MEDIATECHNOLOGY**SYSTEMS** INC.

MANUAL

ION4.4 & ION8.8
CobraNet™ Interfaces

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 ACCCEPT AND OPERATE WITH ANY INTERFERENCE RECEIVED. THIS INCLUDES INTERFERENCE THAT MIGHT CAUSE UNDESIRED OPERATION.

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

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 DESIGEND 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.

MEDIATECHNOLOGYSYSTEMS INC

DECLARATION OF CONFORMITY

The manufacturer of the Products covered by this Declaration is:
Media Technology Systems Incorporated of 766 Lakefield Road, Unit F, Westlake Village, CA 91361-2050 U.S.A.

The Directives covered by this Declaration:
2006/95/EC
2004/108/EC
2002/96/EC
2002/95/EC

The Product(s) covered by this Declaration:

ION Series Interfaces: ION 4.4, ION 8.8

The Basis upon which conformity is being Declared:
The manufacturer hereby declares under its sole responsibility that the products indentified above comply with the safety objectives of the EU's Low Volage Equipment directive, 2006/95/EC, and Electromagnetic Compatibility (EMC) directive 2004/108/EC, and that the following standards have been applied:
EN60065, EN55103-2

The CE mark was first applied in 2009.

Signed: Stephen J. Woolley

Authority: President MTSI

Date: August 25th, 2009

IMPORTANT NOTE:

*The attention of the Specifier, Purchaser, Installer, or user is drawn to special measures and limitations to use which must be observed when these products are placed in service, to maintain compliance with the above and other relevant directives. It is the responsibility of these entities to assure the **system** is in compliance regardless of the individual component's approvals and certification.*

766 LAKEFIELD ROAD - UNIT F, WESTLAKE VILLAGE, CA 91361-2050 U.S.A.

Explanation of Symbols

TO PREVENT ELECTRIC SHOCK DO NOT REMOVE COVER.
NO USER SERVICABLE PARTS INSIDE. REFER TO QUALIFIED
AND CERTIFIED SERVICE PERSONNEL. SMPS/PFC CARRY
POTENTIALLY LETHAL VOLTAGES.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

The exclamation mark in a triangle is intended to alert the use to 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 with the product's chassis that may be sufficient to create a risk of electric shock to humans.

Table of Contents

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.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, 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 How to use this manual.

This manual provides you with valuable information for safely and correctly installing, setting up and operating your ION device. 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 sound 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.

1.3 Terminology: Functions, Names & Acronyms.

Attenuation/Attenuator: An attenuator is used to reduce the level of an incoming signal. Many think the "volume" control on typical audio equipment makes the power of the amplifier greater. In fact amplifiers are typically pre-set with a specific amount of gain. The input attenuator or volume control is used to vary the amount of signal that is allowed through to the amplifier's gain section.

BGM - Back Ground Music: Typically low-level ambient music such as one would find in an elevator or super-market.

CMRR: Common Mode Rejection Ratio, is the ability for an input circuit to reject noise interference and other artifacts induced on the input signal lines. A balanced line, or differential input has two, opposite and equal, plus and minus, input connections and a centre ground reference. The cable has two conductors and a shield or ground connection. At the transmit/send/source end of the cable the audio signal is split and one side is inverted in phase. Over a run of cable any hum, buzz or other electromagnetic inference, not effectively shielded b y the cable is picked up and theoretically induced equally on both the plus and minus conductors. Thus we have the intended signal running out-of-phase and any induced noise running in-phase across the two conductors. These opposite and equal signals are brought into a differential amplifier where the phase of one of the signal that was in inverted is put back into phase and the two signals added together. The signals since they are complementary add together. The noise which was in phase is inverted added together but now out of phase and thus cancelled. The instrumental Instrumentation input is of the highest quality where the circuits and values of the components are closely matched. The more closely matched the two sides of the input are the greater the ability of the circuit to reject and common mode signals.

CobraNet™®: CobraNet™ is a proprietary digital audio networking protocol designed for high quality, low latency digital audio transmission.

http://www.CobraNet™.info/en/

Euroblock: The 'Phoenix/Euroblock' -type connector is a pair of high current, latching, output connectors used for speaker and 70/100V Line loads. Rated at 300V/15A these connectors are reliable, of high quality, and simple to install and re-configure.

LAN -Local Area Network: A digital network normally using CAT-5/RJ-45 or WiFi connectivity for routing data, and digital audio and video signals

Latency: Effectively the time delay between a signal being sent and received through a system, typically caused by signal processing and network transmission time. Low latency is considered in the 2ms to 12ms range. Above the 12ms latency the delay between an original signal and the reproduced signal becomes perceptible and detracts from the intelligibility of the communication. Note: In paging applications latency is not an issue since there is rarely "open-microphone" use as in entertainment or other "Live" uses.

Peak: The LED when illuminated indicates a high level signal is present at the device's input. Caution should be exercised since signals at this level are close to, or are clipping the amplifier.   Occasional peaks are acceptable and let the operator know the system noise and headroom are optimal. Constant peak indication should prompt a review of the system and its use demands. All MTSI products are designed to have graceful overload characteristics which progressively, rather than catastrophically clip, thus significantly improving the real-world quality and usability of the overall system.

Phoenix/Euro Type Connector: Phoenix-type 3 circuit connectors are used for audio signal input to the amplifier channels. Input impedance is 20k Ω balanced, 10kΩ unbalanced.

Power: The Power LED when lit, indicates power is applied to the unit.

RS-485: An IEEE standard protocol for signal distribution.

http://en.wikipedia.org/wiki/RS-485

Signal Present: The LED illuminates with the presence of a low level signal at the amplifier's input. This is a useful feature for visually confirming signal flow to this point in a sound system.   As discussed under "**Peak**" the quality of a system's ability to "communicate" the program material being transmitted is primarily established at the input to that system. The signal to noise and headroom (isolation from potential clip) of a system is established by the optimum setting of the input gain controls. Having good information when setting the input gain is therefore critical. Being able to observe the **Signal Present** and **Peak** levels gives the operator this critical ability.

SMPS: Switch Mode Power Supply, is a type of power supply topology, which takes the incoming potential energy from the A/C power line and "chops" it into very short pulses. SMPS supplies give very stable and highly regulated output regardless, generally, of variations in the A/C input.

Termination-1: Commonly use term for connecting input and output cables.

Termination-2: In the networked and control & monitoring amplifiers, the RS485 connector is provided with a "termination" selector switch to apply a 150Ω resistive load to the I/O. This is often used to "load" the TX/RX driver. Check the requirements of the interfacing device and select the appropriate setting.

2 Specifications

Intermodulation Distortion:	<1%
Total Harmonic Distortion:	<1% THD
Small Signal Frequency Response:	20-20kHz ±3dB
Hum & Noise: Typically	>70dB below rated output
Input Sensitivity:	-56dBu @ max gain for +4dBu output
Voltage Gain:	-60dB to 0dB
Input Impedance:	6K Ohms
Output Impedance:	150 Ohms, 600 Ohm min load.
Max Input voltage level:	+22dBu
Max Output Voltage Level:	+22dBu
Input Level Control: Rotary gain control	60dB gain range.
Phantom Power:	+24VDC, switch selectable per channel
Input: Signal Present - Peak Indicators	Bicolor LED, Green, signal present, RED, 6dB before clip
Output: Signal Present - Peak Indicators	Bicolor LED, Green, signal present, RED, 6dB before clip
Input / Output connections:	EUR 3.5mm type
Power Indicator:	RED Led power ON
Power Requirements:	24VDC @ 1.5A max
Wall Wart DC Power supply:	100 - 240VAC 50/60Hz output 24VDC @ 1.5Amps
Dimensions: ION 4.4	
Dimensions: ION 8.8	
Weight: ION 4.4	
Weight: ION 8.8	

