

NAM and NAM *Plus*



Technical User Manual



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1. INTRODUCTION

Thank you for purchasing tm stagetec systems' professional Network Amplifier Module (NAM).

NAM is a network-enabled four loudspeaker amplifier equipped with four power amplifiers (each 12 W RMS / 8 Ω), internal DSP for audio filter and delay functions, and four autodetecting gigabit LAN ports (2 x Ethernet and 2 x SFP). Optionally, one LAN interface can be configured as a redundancy port to facilitate the 'fall-over' redundancy* capabilities of Dante™ network audio.

The *PLUS* version of NAM features AES3 digital inputs and external GPIO control.

NAM seamlessly integrates with Dante™ and Ethernet to distribute Unicast and Multicast network audio streams to PA endpoints. The NAM can 'subscribe' to any available Dante™ audio streams and route them independently or in combination to any one of its four amplified outputs. Importantly, with some simple changes, existing analog PA systems can also be made networkable with NAM via an IT network infrastructure.

NAM is fully compatible with Dante™ Domain Manager and is configured via web browser or the tm stagetec systems 'Zone Controller'™ mobile app for Apple and Android devices.

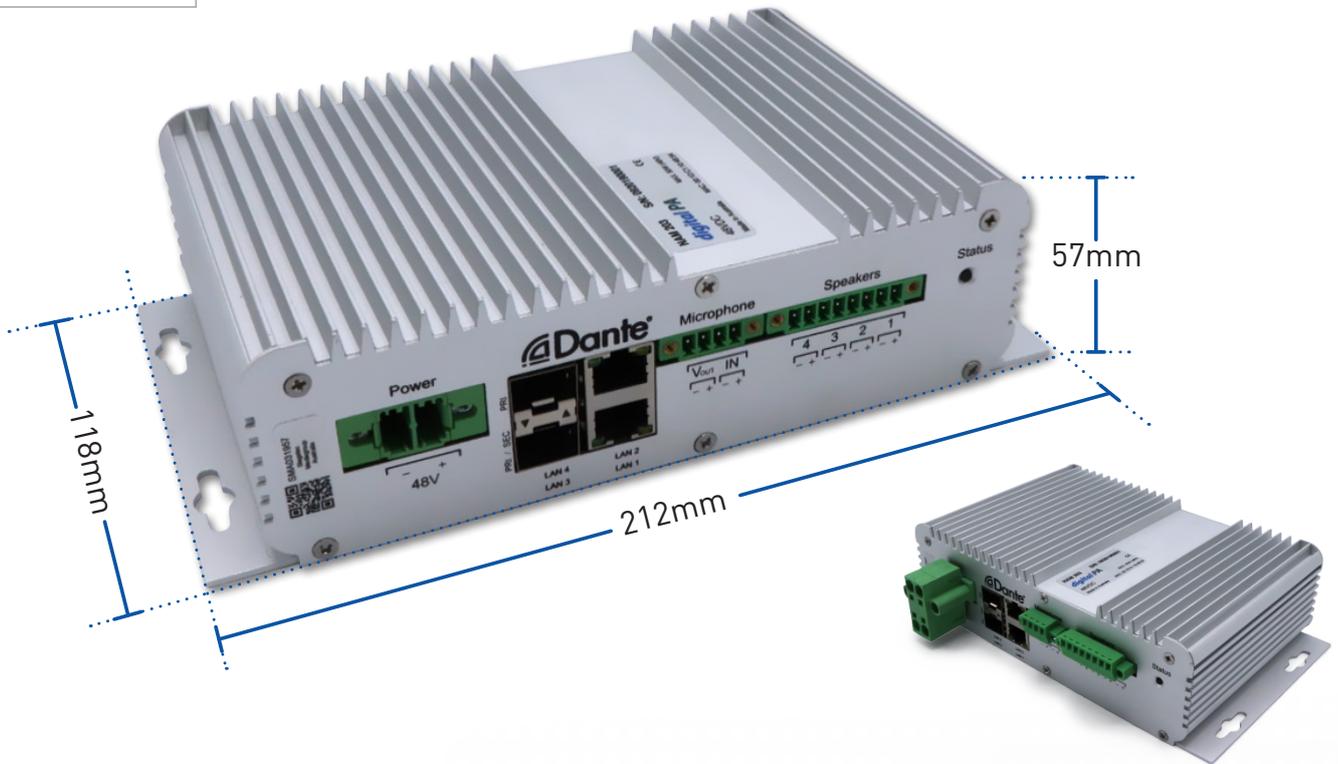
Please read this manual fully before operating your new NAM.
For enquiries and more information please contact us at: info@tm-systems.com.au

*For production environments and mission critical applications, Audinate's Dante™ network audio protocol combines a main primary network and a redundant secondary network to achieve an automatic and seamless fall-over in the case of a network hardware chain failure - see page 5.

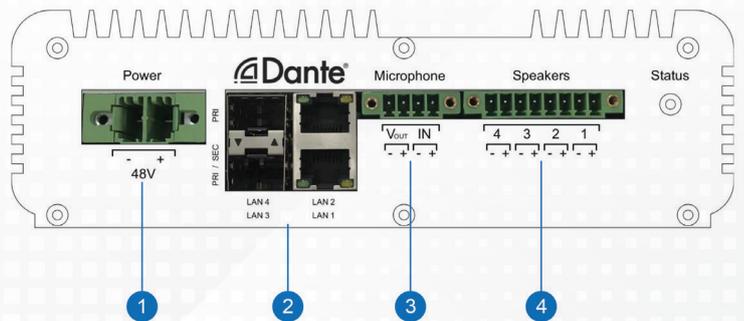
2. HARDWARE OVERVIEW

The Indoor NAM features a strong wall mountable die cast aluminium casing.

Dimensions



NAM603 Connection Details

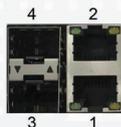


1 Power



2 1
1: 36V – 52V +
2: 36V – 52V -

2 LAN



1: LAN 1
2: LAN 2
3: LAN 3 (SFP)
4: LAN 4 (SFP)

