HANDBOOK

Multi-Channel Dante® Audio Interfaces

AVN-AIO4 4 Input, 4 Output Dante® Interface, PoE

AVN-AIO8 8 Input, 8 Output Dante® Interface, PoE

AVN-AO16 16 Output Dante® Interface, PoE

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 products:
AVN-AIO4, AVN-AIO8 & AVN-AO16 Multi-Channel Dante® Audio Interfaces
AW10973,
Stock Code: 30-382

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Sonifex Ltd, 61, Station Road, Irthlingborough,
Northants, NN9 5QE, England.
Tel: +44 (0)1933 650 700
Fax: +44 (0)1933 650 726
Email: sales@sonifex.co.uk
Website: https://www.sonifex.co.uk

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Contents

Figures c
Product Warranty - 2 Year Extended i
Sonifex Warranty & Liability Terms & Conditions i
1. Definitions i
2. Warranty i
Unpacking Your Product ii
Repairs & Returns iii
CE Conformity iii
Safety & Installation of Mains Operated Equipment iii
Voltage Setting Checks iii
Fuse Rating iii
Power Cable & Connection iii
WEEE Directive iv
Atmosphere/Environment iv
1. Introduction 1
2. Controls, Indicators, and Connections 2
Front Panel 2
PoE 2
Link 2
Clock 2
Reset 2
Back Panel 3
XLR Line Inputs 4
XLR Line Outputs 4
Ethernet Connection 4
3. Dante Controller 5
Download and Install Dante Controller 5
Configuring a Device 6
Device Name 6
Channel Labels 6
Filtering Devices 7
Routing Audio 8
Clock Synchronisation 9
AES67 Compatibility 10
Network Troubleshooting 13
4. Technical Specification 15

Figures

Fig 2-1: AVN-AIO Front Panel 2
Fig 2-2: AVN-AIO Indicators and Reset 2
Fig 2-3: AVN-AIO4 Rear Panel 3
Fig 2-4: AVN-AIO8 Rear Panel 3
Fig 2-5: AVN-AO16 Rear Panel 3
Fig 2-6: Ethernet Connection 4
Fig 3-1: Dante Controller Download Web Page 5
Fig 3-2: Download Dante Controller Installer 5
Fig 3-3: Dante Controller Application Window 5
Fig 3-4: Device Config Tab 6
Fig 3-5: Device with Default Labels 6
Fig 3-6: Changing Receive Label 6
Fig 3-7: Changing Transmit Label 7
Fig 3-8: Channels with Updated Labels 7
Fig 3-9: Showing the Filter Pane 7
Fig 3-10: Filtering Transmitters 8
Fig 3-11: Filtering Channels 8
Fig 3-12: Simple Routing 8
Fig 3-13: Quick Routing Before 9
Fig 3-14: Quick Routing After 9
Fig 3-15: Clock Status Tab 9
Fig 3-16: AES67 Config Tab with AES67 Mode Disabled 10
Fig 3-17: Warning Message 10
Fig 3-18: Reboot Device 10
Fig 3-19: Reboot Warning Message 11
Fig 3-20: AES67 Stream Routing 11
Fig 3-21: New Multicast Flow Icon 11
Fig 3-22: Create Multicast Flow Window 12
Fig 3-23: Multicast Flow in Side Pane 12
Fig 3-24: Adding the Multicast Flow to an AES67 Device, Such as an AVN Portal 13
Fig 3-25: Red Device Name Indicates Different Network Subnet 13
Fig 3-26: Problem Details 13
Fig 3-27: Windows IPv4 Settings 14
Fig 3-28: Dante Controller Network Config 14

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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

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Tel: +44 (0)1933 650 700 • Fax: +44 (0)1933 650 726 • Email: technical.support@sonifex.co.uk • Internet: www.sonifex.co.uk

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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	Quality
Product unit	1
IEC mains lead fitted with moulded plug	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

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

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

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 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. Introduction

These Dante® audio interfaces convert balanced analogue audio line inputs and outputs to Dante AoIP. Simple to configure and operate, these cost-effective rack-mount solutions offer an easy solution for AV professionals and system integrators.

- Provide 4 (AVN-AIO4) or 8 (AVN-AIO8) analogue audio inputs and 4 (AVN-AIO4) or 8 (AVN-AIO8) or 16 (AVN-AO16) analogue audio outputs on Neutrik XLR connectors.
- Dante network connection for configuration using Dante Controller.
- AES67 operation.
- Dante Domain Manager compliant.
- 1U 19” rack-mount form factor.
- Powered by PoE.

