



APPLICATION NOTES

INTEGRATING POWERSOFT IN A DOLBY ATMOS SYSTEM

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1 – INTRODUCTION

This document aims to provide comprehensive guidance and configurations for setting up a Cinema system with Powersoft DSP+ amplifiers, positioning them as the optimal choice for Dolby Atmos installations.

Dolby audio processors can be connected to Powersoft amplifiers over AES67 which is one of the protocols supported by Dolby Atmos Connect, ensuring the transmission of audio data with up to 64 channels, maintaining synchronization across all devices with utmost reliability and efficiency.

Starting from the ArmoníaPlus 2.7.0 release introduces a dedicated Dolby Atmos Connect patching window for the DSP+ and A+ Powersoft amplifiers, empowering users to seamlessly configure AES67 flows directly within the software interface.

From ArmoníaPlus 2.7.1, this functionality is also available for Unica amplifiers that supports Dante/AES67 connectivity.

Details on the Dolby Atmos Connect compatible amplifiers model can be found in [Table 3](#)

This feature significantly reduces the costs, effort, and time involved for patching an auditorium, allowing users to effortlessly incorporate Powersoft amplifiers with Dolby audio processors for swift and efficient deployment in Cinema applications.

2 – USER INPUT

Here we cover the basics setting for a Cinema network equipped with Dolby Atmos Connect AES67 protocol.

The Dolby Audio Cinema processors supported by Powersoft amplifiers are the following:

- CP950A
- IMS3000

Refer to Dolby's official documentation for additional info regarding different equipment, but the correct operability is not guaranteed.

These devices distribute 8 multicast audio streams, allowing the same channels to be accessed by multiple AES67 devices. Each of these 8 streams comprises 8 channels, for a total of 64 channels, which is the maximum number of outputs for Dolby Atmos. Understanding how these audio streams are received is a key part to setting up both simple and complex audio networks.

The examples in the following figures show how to connect a Dolby IMS300/CP950A processor to a Powersoft DSP+ amplifier.