3 Microphone



4 3 2 1
1: Microphone +
2: Microphone -
3: Volts +
4: Ground

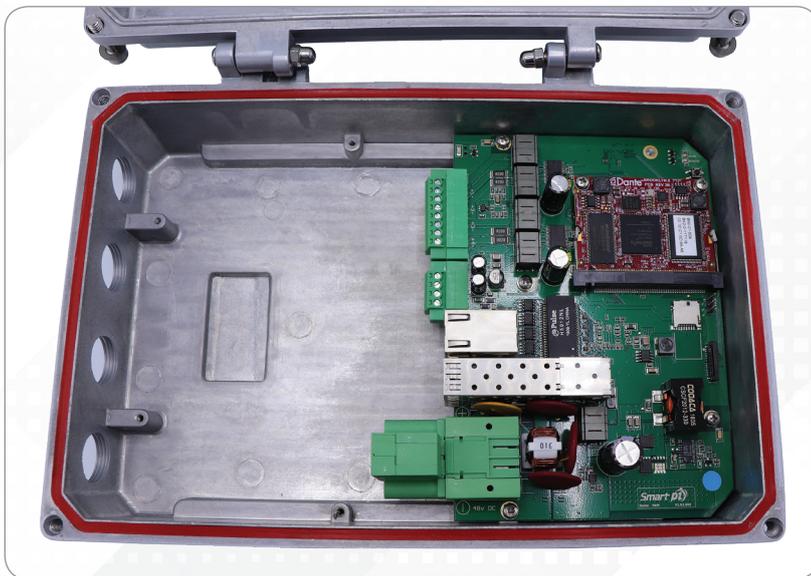
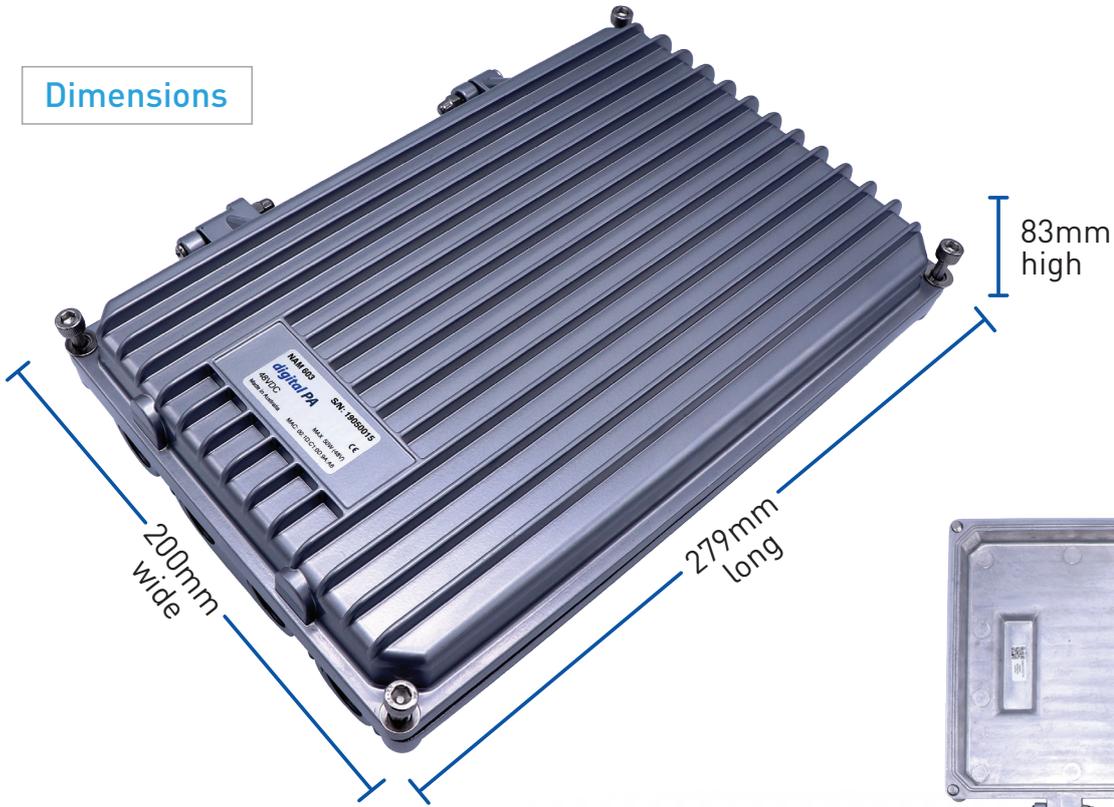
4 To Speakers



8 7 6 5 4 3 2 1
1: Speaker 1 + 5: Speaker 3 +
2: Speaker 1 - 6: Speaker 3 -
3: Speaker 2 + 7: Speaker 4 +
4: Speaker 2 - 8: Speaker 4 -

THE OUTDOOR NAM

Dimensions



3. AT A GLANCE

Hardware	
Power	24 - 54 VDC (1.5 A) - with real-time STATUS screen monitoring.
Network	2 x Gigabit Ethernet and 2 x Small form-factor pluggable (SFP) ports. AutoDetecting - one of each type assigned per LAN in redundancy config.
Amplification	Amplification
GPIO (NAM PLUS)	Vox sources for GPIO triggers.
AES-3 (NAM PLUS):	24 bit, sample rate conversion, Input Max 7:1, max range 139 DNR.
Microphone input	48v Phantom, ref level -18 / -20 dBfs, gain -4.5 to +39.5 dB, max in +18 dB.
SD card	Audio files = 48k / 16 bit linear mono.
Status	Amp status LED Indicator. AES 'Lock' LED Indicator (NAM PLUS).
Management	Web browser interface (up to 20 users). Zone Controller™ mobile app for Apple and Android devices. Dante™ Domain Manager (DDM).

Processing

- Speaker Impedance Measurement with definable tolerance range
- Amp status with fault codes
- Onboard tone generator - White, Pink, 1 k Sine, 400 Hz Sine - adjustable level
- Selectable DSP per output and input - AES, Dante™ 1-8, Mic, AES (L,R), Tone and SD Card.
- 2500 ms delay per channel in 1 ms steps.
- VOX control triggers - Dante™ 1-8, Mic, AES (L,R)
- Latency settings
- 1000 point FIR filter per channel
- Backup / Restore
- Remote update

4. SETTING UP

Open the packaging and make sure all accessories are present. The box will contain:

- 1 x NAM unit
- 1 x Quick start guide

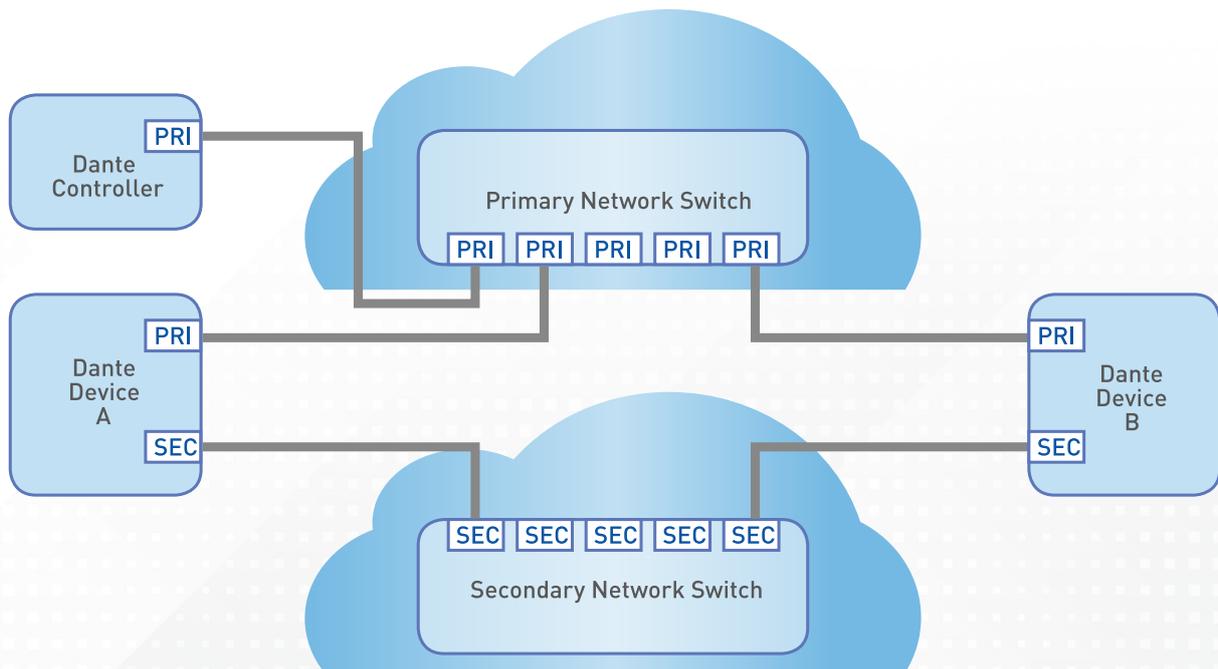
The casing side brackets have pre-drilled holes for flat surface mounting, such as a wall or ceiling. Install the unit in a dry and well ventilated area that is not subject to extreme heat. Take care that the mounting position allows for clear access for cable connections to the unit.

NAM requires a 24 - 54 VDC 1.5 A power source (Phoenix receptacle). **NAM features real-time monitoring of the DC power supply** - see **STATUS** view - page 6.

Connect the NAM for your LAN / PA setup. In a basic network configuration, all 4 of NAM's network ports (copper and fibre) will operate together, much like a 4 port switch. However, this automatically changes if a redundancy configuration is opted for.

4.1 OPTIONAL REDUNDANCY

As a fully featured Dante™ device, the NAM can be connected to a secondary network via its designated secondary LAN port. If needed, redundancy is facilitated by the Dante™ Controller. A redundancy configuration is recommended, but is not mandatory.



