



HANDBOOK

AVN-Commentator Unit AVN-CU2 and AVN-CU4

Portable commentator units with Dante® AoIP interfacing.



*Manufacturers of Audio Products for AV,
Installed Sound, Broadcast Radio & Broadcast TV*

SONIFEX

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This handbook is for use with the following product:

AVN-CU2 and AVN-CU4 portable commentator units with Dante® AoIP interfacing, AW10960,
Stock Code: 30-374

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Register Online for an Extended 2 Year Warranty

As standard, Sonifex products are supplied with a 1 year back to base warranty.

If you register the product online, you can increase your product warranty to 2 years and we can also keep you informed of any product design improvements or modifications.

Product: _____

Serial No: _____

To register your product, please go online to www.sonifex.co.uk/register

Product Warranty - 2 Year Extended

As standard, Sonifex products are supplied with a 1 year back to base warranty. In order to register the date of purchase and so that we can keep you informed of any product design improvements or modifications, it is important to complete the warranty registration online. Additionally, if you register the product on the Sonifex website, you can increase your product warranty to 2 years. Go to the Sonifex website at: www.sonifex.co.uk/ register to apply for your 2 year warranty.

Sonifex Warranty & Liability Terms & Conditions

1. Definitions

‘the Company’ means Sonifex Ltd and where relevant includes companies within the same group of companies as Sonifex Limited.

‘the Goods’ means the goods or any part thereof supplied by the Company and where relevant includes: work carried out by the Company on items supplied by the Purchaser; services supplied by the Company; and software supplied by the Company.

‘the Purchaser’ means the person or organisation who buys or has agreed to buy the Goods.

‘the Price’ means the Price of the Goods and any other charges incurred by the Company in the supply of the Goods.

‘the Warranty Term’ is the length of the product warranty which is usually 12 months from the date of despatch; except when the product has been registered at the Sonifex website when the Warranty Term is 24 months from the date of despatch.

‘the Contract’ means the quotation, these Conditions of Sale and any other document incorporated in a contract between the Company and the Purchaser.

This is the entire Contract between the parties relating to the subject matter hereof and may not be changed or terminated except in writing in accordance with the provisions of this Contract. A reference to the consent, acknowledgement, authority or agreement of the Company means in writing and only by a director of the Company.

2. Warranty

- a. The Company agrees to repair or (at its discretion) replace Goods which are found to be defective (fair wear and tear excepted) and which are returned to the Company within the Warranty Term provided that each of the following are satisfied:
 - i. notification of any defect is given to the Company immediately upon its becoming apparent to the Purchaser;
 - ii. the Goods have only been operated under normal operating conditions and have only been subject to normal use (and in particular the Goods must have been correctly connected and must not have been subject to high voltage or to ionising radiation and must not have been used contrary to the Company’s technical recommendations);
 - iii. the Goods are returned to the Company’s premises at the Purchaser’s expense;
 - iv. any Goods or parts of Goods replaced shall become the property of the Company;
 - v. no work whatsoever (other than normal and proper maintenance) has been carried out to the Goods or any part of the Goods without the Company’s prior written consent;
 - vi. the defect has not arisen from a design made, furnished or specified by the Purchaser;
 - vii. the Goods have been assembled or incorporated into other goods only in accordance with any instructions issued by the Company;

- viii. the defect has not arisen from a design modified by the Purchaser;
 - ix. the defect has not arisen from an item manufactured by a person other than the Company. In respect of any item manufactured by a person other than the Company, the Purchaser shall only be entitled to the benefit of any warranty or guarantee provided by such manufacturer to the Company.
- b. In respect of computer software supplied by the Company the Company does not warrant that the use of the software will be uninterrupted or error free.
- c. The Company accepts liability:
- (i) for death or personal injury to the extent that it results from the negligence of the Company, its employees (whilst in the course of their employment) or its agents (in the course of the agency);
 - (ii) for any breach by the Company of any statutory undertaking as to title, quiet possession and freedom from encumbrance.
- d. Subject to conditions (a) and (c) from the time of despatch of the Goods from the Company's premises the Purchaser shall be responsible for any defect in the Goods or loss, damage, nuisance or interference whatsoever consequential economic or otherwise or wastage of material resulting from or caused by or to the Goods. In particular the Company shall not be liable for any loss of profits or other economic losses. The Company accordingly excludes all liability for the same.
- e. At the request and expense of the Purchaser the Company will test the Goods to ascertain performance levels and provide a report of the results of that test. The report will be accurate at the time of the test, to the best of the belief and knowledge of the Company, and the Company accepts no liability in respect of its accuracy beyond that set out in Condition (a).
- f. Subject to Condition (e) no representation, condition, warranty or other term, express or implied (by statute or otherwise) is given by the Company that the Goods are of any particular quality or standard or will enable the Purchaser to attain any particular performance or result, or will be suitable for any particular purpose or use under specific conditions or will provide any particular capacity, notwithstanding that the requirement for such performance, result or capacity or that such particular purpose or conditions may have been known (or ought to have been known) to the Company, its employees or agents.
- g. (i) To the extent that the Company is held legally liable to the Purchaser for any single breach of contract, tort, representation or other act or default, the Company's liability for the same shall not exceed the price of the Goods.
- (ii) The restriction of liability in Condition (g)(i) shall not apply to any liability accepted by the Seller in Condition (c).
- h. Where the Goods are sold under a consumer transaction (as defined by the Consumer Transactions (Restrictions on Statements) Order 1976) the statutory rights of the Purchaser are not affected by these Conditions of Sale.

Unpacking Your Product

Each product is shipped in protective packaging and should be inspected for damage before use. If there is any transit damage take pictures of the product packaging and notify the carrier immediately with all the relevant details of the shipment. Packing materials should be kept for inspection and also for if the product needs to be returned.

The product is shipped with the following equipment so please check to ensure that you have all of the items below. If anything is missing, please contact the supplier of your equipment immediately.

Item	Quantity
Product unit	1
IEC mains lead fitted with moulded mains plug (AVN-CU4 only). <i>Please note that the AVN-CU2 does not come with the IEC lead.</i>	1
Handbook	1

If you require a different power lead, please let us know when ordering the product.

Repairs & Returns

Please contact Sonifex or your supplier if you have any problems with your Sonifex product. Email technical.support@sonifex.co.uk for the repair/upgrade/returns procedure, or for support & questions regarding the product operation.

CE Conformity

The products in this manual comply with the essential requirements of the relevant European health, safety and environmental protection legislation.

The technical justification file for this product is available at Sonifex Ltd.

The declaration of conformity can be found at:
<https://www.sonifex.co.uk/declarations>

Safety & Installation of Mains Operated Equipment

There are no user serviceable parts inside the equipment. If you should ever need to look inside the unit, always disconnect the mains supply before removing the equipment covers. The cover is connected to earth by means of the fixing screws. It is essential to maintain this earth/ground connection to ensure a safe operating environment and provide electromagnetic shielding.

Voltage Setting Checks (AVN-CU4 Only)

Ensure that the machine operating voltage is correct for your mains power supply by checking the box in which your product was supplied. The voltage is shown on the box label. The available voltage settings are 115V, or 230V. Please note that all products are either switchable between 115V and 230V, or have a universal power supply.

Fuse Rating (AVN-CU4 Only)

The product is supplied with a single fuse in the live conducting path of the mains power input. For reasons of safety it is important that the correct rating and type of fuse is used. Incorrectly rated fuses could present a possible fire hazard, under equipment fault conditions. The active fuse is fitted on the outside rear panel of the unit.

Power Cable & Connection (AVN-CU4 Only)

An IEC power connector is supplied with the product which has a moulded plug attached.

The mains plug or IEC power connector is used as the disconnect device. The mains plug and IEC power connector shall remain readily operable to disconnect the apparatus in case of a fault or emergency.

The mains lead is automatically configured for the country that the product is being sent to, from one of:

Territory	Voltage	IEC Lead Type	Image
UK & Middle East	230V	UK 3 pin to IEC lead	
Europe	230V	European Schuko round 2 pin to IEC lead	
USA, Canada and South America	115V	3 flat pin to IEC lead	
Australia & New Zealand	230V	Australasian 3 flat pin to IEC lead	

Connect the equipment in accordance with the connection details and before applying power to the unit, check that the machine has the correct operating voltage for your mains power supply.

This apparatus is of a class I construction. It must be connected to a mains socket outlet with a protective earthing connection.

Important note: If there is an earth/ground terminal on the rear panel of the product then it must be connected to Earth.

WEEE Directive



The Waste Electrical and Electronic Equipment (WEEE) Directive was agreed on 13 February 2003, along with the related Directive 2002/95/EC on Restrictions of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS). The Waste Electrical and Electronic Equipment Directive (WEEE) aims to minimise the impacts of electrical and electronic equipment on the environment during their life times and when they become waste. All products manufactured by Sonifex Ltd have the WEEE directive label placed on the case. Sonifex Ltd will be happy to give you information about local organisations that can reprocess the product when it reaches its “end of use”, or alternatively all products that have reached “end of use” can be returned to Sonifex and will be reprocessed correctly free of charge.

Atmosphere/Environment

This apparatus should be installed in an area that is not subject to excessive temperature variation (<0°C, >50°C), moisture, dust or vibration.

This apparatus shall not be exposed to dripping or splashing, and no objects filled with water, such as vases shall be placed on the apparatus.

1. AVN-Commentator Unit

Introduction

The AVN-CU2 and AVN-CU4 are portable commentator units. Using Dante® AoIP together with 4 wire connections both the AVN-CU2 and AVN-CU4 bridge the gap between old and new technology, allowing the ease of connectivity & functionality of AoIP together with the legacy connections needed to operate with existing infrastructure in some stadia and sports grounds.

The units have an easy to use physical interface with metal shafted encoders, illuminated buttons, status indicators, and a TFT display showing useful information. An embedded web server is also implemented and is used to access audio routing and more advanced options.

The unit supports up to 16 input and output AoIP channels and up to 16 simultaneous input and output AoIP streams. AoIP streams are setup via Dante® Controller with more detailed configuration performed using the built-in web GUI. Once Dante® flows have been made, the mix engine allows inputs and outputs to be mixed freely to AoIP or physical inputs and outputs, controlled using the programmable buttons and rotary encoders on the unit.

The AVN-CU2 provides two locking mic/line inputs each with +48V phantom power indication and a wide, adjustable gain range. It has two stereo headphone outputs with locking 6.35 mm (¼ inch) jack sockets, suitable for operation by two commentators. The AVN-CU4 provides four commentator positions with four mic/line inputs and four stereo headphone outputs.

The AVN-CU2 can be powered using Power over Ethernet (PoE), and the AVN-CU4 using Power over Ethernet + (PoE+). Both units use Neutrik EtherCON connectors, with primary and secondary ports for power and data redundancy. There is an additional 4 pin XLR 12V DC input for use when PoE is not available or extra power redundancy is required.

The AVN-CU4 also provides a fused AC mains electricity input on an IEC inlet, with universal supply allowing for the varying voltage and frequency requirements of different countries.

The AVN-CU2 provides 6 push-button rotary encoders and 12 key-cap buttons, whilst the AVN-CU4 provides 12 push-button rotary encoders and 24 key-cap buttons. Push-button rotary encoders can be used to control, input levels, output levels and panning of assigned audio sources whilst key-cap buttons can be configured to perform various functions such as taking commentators on-air and activating GPIO.

Each rotary encoder has a separate colour-coded meter section showing the channel name, detailed level metering, left/right panning and a limiter indication, the brightness of the display is adjustable allowing it to remain readable in bright daylight. The colour of each encoder can be programmed allowing a commentator to quickly identify source and destination groups, and so perform adjustment to audio groups intuitively.

Metering is available on each input/output, with output metering configurable as pre or post level adjustment. The top of the display shows output metering, a limiter indication and the name of the output. A limiter with a configurable threshold is also available on every output.

On the AVN-CU2, 2 four-wire RJ45 connections are available on the back panel of the device. One is used as an input and the other is used as an output, both connections can be individually configured as either digital (AES3) or analogue. The input can be routed to the main (program) bus, talkback buses, commentator headphones, the output four-wire connection, and any AoIP outputs. The output can receive audio from the main (program) bus, talkback buses, commentator microphones, the input four-wire connection, and any AoIP inputs.

The AVN-CU4 provides further connectivity with four analogue line inputs on XLR sockets with latching locks, six analogue line outputs on XLR plugs, one RJ45 digital (AES3) stereo input and one RJ45 digital (AES3) stereo output.

Each unit has dual redundant network ports on both RJ45s (PoE using 2 Neutrik EtherCON® connectors) and SFP cages.

There are 10 configurable GPIO on a 15-way D-type connector with 1 switched changeover output.

All of the buttons have key-cap text and can be configured to allow for any button function at any position. There are some standard operations available:

- On-Air control for each commentator position, used to connect mic audio to the main output, either over AoIP or via the physical audio connections.
- A menu button can be used to access limited setup options on the TFT display.
- Page buttons change the display and encoders to monitor an additional set of sources, mix points or outputs. Up to 4 pages per display can be pre-programmed. So, for the AVN-CU2 4 pages labelled 1-4 can be configured on its display and for the AVN-CU4, 4 pages labelled 1-4 can be configured on the left-hand display and another 4 pages labelled 1-4 can be configured on the right-hand display. For example; one page might be used for commentator mics and headphones, one might be used for talkback inputs, one might be used for physical, Dante, or tone inputs, and another may be used for outputs such as the main output.
- User buttons can be programmed to perform various functions using the web server, such as activating a physical GPO, a virtual GPO, a relay, or an event.
- A cough control is available for each commentator position which temporarily takes the commentator off-air while pressed.
- 4 T/B (talkback) controls are available for each commentator position, which can be configured to initiate talkback over AoIP or the physical audio connections using the 4 talkback buses. The talkback buttons can be configured to operate with lazy-gang talkback. By default, activating a talkback will also take the commentator off air until the talkback state is cleared, it is also possible to configure talkback so that the commentator remains on-air when talkback is invoked.

2. Getting Started

We recommend you read the manual in this order.

1. View the **Quick Start** section to get your device up and running.
2. Setup device names and channel labels in Dante Controller, view the **Configuring a Device** section for instructions.
3. Routing audio in Dante Controller, view the **Routing Audio** section for instructions.
4. Adding Dante inputs and Dante outputs to the commentator unit, view the **Adding Dante Input and Output Groups** section for instructions.
5. Configuring user buttons on the top panel of the commentator unit, view the **Front Panel Settings and Control** section for instructions.
6. Controlling inputs, outputs, and mix-points with encoders, view the **Adding an Encoder** section for instructions.
7. Locking user buttons and encoders, view the **Locking User Buttons and Encoders** section.
8. Saving and loading profiles, view the **Save Configuration to A File** section and the **Load Configuration from A File** section.
9. Controlling the commentator unit remotely, view the **Remote Control** section.

3. Quick Start

Connecting to the AVN-CU2/AVN-CU4



1. Plug an Ethernet cable into the primary port of the AVN-CU2/AVN-CU4.



2. Connect the other side of the Ethernet cable into your network switch.



3. If your network switch supports PoE, the unit can be powered using this method and is indicated by the 'Pri' and 'Sec' PoE status LEDs.



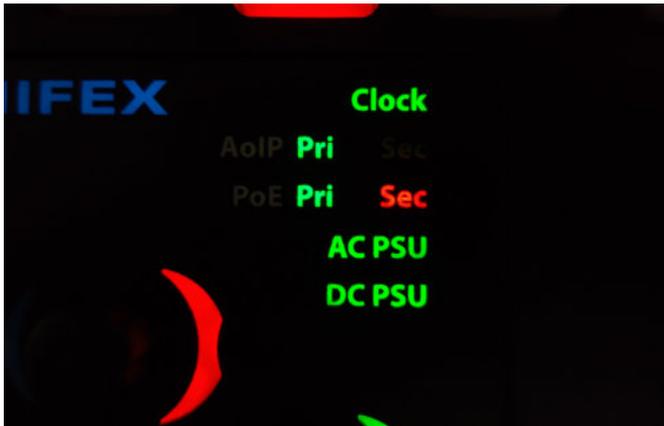
4. If your switch does not support PoE, the DC adaptor can be used instead and has the following pinout:
Pin 1: Ground, Pin 2: N/C, Pin 3: N/C, Pin 4: +12V



5. When powered using a DC supply, the DC PSU LED will turn green. It is possible to power the unit with PoE and DC at the same time for redundancy.



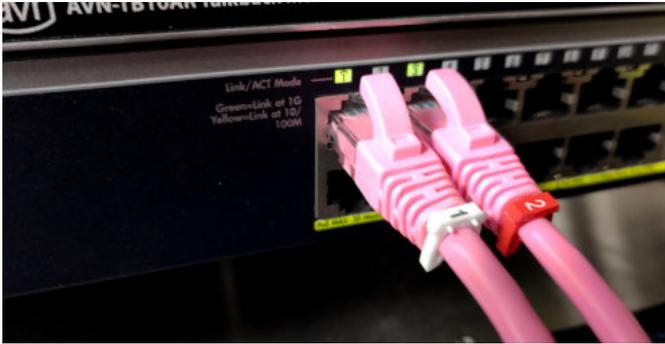
6. On the AVN-CU4 the option to power the unit via an AC supply is also available.



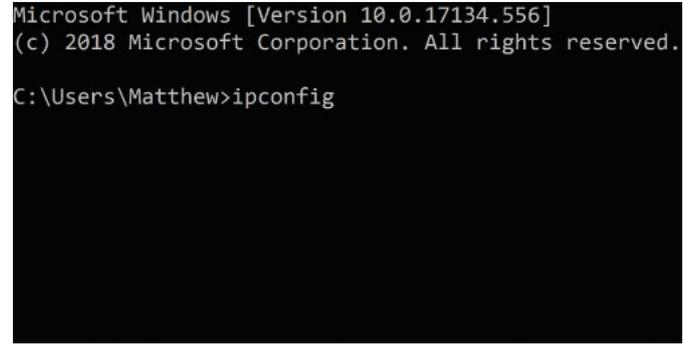
7. When AC power is available the AC PSU LED will illuminate green.



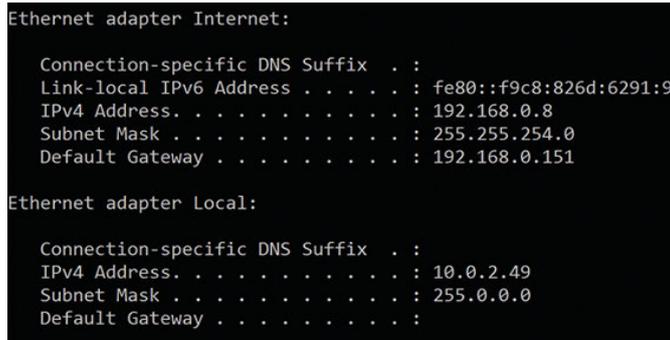
8. Connect an Ethernet cable into the Ethernet port of your PC .



9. Connect the other side of this Ethernet cable into your network switch.



10. In order to find the IP address of your Windows computer open the start menu and type 'Command Prompt', open Command Prompt and type 'ipconfig'.



11. Press enter on the keyboard and note the IP address of your network adaptor connected to the same network switch. In this case it is '10.0.2.49' with a subnet mask of '255.0.0.0'.



12. Press the 'Menu' button on the front panel of the commentator unit, and select the 'Network' sub-menu by pressing down on the white encoder.



13. This sub-menu shows the available network ports on the commentator unit, select the 'Control' port by pressing the white encoder.



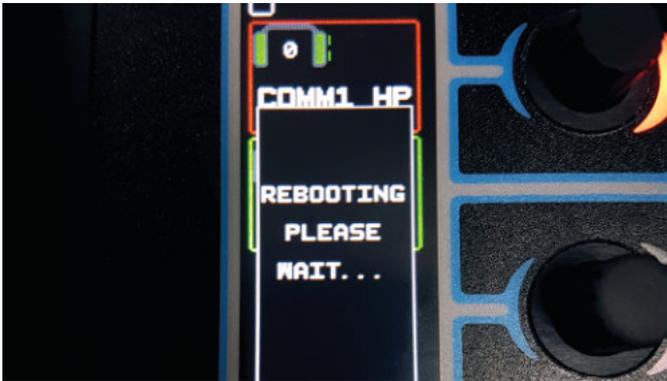
14. This sub-menu shows the IP address settings of the control port, select 'IP Address' by pressing the red encoder.



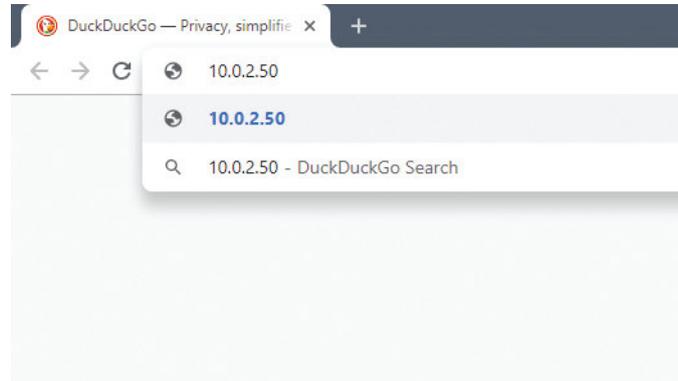
15. Modify the IP address so that it is within the same subnet as your PC, then select 'Save' using the yellow encoder.



16. This takes you back to the control port sub-menu. Select 'Netmask' using the green encoder, and then change the subnet to match the subnet of your PC, again selecting 'Save' once complete.



