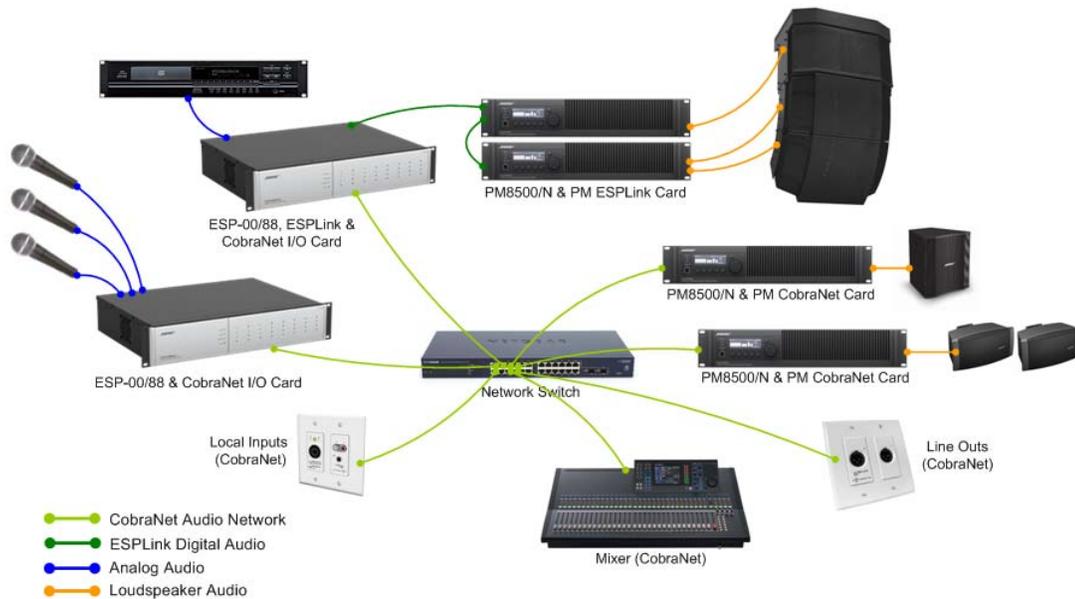


## Using CobraNet® networking with Bose® ControlSpace® and PowerMatch™ products.

CobraNet network audio expansion cards are available for both the ESP-88/00 engineered sound processors and the PowerMatch™ PM8500/N configurable professional power amplifiers. The cards use industry-proven CobraNet technology to transport multiple channels of high quality, uncompressed digital audio in real time across a standard Ethernet network. This is particularly useful when passing audio between ControlSpace and PowerMatch products in different parts of a large building or complex. It also works well to interlink multiple devices within an equipment rack to reduce analog cabling and connections.

*The ESP CobraNet I/O expansion card is supported in ControlSpace Designer software version 2.3b1 or later and the PowerMatch CobraNet card is supported in version 3.1 or later.*



### An example system using CobraNet network audio distribution



**Note:** The ESP CobraNet network audio expansion card is only compatible with ESP-88C and ESP-00 processors. Compatibility can be verified by checking the first six digits of the serial number. Compatible ESP-88s will have the first 6 digits '050137' and ESP-00s will have '050138'. Earlier ESP-88s require internal modification in order to support the CobraNet expansion card.

3<sup>rd</sup> May 2012

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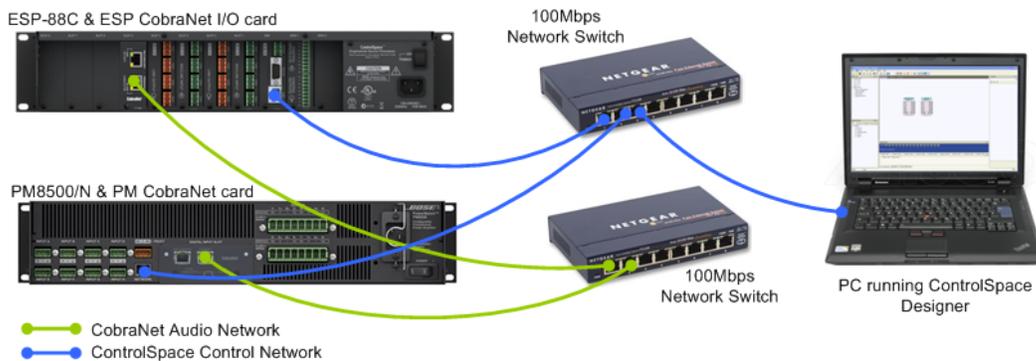
- 1. Creating a CobraNet network**
- 2. ESP CobraNet I/O expansion card**
- 3. PowerMatch CobraNet card**
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This document is intended to be read alongside the '**System examples using CobraNet networking with Bose ControlSpace and PowerMatch products**' Tech Note which includes a number of system examples that illustrate how to configure the products for different applications:

## 1. Creating a CobraNet network

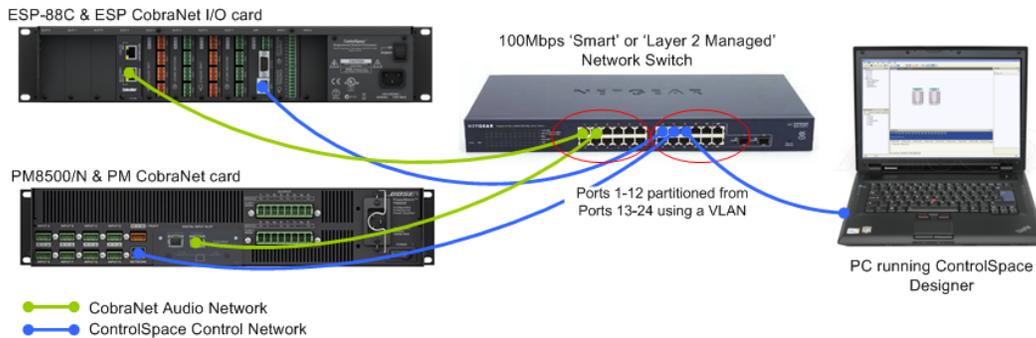
A CobraNet audio network is built using a standard 100Mbit (Fast Ethernet) or 1000Mbit (Gigabit) Ethernet network and can utilize industry-standard structured network cabling (CAT5E/CAT6), Ethernet switches and other network components. For larger systems, and systems which require quality of service, QoS, management a managed or 'smart' switch is recommended. The use of repeaters/hubs, however, is not recommended and should be avoided.

When using CobraNet with Bose® professional system electronics, the CobraNet audio data and the ControlSpace control data must be isolated from each other either as physically separate networks or using a virtual network (VLAN). The volume of traffic produced by CobraNet is incompatible with the 10Mbit control connection found on some ControlSpace devices.