In a redundancy set up (above), the NAM only needs to be configured as a Dante™ device within the Primary network, and **both networks must have the same link speed**. If the primary network transmits at 1 Gb sec⁻¹, this must be matched by the redundant secondary network.

IMPORTANT: In this configuration, the NAM will assign 1 x Gigabit port and 1 x SFP to each network.

5. STATUS VIEW

After powering up the NAM will acquire a network IP address via DHCP. Dante™ Controller management software can be used to discover this IP address, or you can employ other methods of IP discovery. A web browser can then be used to navigate to the NAM's web interface.

The initial **STATUS** page displays an overview of the NAM's current operational status, including current versions of hardware and firmware, network configuration, and realtime monitoring of the DC power supply input.



NAM-104b7a

NAM

- Status
- Login

STATUS

DEVICE INFO

Device Name	NAM-104b7a
Dante Redundancy	Switched
Dante Preferred Master Clock	OFF
Dante Domain	ADHOC
Dante Domain State	DISCONNECTED
Uptime	8 days, 6 hours, 21 minutes
Temperature	43.19 °C
DC Input	49.9 V

VERSIONS

Dante Model ID	52
Dante Software	4.00.009.001
Dante Firmware	4.00.002.007
Device Software	1.03.027
DSP Firmware	02.02.04
Hardware	01.00.000
Options	PLUS
XML Configuration	3.00.005

SWITCH INFO

Status

LAN 1	LAN 2	LAN 3	LAN 4
PRI	PRI	PRI	PRI

DANTE NETWORK PRIMARY

Clock State	SLAVE
Tx util Kbps	61
Rx util Kbps	49
DHCP active	STATIC
IP Address	192.168.12.56
Mask	255.255.255.0
Gateway	192.168.12.254
DNS Suffix	
DNS Server	192.168.10.1
MAC Address	00:1D:C1:10:4B:7A

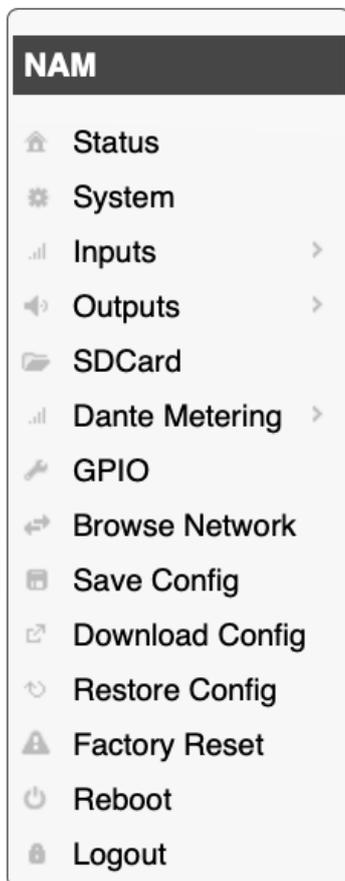
To make any configuration changes, Users must first **Login**.

6. LOGGING IN

Clicking 'Login' in the left edge menu bar will prompt for a password. Enter the password in the text dialog and click 'Ok'.

A screenshot of a 'Login' dialog box. The title bar says 'Login' with a close button. Below the title bar is a dark bar with the text 'ENTER PASSWORD'. Underneath is a text input field with a password icon (a key with a checkmark) on the right. At the bottom right are two buttons: 'Ok' and 'Cancel'.

The default password is, 'password'.



Successful password entry gives full access to all NAM configuration settings via the expanded menu bar options on the left edge of the window.

NOTE: The **GPIO** menu item is only available in NAM *PLUS*.

7. SYSTEM MENU

Click on 'System' to access core Dante™ network configuration options.

There are 2 tabs - **General** and **Dante Network**.

7.1 SYSTEM - GENERAL TAB

SYSTEM

General Dante Network

DEVICE

Device Name (A to Z, 1 to 9 or -)
NAM-Test

Password
..... ?

Dante Redundancy Redundant Switched

Dante Redundancy after Reboot Redundant Switched

Dante Preferred Master Clock ON OFF

Dante Receive Latency (µs) 250 500 1000 5000 20000

Dante Channels per Flow 2 4

Configurable options

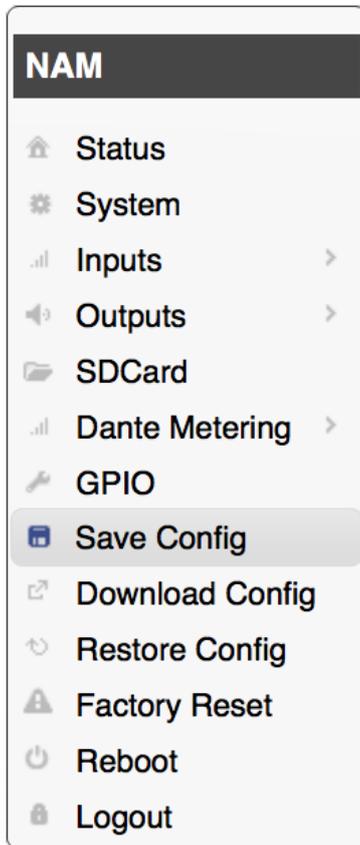
- Device Name:** Enter a name for your NAM on the network. This name will appear in Dante™ Controller / Domain Manager.
- Password:** The **Login** password can be changed here.
- Dante Redundancy:** Determines whether or not the unit will be configured to use a secondary **redundant network** (see 14 - Glossary of Terms). **NOTE:** if no secondary LAN connection is detected, this option will be greyed out.
- Dante Redundancy after Reboot:** Advance selection of redundancy configuration post reboot.
- Dante Preferred Master Clock:** Determines unit candidacy for the role of master digital **clock** (see 14 - Glossary of Terms).
- Dante Receive Latency (µs):** Sets the receive **latency** for this device (see 14. - Glossary of Terms). The default value is 1000 µs.
- Dante Channels per Flow:** Set 2 or 4 channels per **Flow** (see 14. - Glossary of Terms).

IMPORTANT NOTE:

After making any configuration changes in the NAM, a prompt will remind you to save your changes.

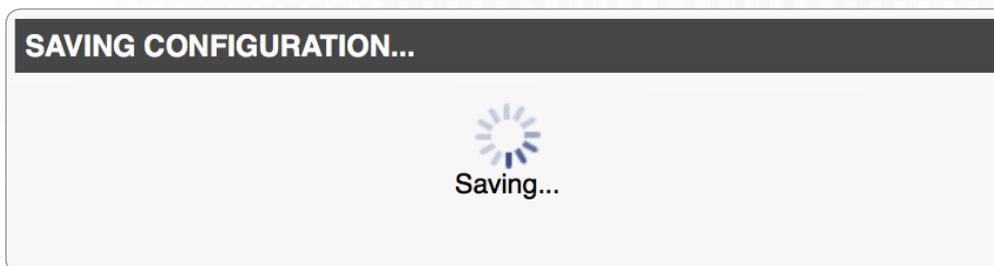
Don't forget to save your changes!

Click 'Save Config' on the left side menu bar.



It is not mandatory to do this immediately after every change, and an accumulation of configuration changes between a variety of tabs may be performed before committing to a save.

However, your changes will not be adopted by the unit in real time until a save is applied.



7.2 SYSTEM - DANTE NETWORK TAB

Dante™ Primary and Secondary (if used) network configurations are made in this tab.

SYSTEM

General	Dante Network
DANTE NETWORK PRIMARY	
Clock State	SLAVE
Tx util Kbps	8
Rx util Kbps	5057
DHCP Active	<input type="radio"/> OFF <input type="radio"/> ON
DHCP after Reboot	<input type="radio"/> OFF <input checked="" type="radio"/> ON
IP Address	<input type="text" value="192.168.12.57"/>
Mask	<input type="text" value="255.255.255.0"/>
Gateway	<input type="text" value="192.168.12.254"/>
DNS Server	<input type="text" value="192.168.10.1"/>
DNS Suffix	stagetec.com.au
MAC Address	00:1D:C1:0B:DB:DC

Status display

- Clock State - Indicates the NAM's clock ranking status. MASTER or SLAVE
- Tx util Kbps - Indicates the NAM's current transmit network bandwidth usage.
- Rx util Kbps - Indicates the NAM's current receive network bandwidth usage.
- DNS Suffix - The applied network Domain DNS Suffix (see 14. - Glossary of Terms).
- MAC Address - The unique media access control (MAC) network address of the Primary network interface controller (NIC).

