DARK1616D

DANTE/AES67 NETWORK AUDIO
8 x AES3 INPUTS 8 x AES3 OUTPUTS
INTERFACE

PRODUCT DETAILS

THE DESIGN BUILDINGS, 6 BROOKS PLACE, MAIDSTONE, KENT, ME14 1HE. ENGLAND.
TEL: +44 (0) 1622 753662
visit our Website at www.glensound.com

Glensound Electronics Ltd

Thank you for choosing a new Glensound product.

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:

Glensound Electronics Ltd
1 – 6 Brooks Place
Maidstone
Kent
ME14 1HE
United Kingdom

Telephone: +44 (0) 1622 753662

EMAIL ADDRESSES

General enquires: office@glensound.com

Technical enquires: techinfo@glensound.com

Sales enquires: sales@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.

SAFETY WARNING

The DARK1616D contains no user serviceable parts and **must not** be disassembled in any way.

CE

EU DECLARATION OF CONFORMITY FOR:

DARK1616D

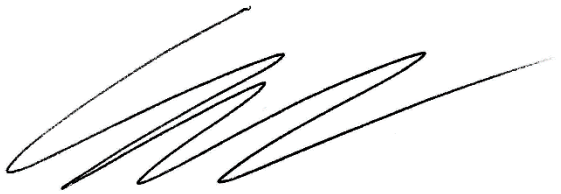
Sixteen channel AoIP, AES3 I/O interface

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.



Gavin Davis, Managing Director
Maidstone, Kent, England

Date: 15/11/2019

RoHS DIRECTIVE

EC directive 2002/95/EC restricts the use of the hazardous substances listed below in electrical and electronic equipment.

This product conforms to the above directive and for this 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 DARK1616D

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OVERVIEW

The Glensound DARK1616D is a digital to digital converter designed to connect AES3 audio circuits to/ from a Dante/ AES67 audio network.

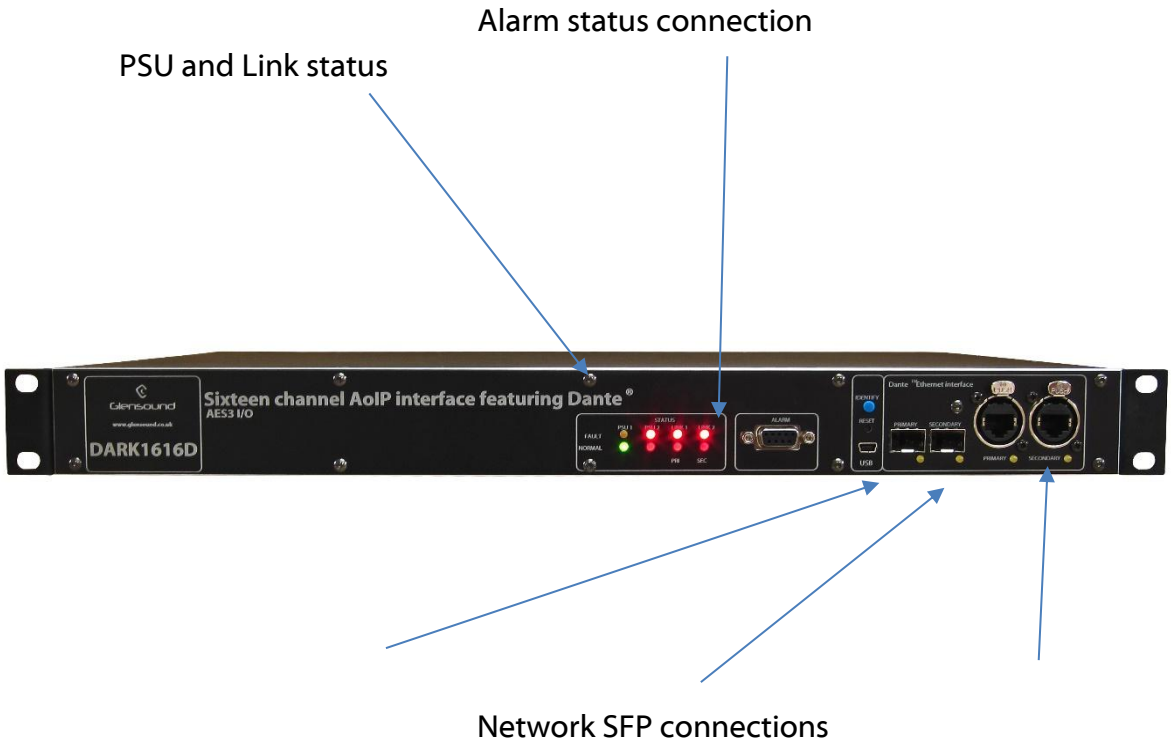
Dante network audio is a common protocol for distributing high quality linear audio over standard IP networks and it is widely used by many audio equipment manufacturers. The Glensound Dark1616D Dante audio interface will be compatible with any other manufacturers Dante audio interface. Further details of Dante network audio can be found at www.audinate.com

Being designed for live on-air broadcast applications the Glensound Dark1616D 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 Dark1616D provides 8 balanced AES3 inputs and 8 balanced AES3 outputs to the Dante network on rear panel D25 connectors wired to AES59 (also known as the Tascam standard).

