



MEDIATECHNOLOGYSYSTEMS INC.



MANUAL

ION 2.0 Input
ION 0.2 Output
ION 1.1 Input/Output
CobraNet™™ Interfaces

766 LAKEFIELD ROAD, WESTLAKE VILLAGE, CALIFORNIA 91361 U.S.A. www.mediatechnologysystems.com
Part # MAN-0308-MCA-RevB

FCC Compliance Notice & Interference Statement.

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING CONDITIONS. THIS DEVICE MAY CAUSE HARMFUL INTERFERENCE. THIS DEVICE IS DESIGNED TO ACCEPT AND OPERATE WITH ANY INTERFERENCE RECEIVED. THIS INCLUDES INTERFERENCE THAT MIGHT CAUSE UNDESIRE OPERATION.

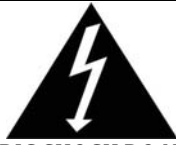
CAUTION: ANY CHANGES OR MODIFICATIONS MADE WITHOUT THE EXPRESS APPROVAL AND PERMISSION OF MANUFACTURER, VOID RESPONSIBILITY OF MANUFACTURER FOR COMPLAINEE.

THIS EQUIPMENT HAS BEEN TESTED BY A COMPETANT BODY AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS-B DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FEDERAL COMMUNICATIONS COMMISSION RULES. THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL RF ENERGY IN A RESIDENTIAL INSTALLATION.

THIS EQUIPMENT, IF NOT PROPERLY INSTALLED IN ACCORDANCE WITH THIS MANUAL, LOCAL, STATE AND NATIONAL RECOMMENDED PRACTICES, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS. SUCH INTEFERENCE AND CAN BE DETERMINED BY SWITCHING THE DEVICE ON AND OFF. THERE IS NO GUARANTEE THAT THE DEVICE WILL NOT CAUSE INTERFERENCE. TO RADIO AND TELEVISION RECEPTION. USER IS ENCOURAGED TO TRY TO CORRECT ANY INTERFERENCE BY ONE OR MORE OF THE FOLLOWING MEASURES:

- RE-ORIENT OR RELOCATE THE RECEIVING ANTENNA*
- INCREASE THE DISTANCE OF ANY EQUIPMENT AND THE DEVICE.*
- CONNECT THE DEVICE TO A DIFFERENT A/C POWER CIRCUIT OUTPUT TO THE RECEIVER*
- CONSULT QUALIFIED TECHNICIAN OR A RADIO.TV SPECIALIST FOR ASSISTANCE.*

Explanation of Symbols



TO PREVENT ELECTRIC SHOCK DO NOT REMOVE COVER.
NO USER SERVICABLE PARTS INSIDE. REFER TO QUALIFIED
AND CERTIFIED SERVICE PERSONNEL.

CAUTION

**RISK OF ELECTRIC SHOCK
DO NOT OPEN**



The exclamation mark in a triangle is intended to alert the user to the presence of important operating and maintenance/service instructions in this manual.



The lightning flash in a triangle is intended to alert the user to the presence of un-insulated “dangerous” voltages within a product’s chassis that may be sufficient to create a risk of electric shock to humans.

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1 Welcome

1.1 Important Safety Instructions

- Important Safety Instructions:
- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Only use attachments/accessories specified by the manufacturer.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

1.2 Declaration of Conformity:

EMC: This equipment has been designed to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

Industry Canada Class A emission compliance statement: This Class B digital apparatus complies with Canadian ICES-003. Avis de conformite' a' la re'glementation d'Industrie Canada. Cet appareil nume'rique de classe A est conforme a' la norme.

1.3 How to use this manual.

This manual provides you with valuable information for safely and correctly installing, setting up and operating your amplifier. It is not possible to cover all aspects of installation and application of complex product. However, we have attempted to supply all critical and essential information, plus advice and explanations where relevant. There is a great body of work re amplification and sounds systems best practices, available from many sources on line. MTSI will, from time to time add "White Papers" and Application Notes to our website. As well as additional information on amplifier use and other valuable information.

It is particularly important that you read this manual and especially the Warnings and Cautions.

2 Specifications

The electrical specifications for the ION2.0 (2 analog input, 0 analog output), ION1.1 (2 analog input, 2 analog output) and ION0.2 (0 analog input, 2 analog output) are given below. The XLR input on the ION2.0 & ION1.1 has variable gain, where the 3 settings are optimized for Dynamic Microphones, Condenser Microphones and Pro-Audio Line level sources respectively. The XLR output on the ION0.2 & ION1.1 has 3 settings, optimized for ProAudio, MI (Prosumer) Microphones and Consumer equipment respectively.

The ION2.0/ION0.2 are PoE devices compliant with IEEE802.3af, Class 2 (3.84-6.49 watts, 17-20mA).

The RCA connectors for both input and output are fixed at -8dBu (nominal).

2.1 ION2.0

Frequency Response	+/- 1dB 20Hz to 20kHz nominal level
THD+noise	Less than 0.1% 20Hz to 20kHz nominal level
Hum & Noise, 150Ω	-122dBm EIN at Max Gain
EIN	-122dBm EIN at Max Gain, 20Hz – 20kHz
Dynamic Range	98 dB (Gain min)
CMRR	65 db
Nominal Input Sensitivity/Max Input Level	
XL Input : Min gain	+4dBu/+22dBu
XL Input :Med gain	-26dBu/-6dBu
XL Input :Max gain	-56dBu/-36dBu
RCA Connectors	-2dBu+20dBu
Input Impedance: XL/RCA	2,000Ω/10,000Ω
Phantom Power:	+15VDC (DIN 45 596 or IEC 268-15A)
PoE	
PoE power consumption:	350 mA maximum per IEEE802.3af
Connector	XL Neutrik NC3FAV1-0 (no latch)
Connector	RCA x 2, L+R summed to channel.

In the ION2.0, the RCA inputs are summed to mono and mixed with the XLR input. This makes the ION2.0 a 2-channel device

2.2 ION0.2

Nominal Input Sensitivity/Max Input Level

XL Output : Min Attenuation +4dBu/+22dBu

XL Output :Med Attenuation -2dBu/+18dBu

XL Output :Max Attenuation -8dBu/+12dBu

RCA Connectors -2dBu+20dBu

Output Impedance: XL/RCA 600 Ω /10,000 Ω

In the ION0.2 the XLR and RCA outputs are all sourced from the same D-A channel. This makes the ION2.0 a 2-channel device

2.3 ION1.1

The ION1.1 is a combination of the ION2.0 and ION0.2 specification. NOTE: the ION1.1 has separate channels for the XLR and RCA connections. Thus, in the ION1.1 input section, the RCA inputs are summed to mono and feed one A-D channel; the XLR input feeds a second A-D channel. In the ION1.1 output section, the XLR output is sourced from one D-A channel and the mono-sum RCA outputs are sourced from a second D-A channel. This makes the ION1.1 a 2-input/2-output device

3 Installation

3.1 USA Mounting Enclosures

The most common decorative wall finish in the US is the Decora® format. The ION2.0, ION1.1 and ION0.2 will both be available in sizes to suit the Decora® '2-gang' face plates widely available in various finishes (Brass, Aluminium, Plastic, etc) and colors (White, Black, Almond, Gold, Silver, etc) – see Figure 3-1

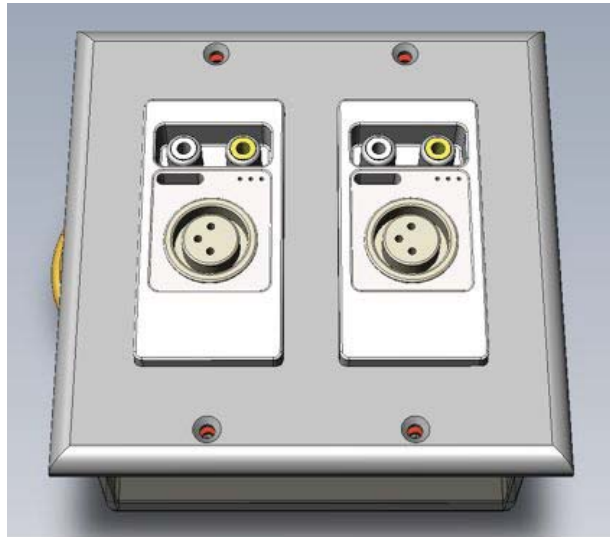


Figure 3-1: ION2.0 CobraNef™ interface tooling to match the common Decora® faceplate

NOTE: Media Technology Systems does not supply the faceplate (as this is to customer aesthetic requirements), but the ION2.0, ION1.1 and ION0.2 are supplied with the white plastic insert (center) that fits the Decora® faceplate.

The ION2.0, ION1.1 & ION0.2 interface and Decora® faceplate combination will need to be installed into a rear enclosure, usually an 'off the shelf' 2-gang J-Box or 2-gang back box. The ION interface will need a metal rear enclosure of minimum of 42mm deep that is well grounded (see 3.3.4 for grounding recommendations) – see Figure 3-2 for an example of a wetwall installation. RACO™, Hubble™, Leviton™, Graybar™, Grady™, Home Depot™ and many others all have equivalent product available.

For drywall installations use a similar metal enclosure with the side support, such as the 681 model from RACO™ - see Figure 3-3. Again, many vendors have equivalent product available.