The sample rate can be configured between the following options via Dante Controller:

- 44.1kHz
- 48kHz
- 88.2kHz
- 96kHz
- 176.4kHz (Not Available On AVN-AIO4)
- 192kHz (Not Available On AVN-AIO4)

On the AVN-AIO4 when the sample rate is configured to be greater than 48kHz, only the first two inputs and outputs can be used.

Note: For the AVN-AIO4, for sample rates >48kHz, the unit can be configured as a 4 input OR 4 output device by loading different firmware. Contact technical.support@sonifex.co.uk if you require this feature.

2. Controls, Indicators, and Connections

This section contains information about the interactivity of the different panels of the device, such as LED descriptions, functions and connector pinouts.

Front Panel

Fig 2-1: AVN-AIO Front Panel

Fig 2-2: AVN-AIO Indicators and Reset

Towards the left-hand side of the front panel are three status LED's and a reset button.

PoE

The PoE status LED is illuminated when power over ethernet is available. Because PoE is the only power supply source, this is essentially a power LED.

Link

The link status LED is illuminated when the device is connected to a valid network.

Clock

The clock status LED is illuminated when the device is a PTP master or synced to a valid PTP master.

Reset

In the unlikely event that the unit fails to respond, press the reset button to reboot the unit. This does not remove the Dante Controller configured settings.

Back Panel

The back panel of the device provides all the inputs and outputs.

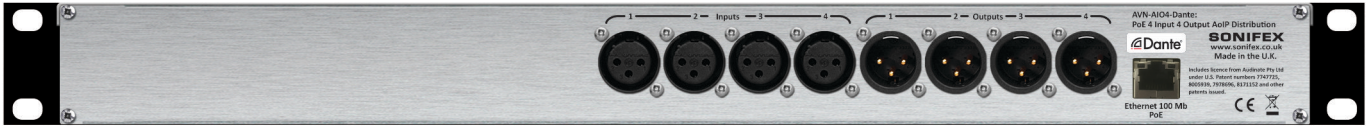

Fig 2-3: AVN-AIO4 Rear Panel

On the AVN-AIO4 four locking XLR line inputs and four XLR line outputs are available.

Fig 2-4: AVN-AIO8 Rear Panel

On the AVN-AIO8 eight locking XLR line inputs and eight XLR line outputs are available.

Fig 2-5: AVN-AO16 Rear Panel

On the AVN-AO16 sixteen XLR line outputs are available.

Each of these inputs and output can be routed in Dante Controller, to receive/transmit AoIP streams. On the right-hand side of the back panel is the Dante Ethernet connection.

XLR Line Inputs

The line inputs have the following pin-out.

Pin	Function
1	Chassis Ground
2	Input Positive
3	Input Negative

XLR Line Outputs

The line outputs have the following pin-out.

Pin	Function
1	Chassis Ground
2	Output Positive
3	Output Negative

Ethernet Connection

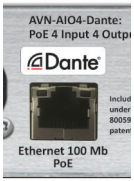

Fig 2-6: Ethernet Connection

The Ethernet connection provides PoE and networking capability. There are also two status LEDs on the connector. The left LED indicates the link speed, the right indicates link activity.

		AIO4	AIO8	AO16
Left LED Link Speed	Orange	100Mbps	1Gbps	1Gbps
	Off	10Mbps	100Mbps	100Mbps

The LED on the right indicates traffic on the connection. When the LED is flashing orange, data is being transmitted/received.

3. Dante Controller

Dante Controller is 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 Audinate documentation page at:

http://dev.audinate.com/GA/dante-controller/userguide/pdf/latest/

Download and Install Dante Controller

The Dante Controller application can be downloaded from the official Audinate website. You will have to create an Audinate account if you don't have one already:

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

On the website you will notice the download section towards the right-hand side of the web page.

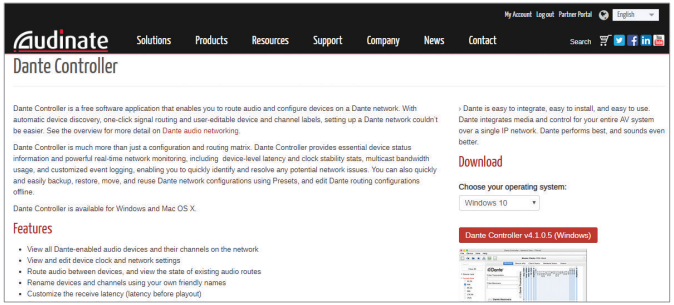

Fig 3-1: Dante Controller Download Web Page

Select your operating system and click the red button, this will take you to another page with the correct download file.

