DARK16I

DANTE NETWORK AUDIO
16 INPUT LINE LEVEL ANALOGUE INTERFACE

PRODUCT DETAILS

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Visit our Website at www.glensound.com

Glensound Electronics Ltd

Thank you for choosing a new Glensound product.

All rights reserved.

Information contained in this manual is subject to change without notice, if in doubt please contact us for the latest product information.

If you need any help with the product then we can be contacted at:

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Technical enquires: techinfo@glensound.com

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IMPORTANT SAFETY INSTRUCTIONS

Read this safety sheet prior to installation or initial use. This generic safety sheet covers multiple product configurations across our range. The full operating & installation manual and model-specific technical specifications are available online at: www.glensound.com

DANGEROUS VOLTAGE: This symbol is intended to warn that dangerous voltages within the product are present and constitute a risk of electric shock.	IMPORTANT INSTRUCTIONS: This symbol is intended to highlight that there are important operating, installation, and maintenance instructions in the literature accompanying this unit.
THIS UNIT MUST BE EARTHED (Class I Mains Models): English: This symbol highlights that the equipment must have a valid earth connection with the protective earthing conductor. Danish: *Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.* Finnish: *Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan.* Norwegian: *Apparatet må tilkoples jordet stikkontakt.* Swedish: *Apparaten skall anslutas till jordat uttag.*	**CAUTION – SHOCK HAZARD: DISCONNECT ALL POWER SOURCES:** This symbol warns that the product can be energised simultaneously from more than one power source (e.g., dual AC mains supplies, external DC power, and/or PoE). Care must be taken if accessing internal components. Ensure that ALL connected power supplies are fully disconnected.

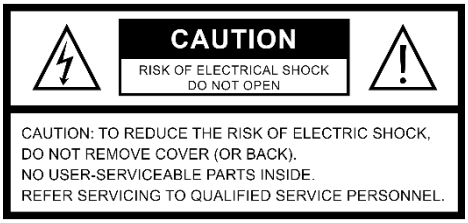
1. Read & Keep Instructions: Read these instructions, keep these instructions, heed all warnings, and follow all instructions.

2. Indoor Use & Moisture: Unless otherwise specified in the model-specific manual, this product is intended for indoor use only. Do not use this apparatus near water, and do not expose this product to rain or moisture.

3. Ambient Temperature: The intended ambient operating temperature of this product is 0°C to 40°C (or 0°C to 50°C where specified in the model-specific technical specifications in the online user manual).

4. Cleaning & Heat Sources: Clean only with a dry cloth. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

5. Cable & Cord Protection: Protect all power cords and network cables from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.





6. Attachments & Lightning: Only use attachments/accessories specified or supplied by the manufacturer. Unplug this apparatus during lightning storms or when unused for long periods of time.

7. Servicing & No User-Serviceable Parts: The product contains no user-serviceable parts and must not be disassembled or modified in any way. Doing so could result in personal injury and/or product failure. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when a power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

8. Professional Environment: This equipment is not suitable for use in locations where children are likely to be present.

POWER SUPPLY & DISCONNECT INSTRUCTIONS (APPLICABLE BY MODEL CONFIGURATION)

9. Simultaneous / Redundant Power Sources (Mains, DC & PoE): Depending on the model, this product may be powered by a single source or simultaneously by multiple redundant power sources (dual AC mains inlets, an AC mains inlet, an external DC power input, and/or Power over Ethernet [PoE]). Disconnecting a single power lead will NOT isolate the unit if another power source remains connected. To completely de-energize the equipment, unplug ALL connected AC mains cords, DC barrel jack/external DC connectors, and PoE RJ45/etherCON network cables.

10. AC Mains Disconnect Devices (Single or Dual IEC Inlets): Where AC mains inlets are fitted, the mains plug(s) and rear-panel IEC appliance coupler(s) serve as the disconnect device(s). On dual-mains models, both mains' cords must be unplugged to isolate the unit from AC mains power. The socket-outlet(s) used for mains power must be installed near the equipment and be easily accessible.

11. Plug Grounding & Polarization (AC Mains Models): Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has 2 blades with one wider than the other. A grounding-type plug has 2 blades and a third grounding prong provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

12. Approved Detachable Earthed Mains Cords (Class I AC Mains Models): Use only approved detachable 3-core earthed mains cords (minimum H05VV-F 3G0.75 mm² with IEC 60320-1 C13 connector) rated for the country of installation: • United Kingdom: Use a BS 1363-1 approved molded plug fitted with a 5 A ASTA-approved BS 1362 fuse. • European Union: Use a CEE 7/7 (Schuko/French) earthed plug. • Denmark: When connecting to wall socket-outlets in Denmark, use an approved 3-pin earthed plug complying with DS 60884-2-D1 (Standard Sheet DK 2-1a) to ensure protective earthing is maintained. • USA/Canada: Use a UL-listed / CSA-certified 3-conductor grounding power cord [minimum 18 AWG, SVT/SJT] with a NEMA 5-15P plug. • All other regions: Use a nationally safety-approved 3-core earthed mains cord rated for the country of installation.