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

DARK1616D 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 DARK1616D 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 DARK1616D to be updated. To prepare the DARK1616D 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 switch mode.

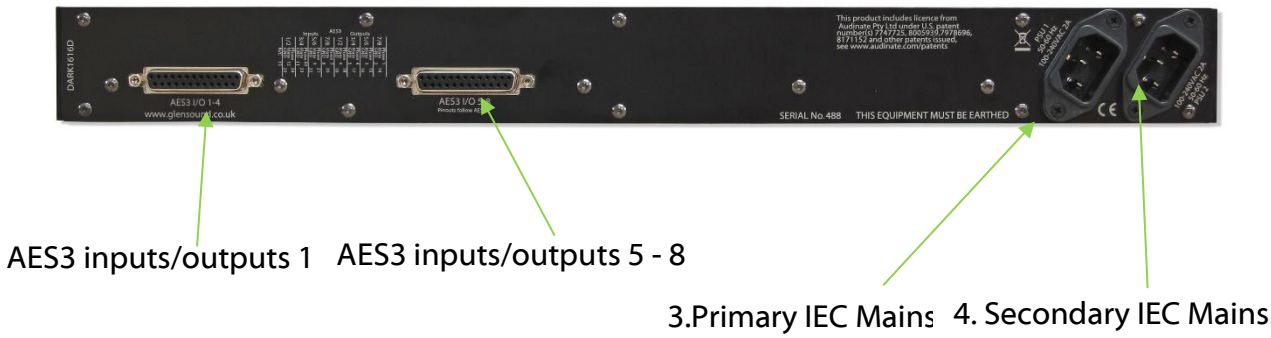
It is possible using Dante controller to set these network interfaces to work in redundant mode instead of the switch mode.

5. **Network RJ45 connections**

There are 2 standard network data RJ45 sockets provided to allow redundant network connectivity if using Dante network audio protocol. They are both gigabit network connections. The status LEDs flash to show when data is being correctly communicated with the attached switch.

DARK1616D REAR PANEL LAYOUT

A detailed wiring table for the pins of rear panel connections can be found at the end of the manual.



1. **AES3 inputs/outputs 1 - 4**

   A 25-way female D-type connector allows a breakout cable to be attached to send and receive 1 – 4 balanced digital AES3 signals. This audio can be routed to anywhere on a network via Dante.

   The AES3 inputs can accept any sample rate up to 192kHz. The input is fed via a sample rate converter and is automatically set to match the Dante network sample rate.

   The AES3 outputs can be up to 192kHz. The actual output sample rate is set to be synchronous with the Dante network sample rate.

2. **AES3 inputs/outputs 5 – 8**

   A 25-way female D-type connector allows a breakout cable to be attached to send and receive balanced digital AES3 signals on channels 5 - 8. This audio can be routed to anywhere on a network via Dante.

   The AES3 inputs can accept any sample rate up to 192kHz. The input is fed via a sample rate converter and is automatically set to match the Dante network sample rate.

   The AES3 outputs can be up to 192kHz. The actual output sample rate is set to be synchronous with the Dante network sample rate.