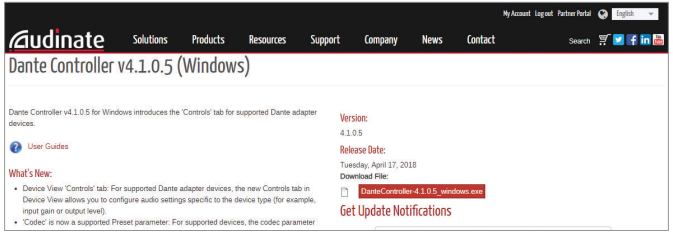

Fig 3-2: Download Dante Controller Installer

Click the red button to download the installation file. The installer will be downloaded. Open the installation file and follow the on-screen instructions. After the installation is complete open the start menu and type:

apps: Dante Controller

Press 'enter' on the keyboard and Dante Controller will open.

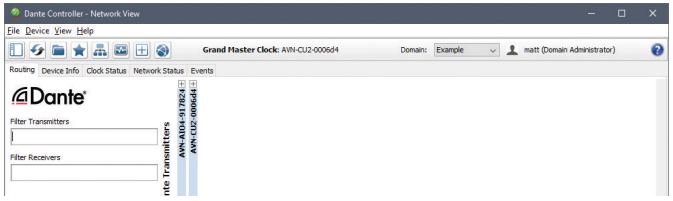

Fig 3-3: Dante Controller Application Window

Configuring a Device

In order to open the ‘Device View’ window for a device in Dante Controller, double click the name of that device in the routing grid.

Device Name

To change the device name, open the ‘Device View’ window and click on the ‘Device Config’ tab.

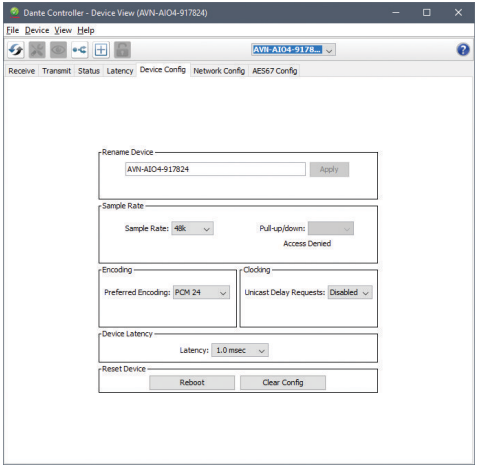

Fig 3-4: Device Config Tab

In the ‘Rename Device’ field the user can change the name that appears in Dante Controller for the device. Change the name in the field and click apply. The name is then updated in the routing grid.

Channel Labels

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

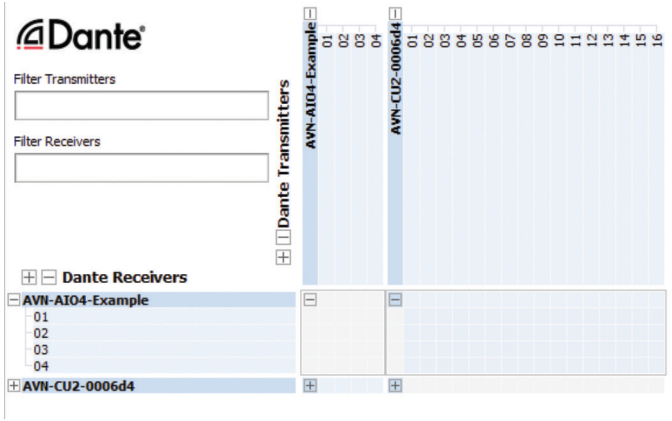

Fig 3-5: Device with Default Labels

Open the ‘Device View’ window, and navigate to the ‘Receive’ or ‘Transmit’ tab. Within the ‘Receive' tab enter the new channel label in the ‘Channel’ field.

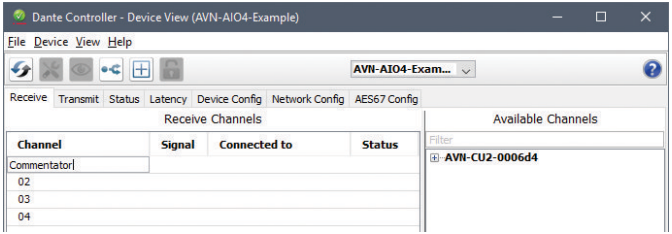

Fig 3-6: Changing Receive Label

Within the 'Transmit' tab the names of labels are instead entered in the 'Channel Label' field.