### Connected using two independent network switches

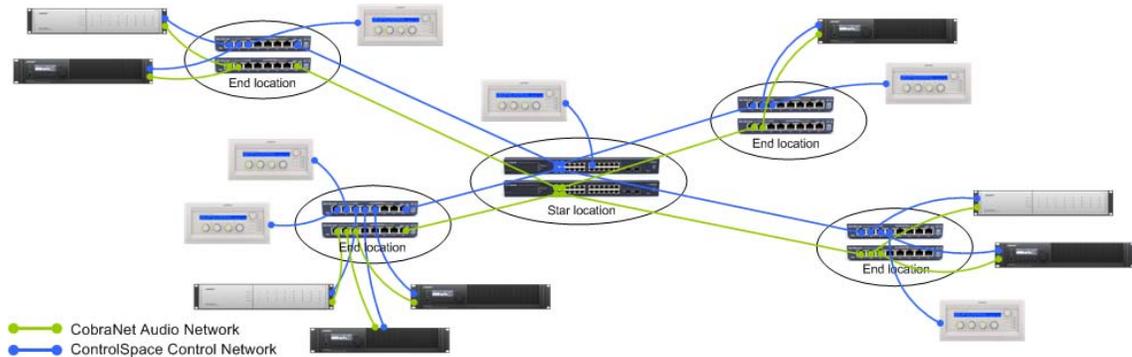
Using a 'Smart' or 'Layer 2 Managed' Ethernet switch that supports VLANs, it is possible to partition the networks within a single switch as illustrated below. However, discussions about network configuration and [VLANs](#) are outside the scope of this document.



### Connected using a 'Smart' or 'Layer 2 Managed' switch to partition the two networks.

In order to avoid unwanted audio artifacts and drop-outs the CobraNet network relies on the timely delivery of audio data and therefore has some fairly strict network requirements. Each time a switch is inserted in the transmission path between the sending and receiving device, known as a 'switch-hop', a small amount of propagation delay occurs. In order for this delay to not affect correct operation a maximum of six 'switch-hops' is recommended for 100Mbit networks, (when using the Standard [5.33mS] latency option). Since 1000Mbit network switches are designed to operate at faster speeds their propagation delay has less significance.

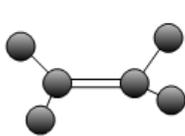
Consistent with most computer based Ethernet networks, and the ControlSpace control network, CobraNet networks typically use a 'Star' or 'Star of Stars' layout. In the example shown below a maximum of three switch-hops is required to reach any other device on the network.



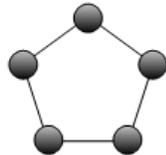
**Typical 'Star of Stars' network topology**

The CobraNet expansion cards have two physical network connections but only communicate through one at a time. The Secondary port adds redundancy and is used automatically should the Primary connection to the network fail.

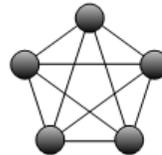
While the two ports provide redundancy for the connection between the CobraNet card and the network, the resilience of the complete connection between CobraNet devices will depend on the network design. Various techniques and protocols exist to provide automatic backup and redundancy for Ethernet networks. Some of these topologies are shown below:



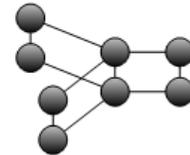
Link aggregation/Trunking



Ring (with Spanning Tree)



Meshing



Dual Link (with Spanning Tree)

### Common network design techniques to provide backup or redundancy

To keep all the CobraNet devices synchronized, one node takes on the role of 'Conductor' and generates regular 'Beat' packets that are broadcast to all of the other nodes (Performers) on the network. The Performers then use these beat packets to synchronize/re-generate their clocks locally.



Each CobraNet port has two LEDs to indicate status:

Green LED	Solid	Link established with another node or network switch
	Blinking	CobraNet activity on the network
Orange LED	Solid	Power applied, node is a Performer (default)
	Blinking	Node is the Conductor (Blinking orange LEDs on both ports indicates an error on the network)



## 2. ESP CobraNet I/O expansion card

The internal architecture of the ESP is designed to support up to 64 audio channels divided into 8 routing slots of up to 8 channels each. Typically most expansion cards occupy one physical expansion slot and have four or eight channels so the routing and physical slots are the same. One exception is the standard 4x4 input/output card which occupies two physical expansion slots (to allow enough space for the output connectors) but only requires one routing slot (8 channels total).

The ESP CobraNet I/O expansion card is different because it only occupies one physical slot but can support up to 32 channels (16 in, 16 out) and can therefore utilize up to four of the eight available routing slots. For convenience the card can be configured as one of eight possible variants, each with a different combination of input and output channels. This allows the card to be configured according to project requirements whilst leaving the maximum number of routing slots free for other expansion cards.

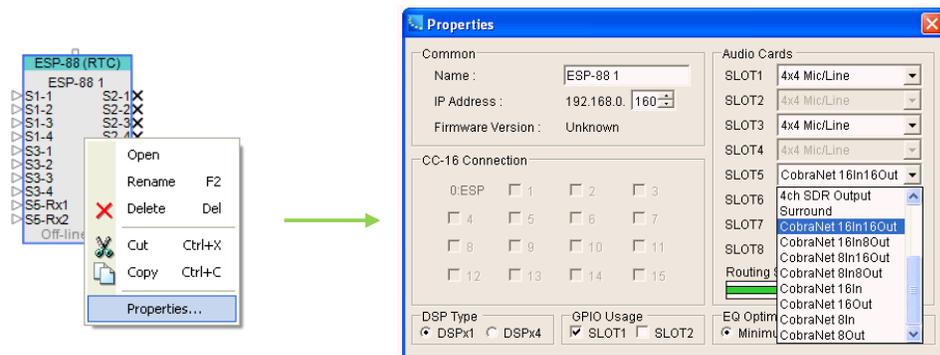
Depending on the number of routing slots allocated to the CobraNet I/O card the number of additional expansion cards (other than the standard 4x4 card) that can be added may be less than the physical expansion slots available as demonstrated in the table below.