13. Internal Primary Fusing & Neutral Fusing Warning (AC Mains Models – Service Personnel Only): Internal primary fuse(s) are located

between the Live terminal of the IEC inlet and the Live input of the power supply and should only be changed by a qualified service engineer using a correctly rated replacement as specified in the product handbook. WARNING – Neutral Fusing: Because the AC mains plug may be reversible in some electrical distribution systems, the internal primary fuse may be located in the neutral conductor. Always disconnect all AC mains power cords completely from the IEC inlet(s) to de-energize all phase conductors before opening the enclosure or servicing the unit.

14. Power over Ethernet (PoE) Models: Unplugging the RJ45 / etherCON network cable disconnects PoE power from the unit. The Ethernet cable intended to be connected to the unit is for indoor building routing only and must not exit the building structure without appropriate primary surge protection.

15. External DC / USB Power Input Models: Connect only the manufacturer-supplied AC/DC power adaptor (where provided), or a safety-approved external DC or USB power supply complying with BS EN IEC 62368-1 (classified as ES1 and PS2/Limited Power Source [LPS]) that matches the voltage, minimum current rating, and pin polarity marked adjacent to the DC/USB input connector or specified in the product manual. The external power adaptor plug and the DC/USB input connector serve as the DC disconnect devices and must remain readily accessible; unplugging the DC/USB connector disconnects external DC power only and will not isolate the unit if AC mains or PoE remains connected.

INSTALLATION, THERMAL, MECHANICAL & OPTICAL SAFETY (APPLICABLE BY MODEL CONFIGURATION)

16. Ventilation & Sealed Heatsink Enclosures: Do not block any ventilation openings; install in accordance with the manufacturer's instructions. On models where the aluminum enclosure acts as the units heatsink, do not cover the unit or speaker grille with soft furnishings, cloths, or curtains, and allow free airflow around the housing.



17. 19-Inch Equipment Rack Installation (Rack-Mount Models): Rack-mounted models are designed for stationary installation in a standard 19-inch equipment rack. Secure the unit to the front rack rails using all four mounting holes on the integral rack ears with appropriate rack screws (e.g., M6 screws and cage nuts). Ensure that ventilation openings on the chassis are not obstructed by rack walls or cabling.

18. Carts, Stands, Brackets & Tip-Over Hazard: Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

19. Optical SFP Transceiver Modules (Where fitted): Any optical SFP transceiver modules installed in this product must be certified Class 1 Laser Products in accordance with IEC/EN 60825-1. Do not look directly into open optical ports or fiber-optic cable ends while the equipment is energized.



Disposal (WEEE): the crossed-out wheeled bin symbol means this product must not be disposed of with household waste. Take it to an approved electrical and electronic equipment recycling point, or contact Glensound for advice.
Declaration of conformity: Glensound declares that this product complies with the applicable UK and EU legislation. The full declaration of conformity is available at www.glensound.com.
Manufacturer: Glensound Electronics Ltd, The Design Buildings, 6 Brooks Place, Maidstone, Kent, ME14 1HE, UK · Tel: +44 (0)1622 753662 · Email: sales@glensound.com · www.glensound.com

PRODUCT WARRANTY:

All equipment is fully tested before dispatch and carefully designed to provide you with trouble free use for many years.

We have a policy of supporting products for as long as possible and guarantee to be able to support your product for a minimum of 10 years.

For a period of one year after the goods have been despatched the Company will guarantee the goods against any defect developing after proper use providing such defects arise solely from faulty materials or workmanship and that the Customer shall return the goods to the Company’s works or their local dealer.

All non-wear parts are guaranteed for 2 years after despatch and any defect developing after proper use from faulty materials or workmanship will be repaired under this warranty providing the Customer returns the goods to the Company's works or their local dealer.

CE

EU DECLARATION OF CONFORMITY FOR:

DARK16I

Sixteen channel AoIP interface

This declaration of conformity is issued under the sole responsibility of the manufacturer.

This equipment is manufactured by Glensound Electronics Ltd of Brooks Place Maidstone Kent ME14 1HE is CE marked and conforms to the following Union harmonisation legislation:

Low Voltage Directive:	EN60065 and EN62368-1:2014
Emissions:	BS EN55032:2015
Immunity:	BS EN55035:2017

Signed for and on behalf of Glensound Electronics Ltd.



Marc Wilson, Managing Director
Maidstone, Kent, England

Date: 04/03/22

RoHS DIRECTIVE

RoHS 2 Directive 2011/65/EU restricts the use of the hazardous substances listed below in electrical and electronic equipment.

