APPLICATION NOTES

AES67 CONFIGURATION

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AES67 is a technical standard designed to allow audio over IP and audio over Ethernet interoperability between different networking systems. All Powersoft amplifiers featuring a Dante card can be configured to work with AES67 audio streams.

Powersoft amplifiers support a limited number of audio streams, also known as 'flows' – the actual number varies by device according to the Dante card it utilises. In general, 'Dante Ultimo' cards allow for a maximum of 2 transmit flows and 2 receive flows to be created, while amplifiers with 'Dante Brooklyn II' cards can simultaneously stream 32 x 32 flows.

Table 1 below presents a summary of all Dante enabled Powersoft amplifiers and their flow streaming capabilities.

	Ultimo UXT (2 x 2 flows)	Ultimo UXT (2 x 0 flows)	Ultimo ULT (2 x 0 flows)	Brooklyn II (32 x 32 flows)
Ottocanali DSP+D				✓
Quattrocanali DSP+D [1]		✓	✓	
Duecanali DSP+D[1]		✓	✓	
X Series				✓
T Series[2]	✓			
Mezzo AD	✓			

Table 1 – List of Dante-enabled Powersoft amplifiers.

NOTE 1: Quattrocanali DSP+D and Duecanali DSP+D amplifiers cannot transmit Dante flows.

NOTE 2: Four-channel versions of T Series amplifiers can be configured to have channels as either 4-IN/4-OUT at 48 kHz or 4-IN/0-OUT at 96kHz. Selection can be done in ArmoníaPlus, in the amplifier's internal configurations, under Options > Dante Settings > Device Configuration.

The Dante modules in Powersoft amplifiers operate with their own dedicated firmware. To ensure a correct configuration of AES67, it is recommended that all modules are running the latest Dante firmware.

The following firmware versions are recommended for Dante cards in Powersoft amplifiers:
- Brooklyn II – version 2.0.1.0 or above;
- Ultimo UXT (T Series) – version 2.1.3.0 or above;
- Ultimo UXT (Quattrocanali and Duecanali Series) – version 4.1.1.4 or above;
- Ultimo ULT – version 3.10.4.1 or above.

More information on how to update the Dante firmware in Powersoft amplifiers can be found on Powersoft's website.

Enabling AES67 and Receiving Flows

Before setting up an AES67 connection between an amplifier and a third-party device, it is necessary to enable AES67 streaming on the amplifier. This is done via the software application 'Dante Controller' provided by Audinate. Free download versions of the software are available for 'Windows' and 'Mac OS X' directly on Audinate's website.

When opening 'Dante Controller', all devices connected to the Dante network will be displayed in the list of transmitters and receivers.

To enable AES67 streaming:

1. Open the **Device View** window by double-clicking on the device to be configured.
2. Select the **AES67 Config** tab[1] (Figure 1).
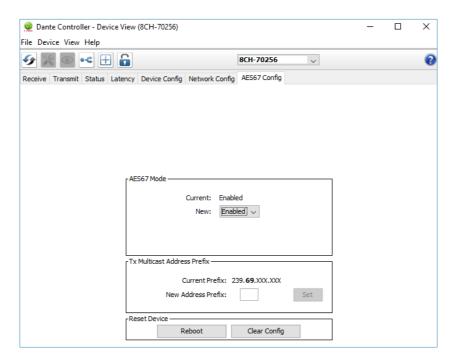3. Under 'AES67 Mode' select 'Enabled' from the drop-down list.

Figure 1 – Dante Controller AES67 Config tab in the Device View window.

NOTE 1: If the AES67 Config tab is not showing in the amplifier's device view, the most likely solution for this issue is to update the firmware of the Dante card. More information can be found on Powersoft's website.

It is important to note that this operation requires a device reboot. This can be done by simply clicking 'Reboot' under 'Reset Device'. However, in some instances, it has been verified that a manual reboot of the amplifier is necessary for modifications to take effect and is, therefore, recommended as best practice.

The above operation will automatically enable the amplifier to receive AES67 streams, and in most circumstances, this is the only necessary configuration. However, some amplifiers can also be set to transmit AES67 audio streams over the Dante network.