3 Functional Description

3.1 Signal Path

Media Technology Systems Inc. ION 4.4 & 8.8 Block Diagram   Rev: 1.0
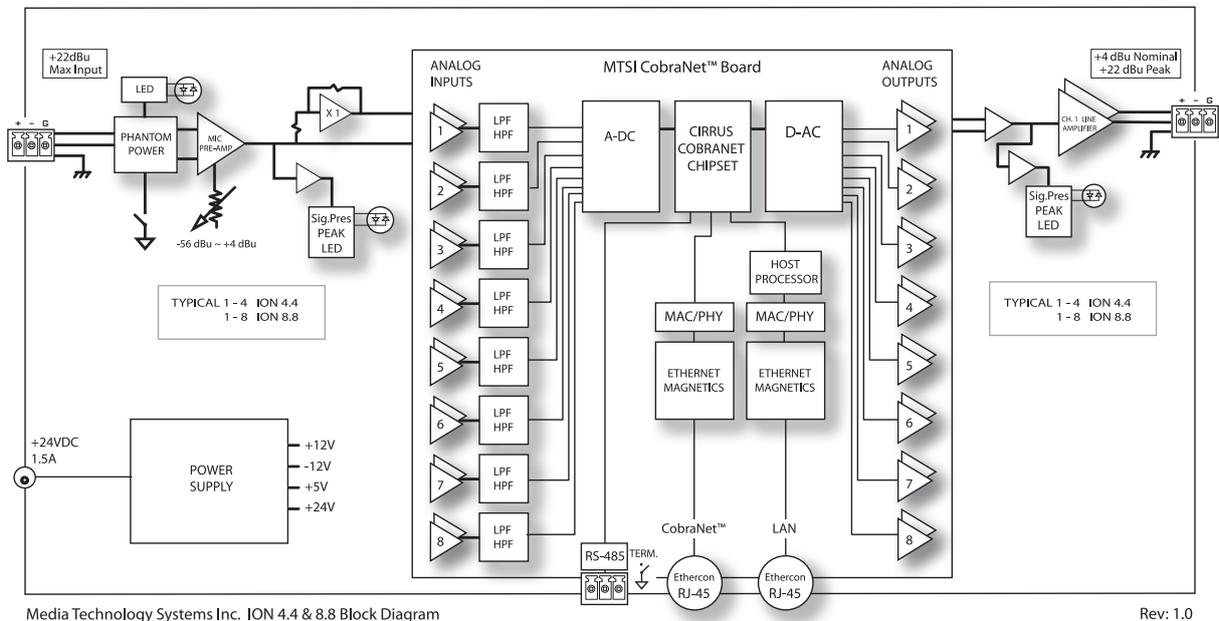
3.2 Analog Section

Each analog input circuit employs a fully balanced true differential topology designed to maximize CMRR across all possible input connection methods, where the input and output connectivity has been designed to meet AES48 standards for immunity to hum, buzz and SCIN.

Each input stage has a 10kohm input impedance and can accommodate signals of up to +24dBu peak, where the input channel gain is adjustable from 0dB to +60dB, ie –from 56dBu (nominal)/+36dbu (peak) to +4dBu (nominal)+24dbu (peak) via a front panel mounted rotary potentiometer. Each input channel has an individual front panel mounted switch that form phantom power (+24volts DC).

Both input and output channels have front panel mounted signal (-20dB threshold) and peak (-3dB threshold) LED's.

Each output channel is 600ohm impedance and drives signals of up to +24dBu peak.

3.3 Digital section

The ION 4.4 (ION8.8) is a CobraNet™ interface with 4 (8) analog Mic/line input channels and 4 (8) line level output channels. Any of the 4 (8) analog and 16 CobraNet™ inputs

can be routed to any of the 4 (8) analog and 16 CobraNet™ outputs. See Figure 3-1 for details of the internal block diagram.
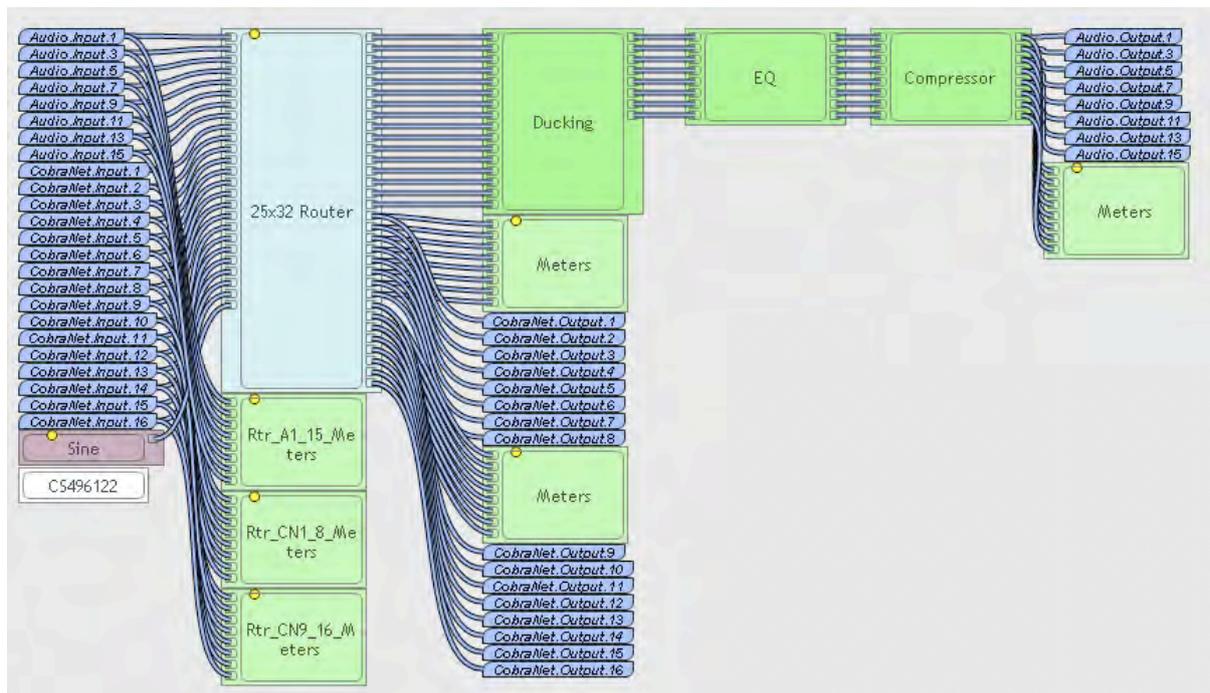
Figure 3-1: Block diagram showing the internal routing of the ION4.4/ION8.8

Both ION4.4 and ION8.8 have simple front panel adjustable phantom power and gain on the mic/line inputs.

The rear panel serial (RS485) port is primarily intended for Serial Bridging in Cirrus firmware 2.11.10 and earlier (Contact Cirrus logic for more information).

There are 2 network ports on the rear panel and these function as follows (Note: the second network port is an Ethernet control port and NOT a redundant CobraNet™ port)…

- CobraNet™ Port: The CobraNet™ port uses the Cirrus Logic CS181xxx/CS496xxx chipset (similar to the commonly used CM2 card). This allows for up to 16 audio input channels from the network, up to 16 audio output channels to the network, 8 local analog mic/line input channels and 8 local analog line level output channels from the network.

  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 and the Cirrus DSP extensions.

  See Cirrus Logic's UM23 users manual for full details of the chipset and PM25 programmers manual for full details of the SNMP controls…

- Ethernet port: The Ethernet port provides control & monitoring capability of all DSP and CobraNet™ parameters using a simple TELNET based protocol.

  In smaller systems, it is likely that the CobraNet™ port will be used for both audio transport and control & monitoring. For larger systems, where the audio transport is on a separate VLAN (to control bandwidth), the TELNET port will provide access to separate control & monitoring port that can be added to the general AV/BMS system.

  Note: The control & monitoring is either/or, ie TELNET or SNMP, but not both simultaneously.