This product conforms to the above directive and for these purposes, the maximum concentration values of the restricted substances by weight in homogenous materials are:

Lead	0.1%
Mercury	0.1%
Hexavalent Chromium	0.1%
Polybrominated Biphenyls	0.1%
Polybrominated Diphenyl Ethers	0.1%
Cadmium	0.01%

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT REGULATIONS 2006 (WEEE)

Glensound Electronics Ltd is registered for business to business sales of WEEE in the UK our registration number is:

WEE/JJ0074UR

GLENSOUND DARK16I

HANDBOOK CONTENTS

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OVERVIEW

The Glensound DARK16I is an analogue to digital converter designed to connect line level analogue audio circuits to a Dante audio network.

Dante network audio is a common protocol for distributing high quality linear audio over standard IP networks and it is widely used by many audio equipment manufacturers. The Glensound Dark16I Dante audio interface will be compatible with any other manufacturers Dante audio interface. Further details of Dante network audio can be found at www.audinate.com

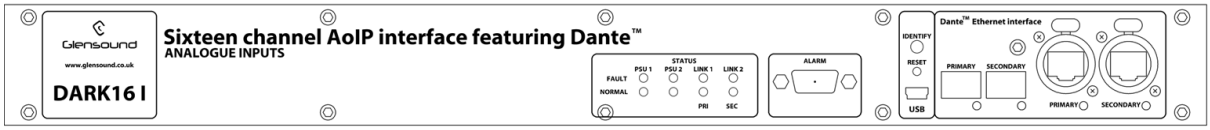
Being designed for live on-air broadcast applications the Glensound DARK16I has been designed with multiple redundancy capabilities. It has 2 mains power sources and it also has fully redundant network connections for both Copper & Fibre circuits.

The DARK16I provides 16 analogue line level (0dB) inputs to the Dante network. Depending on which DARK16I unit you have, the rear panel will have x16 XLR connectors or x2 D25 connectors wired to AES59 (also known as the Tascam standard).

As per our other Dante equipment 0dBu = -18dBFS

DARK16I FRONT PANEL LAYOUT

1. PSU and Link status



There are 4 red LEDs and 4 green LEDs that illuminate depending on the status of the link. Red indicates no connection, green indicates a successful connection.

For example, if you have connected the DARK16I to two separate PSUs, only one of which works then you will have a red 'Fault' LED illuminate to warn you that there is no power detected on the connection that is not receiving mains power.

2. Alarm status connection

This 8-way female D-type connector will report the failure of a link status if one is detected whilst in operation.

3. USB connector and update buttons

The MINI USB connection allows the firmware of the DARK16I to be updated. To prepare the DARK16I for a firmware update; power on the unit, press and hold down the reset button, press and hold down the identify button, release the reset button and then release the identify button a second after.

4. Network SFP Connections

There are 2 standard network data SFP sockets provided to allow redundant network connectivity if using Dante network audio protocol. They are both gigabit network connections. They accept standard SFP modules. The status LEDs flash to show when data is being correctly communicated with the attached switch.

If you require SFP modules then please email sales@glensound.com for a quotation.

Network Note:

Factory default is to have the SFP & RJ45 sockets set to work in redundant mode.

It is possible using Dante controller to set these network interfaces to work as a network switch instead of the redundant mode, meaning other network equipment can be connected to them.

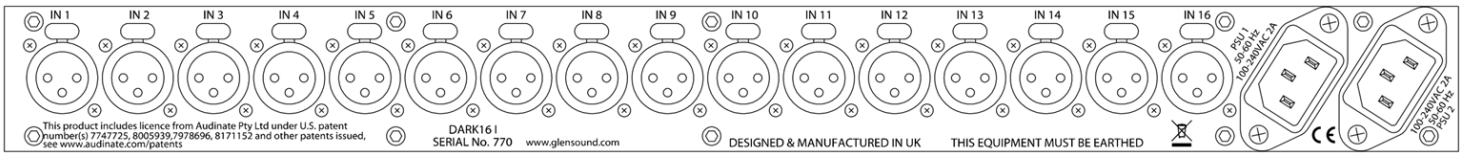
5. Network RJ45 connections

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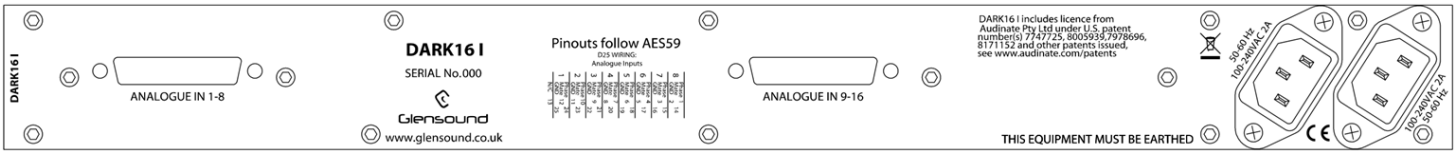
gigabit network connections. The status LEDs flash to show when data is being correctly communicated with the attached switch.