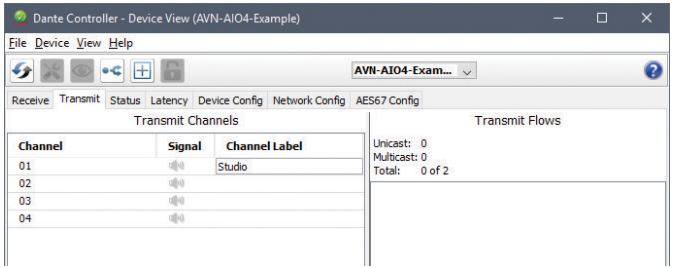

Fig 3-7: Changing Transmit Label

After the desired changes have been made the configuration window can be closed. The changes made are then reflected in the routing grid.

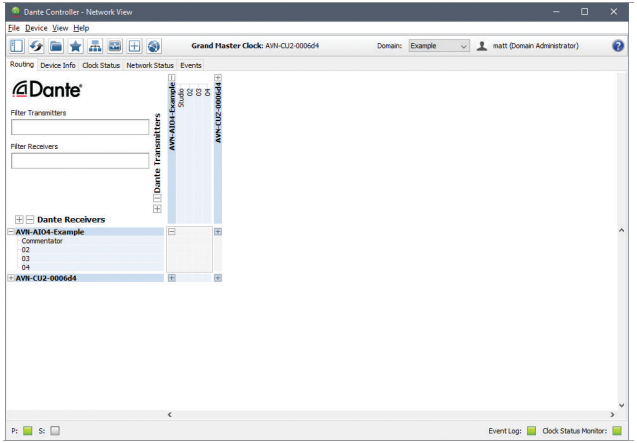

Fig 3-8: Channels with Updated Labels

Filtering Devices

When there are a large number of devices on a network it could take a while to look through all the transmitters and receivers to find the right one. Therefore, filters are available which allow the user to sort through the devices and find the device they need quickly.

By pressing the icon shown in the top left-hand corner the filter pane can be shown or hidden. Within the filter pane various different filters are displayed.

The sample rate section is expanded in this example and '48k' is selected to filter only devices with a sample rate of 48kHz.

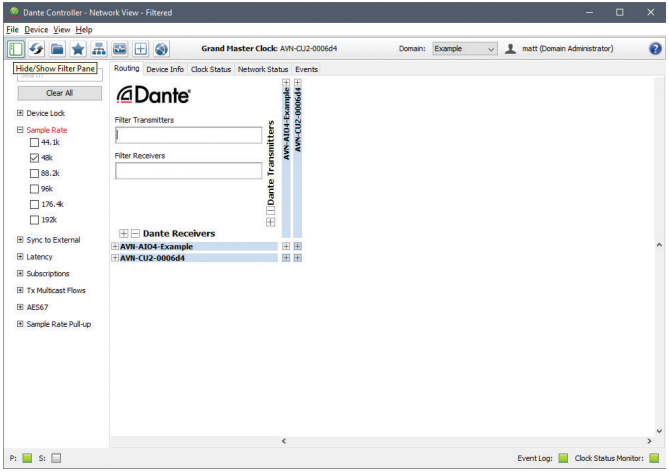

Fig 3-9: Showing the Filter Pane

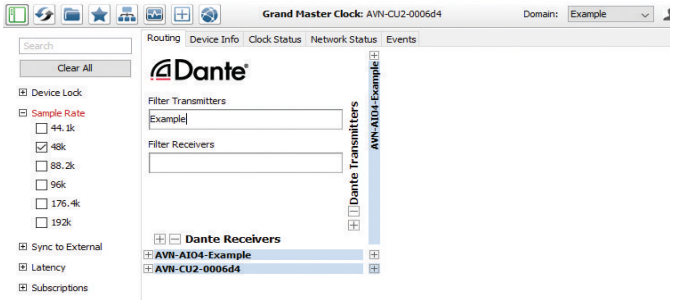

Fig 3-10: Filtering Transmitters

Transmitters can be filtered by typing into the 'Filter Transmitters' field, in the example 'Example' is typed and devices which include this in their name are filtered.

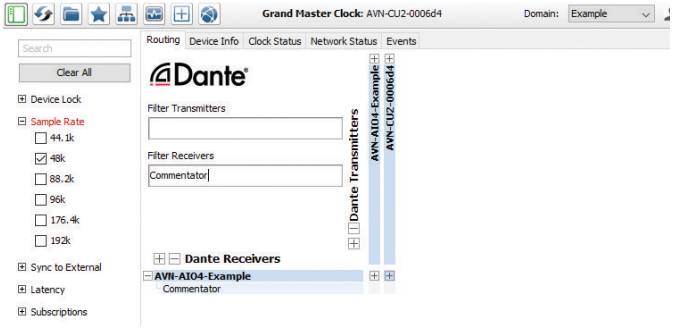

Fig 3-11: Filtering Channels

These two fields can also filter the channels of transmitters and receivers. Typing 'Commentator' into the 'Filter Receivers' field all channels with 'Commentator' in their name are displayed.