Transmitting AES67 Flows

Although enabling AES67 in the 'Dante Controller' automatically configures the amplifier to receive AES67 streams, an additional step is necessary if transmitting audio streams is desired.

In Dante, there are two types of audio streams, or 'flows': Unicast and Multicast. Unicast flows are one-to-one routes that deliver audio to and from specific devices, and support 4 channels of audio simultaneously. A multicast flow "broadcasts" the audio so that multiple receivers can subscribe to it, but the transmitting device is only using one of its available flows. It allows up to 8 audio channels to be streamed in one flow.

When connecting two devices in Dante Controller, a unicast transmit flow is automatically created by default from the transmitter to the receiver. However, AES67 connections only utilise multicast flows, as this is a universal communication method used by most network systems. Therefore, it is necessary to create a multicast flow for the channels of the AES67 transmitting device.

To create a multicast Dante flow and enable AES67 streaming from a transmitting device:

1. Open the **Device View** window by double-clicking on the transmitting device to be configured.
2. Click on the 'Create a new multicast' button at the top bar.
3. In the 'Create Multicast Flow' window, tick the box next to 'AES67 Flow' (Figure 2).
4. Select the channels to be included in the multicast flow.
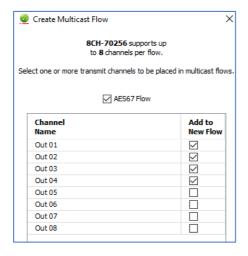5. Click 'Create'.

Figure 2 – Dante Controller 'AES67 Config' tab in the 'Device View' window.

A list of all the transmit flows created for the device, including multicast AES67 flows, can be found in the **Device View** window, under the **Transmit** tab.

Important note: Dante Controller gives the user the option to save all the routing information as a preset by clicking on the "Save preset" button. It is however strongly advised that the preset feature is not used, as loading saved presets in Dante Controller will erase all patching previously made with AES67 devices.

POWERSOFT AMPLIFIERS AND Q-SYS NETWORKING VIA AES67

The following application notes are applicable to Q-SYS and Powersoft amplifiers connections via an AES67 network. Powersoft has also made a series of free plug-ins and communication protocols available for the control of amplifiers directly from the Q-SYS Designer platform. For more information and to access these tools, please email our technical support team at support.audio@powersoft.com.

The integration of Powersoft amplifiers and a Q-SYS AES67 network is done via Dante Controller and the additional software application 'Q-SYS Designer', which can be downloaded directly from QSC's website.

Before creating any AES67 connections with Q-SYS, verify that the properties of Q-SYS Designer match those of Dante 'Quality of Service' (QoS) management. This is specially the case for networks running both AES67 and Dante streams.

In Q-SYS Designer go to **File > Design Properties** (Figure 3). Under 'QoS Preset' select 'Audinate' from the drop-down menu.
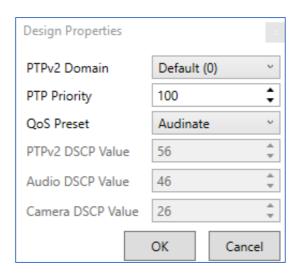

Figure 3 – List of streaming devices available in Q-SYS Designer.

The operation above assumes that Dante streams are present in the network, therefore, any network switch in place must be configured to work with a Dante network, i.e. with the DSCP parameters shown in Figure 3.

If no Dante streams are present and only AES67 streams are used in the network, the switch may be configured following DSCP parameters suggested by QSC, and in such case, 'QLAN' should be the QoS preset selected.

AES67 from Q-SYS to Powersoft Amplifiers

For this operation, the amplifier must first be configured in Dante Controller so that AES67 streaming is enabled. This is done by following the steps described in the section 'Enabling AES67 and Receiving Flows' of this document.

To set up a Q-SYS AES67 transmitter:

1. Open Q-SYS Designer.
2. In the **Inventory** pane, click the '**+**' symbol to add a device.
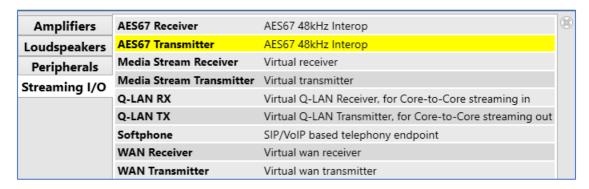3. Select the option **Streaming I/O** and then **AES67 Transmitter** (Figure 4).