DARK16I REAR PANEL LAYOUT

XLR Version



D25 Version



1. Analogue inputs

Two 25-way female D-type connector allow breakout cables to be attached to send analogue line level (0dB) signals in to the DARK16I. These connectors are wired to the AES59 standard (also known as the Tascam standard).

Alternatively the product may be fitted with x16 Female 3 pin XLR connectors.

The 16 channels can then be routed via Dante to anywhere on a network.

2. Primary IEC Mains

The standard IEC mains plug accepts external AC voltages of 100 - 240 VAC +/- 10%. There is a non-accessable internal fuse for this input.

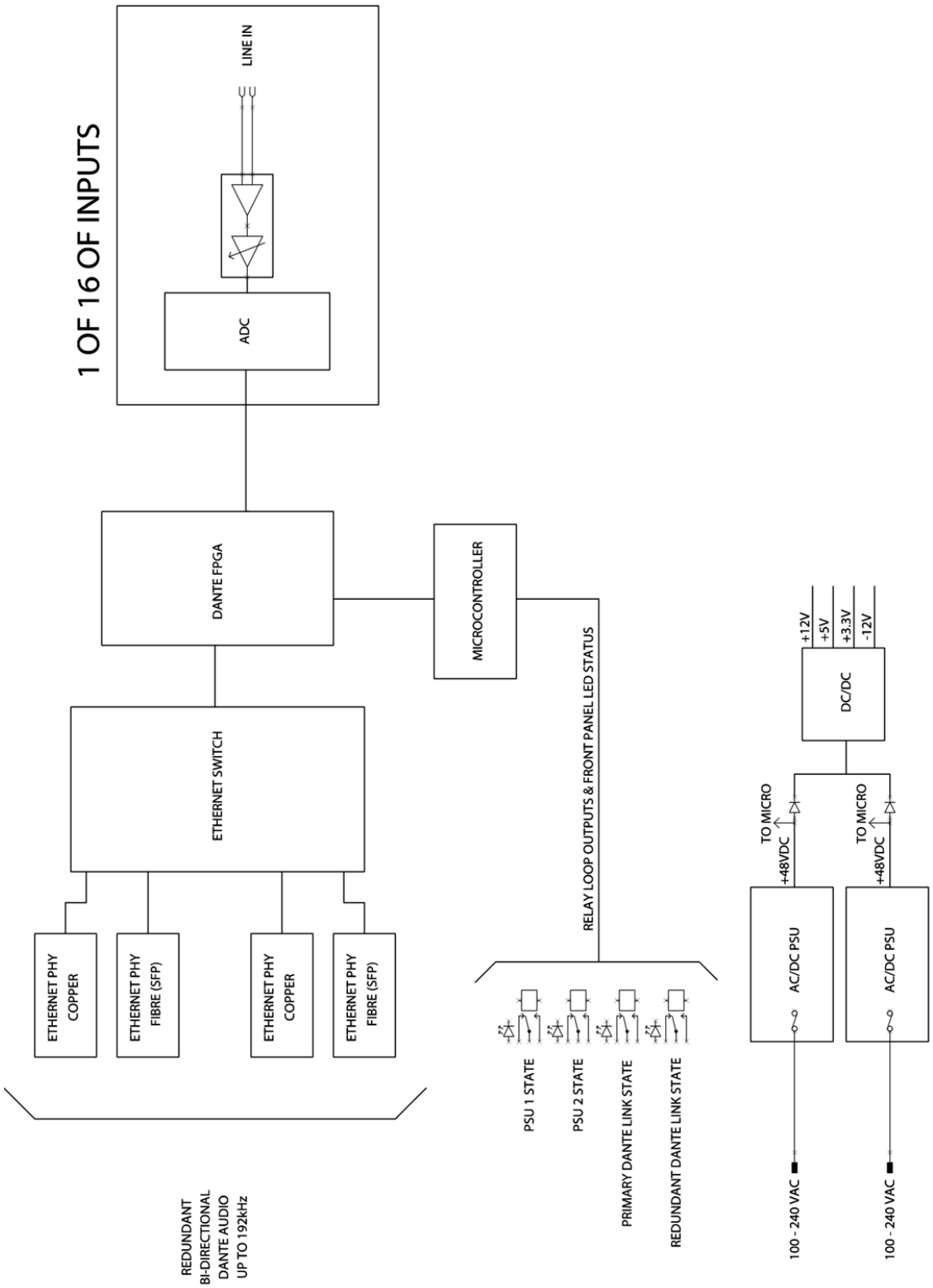
The DARK16I is designed to operate with either primary or secondary mains sources or both for power redundancy.

3. Secondary IEC Mains

The standard IEC mains plug accepts external AC voltages of 100 - 240 VAC +/- 10%. There is a non-accessable internal fuse for this input.