17. Select 'Close' using the cyan encoder, this closes the menu. The unit will then restart to apply the changes.

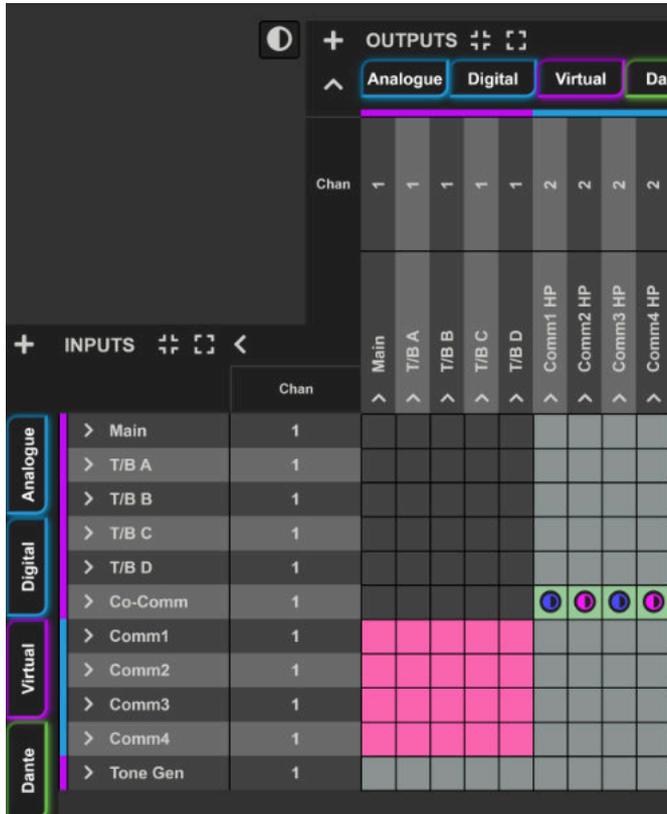


18. Open your web browser, type the IP address into the address bar and press enter.



19. The device information web page will open.

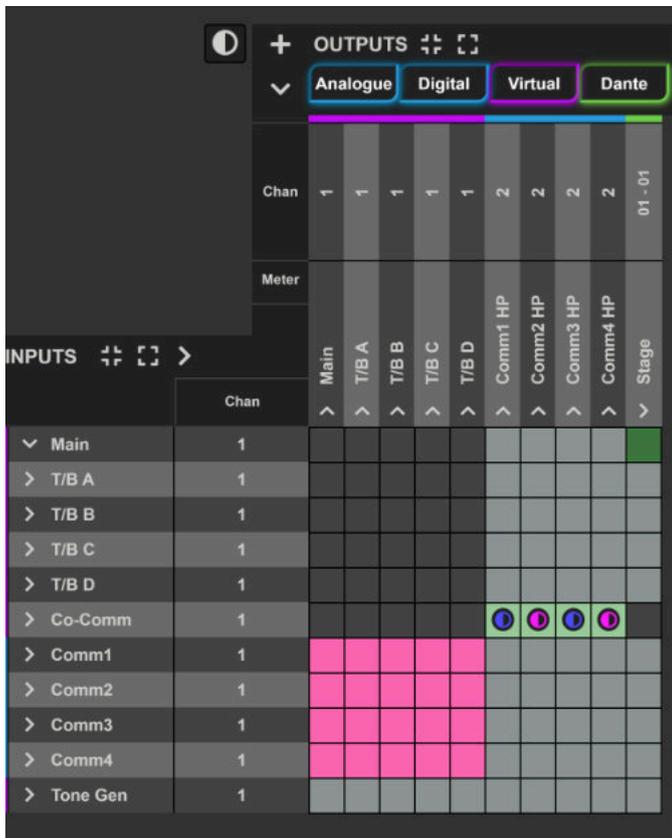
Adding a Main Program Output



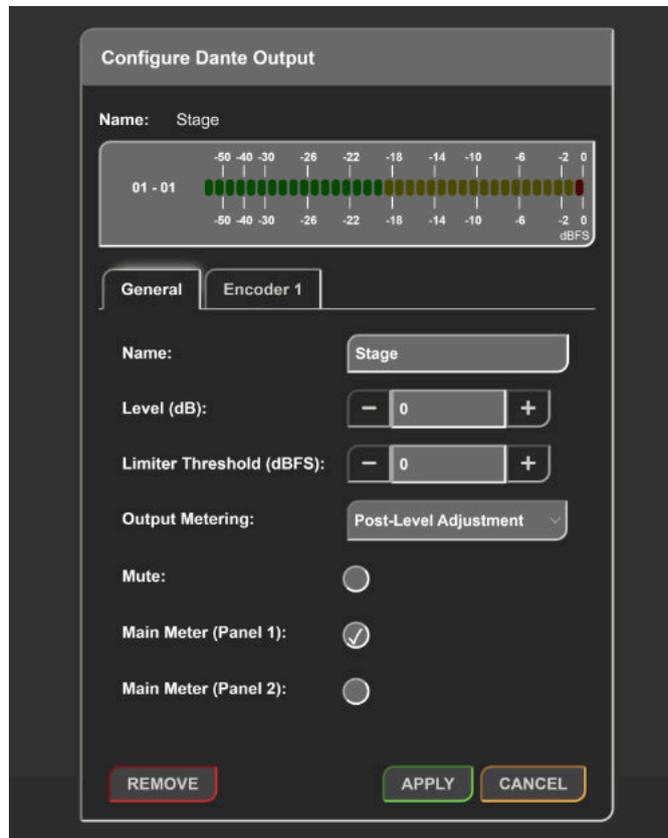
1. Navigate to 'Audio Routing' this can be found under the 'Configuration' tab. Click on the 'Add Output Group' icon (+).



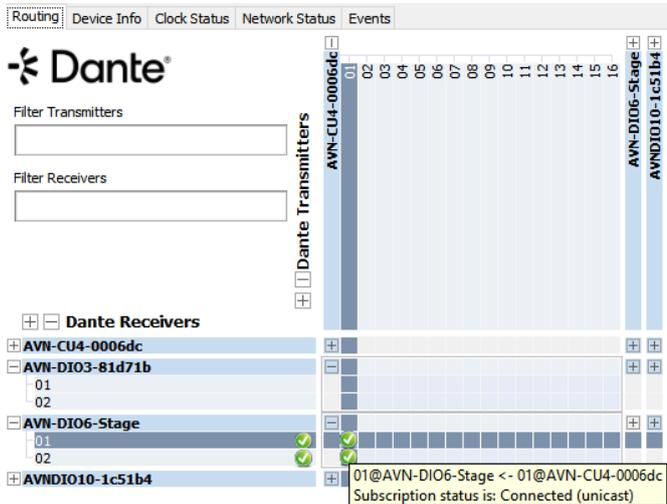
2. The 'Add Output Group' window opens. Enter a name and then change the type, which in this case is a Dante output called 'Stage' on channel 1. Click 'Add'.



3. Click on the box between the 'MAIN' input and 'Stage' to route audio. The new routing is now shown on the routing grid, this is symbolised by the green box between the input and output channel. Click on the 'Stage' output to configure it



4. Selecting 'Main Meter' will cause any audio on the output to be displayed in the main meter section on the top panel display of the device. There won't be any audio yet. Click apply.



5. The device name in Dante Controller is based on the device type and the last 3 octets of the primary Dante ports hardware address, on this device the last 3 octets are '0006DC'. In Dante controller expand the transmit channels of the device, and the receive channels of the device you want to route the audio to. In this case a routing to the Dante device 'AVN-DIO6-Stage' is made, since the 'Stage' output was created on channel 1, a routing between channel 1 of the unit is made to both channels of the 'AVN-DIO6-Stage'. After a short time two green ticks should be displayed.

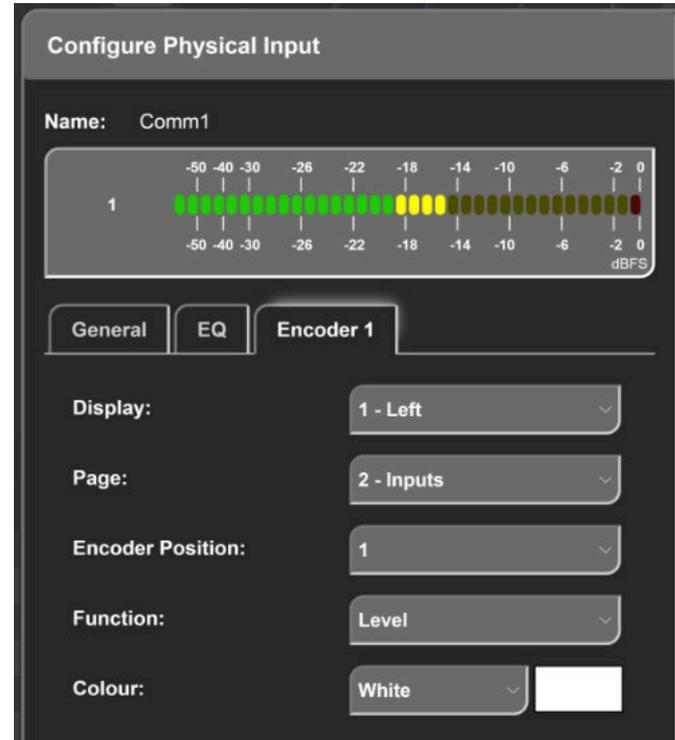
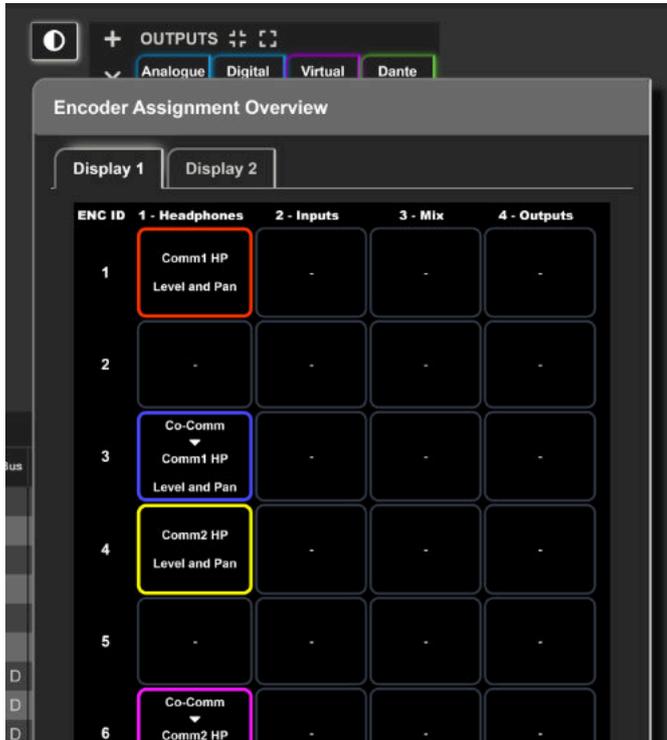


6. Now any audio on the 'Main' output will be routed to the other Dante device. Pressing the 'On-Air 1' button on the top panel of the device will cause any sound on the first commentators' microphone to be heard on the device receiving the stage output. Connect a microphone and pair of headphones to the commentator unit.



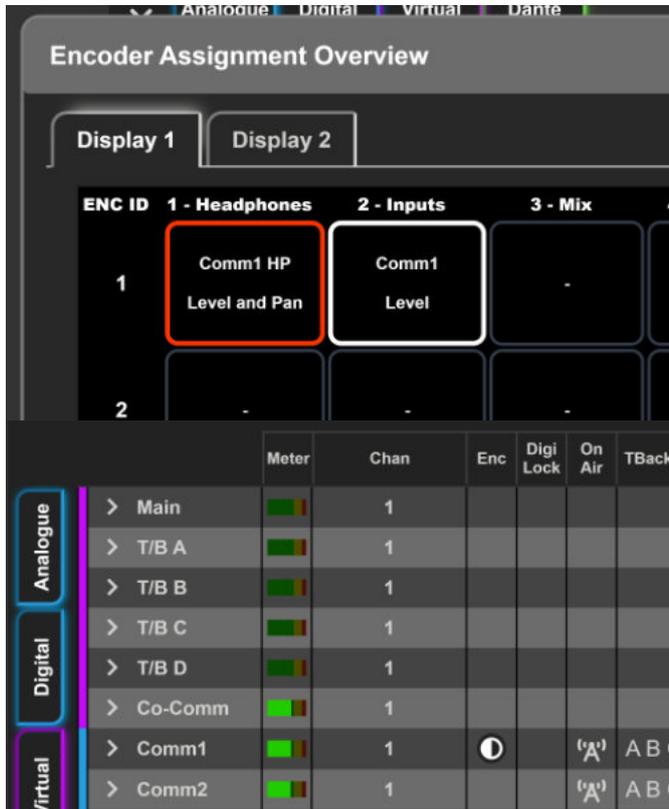
7. Next press the 'On-Air 1' button on the top panel and speak into the microphone, the sound from your microphone should now be received by the other Dante device. You should also notice main metering change whilst using the microphone and the position is on-air.

Assigning an Encoder



1. When you open the 'Audio Routing' web page the 'Encoder Assignment Overview' window should be displayed, if it has been hidden, you can click the 'Show Encoder Assignment Overview' button (🔍). The encoder assignments overview shows the page, position, colour, name of input or output, and function of each encoder.

2. Click on the input, output, or mix-point you would like to add an encoder to, in this case the 'Comm1' microphone is selected. In the configuration window 'Encoder 1' tab is selected. Looking at the encoder assignments overview, encoder position 1 on page 2 is currently free, this position is selected using the dropdown list. The 'Level' function is selected as this will allow adjustment of the microphones level, and the colour is set to white.



3. The new encoder will be displayed in the overview window and also on the actual commentator input.

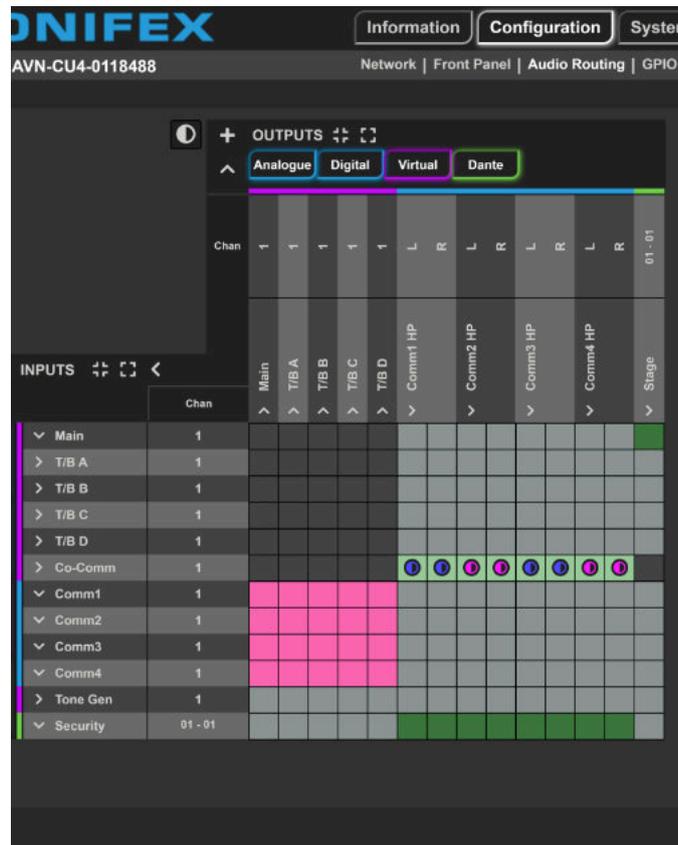


4. The encoder can now also be seen on the top panel of the device, the metering for the audio received by the input is shown along with the current level adjustment. Turn the encoder clockwise and anti-clockwise to adjust this value. Double pressing the encoder will cause the input to mute and unmute.

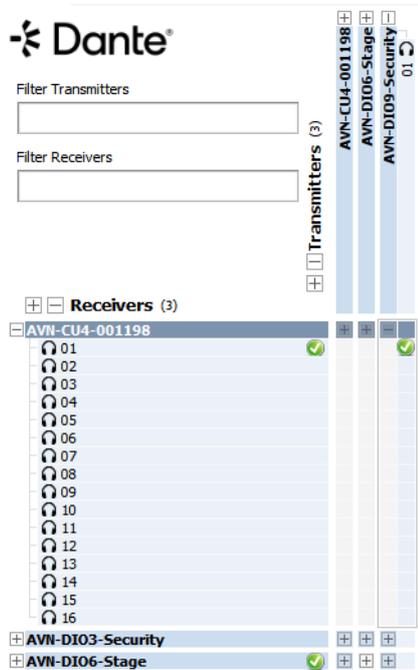
Configuring Talkback



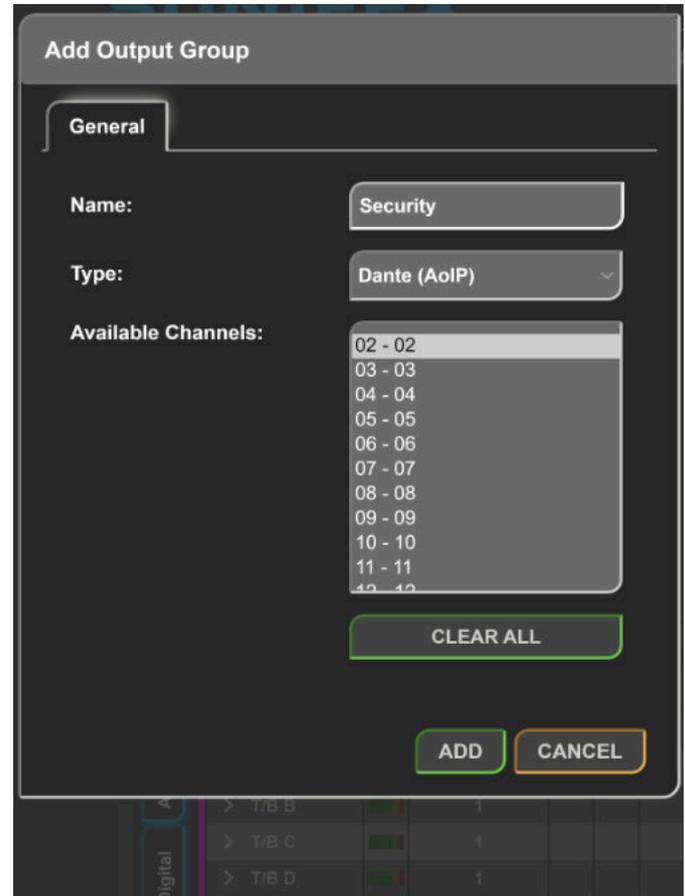
1. An input group is added to the device, this will be an AoIP stream from the person we want to hear.



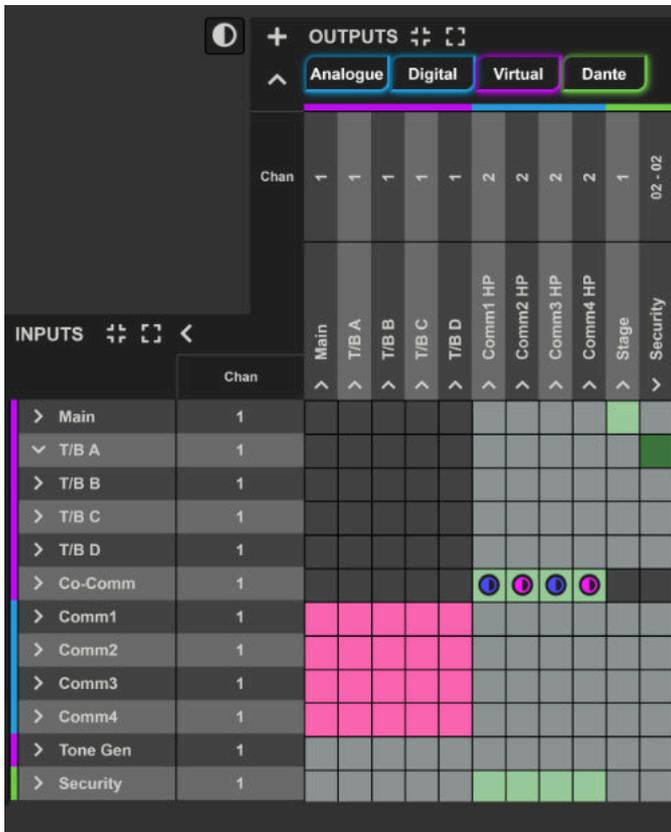
2. This input is routed directly to the commentators headphones.



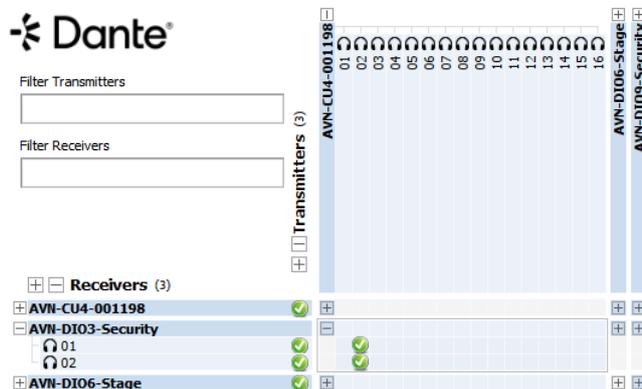
3. In Dante Controller a channel from a transmitter is routed to a receiving channel of the Commentator Unit. Any audio from the transmitter will now be heard in the commentator's headphones.



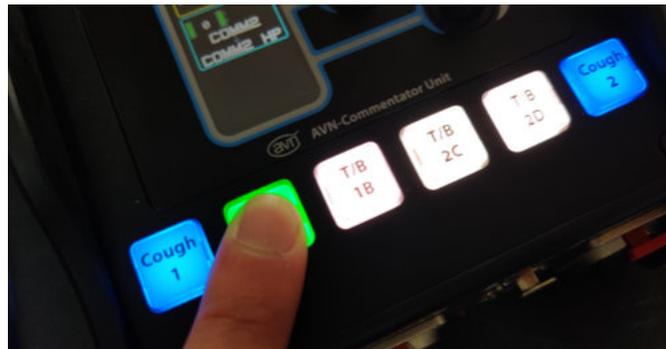
4. A Dante output group is added to the device, this will be used for talkback.



5. A routing is then made between the talkback bus A and the Dante output group.



6. The transmitted Dante channel is then routed to the receiving device.



7. Pressing a talkback button will connect the commentators microphone to the talkback bus, allowing the commentator to be heard by the receiving device. By default if the commentator is on-air whilst the talkback button is pressed they will be taken off-air, this is indicated by flashing the on-air button.

4. Dante Controller

Dante Controller is an application used to create connections between Dante enabled devices on the network, this section will help you get up and running, however for more detailed documentation it is recommended that you visit the official documentation page at:

<https://dev.audinate.com/GA/dante-controller/userguide/webhelp/home.htm>

Download and Install Dante Controller

Dante Controller can be downloaded from the official Audinate website, you will have to create an Audinate account if you do not already have one:

<https://www.audinate.com/products/software/dante-controller>

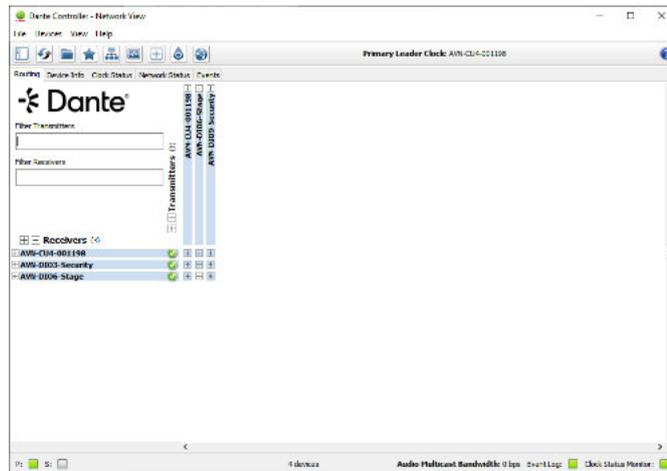


Fig 4-1: Dante Controller application window

Configuring a Device

In order to configure a device in Dante Controller double click the name of that device in the routing grid, this opens the **Device View** window.

Device Name

To change the device name, open the **Device View** window and click on the **Device Config** tab. Change the name in the **Rename Device** field and click apply.

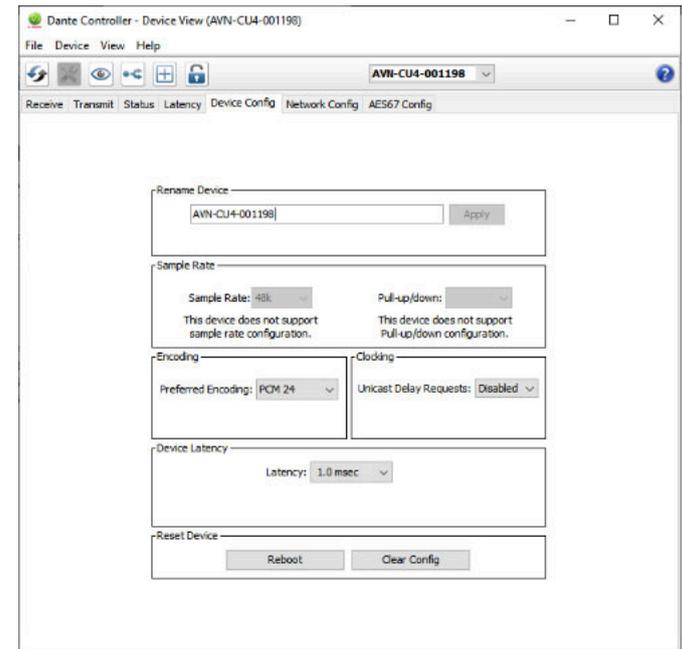


Fig 4-2: Device Config tab

In the routing grid you can see the device is renamed, in this case it is renamed to AVN-CU4-Matt.

