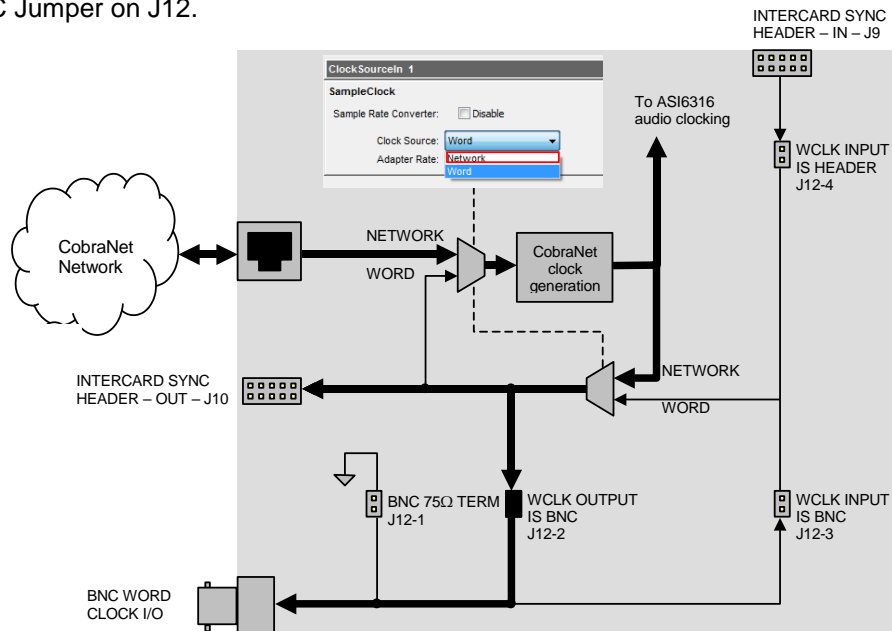
*The default ASI5308/5316/6316 clock source configuration is "Network", which derives the CobraNet clock from the CobraNet network. This default setting will work correctly for 90% of installation scenarios. In this scenario the BNC connector can be ignored and there is no need to adjust any of the jumpers on J12. By default, the BNC connector is configured as an input Word clock with 75ohm termination.

The following diagram shows the ASI5308/5316/6316 and its various connectors/jumpers and headers. Most of the components seen below are hidden by the orange ASI5308/5316/6316 faceplate; the labeled areas are not.



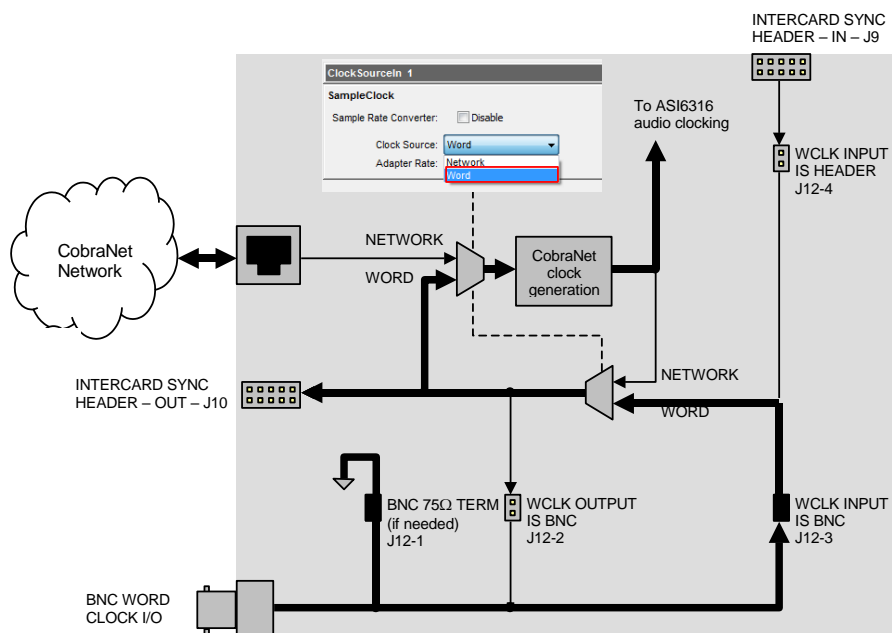
11.2.1 Clock Obtained from the Network and Word Clock Output

This is the default ASI5308/5316/6316 clock source configuration. The ASI5308/5316/6316 obtains its clock from the CobraNet network as a Performer or supplies it to the network as a Conductor. The diagram below shows (in **bold**) the clock signal flow. If the BNC is required to output the network clock, jumper the WCLK OUTPUT IS BNC Jumper on J12.