Figure 3-2: Example of metal backbox suitable for the ION2.0 and ION0.2

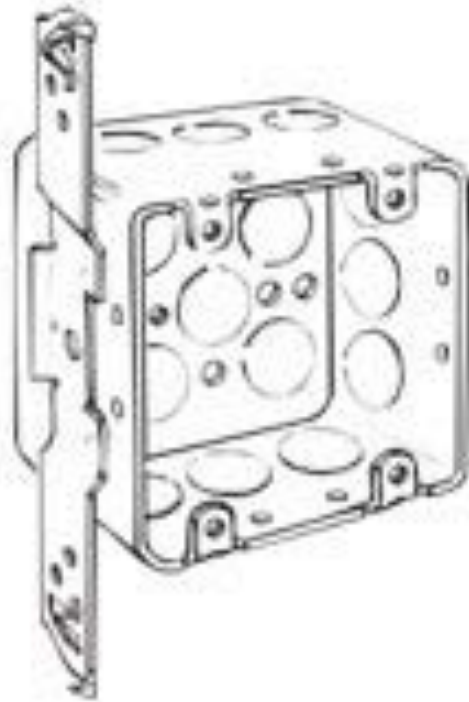


Figure 3-3: RACO™ 681 drywall back box.

3.1.1 USA labelling

There is a recessed slot at the bottom of the ION2.0, ION1.1 and ION0.2 interface, suitable for a 1" wide x $\frac{3}{8}$ " high label see Figure 3-4. The recess allows for labels of up to

5/32" deep, which are sufficient even for "Traffolyte" style engraved labels (typically 1/8" deep) containing an aggressive, permanent adhesive.



Figure 3-4: Graphic showing ION2.0 label recess (bottom of fascia plate) with label screw holes.

The recess can also handle most other label types from recognized suppliers such as Brady, Sharpmark and others.

In addition, the recess also has a pair of mounting holes, 1/2" apart. These can be used for permanently attaching labels with screws, but it DOES require the dismantling of the ION interface, This approach is not recommended, as most aggressive adhesives are sufficiently strong to require a special solvent or tool to remove them.

3.2 Unpacking

It is recommended that the carton and packing material is retained so the ION may be shipped for service should this be required. Any damage caused by improper packaging will not be covered under warranty. Should you chose to dispose of the carton and packaging, make sure to dispose of these parts according to local, state and national requirements and good ecological practice.

3.3 Installing the Interface

3.3.1 Analog Input/Output Wire and Connectors:

Microphone and other input sources as well as output to amplifiers, powered speakers and other such devices, should be connected using high quality connectors and cables to assure reliable and quiet operation. It is false economy to use cheap cables. Normal use will degrade these cables quickly and create noise when handling, poor electrical

connections and sound quality and the likelihood of non-operation at a critical time. Particular attention should be paid to cable type and quality for hand-held microphone applications.

3.3.2 ION2.0/ION1.1 Input Connections

The ION2.0/ION1.1 is should be connected as follows...

- **XLR Connector:** This is a Microphone input (impedance 2k ohm) that can handle both microphone and line level signal levels. The input impedance has been optimized for lowest EIN and to comply with the needs of dynamic microphones, which need to be terminated in about 1500 to 2000 Ohm to optimize the high frequency response.

Note: the phantom power is permanently on at the XLR, to allow for all forms of condenser microphones: high sensitivity (>40mV/Pa, -25dBu), medium sensitivity (~12mV/Pa, -36dBu) and low sensitivity (<2mV/Pa, -52dBu).

In addition to Microphones, this input can also be used for line level equipment with AC coupled, low output impedance, such as +4dbu nominal/150-600ohm Pro Audio sources (Mixing Consoles, DSP processors, etc). It can also be used for AC coupled equipment such as MP3 players and Laptops, where the headphones output has a low impedance drive.

The XLR input is NOT suitable for direct connection to most Consumer line level equipment, which expects an IEC standard input impedance of 10kohm. Connecting Consumer equipment directly to the XLR will cause degradation of headroom, low-end frequency response and increase distortion. The RCA inputs have been provided for Consumer line level inputs.

- **RCA Connectors:** These are provided for Consumer line level sources (10k ohm input impedance) and any sources that are not AC coupled (ie, cannot isolate from phantom power).

Consumer line level is typically -8dBu (308mV nominal) with a single ended (unbalanced) 10k ohm output. This is suitable for the typically short distances (less than 25ft) between the source equipment and the ION2.0 in most applications, but for longer distances, a low impedance drive is needed.

A simple solution is to use an isolating transformer with impedance conversion and then connect to the XLR input of the ION2.0 (medium gain setting). A good example is the Jensen transformers DB2-MX, which has a stereo 3.5mm (1/8th inch) jack input (<http://www.jensen-transformers.com/db2px.html>). The advantage of this solution is as follows...

- Conversion from unbalanced to balanced to maximize common mode noise rejection.
- Output impedance is now 150ohms, ie able to drive long cable lengths.
- 100dB Common mode isolation between input and output.

3.3.3 ION0.2/ION1.1 Output Connections

The ION2.0 is should be connected as follows...

- XLR Connector: The XLR output has a low impedance (600ohm) drive and can be connected to most Pro-Audio, MI, Prosumer or Consumer equipment. The sensitivity switch will set the nominal output to +4dBu (ProAudio), -2dBu (MI/Prosumer), or -8dBu (Consumer) levels.
- RCA Connectors: These are paired/mono outputs with a fixed gain (-8dBu nominal) and 10k ohm output impedance. The RCA outputs provide a simple and fast connection for Consumer equipment such as MP3 players and Laptops over short distances.

3.3.4 Ground pin

The ION2.0, ION1.1 and ION0.2 have a rear PCB mounted ground pin – see Figure 3-5 below. Ideally, STP cable should be used, where the shield is connected to a good ground at the PoE switch, but it is accepted that UTP will be used in most situations. The rear PCB ground pin has been provided as a means of connecting the interface to a good ground when used with UTP cable.

The ground pin should be connected to the metal rear enclosure of the ION2.0, ION1.1 & 0.2 and in turn, the metal rear enclosure should be connected to either technical ground (preferable), common safety ground (next best), or building ground (worst case).

Please note: ALL grounds should comply with local safety codes and usually have a common connection at the building entrance.

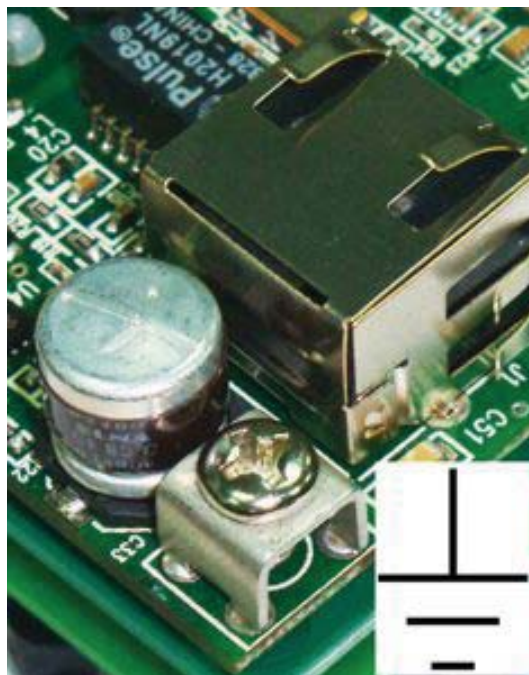


Figure 3-5: Ground Pin on rear PCB of ION2.0/ION0.2

Warning: The ION2.0, ION1.1 and ION0.2 are designed with consideration of real world conditions where it is possible that external devices, such as mixers, power amplifiers and other A/C powered devices can, through cabling defects and anomalies, connect potentially damaging voltages to the installed system. Should such voltages be inadvertently connected to the ION device, we have provided a fuse in the grounding circuit that will 'open' to protect the rest of the installed system from extensive damage. The only indication of this having occurred may be increased noise from the ION. There are no user serviceable parts inside these products so they must be returned to qualified service personnel or the factory for repair. Please review the warranty information in this manual for how to proceed should this happen.

NOTE: Failure under these conditions is not covered under warranty. Always check your system grounding. Never "lift" A/C grounds on any device in a system in an attempt to cure hum or buzz, so doing can expose users to dangerous and lethal voltages.

3.3.5 ION2.0/ION0.2/ION1.1 gain switch and indicator

The XLR connector has a gain switch with 3 positions-see Figure 3-6. There is also an adjacent LED indicator to show the gain setting.

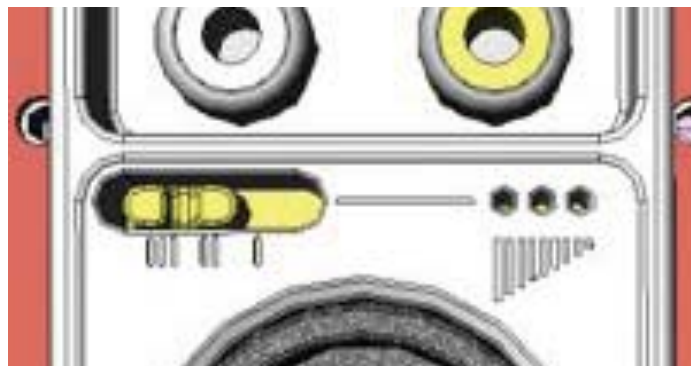


Figure 3-6: Gain switch and LED indicator

In the case of the ION2.0/ION1.1, as the gain switch is moved from left to right, the gain decreases from 60dB to 30db to 0dB respectively. At the same time, the number of exposed LED will reduce from 3 to 2 to 1 to show how much gain is in circuit. NOTE: The LED's are intended to be dim, so that they are useful and not too bright in low light conditions. In a brightly lit room, the position of the switch can be seen directly.