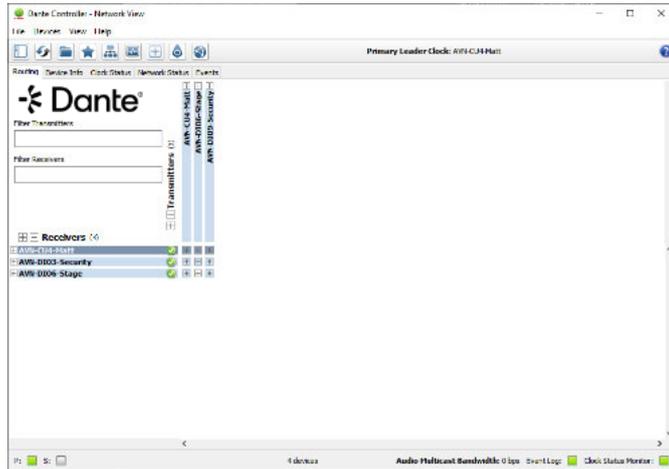


Fig 4-3: Renamed device in routing grid

Channel Labels

The labels of transmit and receive channels can also be changed. By default the channels are labelled with numbers.

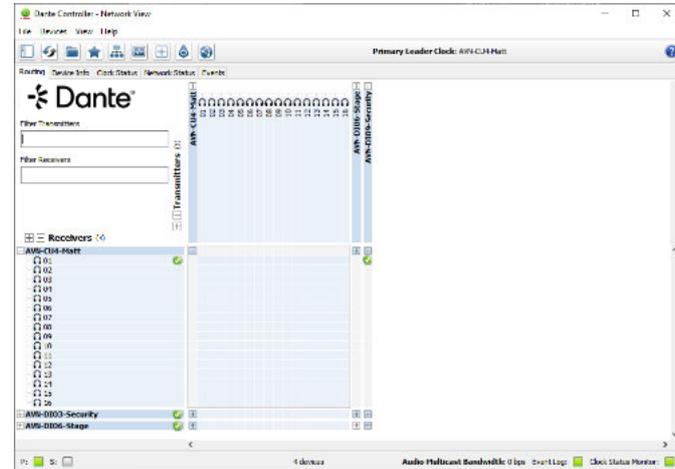


Fig 4-4: Device with default channel labels

To edit receive channel labels open the **Device View** and select the **Receive** tab.

Click a **Channel** field and enter a new name.

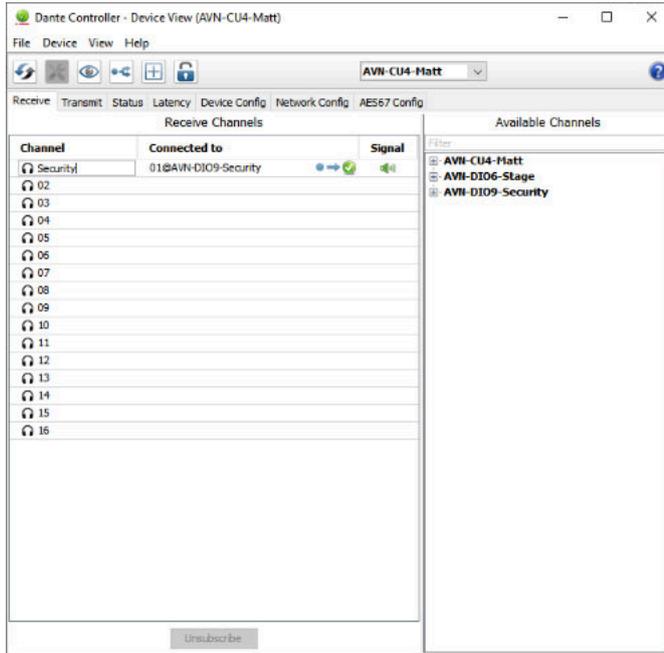


Fig 4-5: Changing receive channel labels

To edit receive channel labels open the **Device View** and select the **Transmit** tab.

Click a **Channel** field and enter a new name.

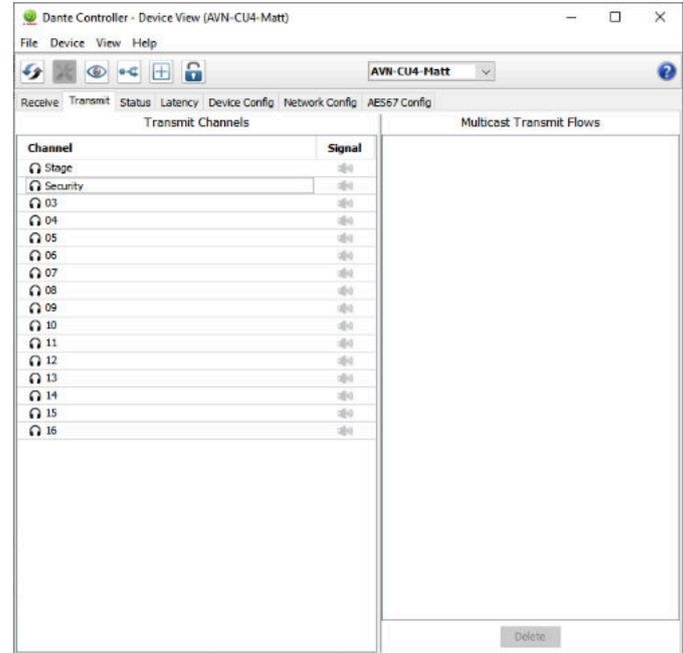


Fig 4-6: Changing transmit channel labels

After the desired changes have been made the **Device View** window can be closed, the changes made are then reflected in the routing grid.

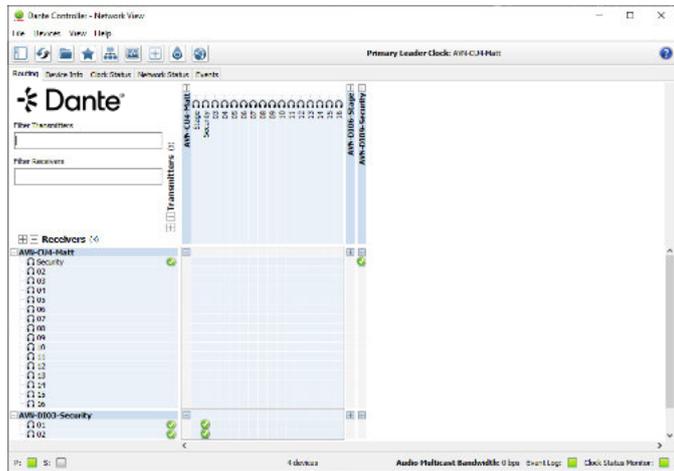


Fig 4-7: Channels with updated labels

Filtering Devices

Filters are available which allow the user to sort through devices and find the device they need quickly. Click the **Hide/Show Filter Pane** icon to view the filter pane. In the example below the **Audio Sample Rate** filter is used to display only devices operating at **48k**.

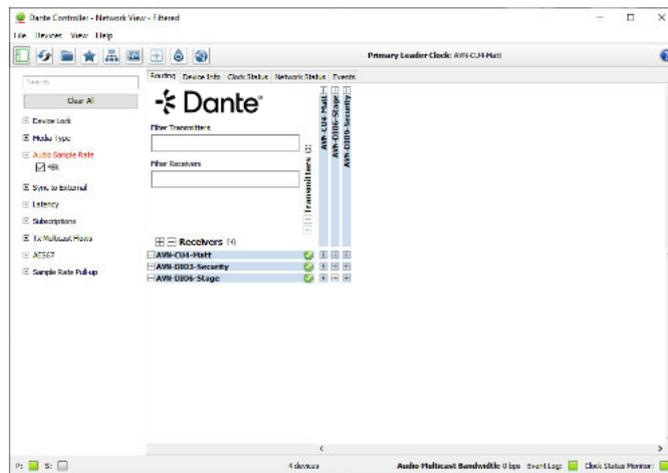


Fig 4-8: Showing the filter pane

The **Filter Transmitters** and **Filter Receivers** fields can be used to filter devices by their name and the names of their channels.

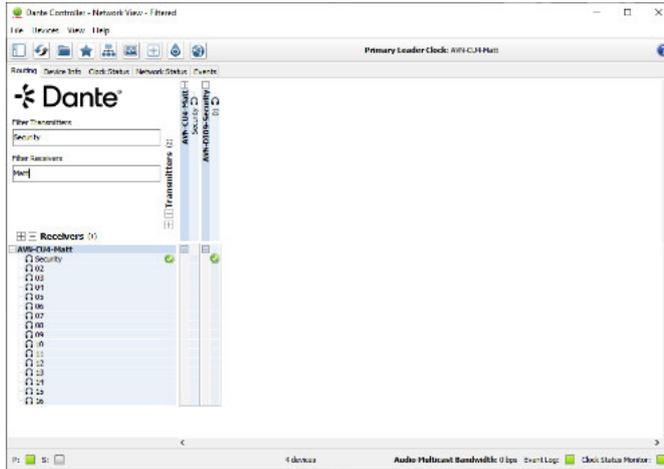


Fig 4-9: Filtering transmitters

Routing Audio

To route audio click on a square between a transmit and receive channel. Initially an hour glass icon is shown on the square to indicate a routing is pending, after a short time this then changes to a green circle with a tick to show the routing has been made successfully. In the example below 01@AVN-DIO9-Security is routed to Security@AVN-CU4-Matt.

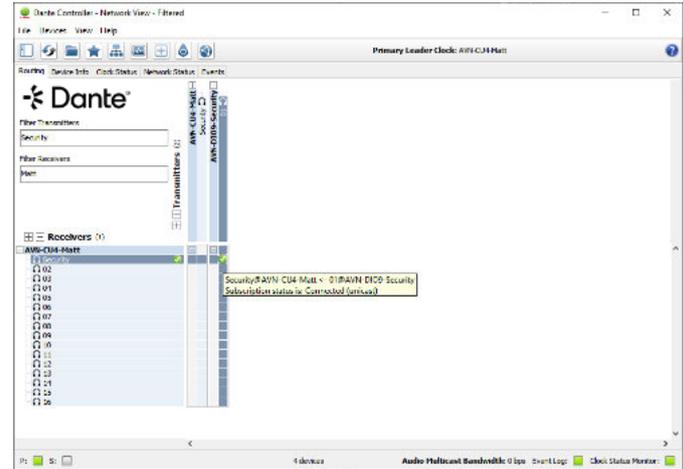


Fig 4-10: Routing between a transmit and receive channel

Hold **Ctrl** and click the collapse square to connect all diagonal routings.



Fig 4-11: Quick routing

AES67 Compatibility

Dante devices with AES67 compatibility will have an **AES67 Config** tab within the **Device View** window.

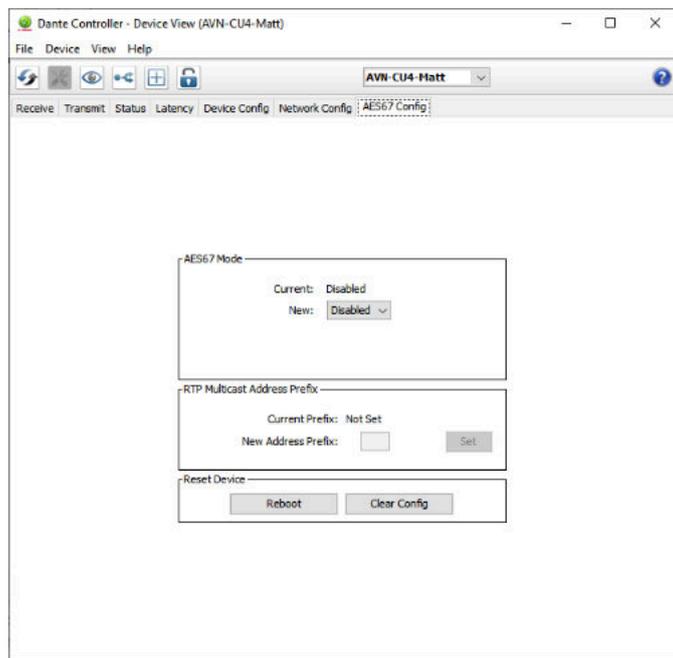


Fig 4-12: AES67 Config tab with AES67 mode disabled

AES67 Mode is disabled by default, select **Enabled** from the dropdown menu to enable this mode. A warning message is displayed, click **Yes** to confirm the changes. The device must then be rebooted for the changes to take effect.

Click **Reboot** to reboot the device. A warning will be displayed, click **Yes** to continue with the reboot. The device will reboot and upon re-entering the **AES67 Config** tab you will see that **AES67 Mode** is now **Enabled**. Also note the **Current Prefix** used is set to 69 by default.

To route audio from an AES67 device to a Dante device with AES67 mode enabled, first ensure that the multicast address of the source AoIP stream has the same prefix as the device you would like to route it to, by default the prefix is 69 so the multicast address of the AoIP stream should be 239.69.X.X where the value of X can be any number between 0 and 255, the user should make sure the address is not used more than once otherwise AoIP streams will clash.

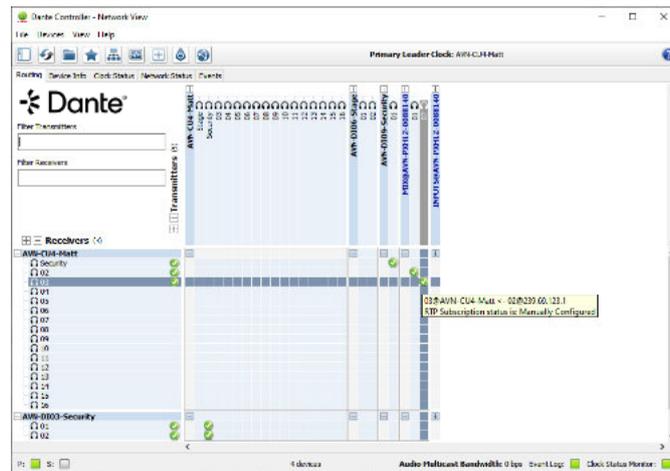


Fig 4-13: Receiving audio from an AES67 device

In the example an AES67 stream MIX@AVN-PXH12-0088140 on the multicast address 239.69.123.1 is routed to channels 02 and 03 on AVN-CU4-Matt.

To transmit audio to an AES67 device, open **Device View** and click on the **Create Multicast Flow** icon. In the **Create Multicast Flow** window select the **AES67** and select the channels you would like to add to the multicast flow.

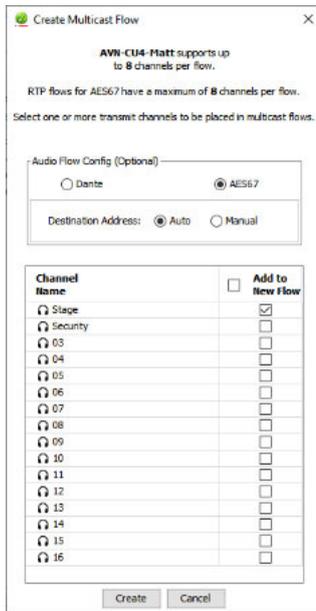


Fig 4-15: Creating a multicast flow

In the example the channel Stage is added to the AES67 multicast flow, the **Create** button is then clicked.

In **Device View** the **Transmit** tab will show the new multicast flow in the **Multicast Transmit Flows** side pane. This also shows the multicast address and port number of the multicast flow.

In the example **RTP Multicast Flow 16** is created, it has a multicast address of 239.69.234.120 and a port number of 5004. The multicast flow can be discovered by and added to AES67 devices.

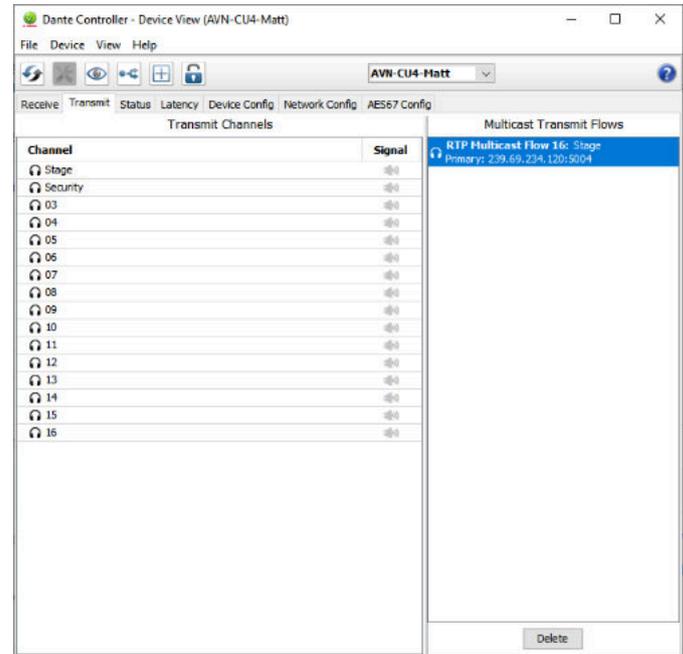


Fig 4-14: Multicast Transmit Flows side pane

When the multicast flow is no longer required it can be deleted by clicking **Delete**.

Clock Synchronisation

Precision Time Protocol (PTP) is used to keep audio being transmitted between devices in sync. Clock synchronisation can be monitored in the **Clock Status** tab.

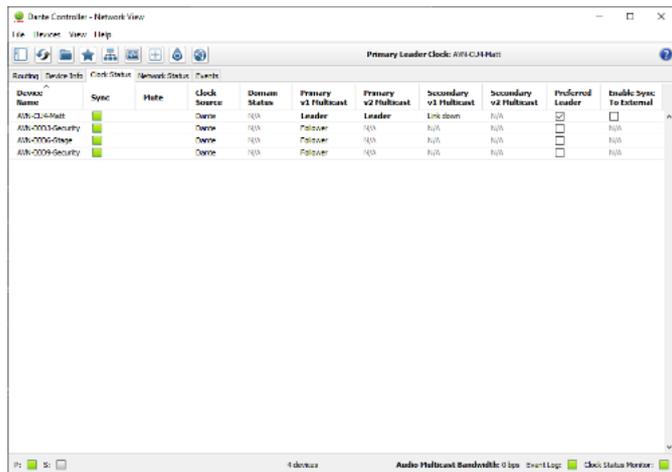


Fig 4-16: Clock status tab

Dante devices use PTPv1 for synchronisation. The **Primary v1 Multicast** column indicates whether a device is a PTPv1 master (Leader) or slave (Follower). A master device provides a clock which all slave devices sync with. The master device is automatically selected using the best master clock algorithm (BMCA), however this can be overridden by selecting the **Preferred Leader** checkbox.

On devices with the **AES67 Mode** enabled the **Primary v2 Multicast** column indicates whether the device is a PTPv2 master or slave. An AES67 enabled device will act as a boundary clock keeping PTPv1 devices in sync with PTPv2 devices. Additional AES67 enabled devices will become passive PTPv1 devices.

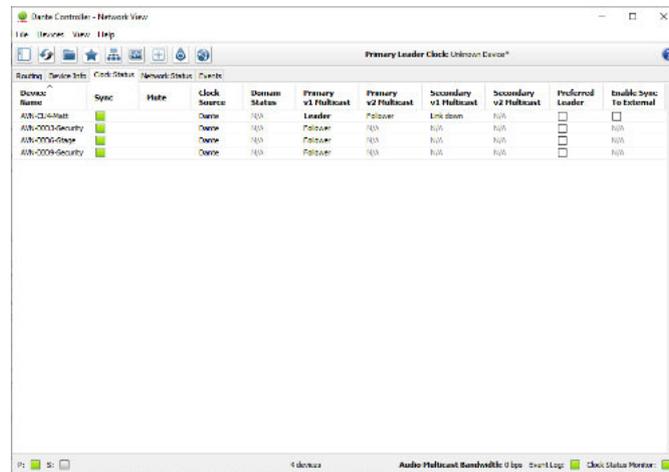


Fig 4-17: Clock status using an AES67 master clock

In the example above AVN-CU4-Matt is AES67 enabled and has become a slave (Follower) to another PTPv2 device, the other PTPv2 device is not a Dante device and therefore not displayed within Dante Controller. AVN-CU4-Matt then acts as a boundary clock keeping PTPv1 devices in sync with PTPv2 devices.

5. Controls, Indicators and Connections

This section contains information about the interactivity of the different panels of the device. This includes pinouts, status colour definitions, and various other useful information.

This section will cover the following;

- Top panel
- Front panel
- Back panel

Top Panel

The top panel can be used to control audio sources, audio destinations and audio mix points.

The top panel provides key-capped buttons which can be configured using the embedded webserver, these buttons allow the commentators to quickly perform functions including taking microphones on-air and off-air, and activating talkback, each buttons action and colour is fully configurable. A button can also be used to open the system menu, this allows basic settings to be configured, such settings include the brightness of LEDs, the network configuration, and also allows the user to select custom loaded pre-sets.

The rotary encoders are used to control the level, pan, and muting of sources, mix-points, and destinations. Each encoder has a side light which allows the commentator to associate colours with a specific source, mix-point, or destination. A quick double press of an encoder allows the assigned input, output or mix-point to be immediately muted or unmuted.

There is also a coloured display which is bright even in daylight viewing conditions, this displays useful information about audio assignments such as their level, whether they are muted, if there is any pan enabled and whether this pan is towards the left or the right. The page selected is also shown in the top-left of the display alongside the main output metering.

Status LEDs are also shown on the top panel which provides quick diagnostic information, such as whether the PTP clock is in sync and whether power is being provided to the unit.

AVN-CU2

The AVN-CU2 has status LEDs, a TFT display, six encoders with colour indicators, and twelve illuminated buttons.



Fig 5-1: AVN-CU2 top panel

AVN-CU4

The AVN-CU4 has status LEDs on the right-hand side of the panel, two TFT displays, twelve encoders with colour indicators (six on each TFT display), and twenty-four illuminated buttons.

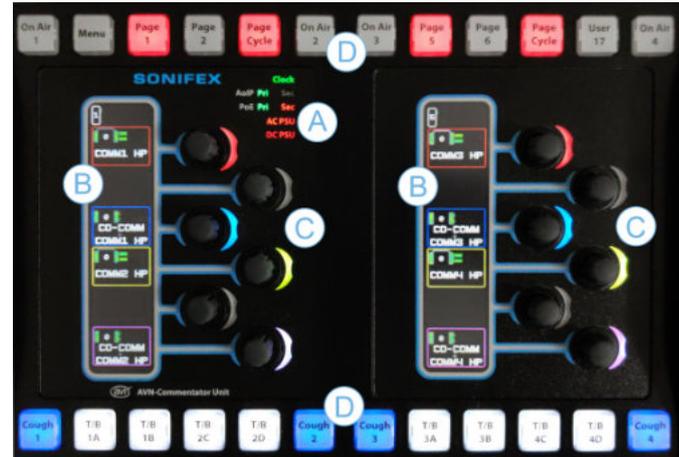


Fig 5-2: AVN-CU4 top panel

Status LEDs (A)

The status LEDs are located in the top right corner of the overlay on the AVN-CU2 and in the top right corner of the first overlay on the AVN-CU4.

Clock

The PTP clock is used to keep audio streams in sync.

- Green - The device is a PTP master or slave.
- Red - PTP sync lost.

AoIP

- Green - Valid AoIP connection on the corresponding connector.
- Off - No valid AoIP connection on the corresponding connector.

PoE

- Green - PoE is available on the corresponding connector.
- Red - PoE is unavailable on the corresponding connector.
- Off - LED disabled via the embedded web server.

AC PSU

This applies to the AVN-CU4 only.

- Green - A safe level of power is available on the AC power supply input.
- Red - The power on the AC power supply input is at an unsafe level or no AC power supply is connected.
- Off - LED disabled via the embedded web server.

DC PSU

- Green - A safe level of power is available on the DC power supply input.
- Red - The DC power supply input is at an unsafe level or no DC power supply is connected.
- Off - LED disabled via the embedded web server.