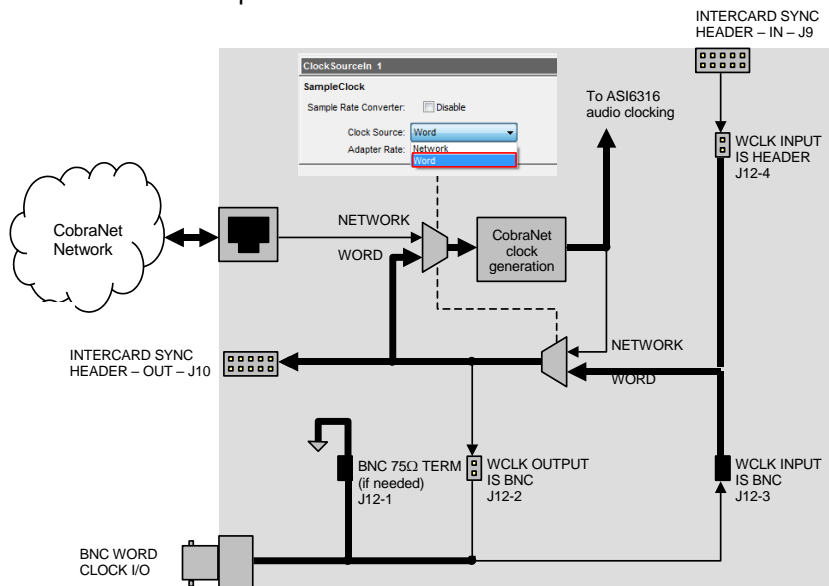
11.2.2 Clock Obtained from BNC

In this mode, the ASI5308/5316/6316 takes a 48kHz word clock in on the BNC causing the CobraNet interface and the card to be synchronized. The clock is available on the INTERCARD SYNC HEADER OUT header to be sent to another ASI5308/5316/6316 if needed. The ASI5308/5316/6316 needs to be the CobraNet Conductor or the BNC clock needs to be synchronized to the CobraNet network clock.



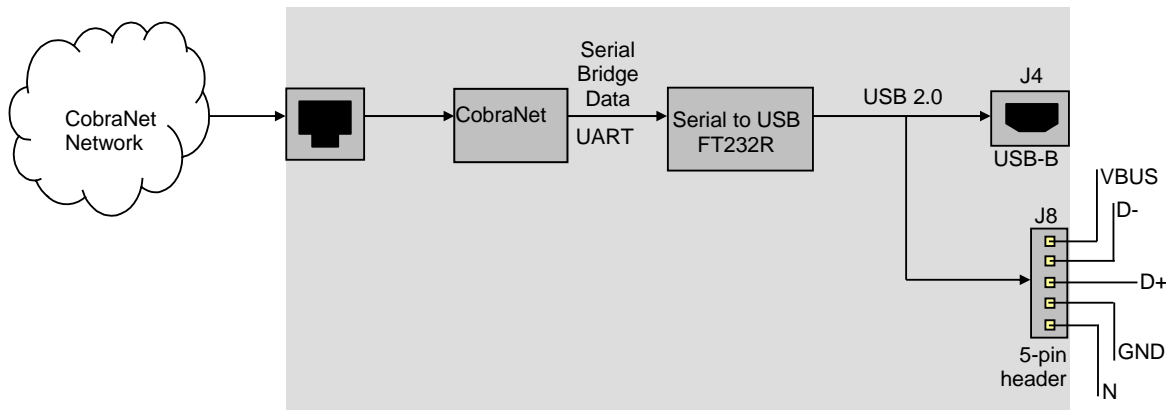
11.2.3 Clock Obtained from Adjacent ASI5308/ASI5316/ASI6316

In this mode, one ASI5308/5316/6316 receives its word clock from an adjacent ASI5308/5316/6316 using a 10pin ribbon cable. Attach one end of the 10pin ribbon cable to J9 on one of the ASI5308/5316/6316s and attach the other end of the 10pin ribbon cable to J10 of the other ASI5308/5316/6316.



11.3 Serial Bridge Connections

Most motherboards have internal USB headers. The ASI5308/5316/6316's 5pin header at J8 can be connected to the motherboard's USB header using a cable such as USB-F5RF5R from <http://www.performance-pcs.com>. Connection should only be made to J4 or J8 as they both interface to the same USB bus.