3. **Primary IEC Mains**

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

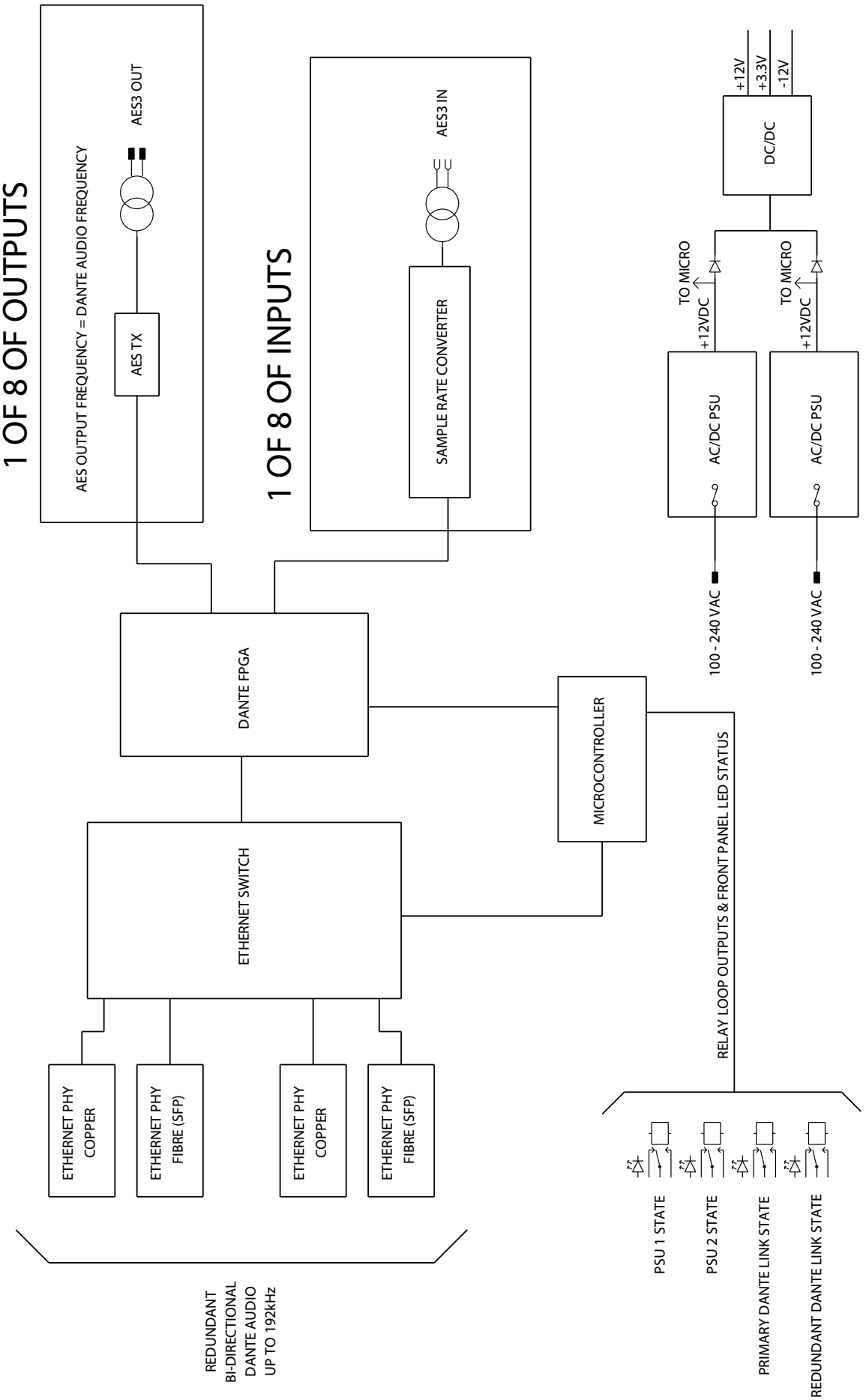
   The DARK1616D is designed to operate with either primary or secondary mains sources or both for power redundancy.

4. Secondary IEC Mains

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

The DARK1616D is designed to operate with either primary or secondary mains sources or both for power redundancy.

SIMPLIFIED BLOCK DIAGRAM



CONNECTING THE DARK1616D TO A DANTE NETWORK

The Dark1616D 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 Dark1616Ds To The Network

Dark1616Ds 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 Dark1616D from within the Dante controller and route its' audio circuits.