TFT Display (B)

A TFT display is located to the left of the encoders. The TFT is split into six encoder sections and a top section which displays the currently selected page number and the metering of a chosen output. The encoder sections below this contain information about the assigned audio source, destination, or mix point.

Encoders (C)

Each of the encoders are assigned to their corresponding encoder section on the TFT display and provide adjustment of the level and pan of the audio. The encoders are also used to navigate and adjust values within the system menu. Situated to the right-hand side of each encoder is an LED which is illuminated in a colour which corresponds to the 'encoder section' it controls.

Illuminated Buttons (D)

The AVN-CU2 has 12 illuminated push buttons, the AVN-CU4 has 24. Each button has a removable cap to allow the user to modify the label on the button. The action, colour and function of each button can be configured via the embedded web server.

Front Panel

AVN-CU2



Fig 5-3: AVN-CU2 front panel

AVN-CU4



Fig 5-4: AVN-CU4 front panel

Each commentator position is composed of a locking XLR mic/line input, a red LED for indicating the use of Phantom power on the associated input, and a locking 6.35 mm headphone jack socket. The AVN-CU2 has two commentator positions, and the AVN-CU4 has four commentator positions. Each commentator position is configurable via the devices embedded web server.

Mic/Line Input

- Pin 1: Ground
- Pin 2: Mic/Line Phase
- Pin 3: Mic/Line Non-Phase

Phantom Power Status LED

Indicates Phantom power on the corresponding input. Phantom power can only be supplied when the mic/line input is set to mic mode. Phantom power is supplied at +48V.

Headphone Output

- Tip: Headphone Left
- Ring: Headphone Right
- Sleeve: Ground

Back Panel

AVN-CU2



Fig 5-5: AVN-CU2 back panel

The back panel provides the majority of physical connections. These connections provide power, audio inputs and outputs, and allow the user to control and configure the device.

The AVN-CU2 has two Ethernet ports for AoIP and PoE, two SFP ports for alternative transceiver types for the AoIP connection, two RJ45 audio connections, a GPIO connector, a DC power connector, and a reset button.

The AVN-CU4 has two Ethernet ports for AoIP and PoE+, two SFP ports for alternative transceiver types for the AoIP connection, two RJ45 audio connections, a GPIO connector, a DC power connector, a reset button, an AC connector with an anti-surge mains fuse, four additional XLR line inputs and six additional XLR line outputs.

AVN-CU4



Fig 5-6: AVN-CU4 back panel

Ethernet Ports

The two locking Ethernet ports on the back of the device are labelled 'Primary' and 'Secondary' and are used for AoIP connectivity and to provide power to the device via Power over Ethernet (PoE) on the AVN-CU2 or PoE+ on the AVN-CU4. PoE/PoE+ can be provided via a supporting network switch or by using a PoE/PoE+ injector.

The two ports can be configured to function in either redundant or switched mode, via the Dante Controller interface. Selecting redundant mode allows the two ports to be connected to separate networks, this means that if one network fails, the other network will be used instead; in this case a separate address is given to each port. Selecting switched mode allows devices to be daisy chained allowing the secondary port to be used by another AoIP device in order to communicate on the network; in this case only the 'Primary' port is given an address.

Each Ethernet port has two LED indicators. The LED located to the top-left of the port indicates the link state, this is green when the connection is operating at 1 Gbps, orange when operating at 100 Mbps, and off when operating at any other speed. The LED located to the top-right of the port flashes if data is being transmitted/received on the port, the rate of the flashing varies depending on the rate of data transmission.

Both Ethernet ports are locking in order to prevent accidental removal of any connections. In order to remove a connector, the 'PUSH' button should be held whilst removing the connector.

SFP Ports

The SFP (Small Form-factor Pluggable) connector allows an alternative interface type (for example fibre) to be used for each network port. If an SFP interface is used, the corresponding RJ45 port cannot be used for network communications at the same time however, the RJ45 port can still be used to provide PoE/PoE+ functionality.

Audio Inputs

Stereo Analogue/Digital Input

This RJ45 input can be configured as either analogue or digital via the embedded web server (this input is only digital on the AVN-CU4). The port uses a StudioHub+ compatible pinout as follows:

- Pin 1: Left+/AES3+
- Pin 2: Left-/AES3-
- Pin 3: Right+
- Pin 4: Ground
- Pin 5: No Connection
- Pin 6: Right-
- Pin 7: No Connection
- Pin 8: +12V

Inputs A, B, C and D (AVN-CU4 only)

These inputs are analogue inputs on locking female XLR connections. The inputs have the following pinout:

- Pin 1: Ground
- Pin 2: Input+
- Pin 3: Input-

+12V DC Input

This 4-pin connector allows an external +12V DC power supply to be used to power the unit. The connection has the following pinout:

- Pin 1: Ground
- Pin 2: +12V (Legacy)
- Pin 3: N/C
- Pin 4: +12 V

Audio Outputs

Stereo Analogue/Digital Output

This RJ45 output can be configured as either analogue or digital via the embedded web server (this output is only digital on the AVN-CU4). The port uses a StudioHub+ compatible pinout as follows:

- Pin 1: Left+/AES3+
- Pin 2: Left-/AES3-
- Pin 3: Right+
- Pin 4: Ground
- Pin 5: Cough GPI
- Pin 6: Right-
- Pin 7: No Connection
- Pin 8: +12V

An AVN-HA1 or AVN-HD1 can be connected to this output, the AVN-HA1 or AVN-HD1 can then be used to control the cough GPI pin.

Outputs A, B, C, D, E and F (AVN-CU4 only)

These outputs are analogue outputs on male XLR connections. The outputs have the following pinout:

- Pin 1: Ground
- Pin 2: Input+
- Pin 3: Input-

Reset Button

On the AVN-CU2, the recessed reset button is situated to the right of the secondary Ethernet connection.

On the AVN-CU4 the button is situated to the right of the mains AC input. A short press of the button will reboot the device leaving the configuration unaffected. Pressing and holding the button for 10 seconds will reboot the unit into recovery mode which can be used to install new device firmware.

GPIO Connector

The AVN-CU2 has a single female D-Sub (DA-15) connection, this provides 10 configurable GPIO and a voltage free switching relay contact. The connection has the following pinout:

- Pin 1: GPIO Port 1
- Pin 2: GPIO Port 2
- Pin 3: GPIO Port 3
- Pin 4: GPIO Port 4
- Pin 5: GPIO Port 5
- Pin 6: Relay – Normally Open Contact
- Pin 7: Relay – Normally Closed Contact
- Pin 8: Relay – Common
- Pin 9: GPIO Port 6
- Pin 10: GPIO Port 7
- Pin 11: GPIO Port 8
- Pin 12: GPIO Port 9
- Pin 13: GPIO Port 10
- Pin 14: Fused (50 mA) +12V DC Supply
- Pin 15: Ground

The +12V DC supply is fused and has a maximum output current of 50 mA.

GPIO ports can be set up as outputs (GPO) or inputs (GPI). GPO are open collector, this means the output pin is connected to ground when the GPO is active. GPI are active low and are triggered when pulled down to ground. GPIO configuration can be managed through the devices embedded web server.

AC Power Connection (AVN-CU4 only)

This universally filtered IEC is the mains AC input power supply to the unit.

Mains Fuse (AVN-CU4 only)

This 20 mm x 5 mm anti-surge mains fuse is rated at 2A.

6. Embedded Web Server

The AVN Commentator Units have an embedded web server which provides easy access to all the configuration options through a web browser. It also gives access to system information and allows firmware to be easily updated when new firmware releases are made available.

The device has two Ethernet ports on its back panel one is the 'Primary' Ethernet port and the other is the 'Secondary' Ethernet port. When the Dante Redundancy is set to 'Redundant' the web server can only be accessed via the primary port, when set to 'Switched' the web server can be accessed via both ports.

By default, the embedded web server is set to static address mode the IP address of the embedded web server is 192.168.0.100 with a subnet mask of 255.255.255.0. If the network address mode for the port to be used has been set to 'Dynamic' the unit will attempt to acquire an IP address from a DHCP server, if no DHCP server is found an automatically generated IP address will be used.

The active IP address for the network port can be found using a service discovery tool such as the 'Discovery Application' which can be found on the Sonifex website:

(<http://sonifex.co.uk/technical/software/index.shtml#sfxsrvdisc>)

Alternatively, the user can display the IP address on the main display of the device by navigating to the 'Status' section using the controls on the front panel. If the embedded web server has yet to acquire an IP address or has failed to link, the corresponding IP address and subnet mask will show 0.0.0.0.

Once the IP address of the embedded web server is known, type this into the address bar of a web browser, the 'Device Information' page will be displayed. This is the default page and will always be displayed first when connecting to the embedded web server. The friendly name of the device is shown underneath the Sonifex logo, this makes it easier to identify the connected device especially when configuring multiple devices at the same time. Help information can be found by clicking on the question mark in the corresponding section.

The screenshot shows the Sonifex AVN-CU4 web interface. At the top, there are tabs for 'Information', 'Configuration', and 'System'. The 'Information' tab is selected, and the page title is 'AVN-CU4 - Commentator Unit'. Below the tabs, there are three expandable sections:

- Device Information:**
 - Device ID: AVN-CU4
 - Host Name: AVN-CU4-1234567
 - Friendly Name: AVN-CU4-1234567
 - Serial Number: 1234567
 - Firmware Version: 02.2.2141
 - Dante Version: 4.6.5.2
 - Front Panel Version: 2.1
 - AC Voltage: 0.00V
 - DC Voltage: 0.00V
 - Pri PoE Voltage: 12.68V
 - Sec PoE Voltage: 0.00V
 - Temperature: 49°C
 - Dante Redundancy: Switched
 - System Up Time: 0 hrs 0 mins
- Control Port Information:**
 - Hardware Address: E2:9A:7C:81:2F:6D
 - Actual IP Address: 10.0.200.22
 - Actual Subnet Mask: 255.255.255.0
 - Addressing Mode: Static
- Primary Dante Port Information:**
 - Hardware Address: D0:A4:B1:00:08:DC
 - Actual IP Address: 10.0.200.23
 - Actual Subnet Mask: 255.255.255.0
 - Addressing Mode: Static

At the bottom of the page, there is a footer with contact information: Address: Sonifex Ltd 81 Station Road #1000000000, Newhampton, UK, NN10 5GE | Tel: +44 (0)1332 550700 | Email: sales@sonifex.co.uk | Web: www.sonifex.co.uk

Fig 6-1: Device information page.

Information

Device Information ?	
Device ID:	AVN-CU4
Host Name:	AVN-CU4-1234567
Friendly Name:	AVN-CU4-1234567
Serial Number:	1234567
Firmware Version:	D2.2.2141
Dante Version:	4.0.9.2
Front Panel Version:	2.1
AC Voltage:	0.00V
DC Voltage:	0.00V
Pri PoE Voltage:	12.52V
Sec PoE Voltage:	0.00V
Temperature:	57°C
Dante Redundancy:	Switched
System Up Time:	0 hrs 14 mins

Fig 6-2: Device information

This information shows the current status of the unit as well as the software versions of the various modules running on the unit. When contacting Sonifex technical support, it is important to provide the information shown on this page.

Control Port Information ?	
Hardware Address:	4E:49:14:50:76:BE
Actual IP Address:	10.0.200.22
Actual Subnet Mask:	255.255.255.0
Addressing Mode:	Static

Primary Dante Port Information ?	
Hardware Address:	D0:A4:B1:00:06:DC
Actual IP Address:	10.0.200.23
Actual Subnet Mask:	255.255.255.0
Addressing Mode:	Static

Secondary Dante Port Information ?	
Hardware Address:	D0:A4:B1:00:06:DD
Actual IP Address:	172.31.183.190
Actual Subnet Mask:	255.255.0.0
Addressing Mode:	Dynamic

Fig 6-3: Port information

The lower half of the page shows the configuration of the network ports; the 'Control Port Information' shows the network address configuration of the embedded web server which can be accessed on both the 'Primary' and 'Secondary' Ethernet connections.

The 'Primary Dante Port Information' and the 'Secondary Dante Port Information' shows the configuration information of each port to the Dante audio network. The network settings of these two ports can be controlled via the Dante controller application or via the 'network' configuration web page. If the Dante redundancy setting for the unit is set to "Switched" via Dante controller then only the Control Port and Primary Dante Port Information are shown here.

Configuration

There are five sections under the 'Configuration' tab, these are as follows.

- Network
- Front Panel
- Audio Routing
- GPIO Settings
- SNMP Settings

Network

The Network page shows the current configuration of the control port which is used to access the devices web server. The friendly name and security options can also be set here.

Fig 6-4: Device Name & Security

Friendly Name

The friendly name identifies the unit on the network. It is a good idea to assign a user name or location as this is easily recognised by other users. The default friendly name is made from the device ID and the 7-digit product serial number i.e. AVN-CU2-1234567 or AVN-CU4-1234567. The friendly name can only contain letters, numbers and hyphens although it cannot start or end with a hyphen.

Password

In order to prevent other users connected to the same network from modifying the configuration of the device it is possible to protect your device with a password. The password may be between 4 and 8 characters long and may only contain numbers and letters.

Retype Password

In this field a password must be retyped, this is to make sure you didn't accidentally enter your intended password incorrectly.

Removing Password Protection

Password protection can be removed from a device by clearing both the 'Password' and 'Retype Password' fields and clicking submit.

HTTP Port

The HTTP port number can be set to any integer from '1024' up to and including '65535', or to '80' the default value. The value entered determines which port the web server on the device will use. When the port number is modified the unit will be restarted automatically. To view the web pages of a device with a modified port number, the port number must be specified in the address bar of the web browser after the IP address and separated by a colon.

For example, if the HTTP port of a unit is set to '1024' and the IP address of the unit is '192.168.0.100' then 'http://192.168.0.100:1024' would need to be entered into the address bar of the web browser.

When the port is set to its default value of '80' a port number doesn't need to be specified when accessing the web server.

The web server on the unit is advertised as an Avahi / Bonjour service so tools like Sonifex Service Discovery or avahi-browse will be able to discover the address and port number being used by the web server on the unit.

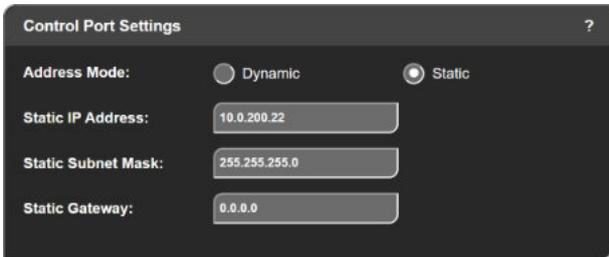


Fig 6-5: Control Port Settings

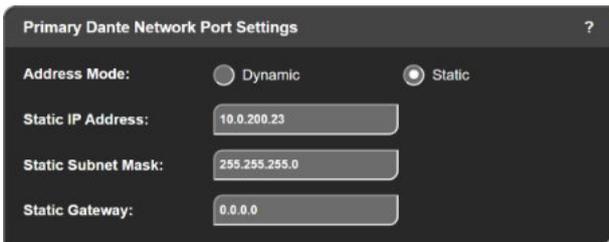


Fig 6-6: Primary Dante Network Port Settings

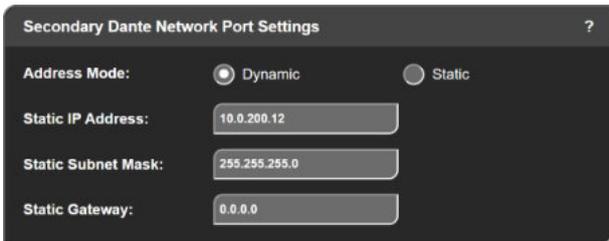


Fig 6-7: Secondary Dante Network Port Settings

Address Mode

The address mode determines how the port obtains its IP address. When set to dynamic, the unit will attempt to acquire an IP address automatically from either a DHCP server or via auto configuration if no DHCP server is found. The actual IP address will be shown on the device information page. When static mode is used, the IP address and subnet mask values entered will be assigned to the port.

Static IP Address

This is the IP address that will be assigned to the port when static address mode is selected. It is important to ensure that this IP address is not currently in use on the network. This value is not used when the address mode is dynamic.

Static Subnet Mask

This is the subnet mask that will be used for the port when static address mode is selected. This value is not used when the address mode is dynamic.

Static Gateway

This is the router IP address that will be used for the port when static address mode is selected.

Note

If the device is in switched mode the secondary Dante network port settings will not be displayed.

If any of the network configuration options are changed, the unit will automatically restart to implement the new settings. If the address mode of the control port is changed, a new connection will need to be made once the unit has restarted and the IP address assigned via DHCP is known. Otherwise, the new page will be reloaded automatically once the restart of the unit is complete.

Network Defaults (AVN-CU2)

Friendly Name: AVN-CU2-xxxxxxx
(Where xxxxxx is the product serial number)

Control Port:

Address Mode: Static
Static IP Address: 192.168.0.100
Static Subnet Mask: 255.255.255.0
Static Gateway: 0.0.0.0

Dante Primary Port:

Address Mode: Dynamic
Static IP Address: 192.168.0.101
Static Subnet Mask: 255.255.255.0
Static Gateway: 0.0.0.0

Dante Secondary Port:

Address Mode: Dynamic
Static IP Address: 192.168.1.101
Static Subnet Mask: 255.255.255.0
Static Gateway: 0.0.0.0

Network Defaults (AVN-CU4)

Friendly Name: AVN-CU4-xxxxxxx
(Where xxxxxx is the product serial number)

Control Port:

Address Mode: Static
Static IP Address: 192.168.0.100
Static Subnet Mask: 255.255.255.0
Static Gateway: 0.0.0.0

Dante Primary Port:

Address Mode: Dynamic
Static IP Address: 192.168.0.101
Static Subnet Mask: 255.255.255.0
Static Gateway: 0.0.0.0

Dante Secondary Port:

Address Mode: Dynamic
Static IP Address: 192.168.1.101
Static Subnet Mask: 255.255.255.0
Static Gateway: 0.0.0.0

Front Panel

The front panel page allows the user to configure the display, status LEDs and button assignments. The page is updated in real time and shows a live representation of the physical unit, this allows remote control of the Commentator Unit.

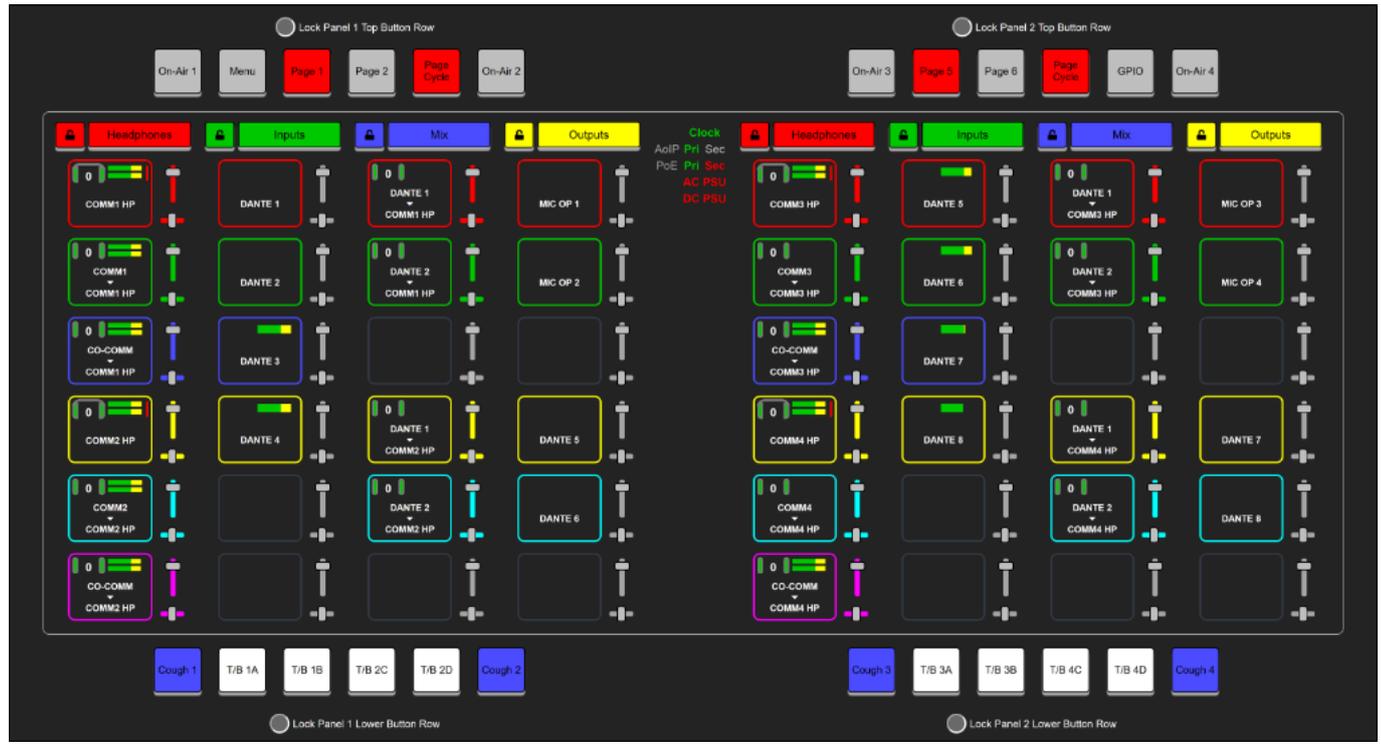


Fig 6-8: Front Panel Settings and Control

Configure LEDs

To configure the brightness of the TFT display, push button LEDs, status LEDs, encoder LED bars and enable or disabled status LEDs open the configure LEDs window by clicking on the status LEDs.



Fig 6-9: Configure status LEDs and brightness

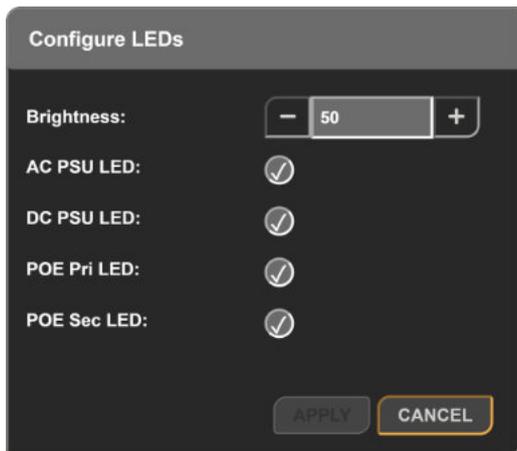


Fig 6-10: Configure LEDs window

Brightness

The brightness can be adjusted by pressing the + and – buttons or by typing the value into the input field. This can be varied from 10% to 100% in steps of 10%.

AC PSU Status LED (AVN-CU4 only)

Selecting this checkbox enables the AC PSU status LED, this LED is illuminated green when power is available on the AC connection. If the checkbox is not selected the LED is not illuminated.

DC PSU Status LED

Selecting this checkbox enables the DC PSU status LED, this LED is illuminated green when power is available on the DC connection. If the checkbox is not selected the LED is not illuminated.

PoE Primary Status LED

Selecting this checkbox enables the PoE primary status LED, this LED is illuminated green when PoE power is available on the primary RJ45 connection. If the checkbox is not selected the LED is not illuminated.

PoE Secondary Status LED

Selecting this checkbox enables the PoE secondary status LED, this LED is illuminated green when PoE power is available on the secondary RJ45 connection. If the checkbox is not selected the LED is not illuminated.

Configure Pages

To configure a page click on the page name.