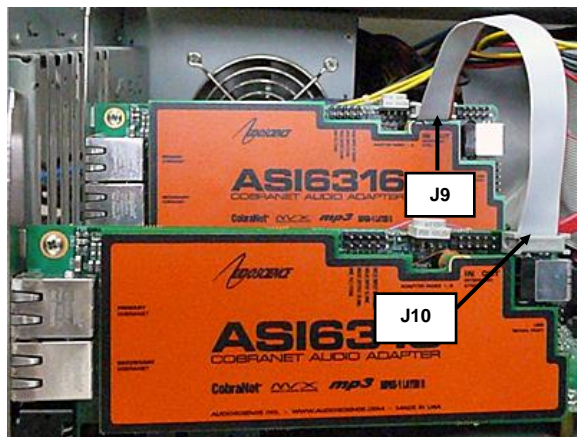
The motherboard should have a USB header with the following pinout:

| Motherboard Internal USB Header Pinouts | | | | |
|-----------------------------------------|---|----|-----|--|
| +5V | 1 | 2 | +5V | |
| D- | 3 | 4 | D- | |
| D+ | 5 | 6 | D+ | |
| GND | 7 | 8 | GND | |
| Key | 9 | 10 | NC | |

11.4 Inter-card Sync

Inter-card Sync across multiple ASI5308/5316/6316s supports exactly aligned channels of ASIO audio. 10pin ribbon cables are used to connect up to 8 ASI5308/5316/6316s for up to 128 channels of ASIO audio. Attach the cables with the PC powered down.

1. Connect the ASI5308/5316/6316s. This is done by attaching one end of the 10pin ribbon cable to J9 on one of the ASI5308/5316/6316s and attaching the other end of the 10pin ribbon cable to J10 of the other ASI5308/5316/6316 as shown in the image below. If connecting more than 2 ASI5308/5316/6316s together, daisy chain J9 to J10 on each ASI5308/5316/6316 down the line.



2. Aggregate all of the ASI5308/5316/6316s being used by placing a checkmark next to each ASI5308/5316/6316 in the AsiAsio Control Panel's Adapter and Sample Type Selection tab.

The AsiAsio Control Panel can be found by going Start→All Programs→AudioScience→AsiAsio Control Panel. In most ASIO applications, this Control Panel can also be accessed within the configuration area of the application.

12 SOFTWARE INSTALLATION

AudioScience makes audio adapters and drivers for various operating systems. Enhancements to an adapter's utility come from the integrators software that uses the audio driver to implement sophisticated audio playback and recording functions.

12.1 Drivers for Windows 10, 7, Server 2008, Server 2012

Typically, drivers are not included with the hardware and will need to be downloaded from the AudioScience website. They can be found here: http://www.audioscience.com/internet/download/win_drivers.htm

The first step is to determine what type of driver is needed for your operating system. Drivers are available for 32-bit and 64-bit Windows systems.

Driver 3.10 and later present the user with three install options during installation:

- Install Standard PCI/PCIe Driver.
- Install Standard + Network Audio Driver.
- Remove all driver components

Traditional installs should select the first of these options. Users of AudioScience CobraNet and AVB products should select the second option with the "+Network Audio Driver." in the text.

12.1.1 Combo Driver

The Combo driver installs WDM devices by default and presents an option to "Install legacy 32-bit WAVE driver" in case your application requires it. Download the file named ASICOMBO_XXXXXX.EXE from www.audioscience.com and run it (_XXXXXX is the version number). After the EXE has run, reboot your computer and the audio adapter will be operational. If the cover is off the computer, one can see one or two blinking LEDs on top of the card indicating its DSP is running and communicating with the driver.

Verify that the adapter is running using ASIControl (see ASIControl section in this document).

12.1.2 ASIO

All AudioScience drivers also install an ASIO driver interface. It is installed by default.

12.1.3 Driver Failure

In the event that an adapter's driver fails to load correctly, the OS's event viewer should be checked. The event log is accessed from the Administrative Tools applet in Windows Control Panel under Event Viewer. The Windows Logs\System view should be selected.

If two or more adapters are installed in the same system, the first thing to check is that the adapters were assigned unique adapter numbers. If issues persist, please email support@audioscience.com.

12.2 Drivers for Linux

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

12.3 Applications for Windows

AudioScience provides ASIControl for adapter set-up and configuration.

12.3.1 ASIControl

All Windows drivers install an AudioScience application called ASIControl that can be used to setup and verify functionality of adapters. ASIControl provides a common interface for users across all driver types.

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



13 OPERATION USING ASICONTROL

Using ASIControl, the ASI5308/5316/6316 will look similar to the following:

The screenshot displays the ASIControl application window. At the top is the 'Adapter List Window' containing a table of detected adapters. Below this is the 'Adapter Topology Window' on the left, which shows a block diagram of the selected adapter (ASI6416) with its internal components and connections. On the right is the 'Node Controls Window', which provides detailed information and control options for the selected adapter.

| Type | Index | Name | Serial No. | Rev | Firmware | MAC Address | IP Address | sysDescription | sysName | sysLocation |
|------|-------|---------|------------|-----|----------|-------------------|---------------|----------------|---------|-------------|
| ASI | 1 | ASI6416 | 24750 | D0 | 3.10.05 | 00.60.2B.06.D0.4C | 192.168.1.102 | | | |

Adapter Info

Serial Number: 24750
 Hardware Revision: D0
 DSP Software Version: 3.10.05
 DSP Utilization: 13%