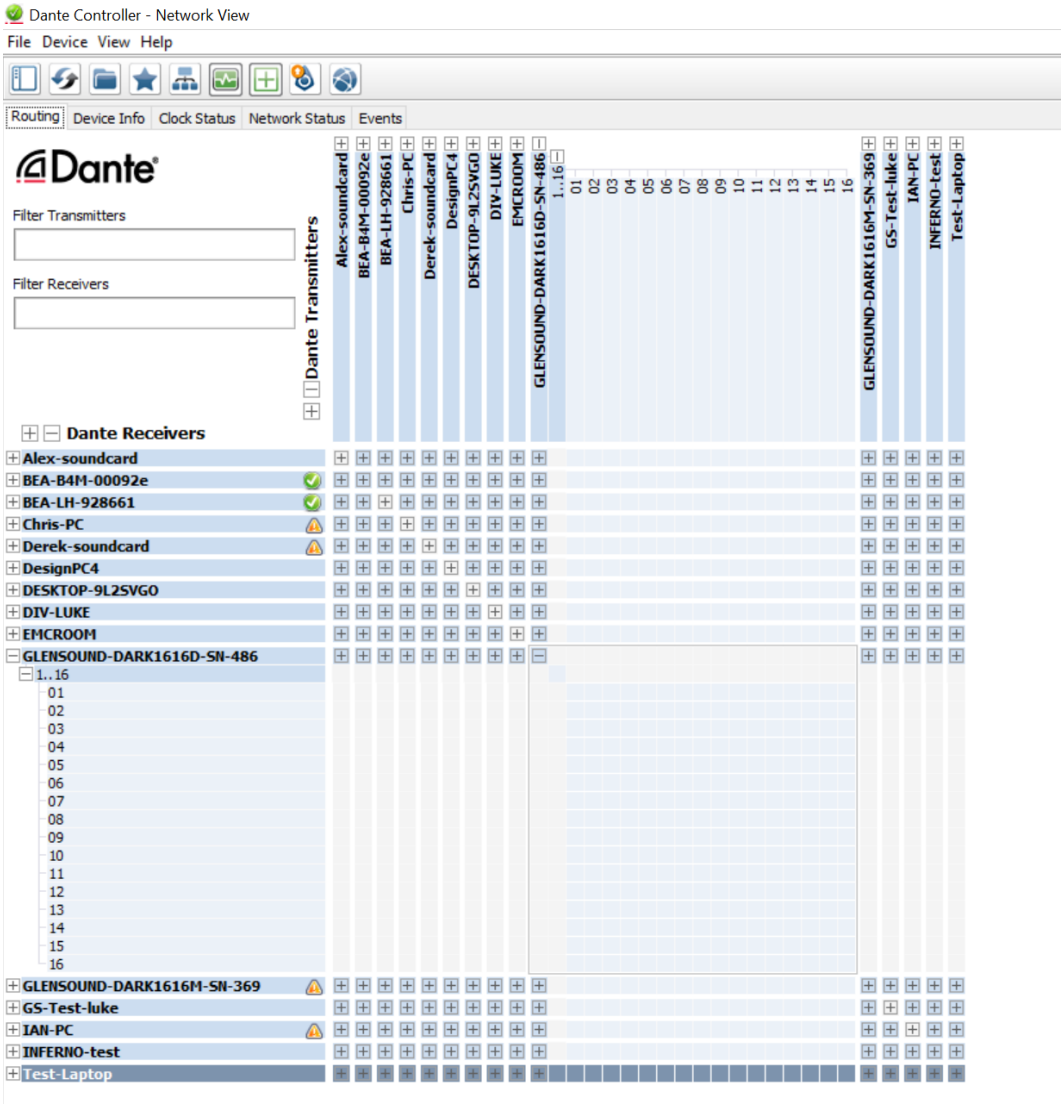
Audio Over IP Network

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 Dark1616D 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:

‘GLENSOUND-DARK1616D-SN-XXX’

Where ‘SN-XXX’ relates to the Dark1616D’s serial number which can be found printed on its rear panel.

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 DARK1616D 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 DARK1616D 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 DARK1616D.

   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

   Contact Glensound for the latest firmware available. sales@glensound.com

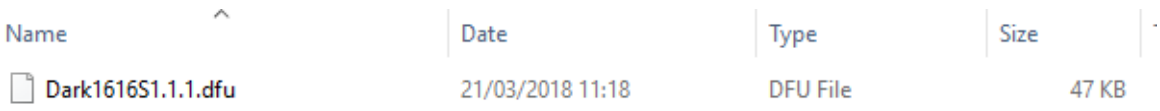


Figure 1 Example filename

4. Connect To A PC

Connect the DARK1616D to the PC via the USB cable. The Mini USB connector is located on the front panel of the DARK1616D.

Figure 2 Front panel USB connector

5. Firmware update preperation

To prepare the DARK1616D 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 DARK1616D successfully entered DFU mode then it will appear as ‘STM Device in DFU Mode’ under the ‘Available DFU Devices tab’.

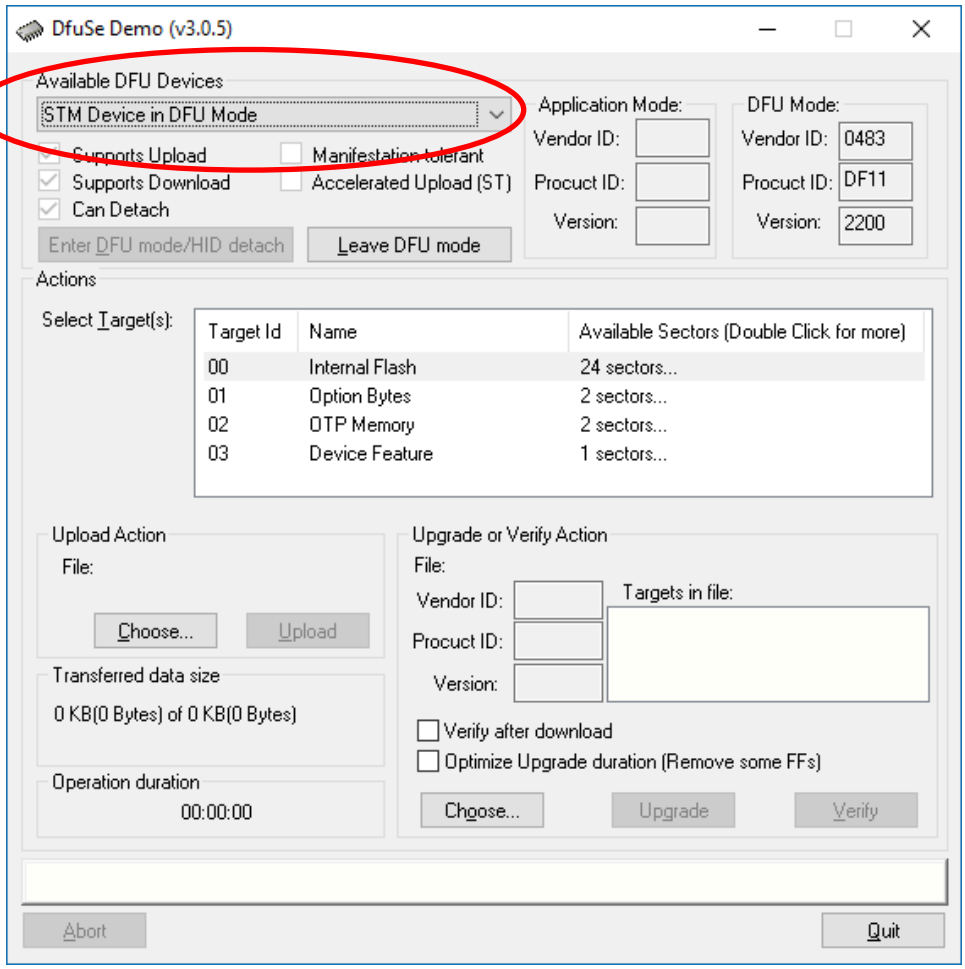


Figure 3 Device successfully recognised

Now the .dfu file needs to be selected so that DfuSe Demo knows the correct firmware to put on to the DARK1616D.