CobraNet® I/O Configuration	Routing Slots Used	Additional I/O Card Capacity	
		ESP-88C	ESP-00
16 in, 16 out	4	2	4
16 in, 8 out	3	3	5
8 in, 16 out	3	3	5
16 in, 0 out	2	3*	6
0 in, 16 out	2	3*	6
8 in, 8 out	2	3*	6
8 in, 0 out	1	3*	7
0 in, 8 out	1	3*	7

\* Limited by the physical expansion slots available

The ESP CobraNet I/O card is added in the same manner as other expansion cards. If the card has already been fitted it will be detected automatically when a hardware scan is performed, otherwise the card can be added manually as follows:

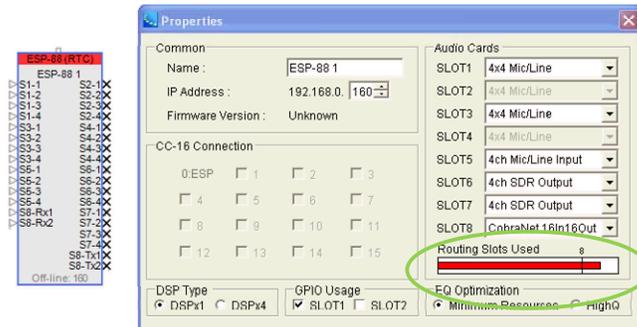
1. Right-click on the ESP in Project View and select 'Properties' to display the ESP 'Properties' dialog box.



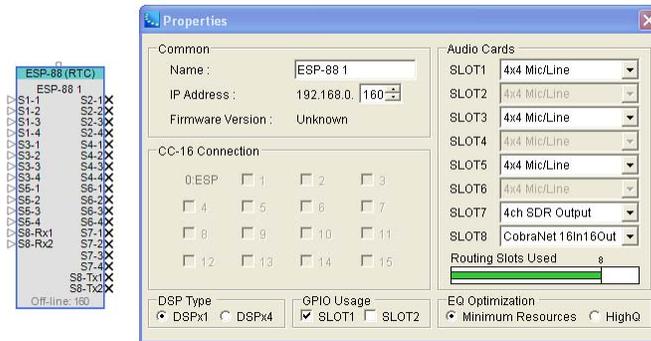
2. Select the required CobraNet I/O card variant from the drop-down list presented for the audio card slot where the card will be installed.

**Note that only one CobraNet I/O expansion card may be installed within an ESP.**

3. When used in conjunction with other expansion cards you will need to ensure that the eight available routing slots are not exceeded. If this occurs the 'Routing Slots Used' meter and relevant ESP icon in Project View will turn red as shown below:

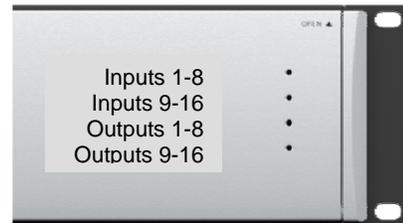


Using standard 4x4 Input/Output expansion cards wherever possible will spare additional routing slots that can be allocated to the CobraNet I/O card. For example, swapping the separate Mic/Line Input and SDR Output cards (from the example above) for a 4x4 Input/Output card (shown below) ensures that the limit of eight routing slots is not exceeded and the design can be used.



The four front panel LEDs for the ESP CobraNet I/O card display an average signal level of each group of eight channels as shown. The individual signal level for each channel can be monitored using ControlSpace Designer.

<b>Green</b>	> -36 dBFS
<b>Yellow</b>	-20 to -6 dBFS
<b>Red</b>	>-6 dBFS



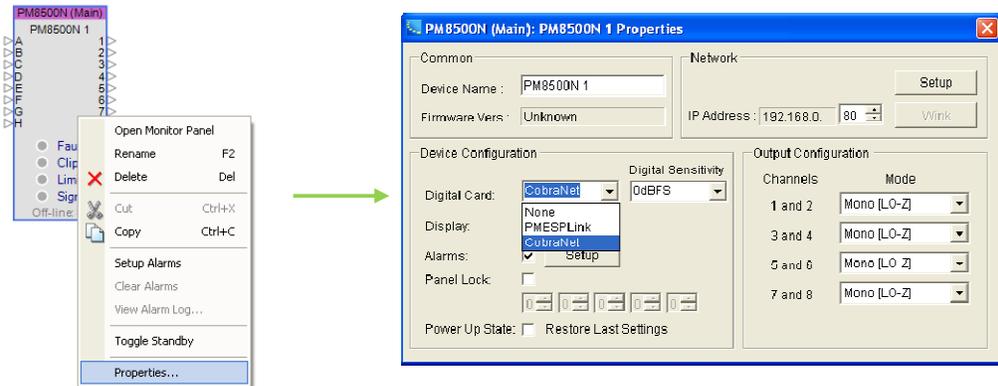
### 3. PowerMatch CobraNet card



The PowerMatch™ PM8500/N CobraNet card provides 8 inputs, presented as the ‘Digital’ source option for inputs A-H, selectable via the Input control panel. In addition, the 8 output channels (post-processing and pre-amplification) are available as an audio monitor bus, and can be sent across the CobraNet network for remote monitoring purposes.

The card will be detected automatically if a scan is performed and PM8500/Ns are present with the card fitted, otherwise the card can be added manually in a similar manner to the PM ESPLink card.

1. Right-click on the PM8500/N in Project View and select ‘Properties’ to display the ‘PM8500/N Properties’ dialog box.



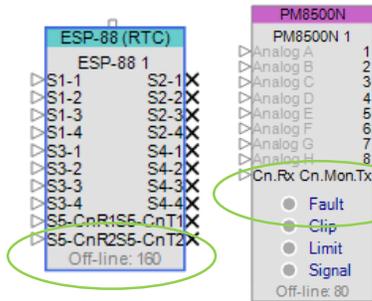
2. Once the “CobraNet” card has been selected, the ‘Digital Sensitivity’ drop-down is enabled. This can be used to adjust the sensitivity for all eight digital inputs globally if required, but typically this would not be necessary.

The input signal levels for the PowerMatch CobraNet card can be viewed via the front panel display by choosing the ‘Input Meter’ option from the ‘Meter’ menu, or via the Input control panel in the ControlSpace Designer software.

## 4. Routing audio between CobraNet devices

Within a CobraNet network, audio is passed between devices in 'Bundles', typically containing eight channels\*. A Bundle can be considered the virtual equivalent of a multi-core cable where eight independent channels of audio are passed through the same connection.

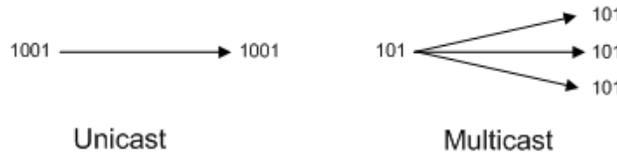
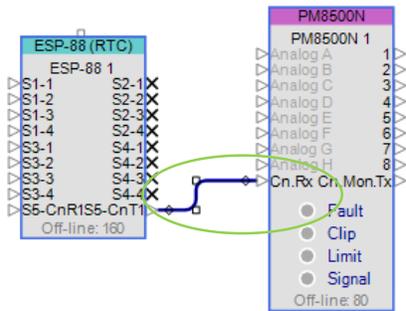
\* Note that when a Bit Depth of 24bits is used with Standard [5 1/3mS] latency the maximum number of channels in a Bundle is reduced to seven.