Adapter Mode

Mode-1

Adapter Topology Window

Player 1, Player 2, Player 3, Player 4, Player 5, Player 6, Player 7, Player 8
 Recorder 1, Recorder 2, Recorder 3, Recorder 4, Recorder 5, Recorder 6, Recorder 7, Recorder 8
 Line_Out 1, Line_Out 2, Line_Out 3, Line_Out 4, Line_Out 5, Line_Out 6, Line_Out 7, Line_Out 8
 Line_In 1, Line_In 2, Line_In 3, Line_In 4, Line_In 5, Line_In 6, Line_In 7, Line_In 8
 ClockSourceIn

ASX v3.10.05, System v3.10.05 PCI/PCIe + Network Driver No Errors

14 USER INTERFACE

14.1 ASIControl Layout

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.

14.1.1 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.

14.1.2 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 | Player | CobraNet In |
| Line Out | Recorder | CobraNet Out |

AES/EBU In Tuner
AES/EBU Out Clock Source In

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.

14.1.3 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.

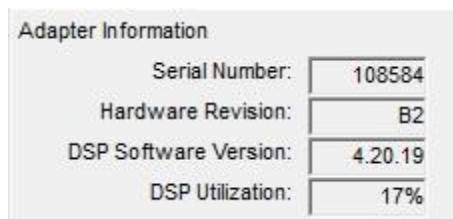
For a comprehensive listing of controls and how to operate ASIControl, please see the ASIControl manual available from www.audioscience.com and also installed by the driver. Not all adapters have all controls. The section below lists some common and any specific controls, as seen in ASIControl, for this adapter.

14.2 Controls

14.2.1 Adapter Information

This control displays information about the installed AudioScience product.

14.2.1.1 Interface



| Adapter Information | |
|-----------------------|---------|
| Serial Number: | 108584 |
| Hardware Revision: | B2 |
| DSP Software Version: | 4.20.19 |
| DSP Utilization: | 17% |

Adapter information seen in right side of ASIControl.

Serial Number:

The serial number is displayed here.

Hardware Revision:

This lists the hardware revision of the AudioScience product.

DSP Software Version:

The DSP software version is displayed; usually the same as the driver version installed.

DSP Utilization:

This shows the loading of the AudioScience product's DSP in percent.

Note: Utilization should be kept below 90%.

14.2.2 Adapter Mode

The Adapter_Mode control changes the number of players/recorders/lineouts that an adapter has. On certain adapters, not all sample rates/formats are supported; changing the mode of the adapter allows for best functionality with certain sample rates/formats. Different adapters will have different modes available, and not all adapters have modes. Please see datasheets on specific adapters, available at www.audioscience.com for more.

14.2.2.1 Interface



| Adapter Mode | |
|--------------|---|
| 12-Play | ▼ |

The ASI5316/6316 supports five adapter modes: 16-Play, Mode-1, Mode-2, Mono, and Low Latency.

The ASI5308 supports three adapter modes: Mode-1, Mono, and Low Latency.

14.2.2.2 16-Play

This mode supports 16 Play streams and 16 Record streams. It is recommended that play and record formats be constrained to 48 kHz mono PCM if all 16 devices are to be used.

14.2.2.3 Mode 1 (default) – Standard Mixing

This mode supports 8 Play streams and 8 Record streams with full mixing capabilities.

14.2.2.4 Mode 2 – Minimal Mixing

This mode supports playback from each Play device to a single LineOut and has no LineIn to LineOut mixing capabilities. This conserves DSP MIPS. Mode 2 supports recording stereo MP2 at 48 kHz on all 8 Record streams.

14.2.2.5 Mono

This mode supports 16 mono Play streams and 16 mono Record streams with full mixing capabilities. Mono mode supports PCM only. Mono mode supports mapping a single Play device to a mono CobraNet channel, allowing independent audio output on each channel.

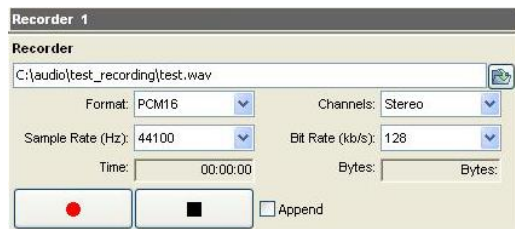
14.2.2.6 Low Latency

This mode supports a single multichannel play stream and a single multichannel record stream, enabling live sound processing in ASIO and Core Audio applications. See the [Low Latency Mode datasheet](#) for further information.

14.3 Recorder

The Recorder control supports recording of an audio file.

14.3.1 Interface



A recorder in ASIOControl.

The first box contains the name given to the recorded file and the location where it is to be saved. Below that is the file information, the record time and record bytes, the recorder control buttons and the file Append option.