Configurable options

- DHCP Active: Switches between automatic acquisition or manual configuration of a LAN IP address. **NOTE:** the **OFF** and **ON** switches are greyed out (as above) if an IP address has already been manually entered and **DHCP after Reboot** is set to **ON**. A device reboot is necessary to re-enable the switch.
- DHCP after Reboot: Selects whether or not the unit should acquire network address settings from a DHCP server after a reboot. If this is set to **OFF**, then the **IP Address, Mask, Gateway** and **DNS Server fields** will become active. **NOTE:** A device reboot is necessary to implement the changes.

8. INPUTS MENU



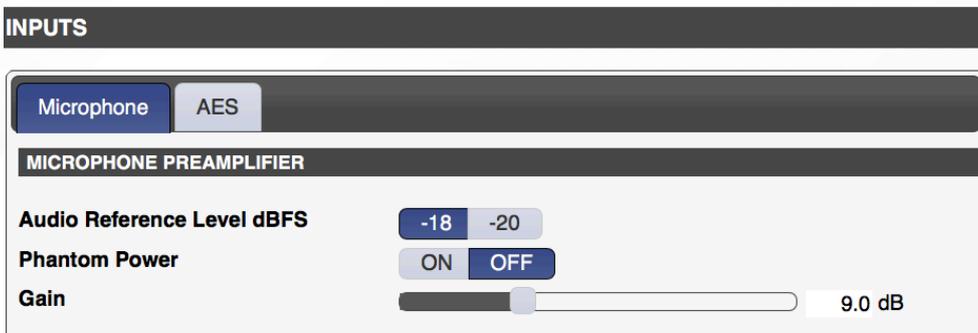
From the side menu, selecting '**Inputs**' gives access to configuration options for available input **Channels** and their customisable **Names**.

All NAMs feature a phantom powered microphone input **Channel**, while NAM *PLUS* features an additional AES-3 input **Channel**.

Customisable naming allows input **Channels** to be assigned user friendly and meaningful names for ease of identification on your network.

8.1 INPUTS - CHANNELS - MICROPHONE TAB

The NAM's inbuilt microphone preamplifier is configurable in this tab.



Configurable options

Audio Reference Level dBFS: Depending on your working environment standard, the audio reference level can be set to either **-18** or **-20 dBFS**.

Phantom Power: When '**ON**' is selected, the NAM will supply 48 VDC to the microphone input.

Gain: The slider can be used to apply or reduce microphone gain within the range of **-2.5 dB** to **41.5 dB**.

8.2 INPUTS - NAMES - AES TAB (NAM PLUS)

The AES tab provides information about the current **Lock Status** of the AES input connection.

INPUTS

Microphone **AES**

AES INPUT

Lock Status OK

8.3 INPUTS - NAMES - CHANNEL NAMES TAB

Inputs can be assigned user friendly names for ease of operation and administration later on.

DANTE TRANSMITTERS

Channel names

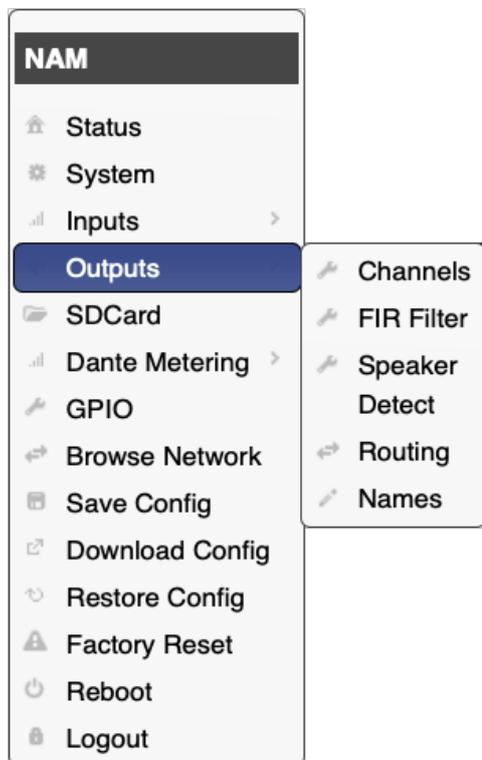
NAME / TYPE	LABEL
AMP Mon 1	<input type="text" value="Main Program Output"/>
AMP Mon 2	<input type="text" value="Auxiliary Feed"/>
AMP Mon 3	<input type="text" value="Backup Feed"/>
AMP Mon 4	<input type="text" value="Unused 1"/>
MIC	<input type="text" value="Microphone - Neumann U87"/>
None	<input type="text" value="Unused 2"/>
AES L	<input type="text" value="Safety Monitor AES (L)"/>
AES R	<input type="text" value="Program Commentary AES (R)"/>

Configurable options

Type in text names for each channel.

9. OUTPUTS MENU

From the side menu, selecting '**Outputs**' gives access to a broad set of configuration options for the NAM's four amplifier outputs, as well as their interactions with connected speakers.



Selection of each of the 5 sub-menus will present another associated window featuring tabs for configurable items.

9.1 OUTPUTS - CHANNELS - GENERAL TAB

The General tab provides a **STATUS** display for important functional attributes of each amplifier channel and selectable options for Amplifier Mode and a Tone Generator.

OUTPUTS

General AMP CH 1 AMP CH 2 AMP CH 3 AMP CH 4 AES CH 1

AES CH 2

GENERAL

Amplifier Mode 4x12W@8Ohm

STATUS

Amp1 CH1-CH2 Communication ✓ OK

Amp1 CH1-CH2 Over Current ✓ OK

Amp1 CH1-CH2 Clocking ✓ OK

Amp2 CH3-CH4 Communication ✓ OK

Amp2 CH3-CH4 Over Current ✓ OK

Amp2 CH3-CH4 Clocking ✓ OK

TONE GENERATOR

Tone WHITE

Volume (ref -18) 0.0 dBFS

Status display

- Amp(n) CH(n)-CH(n) Communication - 'OK' = control signals are working
- Amp(n) CH(n)-CH(n) Over Current - 'OK' = no power overloading
- Amp(n) CH(n)-CH(n) Clocking - 'OK' = digital Clock sync

Configurable options

Amplifier Mode: There are 3 amplification load modes.

4x12W@4Ω 4x12W@8Ω 2x24W@4Ω

Tone: There are 4 tone types. White noise, pink noise, 1kHz sine and 400 Hz sine.

Volume (ref -20): Use the slider to apply gain or gain reduction to the tone within the range of -57 dBFS and 0 dBFS. **NOTE:** a number can be typed directly in the 'dBFS' box.

9.2 OUTPUTS - CHANNELS - AMP CH(N) TABS

The four AMP CH(n) tabs, each have the same configuration options.

The screenshot shows the 'OUTPUTS' configuration window with the 'AMP CH 1' tab selected. The interface is divided into several sections:

- General:** Includes tabs for 'General', 'AMP CH 1', 'AMP CH 2', 'AMP CH 3', 'AMP CH 4', and 'AES CH 1'. Below these is a sub-tab for 'AES CH 2'.
- CHANNEL 1:**
 - Speaker Status:** A button labeled 'FAULT' with a warning icon.
 - FIR Filter:** Toggle buttons for 'ON' and 'OFF', with 'OFF' selected.
 - Volume:** A slider set to 0.0 dB, with a numeric input field containing '0.0 dB'.
 - Delay:** Three numeric input fields for '200 msec', '0.0 meters', and '0.0 feet', each with a corresponding slider below.
 - uDelay:** A slider set to 9 Samples.
 - Line Mute:** Toggle buttons for 'MUTE' and 'UN-MUTE', with 'UN-MUTE' selected.
 - Source:** A dropdown menu showing 'CH1 DANTE'.
- VOX CONTROL:**
 - VOX Source:** A dropdown menu showing 'CH1 DANTE'.
 - VOX Enable:** Toggle buttons for 'OFF' and 'ON', with 'ON' selected.
 - VOX Mode:** Three buttons: 'ROUTE' (selected), 'DIM', and 'MIX'.
 - VOX Timeout:** A slider set to 2 Sec.
 - VOX Threshold:** A slider set to -50 dBFS.
 - VOX Dim Level:** A slider set to -20 dB.

