



White Paper

How to Use Attero Tech Products with BSS SoundWeb Systems

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Revision 02

1 Objective

The objective of this white paper is to explain how to correctly set up a system that includes products from BSS SoundWeb London and Attero Tech.

First, we will discuss the setup required on the SoundWeb system using the HiQNet London Architect software. We will then use the Attero Tech Control Center application to complete the CobraNet setup on the VoiceBox.

Our example only sets up the systems to send audio in a single bundle to a single source so only unicast bundles are required. Multiple bundles may be used and bundles may be multi-unicast or multicast if multiple recipients are needed.

2 Setting Up the SoundWeb System

The device used for this demo is a BLU-800. However, any device in the range can be used as long as it has a CobraNet interface module.

Open the HiQNet software and start a new project. Add the device that will transmit/receive the CobraNet audio, in this case, it is a BLU-800. The device is, by default, set to a sample rate of 48 kHz and a latency of 5.33 ms. This can be altered by selecting the necessary parameters in the parameter list.

Note: All Attero Tech devices except the MatchBox USB have DSP capabilities built in. The DSP code requires it be compiled at a known sample rate. All Attero products are compiled at a sample rate of 48 kHz. Using a different sample rate on these devices will cause problems to the point of the device not running it all. It is recommended the sample rate be left at 48 kHz. However, even though the sample rate must be kept at 48 kHz, the latency can still be changed with no ill effect. All devices will need to be set to the same sample rate and latency in order for them to send and receive audio to one another.

Double click on the BLU-800 block to open it. On the left hand side of the new window there are various input blocks. Four Input Bundle blocks numbered A through D should be shown. The same is also true for the output blocks on the right hand side. The bundle block setup is basically the same for inputs and outputs though there are additional transmit parameters that can be changed.

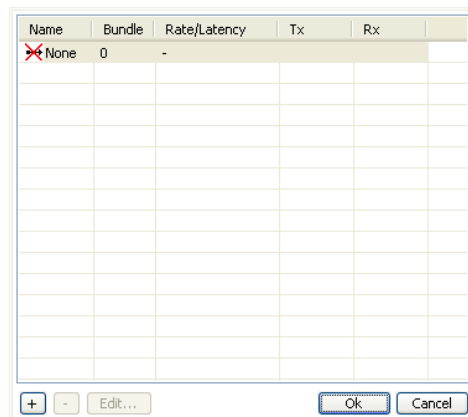
To set up a receiving bundle, locate an Input Bundle block (numbered A through D) and click it once to highlight it. To set up a transmitter bundle, locate an Output Bundle block (also numbered A through D) and click it once to highlight it.

In the properties box, select the Number property from the parameters section and click the button at the end of the box with three dots on it.

The bundle details box appears (shown right). From here, all bundles required for the design can be added, edited, or removed for both received and transmitted bundles.

Note: Each CobraNet bundle transmitter on a CobraNet network must be configured with a unique bundle number. If the SoundWeb London is both sending and receiving audio to the VoiceBox, the received bundle must be a different number than the transmitted bundle number.

To add a bundle, click the “+” button. Input a bundle name, its number, and a description. If the design needs the bundle to be multicast then also check the multicast portion. Then click OK to complete.



Each bundle added appears in the bundle list. Any new bundles that are added are not immediately allocated to any object. However, they can be allocated to the current object by selecting the bundle required and clicking on OK. Having allocated a bundle number, the block will turn green. In addition, if an output bundle was selected, additional parameters will appear in the parameters list such as bit resolution, priority, and maximum receivers. These parameters should be set up as required.

The block setup is now complete and is ready to be connected to other blocks. Repeat this process for each of the CobraNet bundles needed to be received or transmitted.



3 Attero Product Setup

In order to set up any of the Attero Tech products, the Attero Tech Control Center Software should be installed on a PC connected to the CobraNet system and set up so the devices on the network can be seen.

Note: For the purposes of this document, it is assumed that some familiarity with the Attero Tech Control Center has been gained. For detailed instructions on using the application, refer to the Control Center User Manual.

For each product, there is some specific setup required. Once complete, the bundle setup must be completed. Once the bundles are configured, audio will then pass between the devices.

3.1 Using a VoiceBox

The VoiceBox can be used to send audio to the SoundWeb or receive audio from it. In order to do so, the DSP processing must be set up to pass the audio through the VoiceBox, and bundles must be set up.

3.1.1 VoiceBox Audio Processing Setup

The VoiceBox contains digital audio processing elements as well as a Matrix Mixer that will need setting up. How these controls are set will depend on the application the VoiceBox is to be used in. However, for testing the audio links to the SoundWeb, the DSP controls should be set to have no effect on the audio as it passes through. Once the audio links are established and tested, the controls can then be altered to suit the application.