The DARK16I is designed to operate with either primary or secondary mains sources or both for power redundancy.

SIMPLIFIED BLOCK DIAGRAM



CONNECTING THE DARK16I TO A DANTE NETWORK

The DARK16I is a network audio device utilizing the reliable and versatile Dante audio over IP protocol. Dante is a proprietary system (although very widely used) the originators of which are Audinate.

The information below is only meant as a very basic guide. Full details of the power of Dante network audio and instructions for using it can be found at www.audinate.com

Getting Dante Controller

If you are connecting the inferno to a new Dante network the first thing you will need to do is to get the free Dante controller software from Audinate.
This can be downloaded by visiting Audinate's web site at www.audinate.com

Connecting DARK16Is To The Network

DARK16Is can be connected to the network that you are going to use for your audio distribution simply by plugging in either, and, or any of the network connections on the rear. Once connected to the network it will be possible to see the DARK16I from within the Dante controller and route its' audio circuits.

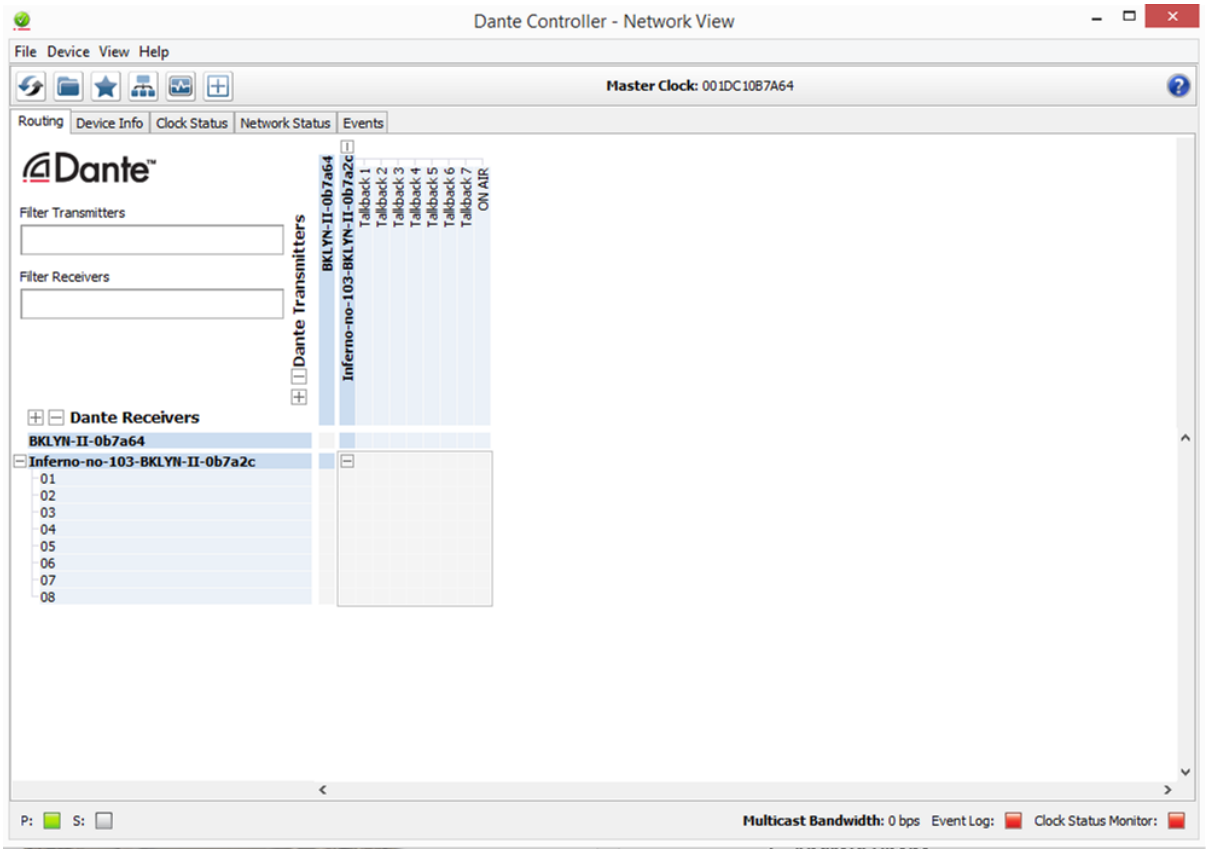
Audio Over IP Network

We strongly recommend that you consider your network topology carefully and would not recommend sharing broadcast audio and general data on the same network.

For more details of audio over IP network structure please visit www.audinate.com

Running Dante Controller

At the time of writing this manual the Dante Controller looks as per the screenshot below:



The DARK16I will have been named at the factory during test to allow them to be identified by the Dante controller.