Figure 4 – List of streaming devices available in Q-SYS Designer.

4. An AES67 Transmitter device will be added to the Inventory list. Click, drag and drop this device as a component onto the design schematic window (Figure 5).
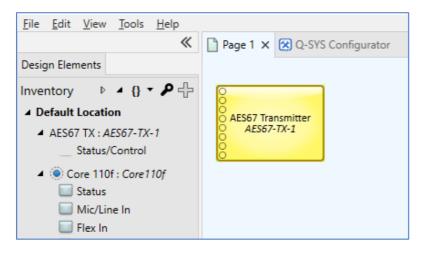

Figure 5 – AES67 Transmitter device in Q-SYS Designer.

5. Click on the AES67 Transmitter component to view its properties under the **Properties Pane**. Set 'Connection Mode' to 'Auto' and edit the 'Channel Count' to the number of channels to be transmitted from Q-SYS to the amplifier in the AES67 flow (Figure 6). It is **important** to note that it has been verified that changing the 'Channel Count', without deleting/redoing the patching in Dante Controller, creates audible HF distortion in the audio signal.
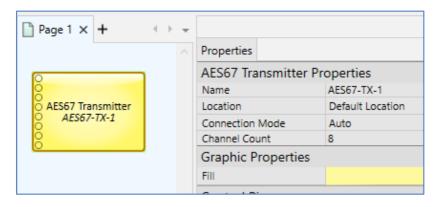
Figure 6 – AES67 Transmitter properties in Q–SYS Designer.

6. Save the design to the Q-SYS Core by pressing **F5** or selecting **File > Save to Core Run** .
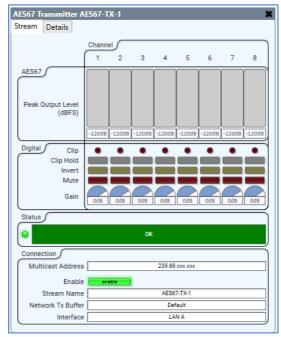7. Double-click the AES67 Transmitter component to open the **Connection** pane (Figure 7).

Figure 7 – AES67 Transmitter Connection pane.

8. Note that the AES67 Transmitter automatically assigns a name to the 'Stream Name'. The AES Transmitter device is now available for connection with other AES67 devices and can be seen in the list of Dante Transmitters in Dante Controller (Figure 8).
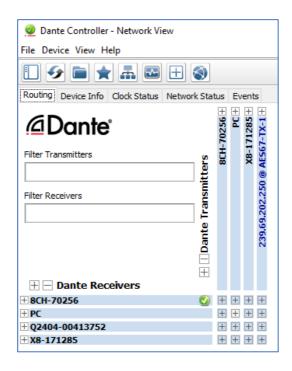
Figure 8 – The AES67 Transmitter in Dante Controller.

9. Note from 'Figure 7' that Q–SYS has automatically assigned an IP address to the AES67 Transmitter flow (239.69.xxx.xxx). This default configuration is appropriate when only one AES67 Transmitter component is used in the Q–SYS design schematic. However, when several transmitter components are added to the design, Q–SYS will incorrectly assign the same IP address to all AES67 flows. In such instance, it is recommended to manually configure the IP of the 'Multicast Address' in each transmitter component independently (Figure 9).
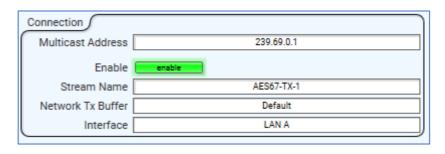

Figure 9 – Manual configuration of the 'Multicast Address' for an AES67 Transmitter.

For best practice, it is recommended that static multicast IP addresses are always used for Q–SYS AES67 Transmitter flows, as it will make the network routing more reliable. This is specially the case when devices are restarted and/or put in a different network, causing the IP addresses to change and the routing to be lost.