- Additional RS485 Port: The additional RS485 port provides a serial connection, so that 3rd party serial data can be bridged on to the CobraNet™ network for communications between CobraNet™ nodes.

- DSP: The DSP is based on the CS496122 chipset and provides >100MIPS of processing power.

3.4 Power Supply

The ION 4.4 and 8.8 interface products use an internationally approved "world voltage", external power supply unit, model number:

This supply takes 100-240VAC 50/60Hz and provides 24VDC at 1.5 Amps to the internal supply board. Regulation and supply rails are generated internally by a Switch Mode Power Supply (SMPS) board that derives plus 12 and minus 12 Volt, 5 Volt and 24Volt rails for the various circuit elements, such as the MTSI CobraNet™™ board, that make up the ION 4.4/8.8.

3.5 Installing the Interface

What is Included: Each MTSI ION is shipped with the following:

- An A/C power cable, IEC type with appropriate mains plug for the region in which it is sold.
- Phoenix/Euro-type input connectors, as required per channel.
- Phoenix/Euroblock-type speaker load output connectors, as required per module.
- Rack mount 'ears' and connecting plate
- Basic Owner's/Operator's Manual and other documentation.
  For full documentation on ION software, control and other protocols, please refer to www.mediatechnologysystems.com website for downloads and additional valuable information. Or contact your official distributor.

Rack Mounting of ION4.4: The MTS ION4.4 is provided with rack mount accessories for either a single ION4.4 with a blank side plate, or as a pair of ION4.4's in a 1U package. The rack ears are screwed to the side of the ION4.4 for single interface. For two x ION4.4 in 1U, then only the small rack ears are used from each interface (the large rack ears are discarded) and the connecting plate (with the MTS logo) is used to link the front panel of each ION4.4. See Figure 3-2 below.
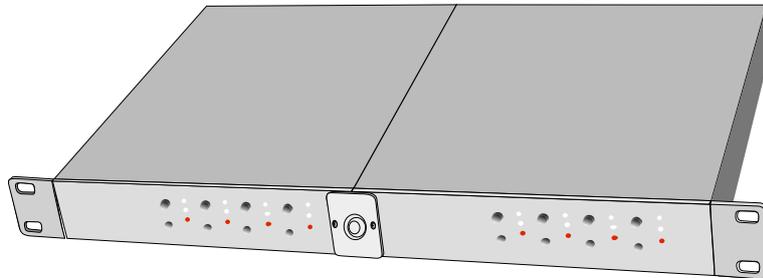
Figure 3-2: ION4.4 joined in the center to make a iU chassis

Wall-Floor-Ceiling Mounting of ION4.4 The MTS ION4.4 can be mounted inside a ceiling cavity space, to a wall, inside a riser or under a table using the variety of mounting holes and hardware combinations. Although Figure 3-3 (below) shows the cable management conduit/trunking located away from the rear panel of the ION4.4 (for ease of understanding the mounting), it would be expected that the cable management would be directly adjacent to the ION4.4 to protect cables and connectors.
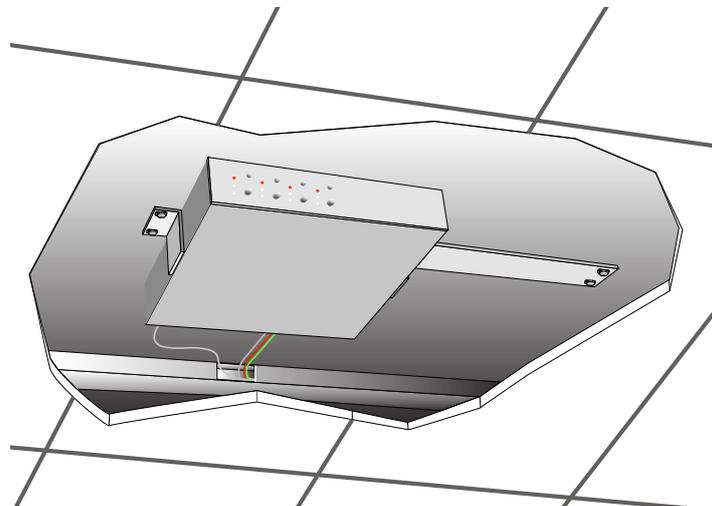
Figure 3-3: Ceiling mounting of the ION4.4

For other applications the "rack ears" provided can be oriented to allow your ION 4.4 to be fixed to a wall, cabinet wall, under desk or variety of other applications. Figure 3-4 below shows a typical vertical mounting of the ION4.4 in a riser or cabinet.
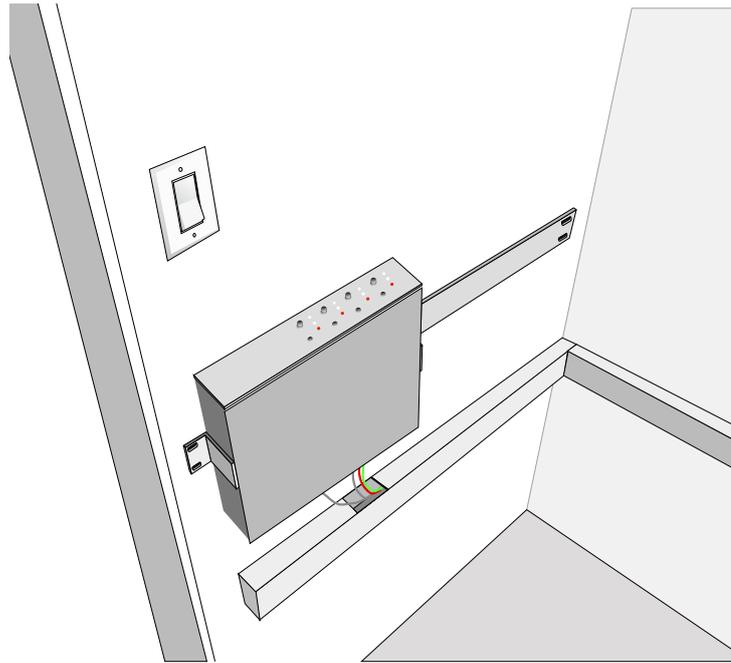
Figure 3-4: Vertical mounting in riser or cabinet

Rack Mounting of ION8.8: The MTS ION 8.8 is built to industry standard 19"/48.25cm, rack mount dimensions, and is 1U – 1.75"/4.45cm in front panel height.

Use four screws of appropriate thread pitch and size to your rack. The ION is designed as a single rack height unit using heavy gauge metals for strength. As a matter of form with any low profile rack mounted product it is advisable to consider supporting the rear to avoid stress on cables and adjacent products. Most rack systems have available hardware to provide this support where needed. In fixed installations rear support is recommended. In any portable or mobile system, it is mandatory.

Air Flow and Cooling Requirements:
The ION family of products, generally do not require special consideration for air-flow or spacing from other products. However caution should be exercised when mounting in proximity to any heat generating device, such as an amplifier. Heat is the enemy of all electronics, reducing the product life and reliability.

The MTS ION4.4 is designed to operate in temperatures from 0 to +50degrees Centrigrade. The ION8.8 is designed to operate in temperatures from +10 to +40degrees Centrigrade

A/C Mains Power Connection: MTSI IONs are designed to operate on all standard A/C Power voltage and frequencies found Worldwide. There is no requirement to set Voltage or Frequency selectors etc.

Power Cable: Use only the power supply and cable supplied with the ION.

Incoming Power Requirements: Make sure that the power circuit, cables, sockets, breakers etc., feeding your ION are rated to support the power indicated on the rear panel of your ION (in Watts). Care should be taken to assure that the power

distribution arrangements are sufficient for the nominal A/C Voltage and the resultant current being sourced by your ION.

3.6 Setup

Unpacking your ION: 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.

What comes with your ION: A full set of input and output "line" connectors are fitted as standard to your new MTSI ION. A power supply and cables are supplied that are appropriate to the territory within which the ION is supplied.