In the case of the ION0.2/ION1.1, the switch sets the output sensitivity, so that the output of the ION0.2/ION1.1 can match the full scale/clip point of the connected device. The switch should be set to the left for more sensitive equipment (ie, needs less signal level to drive full output) and to the right for less sensitive equipment (ie, needs more level to drive full output). The LED and switch represents the sensitivity of the connected equipment, so that the peak output of the of the ION0.2 increases from left to right, where the left position is for connected devices with a maximum capability of -8dBu (nominal, +12dbu peak), the middle position is for connected devices with a maximum capability of -2dBu (nominal, +18dbu peak) and the right position is for connected devices with a maximum capability of +4dBu (nominal, +22dBu peak).

3.3.6 Mounting Position

The ION can be mounted either way up, ie label at the top or label at the bottom. However, it is recommended that the ION be mounted label at the bottom, as it makes the gain position and LED's easier to see, when the XLR is connected.

In the situation where the ION is mounted with the back can installed for protection (see Figure 3-7), then label at the bottom position is mandatory.

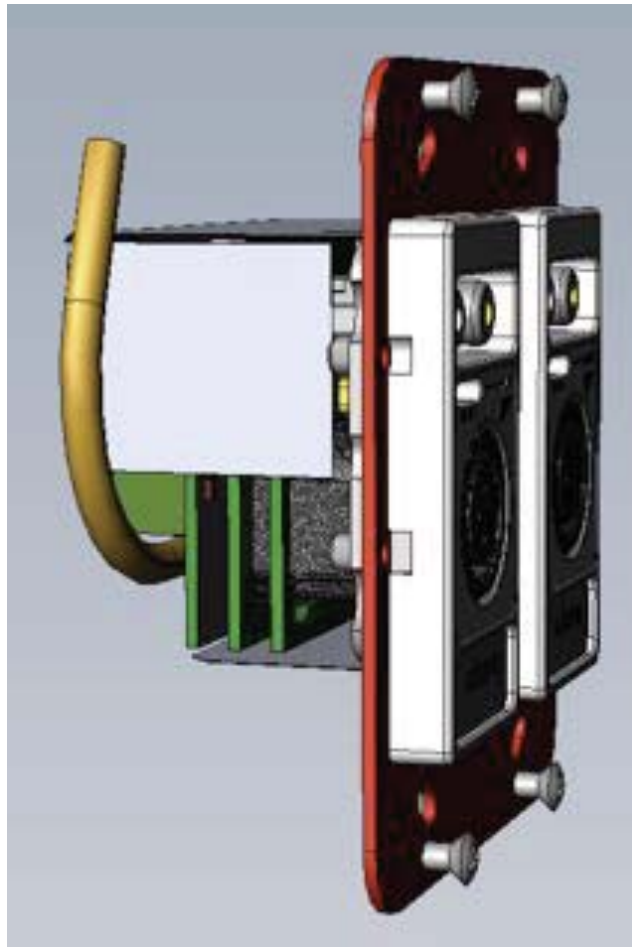



















Figure 3-7: Side view showing back can in position

3.3.7 Network connections

The MTS ION2.0, ION1.1 and ION0.2 uses the standard TIA/EIA-568-B wiring scheme (T568A)... see below:

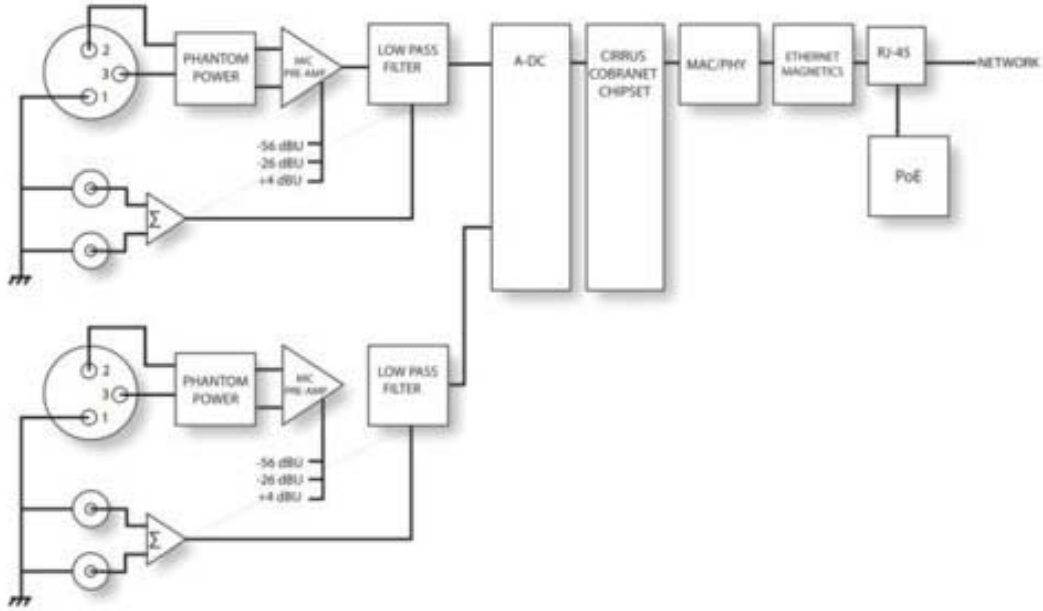
Pin	T568A Pair	T568B Pair	Wire	T568A Color	T568B Color	Pins on plug face (socket is reversed)
1	3	2	tip	 white/green stripe	 white/orange stripe	 Pin Position 8 7 6 5 4 3 2 1
2	3	2	ring	 green solid	 orange solid	
3	2	3	tip	 white/orange stripe	 white/green stripe	
4	1	1	ring	 blue solid	 blue solid	
5	1	1	tip	 white/blue stripe	 white/blue stripe	
6	2	3	ring	 orange solid	 green solid	
7	4	4	tip	 white/brown stripe	 white/brown stripe	
8	4	4	ring	 brown solid	 brown solid	

NOTE: Please use unbooted RJ45 crimp connectors.

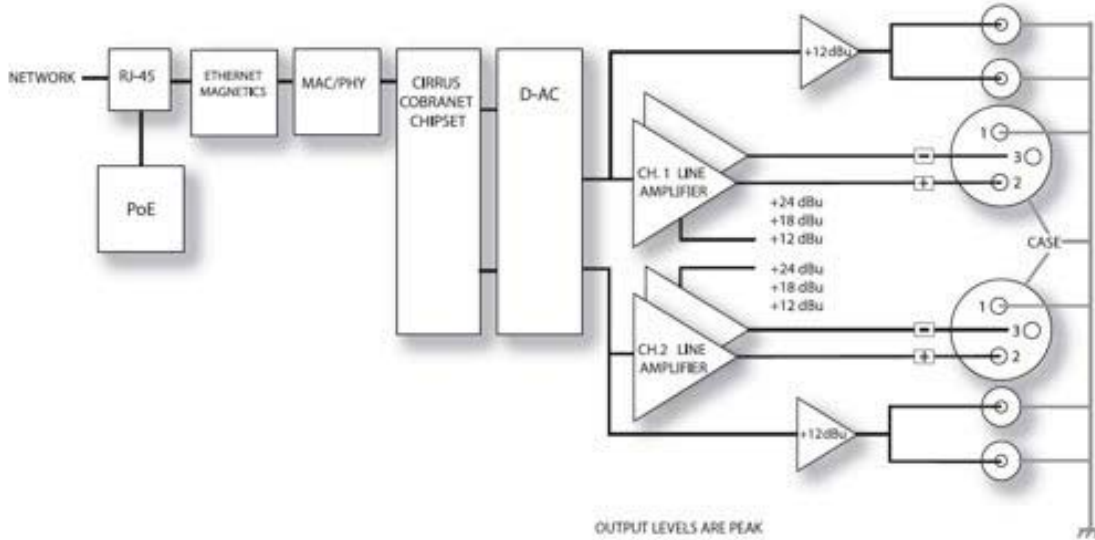
Media Technology Systems recommend using high quality UTP cable such as Belden MediaTwist 1872A or equivalent.