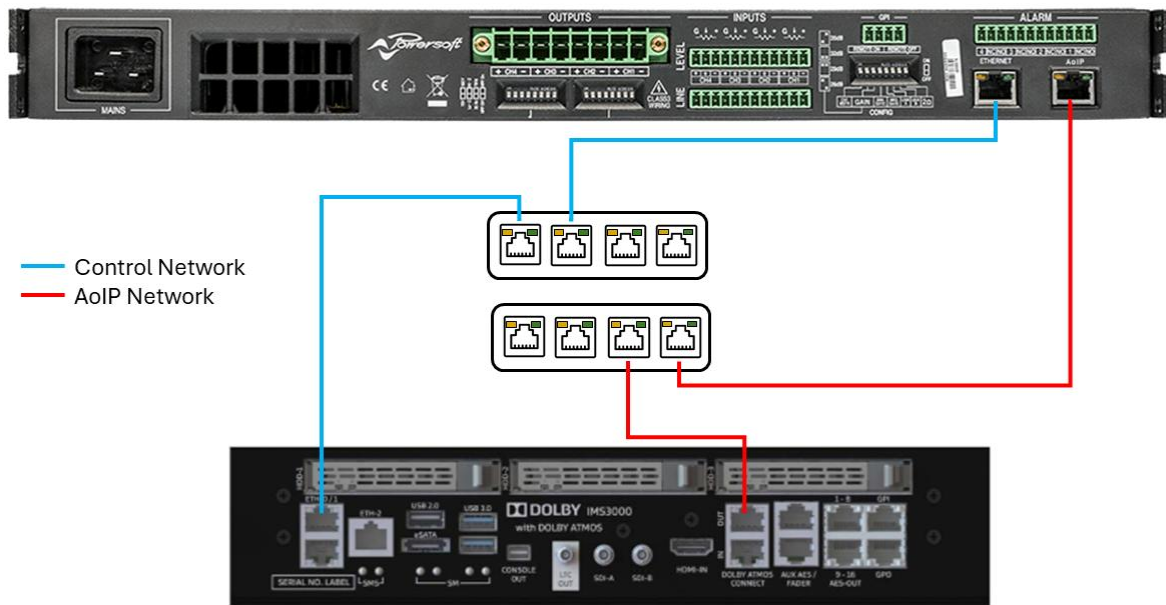


Figure 1 Connecting a Dolby IMS3000 to a QuattroCanali 4804 DSP+

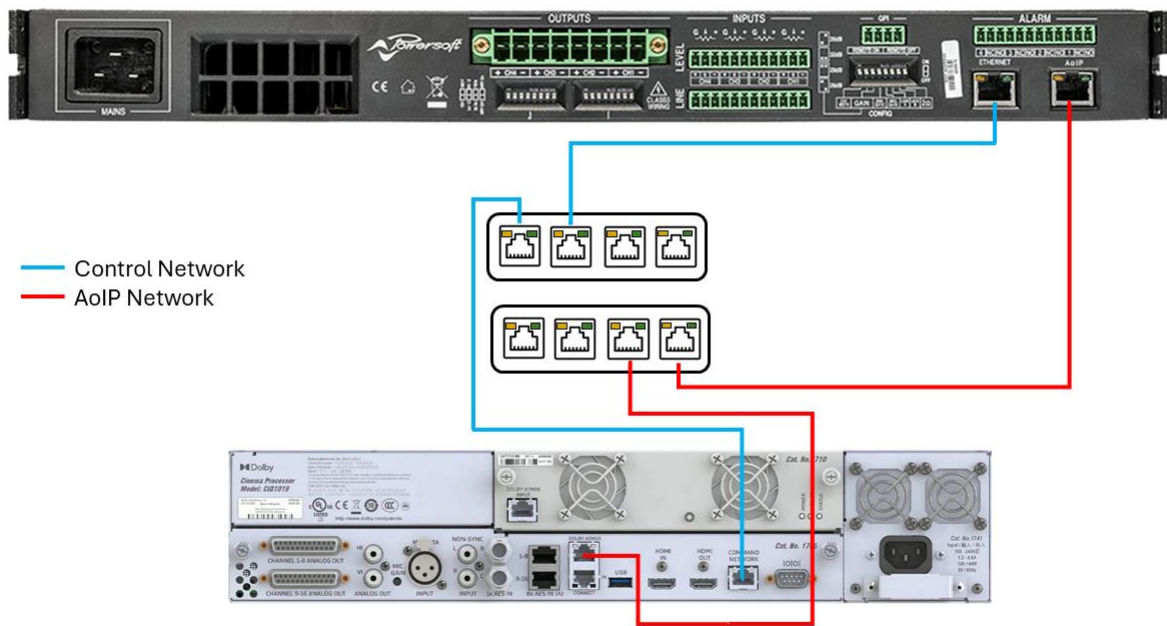


Figure 2 Connecting a Dolby CP950A to a QuattroCanali 4804 DSP+

In the majority of cinema cases, there is the necessity to separate the control traffic from the AES67 flows, this means we need an administrable network, which mandates the deployment of managed switches in a star topology.

For the AoIP network in case of multiple receiver's daisy chain is not recommended to prevent excessive latency due to multiple hops.

To ensure optimal multicast efficiency and reliability, it is advised to follow the general recommendations present in the Powersoft [Dante/AES67 white paper](#).

3 – PLANNING THE STREAM USAGE

This section aims to cover the fundamental AES67 and network configurations within the Dolby Cinema Processor to ensure the correct operability with Powersoft amplifiers. These settings will need to be replicated in ArmoníaPlus later to subscribe to the required streams and subsequently patch the relevant channels according to the auditorium stream planning.

Connect your computer to the control network and type the Dolby audio processor IP address in your browser. The following are the default IP for the supported Dolby Cinema processors:

CP950A	IMS300
Command Port	Eth-0
192.168.1.151/25	192.168.100.50/24

Table 1 Dolby processors default IP

CP950A

Under the network tab select the Dolby Atmos connect settings:

The screenshot displays the 'Dolby Atmos Connect' configuration tab for the CP950A processor. The interface includes a sidebar with navigation options: status, setup (macro editor, equalization, auditorium), system (preferences, logs, user access, network, maintenance). The main configuration area shows the following settings:

- Advanced mode: ☒
- static source IP: 192.168.1.151
- PTP domain number: 109
- PTP priority 1: 127
- PTP priority 2: 127
- destination multicast IP: 239.81.83.67

Below these settings are RTP source and destination UDP ports for 8 channel groups (1-8, 9-16, 17-24, 25-32, 33-40, 41-48, 49-56, 57-64). The source ports are 6518, 6519, 6520, 6521, 6522, 6523, 6524, and 6525. The destination ports are all 6517. At the bottom are 'apply', 'cancel', and 'reset' buttons.