Level Controls: Initial setting for these should be to the full counter-clockwise position, or minimum. This is an advisable set up convention, which avoids accidental high-level signals potentially damaging the loudspeaker. With an appropriate signal applied to the input, gradually bring up the signal level through the ION and confirm proper system operation. See **Signal Present** and **PEAK** sections.

RS485 ground and termination selector: See relevant section.

3.7 Input Wire and Connectors:

Each channel input uses a Euro/Phoenix type input connector set. The line connectors are supplied with your ION. It is recommended that balanced connections are used for all inputs in professional applications, since significantly less hum, buzz or other noise are induced on the signal, particularly in long cable runs such as are found in installations.

Cable/Line Connections: For balanced input connect as Figure 3-5 below. For an unbalanced source, use balanced cable and only connect the shield at the ION4.4/8.8. The source should be connected to the + and – of the cable only (not the shield).
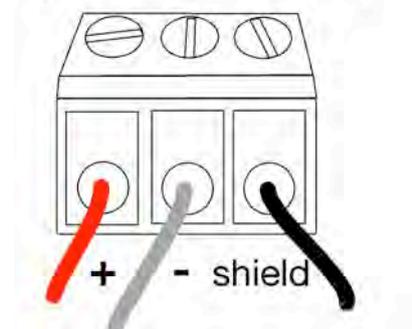
Figure 3-5: Euroblock connector pinout

Note: The Phoenix/Euro type connectors on the left side of the I/O area show the Channel Number, the plus, minus and GND or shield. In the interests of reducing

ground anomalies in large systems where signals may be routed from remote sources with the opportunity for ground anomalies, it is common practice to 'lift' the shield on one end (only) of the cable to minimize ground loops. Under any and all circumstances, for safety, check and make sure that proper A/C and systems grounding is practiced. Your MTSI ION is designed in keeping with correct safety grounding approved under international accepted standards. It is also designed with an understanding of the 'Real-World' circumstances of systems installation. The instrumentation differential input, the signal grounding practice and other build aspects are designed to provide the minimum opportunity for A/C and signal borne noise and interference to contaminate your program material and system functionality.

3.8 Ground Pin

Both the ION4.4 and ION8.8 have a rear panel mounted ground pin (bottom right of the rear chassis panel – see Figure 3-6 below. The 24volt external power supply is ungrounded and the rear panel ground pin has been provided as a means of connecting the interface to a good ground. This may be necessary if the ION interface (particularly the ION4.4) is located outside a rack and a ground reference is needed to minimize noise.

Figure 3-6: Rear chassis panel showing ground pin

3.9 Network connections

The MTS ION uses the Neutrik Ethercon socket to provide a more secure, robust connection. Please download the Ethercon assembly manual from the Neutrik website…

http://www.neutrik.com/client/neutrik/media/downloads/Media_240701762.pdf

NOTE: Be careful to remove the RJ45 tab if you are adding the Ethercon shell to the RJ45 connector, otherwise you will not be able to remove the assembly from the Ethercon socket.

4 Control Ports

4.1 CobraNet™

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.

4.2 Ethernet

There is a simple test GUI available for setting up the CobraNet™ port parameters, the ION parameters and controlling the internal DSP. This can be downloaded from the MTS website.

To use the GUI, the host PC or laptop must be set to the default IP subnet in order to talk to the ION. Figure 4-1 below shows the method of setting up a Windows computer.
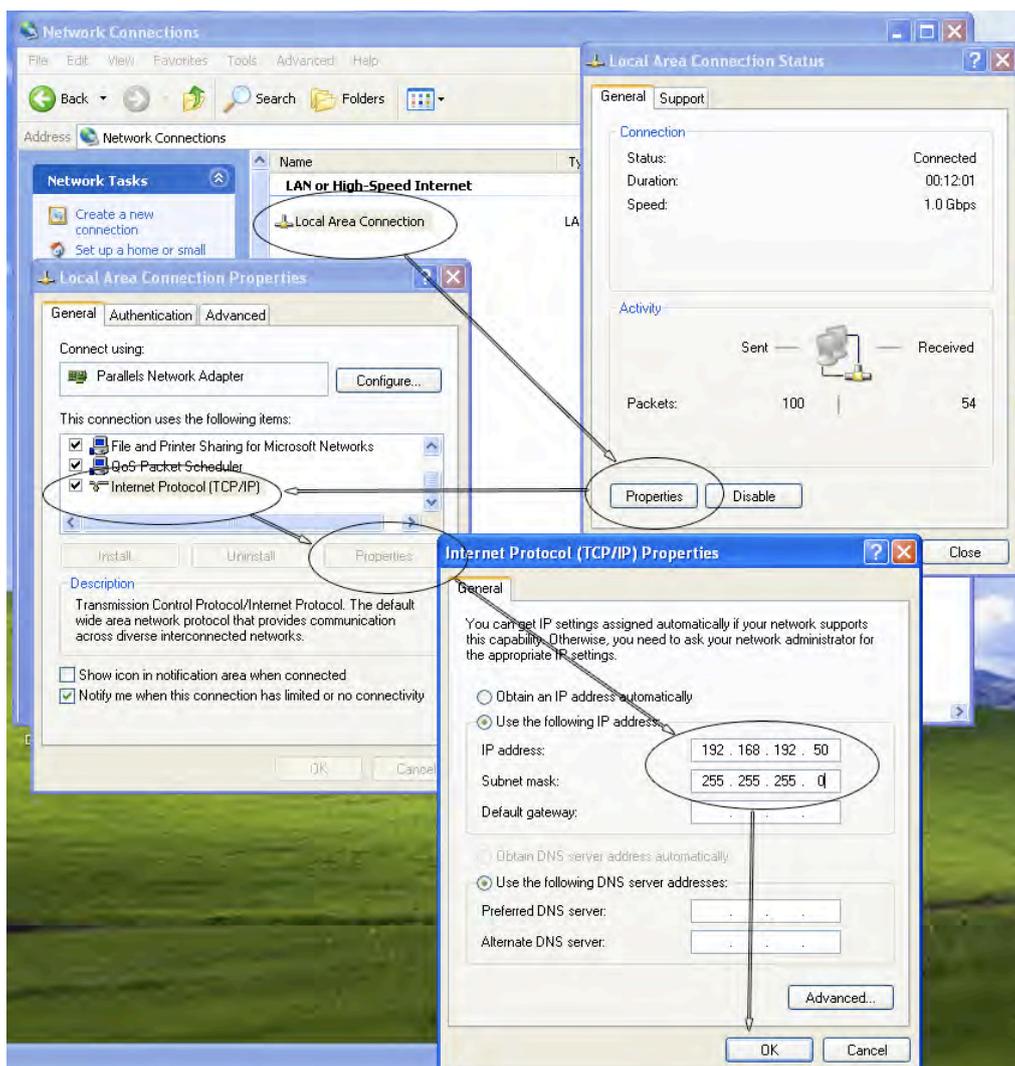
Figure 4-1: Setting up the IP address and subnet mask.

- Set the ION Ethernet port to 192.168.192.100 (say). This is done via the VFD – see section below.
- 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 as follows:-
  - IP address: 192.168.192.50
  - Subnet mask: 255.255.255.0
    It can be any IP address in the range 192.168.192.2 to 192.168.192.99. Once the IP address and subnet mask has been set then open the GUI application.
- After finishing using the MTS GUI 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.

4.2.1 GUI default page

The GUI application default page is shown below in Figure 4-2.

Figure 4-2: GUI opening page

Note: The GUI is common to the MTS amplifier line and there will be many amplifier parameters shown in the screen. However, these will be grayed out and can be ignored. These will not be referred to in the descriptions below.

The default page will show 192.168.192.100, as this is the factory IP address set in the GUI. If this is a new ION then simply press "Connect".

Note: Each ION will attempt to obtain an IP address by DHCP on power up. This process lasts about 1 minute. Until the DHCP period is over, it will not be possible to connect to the ION using the GUI. If the ION has been programmed with a default address, then it will not follow a DHCP process.