Routing Audio

Routing audio between two Dante devices is simple. Click on the box at which a transmit and receive channel meet.

In the example '01@AVN-CU2' is routed to 'Commentator@AVN-AIO4-Example'. 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 in it to show the routing has been made successfully.

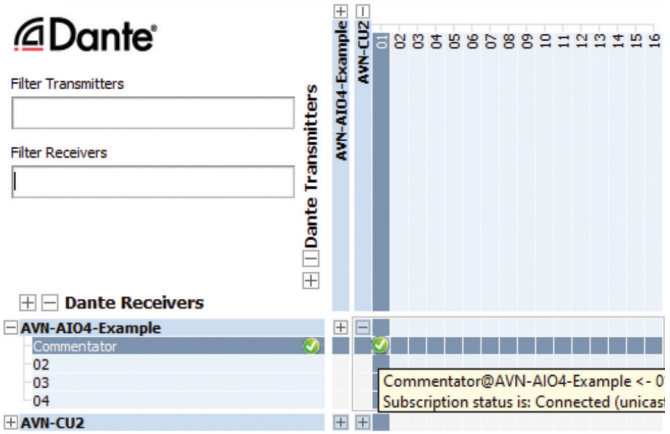

Fig 3-12: Simple Routing

Multiple channels in a diagonal line can be routed at once by holding ‘Ctrl’ down and pressing on the box with a minus sign.

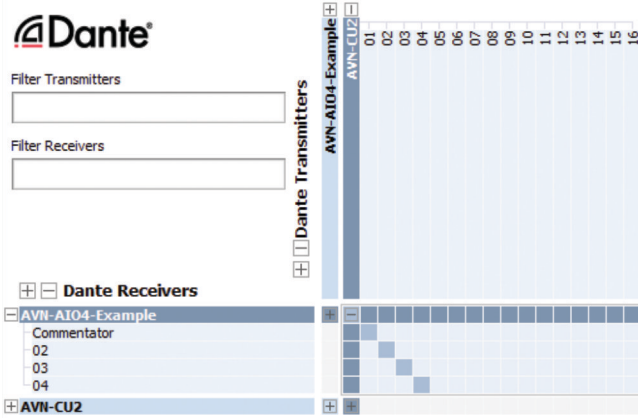

Fig 3-13: Quick Routing Before

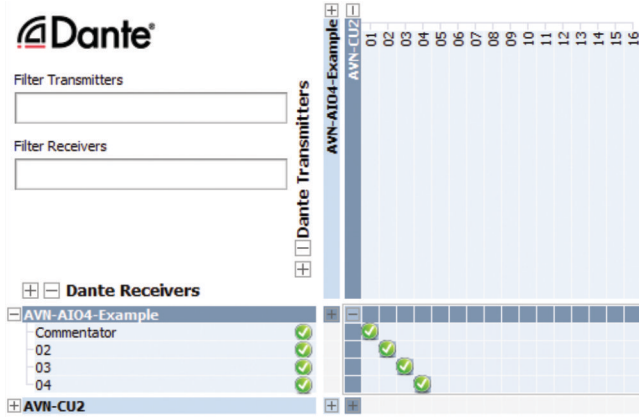

Fig 3-14: Quick Routing After

Clock Synchronisation

The clock synchronisation can be checked in the ‘Clock Status’ tab.

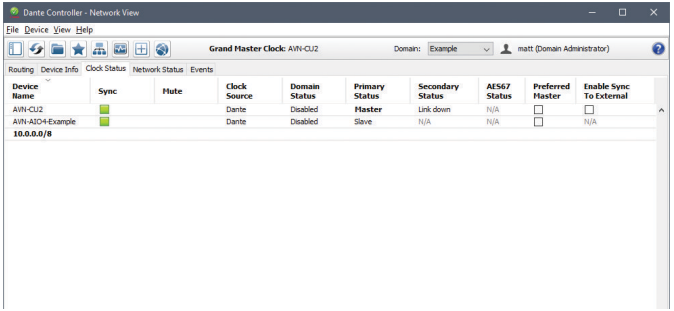

Fig 3-15: Clock Status Tab

The status of the PTP clocking between devices keeping audio in sync can be checked here. The ‘Primary Status’ field tells the user whether their device is a PTP master or a PTP slave. A master device provides a clock which all slave devices on a network remain in sync with. The master device is selected using the best PTP clock algorithm. If you wish a certain device to be the master however then the ‘Preferred Master’ checkbox can be selected.

On devices with the AES67 mode enabled an ‘AES67 Status’ is also displayed. A device with AES67 mode enabled will act as a boundary clock linking the AES67 network to the Dante network. If an AES67 only device is setup as a master clock, a Dante device acting as a boundary clock will sync to the AES67 master and then provide a master clock to any Dante only devices.