14.3.2 How To Record a File

The first step in recording a file is to have audio coming into the adapter. This can be from a line-in or from one of the players in ASIOControl. See appropriate sections in this datasheet to accomplish this. Next, the new file needs a name and place to be saved, or an existing audio file can be selected to be overwritten or appended to. Use the **file icon button** to navigate to the location to create the file and to give it a name, or to open a previously recorded file to overwrite or append to it. Next, from the dropdown arrows, select the number of “**Channels**”, the “**Sample Rate**”, the “**Format**”, and the “**Bitrate**” that the file should be recorded in.

Check the **Append** checkbox to save the audio to the end of an already existing file.

The file is now ready to be recorded. To start recording, press the **record button**. At this point the “**Time**” and “**Bytes**” fields report record time and the number of bytes of the file that have been recorded.

Once recording has started the **stop** and **pause buttons** can be used to stop or pause the playback.

14.3.3 Developer

14.3.3.1 Windows APIs

Wave – use `waveInOpen()`, `waveInStart()` etc.

HPI – use `HPI_InStreamxxx()` functions.

ASX – use `ASX_Recorder xxx()` functions.

14.3.3.2 Linux APIs

HPI – use `HPI_InStreamxxx()` functions.

ASX – use `ASX_Recorder xxx()` functions.

14.4 ClockSourceIn

In the topology pane of ASIControl, click on Clock Source 1



to see the ClockSourceIn information in the node pane.

14.4.1 Interface for CobraNet Sound Cards



Figure 9. Clock Source info for AudioScience CobraNet sound cards as seen in ASIControl

Sample Rate Converter: Starting with driver 4.02.00, all CobraNet sound cards have the ability to lock the sample rate, i.e. to disable the sample rate converter. Check the Disable checkbox to do this.

Clock Source: CobraNet supports 48kHz. For this reason, the Clock Source is grayed out and is not user selectable.

Adapter Rate: Displays CobraNet clock rate.

14.4.2 Interface for Hono Custom/ASI2416



Figure 10. Clock Source information for Hono Custom/ASI2416 devices as seen in ASIControl.

Clock Source: CobraNet supports 48kHz. For this reason, the Clock Source is grayed out and is not user selectable.

Adapter Rate: Displays CobraNet clock rate.

15 COBRANET

ASIControl can be used to configure both AudioScience CobraNet devices and third party CobraNet devices, via its CobraNet Configuration dialog box. This dialog box can be used to configure CobraNet devices and assign names, locations, bundle numbers, channel assignments, etc. Third party applications such as CobraNet Discovery can also be used to configure AudioScience CobraNet devices.

Below lists how to set up AudioScience's software so ASIControl may be used to configure CobraNet.

NOTE: Under some Windows operating systems, ASIControl must be run as administrator in order to see all networked CobraNet devices. In Windows this is done by right clicking on the ASIControl shortcut on the desktop and selecting "Run as administrator."

NOTE: Some antivirus programs and/or firewalls can prevent ASIControl from showing all CobraNet devices on a CobraNet network. If all CobraNet devices are not showing in the top pane of ASIControl, please check settings and/or turn off any antivirus programs or firewalls that may be running on the PC.

15.1 Setting Up AudioScience Software to Configure CobraNet

To configure an AudioScience CobraNet devices using ASIControl, the following must be in place: the AudioScience network driver must be installed, the networked adapters option must be selected in ASIControl, the AudioScience CobraNet device must be connected to the CobraNet network via an Ethernet cable, and the PC that is running ASIControl must also be connected to the same CobraNet network.

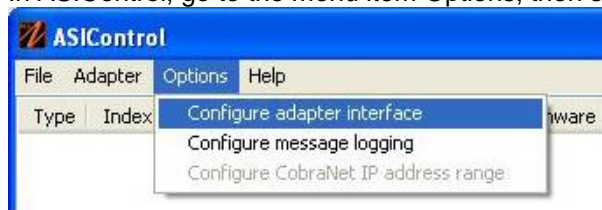
15.1.1 Install the Network Driver

When an AudioScience driver install EXE is run, three choices are made available as shown in the image below. Select "Install Standard + Network Audio Driver" when installing AudioScience CobraNet products, then run the driver install EXE as usual.

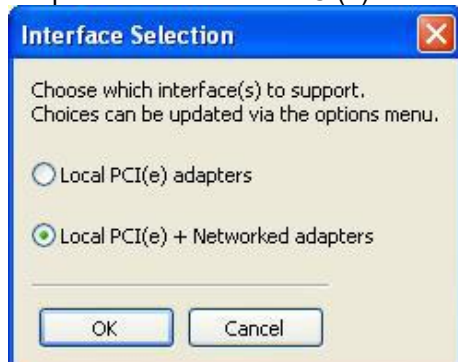
- ☐ Install Standard PCI/PCIe Driver.
- ☒ Install Standard + Network Audio Driver.
- ☐ Remove all driver components.