4 Functional Description

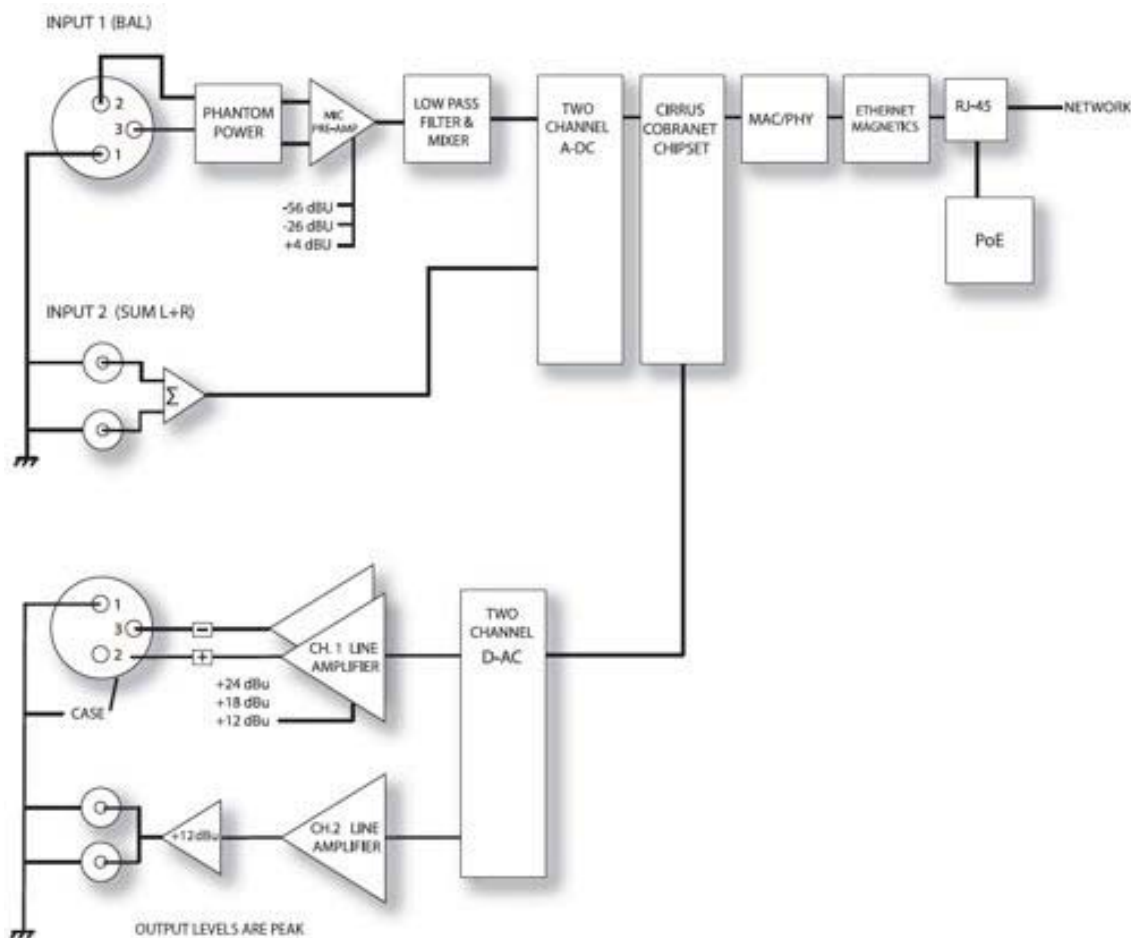
4.1 Signal Path ION 2.0



4.2 Signal Path ION 0.2



4.3 Signal Path ION 1.1



4.4 Analog Section

The MTSI ION series products feature a high quality microphone pre-amplifier input design, where great attention has been placed upon audio quality, noise rejection and dynamic range. The input to your system is the first and critical stage in delivering high quality audio. All too often, otherwise good systems suffer from the “garbage in, garbage out” problem. It does not matter how good your DSP and other processing is if you are not getting the best possible input to the first stage of the system. Understanding the applications for this type of device, it has been designed to have low noise and high headroom. It is always possible that through abuse or mis-setting for the input to be overloaded. MTSI has designed the ION 2.0/ION 1.1 pre-amp using sophisticated circuitry to significantly reduce the catastrophic overload and clip that is often found in digital interfaces. Graceful and progressive overload characteristics dramatically extend the usable headroom of the device.

Note: Although unlikely, it is possible that 3rd party, poorly designed, altered or damaged devices can be connected to your ION interface. It is possible that this connection can carry dangerous A/C voltages that might otherwise damage your installed system. MTSI has designed in a special fused connection on the audio ground that will fail open and prevent damage to devices up stream of the input. The ION

device may fail, or possibly continue to operate but may be more susceptible to noise. Should an ION interface fail or become noisy under these circumstances, replacement is recommended.

4.5 Digital section

4.5.1 ION2.0/ION1.1

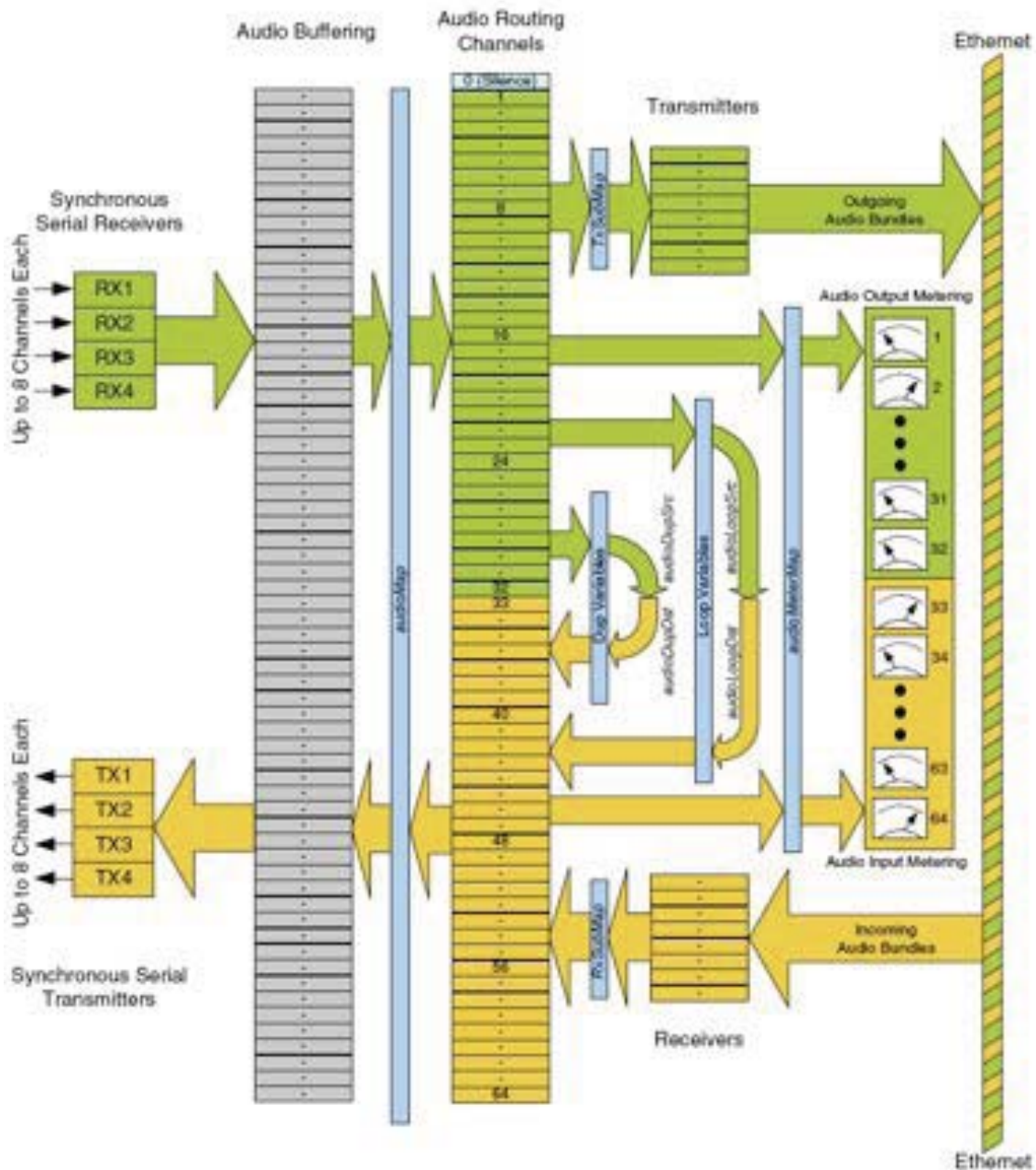


Figure 4-1: Block diagram showing the CobraNet routing of the ION2.0/ION0.2

The ION2.0/ION1.1 is a CobraNet™ interface with 2 analog Mic/line input channels. These are converted into digital audio streams and passed to the CobraNet™ interface

and the Cirrus Logic CS496112 chipset. The CobraNet™ interface provides up to 4 simultaneous bundle transmitters connecting up to 8 simultaneous audio streams on to the network (see Cirrus Logic UM23 and PM25 for full details of the CobraNet™ chipset and protocol).

Each Bundle transmitter can handle 8 audio channels of 20bit word depth. Four Bundle transmitters would therefore imply 32 audio streams. However the chipset is limited to a maximum of 8 simultaneous audio streams. Thus the 8 channels can be spread out over 4 Bundle transmitters, or all loaded into one Bundle transmitter, or any combination in between.

For example, the 2 analog inputs could be sent to 4 different network locations, ie 4 Bundle transmitters, each of 2 audio channels. Or analog input 1 could be sent in Bundle transmitter 1, analog input 2 sent in Bundle transmitter 2 and both analog inputs 1 & 2 sent in Bundle transmitter 3, etc.

See Figure 4-1 for details of the internal block diagram.