In Project View, CobraNet connections are shown as 'CnTx' and 'CnRx', these are the CobraNet transmitters and receivers. A transmitter can send one Bundle of eight channels and the receiver can receive another, also containing eight channels. For card variants that have sixteen inputs or outputs two receivers or transmitters are provided. Each of these would have a different Bundle assignment and could be linked to a different CobraNet device.

Connections can be drawn between CobraNet transmitters and receivers in Project View but it should be noted that these are for visual reference only and do not influence operation. The actual link is formed by assigning a transmitter and receiver the same Bundle number and then the CobraNet hardware manages the connection.

A CobraNet receiver may only be connected to one transmitter (which must be on a different device) but depending on the Bundle type a transmitter may be linked either to one (Unicast), or to many receivers (Multicast). Bundle numbers are normally in the range 1-65,279 and the Bundle type is determined by the number with 1-255 defined as Multicast and 256-65,279 usually defined as Unicast.



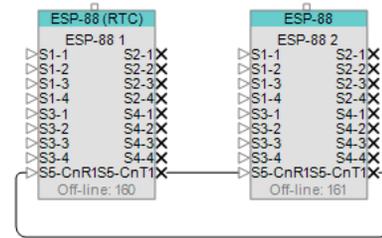
Both types can only be sent by a single transmitter and Unicast Bundles can typically only be received by one receiver\*\*. A Multicast Bundle can be received by any number of devices but adds additional network traffic and should only be used if required. A Multicast Bundle will normally be sent to every port on the network irrespective of whether any receivers are requesting it. Whereas a Unicast Bundle is only sent to a network port leading to a CobraNet device requesting it, otherwise it is not transmitted. Eight bundles on any port (including all the Multicast Bundles on the network) will consume all the available bandwidth on a 100Mbit network and hence a maximum of four Multicast Bundles is generally recommended.

\*\* Note that it is possible for Bundles in the Unicast range (256-65,279) to be set to Multi-Unicast (allowing a copy to be received by up to four devices) or Multicast, but these modes are rarely used and are not currently supported via ControlSpace Designer.

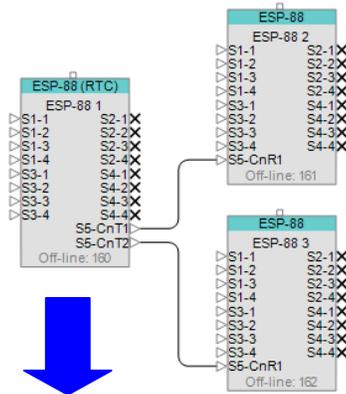
4.1 Routing Examples

The first example includes two ESP-88s fitted with CobraNet I/O cards, both configured as the 8 in, 8 out variant. One Bundle of eight channels passes from ESP-88 1 to ESP-88 2 and a second Bundle of eight channels passes back the other way from ESP-88 2 to ESP-88 1.

Since both of these connections are from a single transmitter to a single receiver Unicast Bundles (256-65,279) should be used.

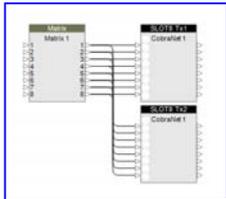


Example 1



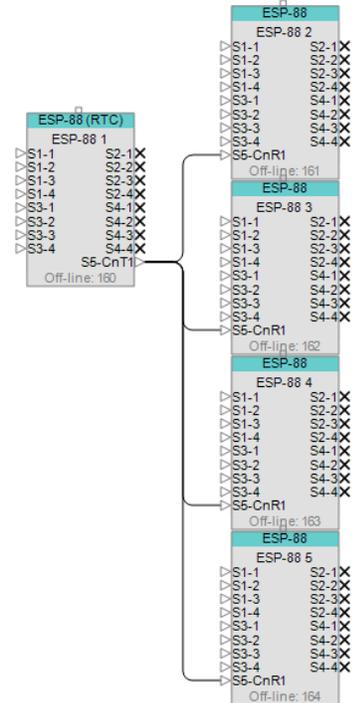
In this second example the CobraNet I/O card in ESP-88 1 is configured as '16 out' and the others as '8 in'. One Bundle of eight channels passes from ESP-88 1 to ESP-88 2 and a different Bundle of eight channels passes from ESP-88 1 to ESP-88 3.

If desired some or all of the channels in each Bundle can be the same simply by linking the same paths to each CobraNet output module. This has the benefit that both connections are still from a single transmitter to a single receiver hence Unicast Bundles (256-65,279) can be used, thus preserving network bandwidth.

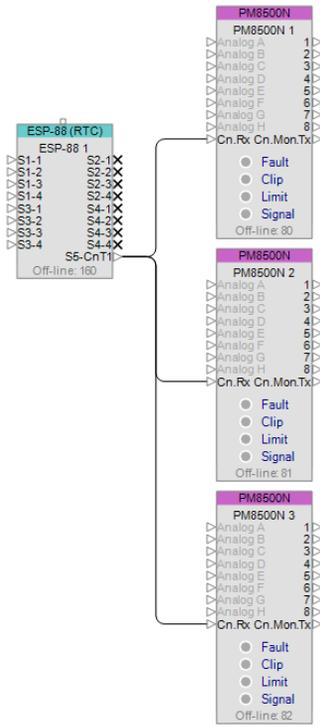


Example 2

In this third example the CobraNet I/O card in ESP-88 1 is configured as '8 out' and the remainder as '8 in'. With this design the one Bundle of eight channels is passed from ESP-88 1 to all of the other ESPs. Since these connections are from a single transmitter but to multiple receivers a Multicast Bundle (1-255) would be required.



Example 3



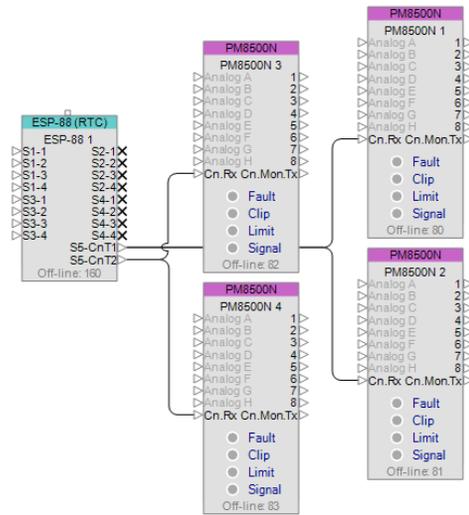
Example 4

This fourth example is essentially the same as the previous one but the receiving ESPs have been replaced by PowerMatch™ amplifiers. Since this will be a common scenario, the configuration is supported 'out-of-the-box' with minimal setup required.