Status display

Speaker Status: For the channel speaker, this will indicate either 'OK' or 'FAULT'.

Configurable options

FIR Filter: Enable (**ON**) or disable (**OFF**) the amp channel Finite Impulse Response (FIR) filter.

Volume: The slider sets the output volume of the amp channel. The range is -72 dB to 24 dB. **NOTE:** a numeric setting can also be typed in directly to the 'dB' box.

Delay: An adjustable channel output delay of up to 1.8 seconds can be defined in either milliseconds, metres or imperial feet.

uDelay: A sample accurate (max 48) delay can be specified for phase based line arrays.

Line Mute: **MUTE** or **UNMUTE** the amp channel output.

Source: Select an audio source for the amp channel from the drop down menu.

Note on VOX function

The **VOX Source** can be thought of as a side chain input that beyond a definable volume threshold attenuates the main amp channel output by a definable amount. The Vox function has 3 modes.

Mode 1 - ROUTE

When it rises above the set threshold volume, the **VOX Source** will be hard routed straight to the main amp channel output, completely overriding the main output source until the **VOX Timeout** duration has been passed **AND** the **VOX Source** volume has dropped back below the set threshold.

Mode 2 - DIM

The **VOX Source** itself will not be routed to the amp channel output. However, when the **VOX Source** rises above the set threshold volume, a definable attenuation of the main output channel will occur until the **VOX Timeout** duration has been passed **AND** the **VOX Source** volume has dropped back below the set threshold.

Mode 3 - MIX

When it rises above the set threshold volume, the **VOX Source** will be mixed with the main output source until the **VOX Timeout** duration has been passed **AND** the **VOX Source** volume has dropped back below the set threshold.

- VOX Source:** Use the drop down menu to select a VOX source from Dante™ channels 1-8, the microphone input, the AES left or the AES right inputs (NAM *PLUS*).
- VOX Enable:** Enable (**ON**) or disable (**OFF**) the VOX side chain functionality.
- VOX Mode:** Choose which VOX mode to operate in (see Note on VOX function, above).
- VOX Timeout:** This slider sets the time period after which the unit reverts to normal amplification operation after the **VOX source** input drops below its set threshold volume. The timeout period ranges from 2 to 20 seconds.
- VOX Threshold:** This slider sets the volume threshold that the **VOX Source** must breach in order to trigger VOX functionality. Range = -70 to 0 dBFS.
- VOX Dim Level:** This slider sets the volume attenuation level for the main channel output when the unit is in VOX **Mode 2** (DIM). Range = -144 to -6 dB.

9.3 OUTPUTS - CHANNELS - AES CH TABS (NAM PLUS)

The two AES CH(n) tabs, each have the same configuration options.

The screenshot shows the 'OUTPUTS' configuration window. At the top, there are tabs for 'General', 'AMP CH 1', 'AMP CH 2', 'AMP CH 3', 'AMP CH 4', and 'AES CH 1'. Below these is a sub-tab for 'AES CH 2'. The main area is titled 'CHANNEL 1' and contains the following controls:

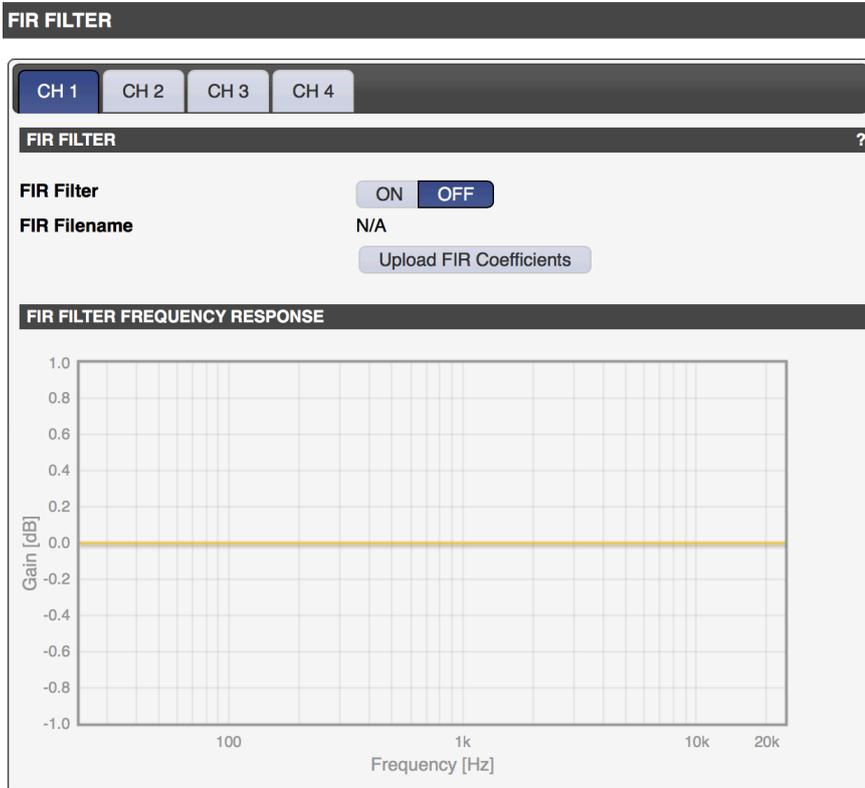
- Volume:** A slider set to 0.0 dB.
- Line Mute:** Two buttons, 'MUTE' and 'UN-MUTE', with 'UN-MUTE' selected.
- Source:** A dropdown menu showing 'CH1 DANTE'.
- VOX CONTROL:**
 - VOX Source:** A dropdown menu showing 'CH1 DANTE'.
 - VOX Enable:** Two buttons, 'OFF' and 'ON', with 'ON' selected.
 - VOX Mode:** Three buttons, 'ROUTE', 'DIM', and 'MIX', with 'ROUTE' selected.
 - VOX Timeout:** A slider set to 2 Sec.
 - VOX Threshold:** A slider set to -50 dBFS.
 - VOX Dim Level:** A slider set to -20 dB.

Configurable options

- Volume:** The slider sets the output volume of the amp channel. The range is -72 dB to 24 dB. **NOTE:** a numeric setting can also be typed in directly to the 'dB' box.
- Line Mute:** **MUTE** or **UNMUTE** the amp channel output.
- Source:** Use the drop down menu to select a source from Dante™ channels 1-8, the microphone input, the AES left or right inputs (NAM PLUS), the tone generator or the MicroSD card.
- VOX Source:** Select a VOX source from Dante™ channels 1-8, the microphone input, the AES left or the AES right inputs (NAM PLUS).
- VOX Enable:** Enable (**ON**) or disable (**OFF**) the VOX side chain functionality.
- VOX Mode:** Choose which VOX mode to operate in.
- VOX Timeout:** This slider sets the time period after which the unit reverts to normal operation after the 'disappearance' of the **VOX source** input. Range = 2 to 20 secs.
- VOX Threshold:** This slider sets the volume threshold that the **VOX Source** must breach in order to trigger the VOX functionality. Range = -70 to 0 dBFS.
- VOX Dim Level:** This slider sets the volume attenuation level for the main channel output channel when the unit is using VOX **Mode 2 (DIM)**. Range = -144 to -6 dB.

9.4 OUTPUTS - FIR FILTER - CH TABS

Each of the NAM's four outputs boasts an independent 1000 point FIR filter, and the ability to upload FIR preset curves.