4.5.2 ION0.2/ION1.1

The ION0.2/ION1.1 is a CobraNet™ interface with 2 analog Line level output channels. The digital audio streams are sourced from the CobraNet™ interface/CS496112 chipset and converted into analog audio. The CobraNet™ interface provides 8 simultaneous bundle receivers with up to 8 simultaneous audio streams (see Cirrus Logic UM23 and PM25 for full details of the CobraNet™ chipset and protocol).

Each Bundle receiver can handle 8 audio streams of 20bit word depth. Eight Bundle transmitters would therefore imply a potential of 64 audio streams. However the chipset is limited to a maximum of 8 simultaneous incoming audio streams. Thus the 8 streams can be sourced one from each of 8 Bundle receivers, or all 8 streams sourced from one Bundle receiver, or any combination in between.

For example, the 2 analog outputs could be sourced from 2 different network locations, ie 2 Bundle receivers, each of 1 audio channel. Or an 8 channel bundle of BGM audio could be sourced from the network and the desired BGM channel within the 8 from the Bundle receiver could be locally routed to the analog output.

ION2.0, ION1.1 and ION0.2 are powered by IEEE802.3af Power over Ethernet (PoE).

In addition to audio transport, the CobraNet™ port provides control and monitoring capability via SNMP. MTS provides an OEM version of Stardraw control with embedded MTS SNMP drivers for custom GUI rendering. This is downloadable from the MTS website.

The SNMP controls include all the standard CobraNet™ OID's. See Cirrus Logic's UM23 users manual for full details of the chipset and PM25 programmers manual for full details of the SNMP controls...<http://www.CobraNet™.info/en/products>

4.6 Digital Signal processing.

The ION2.0, ION1.1 and ION0.2 all use the CS496112 chipset, which allows for >100MIPS of digital signal processing (DSP). The internal DSP schematic is shown in Figure 4-2

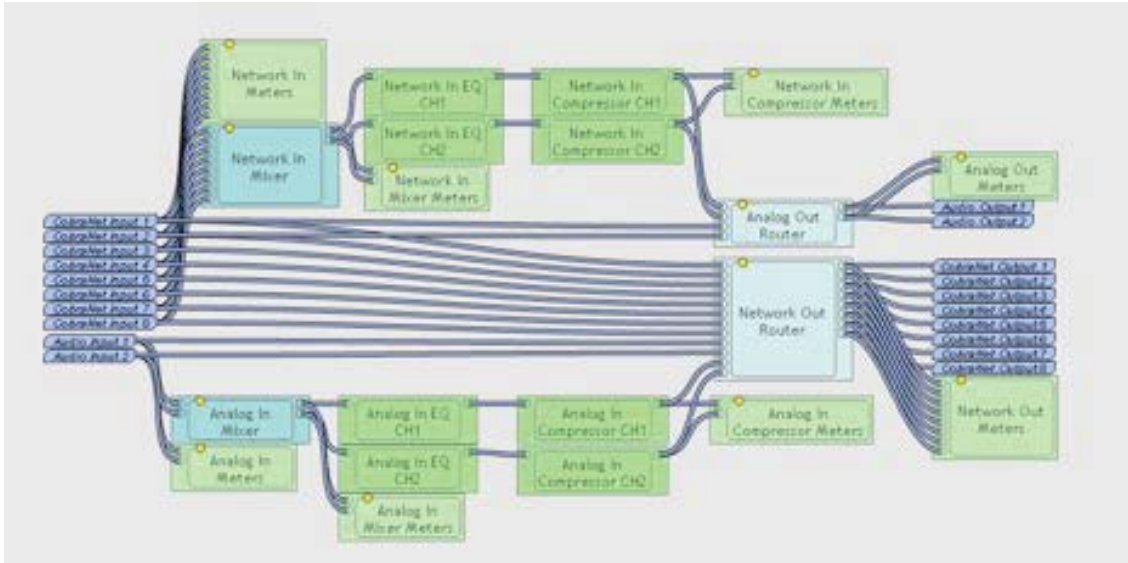


Figure 4-2: Internal DSP schematic of ION2.0 and ION0.2

Although the DSP schematic and thus firmware are common to both ION2.0 and ION0.2, only the input parts of the schematic are available to The ION2.0 and the output parts available to the ION0.2. The ION1.1 has both parts available.

4.6.1 ION2.0/ION1.1 DSP

The section of the schematic available to the ION2.0 & ION1.1 is shown in Figure 4-3, as the colored section. The grayed out section is the ION0.2 and other half of the ION1.1.

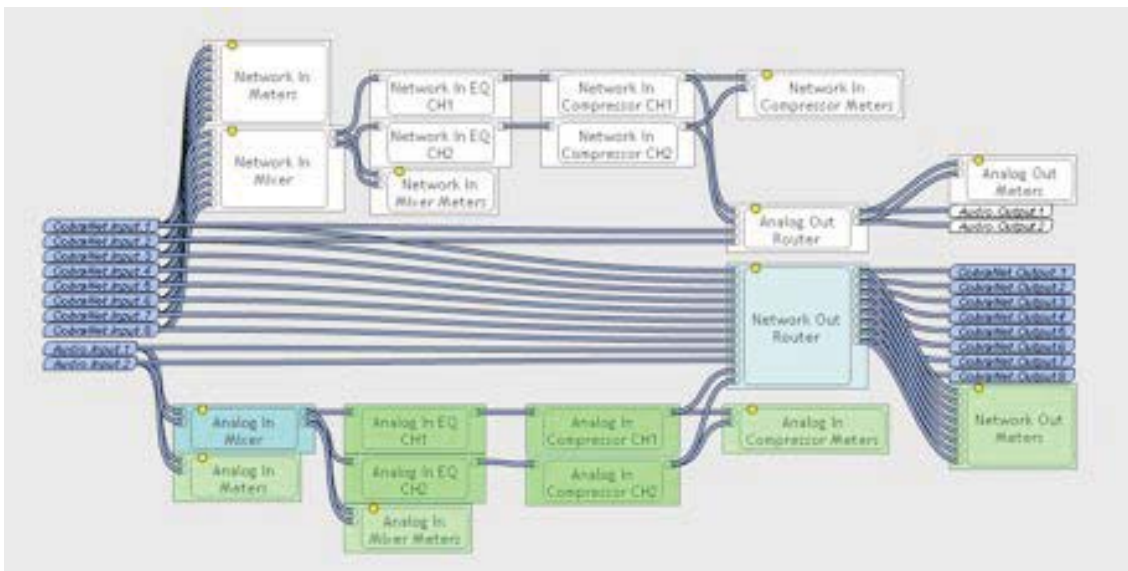


Figure 4-3: ION2.0 DSP

There are 2 analog and 8 Cobranet input channels available to the ION2.0/ION1.1 and these can be connected to any of 8 Cobranet output channels. As well as simple Input/Output routing, there are 2 DSP side chains available for the analog inputs. The side chains connect to the analog inputs via a simple 2x2 input mixer. Each side chain (see Figure 4-4) contains a 5 band parametric equalizer, high pass, low pass and low shelf filters (to compensate for proximity effect on microphones) and finally a compressor.

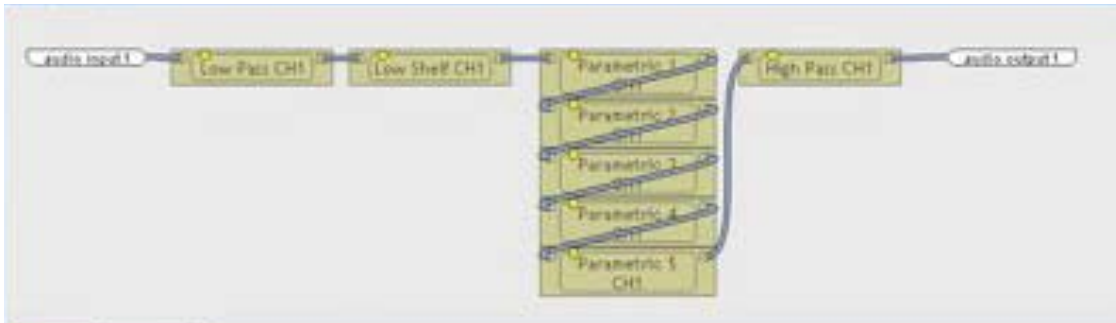


Figure 4-4: ION2.0 EQ side chain

An extremely useful feature of the ION2.0/ION1.1 is the ability to import Cobranet streams from other ION's, combine them with the local analog inputs and transmit an 8 channel Cobranet bundle. Many manufacturers products (eg, QSC BASIS, BSS Soundweb, Symetrix Symnet) are designed to receive only 8 channel bundles. In this situation, one ION2.0 can receive three 2 channel Cobranet bundles from three other ION's and use the internal router to combine the 6 Cobranet channels with the local analog inputs to make one 8 channel Cobranet Bundle.

For simple applications requiring no DSP, the ION2.0/ION1.1 will power up as a default 2 channel analog input Cobranet interface, where the 2 analog channels are routed straight through to the first 2 Cobranet output channels as shown in Figure 4-5. No DSP configuration is needed in this situation.