PowerMatch CobraNet cards come factory set to receive Bundle '100' and using ControlSpace Designer v3.1 or later the first ESP CobraNet transmitter in the design will be set automatically to the same Bundle. Hence once the cards have been physically added and connected, simply uploading the design file to the ESP is all that is required to establish the link. Routing audio to the CobraNet output module in the ESP and selecting the 'Digital' source on the amplifiers will then allow audio to pass.

The last example is a slightly more complex scenario involving PowerMatch amplifiers. With this design one Bundle of eight channels is sent to amplifiers 1 and 2 (similar to the example above) but then a different Bundle of eight channels is sent to amplifiers 3 and 4. The default Multicast link (Bundle 100) can still be used to pass audio from the ESP to amplifiers 1 and 2, but a second will need to be added (e.g. Bundle 101) to pass audio from the ESP to amplifiers 3 and 4.

Currently it is not possible to change the PM CobraNet card settings via the ControlSpace Designer software and hence this configuration will require some changes to be made using the CobraNet Discovery (Disco) utility (see section 6 for more details).

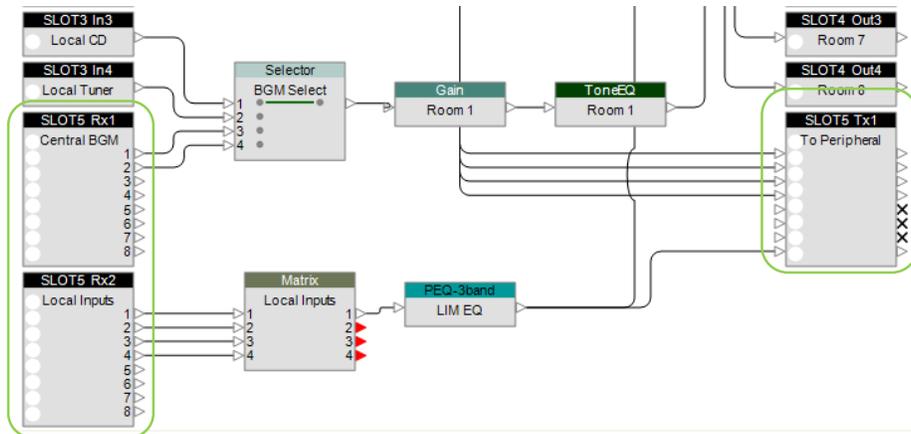


Example 5

## 5. Managing CobraNet settings for ESP-88/00



In ESP view a CobraNet input or output module with eight channels will be added for each CobraNet receiver or transmitter according to the card variant selected. Audio can be routed into and out of these modules in the same manner as any other input and output blocks.



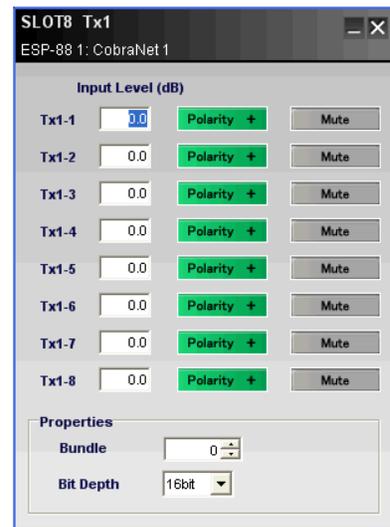
ESP CobraNet I/O card - 16x8 variant shown

### 5.1 CobraNet Output Control Panel

A double click on the CobraNet output module in ESP View will present the control panel in the usual manner. This includes a separate output level, polarity and mute control for each of the eight outputs plus the CobraNet Bundle and Bit depth settings.

With the exception of the first CobraNet transmitter in the project (set to '100' automatically for simplified connectivity with PowerMatch™ amplifiers) all transmitters are set to Bundle '0' by default which disables transmission. In order for audio to pass between CobraNet devices a transmitter and a receiver (on a different device) must be set to the same Bundle number. If the number is in the Unicast range then it can only be received by one device. If two or more receivers request the same Bundle it will be allocated on a first-come, first-served basis.

Adjusting the Bit depth property changes the sample resolution for the audio being transmitted. The options are 16bit, 20bit and 24bit with 20bit being the default. It is possible to use different Bit depths within the same project, but the default of 20bit should be fine for most applications.



*Note: when a Bit Depth of 24bit is used with Standard [5 1/3mS] latency the number of channels in a Bundle is reduced to seven.*

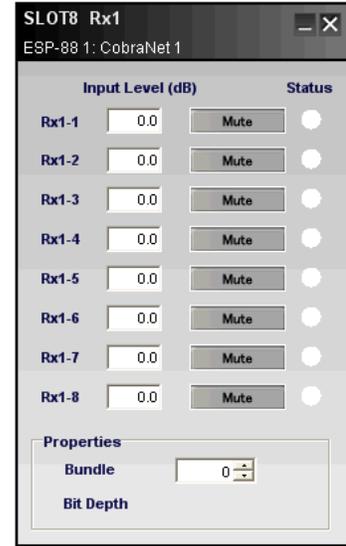
### 5.2 CobraNet Input Control Panel

Similarly a double click on a CobraNet input module in ESP View will present the input control panel, which includes an input level and mute control for each of the eight inputs plus the CobraNet Bundle property.

The CobraNet input modules are also set to Bundle '0' by default which disables reception whilst the port is unused.

The Bit-depth is read-only field and will be populated when ControlSpace Designer is on-line and audio is being received.

To the right a Status indicator is provided for each input channel. These are not audio signal indicators; instead they indicate whether valid CobraNet data is being received for each channel. These can prove particularly useful when setting-up or diagnosing system issues because they indicate whether the network is functioning and the Bundle assignments are correct even when there is no audio present.