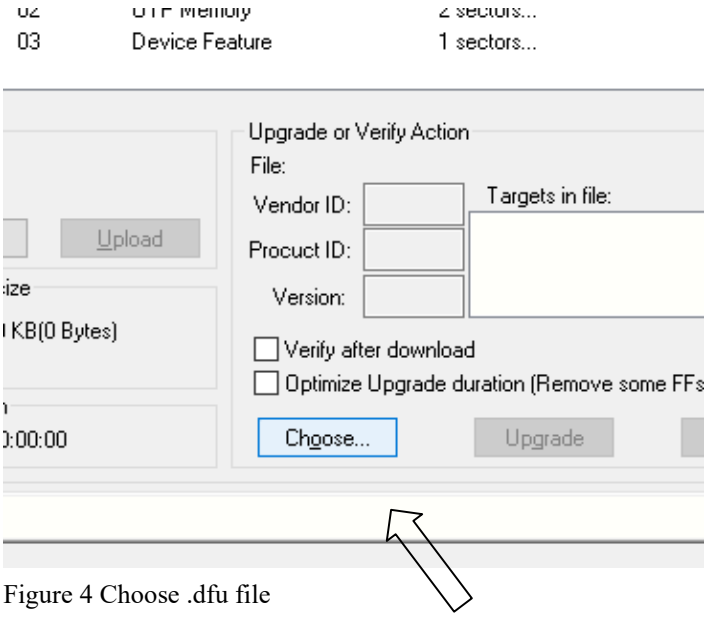


Figure 4 Choose .dfu file

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’.

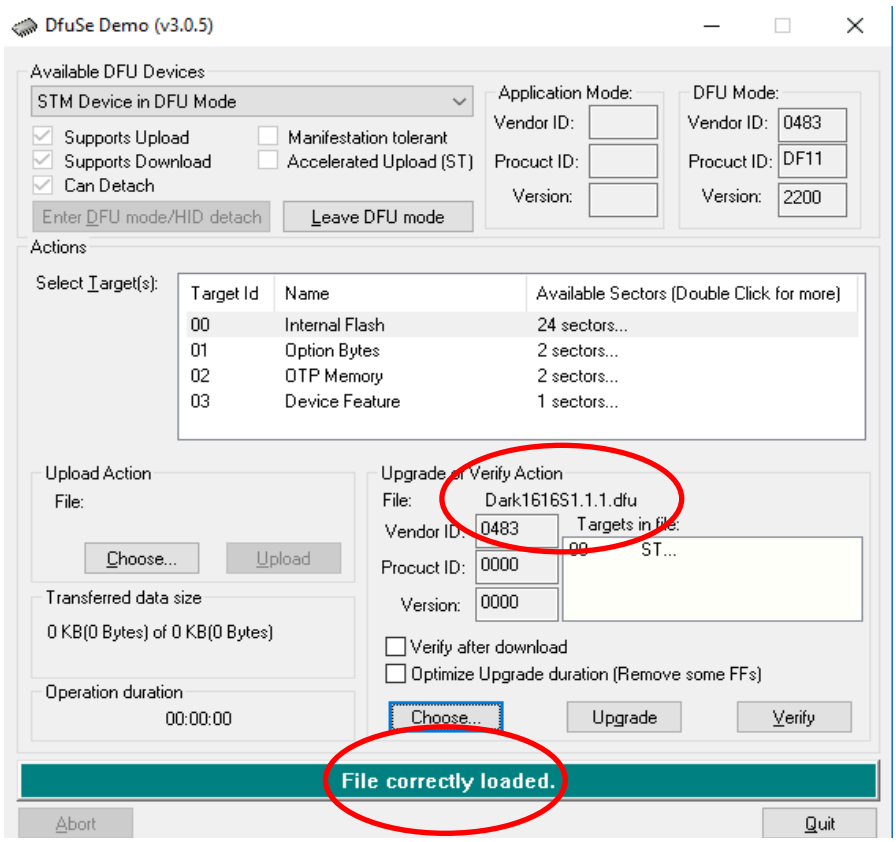


Figure 5 .dfu successfully loaded

7. Upgrading the DARK1616D firmware

The firmware is now ready to be put on to the DARK1616D. Tick the ‘Verify after download’ box first and then click ‘Upgrade’.