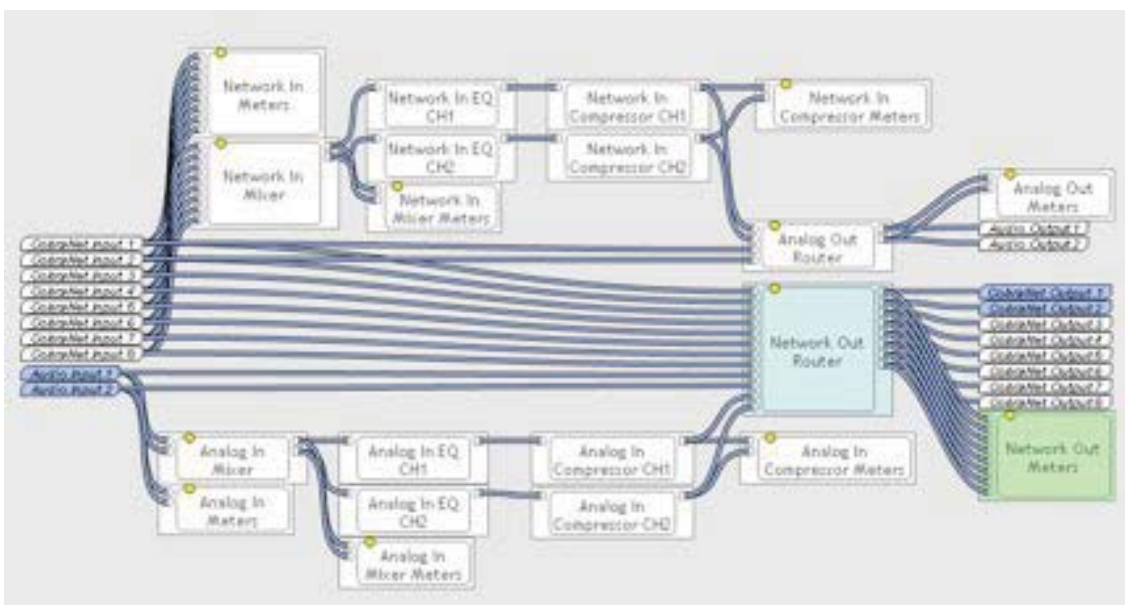


Figure 4-5: ION2.0 as a simple Cobranet Interface (No DSP)

4.6.2 ION0.2/ION1.1 DSP

The section of the schematic available to the ION0.2 & ION1.1 is shown in Figure 4-6, as the colored section. The grayed out section is the ION2.0.

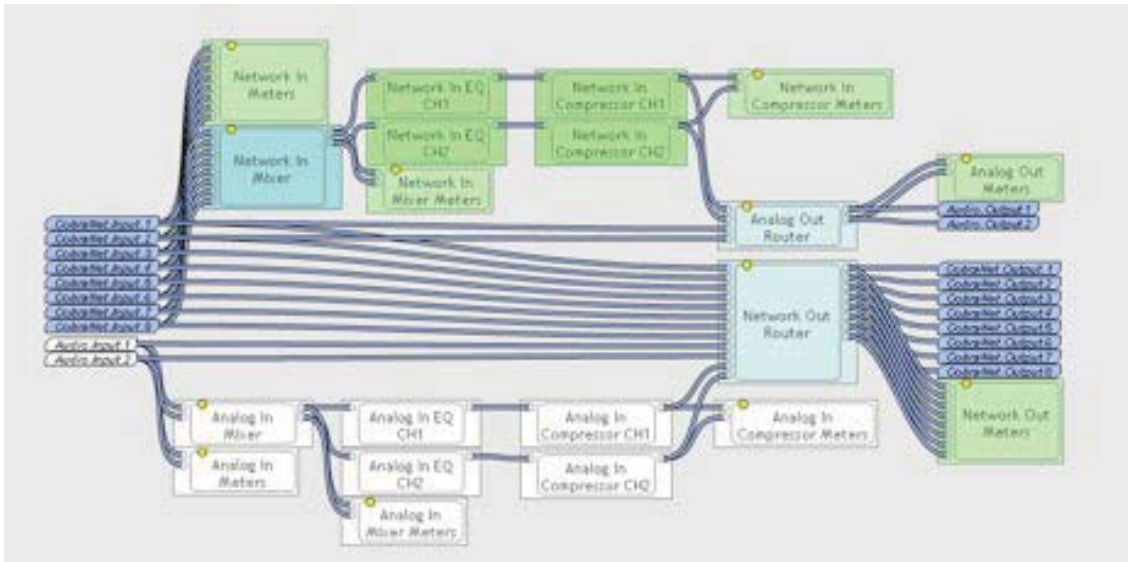


Figure 4-6: ION0.2 DSP

There are 8 Cobranet input channels available to the ION0.2/ION1.1 and these can be connected to any of 8 Cobranet and/or 2 analog output channels. As well as simple Input/Output routing, there are 2 DSP side chains available for the analog outputs. The side chains connect to the analog outputs via a simple 2x2 input mixer. Each side chain (see) contains a 8 band parametric equalizer, high pass and low pass filters and a compressor.

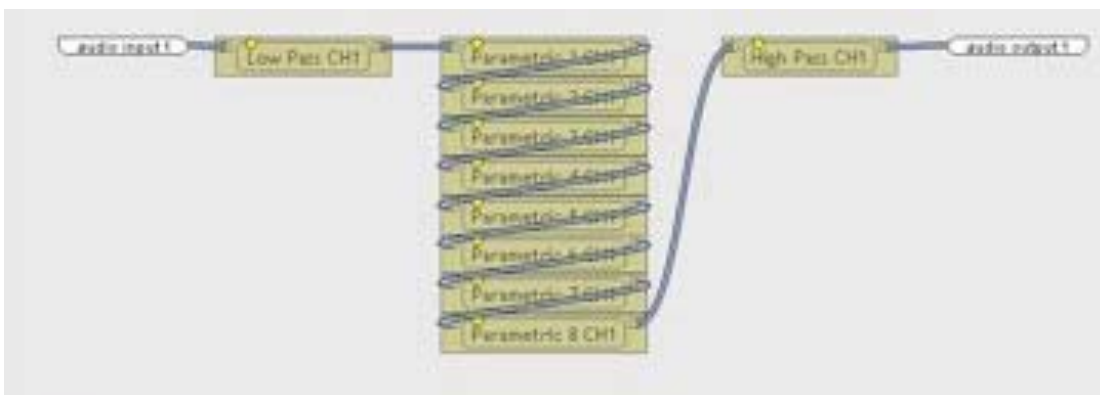


Figure 4-7: ION0.2 EQ side chain

For simple applications requiring no DSP, the ION0.2/ION1.1 will power up as a default 2 channel analog output Cobranet interface, where the first 2 Cobranet input channels are routed straight through to the 2 analog output channels as shown in Figure 4-8. No DSP configuration is needed in this situation.

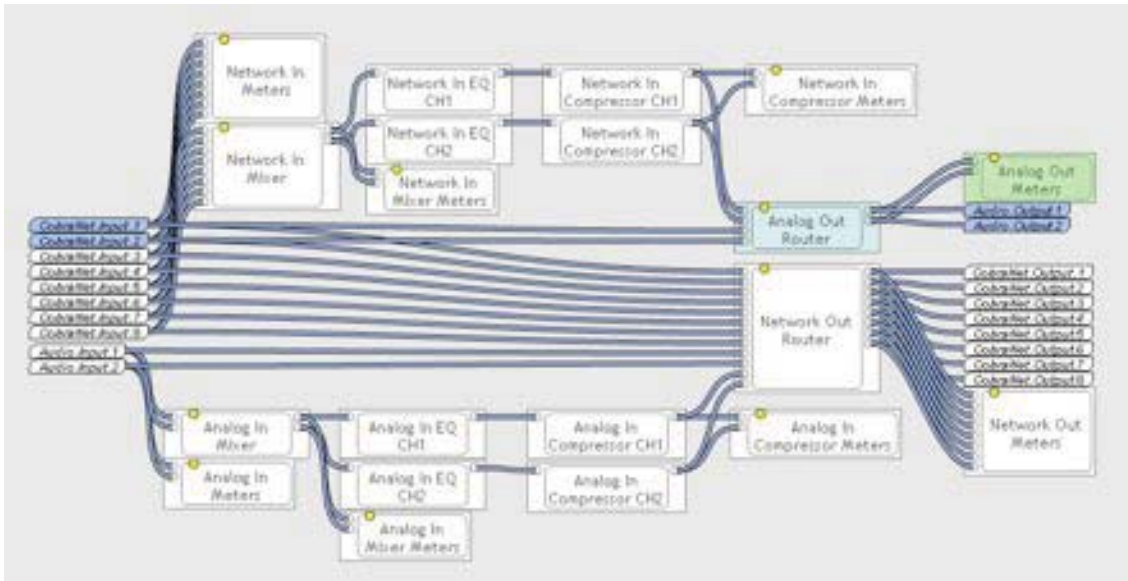


Figure 4-8: ION0.2 as a simple Cobranet Interface (No DSP)

If the ION0.2/ION1.1 is being used with a Cobranet product designed to transmit only 8 channel bundles, then the ION0.2 can be used to ‘breakout’ pairs of Cobranet channels from the bundle. In this situation, each of four ION0.2/ION1.1 will be configured to look at bundle channels 1-2, 3-4, 5-6 and 7-8 respectively.