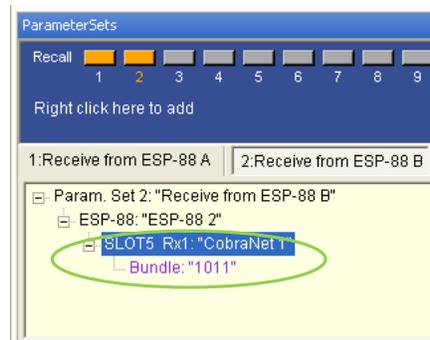
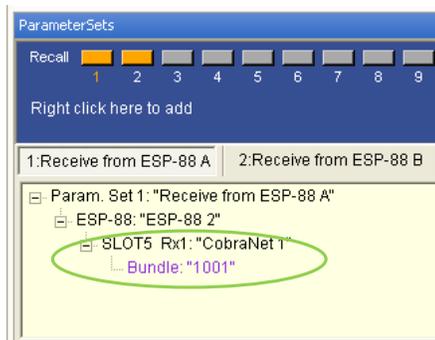


<b>Black</b>	Channel not being received
<b>Green</b>	Channel being received correctly
<b>Red</b>	Channel being received with errors (typically incorrect latency or network issues)

### 5.3 Controlling ESP CobraNet modules via Parameter Set.

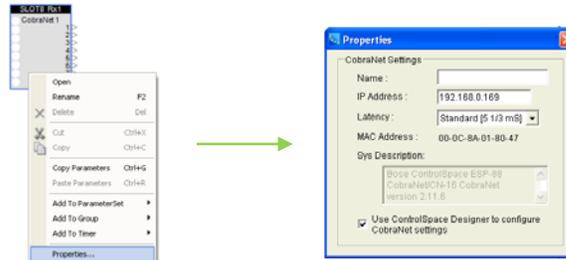
The level, mute and polarity (output) parameters for each channel can be stored and recalled via Parameter Sets allowing them to be adjusted dynamically if required, however they cannot be dragged directly onto GPI contacts and serial inputs.

It is also possible for the Bundle number to be stored and recalled via Parameter Sets which opens up the possibility of having an ESP receive audio from any one of a number of different CobraNet devices by dynamically changing the Bundle number parameter during day-to-day operation. A good example of this would be switching between the monitor outputs from a large number of PowerMatch amplifiers, using only a single CobraNet receiver.



## 5.4 Changing the card properties

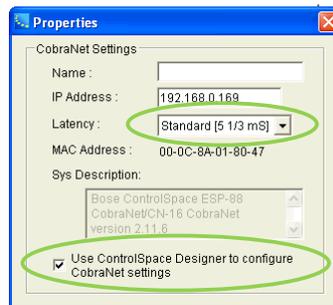
To access the properties for the ESP CobraNet I/O card, right-click on any of the CobraNet input or output modules and select 'Properties...'



By default ControlSpace Designer will allocate the ESP CobraNet I/O card an IP Address that is equal to the address of the host ESP plus eight (e.g. 192.168.0.168 for an ESP address of 192.168.0.160) but this can be overwritten with an alternate address if required. Note that the IP address is only used when the CobraNet card is being configured by SNMP or the CobraNet Discovery utility and is not referenced in normal operation.

### Latency

CobraNet networks can operate in one of three latency modes: 5.33mS, 2.33mS and 1.33mS which can be set in the Card Properties. With lower latency settings there is less tolerance for propagation delays and hence fewer 'switch-hops' are permitted. At the lowest latency setting of 1.33mS only 1 or 2 'switch-hops' are possible on a typical 100Mbit network. It also significantly increases the load on the CobraNet processors which have to process more data packets. So unless a lower latency is specifically required and the networking implications are fully understood it is recommended that the default setting of 'Standard [5 1/3mS]' is used. Note that for audio to pass correctly between CobraNet devices on a network they must all be set to the same latency mode.



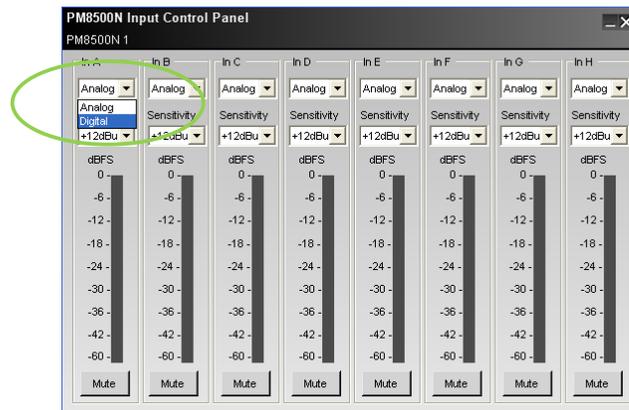
### Use ControlSpace Designer to configure CobraNet settings

This property is checked by default and typically ESP CobraNet settings such as Latency, Bundle numbers, Bit depth etc can be managed using the ControlSpace Designer software. However for more complex systems, or those using a combination of ESP and PowerMatch CobraNet cards it may be desirable to turn off ControlSpace Designer control of CobraNet settings so that all the cards may be configured together using the CobraNet Discovery (Disco) utility.

## 6. Managing CobraNet settings for PM8500/N

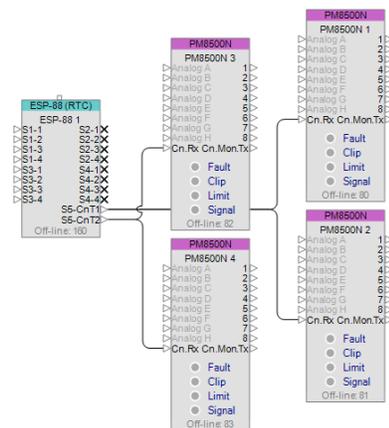


With the PowerMatch™ amplifier the CobraNet audio is presented simply as the ‘Digital’ source option selectable via the front panel or the Input control panel in the ControlSpace Designer software. The input source for any channel can be set independently with any combination of analog and digital (CobraNet) inputs permissible. With the PM8500N the Input Source can be stored and recalled via Parameter Sets offering the possibility of having inputs switching to analog inputs as a backup.



The PowerMatch CobraNet card is factory set to receive Bundle ‘100’ and cannot currently be changed using the ControlSpace Designer software. A simple system with eight channels of audio passing from an ESP to one or more PowerMatch amplifiers is supported out-of-the-box and requires no additional configuration.

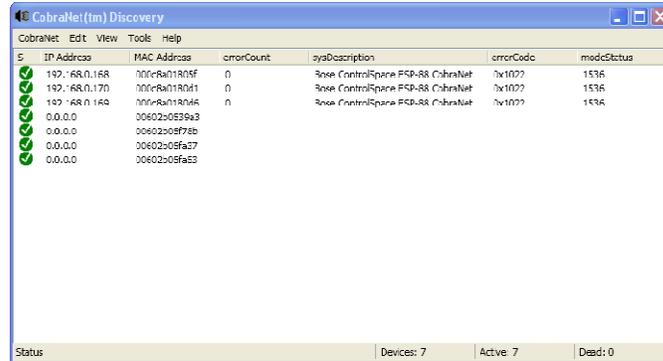
For more advanced systems, such as sending more than one Bundle of 8 channels to different amplifiers will require the use of the CobraNet Discovery (Disco) utility to change the PowerMatch CobraNet card settings directly. This is described in detail in the following section.