AES67 Compatibility

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

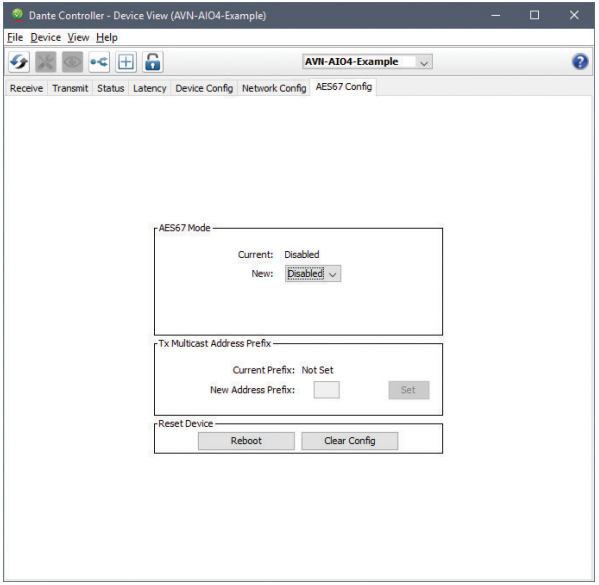

Fig 3-16: AES67 Config Tab with AES67 Mode Disabled

This is 'Disabled' by default. Select 'Enabled' from the dropdown menu to enable this mode. This option will be not be available if the device is part of a Dante domain. A warning will be displayed asking you to confirm the change, and that the device must be rebooted before the changes are made.

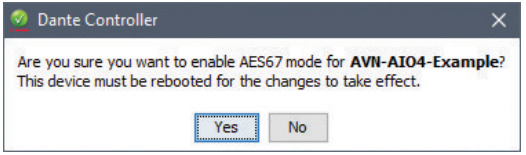

Fig 3-17: Warning Message

Click 'Yes' to continue. Then reboot the unit by clicking the 'Reboot' button in the 'Reset Device' section of this tab.

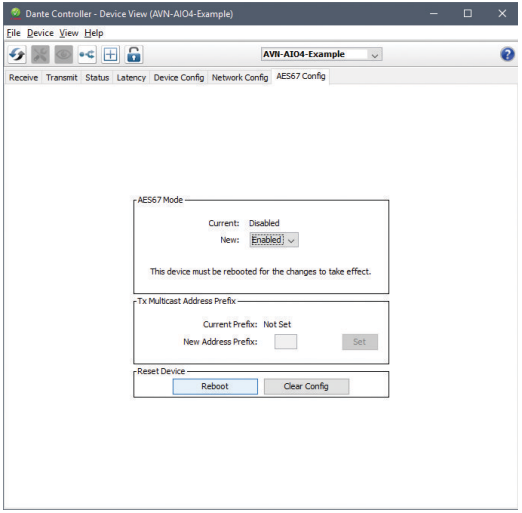

Fig 3-18: Reboot Device

Another warning message will be shown asking you to confirm the reboot procedure.

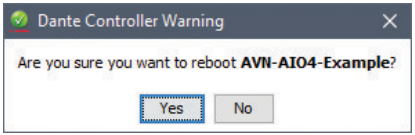

Fig 3-19: Reboot Warning Message

Again, click 'Yes' if you would like to continue. The device will reboot and upon re-entering the 'AES67 Config' tab you will see that AES67 mode is now enabled. Also note that the prefix address used for multicast 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 you should make sure the address is not used more than once otherwise AoIP streams will clash.

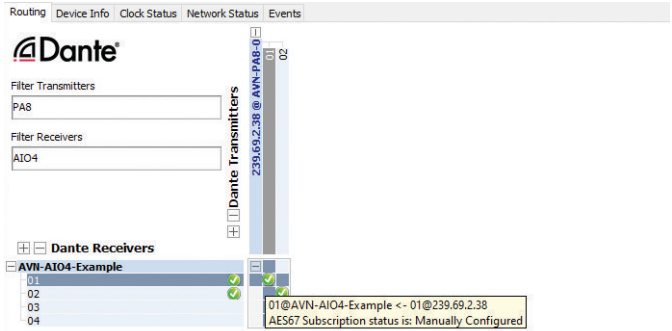

Fig 3-20: AES67 Stream Routing

In the example an AES67 stream 'AVN-PA8-0' on the multicast address '239.69.2.38' is routed to channels '01' and '02' on the device 'AVN-AIO4-Example'.

To create AES67 transmit streams first open the device configuration window, and click on the 'Create Multicast' flow icon. Alternatively hold 'Ctrl' and press 'M', the 'Create Multicast Flow' window will then open.