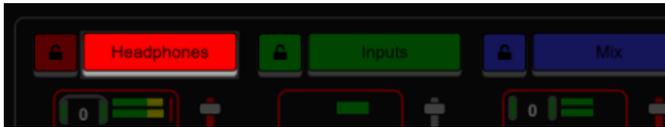


Fig 6-11: Page name

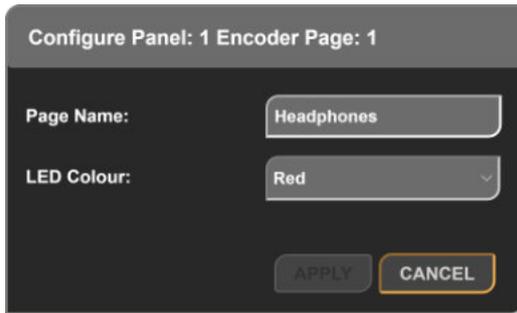


Fig 6-12: Configure panel page window

Page Names

A name can be given for each encoder page on the commentator unit, simply type the new page name in the **Page Name** field and then click **Apply**. Note that the page name can be up to 10 characters in length and should be alphanumeric.

The new page names will now be shown in the **Encoder Assignments Overview** on the **Audio Routing** web page. In the example the page names are 'Headphones', 'Inputs', 'Mix', and 'Outputs'. For more information on the **Encoder Assignments Overview** look at the **Encoder Assignments** section within the **Audio Routing** section of this manual.

Page LED Colours

A colour can be assigned to each encoder page using the LED Colour dropdown menu, the list of available colours is shown below:

- Off
- White
- Red
- Green
- Blue
- Yellow
- Cyan
- Magenta

A **Page Select** button will be illuminated in its corresponding page colour. A **Page Cycle** button will be illuminated in the colour corresponding to the current page if setup to follow page LED colours.

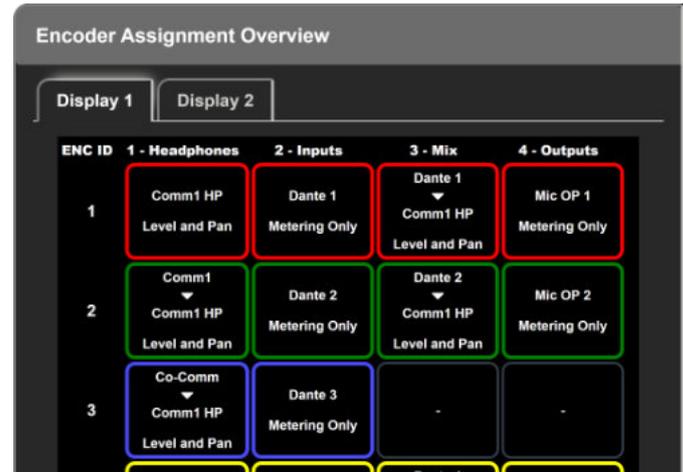


Fig 6-13: Encoder assignment overview with page names

Lock Pages

Pages can be locked to prevent the commentator from using any of the encoders on that page. To lock a page simply click the lock icon to the left of the page name. The icon will then change to signify the page has been locked.

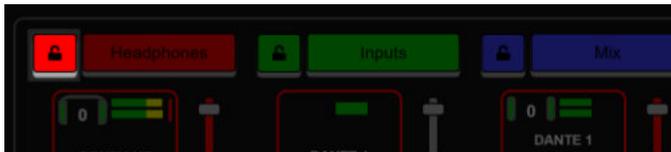


Fig 6-14: Lock page



Fig 6-15: Locked page

When locked, lock icons also appear on the encoders in the encoder assignments overview window. When the commentator attempts to use a locked encoder, a warning will be displayed on the devices display.

Lock Button Row

A row of buttons can be locked by selecting the Lock Button Row checkbox. When locked pressing any button in the row will have no effect. A warning message will be displayed on the devices display.

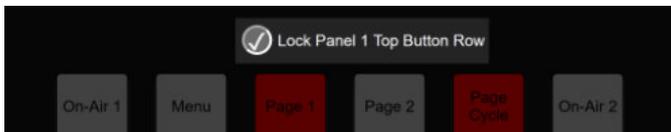


Fig 6-16: Lock button row

Control and Configure Buttons

Each button on the device is actionable and fully customisable from the front panel web page. To action a button left click it. To customise a button right click it, this opens the Configure Button window.

Configure Button Window

The title bar of the window names the button being configured. At the bottom of this window are two buttons 'Apply' and 'Cancel'. Pressing 'Apply' submits any changes made and clicking 'Cancel' discards any changes made, in both cases the window is automatically closed.

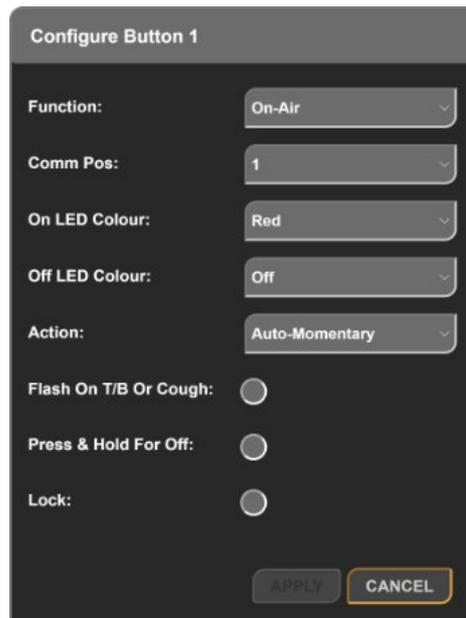


Fig 6-17: The 'Configure Button' window

Function

The function drop-down menu allows the user to configure how the button selected will operate, the options available are described below.

Disabled

The button performs no function when pressed, the button is never illuminated. All other options are hidden.

On-Air

The button enables or disables the mixing of a commentator input onto the main bus. The commentator input to mix is selected using the 'Comm Pos' drop-down menu.

One 'On-Air' button may be assigned for each commentator. This means there can be up to two 'On-Air' buttons on the AVN-CU2 and up to four 'On-Air' buttons on the AVN-CU4.

When the On-Air function is selected the following options are also displayed:

- Comm Pos
- On LED Colour
- Off LED Colour
- Action
- Flash On T/B Or Cough
- Press & Hold For Off
- Enabled on startup
- Lock

Talkback A/B/C/D

The button enables or disables the mixing of a commentator input onto the talkback A/B/C/D bus. The commentator input to mix is selected using the 'Comm Pos' drop-down menu.

One 'T/B' button may be assigned for each commentator per talkback channel. The button is shown graphically with the commentator position and talkback channel, for example for a button controlling talkback to talkback channel C for commentator two the button will display 'T/B 2C'. This means there can be up to eight buttons assigned to 'Talkback' on the AVN-CU2 and up to sixteen buttons assigned to 'Talkback' on the AVN-CU4.

When the Talkback A/B/C/D functions are selected the following options are also displayed:

- Comm Pos
- On LED Colour
- Off LED Colour
- Action
- Press & Hold For Off
- Lock

Page Select

The button switches to the page selected using the 'Page #' drop-down menu. Each page controls different inputs, outputs and mix points.

One page select button can be assigned for each page on the device. Both the AVN-CU2 and AVN-CU4 can have a maximum of four pages which allows for a maximum of four page select buttons.

When selected the following options are also displayed:

- Page #
- Lock

Page Cycle

The button switches through all pages incrementally after reaching page four it loops back around to page one. The LED colour can be set to match the colour of the page selected by selecting 'Follow Page LED Colours', for example if page three is selected and the colour of the page is set to 'Red' the button is illuminated red. If 'Follow Page LED Colours' is unticked, the user can select a constant LED colour for to use for the 'Page Cycle' button. Only one 'Page Cycle' button can be assigned.

When selected the following options are also displayed:

- LED Colour (If Follow Page LED Colours is unticked)
- Follow Page LED Colours
- Lock

GPIO

The button controls the state of a GPIO, the GPIO can be configured further in the GPIO page.

Each button on the device can be assigned as a GPIO. This provides a maximum of twelve GPIO buttons on the AVN-CU2 and a maximum of twenty-four GPIO buttons on the AVN-CU4.

When selected the following options are also displayed:

- On LED Colour
- Off LED Colour
- Flash user LED
- Enabled on startup
- Lock

Cough

The button temporarily takes a selected commentator's microphone off-air. One 'Cough' button may be assigned for each commentator. This means there can be two 'Cough' buttons on the AVN-CU2 and four 'Cough' buttons on the AVN-CU4.

When selected the following options are also displayed:

- Comm Pos
- On LED Colour
- Off LED Colour
- Action
- Press & Hold For Off
- Lock

Menu

The button brings up the system menu on the TFT display, pressing the button again whilst the menu is shown on the TFT display will close the menu. Only one 'Menu' button can be assigned.

When selected the following options are also displayed:

- On LED Colour
- Lock

Brightness

The button jumps into the brightness control menu of the system menu on the TFT display; the brightness of the TFT display, push button LEDs, and status LEDs can then be adjusted. Only one 'Brightness' button can be assigned.

When selected the following options are also displayed:

- On LED Colour
- Lock

Comm Pos

The 'Comm Pos' drop-down menu allows the user to select which commentator microphone the selected function applies to. On the AVN-CU2 this option ranges from 1 –2. On the AVN-CU4, this option ranges from 1 – 4.

On LED Colour / Off LED Colour

The colour of the LED when the function assigned to the button is active (On LED Colour) or inactive (Off LED Colour) can be configured.

The following options are available:

- Off
- White
- Red
- Green
- Blue
- Yellow
- Cyan
- Magenta

Flash On T/B Or Cough

Enabling this option causes the associated On-Air button to flash when either the T/B or cough button assigned to the same commentator position are used.

Page #

The page to switch to when the button being configured is pressed, this can be set to 1, 2, 3, or 4 on the first panel or to 5, 6, 7, or 8 on the second panel (CU4 only).

Press & Hold for Off

To protect against the user accidentally deactivating a button (for example the On-Air state) the "Press & Hold For Off" setting can be used. When this setting is enabled, an active button must be pressed and held for 5 seconds to be deactivated. The 'Press & Hold For Off' option overrides the 'Action' property to 'Latching'.

Enabled on startup

Applies to On-Air and GPIO buttons. Normally when the unit starts up, all buttons are initially in the off state and require user input to be enabled. This setting allows the initial buttons state to be set to the on state when the unit starts up.

Flash User Led

Applies to GPIO buttons . When enabled, the GPIO button will flash in the configured on LED colour when the user led GPO is asserted.

Lock

When a button has 'Lock' enabled pressing that button has no effect and "Locked" will flash up in the top section of the TFT display. The LED will continue to show the state the LED was in before 'Lock' was enabled. A button can be locked in either the on or off state.

Action

This decides how the button behaves when pressed and when released. The options available are described below.

Auto-Momentary

If the button is pressed and release quickly, the assigned function is latched. When the button is pressed and released again, the function is deactivated. If the button is pressed for longer than 350 milliseconds, the button will then behave like a momentary button and the function is instead active until the button is released.

Momentary

The function is active whilst the button is pressed until it is released.

Latching

The function is latched active when the button is pressed and released, the button must then be pressed and released again to deactivate the function.

Remote Control

Each encoder is displayed on the front panel web page. They can be controlled from here.

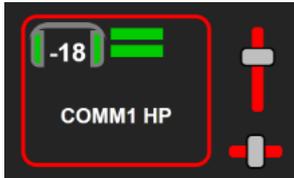


Fig 6-18: Remote control

Level

The audio level is displayed using two metering bars on stereo sources and a single metering bar for mono sources, yellow metering is displayed once the audio level rises above 0 dBu (0 dBFS = 18 dBu D/A line-up). Limiting is applied when the audio level rises above 18 dBu helping to prevent distortion of the output, limiting is indicated using a red bar to the right of the metering.

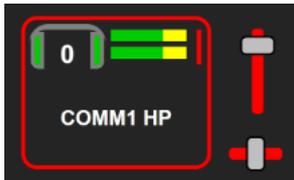


Fig 6-19: Limiting

Gain

The gain in dBs being applied to the audio is displayed in the top left corner. The gain can be adjusted using the vertical slider toward the right, moving the slider upwards increases the gain to the maximum of 10 dB's, moving it downwards allows the audio to be attenuated by 80 dB's.

Pan



Fig 6-20: Pan control

The audio can be panned left and right on stereo sources, the current share of audio on each channel can be seen around the gain value.

The pan is controlled using the horizontal slider to the right, moving the

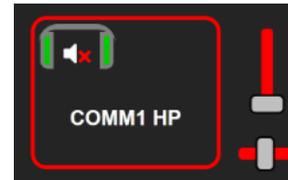


Fig 6-21: Muted

slider completely left muted the right channel and moving the slider completely right mutes the left channel.

Mute

An audio source can be muted by double clicking it. Double clicking again unmutes the audio source. A muted source is indicated with the mute icon.

Inputs are shown to the left of the grid and outputs are shown above the grid, connections are shown between them. Next to the 'INPUTS' text and 'OUTPUTS' text various buttons are available which allow audio groups to be added, expanded, and minimised. Encoder icons can be seen on inputs, outputs, and routings. An encoder assignment overview can be viewed by clicking on the 'Show Encoder Assignment Overview' button.

Mix-Points

Between the input and output sections is the routing grid which allows connections to be made between inputs and outputs, encoders can also be assigned to these connections to provide additional control. We call these routings 'mix-points'. Routings are generally represented by green boxes (or pink boxes if they represent a fixed routing). See the **Routing Grid** section of this manual for more information.

Virtual Inputs and Outputs

Commentator inputs are routed to the virtual outputs by default (these routings are fixed and are shown in pink), physical and AoIP inputs can also be routed to the virtual outputs. The virtual outputs then appear as inputs that can be routed to a physical and AoIP outputs. This allows the user to group inputs from different sources onto a bus then route them all at the same time to physical or AoIP outputs. The virtual buses also provide smart functionality for the commentator inputs. For example, when a commentary position is on air, the audio from this source will be present on the 'Main' virtual bus and if talkback is active then the audio from the commentary position will be present on the relevant talkback virtual bus.

Main Bus

The main bus contains audio from commentators when they are on-air, other audio sources can be routed to the main bus and will remain there whether a commentator is on air or not.

T/B Bus

There are four talkback buses available, a talkback bus contains audio from any commentator that has chosen to speak on that bus using the associated button for that bus A/B/C/D. A button can be configured to enable/disable a specific talkback bus in the front panel web page.

Co-Comm Bus

When the co-commentator bus is routed to a commentator's headphones the commentator can then hear other commentators but won't hear themselves. Note the co-commentator bus is only available on the AVN-CU4.

Tone Gen

The tone generator allows the user to generate a sine wave with a frequency ranging between 100 Hz and 10 kHz. This is useful for testing outputs to ensure audio is reaching its destination.

Adding Dante Input and Output Groups

Dante input groups can be added via the 'Audio Routing' webpage of the commentator unit and allow audio routed to channels belonging to 'Dante Receivers' within the Dante Controller application to be used as inputs.

In this example a channel from AVN-DIO9-Security is routed to the first channel of the AVN-CU4, this is setup in the **Routing** tab of Dante Controller.

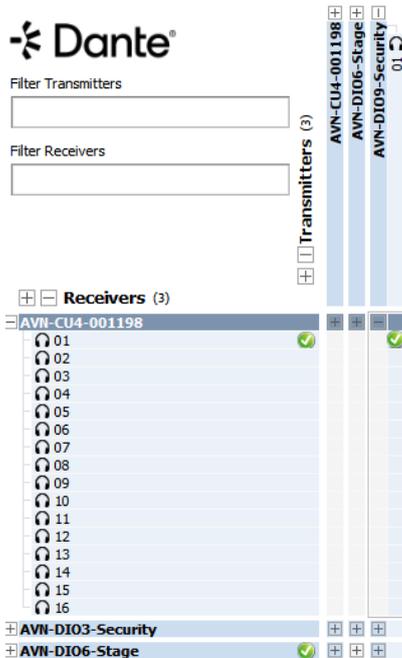


Fig 6-23: Dante Controller routings

In the **Audio Routing** webpage of the commentator unit the **+** button next to the **INPUTS** is clicked, this brings up the **Add Input Group** window.

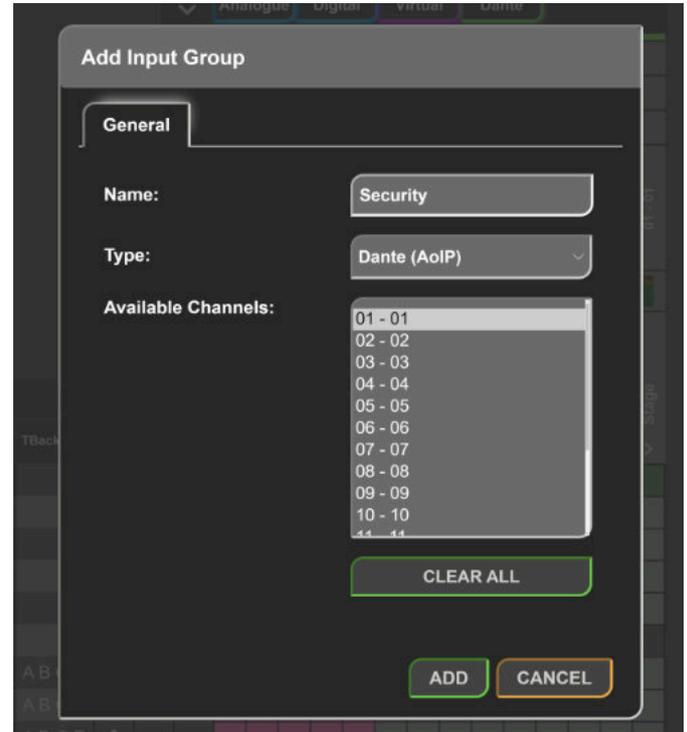


Fig 6-24: Adding a Dante input group

In the **Add Input Group** window the group is given a name, in the example it is set to 'Security'. The **Type** is set to **Dante (AoIP)**. In **Available Channels** the first channel is selected as this is the channel that audio was routed to in Dante Controller. The **Add** button is clicked.

The input group can now be seen in the audio routing grid. Pressing the arrow to the left-hand side of the input expands the input group to show the channels belonging to it.

The input group can then be routed to the outputs as required. In the example a channel is routed to all the commentators headphones.

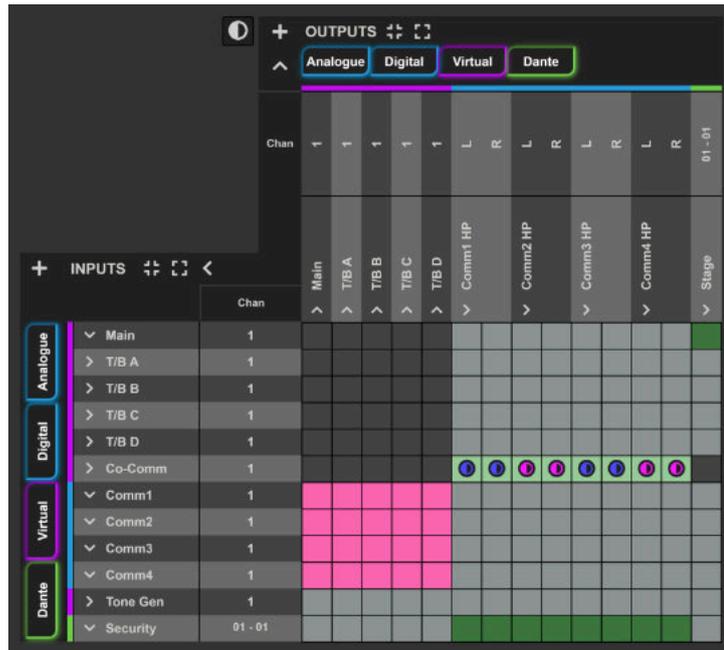


Fig 6-25: Routing Dante input group

Audio can also be routed to the **Transmit** channels of the device, this is done by creating an output group and selecting the required transmit channels.

Click the **+** button next to **OUTPUTS**. Type in a name for the new output and select **Dante (AoIP)** from the type dropdown menu. Select from **Available Channels** the channels that should be added to the group and then click the **Add** button.

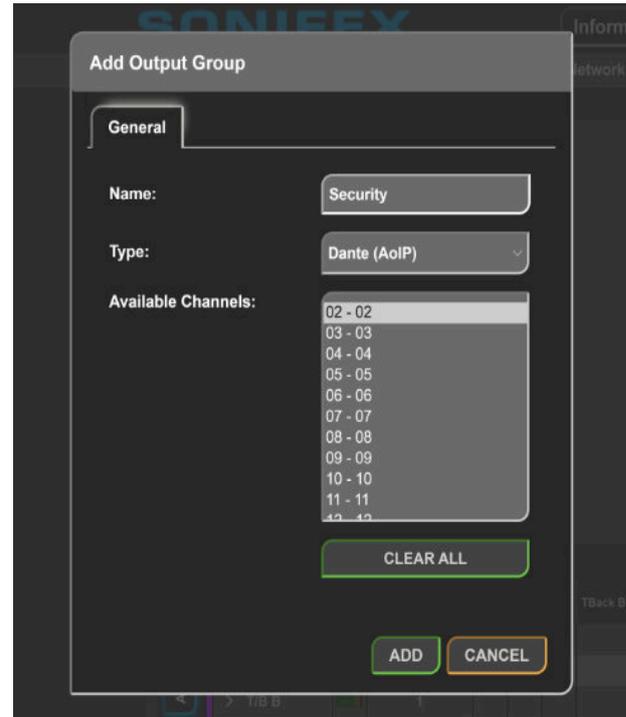


Fig 6-26: Adding a Dante output group

Inputs can now be routed to the output group. In the example the virtual input **T/B A** is routed to the 'Security' output so that when the commentator activates **T/B A** the commentator can speak to security.

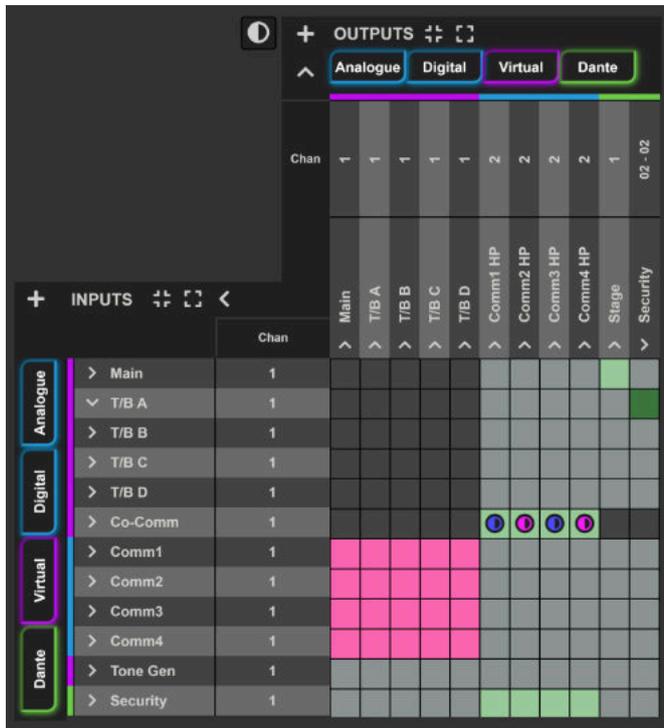


Fig 6-27: Routing talkback bus to a Dante output group

Within the **Routing** tab of Dante Controller the transmit channel can be routed to Dante receivers. In the example the channel setup for security is routed to the security receiver device.

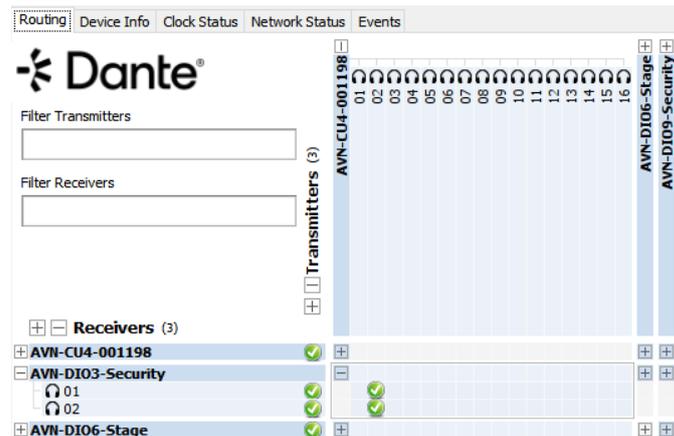


Fig 6-28: Routing transmit channels in Dante Controller.