15.1.2 Select Networked Adapters in ASIControl

In ASIControl, go to the menu item Options, then select Configure adapter interface, as shown below.



Since ASIControl is used for both AudioScience's non-CobraNet adapters and CobraNet adapters, the correct interface must be selected when using ASIControl for CobraNet configuration. Click on menu item Options, then Configure adapter interface. The Interface Selection dialog box opens; the default selection is "Local PCI(e) adapters. Select 'Local PCI(e) + Networked adapters.' then click OK.



ASIControl will restart, looking for all CobraNet devices on the network, assigning IP addresses where needed, and showing CobraNet devices on the network in its top pane.

15.1.3 Connect CobraNet Device to the Network

Plug one end of an Ethernet cable into the back of the AudioScience CobraNet device. Plug the other end into the CobraNet or test network.

15.1.4 Connect PC to the Network

CobraNet control is via SNMP. In order for ASIControl to establish an SNMP connection to an AudioScience (or other) CobraNet device(s) for configuring, a valid network path must be established between the PC running ASIControl and the AudioScience (or other) CobraNet device(s). This is done by plugging one end of an Ethernet cable into the back of the PC's network interface card (NIC) and plugging the other end into the CobraNet or test network.

If the PC running ASIControl must be connected to an office network and if the CobraNet network data is required to be separate from the office network, another NIC must be added to the PC; one for the office and one for CobraNet.

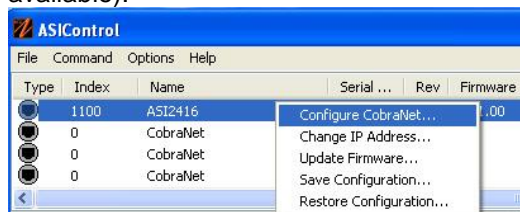
If the PC is on an office network and the CobraNet network data is not required to be separate from the office network, the PC can temporarily be removed from the office network and plugged into the CobraNet or test network. After the CobraNet configurations are made, the PC can be taken off the CobraNet network and placed back on the office network. **Note:** If any CobraNet configurations need to be changed in the future, the PC must be placed back on the CobraNet network in order to establish the SNMP connection.

If the PC does not need to be on an office network, plug it's NIC into the CobraNet or test network and either leave it there or remove it after configuring CobraNet. If it's removed, the PC must be connected to the CobraNet or test network again if CobraNet configurations need to be changed in the future.

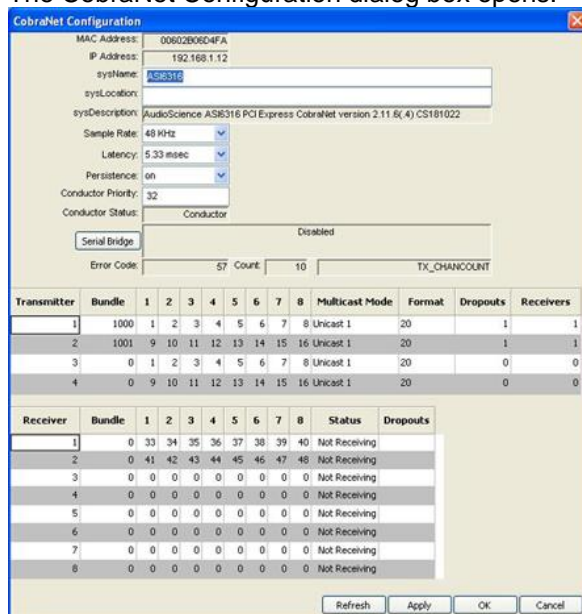
Note: If plugging an AudioScience CobraNet device into an already existing CobraNet network, the PC must have the same IP address range as the CobraNet network in order for it to assign the AudioScience CobraNet device an IP address in the same range. Alternatively, if another CobraNet set-up application was used such as CobraNet Discovery, the same application may be used to assign an IP address and configure AudioScience CobraNet devices.

15.2 Configuring CobraNet Using ASIControl

The CobraNet Configuration dialog box is accessed via ASIControl, which is installed when the driver EXE is run. Double click on the ASIControl icon on the desktop, then in the top section right click on the CobraNet device and select Configure CobraNet... (see further for information on the other selections available):



The CobraNet Configuration dialog box opens:



15.2.1 CobraNet Configuration Interface

There are three main sections of the dialog box: the top shows the configuration section of the CobraNet device, the transmitter section is in the middle, and the receiver section is at the bottom. There are also four user control buttons on the bottom right.

15.2.1.1 CobraNet Device Configuration Section

MAC Address: Read only; displays the MAC address of the CobraNet device.

IP Address: Read only; displays the assigned IP address of the CobraNet device.

SysName: Editable; a meaningful name can be given to a CobraNet device here.

SysLocation: Editable; a physical location can be listed here for ease of reference.