5 Simple Configuration (No DSP)

In many applications, the ION2.0, ION1.1 and ION0.2 will be used as a simple Cobranet interface, providing local analog inputs or outputs (respectively) and connecting to a central DSP processor. In that situation, the DSP will not be used. This Section covers the use of the ION as a simple Cobranet interface and Section 6 cover the more complex DSP configuration and control

The standard CobraNet™ tools, including CobraNet™ Discovery (CNDISCO) and CobraCAD are available for use with the MTS CobraNet™ enabled IONs. These tools are available as a free download from the Cirrus Logic Website.

The utility CNDISCO is the simplest method of configuring the ION2.0, ION1.1 and ION0.2 interfaces. Simply download from the Cirrus Logic website and run the exe file on the PC or laptop.

5.1 CNDISCO - Setup

To use CNDISCO, the host PC or laptop must be set to the default IP subnet in order to talk to the ION. Figure 5-1 below shows the method of setting up a Windows computer.

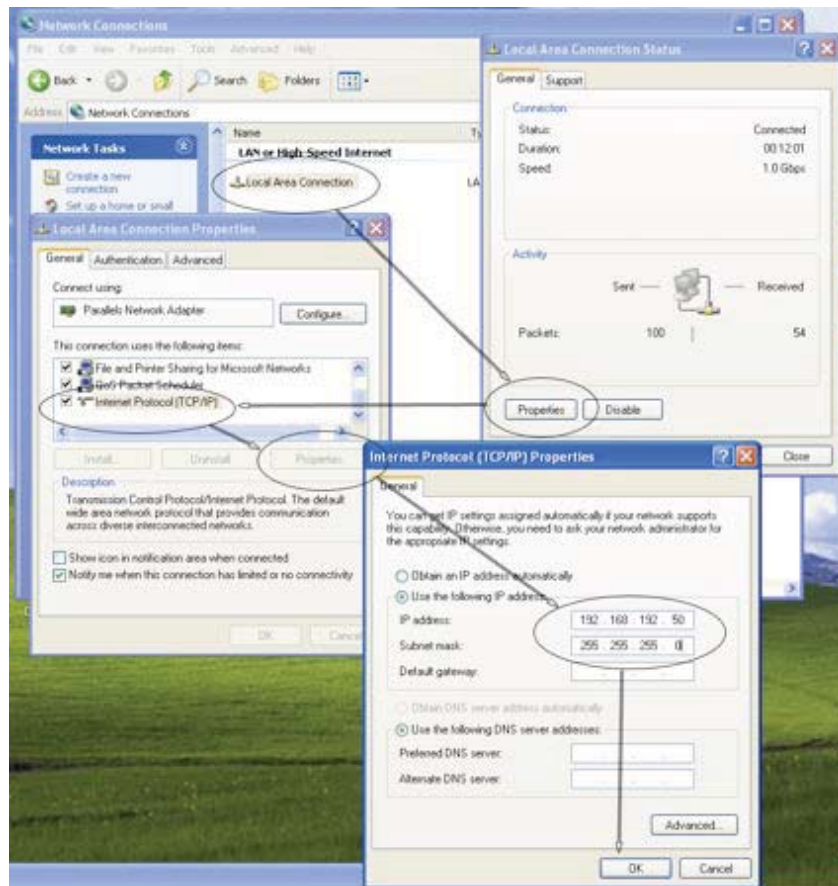


Figure 5-1: Setting up the IP address and subnet mask.

- Go to Control Panel and then open “Network connections”.
- Click on the General tab and open “Properties”.
- Select “Internet Protocol (TCP/IP)” and click on properties.
- Finally, change the selection from “Obtain an IP address automatically” to “Use the following IP address” and set to your desired IP domain, eg:-
 - IP address: 192.168.192.50
 - Subnet mask: 255.255.255.0
- After finishing using the CNDISCO application, return to the Control Panel and reset the selection back to “Obtain an IP address automatically”.

If an intelligent or managed switch/router is in use, then the switch address will need to be set to the same subnet, usually 192.168.1.1 or 192.168.1.254 are the most common default addresses.

5.2 Advanced settings

In order to use CNDISCO effectively, it will be necessary to enable the configuration and advanced features. This will also allows you to put any version of firmware on any hardware-compatible CobraNet™ module. CNDISCO needs to have the particular firmware version of a device in its firmware directory in order to properly identify the device for compatible firmware upgrades. Should the situation arise where you know the device is a specific model but CNDISCO says there are no compatible firmware upgrades, using the advanced feature, you'll be able to update the firmware anyway.

How to enable the advanced feature:

Open cndisco.ini (WinXP) or the config file (WinVista/Win7) the in Notepad

Its usually in a directory like this: C:\Program Files\Peak Audio\CobraNet™ Discovery.

Find the Configuration section. It usually looks something like this:

```
[Configuration]
Adapter Index=[10] [10] Broadcom NetXtreme 57xx Gigabit Controller
Firmware Location=C:\Program Files\Peak Audio\CobraNet™ Discovery\firmware
```

Start a new line after one of the lines in that section and type in Advanced Feature=1.
Add CC_Enable=1 under Advanced Feature=1

It should look something like this when you're done:

```
[Configuration]
Adapter Index=[10] [10] Broadcom NetXtreme 57xx Gigabit Controller
Firmware Location=C:\Program Files\Peak Audio\CobraNet™ Discovery\firmware
Advanced Feature=1
CC_Enable=1
```

For WinVista/Win7, the line is slightly different, ie, change...

```
<add key "Advanced Feature" value="0" />
```

to...

```
<add key "Advanced Feature" value="1" />
```

Save the changed .ini/config file and exit Notepad. The advanced features are now enabled.

Now when you update the firmware you'll see a check box in the "Select Firmware Version" dialog box marked "Show All Firmware Versions". Check the box and you'll be able to choose from all the firmware versions stored in the firmware directory.

5.3 Configuration

The CNDISCO manual (found in the C:\Program Files\Cirrus Logic\CobraNet™ Discovery folder) will explain in detail most of the configuration processes, so these have not been repeated here. However, there are some useful features of the CobraNet™ protocol that are not covered explicitly, ie...

One of the key features of the ION product is the ability to set up to 4 CobraNet™ audio transmitters (ION2.0/ION1.1) and 8 CobraNet™ receivers (ION0.2/ION1.1). In addition, MTS has provided the ability to set each bundle subchannel configuration.

The settings are:-

- Transmitter setup: This section covers the CobraNet™ transmitters (see Figure 5-2). The CS496112 chipset allows for up to 4 transmitters, each of up to 8 channels, subject to an overall channel count of 2 analog input channels and 8 network audio streaming channels. The settings are:-
 - Bundle number: This sets the bundle address of each transmitter. The bundle numbers are 0 (off, ie no transmission), 1-255 are multicast, 256-65279 are unicast and 65280-65535 are private.
 - Unicast mode: If the transmitter bundle address is normally unicast (>255), but more than one receiver is available for that bundle address, then the bundle can be transmitted either multicast or multi-unicast.
 - Max Unicast: Depending on unicast mode, the maximum number of multi-unicast bundles can be set between 1 and 4.
 - Transmitter1...Transmitter4: This lists the four transmitters associated with the bundle address and allows the user to set the audio subchannels associated with that bundle. The subchannel mapping allows the user to decide which of the 8 audio channels are mapped to each bundle and in which order they are transmitted.
 - Subformat Resolution: This sets the word length of the transmitted audio to 16, 20, or 24 bit. Note: if the word depth is set to 24bit, then only 7 audio channels can fit in one bundle.

- UnicastMode: This value can be used to override or modify the normal unicast vs. multicast implications of the assigned bundle number. The normal default value is 'Never Multicast'. The available options are:
 - Always Multicast – All bundles are sent multicast regardless of Bundle number.
 - Multicast over 1 – If more than one receiver is set to receive this bundle, it will be multicast, else it will be Unicast
 - Multicast over 2 – If more than two receivers are set to receive this bundle, then it will be multicast, else it will be unicast or multi-unicast
 - Multicast over 3 – If more than three receivers are set to receive this bundle, then it will be multicast, else it will be unicast or multi-unicast
 - Multicast over 4 – If more than four receivers are set to receive this bundle, then it will be multicast, else it will be unicast or multi-unicast
 - Never Multicast – Only a single bundle will be sent unicast