Adding an Input Group

By default, the commentator has the virtual inputs added to the routing grid, these can't be removed. The two commentator mics on the AVN-CU2 and the four commentator mics on the AVN-CU4 are also added by default and have fixed routings to the virtual outputs. Lastly a tone generator is also added to the inputs section by default.

Additional digital, analogue, and Dante inputs can be added to the unit as the user desires.

To add a new input group to the audio routing grid:

- Click the **+** button next to **INPUTS**, this will open a new window.
- Type in a name for the new input group, this name is displayed as the label for the input on the inputs section of the grid.
- Select the input type, digital and analogue inputs are located on the rear of the device whereas Dante inputs are accessible using Dante Controller.
- Select which of the available channels you would like to add to the group. A maximum of 8 channels can be added to a group.
- Click the **Add** button, the input group will now appear in the inputs section of the audio routing grid with the name provided.

Tips:

- A tooltip will be displayed if there are any issues with adding the input.
- The shift button **⇧ Shift** and control button **⌘ Ctrl** can be used to select multiple channels.
- The **Clear All** button can be pressed to deselect all channels.
- Clicking **Cancel** at any time will discard all changes.

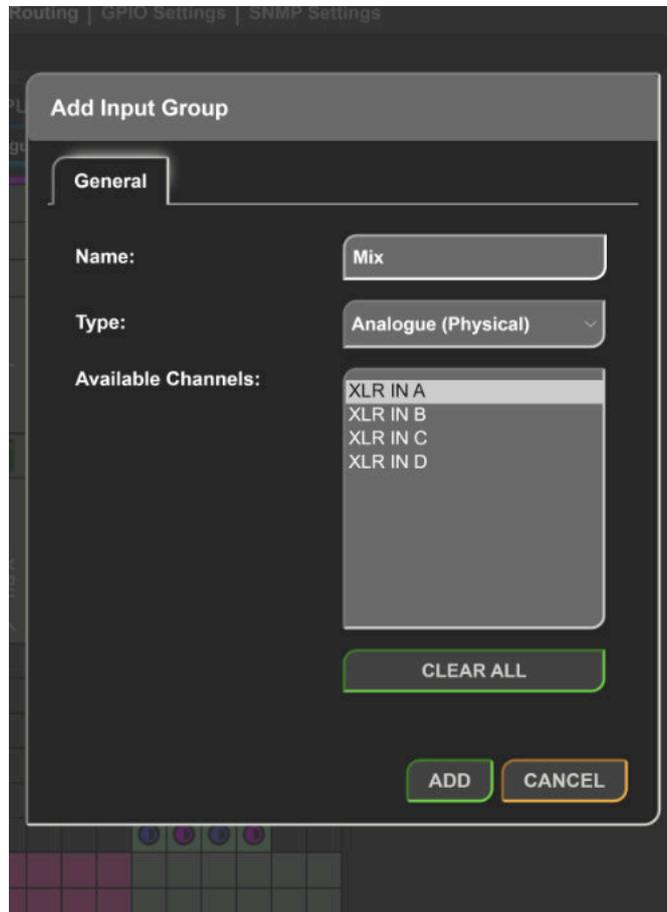


Fig 6-29: Adding an input group

Adding an Output Group

By default, the commentator has the virtual outputs added to the routing grid, these can't be removed. The two commentator headphones on the AVN-CU2 and the four commentator headphones on the AVN-CU4 are also added by default.

Additional digital, analogue, and Dante outputs can be added to the unit as the user desires.

To add a new output group to the audio routing grid:

- Click the **+** button next to **INPUTS**, this will open a new window.
- Type in a name for the new output group, this name is displayed as the label for the group on the outputs section of the grid.
- Select the output type, digital and analogue outputs are located on the rear of the device whereas Dante outputs are accessible using Dante Controller.
- Select the available channels you would like to add to the group. A maximum of 8 channels can be added to a group.
- Click the **Add** button, the output will now appear in the outputs section of the grid with the name provided.

Tips:

- A tooltip will be displayed if there are any issues with adding the output.
- The shift button **⇧ Shift** and control button **⌘ Ctrl** can be used to select multiple channels.
- The **Clear All** button can be pressed to deselect all channels.
- Clicking **Cancel** at any time will discard all changes.

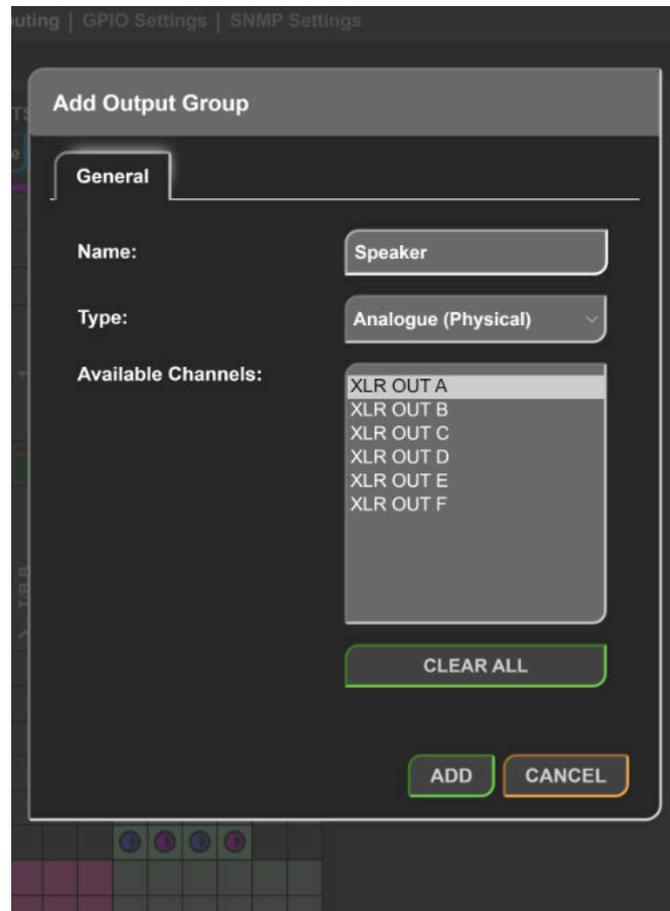


Fig 6-30: Adding an output group

Encoder Assignments

The encoder assignments overview shows:

- The current position of encoders on each page.
- The input/output or mix point an encoder belongs to.
- The colour of the encoder.
- The encoders function.
- Whether an encoder is locked.

At the top of the window is a tab for **Display 1**, on the AVN-CU4 there is also a tab for **Display 2**. Each display has four pages with names each column represents a page. Each page has six encoder positions each row represents an encoder position.

The colour of the box matches the colour of the encoder, in the box first the name of the input/output is displayed, then underneath this the functionality of the encoder is displayed. If no encoder is assigned to a particular encoder position/page the box is greyed out and no text is displayed. If an encoder is locked, a lock symbol is also shown.

In the example an encoder is assigned to page **2 - Inputs** and this is in encoder position **1** the encoder is white corresponding to the colour of the surrounding box, this is assigned to an input with the name **Comm1** and controls the **Level** of that input.

Whilst this window is open other settings on the Audio Routing webpage can still be modified. The window can be hidden by clicking the Hide Encoder Assignment Overview button (🔇) which is to the left of the **OUTPUTS** section.

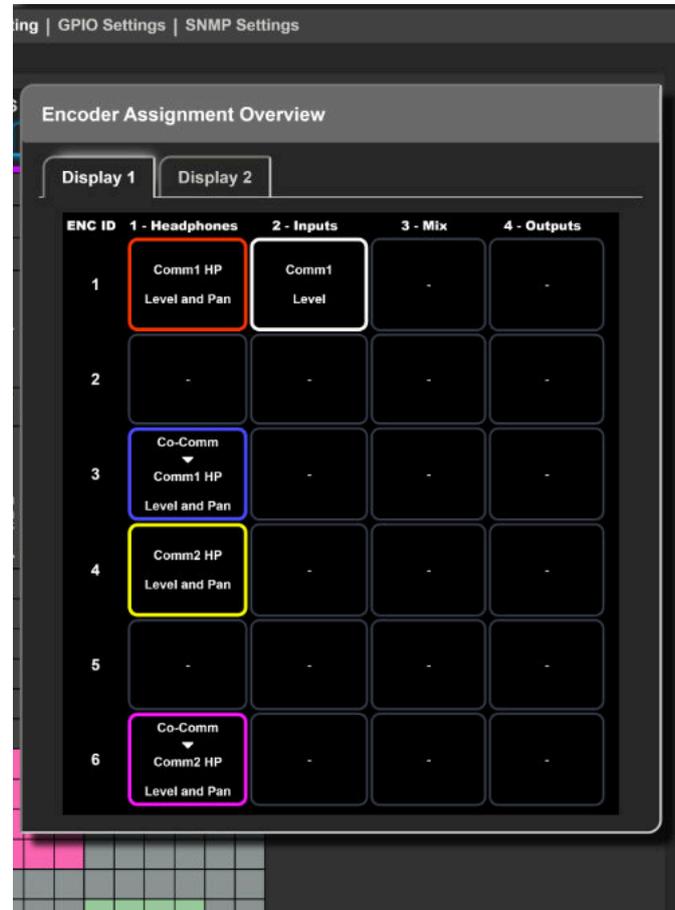


Fig 6-31: Encoder assignments overview

Adding an Encoder

An encoder can be assigned to an input, mix-point, or output. To add an encoder, click on the point you would like to add it to. The configuration window for the point clicked will be displayed.

In the configuration window select the **Encoder 1** or **Encoder 2** tab. The Encoder 2 tab is shown on stereo points and allows each encoder to control one of the functions: metering, level, or pan.

In the encoder tab select the **Display**, **Page**, and **Encoder Position** to assign the encoder to. Then select the **Function** and **Colour** of the encoder. Only select **Lock** if you want to prevent the use of the encoder. These settings are covered in more depth in the **Encoder Tabs** section of this manual. Click **Apply** to add the encoder.

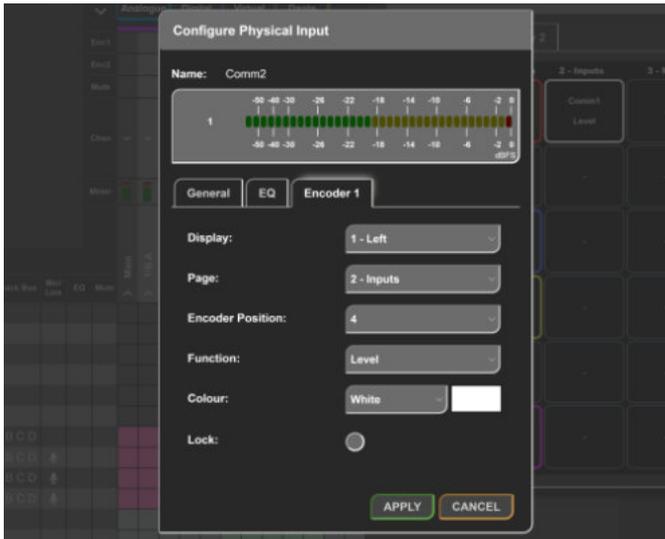


Fig 6-32: Adding an encoder

The added encoder can now be seen in the audio routing grid and the encoder assignments overview. It is now also available for use via the top panel of the device.

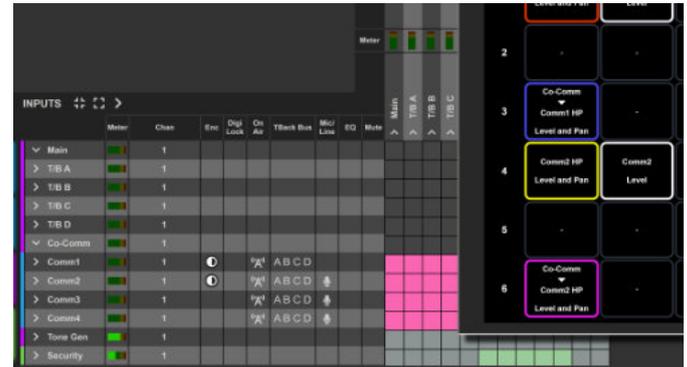


Fig 6-33: Added encoder shown in audio routing grid



Fig 6-34: Added encoder on the top panel of the device

Collapsing and Expanding Views

Inputs and outputs can be expanded or collapsed, when expanded individual channels belonging to an input/output can be seen, when collapsed only the input/output is shown along with a channel count.

Individual inputs and outputs can be expanded/collapsed by clicking the arrow  next to that input/output.

The whole input or output sections can be expanded/collapsed by pressing the expand button  and the collapse button .

To show/hide input/output status icons click the arrow  near the **INPUTS** and **OUTPUTS** text.

The status icons show:

- The encoder assigned to an input/output - if an encoder is assigned the encoder and its colour  is shown otherwise this section is blank
- Digital lock status - on digital inputs shows if the input is unlocked  or locked 
- On air status - on commentator inputs shows if the input is on air  or off air 
- Talkback bus status - on commentator inputs shows if a talkback bus is enabled  or disabled 
- Mic/line status - on commentator inputs it is blank if input is in line mode and displays a mic icon  if in mic mode, the mic is green if Phantom power is enabled 
- EQ status - if EQ is enabled the EQ icon  is shown
- Mute status - if the input/output is muted the mute icon  is shown
- Metering is also displayed showing the current level of audio on each channel

Configuring Inputs, Outputs, and Connections

To configure an input or output click on the name of that group, clicking on icons will open the relevant tab, for example if an encoder icon is clicked the encoder tab will automatically be opened. To configure a connection click on the connection (mix-point).

General Tab

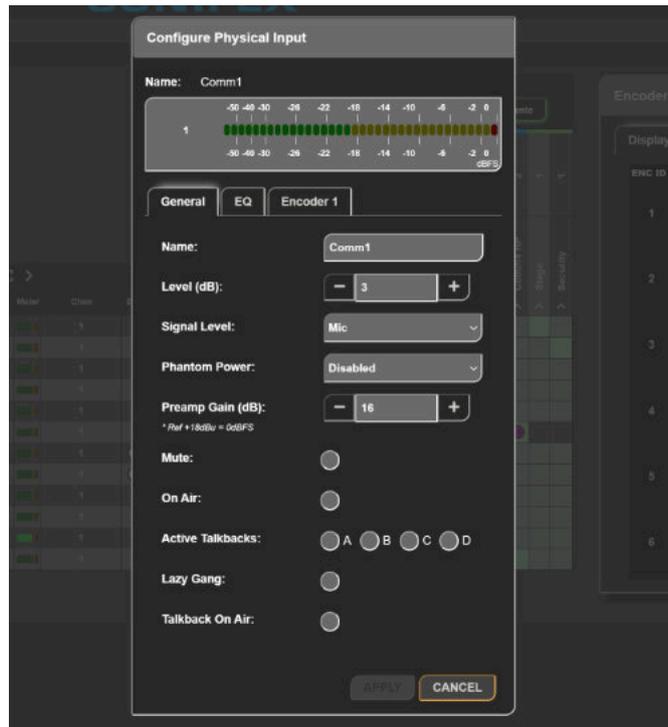


Fig 6-35: General tab of an input configuration window

Active Talkbacks

Applies to commentator inputs. Four checkboxes labelled **A**, **B**, **C**, and **D**. When checked, the selected commentator input will be routed to the corresponding talkback bus.

Audio Line Up

Applies to commentator inputs in line mode, analogue inputs, and analogue outputs. Set the analogue audio level that is equal the 0 dBFS full scale digital value. Can be set to either 15, 18, 20, 22, or 24 dBu. The audio line-up level will depend on the minimum and maximum audio levels required.

Bypass SRC

Applies to digital inputs. If the sample rate of the input signal is the same as the Dante clock that is in use, there is no need for any sample rate conversion. This option allows the user to bypass sample rate conversion for the selected input.

Ducking Level

Applies to commentator outputs. Can be varied from -80dB to 0dB. When the ducking GPIO handler associated with the output is asserted, the audio level for all mixpoints linked to this output are reduced by this amount. (See GPIO Settings section for more information)

Headphone Attenuation

Applies to headphone outputs. Can be varied between 0dB and 24dB and determines how much the headphones signal is reduced by.

Lazy Gang

Applies to commentator inputs. When enabled, all talkbacks corresponding to the commentator input are enabled/disabled simultaneously when any of the talkbacks on that commentator input become enabled/disabled.

(Mix) Level

Applies to inputs, outputs, and connections. Sets the level the signal is amplified by. Can be varied from -80 dB to +10 dB.

Limiter Threshold

Applies to outputs. Set the dBFS level that the limiter for the selected output group will activate. Can be varied from -40dBFS to 0dBFS.

Main Meter

Applies to outputs. When ticked, the metering data for the selected output will be shown at the top segment of the TFT display.

Mute

Applies to inputs, outputs, and connections. Selecting **Mute** mutes the input, output, or connection (mix-point).

Name

Applies to inputs and outputs. Used to name the input or output that is being configured.

On Air

Applies to commentator inputs. Selecting **On Air** routes the selected commentator input on to the main audio bus, if a button is configured with the **On Air** function it will also illuminate.

Output Metering

Applies to outputs. Determines whether the metering shown on for this output is obtained before (**Pre**) or after (**Post**) **Level** adjustment.

Pan

Applies to stereo outputs and connections. The value can be varied between -12 (audio is fully left) and +12 (audio is fully right).

Phantom Power

Applies to commentator inputs in mic mode. Selecting **Enabled** provides the connected microphone with a +48V DC supply.

Preamp Gain

Applies to commentator inputs in mic mode. The user can add 16 to 76 dBs of gain in steps of 3 dB.

Presence Threshold

Applies to inputs. Sets the level that the signal presence gpio trigger event associated with this input is asserted. Can be varied between -80dB and 10dB. (See GPIO Settings section for more information).

Presence Timeout

Applies to inputs. This setting configures how long in seconds that the audio needs to be under the presence threshold before a signal presence gpio trigger is deasserted. (See GPIO Settings section for more information)

Signal Level

Applies to commentator inputs. Selecting **Mic** displays the options for **Phantom Power** and **Preamp Gain**. Selecting **Line** displays the **Audio Line Up** option.

Talkback On-Air

Applies to commentator inputs. Selecting **Talkback On-Air** prevents the commentator from being taken off air when talkback is enabled, hence allowing a conversation to also be heard on air.

EQ Tab

The EQ tab is only available on the commentator inputs.

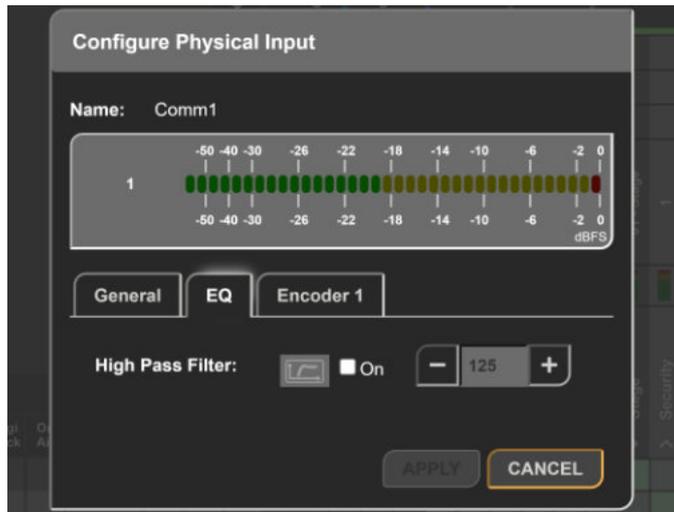


Fig 6-36: EQ tab of an input configuration window

High Pass Filter

The **High Pass Filter** can be enabled by selecting **On**. This removes low frequency components from a signal. The cut-off frequency can be set to a value from 40Hz to 10000Hz.

Encoder Tabs

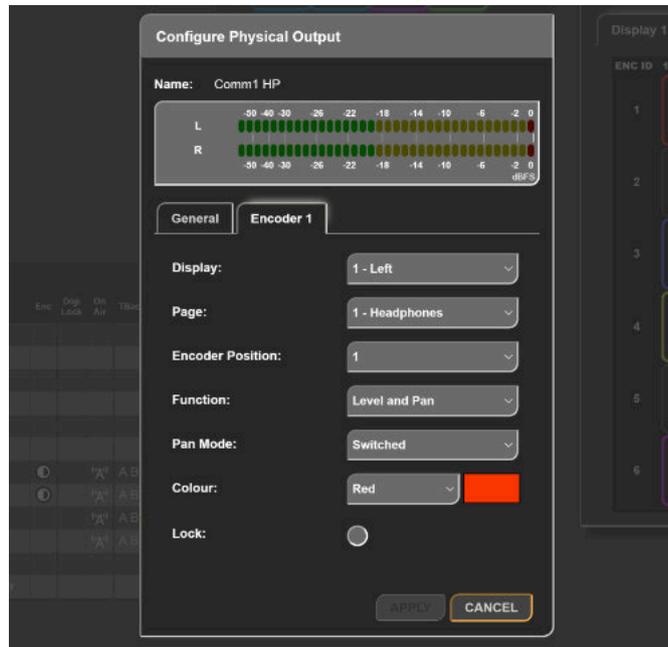


Fig 6-37: Encoder tab of an output configuration window

The encoder tab is used to setup an encoder for the corresponding input, output, or mix-point. The second encoder tab is available on points with pan functionality. With two encoders the user can assign one to control the level and the other to control the pan. The options in the encoder tabs are described on the next page.

Display

This option is only available on the AVN-CU4. This allows the user to select which display they would like to configure the encoder for.

Page

Use the **Page** dropdown to select which page of a **Display** an encoder is displayed on. Selecting **Unassigned** removes the encoder from all pages. Selecting **All** adds the encoder to every page of a **Display**.

Encoder Position

Use the **Encoder Position** dropdown to select between six positions, this is the position of the encoder on the **Page**.

Function

Metering Only

The encoder displays metering information for the input, output, or connection (mix-point) configured.

Level

The encoder can be used to control the level of audio, rotating clockwise to increase the level, anti-clockwise to decrease it, and double pressing on the encoder to mute/unmute audio.

Pan

Available on points with pan control in the **General** tab. The encoder can be used to pan the audio, rotating clockwise pans the audio right and rotating anti-clockwise pans the audio left. The **Pan Mode** option also becomes available allowing further customisation.

Level and Pan

Available on points with pan control in the **General** tab. The encoder can be used with both **Level** and **Pan** functionality. Pressing the encoder once to switch between the two functions.

Pan Mode

Switched

The encoder switches between centre, fully left, and fully right panning.

Variable

The encoder is used to adjust the pan value gradually between the values - 12 (fully left) and 12 (fully right) allowing for more precise panning control.

Colour

This setting allows the user to set the colour of the LED bar next to the encoder and the box around the encoders section of the TFT display. The following options are available:

- White
- Red
- Green
- Blue
- Yellow
- Cyan
- Magenta

To the right of the dropdown list is also a box which displays the colour selected.

Gang Encoder Pages:

When this setting is enabled, all pages for this encoder will get linked together and adjustments to the level or pan made by an encoder get applied to all assigned pages simultaneously. This is done regardless of which page is currently shown on the display.

Lock

Selecting **Lock** causes the encoder to be locked and so turning or pressing the encoder no longer has an effect. If a locked encoder is turned or pressed **ENC LOCKED** will flash on the screen to indicate that the encoder is currently locked.