Also note that the internal UART interrupts are not enabled until after the DHCP process, so ION parameters cannot be changed or updated during the DHCP period.

NOTE: many pages, or sections of pages, have an "UPDATE" button. If changes are made through SNMP or TELNET, rather than the GUI, these changes will only be reflected in the GUI after pressing UPDATE. Otherwise, the GUI would have to continuous poll every setting and the HMI would have little processing time left over.

4.2.2 System settings

Selecting the "System" tab will open the page shown in Figure 4-3 below. The settings are changed as follows:-

- Ethernet IP address: This can be changed from the default address to any address. Enter the new address and press "Set". Note: once the IP address is changed, the user will need to wait approximately 20 seconds for the application to reconnect, or they can restart the application and enter the new address.

- CobraNet™ IP address: As CobraNet™ is layer 2, it does not need an IP address to pass audio. However, for programming via SNMP the default CobraNet™ address of 0.0.0.0 can be changed. The IP address set using the GUI is persistent.

- The CobraNet™ firmware revision is for information only. There is no setting. New firmware should be loaded using CobraNet™ Discovery (CNDISCO).

- The parameters are set as follows:
  - The RS485 bridge status allows the user to switch the RS485 port between local/remote ION control & monitoring or serial bridging.
  - The RS485 address refers to the address used by the RS485 port to communicate to external devices (TBA).
  - The RS485 Master/Slave switch allows the ION to be slaved to a host processor or act as the Master controller for the MTS wall panels or a remote MTS ION (TBA).
  - The remote MAC address refers to the serial bridging channel settings described in the Cirrus Logic PM25 document. Please note that the remote MAC address value is NOT stored in presets due to issues with the

network configuration. This will have to be loaded manually by the users application software.

Note: RS485 settings as follows…

- Local = Local RS485 control and monitoring of all ION parameters via the CobraNet™ RS485 port (ie serial bridging is off). The Master/Slave toggle then determines whether the ION is slaved to a separate PC/Processor or acting as the master to communicate with wall plates (TBA).
- Bridge = Serial bridging, where the CobraNet™ RS485 port is simply a multidrop bidirectional serial communications channel. The data at the CobraNet™ RS485 port is not used by the local ION, but communicated to a remote device(s) on the network. This is the standard Cirrus setup. Master/Slave also has no effect in this situation.
- Remote = Remote control via serial bridging, ie a serial port on a remote CobraNet™ interface can control and monitor the local ION (TBA).
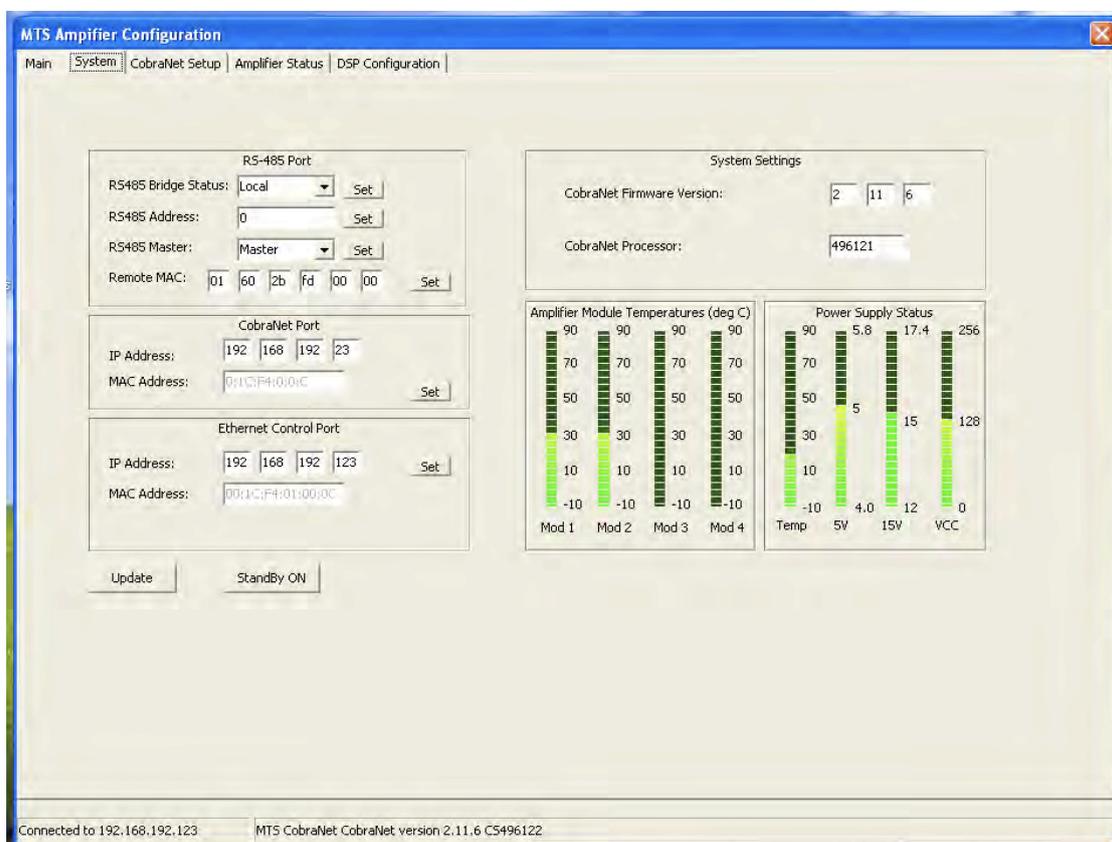
Figure 4-3: System settings page.

Notes:

- All RS485 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.
- The RS485/CobraNet™ DIP switch on the rear of the ION should be set to CobraNet™. If it is set to RS485, then the RS485 address on the DIP switches

must match the RS485 address used in the GUI/VFD display and the I-bus baud rate and master/slave setting must match that used in the GUI/VFD display.

4.2.3 CobraNet™ settings

The CobraNet™ settings page is shown below in Figure 4-4.

One of the key features of the MTS ION is the ability to set up to 4 CobraNet™ audio transmitters and 8 CobraNet™ receivers. In addition, MTS has provided the ability to set each bundle subchannel configuration.