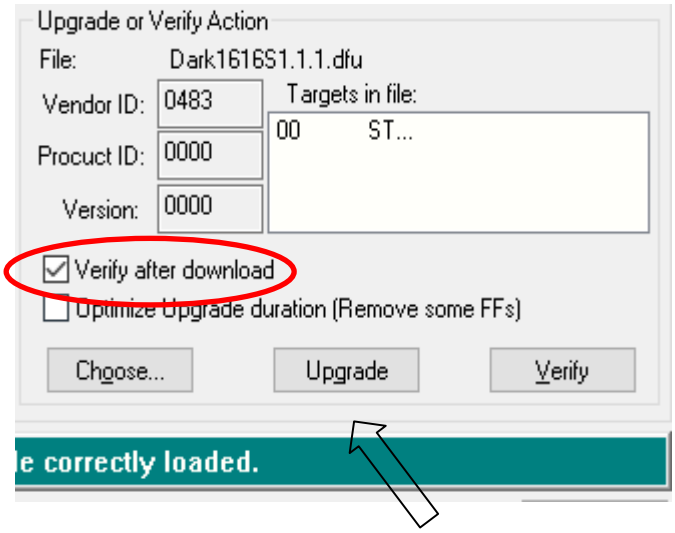


Figure 6 Upgrade

Click yes to proceed.

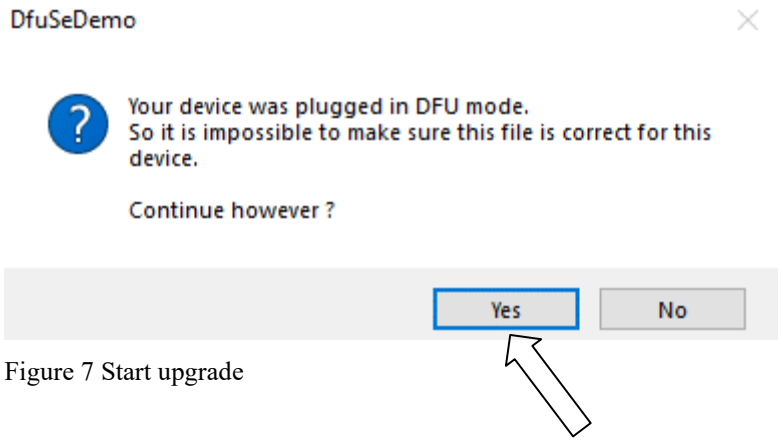


Figure 7 Start upgrade

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

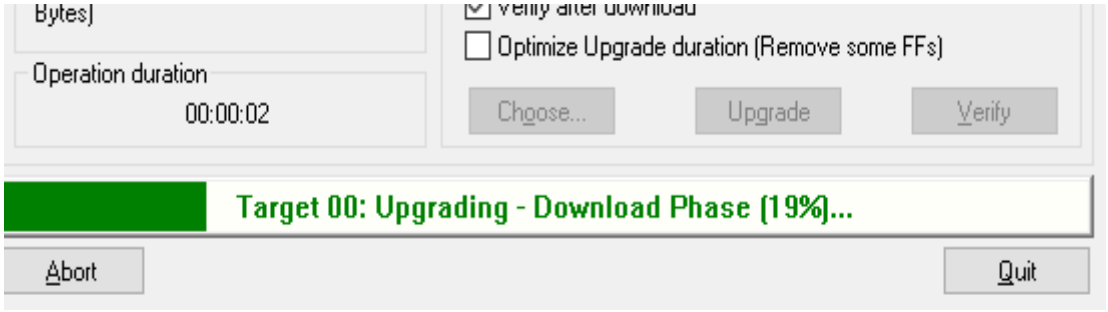


Figure 8 Upgrade status

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.