Routing Grid

The routing grid uses coloured routing squares to show the status of a routing within the grid.

■ Un-routed squares will be displayed in grey, this represents a mix-point that is not yet routed but can be, clicking will cause corresponding input and output to be expanded to show their channels. Clicking a second time will cause the input and output channel to be routed.

■ A routed channel is indicated by a green square.

■ To quickly remove routings the user can hold the control key **Ctrl** and click. Whilst the control key is held, hovering over a routing turns it red.

■ Squares that cannot be routed are indicated by dark grey squares.

■ Fixed routings that cannot be edited are indicated using pink squares.

Locking User Buttons and Encoders

After the unit has been setup user buttons and encoders may be locked to prevent the commentator from using them.

To lock a user button navigate to the **Front Panel** web page and right click a button, in the configuration window select **Lock**.

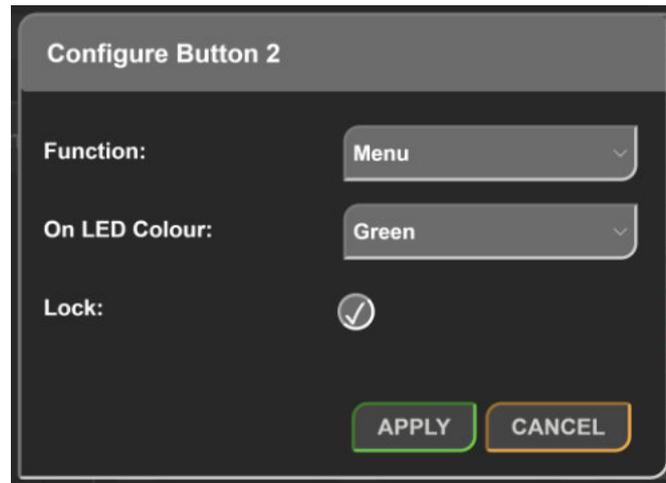


Fig 6-38: Locking a user button

A complete row of buttons can also be locked by selecting the corresponding checkbox in the **Front Panel** web page.



Fig 6-39: Locking a row of buttons

Pressing a locked user button will cause the **LOCKED** warning messages to appear in the main output section of the top panel TFT display.



Fig 6-40: Locked user button warning

To lock an encoder navigate to the **Audio Routing** web page and click an encoder, in the configuration window select **Lock** and click **Apply**.

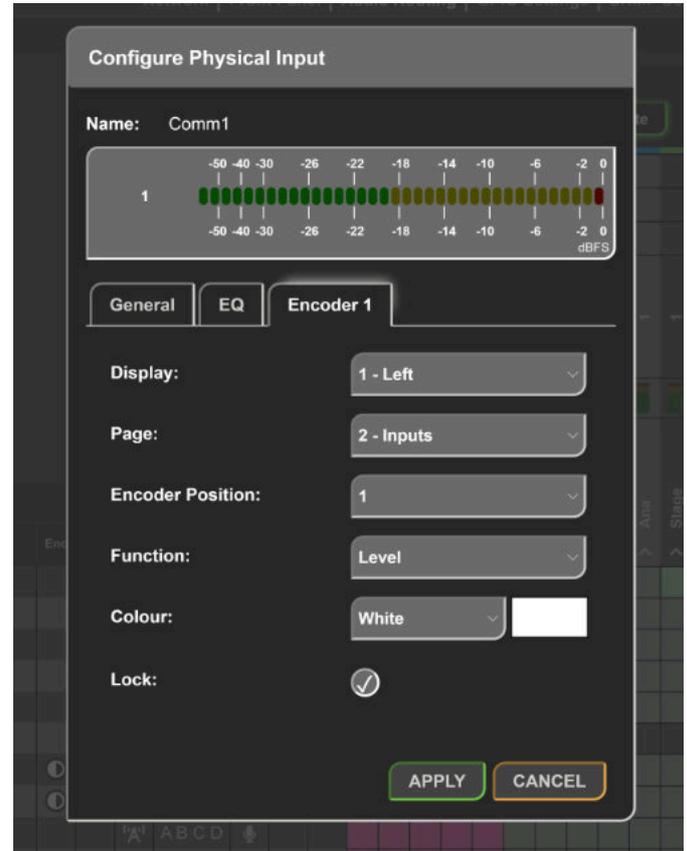


Fig 6-41: Locking an encoder

Alternatively an entire **Page** of encoders can be locked in the **Front Panel** webpage by selecting the lock icon next to a pages name. The lock icon first appears as an open lock  and then after clicking it turns to a closed lock  indicating the page of encoders is now locked.

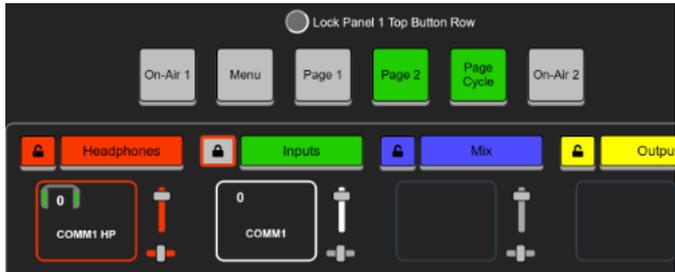


Fig 6-42: Locking a page of encoders

The **Encoder Assignment Overview** on the **Audio Routing** page shows the currently locked encoders.

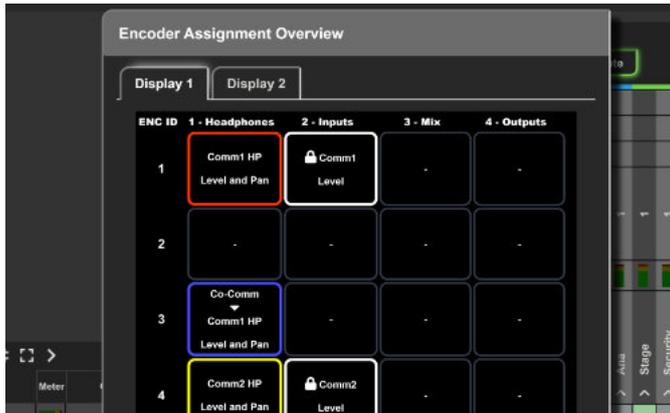


Fig 6-43: Encoder assignment overview with locked encoders

When an encoder is locked if it is turned or pressed the **ENC LOCKED** message will be displayed in the encoder segment.



Fig 6-44: Locked encoder

GPIO Settings

The **GPIO Settings** web page shows an overview of connections between logical inputs and logical outputs, this web page allows the device to be configured to perform actions when events occur.

The inputs can be of type:

- Physical GPI
- Virtual GPI
- Cough GPI
- Events
- User buttons

The outputs can be of type:

- Physical GPO
- Virtual GPO
- Events
- User LEDs
- Relays

An example scenario of when these logical connections might be useful is as follows:

In a particular setup there is an LED sign which can be controlled using a physical GPIO connection, the commentator wants this LED sign to be turned on whenever they are on-air, therefore they add the event **On Air 1** as an input, then they add a physical GPIO as an output selecting **Physical Port 1**. They then click in the white square which is in line with both that input and that output which causes a connection between the two, to be made. Now whenever the first commentator is on-air their corresponding on-air LED sign will illuminate.

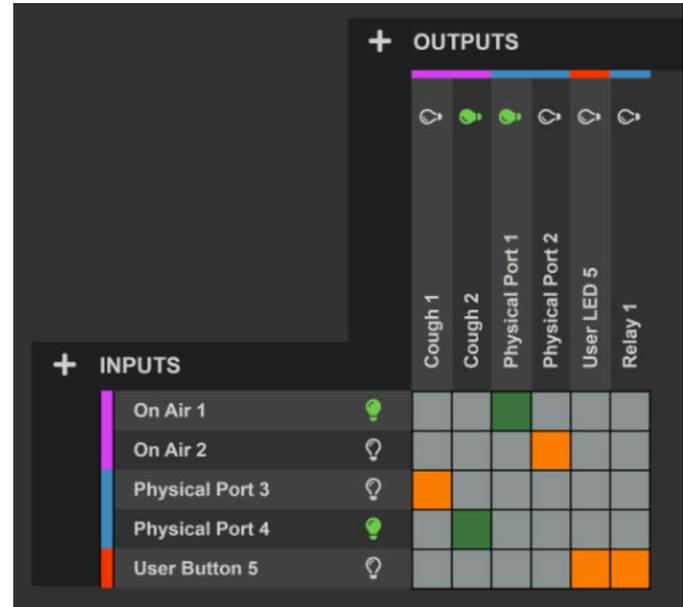


Fig 6-45: Example GPIO routing grid

In the example commentator position 1 is on-air indicated by the green lightbulb on the input **On Air 1** the routing to **Physical Port 1** becomes active indicated by the green box between them. The lightbulb on the input **Physical Port 4** is also green which indicates that this physical port is active, in the case it activates the output **Cough 2**.

Inputs and outputs can be added to the GPIO routing grid by clicking the **+** icon next to **INPUTS** or **OUTPUTS**. Once added routings can be made between inputs and outputs. An orange square indicates an in-active routing, a green square indicates an active routing.

Add Input

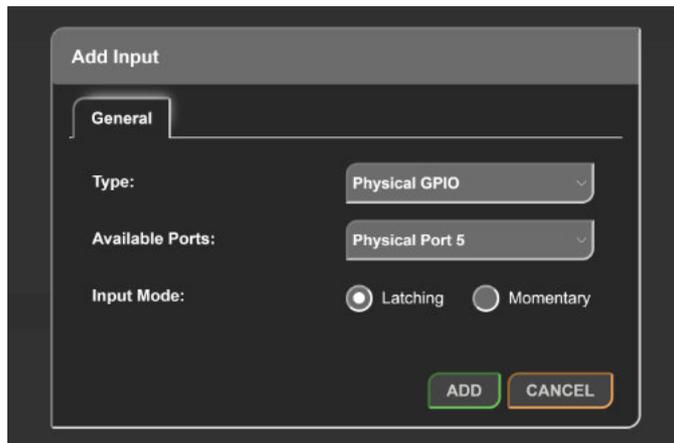


Fig 6-46: Adding an input to the GPIO routing grid

Type

The type drop-down menu allows the user to configure how the input will operate, the options available are described below.

Physical GPIO

Allows a general-purpose input on the rear panel of the device to be used as a trigger for an output.

When selected the following fields are also displayed:

- Available Ports
- Input Mode

Virtual GPIO

Allows a virtual general-purpose input to be created using a source from the network, this can then be used as a trigger for an output.

When selected the following fields are also displayed:

- Available Ports
- vGPIO Source

Cough

Allows a cough input to be created this cough port can be activated by connecting an AVN-HA1 or AVN-HD1 to the stereo analogue/digital output on the AVN-CU2 or stereo digital output on the AVN-CU4, this can then be used as a trigger for an output.

When selected the following fields are also displayed:

- Available Ports

Event

Allows an input event to be selected which will then cause an output to be triggered, for example an input event could be set when DC power is lost.

When selected the following fields are also displayed:

- Available Events

User Button

Allows a user button on the front panel of the device to be setup to trigger an output. The user button must first be configured in the **Front Panel** web page by setting its **Function** to **GPIO**.

When selected the following fields are also displayed:

- Available Buttons

Available Ports

This drop-down menu allows the user to select which of the available physical ports, virtual ports, or cough ports to setup, this is dependent on the type of port selected.

There are ten physical ports available, ten virtual ports available, and one cough port available.

Input Mode (Physical GPI Only)

Momentary

When the input mode is set to Momentary, the input function is enabled only whilst the input is active.

Latching

When the input mode is set to Latching, making the input active briefly will toggle whether the input function is enabled or disabled.

vGPIO Source (Virtual GPI Only)

The vGPIO Source drop-down window allows the user to select a virtual general-purpose output port from another device that is available on the network and use that to set the state of the virtual input.

Available Events

This drop-down menu allows an event to be selected that can then be used as an input to drive the state of another output, the list of options are as follows.

Primary Link Down

Active when no connection is available via the primary network port on the device.

Secondary Link Down

Active when no connection is available via the secondary network port on the device.

AC Power Off (AVN-CU4 Only)

Active when the status of the AC port is in fault condition.

DC Power Off

Active when the status of the DC port is in fault condition.

POE1 Power Off

Active when the status of the primary PoE port is in fault condition.

POE2 Power Off

Active when the status of the secondary PoE port is in fault condition.

PTP Sync Lost

Active when the connection to the PTP master is lost.

On Air n

Active when commentator position **n** is on air.

Cough n

Active when commentator position **n** is in cough mode.

T/B n I

Active when commentator position **n** is routed to talkback bus I.

Signal Present <input name>

Active when audio is present on the the named input. To adjust the behaviour of when this event becomes active or inactive, the **Presence Threshold** and **Presence Timeout** settings in the input configuration menu for the relevant input on the **Audio Routing** webpage can be used. The **Presence Threshold** sets the audio level required on the input before this event becomes active. The **Presence Timeout** setting for the input determines how long the audio level present at the input needs to be under the **Presence Threshold** level before this event becomes inactive again.

Available Buttons

The Available Buttons drop-down menu allows the user to select which of the available user buttons to setup, this provides 12 user buttons on the AVN-CU2 variant and 24 user buttons on the AVN-CU4 variant.

Add Output

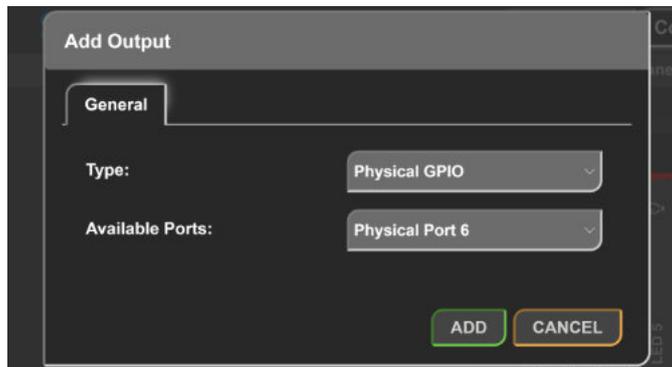


Fig 6-47: Adding an output to the GPIO routing grid

General Tab

Type

Allows the user to configure the outputs operation.

Physical GPIO

Allows a GPO on the rear panel of the device to be activated.

When selected the following fields are also displayed:

- Available Ports

Virtual GPIO

Creates a virtual GPO on the network which can be activated.

When selected the following fields are also displayed:

- Available Ports

Event

Allows an event to be activated.

When selected the following fields are also displayed:

- Available Events

User LED

Allows the user LED to be toggled between its on colour and its off colour, the on colour is displayed when any of the inputs routed to this output are active. The user button must first be configured in the **Front Panel** web page by setting its **Function** to **GPIO**.

When selected the following options are also displayed:

- Available Buttons

Relay

Allows the relay available on the GPIO connector, to be toggled on and off.

When selected the following options are also displayed:

- Available Relays

Available Ports

Allows the user to select which of the available physical ports or virtual ports to setup, this is dependent on the type of port selected.

There are ten physical ports available and ten virtual ports available.

Available Events

Allows the event to be triggered when any input routed to this output is active, the list of options are as follows.

On Air *n*

Activate commentator position *n* on air control.

Cough *n*

Activate commentator position *n* cough mode control.

T/B *n l*

Activate commentator position *n* routing to talkback bus *l*.

T/B Notify *n l*

When activated, any button assigned to activate the talkback for commentator position *n* talkback bus *l* will be set to flash. This can be used to help the commentator identify which button to press to route their microphone input to the correct talkback bus.

Duck Comm n HP

When activated, audio routed to the headphone output for commentary position **n** is ducked. The amount the audio level is reduced by can be configured using the **Ducking Level** setting on audio routing webpage for the relevant commentary position output. If this event is triggered by a Signal Present input event, audio originating from the input the Signal Present event is associated with will not be ducked.

Mute input / output

When activated, audio is muted on the named input or output.

Available LEDs

Allows the user to select which of the available user LEDs to setup, this provides 12 user LEDs on the AVN-CU2 and 24 user LEDs on the AVN-CU4.

Available Relays

Allows the user to select which of the available relays on the device is to be setup as an output, there is one relay available on both the AVN-CU2 and AVN-CU4.

Routing Grid

Create Connection

Clicking on a square in the routing grid creates a connection.

- Orange squares indicate inactive connections.
- Green squares indicate active connections.
- Dark grey squares indicate an input and output are not allowed to be connected, for example an event cannot be routed to the same event.

When an input is active indicated by a green lightbulb the connection becomes active, this in turn makes the output active indicated by a green lightbulb.

Remove Connection

Hold the control key **Ctrl** and click a connection to delete it. Alternative click on a connection and then click **Delete** in the **Configure Connection** window.

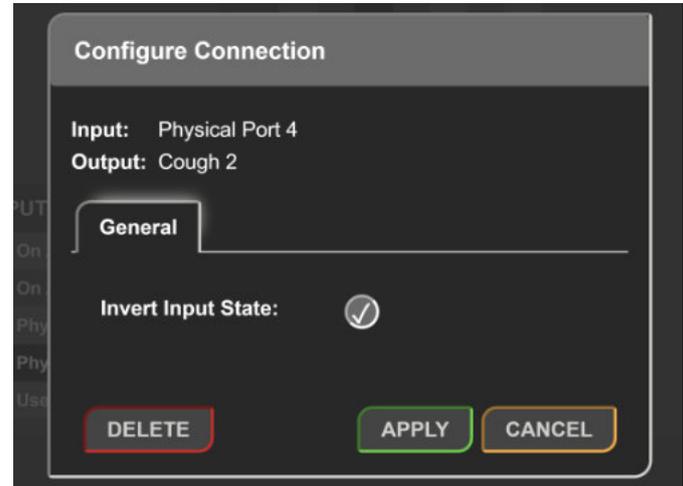


Fig 6-48: Invert connection

Invert Connection

A connection can be inverted by clicking the connection and then selecting **Invert Input State** in the **Configure Connection** window. Now when the connection would normally be active it is inactive, and when it would normally be inactive it is active.

SNMP Settings

The SNMP settings web page allows configuration of SNMP messages and can be used send traps to an SNMP master which can then perform tasks such as sending email.

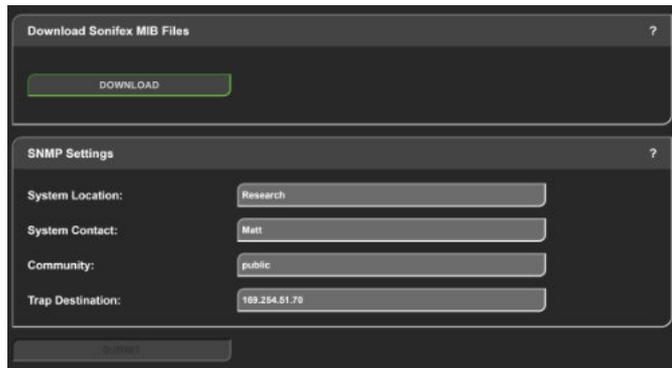


Fig 6-49: SNMP web page

Download Sonifex MIB Files

Click **Download** to download two files SONIFEX-GPIO-MIB and SONIFEX-MIB these are used by the SNMP master to decode received messages.

SNMP Settings System Location

The system location is used to specify the physical location of the unit this may be set to any value which is between 0 and 20 characters in length. The system location can be accessed via SNMP using the OID 1.3.6.1.2.1.1.6 (sysLocation).

System Contact

The system contact is used to specify the user of the device again this may be set to any value which is between 0 and 100 character is length. The system contact can be accessed via SNMP using the OID 1.3.6.1.2.1.1.4 (sysContact).

Community

The SNMP community string is used as a form of security, if the string is set to 'public' without quotation marks any SNMP master on the network may query the device. If the community string is set to anything else the SNMP master will need to send this community string along with any SNMP requests in order to acquire the requested information otherwise the request will be denied. This may be set to any value which is between 0 and 20 characters long.

Trap Destination

The trap destination is the IP address of the SNMP master, this allows the device to send SNMP trap messages to the SNMP master containing information about the devices current state, for example a SNMP trap message is sent when the state of a GPI is changed along with information about that GPI such as the GPI number and its current state.

Disabling SNMP Trap Messages

To prevent SNMP trap messages being sent the 'Trap Destination' field can be cleared and the form submitted.

System

The system web page is used for the following:

- Updating the unit
- Saving and loading configuration files
- Retrieving the unit's system logs
- Rebooting and resetting the unit

Update Firmware

In this section the current firmware version on the connected unit is shown. New versions of firmware will be released as new features are added, and when any bug fixes are completed, click on the software downloads link to visit the firmware downloads webpage of the Sonifex website. If an update is available for your unit you can download it as a zipped archive file, you will need to extract the 'SWU' file from the archive, this can be done in Windows by right-clicking the archive and selecting extract all.

Clicking update will then bring up a window explaining the firmware update procedure, clicking the continue button will cause the unit to reboot into maintenance mode and allow the new firmware to be uploaded to the unit.

Save Configuration to A File

The currently loaded configuration of the unit can be saved to a local 'JSON' file by clicking the save config button. The filename will be the device ID followed by an underscore and the device's friendly name.

It is a good idea to save the configuration settings of all units on the network once they have been setup as this provides a quick and easy way of returning the units to a known working condition.

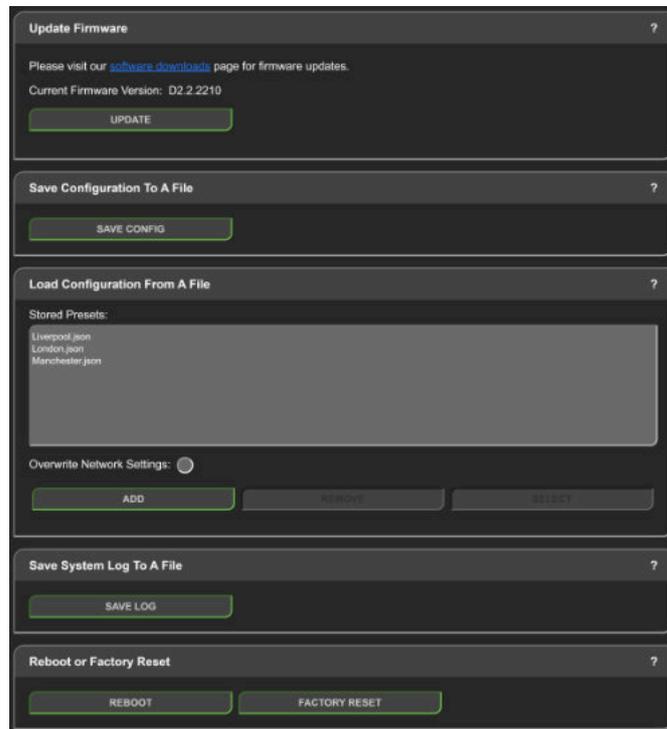


Fig 6-50: System web page

Load Configuration from A File

This section is used to load stored pre-set files, this is useful when the unit is being moved between locations with different setups. Configuration files store the complete setup of the unit including the units network settings, however network settings are only changed when the overwrite network settings checkbox is selected.

A maximum of 8 pre-sets can be added to the unit, a pre-set is added by clicking the Add button and selecting a local configuration file. A pre-set can be removed by selecting it in the menu and clicking the Remove button. A pre-set is loaded on the unit by selecting the pre-set in the menu and pressing the Select button, if it is necessary to also load the network settings that are present in the configuration file the overwrite network settings checkbox can be selected. If you would like to maintain the current network settings, uncheck this option and all other settings stored in the selected pre-set will be applied.

When a pre-set is loaded the unit will automatically reboot to load the new configuration settings. This takes approximately 25 seconds during which time; a progress page will be shown. If the settings of the network port the browser is connected to have changed, a new connection will need to be made once the unit has restarted. Otherwise, the device information page will be shown automatically.