SysDescription: Read only; lists the type of CobraNet interface.

Sample Rate: 48k (default) or 96 kHz. A CobraNet device must run at one sample rate only. Two CobraNet devices on the same network can each operate at a different sample rate.

Latency: Choose between 1.33, 2.67, or 5.33 (default) ms.

Persistence: On or off. When set to on, settings are saved to flash and will be restored after a restart.

Conductor Priority: Editable; set a low number to ensure the CobraNet device will always be a Performer (it is never a Conductor) or set it to a high number to ensure it will always be a Conductor (it is never a Performer).

The following are Cirrus numbering conventions:

- 0 = never conductor
- 32 = normal conductor priority (the CobraNet device will either be the Conductor or the Performer)
- 128 = high conductor priority (the CobraNet device will be the Conductor)

Conductor Status: Read only; displays if the CobraNet device is a Conductor or Performer.

Serial Bridge: Not available on all CobraNet devices. Clicking on this button opens the Serial Bridge Configuration dialog box.

Error Code: Displays CobraNet-specific error information using Cirrus' error numbering conventions.

Count: Displays the number of errors that have occurred on the device. Some errors result from normal operation; disconnecting cables, rerouting, etc. The text field to the right of Count displays the Cirrus-related text.

15.2.1.2 Transmitter Section

Transmitter:

Sends an audio bundle, made up of up to 8 audio channels, to a CobraNet receiver on the network.

Bundle:

The basic CobraNet audio routing component, can have 0 to 8 channels. Assign specific bundle numbers here.

Bundle numbers can be 0 and 1 – 65535

- 0 for turning transmitter off or for silence
- 1-255 for multicast
- 256-65279 for unicast
- 65280-65535 for private

1-8 Audio Channels:

The number of mapped channels from mixer to transmitter. Channels 0 (inactive) and 1-32 can be assigned. A 0 mapping of end channels 'shortens' the bundle; a mapping of 0 in the middle of mapping denotes silence.

Multicast Mode: Double click to change setting in the dropdown list; use the following table to determine what setting to select:

| Settings | Number of Receivers <= N | Number of Receivers > N |
|--------------------------|--------------------------|---------------------------------------------------|
| Multicast Bundle # < 256 | Multicast | Multicast |
| Always | Multicast | Multicast |
| Unicast N | Unicast | Unicast if Receiver = 1-N Fail if Receiver > N |
| Multicast Over N | Unicast | Multicast |

Format: Double click to change the audio sample format to 16, 20, or 24 bits.

Dropouts: The number of times the channel transmission has been interrupted. Interruptions can be caused by loss of transmit permission from conductor (i.e. conflict with another transmitter set to the same bundle number) or by changes to txBundle.

Receivers: The number of receivers requesting this bundle.

15.2.1.3 Receiver Section

Receiver: Can receive from a CobraNet transmitter on the network one bundle made up of up to 8 audio channels.

Bundle: The basic CobraNet audio routing component; assign a specific Bundle number here. A Receiver can carry 0 (channel will not be mapped to mixer) to 8 audio channels.

1-8 Audio Channels: The number of audio channels in the bundle to be routed to the particular Receiver; channels 0 (inactive) and 33-64 can be assigned.

Status: Displays 'Receiving' when a bundle is successfully routed to it.

Dropouts: Displays number of times bundle reception has been interrupted. Interruptions can be caused by transmitter failure or by reconfiguring the receiver.

15.2.1.4 User Control Buttons

Refresh: Updates fields and statuses. If clicked before Apply, clears any changes made.

Apply: Accepts changes and leaves dialog box open.

OK: Accepts changes and closes dialog box.

Cancel: Does not accept any changes made and closes dialog box.

15.3 How To Configure and Transmit a Bundle

The minimum configuring needed to test basic functionality of sending and receiving a bundle is to set a transmitter bundle and channels on one CobraNet device, and then set the receiver of another CobraNet device to the same bundle number, plus assign its channel numbers.

For example, an ASI6416 is installed in a computer, ASIControl is opened and is used to play a stereo audio file in the ASI6416's Player 1. The Repeat box is checked to have continuous audio playing.

ASIControl is then used to set the ASI6416's first transmitter to have bundle number and channel assignments. Double clicking in receiver 1's bundle field makes it editable and 255 (for example) is typed in. Double clicking in the receiver 1, channel 1 box makes it editable and 1 is typed in (numbers 0 and 1-32 can be used). Hitting the Tab key auto fills the rest of the channels. Since only two channels are needed, double clicking in the channel 3 box, typing in 0, and then hitting the Tab key changes channels 3-8 to have 0s in them. The OK button is clicked and the dialog box closes.