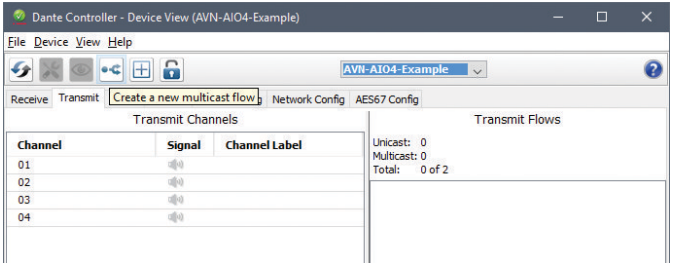

Fig 3-21: New Multicast Flow Icon

In the ‘Create Multicast Flow’ window select the ‘AES67 Flow’ checkbox and select the channels you would like to add to the multicast flow.

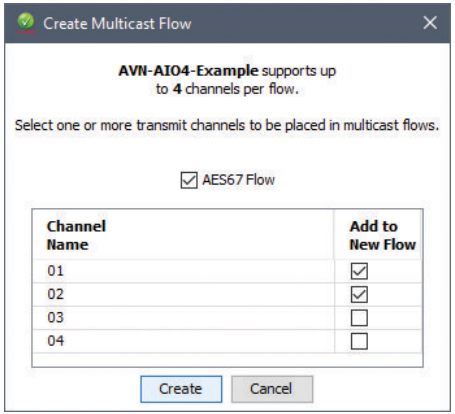

Fig 3-22: Create Multicast Flow Window

In the example the channels ‘01’ and ‘02’ are added to the AES67 multicast flow, the ‘Create’ button is then clicked.

The ‘Transmit’ tab of the device configuration window will show the new multicast flow in the ‘Transmit Flows’ side pane. This also shows the multicast address of the multicast flow.

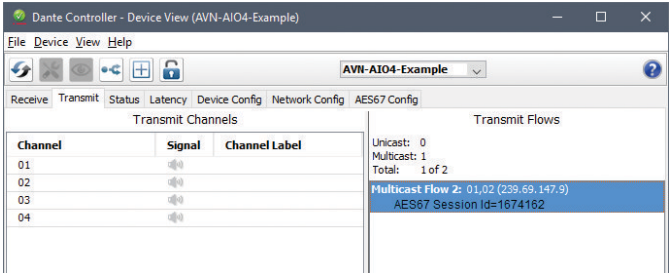

Fig 3-23: Multicast Flow in Side Pane

In the example ‘Multicast Flow 16’ is created and has a multicast address of ‘239.69.147.9’.

The multicast flow can then be added to AES67 devices. In the example below the multicast flow is added to an AVN-Portal.

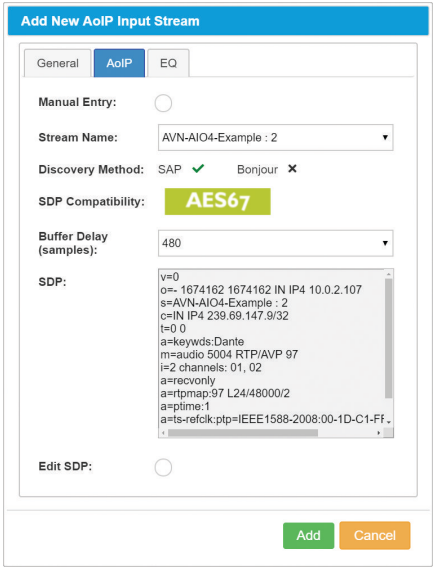

Fig 3-24: Adding the Multicast Flow to an AES67 Device, Such as an AVN-Portal

The stream name is the name of the device followed by the flow number, in this case '2'. The SDP compatibility shows it is AES67 compatible.

Network Troubleshooting

The device can be seen within Dante® Controller if it is connected to the same network as the computer. If the device doesn't show up in Dante® Controller please check that the connection to the network is correct and that the device and computer are on the same network.

If the computer and the device are on different IP subnets, the device will appear in Dante® Controller with red text:

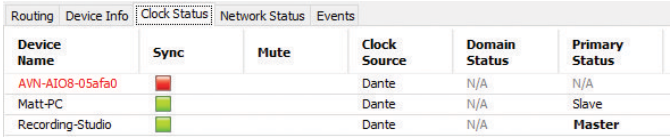

Fig 3-25: Red Device Name Indicates Different Network Subnet

Opening the **Device View** for the device will provide details about the problem.