The settings are:-

- Transmitter setup: This section covers the CobraNet™ transmitters. The CS496xxx chipset allows for up to 4 transmitters, each of up to 8 channels, subject to an overall channel count of 16 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.
  - Priority: This sets the priority of the transmitter. If bandwidth resources are limited, then audio will be transmitted in order of priority.
  - 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.
  - TX1…TX4: This lists the four transmitters associated with the bundle address and allows the user to set the audio subchannels associated with that bundle. A CobraNet™ CM2 type interface can have up to 16 audio channels, numbered 1-16. The subchannel mapping allows the user to decide which of the 16 audio channels are mapped to each bundle and in which order they are transmitted.
  - 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.
  - Transmitter format settings: 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). Also note that the MTS IONs uses all 16 CobraNet™ channels of the CS496xxx chipset, so only a sample rate of 48kHz is enabled (96kHz operation is not possible).
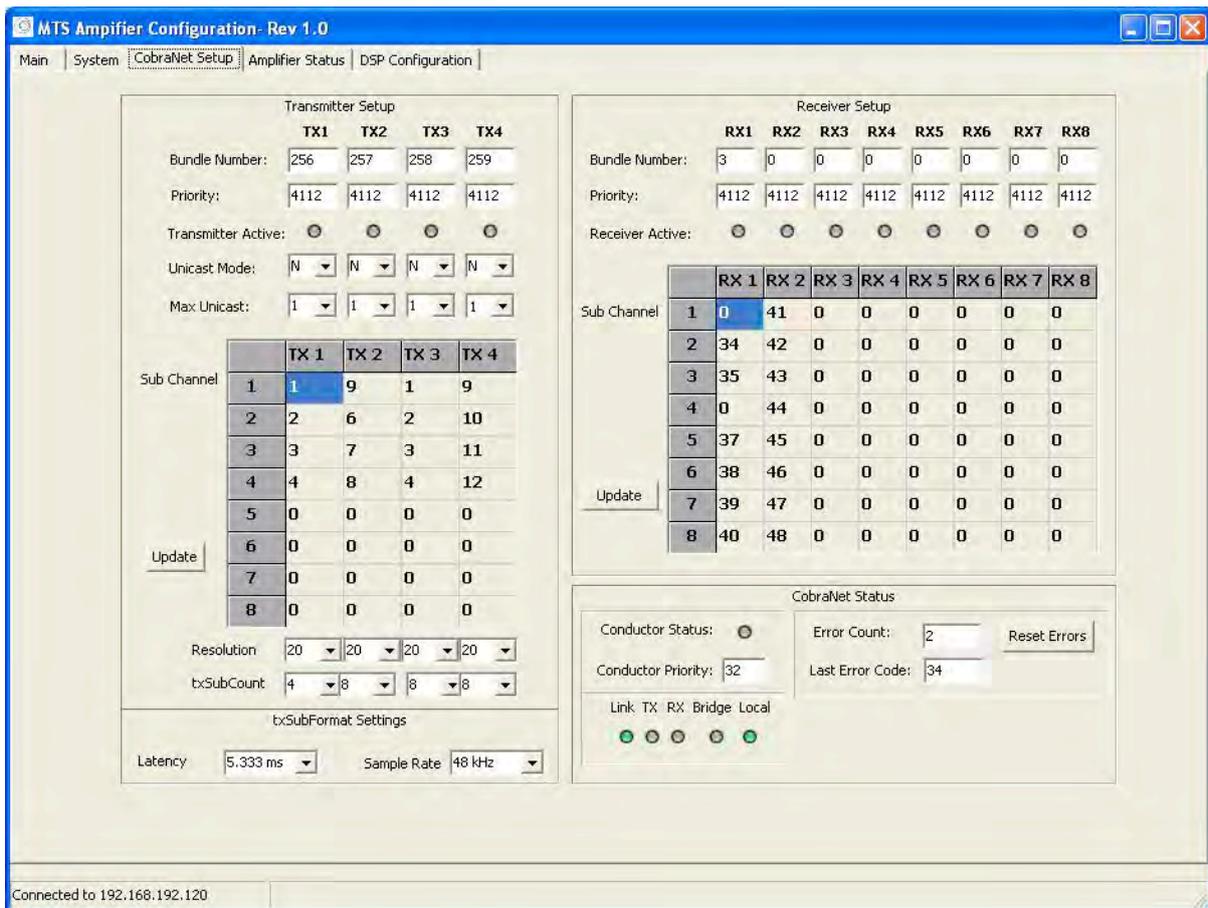
Figure 4-4: CobraNet™ settings page

- Receiver setup: This section covers the CobraNet™ receivers. The CS496xxx chipset allows for up to 8 receivers, each of up to 8 channels, subject to an overall channel count of 16 channels. The settings are:-
  o Bundle number: Same process and limitations as described in the transmitter section
  o Priority: Same process and limitations as described in the transmitter section
  o Receiver active: This LED only lights if there is a valid transmitter sending audio on that bundle address.
  o RX1…RX8: Same process and limitations as described in the transmitter section

- CobraNet™ status: As follows:-
  o Conductor status: LED lights up, if the ION is the Conductor.
  o Conductor priority: Default is 32. Change the value to increase or decrease the possibility of this interface becoming the Conductor
  o Error count: Running total of CobraNet™ errors detected.
  o Last error code: The CobraNet™ error code of the last error detected.
  o Status LED's: Link shows Ethernet link status. Tx and Rx shows data transfer. Bridge/Local shows serial bridge status.

Note 1: To enter a value in any of the setting boxes, overwrite the existing value and then press "Enter"/"Return". If "Enter"/"Return" is not pressed then the value is not stored.

Note 2: "Update" gets the current values from the ION NOT sends values to the ION.

Note 3: See below for Unicast/Multicast/Multi-Unicast operation

- If Unicast mode = A (ie always Multicast) and MaxUnicast = 0, then the bundle is always Multicast
- If Unicast mode = A (ie always Multicast) and MaxUnicast = 1, then the bundle is always Multicast above 1 Multi-Unicast bundle
- If Unicast mode = A (ie always Multicast) and MaxUnicast = 2, then the bundle is always Multicast above 2 Multi-Unicast bundles
- If Unicast mode = A (ie always Multicast) and MaxUnicast = 3, then the bundle is always Multicast above 3 Multi-Unicast bundles
- If Unicast mode = A (ie always Multicast) and MaxUnicast = 4, then the bundle is always Multicast above 4 Multi-Unicast bundles
- If Unicast mode = N (ie never multicast) and MaxUnicast = 1, then the Multi-Unicast is limited to 1 bundle and receiver priority will determine access.
- If Unicast mode = N (ie never multicast) and MaxUnicast = 2, then the Multi-Unicast is limited to 2 bundles and receiver priority will determine access.
- If Unicast mode = N (ie never multicast) and MaxUnicast = 3, then the Multi-Unicast is limited to 3 bundles and receiver priority will determine access.
- If Unicast mode = N (ie never multicast) and MaxUnicast = 4, then the Multi-Unicast is limited to 4 bundles and receiver priority will determine access.

Note 1: When Unicast = N and MaxUnicast is set to 0, this is a null setting and MaxUnicast is actually set to 1 as default.

Note 2: 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.

4.2.4 DSP settings

The final configuration tab is for the DSP inside the IONs- see Figure 4-5 below.

The DSP controls are described below…

- Router: The router (see Figure 4-6 below) accepts 25 inputs and 32 outputs. The first 8 inputs are ION local analog. Note: ION8.8 uses all 8, the ION4.4 only uses the first 4. The next 16 inputs are CobraNet™ inputs 01-16, as defined in the protocol sub channel mapping. The final input is the Test Tone (Sine wave).

  The first 16 outputs are 8 channel pairs. The Odd channels are Ducker inputs (eg BGM signals) and the Even channels are the Ducker signal (eg, Paging Microphones). The next 16 outputs are CobraNet™ outputs 33-48, as defined in the protocol sub channel mapping.