To reset the VoiceBox DSP elements so they have no effect, follow the steps below:

1. Ensure the VoiceBox to be set up is still selected and click the Device Setup button. For each of the input channels check the following:
 - The Compressor bypass is enabled.
 - For all EQ parameters, the Gain control is set to 0 dB.
 - The Gain control is set to 0, and the Mute and Invert buttons are not active.
2. Next, click onto the Matrix Mixer tab and ensure that:
 - All Input faders are set to 0 dB, and the Mute, Invert, and Solo buttons are all inactive.
 - All Local Output faders are set to 0 dB, and the output Mute and Invert buttons are inactive.
 - All CobraNet Output faders are set to 0 dB, and the output Mute and Invert buttons are inactive.
 - All Output Limiters on the local outputs are all bypassed.
3. Finally, make sure all Matrix Mixer knobs are set to -100 dB (fully counter-clockwise) except for the following which should be set at 0 dB (fully clockwise):
 - C11 - OUT1
 - C12 - OUT2
 - C13 - OUT3
 - C14 - OUT4
 - IN1 - CO1
 - IN2 - CO2
 - IN3 - CO3
 - IN4 - CO4

As long as the power remains on, the device will remember the above settings. Once power is removed, the device will return back to its last saved settings. If the above settings need to be retained during power off, click the Save as Default button.

Now see Section 3.5 and 3.6 to set up the bundles.

3.2 Using a MatchBox

Like the VoiceBox, the MatchBox can also send audio to and receive audio from the SoundWeb. Either the standard MatchBox or the MatchBox 1x8 can be used. Both devices have various configurations they can be set to regarding the number of channels they support into or out of the PC. This needs to be configured first. Once that is done, the bundles need to then be configured. It is assumed at this point that the MatchBox has already been connected to the PC and been correctly recognized.

3.2.1 Setting the MatchBox Mode

Setting the MatchBox mode requires using the MatchBox Configuration Tool within the Attero Tech Control Center PC application (instructions on installing and using this tool can be found in the MatchBox USB User Manual). The exact setup required will depend on the type of MatchBox used and whether audio is to be passed from PC to SoundWeb, from SoundWeb to PC, or both simultaneously.

Once mode selection is complete, see Section 3.5 and 3.6 to set up the bundles.

3.3 Using an OutBox X2/R8

OutBox X2 and R8 products are generally used to output audio received from the network. In order to do so, the DSP processing must be set up to pass the audio through, and receive bundles then need to be set up.

3.3.1 OutBox Audio Processing Setup

The OutBox devices contain digital audio processing elements that will need setting up. How these controls are set will depend on the application the OutBox is to be used in. However, for testing the audio links from the SoundWeb, the DSP controls should be set to have no effect on the audio as it passes through. Once the audio links are established and tested, the controls can then be altered to suit the application.

To reset the OutBox DSP elements so they have no effect, ensure the OutBox to be set up is still selected and click the Device Setup button. For each of the channels check the following:

- All Output Limiters are all bypassed.
- The Gain controls are all set to 0, and the Mute and Invert buttons are not active.
- The delay is set to 0.

As long as the power remains on, the device will remember the above settings. Once power is removed, the device will return back to its last saved settings. If the above settings need to be retained during power off, click the Save as Default button.

Now see Section 3.6 to set up the bundles.

3.4 Using an InBox X2/R8

InBox X2 and R8 products are generally used to input audio onto the network. In order to do so, the DSP processing must be set up to pass the audio through, and receive bundles then need to be set up.

3.4.1 InBox Audio Processing Setup

The InBox devices contain digital audio processing elements that will need setting up. How these controls are set will depend on the application the InBox is to be used in. However, for testing the audio links from the SoundWeb, the DSP controls should be set to have no effect on the audio as it passes through. Once the audio links are established and tested, the controls can then be altered to suit the application.

To reset the InBox DSP elements so they have no effect, ensure the InBox to be set up is still selected and click the Device Setup button. For each of the channels check the following:

- The Low and High Cut EQs are bypassed.
- The gain for the Low EQ, Mid Sweep, and High EQ controls is set to 0.
- The Compressor bypass is active.
- The Gain controls are all set to 0, and the Mute and Invert buttons are not active.
- The delay is set to 0.

As long as the power remains on, the device will remember the above settings. Once power is removed, the device will return back to its last saved settings. If the above settings need to be retained during power off, click the Save as Default button.

Now see Section 3.6 to set up the bundles.



3.5 Setting up an Output Bundle

Follow these instructions if you need to pass audio from an Attero product to the SoundWeb System.

Ensure the device is selected and click the Bundle Setup button. In the transmit section, set up bundle transmitter TX1 with the bundle number used during set up of one of the Input Bundle blocks on the SoundWeb system previously.

The submap setup should include all the active local inputs. All the remaining submaps should be set to 0. When using four channels, the submap for the bundle should read 1, 2, 3, 4, 0, 0, 0, 0. For two channel devices, only submaps 1 and 2 are used. For four channel devices, submaps 1, 2, 3, and 4 are used. For eight channel devices submaps 1 through 8 are used.

When setting the Submap, ensure the bit depth is set to 20. Next, set the Unicast mode to "U" for unicast-only.