The format used for the factory name is:

‘DARK16I-no-103-BKLYN-II-ob7a2c’

Where ‘DARK16I-no-103’ refers to the Glensound product i.e. DARK16I and its serial no (in this case 103) and ‘BKLYN-II-ob7a2c’ refers to the units Dante Brooklyn II module and its MAC address.

Dante Controller TIP

If you have never run Dante controller before then make sure that on the bottom left of the Dante controllers’ screen ‘P’ or ‘S’ is next to a green square as this indicates that it is connected to a network. By clicking ‘P’ or ‘S’ a pop up box opens to allow you to set what network interface the controller is using.

UPDATING FIRMWARE

The DARK16I is a complex digital audio system comprising of a DSP and several Micro Controllers. All these items run software and may need to be occasionally updated.

Equipment needed

- A windows based PC
- USB Type A to Mini B cable
- A copy of 'DfuSe Demo' software
- The latest firmware from Glensound
- A DARK16IM and mains power

Instructions

1. Download and install DfuSE Demo

   'DfuSE Demo' is a firmware updating tool that is required for loading new firmware on to the DARK16I.

   It can be downloaded from the STMicroelectronics website found here: https://goo.gl/AbzhsA. It is the file named "STSW-STM32080".

   Once you have downloaded this file you will need to extract the .exe "DfuSe_Demo_V3.0.5_Setup.exe", then run and install it.

2. Install DFuSE driver
   Once DFuSE is installed, navigate to the following location on your machine:

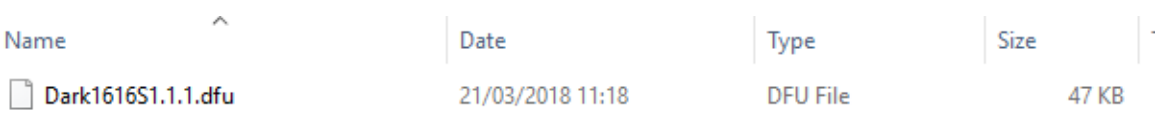
   C:\Program Files (x86)\STMicroelectronics\Software\DfuSe v3.0.6\Bin\Driver\Win10

   You now need to run the following driver.
   -If your machine is 64 bit run 'dpinst_amd64.exe'
   -If your machine is 32 bit run 'dpinst_x86.exe'

   This will install the driver you need.

3. Download firmware

   The latest firmware for the DARK16I can be found on the Glensound website, under the product page for DARK16I. Once you have downloaded the file, place it in a folder or location of your choice.



4. Connect To A PC

Connect the DARK16I to the PC via the USB cable. The Mini USB connector is located on the front panel of the DARK16I.

5. Firmware update preparation

To prepare the DARK16I for a firmware update;

1. Power on the unit
2. Press and hold down the reset button
3. Press and hold down the identify button
4. Release the reset button and then release the identify button a second after

Your PC should make an audible sound when this process is successful as windows is detecting a new USB device.

6. Loading the firmware

Now open DfuSe Demo.

If the DARK16I successfully entered DFU mode then it will appear as ‘STM Device in DFU Mode’ under the ‘Available DFU Devices tab’.

Now the .dfu file needs to be selected so that DfuSe Demo knows the correct firmware to put on to the DARK16I.

Click choose and then select the .dfu file that you downloaded from the Glensound website. This will be located in your downloads folder by default.

If the file loads successfully then it will read along the bottom ‘File correctly loaded’.

1. Upgrading the DARK16I firmware

The firmware is now ready to be put on to the DARK16I. Tick the ‘Verify after download’ box first and then click ‘Upgrade’.

Click yes to proceed.

The progress bar along the bottom will show the status of the operation.

If the operation was successful, DfuSe Demo will report that “Targery 00: Verify Successful!”.

You may also see that it will report how much data was successfully transferred.

2. Final steps

   Now click “Leave DFU mode” to finish the procedure.

   You may now disconnect the USB cable and continue to use the DARK16I with the freshly updated firmware!

UPDATING THE BROOKLYN MODULE

The Brooklyn module is a device supplied by Audinate that does most of the processing for the actual Dante/ AES67 network audio streams. There is one Brooklyn module in each DARK16I. We supply special code (a .dnt file) that sets up/ initiates the Brooklyn module and makes it work in particular way and we also run extra code on its internal microprocessor to make it work correctly with the DARK16I.

1. Finding Out Current Installed Version

Open Dante Controller.
Open Device Info tab.
Double Click in the device that you are working with….a new window will open called ‘Device View (name of device’
Open the status tab.
The Firmware Version (of the Brooklyn module) will be found under the ‘Device Information’ heading.

2. Finding Out What The Latest Available Version Is

Go the DARK16I’s web page at http://www.glensound.co.uk/product-details/dark-1616/ and open the ‘Firmware Latest Version’ Tab.
This will give both the latest version numbers/ file names and also the location to download the file from.