## 6.1 Changing CobraNet settings using the Discovery utility

The CobraNet Discovery utility can be downloaded from [www.cobranet.info](http://www.cobranet.info).

To use the Discovery (Disco) utility, first ensure that your network adaptor is correctly configured and connected to the CobraNet network (rather than the ControlSpace control network) and then launch the utility. Any CobraNet devices connected to the network should be discovered automatically and added to the device list.

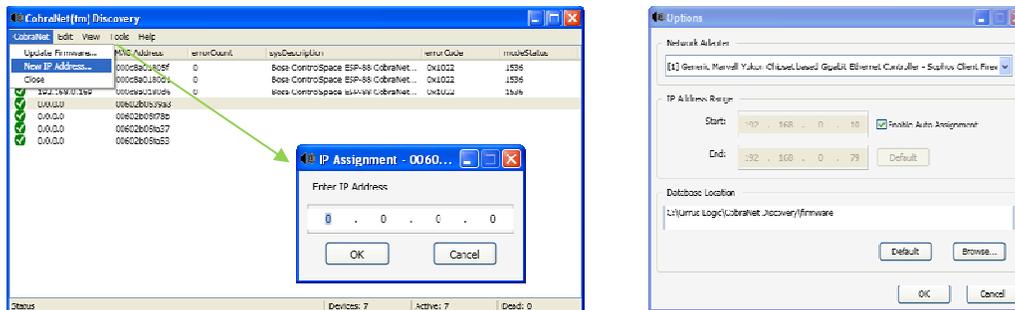


If no devices are detected check the network connections and ensure the correct network adaptor is selected in the 'Tools', 'Options' dialog.

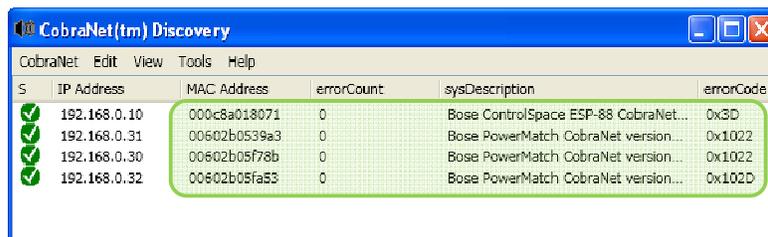
### Assigning IP addresses

Once the ESP has a design loaded the CobraNet I/O card will be assigned an IP address as the ESP boots up. By default this is 8 above the IP address of the ESP itself. In contrast PowerMatch CobraNet cards will power-up with a default IP address of 0.0.0.0 and will need to have a valid IP address set before they can be configured using Discovery. CobraNet devices only require an IP address for configuration, not for normal operation so the addresses are usually temporary.

An IP address for each PowerMatch CobraNet card can be set manually by selecting 'New IP address' from the 'CobraNet' menu, or you can have the Discovery utility automatically assign IP addresses to devices by checking 'Enable Auto Assignment' in the 'Options' dialog.



Once IP addresses are assigned to the PowerMatch CobraNet cards Discovery can query them and update their status in the device list.

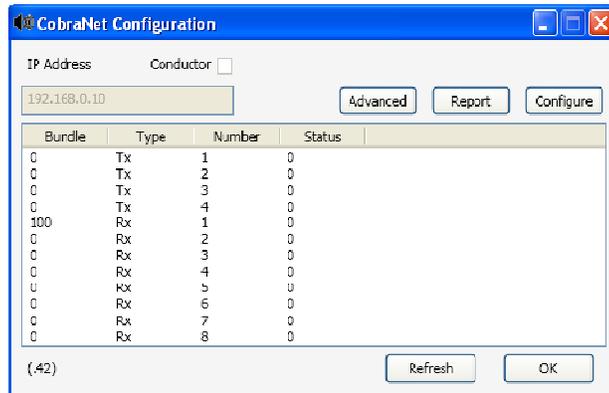


To identify which CobraNet card is fitted to which amplifier you can either add them to the network one-by-one or temporarily disconnect one and the green tick to the left will change to a red cross to indicate the device is missing. Once identified, it can be re-connected and the green tick will be restored. Since the IP addresses are only temporary it's usually a good idea to make a note of the MAC addresses in case you should need to identify the cards again later on.

## Setting Bundle numbers

Once a device has an IP address assigned double clicking on it will open the 'CobraNet Configuration' dialog for that particular device.

Each row in the list is a discrete Bundle transmitter or receiver and is typically the same for all CobraNet devices (although the number of receivers may vary) irrespective of how many inputs or outputs the device actually has.



For most applications, receiving a single Bundle of 8 channels is sufficient\*\*\* and only Receiver 1 (Rx 1) will be used. In applications where remote monitoring of the PowerMatch amplifiers is required then Transmitter 1 (Tx 1) can also be configured. The remaining transmitters and receivers should all be left set to '0' which is their unused state. PM CobraNet cards are factory set to receive Bundle '100' and this will appear on Receiver 1 as shown.

\*\*\* It is possible for the PowerMatch CobraNet card to receive multiple Bundles with fewer channels (e.g. 2x 4ch Bundles) but this is more complex, outside the scope of this document and not recommended for novice CobraNet users.

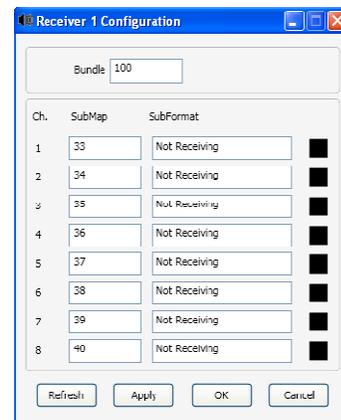
## Receiver 1 Configuration

To change the Bundle number assigned to the receiver one can either; double-click on the Rx 1 row, or select it and click on the 'Configure' button from configuration dialog.

The 'Receiver 1 Configuration' dialog will be presented and one can simply enter a new Bundle number and click 'Apply'. If you are working live clicking the 'Refresh' button will cause the status indicators and SubFormat fields to be updated.

The 'SubMap' values control how the received Bundle channels relate to the hardware channels of the device (channels A-H on the PM8500/N). The default values are '33-40' and should not be changed.

The 'SubFormat' fields are populated when audio is being received and indicate the audio format. The default format is 48kHz 5 1/3mS 20bit. The sample rate (48kHz) and latency (5 1/3mS) must be the same for all CobraNet devices on the network, but differences in bit-depth between devices are permissible.