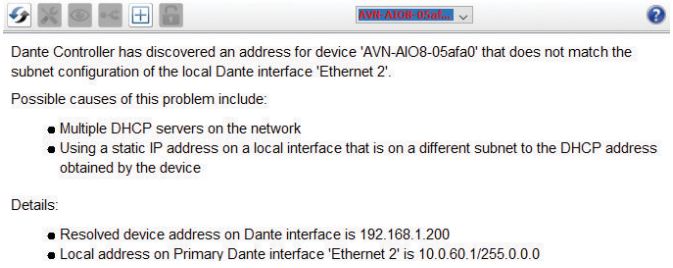

Fig 3-26: Problem Details

In this example notice the device is on the 192.168.1.X subnet and the computer is on the 10.X.X.X subnet. To correct this, edit the computer's IP address.

In Windows 10, type **View Network Connections** into the search bar. Right-click the network that the device is connected to and select **Properties**. Double click **Internet Protocol Version 4 (TCP/IPv4)** in the item list and edit the IP address.

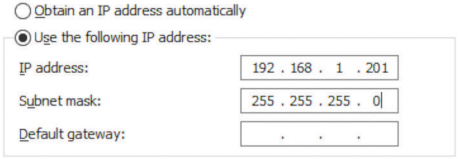

Fig 3-27: Windows IPv4 Settings

Save the changes made to the settings then close and re-open Dante® Controller. The device should now appear correctly. If the device name is still red, you may need to disable the other network connections on the computer. To do this, in Windows 10, type **View Network Connections** into the search bar. Right-click the network connection to disable and select **Disable**.

Now that the device appears in Dante® Controller, it can be configured and the network settings can be modified so that the device is in the correct subnet.

Open the Device View for the device and select the Network Config tab. Within this tab are options to obtain an IP address automatically, or to configure an IP address manually.

After configuring the devices address, click the Reboot button and then revert your computers IP address so that it is on the original subnet using the process above.

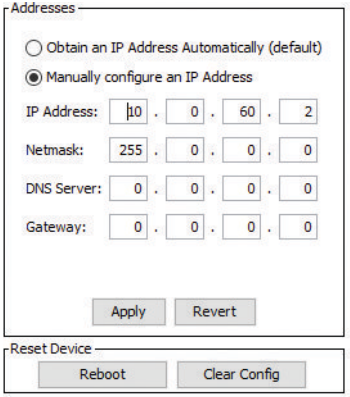

Fig 3-28: Dante Controller Network Config

For more troubleshooting information please see the official Dante® FAQs at:

https://www.audinate.com/resources/faqs

And Dante® Controller User Guide at:

https://dev.audinate.com/GA/dante-controller/userguide/pdf/latest/

4. Technical Specification

Audio Input Performance Specifications	
Parameter	**Line Input**
Input Impedance:	>20kΩ balanced
0dBFS Line-Up:	+18dBu balanced
Frequency Response:	20Hz to 20kHz, +0/-0.2dB
THD+N:	<-110dBFS, -30dBFS, 20Hz to 20kHz, 20kHz BW
Noise:	-110dBFS, 20kHz BW, Rs=200Ω
Crosstalk:	<-100 dB
Common Mode Rejection:	>60dB @ 1kHz

Audio Output Performance Specifications	
Parameter	**Line Output**
Output Impedance:	<50Ω balanced
0dBFS Line-Up:	+18dBu balanced
Frequency Response:	20Hz to 20kHz, +0/-0.5dB
THD+N:	<-110dBFS, -30dBFS, 20Hz to 20kHz, 20kHz BW
Noise (Mic=EIN):	-100dBFS, 20kHz BW
Crosstalk:	<100dB

Balanced Line Input XLR Pinout	
Pin	**Function**
1	Chassis Ground
2	Input Positive
3	Input Negative

Balanced Line Output XLR Pinout	
Pin	**Function**
1	Chassis Ground
2	Output Positive
3	Output Negative

Dante	
Parameter	**Description**
Sample Rate:	AIO4 - 44.1kHz, 48kHz, 88.2kHz, 96kHz Note: 2 channels only when >48kHz
Sample Rate:	AIO8 - 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz
Sample Rate:	AO16 - 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz
Encoding:	PCM 16, PCM 24, PCM 32

Physical Specification	
Dimensions (Raw):	48cm (W) x 11cm (D) x 4.3cm (H)(1U) 19” (W) x 4.3” (D) x 1.7” (H)
Weight (AVN-AIO4):	Nett: 0.86kg Nett: 1.89lbs
Weight (AVN-AIO8, AVN-AO16):	Nett: 1.8kg Nett: 3.3lbs

SONIFEX
www.sonifex.co.uk
t:+44 (0)1933 650 700
f:+44 (0)1933 650 726
sales@sonifex.co.uk