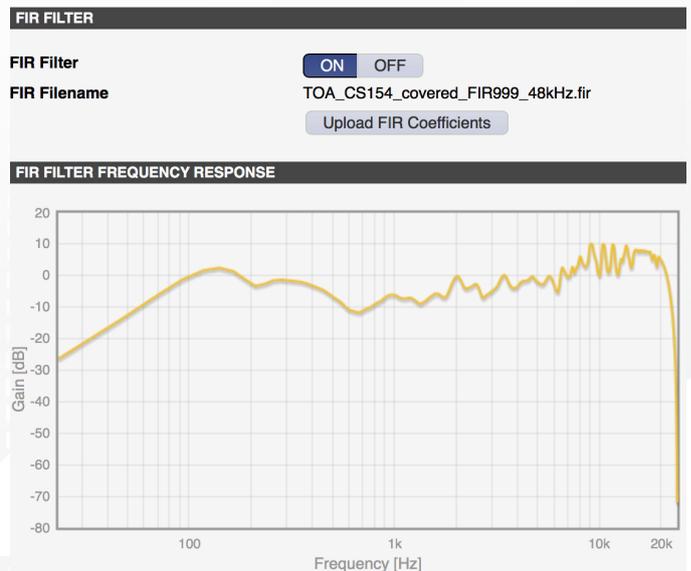


Configurable options

FIR Filter: Enable (**ON**) or disable (**OFF**) the amp channel Finite Impulse Response (FIR) filter.

FIR Filename: Click **Upload FIR Coefficients** to access a .fir file upload dialog. The preset file can be uploaded to the channel and its filename will be displayed. The frequency response chart will also update to display the curve of the uploaded FIR preset.

NOTE: A curve can only be fully cleared by uploading a replacement .fir file or factory resetting the NAM.



9.5 OUTPUTS - SPEAKER DETECT - GENERAL TAB

The Speaker Detection General tab provides status details of all connected speakers and allows adjustment of the Single Shot detection pulse timing.

SPEAKER DETECTION

General CH 1 CH 2 CH 3 CH 4

GENERAL

Single Shot Measurement ON OFF

Refresh Rate 60 Sec

STATUS

Ch-1 (avg Ohm)	<input checked="" type="checkbox"/> OK
Ch-2 (avg Ohm)	<input checked="" type="checkbox"/> OK
Ch-3 (avg Ohm)	<input checked="" type="checkbox"/> OK
Ch-4 (avg Ohm)	<input checked="" type="checkbox"/> OK

Status display

Ch(n) (avg Ohm): After a Speaker Detection pass, an average impedance measurement for that speaker will be displayed in brackets in place of 'avg Ohm'. For example, **Ch-1 (avg 8.1 Ohm)**.

The 'OK' status display means that correct impedance is detected. Otherwise 'FAULT' will be displayed.

Configurable options

Speaker Detection: Switches speaker detect functionality on or off. Enable (**ON**) or disable (**OFF**).

Repeat Rate: This slider controls how often speaker detection is repeated. The time period ranges between 1 and 600 seconds.

9.6 OUTPUTS - SPEAKER DETECT - CH TABS

The four CH(n) tabs allow adjustment of detection parameters and functionality per speaker.

SPEAKER DETECTION

The screenshot shows a control panel for 'SPEAKER DETECTION'. At the top, there are five tabs: 'General', 'CH 1', 'CH 2', 'CH 3', and 'CH 4'. The 'CH 1' tab is selected. Below the tabs, the text 'CHANNEL 1' is displayed. There are three main settings:

- Status (avg Ohm):** A button with a checkmark and the text 'OK'.
- 20kHz Pilot Signal Level:** A horizontal slider bar with a blue knob positioned at the right end, labeled '-30 dB'.
- Detect Range:** A dual-ended horizontal slider bar with two blue knobs. The text '1.0 to 30.0 Ohm' is displayed to the right of the slider.

Status display

Status (avg Ohm): For the selected speaker, the 'OK' status display means that correct impedance is detected. Otherwise 'FAULT' will be displayed.

After a detection pass, an average impedance measurement for that speaker will be displayed in brackets in place of 'avg Ohm'.

Configurable options

20 kHz Pilot Signal Level: This slider allows setting the volume level of the 20 kHz speaker detection signal. The range is -30 dB to -60 dB.

Detect Range: The dual ended slider defines the impedance detection range. Ranges between 1 Ω and 100 Ω can be set by positioning each end marker of the slider.

9.7 OUTPUTS - ROUTING - CH 1-8 TAB

This section sets the NAM's 8 possible Dante™ network audio subscriptions - which can be used as amplified outputs to speakers or as VOX side chain inputs (see page 16).

ROUTING

CH 1-8

01 - DEFAULT 1 - NONE (01)

Subscription	SAM BC 1 L@BGM-PC	 
Mute	<input type="radio"/> ON <input checked="" type="radio"/> OFF	
Latency μ s	6000	
Status	DYNAMIC	
Flow	1	

02 - DEFAULT 1 - NONE (02)

Subscription	SAM BC 1 R@BGM-PC	 
Mute	<input type="radio"/> ON <input checked="" type="radio"/> OFF	
Latency μ s	6000	
Status	DYNAMIC	
Flow	1	

Status display

- Subscription:** Displays the name of the current Dante™ subscription for the channel.
- Mute:** **ON** or **OFF** - enables or disables the stream.
- Latency μ s:** Shows the current Latency setting applied to the Dante™ channel.
- Status:** The type of Dante™ route subscription.
- Flow:** Shows which Dante™ Flow (see - Glossary of Terms) the NAM is subscribed to.

Configurable options

The Add / Change Subscription button  displays a list of available Dante™ devices.

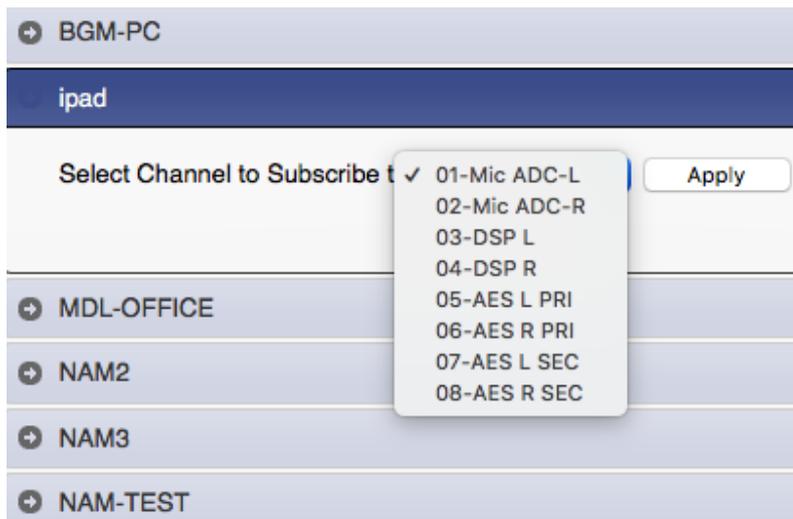
Select Source for Channel 1

Filter

- BGM-PC
- ipad
- MDL-OFFICE
- NAM2
- NAM3
- NAM-TEST

Cancel

Clicking on a device will reveal a drop down menu featuring all available Dante™ streams being broadcast by that device.



After selecting a stream, click 'Apply' to subscribe to it.

To remove a stream, click the Clear Subscription button  clear the Dante™ channel.

A confirmation dialog will ask you to confirm.



9.8 OUTPUTS - NAMES - CHANNEL NAMES TAB

The 8 Dante™ network audio subscriptions can be assigned user friendly names for ease of operation and administration later on.