3. Updating the Brooklyn Module

The firmware that runs on the Brooklyn module is updated using Audinate’s Firmware updating tool. The updating tool and a user guide can be downloaded from Audinate’s website:

https://www.audinate.com/products/firmware-update-manager

Please note we strongly advise that when you do the update that only your PC and the DARK16I that you want to update are on the network to save accidentality updating the wrong Dante device.

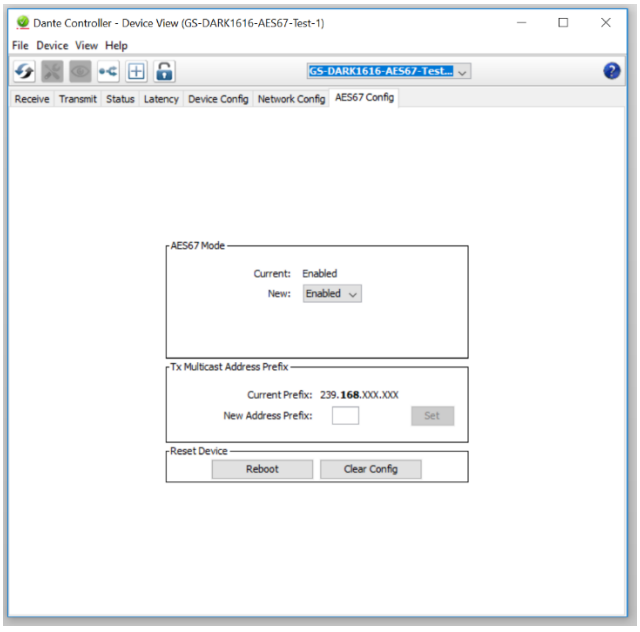
AES67 MODE

The DARK16I uses a module from Audinate called a Brooklyn Module for its network audio interface. Audinate are the company behind Dante® and as such the module's primary network audio protocol is Dante®, however Audinate have enabled their module to comply with AES67 and therefore the DARK16I can be set to AES67 mode for interaction with other AES67 devices.

Please note however that Glensound are relying on Audinate's AES67 interface and are unfortunately not able to provide full AES67 support for the unit. AES67 support should be sought directly from Audinate.

1. Turning On AES67 Mode

If you want to use your DARK16I on an AES67 network and it has not been set to AES67 mode then this can be set in Dante controller by double clicking the DARK16I to open the Device View window where you will find an AES67 tab to enable AES67 support.

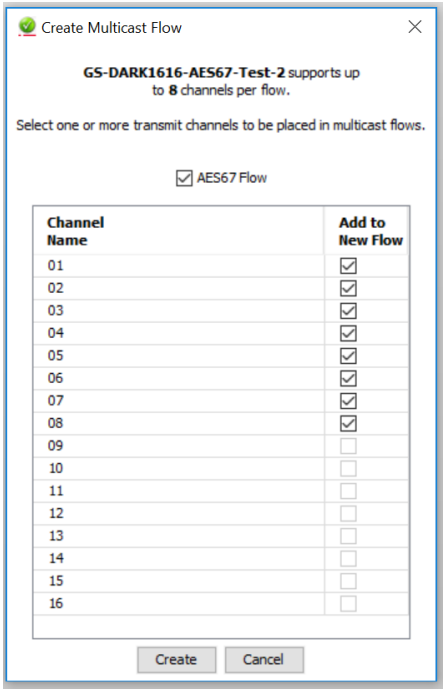


Once the AES67 drop down box has been enabled you'll have to reboot the DARK16I for the change to take effect. After the reboot go back to the AES67 tab and set the multicast prefix address to one that is suitable for your newtork.

2. Sending AES67 Audio

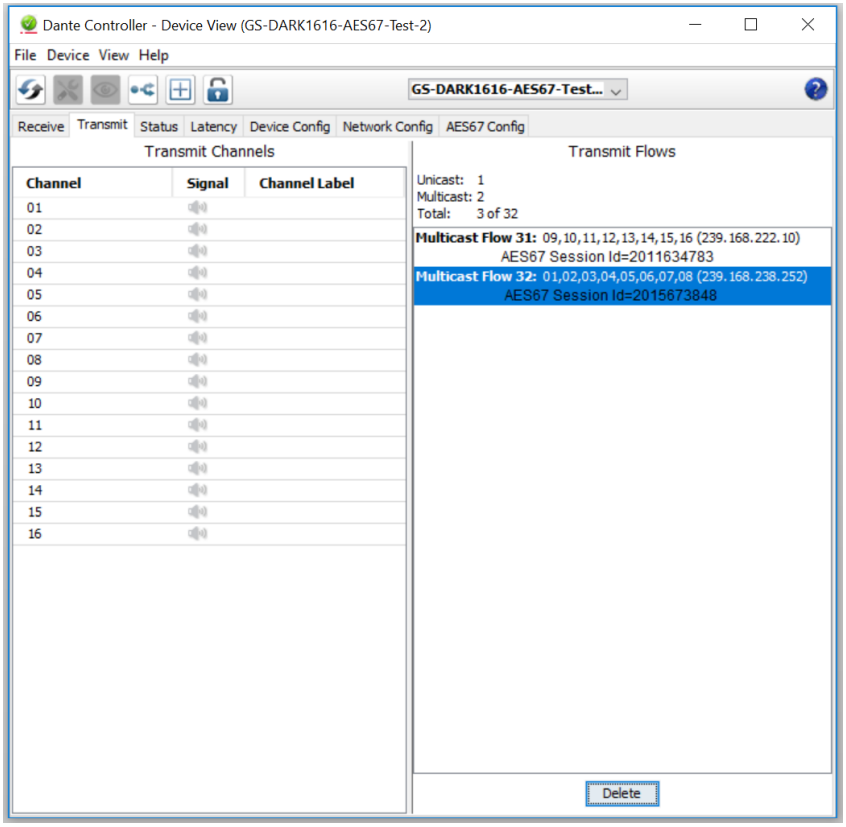
To transmit AES67 audio to the network a multicast flow must first be setup.