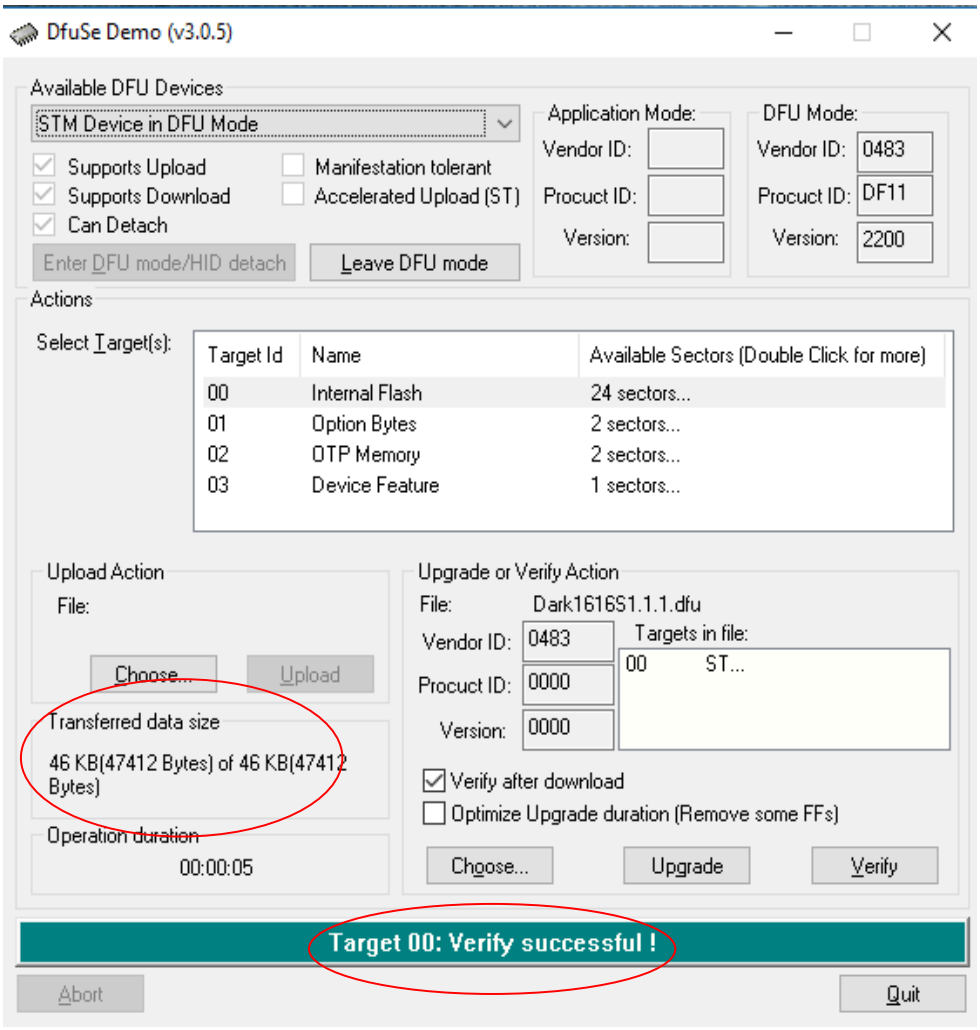


Figure 9 Successful upgrade!

8. Final steps

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

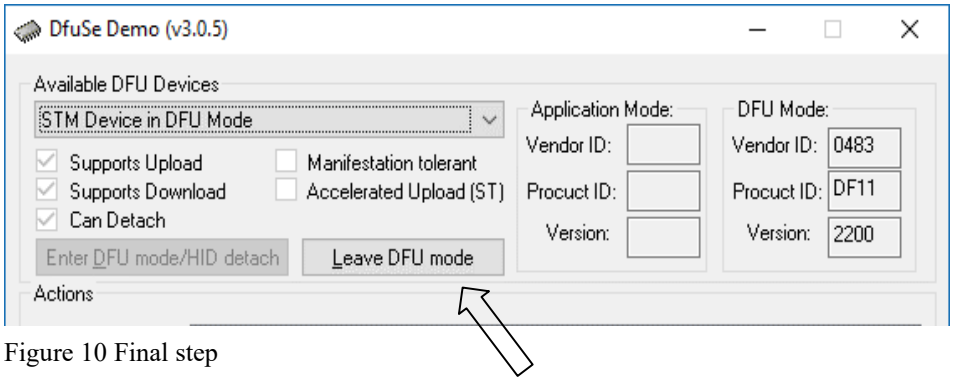


Figure 10 Final step

You may now disconnect the USB cable and continue to use the DARK1616D 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 Dark1616D. 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 Dark1616D.

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

Contact Glensound for the latest firmware available. Sales@glensound.com

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 Dark1616D that you want to update are on the network to save accidently updating the wrong Dante device.

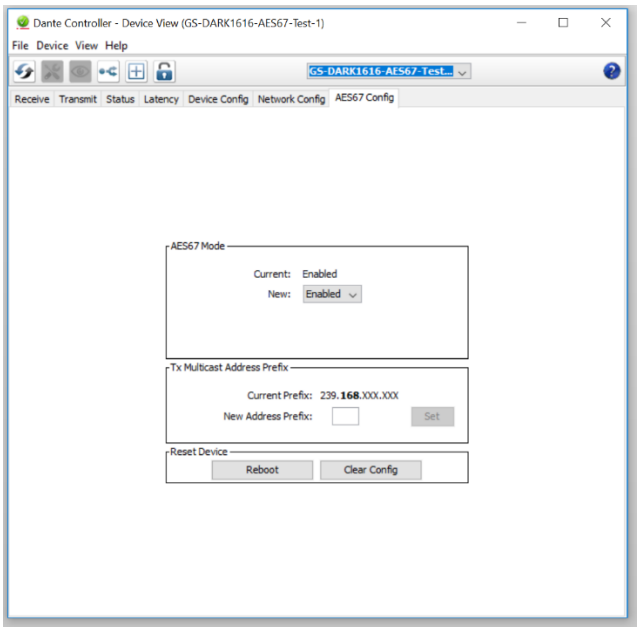
AES67 MODE

The Dark1616D 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 Dark1616D 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 Dark1616D 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 Dark1616D to open the Device View window where you will find an AES67 tab to enable AES67 support.