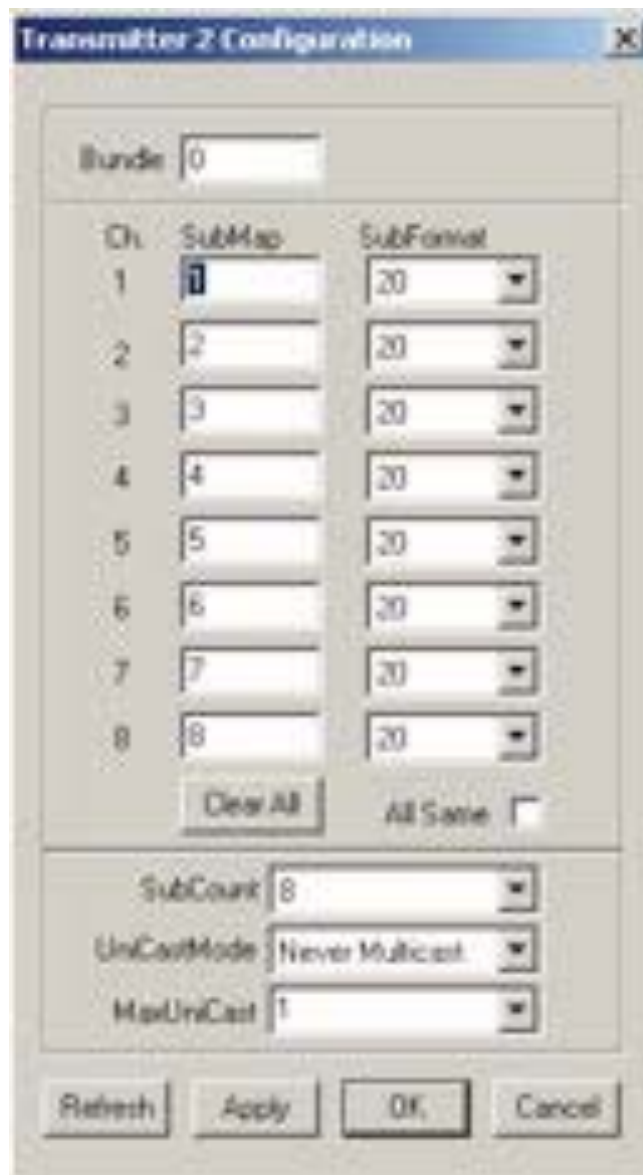


Figure 5-2: CobraNet™ Transmitter settings page

- Receiver setup: This section covers the CobraNet™ receivers (see Figure 5-3). The CS496112 chipset allows for up to 8 receivers, each of up to 8 channels, subject to an overall channel count of 2 analog output channels and 8 network audio streaming channels.. The settings are:-
 - Bundle number: Same process and limitations as described in the transmitter section
 - Receiver active: This LED only lights if there is a valid transmitter sending audio on that bundle address and channel.
 - RX1...RX8: Same process and limitations as described in the transmitter section



Figure 5-3: CobraNet™ Receiver settings page

- Main Interface settings: This section covers the more advanced variables not usually associated with bundle management and which apply to the CobraNet™ device globally (see Figure 5-4). These are explained in detail in the CNDISCO manual, but 2 are of particular importance to the ION series interfaces, ie...
 - Persistence: The ION2.0, ION1.1 and ION0.2 is a very simple interface product and does not have a preset memory, so “persistence” is used to store the last settings in case of power down. However, note that all CobraNet™ settings need up to 1 minute to establish persistence, as they are stored in the CobraNet™ flash. If the ION power is cycled before the settings are stored to flash, then the settings will be lost. If the persistence tick box is off, then no settings will be saved.

- Mode Rate Control: The options are 1.33mS, 2.66mS or 5.33mS latency. Note: there are significant trade-offs if changes are made to the 5.33mS default settings (see PM25), particularly in terms of the number of switch hops that can be used. If the ION interface is being used with a simple local network with a single Ethernet switch, then 1.33mS can be safely used. If more than 1 switch, then use 2.67mS. If more than 3 switches, then use 5.33mS.
- The “Location” is a useful way of uniquely naming the ION interface. Up to 60 characters, eg “Ballroom 3: Stage left, Mics 7/8”. For more detailed naming information in a large project, both the “Location” and “Contact” fields can be used.

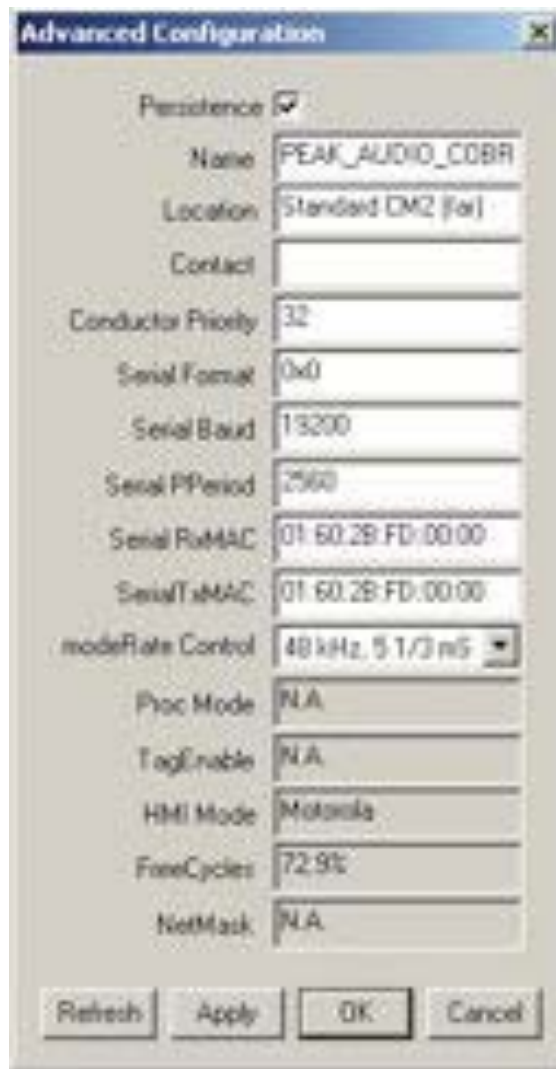


Figure 5-4: Global Interface settings

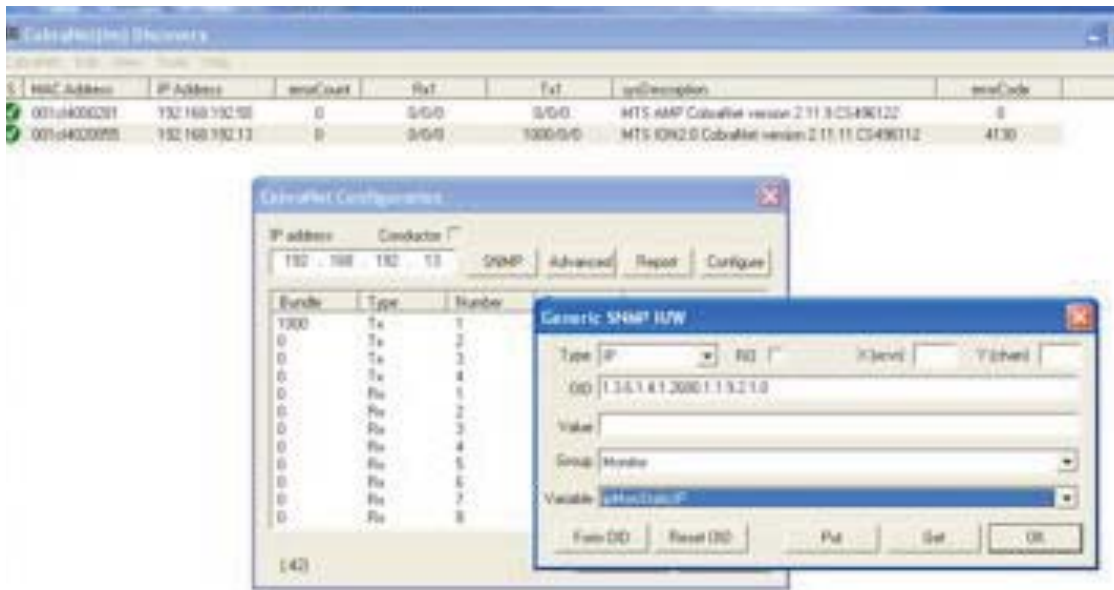
5.4 Presets

The ION2.0, ION1.1 and ION0.2 are simple devices and do not contain a host processor and no access to multiple preset functionality. However, the Cobranet flash can be used

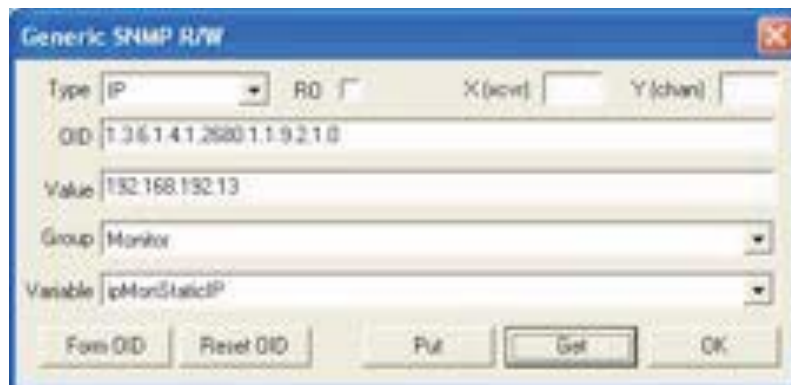
to save settings via “persistence” (see previous section and Figure 5-4). If the persistence option is enabled, then the last set of values/settings can be stored into the Cobranet flash and will be restored on power up. Note that these settings can take up to 1 minute to save, as they are stored in between other processes.

5.5 Setting a static IP address

First set persistence on (See Advanced in Section 5.3). Then double click on the device in the main CNDISCO window to open the configuration menu (see below). In the configuration menu select the “SNMP” button. An SNMP window will open and select the “Monitor” Group and the “ipMonStaticIP” variable.



In the value section, type the desired IP address in AAA.BBB.CCC.DDD format and then press “PUT”. Confirm the setting by pressing “GET” See below for an example.



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