DANTE RECEIVERS

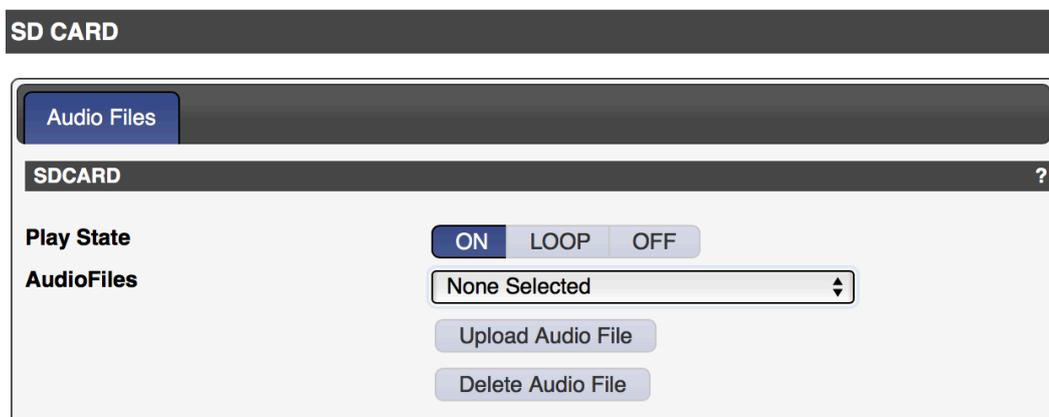
Channel names

INDEX / TYPE	NAME
01	<input type="text" value="Background Music"/>
02	<input type="text" value="Neumann U87 mic booth"/>
03	<input type="text" value="Foxtel feed"/>
04	<input type="text" value="Building announcements"/>
05	<input type="text" value="News feed"/>
06	<input type="text" value="CH6"/>
07	<input type="text" value="CH7"/>
08	<input type="text" value="CH8"/>

Names can be typed directly in to the text area for each subscription channel.

10. SD CARD - AUDIO FILES TAB

NAM comes with an onboard SD Card for the purpose of storing and playing user generated .wav files (48 kHz, 16 bit, mono).



Configurable options

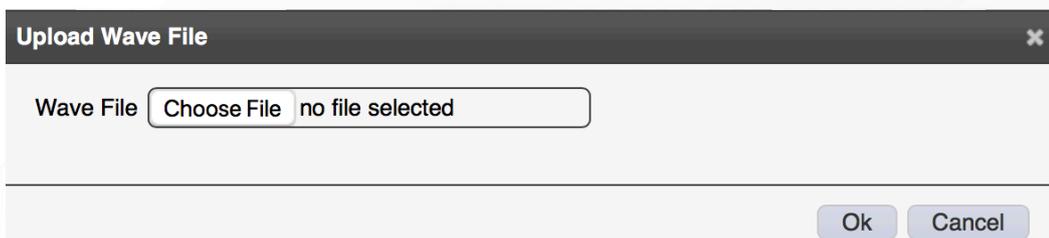
Play State: When 'ON' is selected, any audio file selected from the Audio Files drop down menu will play immediately upon selection - and once only. In this mode, a selected audio file can also be triggered via GPIO or UDP protocol.

When 'LOOP' is selected, any audio file selected from the Audio Files drop down menu will play over and over continuously until the Play State mode is changed.

When 'OFF' is selected, the SD Card audio file functionality is disabled.

Audio Files: The drop down menu lists all audio files stored on the SD Card, and is used to select a file for playback.

Click the **Upload Audio File** button to upload a new file from your computer. An file search dialog will facilitate the upload process.



Click the **Delete Audio File** button to delete the currently selected audio file from the SD Card. A confirmation dialog will warn you before the deletion process.

11. DANTE™ METERING

11.1 RECEIVERS - PEAK VALUES TAB

NAM provides real-time level metering of the audio volume of all Dante™ network audio streams that the NAM is currently subscribed to. Notice that where they have been assigned, user defined names for the streams are used in the display.

DANTE RECEIVERS										
Peak Values										
01 - Background Music	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
02 - Neumann U87 mic booth	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
03 - Foxtel feed	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
04 - Building announcements	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
05 - News feed	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
06 - CH6	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
07 - CH7	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
08 - CH8	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS

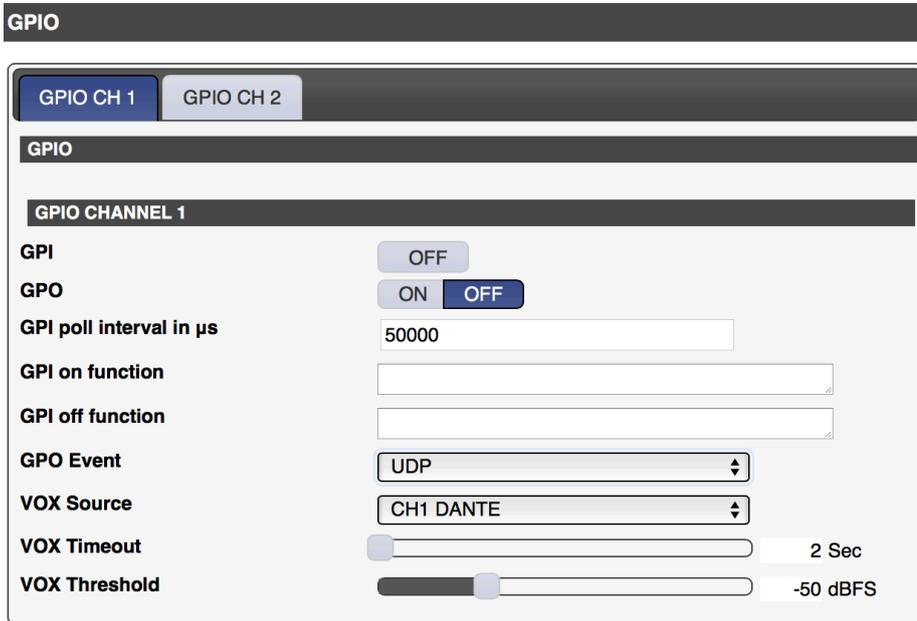
11.2 DANTE™ METERING - TRANSMITTERS - PEAK VALUES TAB

NAM also provides real-time level metering of the audio volume of all physical input sources: the microphone input, SD Card audio files, Tone generator and AES L+R (NAM PLUS). Notice that where they have been assigned, user defined names for the input sources are used in the display.

DANTE TRANSMITTERS										
Peak Values										
01 - Main Program Output	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
02 - Auxiliary Feed	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
03 - Backup Feed	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
04 - Unused 1	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
05 - Microphone - Neumann U87	-72	-63	-54	-45	-36	-27	-18	-9		-99 dBFS
06 - Unused 2	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
07 - Safety Monitor AES (L)	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
08 - Program Commentary AES (R)	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS

12. GPIO (NAM PLUS)

With NAM PLUS, a general-purpose input/output (GPIO) add-on is provided for extended control functionality, which is user definable.



The screenshot displays the GPIO configuration interface. At the top, there are two tabs: 'GPIO CH 1' and 'GPIO CH 2'. Below the tabs, the 'GPIO CHANNEL 1' configuration is shown. The settings include:

- GPI:** A toggle switch set to 'OFF'.
- GPO:** A toggle switch set to 'ON'.
- GPI poll interval in µs:** A text input field containing '50000'.
- GPI on function:** An empty text input field.
- GPI off function:** An empty text input field.
- GPO Event:** A dropdown menu showing 'UDP'.
- VOX Source:** A dropdown menu showing 'CH1 DANTE'.
- VOX Timeout:** A slider control set to '2 Sec'.
- VOX Threshold:** A slider control set to '-50 dBFS'.

Status display

GPI: Displays the status of incoming GPI signal. Either ON or OFF.

Configurable options

GPO: When 'ON', audio output as defined by the configuration is enabled.

GPI poll interval: How often NAM checks for a GPI signal. The default is every 50000 µs.

GPI on function: Can be used to trigger any API event within the device when set high.

GPI off function: Can be used to trigger any API event within the device when set low.

GPO event: Select GPO triggers from the dropdown menu (see 12.1 - GPO options).

VOX Source: Select a VOX source from Dante™ channels 1-8, the microphone input, or AES L / R inputs (NAM PLUS).