The router provides the ION with the ability to bridge the analog inputs to the network via the CobraNet™ outputs, as well as route either analog inputs or CobraNet™ inputs to the ION outputs.
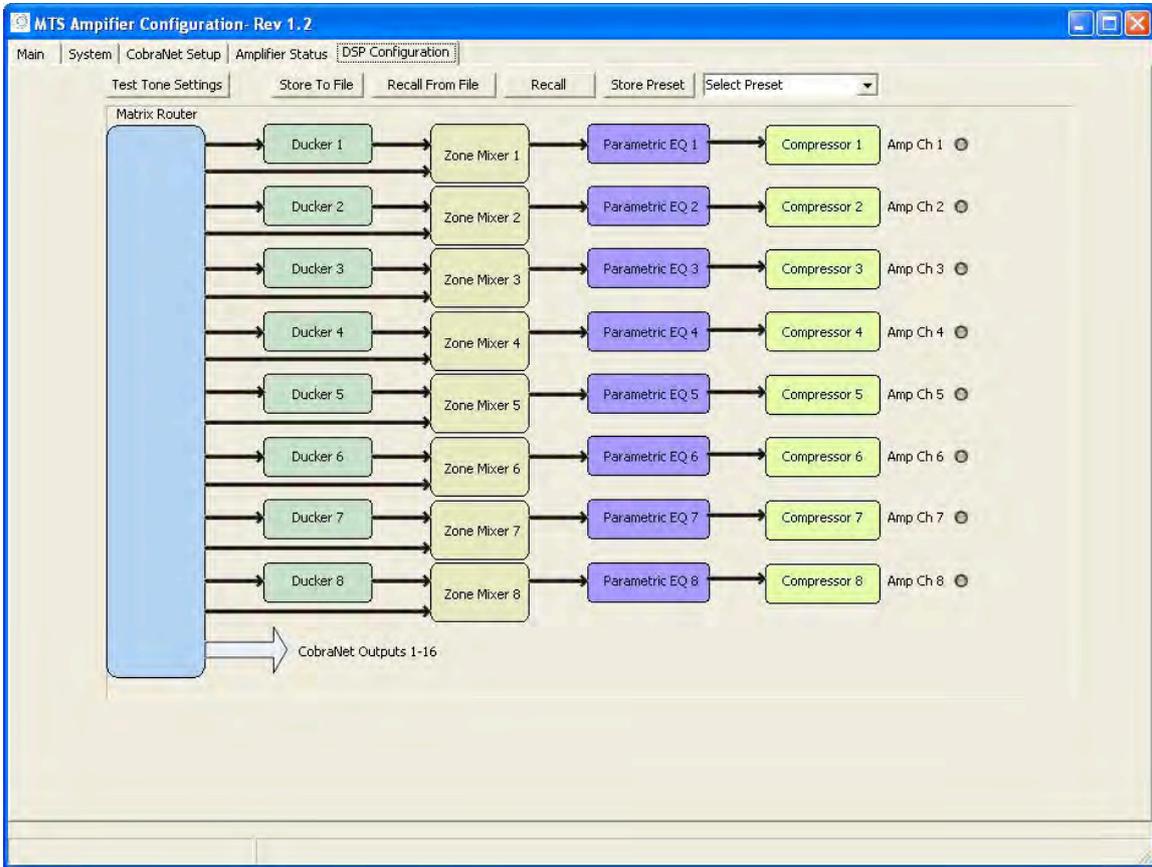
Figure 4-5: DSP configuration tab.
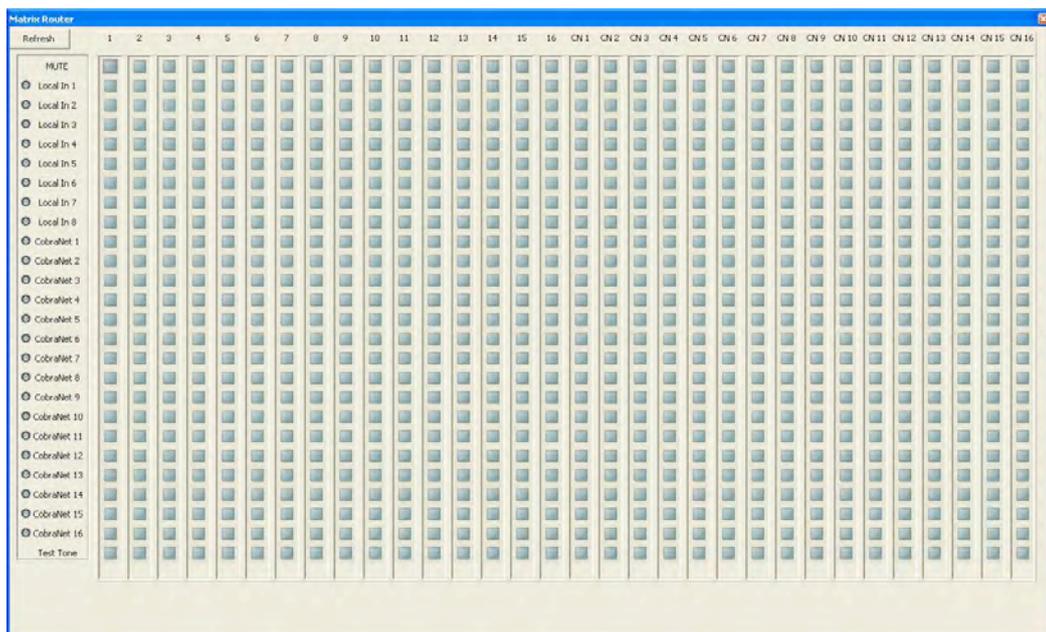
Figure 4-6: Router

- Test tone settings: The Test Tone is a simple Sine wave generator with controls for level and frequency (see Figure 4-7 below)
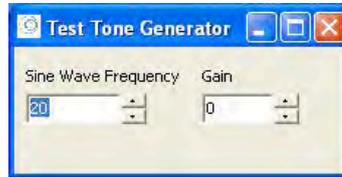
Figure 4-7: Test Tone Generator

- Ducker: The Ducker allows the user to bring 2 inputs into each channel, one as the BGM source and one as the Paging source. When the paging source input exceeds a set threshold, then the BGM input will be reduced in level set by the depth control. The attach and release times set the speed of response and the hold time will hold the ducker active (ie BGM input low) for a set time after the paging input goes low. The hold time stops the ducker switching in and out during gaps in speech. See Figure 4-8 below.
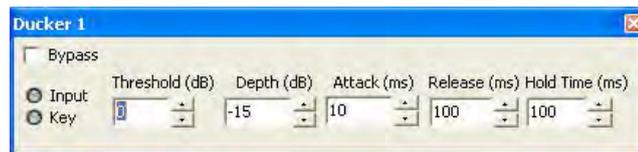
Figure 4-8: Ducker Controls

- Mixer: The Even channels (Paging signal) are routed to both the Ducker (side chain control and to the Mixer. The mixer recombines the BGM and Paging signals and allows the user to set the relative balance between input 1 (BGM) and input 2 (Paging). The mixer is shown in Figure 4-9 below.
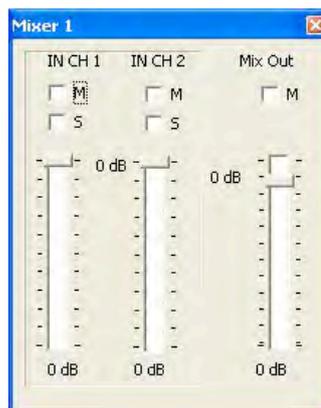
Figure 4-9: Mixer Controls

- EQ: The Equalizer has 10 sections, a High Pass filter, a Low Pass filter and 8 bands of Parametric equalizer. See Figure 4-10 below. Note the HPF and LPF need to be bypassed if they are not to be used.
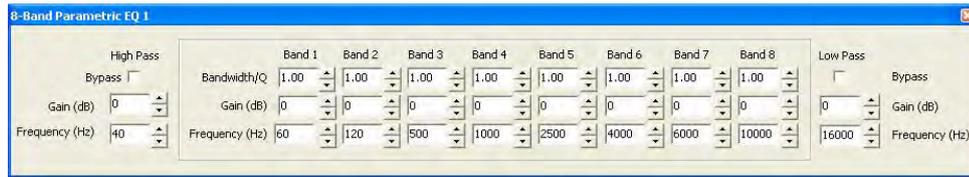
Figure 4-10: Equalizer Controls

- Compressor: The compressor is a simple soft knee device shown in Figure 4-11 below. The threshold sets the level at which the compressor starts operating and the ration sets the amount of compression.
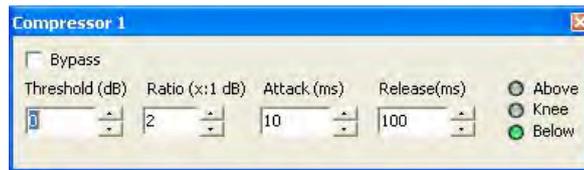
Figure 4-11: Compressor Controls

There are 8 optional presets, where the power up preset is always configured as Preset 1. If no values are stored in Preset 1, then there will be no power up preset.
The presets operate by first selecting the desired preset number from the pull down menu (see Figure 4-12 below).
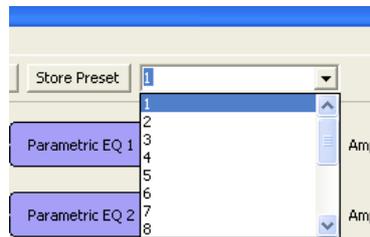
Figure 4-12: Preset Selection

This will make the preset 'active' and the store-recall buttons will be applied to those presets, as follows...