This is done by selecting the 'Create New Multicast Flow' Icon  in the Device View.



Tick the AES67 Flow check box, then select up to 8 channels to be included in the flow then click 'Create'

Once set the flows can be seen in the transmit tab of the device view.



3. Receiving AES67 Audio

Once a compatible AES67 stream is detected on the network by Dante Controller the AES67 flows will appear in the Dante Transmitters section in the Routing tab.

4. AES67 Restrictions

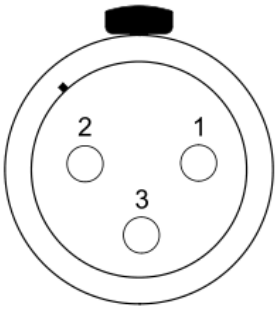
AES67 flows can only be generated with the following constraints:

- Multicast Only
- Non-redundant
- Destination address in range 239.nnn.0.0 to 239.nnn.255.255 (239.nnn/16), port 5004
- 48kHz sampling rate
- 24 bit linear (L24) encoding
- 1 msec packet time
- Up to 8 channels per stream

Received AES67 flows have the following constraints:

- Multicast Only
- Non-redundant
- Destination address in range 239.nnn.0.0 to 239.nnn.255.255 (239.nnn/16), port 5004. Must match destinatio address range.
- 48kHz sampling rate
- L16 or L24 encoding
- 125usec, 250usec, 333usec, 1 msec packet time
- Up to 8 channels per stream

WIRING INFORMATION



XLR SOCKET (FEMALE)

AUDIO I/O D25 SOCKET PIN OUT

The wiring used for the DARK16I conforms to AES59 (Also known as the Tascam standard). Pre-made break out cables are available from a number of suppliers.

ANALOGUE AUDIO INPUTS 1 - 8		
Input 1	Pins 24, 12, 25	In Phase, Mate, Ground
Input 2	Pins 10, 23, 11	In Phase, Mate, Ground
Input 3	Pins 21, 9, 22	In Phase, Mate, Ground
Input 4	Pins 7, 20, 8	In Phase, Mate, Ground
Input 5	Pins 18, 6, 19	In Phase, Mate, Ground
Input 6	Pins 4, 17, 5	In Phase, Mate, Ground
Input 7	Pins 15, 3, 16	In Phase, Mate, Ground
Input 8	Pins 1, 14, 2	In Phase, Mate, Ground

ANALOGUE AUDIO INPUTS 9 - 16		
Input 9	Pins 24, 12, 25	In Phase, Mate, Ground
Input 10	Pins 10, 23, 11	In Phase, Mate, Ground
Input 11	Pins 21, 9, 22	In Phase, Mate, Ground
Input 12	Pins 7, 20, 8	In Phase, Mate, Ground
Input 13	Pins 18, 6, 19	In Phase, Mate, Ground
Input 14	Pins 4, 17, 5	In Phase, Mate, Ground
Input 15	Pins 15, 3, 16	In Phase, Mate, Ground
Input 16	Pins 1, 14, 2	In Phase, Mate, Ground

ALARMS D9 SOCKET PIN OUT

ALARMS		
PSU1 Failure NC	Pin 1	Closed Contact when PSU1 fails
PSU1 Failure NO	Pin 6	Open Contact when PSU1 fails
PSU2 Failure NC	Pin 2	Closed Contact when PSU2 fails
PSU2 Failure NO	Pin 7	Open Contact when PSU2 fails
LINK Primary Failure NC	Pin 3	Closed Contact when Primary link fails
LINK Primary Failure NO	Pin 8	Open Contact when Primary link fails
LINK Secondary Failure NC	Pin 4	Closed Contact when Secondary link fails
LINK Secondary Failure NO	Pin 9	Open Contact when Secondary link fails
COMMON	Pin 5	Common for above (Internally linked to Ground)