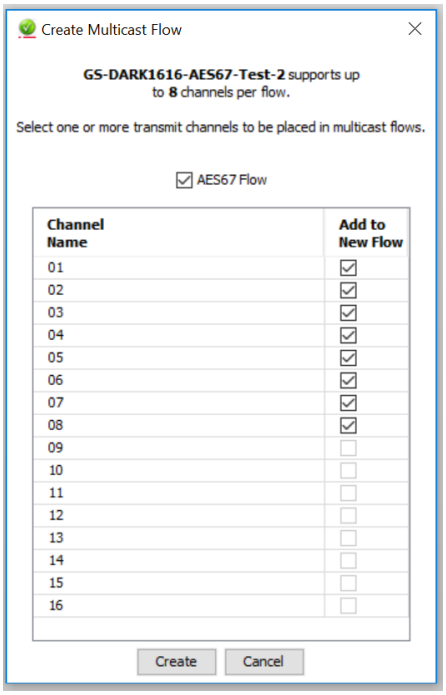


Once the AES67 drop down box has been enabled you'll have to reboot the Daek1616D for the change to take effect. After the reboot go back to the AES67 tab and set the multicast prefix address to one that is suitable for your network.

2. Sending AES67 Audio

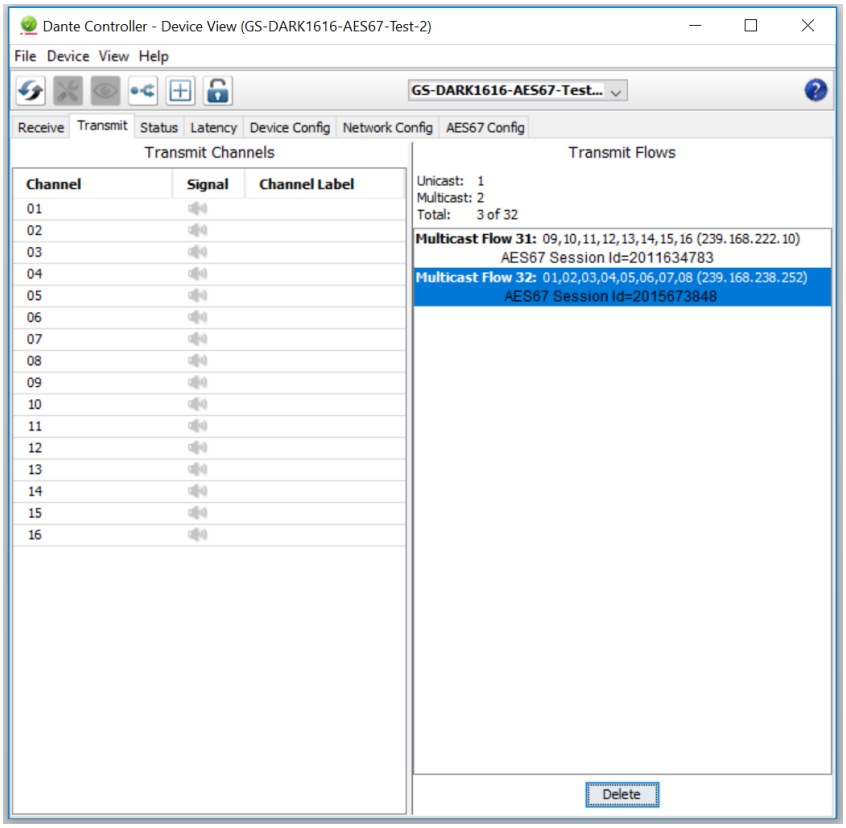
To transmit AES67 audio to the network a multicast flow must first be setup.

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:

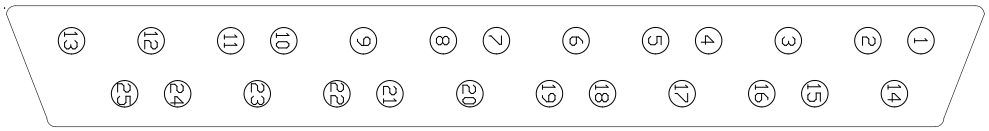
- Multicast Only
- Non-redundant
- Destination address in range 239.nnn.0.0 to 239.nnn.255.255 (239.nnn/16), port 5004
- 48kHz sampling rate
- 24 bit linear (L24) encoding
- 1 msec packet time
- Up to 8 channels per stream

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 destination address range.
- 48kHz sampling rate
- L16 or L24 encoding
- 125usec, 250usec, 333usec, 1 msec packet time
- Up to 8 channels per stream

WIRING INFORMATION

AUDIO I/O D25 SOCKET PIN OUT



The wiring used for the DARK1616 conforms to AES59 (Also known as the Tascam standard). Pre-made break out cables are available from a number of suppliers.

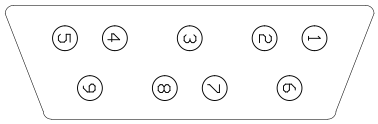
AES3 AUDIO INPUTS/ OUTPUTS 1 - 4

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

AES3 AUDIO INPUTS/ OUTPUTS 5 – 8

Input 9/10	Pins 24, 12, 25	In Phase, Mate, Ground
Input 11/12	Pins 10, 23, 11	In Phase, Mate, Ground
Input 13/14	Pins 21, 9, 22	In Phase, Mate, Ground
Input 15/16	Pins 7, 20, 8	In Phase, Mate, Ground
Output 9/10	Pins 18, 6, 19	In Phase, Mate, Ground
Output 11/12	Pins 4, 17, 5	In Phase, Mate, Ground
Output 13/14	Pins 15, 3, 16	In Phase, Mate, Ground
Output 15/16	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)