Save System Log to A File

An internal log records system events and errors. The current log can be retrieved from the device by clicking Save log.

If there have been no process crashes the current log is saved and is a single text file. Otherwise multiple logs will be stored together in a 'TAR' archive file. This archive can be sent to Sonifex to help you resolve any issues with the unit.

Reboot or Factory Reset

The unit can be rebooted using the reboot button, a quick reboot can often fix any issues with the unit, after rebooting the webpage should automatically be reloaded. The factory reset button restores the unit to factory settings, restoring the factory settings will also cause the unit to reboot.

The pre-set configuration files previously uploaded to the unit will still be available after a factory reset, this allows the unit to be quickly restored to a known working state.

7. System Menu

The system menu can be opened by pressing a push button assigned with the **Menu** function. If there are no push buttons assigned to the **Menu** function then the menu can still be accessed if buttons 1, 6 7 and 12 (the 4 corner buttons) are pressed while the unit is booting and the loading screen is shown on the TFT display. When the buttons are pressed **Displaying Menu** is shown on the display. When the unit has then been initialised, it will load into the system menu.

To navigate the system menu, an encoder is pressed in order to select the corresponding item from that menu. The LED bar located next to each encoder is illuminated in the same colour as the corresponding menu item. In the brightness menu all LED bars are illuminated regardless of the menu items.

When an item is selected from the system menu the background colour is gradually erased once fully erased an operation is performed, this allows the commentator time to acknowledge that they have pressed an encoder.

When the system menu opens the following items are displayed:

- Network
- Brightness
- Status
- Config
- Audio
- Close

You can exit this menu by clicking the **Menu** push button again or by selecting the **Close** menu item.

The output section of the TFT display shows the name of the current sub-menu whilst in the system menu, except in the main menu when no name is shown.

Network

In the network sub-menu, the user can set the configuration on each of the device's network ports. When the network sub-menu opens the following items are displayed:

- Control
- Primary
- Secondary
- Back
- Close

Control

In this sub-menu, the user can configure the connection to the devices embedded web server. When the control sub-menu opens the following items are displayed:

- Mode
- IP Address
- Netmask
- Gateway
- Back
- Close

Mode Dynamic

When set to dynamic, the unit will attempt to acquire an IP address automatically from either a DHCP server or via auto configuration if no DHCP server is found.

Static

When static mode is used, the IP address and subnet mask values provided in the other sections will be assigned to the port.

IP Address

The IP address is split onto four encoder display sections. Pressing an encoder cycles through the digits in the corresponding octet. Whilst a digit is highlighted the encoder can be rotated in order to increase or decrease the value. After all digits have been cycled an individual digit is no longer highlighted and so changes can be saved. To discard changes select **Cancel**. To save changes select **Save**, the unit will restart.

Netmask

Configure the subnet mask for this connection.

Gateway

Configure the gateway for this connection.

Primary

This port is used for Dante connections, this provides the same options as the **Control** port.

Secondary

This port is used to provide redundancy to Dante connections if the port is in redundant mode, this provides the same options as the **Control** port.

If the port is in switched mode these settings can still be changed, they will be stored in the configuration file and loaded when the port is switched back to redundant mode via the Dante controller application.

Brightness

Used to set the brightness of the TFT display, push button LEDs, status LEDs, and encoder LED bars. Whilst in the brightness sub-menu all the encoder LED bars are on, this allows the level of each of the colours to be seen.

Pressing the first encoder causes the percentage to be highlighted, the brightness can then be adjusted by rotating the encoder. The brightness is adjusted in 10% steps. Select **Cancel** to discard the changes or **Save** to keep the changes.

Status

The status sub-menu provides a detailed list of the device's current settings and status. The following information is included in the list:

- Product ID
- Firmware Version
- Serial Number
- Friendly Name
- Control IP Address
- Control Netmask
- Control MAC Address
- Primary IP Address
- Primary Netmask
- Primary MAC Address
- Secondary IP Address
- Secondary Netmask
- Secondary MAC Address
- System Uptime

Config

Provides a list of currently available pre-set configs uploaded to the device. When more configs are available than can fit in the menu each of the encoders can then be rotated in order to move up and down the list.

Press down on an encoder in order to select the corresponding config. The selected pre-set config is then marked with a tick. Selecting **Save** in this sub-menu and then closing the menu will cause the unit to reboot and the selected config to be loaded to the unit. Select **Cancel** to discard changes.

When loading a configuration from the system menu network settings are not overwritten.

Audio

The audio sub-menu allows the adjustment of various audio settings for each commentator position. First the commentator position is selected, positions 1 to 2 can be selected on the AVN-CU2 and positions 1 to 4 can be selected on the AVN-CU4.

After the commentator position is selected, the **Input** option can be selected to modify the commentator's input configuration, or the **Headphone** option can be selected to modify the commentator's headphone configuration.

Input

Signal

This allows the commentator input to be switched between microphone and line modes.

When in microphone mode the following options are available:

- Gain
- Phantom
- HPF

When in line mode the following options are available:

- Line up
- HPF

Gain

In the gain sub-menu, the pre-amp gain (measured in dB) can be adjusted from 16 dB to 76 dB.

Phantom

In the phantom sub-menu, phantom power can be enabled or disabled.

Line up

The line-up level can be adjusted between the following values:

- +15 dBu = 0 dBFS
- +18 dBu = 0 dBFS
- +20 dBu = 0 dBFS
- +22 dBu = 0 dBFS
- +24 dBu = 0 dBFS

HPF

In the HPF (High Pass Filter) sub-menu are two items, the first **HPF State** allows enabling and disabling of the high pass filter, the second item **Frequency** allows the cut-off frequency for the high pass filter to be adjusted, the cut-off frequency can be from 40 Hz to 3 kHz.

Headphone

Attenuate

Allows the headphone attenuation (measured in dB) to be adjusted, this can be set to a value from 0 dB up to 24 dB.

Set Limit

Allows a limiter threshold to be set for the commentator headphones, this helps to prevent distortion of audio as the audio level rises. The threshold for the headphones can be set to a value from -40 dBFS up to 0 dBFS.

8. Ember+

Device information and configuration can also be viewed and modified using Ember+.

EmberPlus Viewer can be downloaded from:
<https://github.com/Lawo/ember-plus/releases>

To add a device to the viewer click **Add** next to **Communication Ports**. In the window that appears an IP address and port is required. Type in the IP address of the unit and leave the port number as 9000.

A device tree appears under **Communication Ports**.

There are four main nodes:

- identity
- system
- network
- gpio

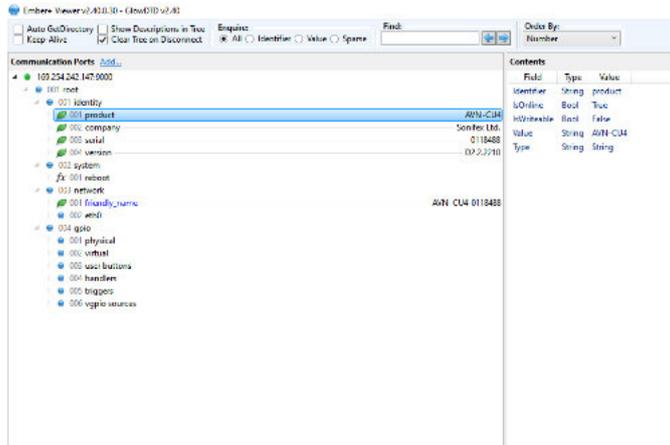


Fig 8-1: EmberPlus Viewer

The **identity** node contains device information:

- product - This specifies the type of product being used.
- company - This specifies the manufacturer of the product.
- serial - This specifies the devices serial number.
- version - This specifies the devices current firmware version.

Within the **system** node is a reboot function, clicking **Invoke** will cause the unit to be rebooted.

The **network** node contains the network configuration. After changing any network settings via Ember+ the unit has to be rebooted to apply the changes. The **network** node contains the options:

- friendly_name - The name given to the device by the user, click **Change** to change the name.
- eth0 - The devices control port.
 - mode - Allows the user to select between **static** and **dynamic** addressing modes.
 - ip_address - Allows the user to enter an IP address for **static** mode.
 - netmask - Allows the user to enter a subnet mask for **static** mode.
 - gateway - Allows the user to enter a gateway address for **static** mode.
 - mac_address - This specifies the MAC address of the port.

The **gpio** node provides the same options found on the **GPIO Settings** web page of the devices web server and allows connections to be configured. Names of input events are found under the **triggers** node and can be entered into an **output triggers** field. Names of output events are found under the **handlers** node and can be entered into an **input functions** field. Names of virtual GPIO sources are found under the **vgpio sources** node and can be entered into the **vgpio source** field of a **vgpio** under the **virtual** node.

9. Remote Control

The unit can be controlled remotely using the Embedded web server, physical and virtual GPIO, and EmberPlus.

Embedded Web Server Control

The embedded web server allows the user to control various settings which would normally be controlled using the front panel. The operator of the embedded web server can control whether the commentator microphones are on-air, whether talkback is enabled, the level of inputs, mix-points, and outputs (and muting), and the pan of outputs or mix-points.

Front Panel Control

All the functionality available from the front panel is also available through the web server via the **Front Panel** web page, this allows the user to control the volume and pan of each encoder as well as activating any of the function buttons, further options are available to lock buttons and encoders to prevent their physical use.

On Air Control

Navigate to the **Audio Routing** web page. Click on the commentator input you would like to put on air. In the **General** tab select **On Air**.

Talkback Control

Navigate to the **Audio Routing** web page. Click on the commentator input you would like to activate talkback for. In the **General** tab select **A, B, C,** or **D** from **Active Talkbacks**.

Level Control

Navigate to the **Audio Routing** web page. Click on the input, mix-point, or output you would like to level adjust.

In the **General** tab locate the **(Mix) Level (dB)** field and increase or decrease the level as necessary.

Mute Control

Navigate to the **Audio Routing** web page. Click on the input, mix-point, or output you would like to mute/unmute. In the **General** tab locate the **Mute** checkbox and select/deselect it as necessary.

Pan Control

Navigate to the **Audio Routing** web page. Click on the stereo mix-point, or output you would like to pan. In the **General** tab locate the **Pan** field and increase or decrease the pan as necessary.

Note the value in pan will jump between the values -12, 0, and +12 if an encoder is set to switched mode on this point.

GPI Control

Physical and virtual GPI can be used to activate events such as on air and talkback, these settings can be configured as described in the **GPIO Settings** section.

Virtual GPI are controlled using virtual GPO from other devices.

Physical GPI can be made active by shorting their corresponding pin to the ground pin on the GPIO remotes connector.

Ember+ Control

The Ember+ Viewer can also be used to configure and control the GPIO settings.

10. Technical Specifications for AVN-CU2 & AVN-CU4

AVN-CU2

Network and AoIP	
AoIP Standard:	Dante
Number of Channels:	16 receive, 16 transmit
Number of Streams:	16 receive, 16 transmit
Sample Rate:	48 kHz
Format:	Linear PCM, 16 or 24 bit
AES67 Support:	Yes
Connectivity:	2 x RJ45 and 2 x SFP
Speed:	1Gbps and 100Mbps
Network Modes:	Switched or redundant
Dante Domain Manager Ready:	Yes

Mic/Line Inputs	
Input Impedance (Mic Mode):	2.5k Ω electronically balanced
Input Impedance (Line Mode):	>10k Ω electronically balanced
Preamp Gain (Mic Mode):	User selectable 16dB to 76dB in 3dB steps (Ref. +18dBu = 0dBFS)
0dBFS Line-up (Mic Mode):	-58dBu @ Max preamp gain, +2dBu @ Min preamp gain
0dBFS Line-up (Line Mode):	User selectable +15dBu / +18dBu / +20dBu / +22dBu / +24dBu = 0dBFS
Frequency Response (Mic Mode):	+0/-0.2dB 20Hz to 20kHz Ref 40dB gain @ 1kHz
Frequency Response (Line Mode):	+0/-0.2dB 20Hz to 20kHz Ref 0dBu @ 1kHz
THD+N (Mic Mode):	<-90dBFS, -64dBFS, 20Hz – 20kHz, 40dB gain, 20kHz BW
THD+N (Line Mode):	<-98dBFS, -30dBFS, 20Hz – 20kHz, 20kHz BW
Equivalent Input Noise (Mic Mode):	125dB Ref. 76dB preamp gain, $R_s = 200\Omega$
Noise (Line Mode):	<-100dBFS, 20kHz BW, $R_s = 200\Omega$
C.M.R.R.	>60dB @ 1kHz
Phantom Power (Mic Mode):	+48V
High Pass Filter:	12dB/octave, user selectable frequency

Stereo Analogue/Digital Input	
Input Impedance (Analogue Mode):	>20kΩ electronically balanced
Input Impedance (Digital Mode):	110Ω
Supported Input Rates (Digital Mode):	32kHz, 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz and 192kHz
0dBFS Line-up (Analogue Mode):	User selectable +15dBu / +18dBu / +20dBu / +22dBu / +24dBu = 0dBFS
Frequency Response (Analogue Mode):	+0/-0.2dB 20Hz to 20kHz Ref 0dBu @ 1kHz
THD+N (Analogue Mode):	<-107dBFS, -30dBFS, 20Hz – 20kHz, 20kHz BW
Noise (Analogue Mode):	<-108dBFS, 20kHz BW, Rs = 200Ω
C.M.R.R (Analogue Mode):	>60dB @ 1kHz

Stereo Analogue/Digital Output	
Output Impedance (Analogue Mode):	<50Ω
Output Impedance (Digital Mode):	110Ω
Supported Output Rates (Digital Mode):	48kHz
0dBFS Line-up (Analogue Mode):	User selectable 0dBFS = +15dBu / +18dBu / +20dBu / +22dBu / +24dBu
Frequency Response (Analogue Mode):	+0/-0.5dB 20Hz to 20kHz Ref 0dBu @ 1kHz
THD+N (Analogue Mode):	<-107dBFS, -30dBFS, 20Hz – 20kHz, 20kHz BW
Noise (Analogue Mode):	<-107dBFS, 20kHz BW

Headphone Outputs	
Drive Capability	Drives 150mW into 32Ω to 600Ω headphones
0dBFS Line-up:	Fixed 0dBFS = +18dBu
Frequency Response:	+0/-0.2dB 20Hz to 20kHz
Response:	Ref 0dBu @ 1kHz
THD+N:	<-107dBFS, -30dBFS, 20Hz – 20kHz, 20kHz BW
Noise:	<-110dBFS, 20kHz BW

Main Panel Operational Controls & Indicators	
Power LED	Sonifex logo illuminates when power is present
Pushbuttons:	12 x Illuminated buttons that can be assigned to any of the following functions, and configured: On-Air / Talkback / Page # / Page Cycle / GPO / Cough / Menu / Brightness
Display:	480 x 107 pixel colour TFT display showing pan status, level, metering, control type, source/mix/destination names and main output metering
Status LEDs:	Clock / AoIP status / PoE status and PSU status LEDs to monitor power and connectivity. Can be disabled if required
Rotary Encoders:	6 x robust soft touch rotary encoders with adjacent configurable light bars for group/source/commentator grouping and identification

10 Technical Specifications

Front Panel Connections

Headphone Outputs:	2 x Neutrik ¼" (6.35mm) locking jack sockets
Microphone/Line Inputs:	2 x Neutrik 3 pin latching XLR sockets

Rear Panel Connections

Stereo Analogue/ Digital Input:	RJ45 socket (electronically balanced)
Stereo Analogue/ Digital Output:	RJ45 socket (electronically balanced)
GPIO Port:	15-way 'D'-type socket
DC Input:	Neutrik 4 pin XLR plug, 12VDC, Maximum 12W
Network:	2 x 1Gbps Neutrik EtherCON receptacles, with PoE, maximum 12W 2 x SFP slots for alternative interfaces

PoE Power

Standard:	802.3af
Class:	0
PD Power Range:	0.44 W to 12.94 W
Typical PSE Power Usage:	13 W
Max PSE Power Usage:	15.4 W

Equipment Type

AVN-CU2	Dante® Commentator Unit, 2 Commentators
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Physical Specification

Dimensions (Raw):	13.5cm (W) x 23cm (D) x 9.0cm (H - rear) 6.6cm (H - Front) 9.3cm (H - Maximum) 5.3" (W) x 9" (D) x 3.5" (H - front) x 2.6" (H - rear) 3.7" (H - Maximum)
Dimensions (Boxed):	30.5cm (W) x 21.5cm (D) x 16.3cm (H) 12" (W) x 8.5" (D) x 6.4" (H)
Weight:	Nett: 1.8kg Gross: 2.1kg Nett: 3.96lbs Gross: 4.62lbs

Accessories

AVN-DCX60	DC Power Supply for AVN Range, 4 pin XLR socket, 60W
AVN-TC3 (Case Only)	Transport Case, AVN-CU2 & Power Supply Cut-out
AVN-TC3 (Case Only)	46.5cm (W) x 36cm (D) x 17.6cm (H)
Dimensions(Raw):	18.3" (W) x 14.2" (D) x 6.9" (H)
AVN-TC3 (Case Only)	52cm (W) x 21.5cm (D) x 43cm (H)
Dimensions (Boxed):	20.5" (W) x 8.5" (D) x 16.9" (H)
AVN-TC3 (Case Only)	Net: 3.0kg Gross: 3.5kg
Weight:	Net:6.6lbs Gross: 7.7lbs

AVN-CU4

Network and AoIP	
AoIP Standard:	Dante
Number of Channels:	16 receive, 16 transmit
Number of Streams:	16 receive, 16 transmit
Sample Rate:	48 kHz
Format:	Linear PCM, 16 or 24 bit
AES67 Support:	Yes
Connectivity:	2 x RJ45 and 2 x SFP
Speed:	1Gbps and 100Mbps
Network Modes:	Switched or redundant
Dante Domain Manager Ready:	Yes

Mic/Line Inputs	
Input Impedance (Mic Mode):	2.5kΩ electronically balanced
Input Impedance (Line Mode):	>10kΩ electronically balanced
Preamp Gain (Mic Mode):	User selectable 16dB to 76dB in 3dB steps (Ref. +18dBu = 0dBFS)
0dBFS Line-up (Mic Mode):	-58dBu @ Max preamp gain, +2dBu @ Min preamp gain
0dBFS Line-up (Line Mode):	User selectable +15dBu / +18dBu / +20dBu / +22dBu / +24dBu = 0dBFS
Frequency Response (Mic Mode):	+0/-0.2dB 20Hz to 22kHz Ref 40dB gain @ 1kHz
Frequency Response (Line Mode):	+0/-0.2dB 20Hz to 22kHz Ref 0dB @ 1kHz
THD+N (Mic Mode):	<-90dBFS, -64dBFS, 20Hz – 20kHz, 40dB gain, 20kHz BW
THD+N (Line Mode):	<-98dBFS, -30dBFS, 20Hz – 20kHz, 20kHz BW
Equivalent Input Noise (Mic Mode):	127dB Ref. 60dB preamp gain, Rs = 200Ω
Noise (Line Mode):	<-110dBFS, 20kHz BW, Rs = 200Ω
C.M.R.R.	>60dB
Phantom Power (Mic Mode):	+48V
High Pass Filter:	12dB/octave, user selectable frequency

10 Technical Specifications

Stereo Digital Input

Input Impedance:	110Ω
Supported Input rates:	32kHz, 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz and 192kHz

Stereo Digital Output

Output Impedance:	110Ω
Supported output rates:	48kHz

Analogue Line Inputs

Input Impedance:	>20kΩ electronically balanced
0dBFS Line-up:	User selectable +15dBu / +18dBu / +20dBu / +22dBu / +24dBu = 0dBFS
Frequency Response:	+0/-0.2dB 20Hz to 22kHz Ref 0dBu @ 1kHz
THD+N:	<-110dBFS, -30dBFS, 20Hz – 20kHz, 20kHz BW
Noise:	<-110dBFS, 20kHz BW, Rs = 200Ω
C.M.R.R.:	>60dB

Analogue Line Outputs

Output Impedance:	<50Ω
0dBFS Line-up:	User selectable 0dBFS = +15dBu / +18dBu / +20dBu / +22dBu / +24dBu
Frequency Response:	+0/-0.5dB 20Hz to 22kHz Ref 0dBu @ 1kHz
THD+N:	<-110dBFS, -30dBFS, 20Hz – 20kHz, 20kHz BW
Noise:	<-110dBFS, 20kHz BW

Headphone Outputs

Drive Capability	Drives 150mW into 32Ω to 600Ω Headphones
0dBFS Line-up:	Fixed 0dBFS = +18dBu
Frequency Response:	+0/-0.2dB 20Hz to 22kHz Ref 0dBu @ 1kHz
THD+N:	<-108dBFS, -30dBFS, 20Hz – 20kHz, 20kHz BW
Noise:	<-110dBFS, 20kHz BW

Main Panel Operational Controls & Indicators

Power LED	Sonifex logo illuminates when power is present
Pushbuttons:	24 x illuminated buttons that can be assigned to any of the following functions, and configured: On-Air / Talkback / Page # / Page Cycle / GPO / Cough / Menu / Brightness
Display:	2 x 480 x 107 pixel colour TFT display showing pan status, level, metering, control type, source/mix/destination names and main output metering
Status LEDs:	Clock / AoIP status / PoE status and PSU status LEDs to monitor power and connectivity. Can be disabled if required
Rotary Encoders:	12 x robust soft touch rotary encoders with adjacent configurable light bars for group/source/commentator grouping and identification

Front Panel Connections	
Headphone Outputs:	4 x Neutrik ¼" (6.35mm) locking jack sockets
Microphone/Line Inputs:	4 x Neutrik 3 pin latching XLR sockets

Rear Panel Connections	
Stereo Digital Input:	RJ45 socket (electronically balanced)
Stereo Digital Output:	RJ45 socket (electronically balanced)
Analogue Line Inputs:	4 x Neutrik locking XLR sockets
Analogue Line Outputs:	6 x Neutrik locking XLR plugs
GPIO Port:	15-way 'D'-type socket
Network:	2 x 1Gbps Neutrik EtherCON receptacles, with PoE+ 2 x SFP slots for alternative interfaces
DC Input:	Neutrik 4 pin XLR plug, 12VDC, Maximum 30W
Mains Input:	Filtered IEC, 85 – 264VAC, 47-63 Hz, 30W max
Fuse Rating:	Anti-surge fuse 2A 20 x 5mm

PoE+ Power	
Standard:	802.3at Type 2
Class:	4
PD Power Range:	12.95 W to 25.50 W
Typical PSE Power Usage:	20W
Max PSE Power Usage:	30W

Equipment Type	
AVN-CU4	AVN Dante commentator unit, 4 commentators

Physical Specification	
Dimensions (Raw):	25.7cm (W) x 22.9cm (D) x 9.2cm (H - max), 6.5cm (H - front), 8.9cm (H - rear) 10.1" (W) x 9" (D) x 3.6" (H - max), 2.6" (H - front), 3.5" (H - rear)
Dimensions (Boxed):	37cm (W) x 35.5cm (D) x 19cm (H) 14.6" (W) x 14" (D) x 7.5" (H)

Accessories	
AVN-DCX60	DC Power Supply for AVN Range, 4 pin XLR socket, 60W
AVN-TC1 (Case Only)	Transport Case, AVN-CU2 & Power Supply Cut-out
AVN-TC1 (Case Only)Dimensions (Raw):	46.5cm (W) x 36cm (D) x 17.6cm (H) 18.3" (W) x 14.2" (D) x 6.9" (H)
AVN-TC1 (Case Only)Dimensions (Boxed):	52cm (W) x 21.5cm (D) x 43cm (H) 20.5" (W) x 8.5" (D) x 16.9" (H)
AVN-TC1 (Case Only)Weight:	Net: 3.0kg Gross: 3.5kg Net:6.6lbs Gross: 7.7lbs

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