AES67 from Powersoft Amplifiers to Q–SYS

For this operation, a multicast AES67 flow must have been created for the amplifier in Dante Controller. This is done by following the steps described in the section 'Transmitting AES67 Flows' of this document.

To set up a Q–SYS AES67 receiver:

1. Open Q–SYS Designer.
2. In the **Inventory** pane, click the '**+**' symbol to add a device.
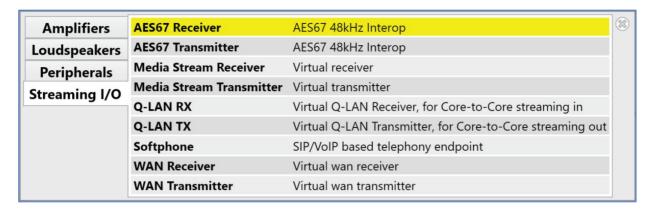3. Select the option **Streaming I/O** and then **AES67 Receiver** (Figure 10).

Figure 10 – List of streaming devices available in Q–SYS Designer.

4. An AES67 Receiver device will be added to the Inventory list. Click, drag and drop this device as a component onto the design schematic window (Figure 11).
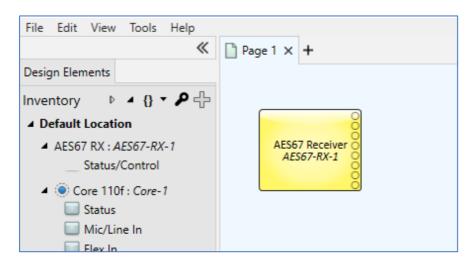
Figure 11 – AES67 Receiver device in Q–SYS Designer.

5. Click on the AES67 Receiver component to view its properties under the **Properties Pane**. Edit the 'Channel Count' to match the number of channels to be received from the amplifier in its AES67 multicast flow (Figure 12). For this example, four channels have been selected to match the number of channels seen in 'Figure 2'.
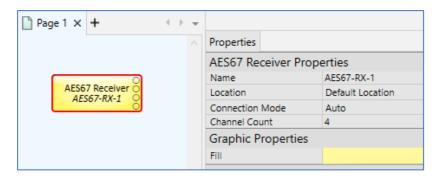
6. Set 'Connection Mode' to 'Auto'.

Figure 12 – AES67 Receiver properties in Q-SYS Designer.

7. Save the design to the Q-SYS Core by pressing **F5** or selecting **File > Save to Core Run** .
8. Double-click the AES67 Receiver component to open the **Connection** pane (Figure 13).
9. Note that the AES67 Receiver status initially displays the message "Not Present – Waiting for SAP". This means that the receiver is waiting for its first SAP announcement from the network.
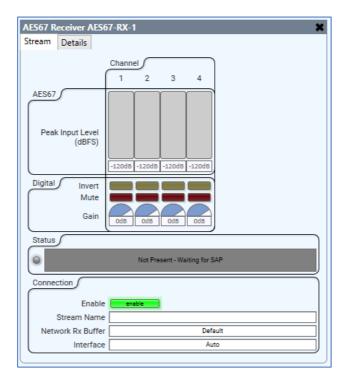

Figure 13 – AES67 Receiver Connection pane.

10. The status of the receiver should automatically change to "Not Present – No Stream Specified" (Figure 14), as soon as the AES67 Receiver receives its first SAP announcement. This indicates that the AES67 streams in the network have been discovered but have not yet been selected. Note that sometimes it may take up to 30 seconds for the status to be updated.

Figure 14 – AES67 Receiver status following the first SAP announcement.

11. In the **Connection** pane, click on the field next to 'Stream Name' and, from the drop-down list, select the transmitting device to connect the receiver to. In this example, the same Ottocanali 12K4 D+DSP amplifier from 'Figure 2' has been selected (Figure 15). It is important to emphasise that the number of channels on both receiving and transmitting devices <u>**must**</u> be the same.
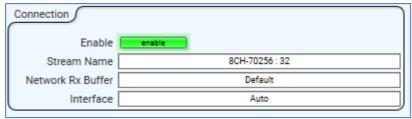

Figure 15 – AES67 Receiver properties in Q–SYS Designer.

The AES Receiver is now ready to receive AES67 flows from the Powersoft amplifier.

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