- The "Store" button packs the DSP controls, GUI specific control DSP control information, the CobraNet™ Setup page information and the ION settings and sends the packet for storage in serial flash in a memory space allocated for the chosen preset #. This process will take around 2 seconds
- The "Recall" button directs the HMI processor to retrieve the chosen preset # data from serial flash and send the GUI specific DSP control information to the GUI and then to parse through the saved CobraNet™ Setup page settings and implement it via the HMI. The parsing process will take up to 10 seconds, due to the time taken to restore data to the CobraNet™ flash.
Note 1: the changes are only seen in the GUI when that page is selected and the operator requests updates for that page.
Note 2: If there is no preset in flash, then an error message will be shown.

Note 3: If the ION is in Standby, then the act of recalling a Preset will cause the ION to come out of standby.

Note 4: The full preset value load takes around 5 seconds due to the thousands of DSP values that need to be recalled.

- The "Save to file" process creates a "Preset #".cfg file that is (by default) stored in the MTS folder in program files (see Figure 4-13 below). The save to file option allows the user to do the following...
  - o Archive all settings. This allows the customer to upload them to a replacement ION if a failure occurs.
  - o Allow the user to transfer similar configurations settings from one preset to another or one ION to another, ie in large projects, where many parameters have the same values.
- The "Recall from File" is a two-step process where the data is pulled from the *.cfg file into computer RAM and then the user presses "Store" to save the settings to the desired preset. This enables common values to be copied between presets. See Figure 4-14 below.
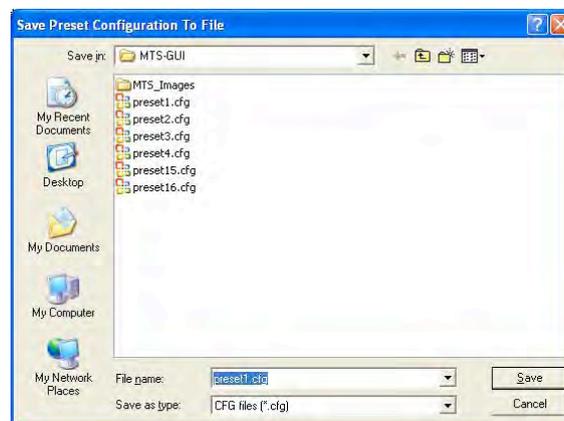
Figure 4-13: Save Preset to File Menu
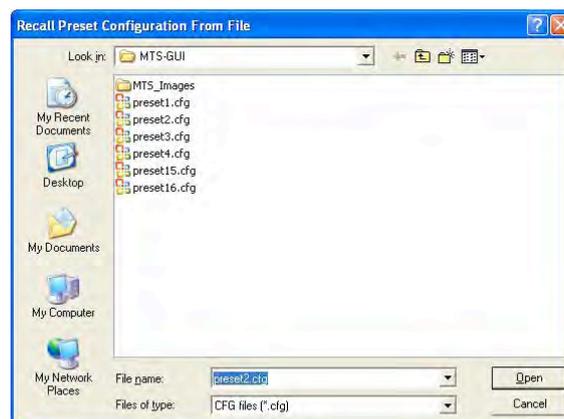
Figure 4-14: Recall Preset from File Menu

The Store/Recall buttons will gray out during the saving and loading processes. Do not try to perform any actions during this period, see Figure 4-15 below.

Figure 4-15: Buttons fade during Save/Recall Process.

NOTE: when a preset is recalled from file, the preset is loaded in the selected preset in flash. For example, if the preset menu is set to "1" and preset2.cfg file is recalled, this preset data will be saved in the preset 1 flash location. Therefore, you must set the preset menu number prior to recalling a preset from file, since the recall from file action also stores the recalled preset into flash.

4.2.5 Sniffing MAC/IP address

If the IP address has been changed and the address lost, then a simple MAC/IP sniffer application can be used to poll the ION4.4 or ION8.8 and find the details of the Ethernet port. There are a number of such applications available on the internet. The simplest is CC Get MAC address..

http://www.youngzsoft.net/cc-get-mac-address/

A range of IP addresses is entered into the software and those used will be listed, along with the MAC address. This is a very simple way of tracking down errant IP addresses.

For the Cobranet IP address, CNDISCO will perform the same task.

5 MTSI Warranty: United States & Canada

MTSI ION 4.4 & 8.8 CobraNet™ Interfaces

Media Technology Systems Inc., of 766 Lakefield Road, Unit –F, Westlake Village, California 91361-2050, USA, warrants to purchaser and subsequent owner, that each individual product is free from defects in materials and workmanship for a period of three (3) years from the date of purchase.

Warranty is valid only within the country in which the product was purchased.

Warranty registration is required and can be performed through Online Registration at:
www.mediatechnologysystems.com/support/product-registration

Have available your original purchase information containing model, serial number(s), date and other relevant information and your contact details. Adequate Proof of purchase is required should a product not have been registered at the time of purchase and installation.

Exclusions from this Warranty:

Failures in new products, due to materials and workmanship are warranted only for a period of three (3) years from the date of purchase, The Warranty Period.

This warranty does not cover wear items, such as: connectors, switches, finish, or abuse or misuse, or operation at other than within specified conditions. The MTSI warranty also does not extend to any product where the serial number has been defaced, altered, or removed in any way. Understanding the typical application for this range of product. We advise that the cause of any failure is ascertained prior to contacting MTSI or its agents and distributors. Such information can assist both you and MTSI in expediting a solution for such problems.

U.S.A & Canada: No person or party is authorised to change, alter, enlarge, amend, restrict or in any other way modify this warranty.

International Service

Service may be obtained from an authorized service center. (Warranty Terms and Conditions vary from country to country. Contact your local MTSI distributor, dealer or representative for applicable terms and conditions) To obtain service contact your local distributor or dealer and have available the original bill of sale as proof of purchase. Should return to MTSI facilities be required, International customers must bear the cost of shipping the product from any country (other than the USA and Canada), including the return shipment and any and all duties, taxes and other such fees that may apply.

Warranty Work:

Warranty work will only be carried out at MTSI's facilities, or depending on the type of failure, at authorised service centres. MTSI is aware that its products are used primarily in commercial applications where downtime is critical, and undertakes to remedy and return and product in a timely manner. MTSI will bear the costs of repair and return the product to the customer via the same method it was shipped to MTSI for service. This applies only to the United States and Canada.

How to Obtain Warranty Service:

Notification of a need for Warranty Service must be made within the Warranty period.

Products will only be accepted with an MTSI issued RMA, Return Merchandise Authorization. RMA's can be received by contacting MTSI via email or telephone at the contact numbers below. Any product being shipped without an RMA will be rejected. All returned product should be in original factory packaging. Any product received in other than original factory packaging that is damaged will not be accepted for service under the terms of this warranty. Care must be taken to assure suitable packaging is used should the original materials not be available.

Due to the ION 4.4 and 8.8 interfaces having an external power supply unit, it is advised that both the power supply and ION Interface are returned for warranty at the same time.

Ascertaining the type of Failure:

Please include a note with all pertinent details explaining/describing the failure of the product. Take care in ascertaining any such information and under no circumstances open the chassis/enclosures of the product. Read, understand and follow all safety instructions in the manuals and on the product.

Disclaimer:

Where applicable under local laws: Under no circumstances will MTSI be responsible for Incidental or Consequential Damages from any defect in the product. This includes damage to the product and any other associated products resulting from any defect.

Legal Rights:

This is a Limited Warranty and gives you specific legal rights. It may not in any way restrict any additional legal rights you may have which vary from State to State

Design Changes:

MTSI, without notice, reserves the right to change or improve the product from time to time. MTSI is under no obligation to modify, change or update products previously manufactured. However, at it's discretion, applicable updates may be performed to warranty return products.

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