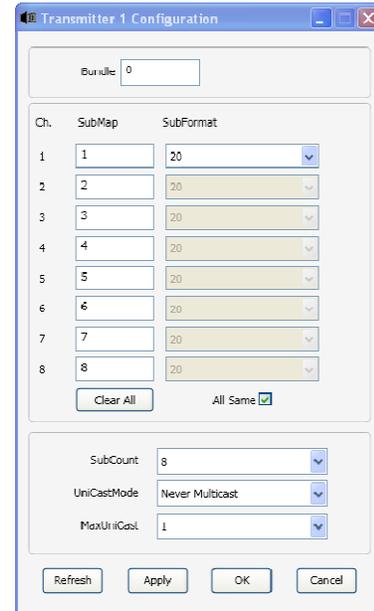
## Transmitter 1 Configuration

For monitoring purposes, the output channels (post-processing, pre-amplification) of a PowerMatch amplifier can also be sent across the CobraNet network. This is turned off by default, but is enabled simply by assigning a suitable Bundle number to Transmitter 1. This should be in the Unicast range, especially if there are multiple amplifiers, to limit the amount of network traffic.

Similar to the receiver, the 'SubMap' values control how the hardware channels are mapped to the Bundle channels. The default values are '1-8' and should not be changed.

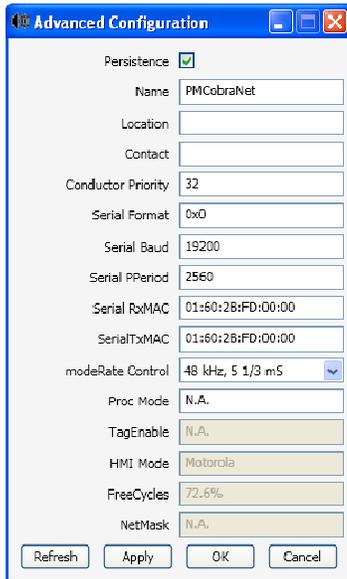
The 'SubFormat' drop-down sets the bit depth for each channel. The default is 20bit (so 8 channel bundles are supported with 5.33mS latency) applied to all channels.

The last section which includes the 'SubCount', 'UnicastMode' and 'MaxUniCast' parameters can be used to create Bundles of fewer channels, or to override the default Unicast behaviour and send copies of the Bundle to multiple devices. These should only be required for more complex systems are outside the scope of this document.



## Advanced Configuration

Clicking 'Advanced' from 'CobraNet Configuration' presents a dialog with a number of card properties. Most of these are factory set for correct operation and should not be changed, but there are a few to be aware of.



The 'Persistence' property will be checked by default on PowerMatch CobraNet cards to ensure that any changes made to the card settings (such as Bundle assignments) are retained after power down. If this is turned off then the settings will be lost when the amplifier is turned off.

In contrast, the ESP CobraNet I/O card is designed to work with or without the 'Persistence' bit set. This is because the ESP will provide the CobraNet I/O card with the settings on power up if 'Persistence' is turned off. This does not happen with PowerMatch amplifiers.

'Name', 'Location' and 'Contact' are simple text fields that can be used to identify the card on a network. Simply enter the desired text and click 'Apply'.

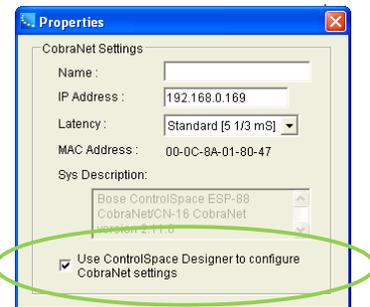
The last setting to be aware of is the 'modeRate Control'. This sets the combination of the sample rate and latency and will be 48 kHz, 5 1/3 mS by default. Although 96 kHz options are presented they are not supported by ControlSpace hardware and should not be used.

There are three latency options available; 5.33mS, 2.33mS and 1.33mS. With lower latency settings there is less tolerance for propagation delays and hence fewer 'switch-hops' are permitted. At the lowest latency setting of 1.33mS only 1 or 2 'switch-hops' are possible on a typical 100Mbit network. It also significantly increases the load on the CobraNet processors which have to process more data packets so unless there is a specific need to use a lower latency the default of 5.33mS should be used. For the system to operate correctly all devices must be set to the same 'modeRate Control' setting.

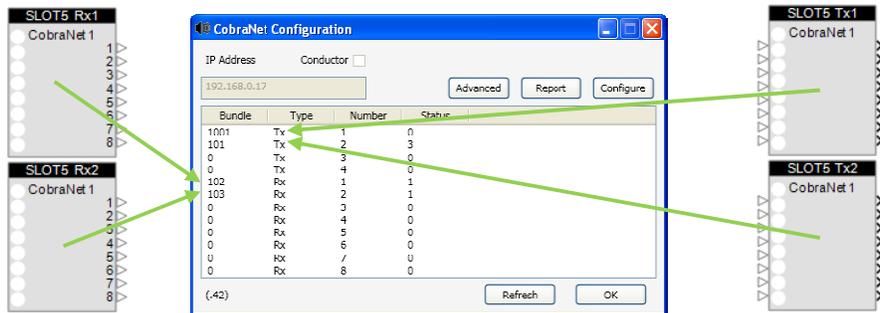
**Changing ESP CobraNet I/O card settings using Discovery**

Configuration of the ESP CobraNet I/O card settings can still be done via ControlSpace Designer even if the PowerMatch CobraNet card settings are changed via Discovery, simply by not changing any of the ESP settings manually. The benefits are that the ESP CobraNet I/O card settings are stored in the design file for ease of reference and troubleshooting and Bundle assignments can be changed dynamically using Parameter Set programming.

Alternatively, all CobraNet devices can be managed via the CobraNet Discovery utility, but in order to prevent changes made in Discovery from being overwritten, control via the ControlSpace Designer software must be turned off. This is done by right-clicking on any of the CobraNet modules for an ESP, selecting properties and un-checking 'Use ControlSpace Designer to configure CobraNet settings'. This will need to be repeated for each ESP in the design and then the modified design sent to the hardware. With this turned off ControlSpace Designer software or the ESPs will not send any settings to the cards.



Audio is still routed to the CobraNet modules in ESP view in the usual way, only the CobraNet parameters are unused. When viewing the ESP in the Discovery utility the Tx1, Tx2, Rx1 and Rx2 rows relate to the equivalent modules in ESP view.



**Note:** The CobraNet Discovery utility exposes a great number of settings that are factory set for correct operation and should not be changed. Changing settings other than those described in this document may cause issues with the system that are hard to diagnose and resolve without in-depth CobraNet knowledge.