On the same CobraNet network is an ASI2416. Its CobraNet Configuration dialog box is opened using ASIControl. Using the same procedures as above, 255 is typed in (since 255 was used in the example above) as the bundle number for the ASI2416's receiver 1, and its first two channels are assigned numbers 33 and 34 (numbers 0 and 33-64 can be used). This time the Apply button is clicked so the dialog box remains open. Immediately in the CobraNet Configuration dialog box the first two channels in receiver 1 turn green and the Status field changes to 'Receiving' to indicate a bundle has been successfully routed to the receiver. If any errors, the receivers would turn red.

Clicking OK closes the CobraNet Configuration dialog box. ASIControl is still open and meter movement is seen in CobraNet_Ch 33 and 34, as well as Line_Outs 1 and 2.

15.4 References

http://cirrus.com/en/pubs/appNote/CobraNet_AudioRoutingPrimer.pdf



http://cirrus.com/en/pubs/manual/CobraNet_Programmer_Manual_PM25.pdf

http://www.cirrus.com/en/support/cobranet/design/switched_networks.html

15.5 Network Configuration

15.5.1 Change IP Address

Change the IP address of a CobraNet device here.

| Type | Index | Name | Priv. | Serial ... | Rev | Fi |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|-------------------------------------------------------------------------------------|------------|-----|----|
|  | 1 | ASI5316 |  | 57560 | F1 | A |
| <div> <div>Configure CobraNet...</div> <div>Launch Hono AVB Controller</div> <div>Change IP Address...</div> <div>Open in browser</div> </div> | | | | | | |

After right clicking on a CobraNet device in ASIControl and selecting "Change IP Address...", the dialog box below opens.

15.5.1.1 Interface

CobraNet change IP address

☐ Auto-assign a new dynamic IP address
☐ Set dynamic IP address
☒ Set static IP address

IP Address:

OK Cancel

Auto-assign a new dynamic IP address: Check this option and click OK to have a new DHCP IP address assigned.

Set dynamic IP address: Check this option to manually assign a dynamic IP address. Enter the value in the IP address boxes and click OK.

Set static IP address: Check this option to assign a static IP address. Enter the value in the IP address boxes and click OK.

15.5.2 Configure Network Interface and Auto-IP Assignment Range

Driver 4.04.00 and later groups the network interface and the auto-IP assignment under Options→Configure Network Interface and Auto-IP Assignment Range. Clicking on it opens the ASIControl – Configure network interface dialog box.

ASIControl - PCI/PCIe+ Network - x64

File Adapter Options Help

| Type | Index | |
|------|-------|----------------------------------------------------------|
| | 1 | Launch Hono AVB Controller |
| AVB | 5882 | Configure Adapter Interface |
| AVB | 6920 | Configure Message Logging |
| | | Configure Network Interface and Auto-IP Assignment Range |

Configure Network Interface and Auto-IP Assignment Range

Network Adapter
Select the network adapter that is attached to your CobraNet network or device.

Realtek PCIe GBE Family Controller
Npcap Loopback Adapter

CobraNet IP Address Assignment
CobraNet devices require an IP address for configuration.
Enter the address range that you want to use for dynamic IP assignment for CobraNet devices.
If the CobraNet devices on your network have static IP addresses assigned you may leave this feature off.

☒ Enable dynamic CobraNet IP address assignment

Starting IP:

Ending IP:

OK

Network Adapter: From this box you can choose the network interface you wish to use for CobraNet by selecting it in the top box and clicking OK.

CobraNet IP Address Assignment: This section allows you to set ASIControl to act as a limited DHCP server for AudioScience CobraNet devices on your network. Check the box and enter a start and end IP address to be assigned to your other devices.

16 ERRATA

16.1 “Buzzy” audio

If “buzzy” audio is heard from an ASI5308/5316/6316, the following may fix it:

- (If needed, save current ASI5308/5316/6316 settings using ASIControl by going to menu item Adapter→Save Configuration.)
- Open ASIControl and in the top pane right click on the ASI5308/5316/6316 to select Configure CobraNet. If Persistence is set to on, change it to off.
- Close ASIControl and restart the machine.

16.2 PCIe-to-PCI Bridge

This errata arises due to the poor audio playback performance of the XIO2000 PCIe-to-PCI bridge used on certain revisions (see below) of AudioScience PCIe audio adapters. The symptom is intermittent audio breakup when playing many channels of 32-bit PCM audio.

This errata applies to the following PCIe adapters having more than 6 streams of stereo 32-bit PCM playback active at once:

- ASI6316 Rev D and earlier
- ASI53xx Rev D and earlier

The workaround is to restrict playback of many audio channels to 16-bit PCM audio format when using the adapters listed above.

The issue has been resolved in later revisions of the adapters:

- ASI6316 Rev E and later
- ASI53xx Rev E and later

17 TECH SUPPORT

If at any point you need help with this information please contact our Technical Support department at 585-271-8870 between the hours of 9AM and 5PM EST or email us at support@audioscience.com

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