Set the subcount to the number of channels being used in the bundle. In our example above, the subcount would be set to 4.

Finally, ensure the Mode Rate Control is set correctly. It must match the sample rate and latency set on the SoundWeb system. Once all setup is complete, click the Apply button to finalize.

The device should now be able to feed audio into the SoundWeb system.

3.6 Setting up an Input Bundle

Follow these instructions if you need to pass audio from the SoundWeb System to an Attero product.

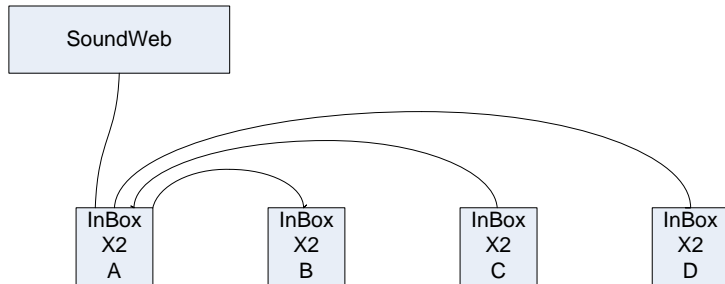
Ensure the receiving is selected and click the Bundle Setup button. Type the bundle number used during setup of the Output bundle block on the SoundWeb system previously into the edit box for RX1. Next, set up the submap for the number of channels being received. The submap for the bundle should read 33, 34, 35, 36, 0, 0, 0, 0. For two channel devices, only submaps 33 and 34 are used. For four channel devices, submaps 33, 34, 35, and 36 are used. For eight channel devices submaps 33 through 40 are used.

Finally, ensure the Mode Rate Control is set correctly. It must match the Mode Rate Control set on the SoundWeb system.

Click the Apply button to finalize the settings. Audio should now be available on the device from the SoundWeb system.

3.7 Bundle Efficiency for InBox X2

It is perfectly feasible to use an InBox X2 to send data to a SoundWeb system. However, the SoundWeb system only accepts four bundles with eight channels of audio in each. This means there are six wasted channels per bundle. In order to make better use of the channels in a bundle, the audio needs to be concatenated together in some way. Fortunately, the InBox X2 has a feature called bundle blending which allows a single InBox X2 to collect audio data from other InBox X2 units and pass a single bundle with all the channels to the SoundWeb. This eliminates the problem of wasted channels.



The diagram, left, shows conceptually how this is done. Three InBox X2 units feed their audio via the CobraNet system to a central InBox X2. The central InBox unit then takes the six channels of incoming CobraNet audio, adds its own local audio and sends them all out as a single bundle of eight channels to the SoundWeb.

Note: The diagram shows only the logical audio connections between the devices. Each InBox will need to be physically connected to a PoE switch.

The only downside to this method is the additional step means the audio is delayed by a further latency period. However, at worst case this is an additional 5 ms and in nearly all cases, this additional delay would be completely unnoticed.

3.7.1 Setting up the system

Using the above diagram, InBox X2 B, C, and D are set up as described above (section 3.3 and 3.5) with each device transmitting its own bundle of two audio channels. For the purposes of this white paper, assume they are numbered 301, 302, and 303.

Inbox X2 A is required to receive these three bundles so three bundle receivers need to be set up, one for each of the above bundles. Set bundle receiver RX1 to receive bundle 301, RX2 to receive 302, and RX3 to receive bundle 303.

The next step is to route the incoming audio. To do so, set the receiver submaps as follows:

- For RX1, set the submap to 33, 34, 0, 0, 0, 0, 0, 0
- For RX2, set the submap to 35, 36, 0, 0, 0, 0, 0, 0
- For RX3, set the submap to 37, 38, 0, 0, 0, 0, 0, 0

The InBox X2 is set up to route the incoming audio back to the CobraNet outputs.

The next stage is to create an outgoing bundle for the SoundWeb to receive. For the purposes of this white paper, we will number it 304. For InBox A, set the bundle number on bundle transmitter TX1 to 304. Set its submap to 1, 2, 3, 4, 5, 6, 7, 8, its subcount to 8, and make it unicast (Multi-cast and multi-unicast could also be used if required).



In order to receive all the audio, the SoundWeb needs a receive bundle set up to receive; in this case, bundle 304. The following table shows how the audio will be seen by the SoundWeb.

SoundWeb Receiver Submap	Original Source
1	InBox A - Channel 1
2	InBox A - Channel 2
3	InBox B - Channel 1
4	InBox B - Channel 2
5	InBox C - Channel 1
6	InBox C - Channel 2
7	InBox D - Channel 1
8	InBox D - Channel 2

The final step is to ensure the local audio on InBox X2 A is delayed the same amount as the audio coming in from InBoxes B, C, and D. To do this, open the Device Setup screen for InBox X2 A and set the delay to be either 1.3 ms, 2.6 ms, or 5.3 ms. The value chosen should reflect the current latency setting.