VOX Timeout: This slider sets the time period after which the unit reverts to normal amplification operation after the **VOX source** input drops below its set threshold volume. The timeout period ranges from 2 to 20 seconds.

VOX Threshold: This slider sets the volume threshold that the **VOX Source** must breach in order to trigger VOX functionality. Range = -70 to 0 dBFS.

12.1 GPO OPTIONS

The NAM *PLUS* GPIO configuration tabs feature a 'GPIO Event' control drop down selection menu. The menu allows selection of any one of the listed NAM *PLUS* facilities as a means of triggering a GPIO event.

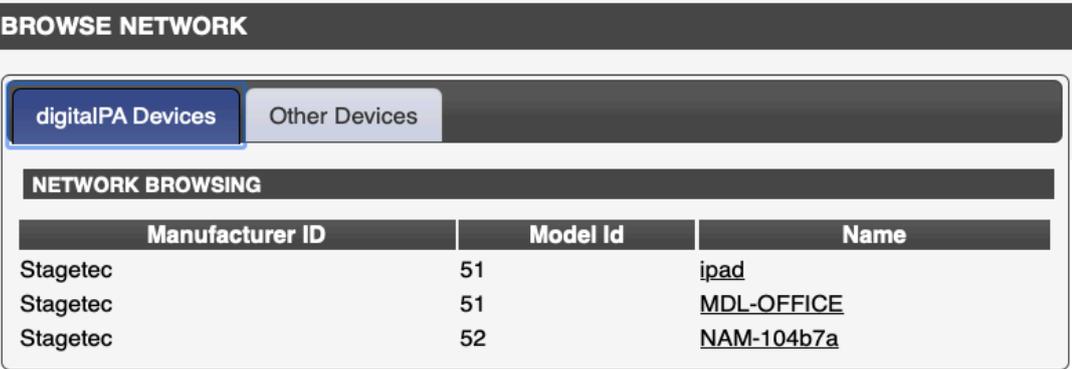
√UDP
NET1 LINK FAIL
NET2 LINK FAIL
NET1-2 LINK FAIL
VOX
AES SYNC FAIL
CH1 DANTE MUTE
CH2 DANTE MUTE
CH3 DANTE MUTE
CH4 DANTE MUTE
CH5 DANTE MUTE
CH6 DANTE MUTE
CH7 DANTE MUTE
CH8 DANTE MUTE

- UDP:** GPIO is triggered by a UDP command via the LAN.
- NET1 LINK FAIL:** GPIO is triggered by a network link failure.
- NET2 LINK FAIL:** GPIO is triggered by a network link failure.
- NET1-2 LINK FAIL:** GPIO is triggered by the failure of all network links.
- VOX:** GPIO is triggered by
- AES SYNC FAIL:** GPIO is triggered by a synchronisation failure of the the AES digital I/O.
- CH1 DANTE MUTE:** GPIO is triggered by silence on the Dante™ Channel (Path Fail Alarm).

13. ADMINISTRATIVE FUNCTIONS

Other side menu functions provide non-audio related device management functionality.

Browse Network: Provides a list of Dante™ devices on the network (**digitalPA Devices** tab) and also other visible devices (**Other Devices** tab).



The screenshot shows a web interface titled "BROWSE NETWORK". It has two tabs: "digitalPA Devices" (selected) and "Other Devices". Below the tabs is a section titled "NETWORK BROWSING" containing a table with three columns: "Manufacturer ID", "Model Id", and "Name".

Manufacturer ID	Model Id	Name
Stagetec	51	ipad
Stagetec	51	MDL-OFFICE
Stagetec	52	NAM-104b7a

Save Config: Used extensively in NAM, this single button function is used to save changes throughout the entire configuration process. When a 'Save Config' is necessary, a prompt window appears above the current window to inform the User.

Download Config: When clicked, this single function side menu button facilitates a .xml file download of the current configuration of the NAM unit to your computer.

Restore Config: Enables a previously saved .xml configuration file to be reloaded into NAM.

Factory Reset: Use with care. This function wipes the NAMs current configuration and reverts it to a factory default condition. There is no recovery of the previous configuration after doing this.

Reboot: Facilitates a complete re-start of the NAM.

Logout: Click 'Logout' to leave configuration mode and return to view STATUS only mode.

14. GLOSSARY OF TERMS

- DNS Suffix:** The DNS suffix specifies the network Domain name to be appended to the computer name when completing its Fully Qualified Domain name (FQDN). If a computer doesn't have the correct DNS suffix, it may have name resolution issues and may be unable to join a network Domain.
- FIR:** A Finite Impulse Response filter is a digital equalisation tool that can compensate for loudspeaker non linearities or counter the effects of room acoustics. An FIR filter is typically used when a speaker manufacturer develops and provides a proprietary FIR coefficient file that corresponds directly to their own loudspeaker or speaker cabinet, addressing frequency and phase issues based on their own measurements and formulations.
- Flow:** For network bandwidth efficiency Dante™ normally packages audio into 4-channel 'Flow's when using Unicast. Flows are unique to each receiver and 1 channel sent to 1 receiver will use the same bandwidth as 4 channels. This means that Flows will always exist as a group of four per channel, even if three of them are 'empty' (contain no audio stream).
HOWEVER, NAM has the inbuilt functionality (System > General) to choose between 2 and 4 Flows per channel - a further bandwidth saving option.
- Latency:** Latency is the time taken for a signal to travel from the input to the output of a system. All digital systems exhibit latency. Each Dante™ receiver introduces a specific, user-adjustable amount of latency before playing out audio to account for any delay variation in the network or end device, and this guarantees that all devices play out in perfect sync. Dante™ Controller sets this latency per device, and the value selected should be based on the size of the network.
- Master Clock:** Dante™ audio networks utilise a master clock device to precisely co-ordinate data transfer among all network devices. The winning master clock candidate is normally designated by the Dante™ Controller application, or the Dante™ Domain Manager application.
- Redundancy:** For '**Redundant**' operation, the NAM must be configured so that there is 1x Ethernet connection and 1x SFP connection in each of the primary and secondary networks (essentially different VLANs). The order is irrelevant as long as the configuration is clear and understood. In a '**Switched**' configuration, redundancy is not used and all four LAN ports are connected via the internal switch function (all in the same VLAN).

15. AUDIO SPECIFICATIONS TABLE

Test	2 x 24 w @ 4 Ω	4 x 12 w @ 8 Ω		
	4 ohms	4 ohms	8 ohms	16 ohms
Maximum output power - all channels driven	30.3	21.6 W	19 W	
Maximum output power - one channel driven	30.3	26.5 W	19 W	10 w
Frequency response 20 Hz to 16 kHz	+0.6/-0.2	+/-0.1 dB	+0.7/-0.2 dB	+1.5/-0.2 dB
Total harmonic distortion + noise- all channels driven	<-55 dB (0.18 %)	<-60 dB (0.1 %)	<-61 dB (0.18 %)	
Difference frequency distortion + noise - all channels driven: 1 kHz/80 Hz and 4 kHz/80 Hz	<-40 dB (1%) up to 8.5 volts	<-40 dB (1%) up to 7.8 volts	<-40 dB (1%) up to 9.2 volts	
Residual hum and noise A weighted - any channel		<-77 dBu(A)		
Inter-channel crosstalk	<-80 dBu below 5 kHz, -70 dBu to to 15 kHz			
Dynamic headroom		1 dB	0 dB	
Output resistance	0.2 ohms			
Latency - input to output delay with 0 ms delay setting	2.08 ms - all channels			

16. HARDWARE LED STATUS

State	Description
Steady LED . No flashing	System operating normally No Error
Continual rapid flashing	CPU firmware update in progress
Error Codes	X number of 500ms flashes followed by 3 sec OFF
1	DSP communication – sync fault
2	AMP IC CH1-2 communication fault
3	AMP IC CH3-4 communication fault
4	Temperature sensor communication fault
5	MIC - Speaker Detect communication fault
6	SD card Initiation fault
7	TDM Delay - SDRAM IC readback fault