Figure 3 CP950 Dolby Atmos Connect tab

Under the Cinema Audio tab select AES configuration, then AES67 network outputs:

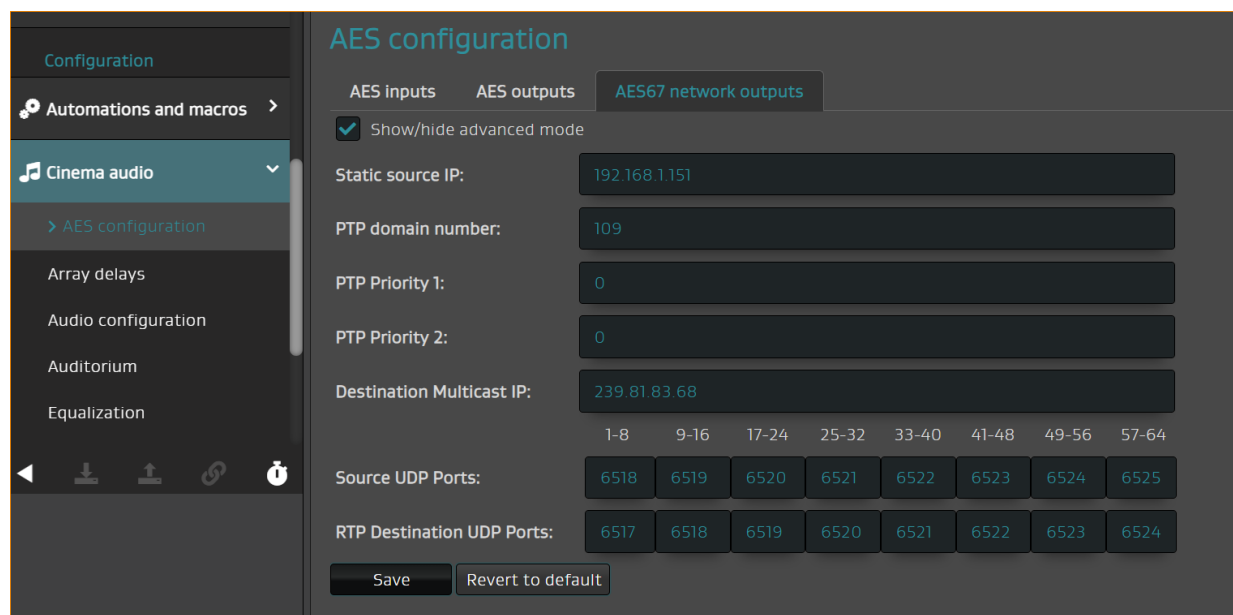


Figure 4 IMS3000 Dolby Atmos Connect tab

NOTE – Flag the advanced mode checkbox to access the source and destination individual stream port configuration. Dolby default legacy mode must be disabled to access the Real-Time Transport Protocol (RTP) settings for all the streams. Specifically, the Dolby legacy mode sets all the RTP destination to the same port number (6517) with incremented port numbers for the Source UDP port (6518 to 6525).

Follows a description of the main parameters:

- **Static source IP:** indicates the IP address used at the Dolby Atmos Connect Out Port. If more screens are on the same network is recommended to vary the third octet in order to avoid network conflicts.
- **PTP domain number:** the PTP domain number is a logical grouping of devices within a network that synchronizes their clocks to a common time source. All devices in an auditorium room must be set to the same PTP domain number. Use a different domain for each auditorium, otherwise, the network will encounter severe timing problems. The PTP election process defines which device should be the clock master, in nearly all cases the AES67 transmitter should be the clock master. Dolby defaults to 109.
- **PTP Priority 1:** priority defines the most trusted clock during the election. The value spans from 0 to 255, Dolby defaults to 127 where lower values relate to higher priority.
- **PTP Priority 2:** if there is a tie with priority1 and priority2, the parameters used to elect a master clock are Clock Class, Clock Accuracy, Offset Scaled Log Variance, and finally Clock Identity.
- **Destination Multicast IP:** identifies the main IP address for the multicast audio transmission. Dolby defaults to 239.81.83.67. Use other values for different rooms.

- **Source UDP Ports:** Settings that can be left unchanged leaving unaffected the integration with Powersoft amplifiers. These port numbers are used only by Dolby devices to identify the different streams.
- **RTP Destination UDP Ports:** Powersoft amplifiers only use the RTP Destination UDP port number for connecting to a stream and decoding audio packets; the source UDP port is simply ignored. To correctly receive all Dolby Atmos 64 channels, each stream must be associated with a unique number. The standard settings increment the destination port by +1 from 6517 to 6524 for the 8 streams, but any number is accepted and valid. Please note that the transmitter and the receiver RTP destination UDP port numbers must be equal; any mismatch will result in an unaccepted stream.
[Section 4](#) explains how to correctly create the AES67 flows in ArmoníaPlus as well as where to match the set port numbers.

Understanding the needs of the system, maximizing the used channels within the streams for a given amplifier is crucial to increase the efficiency and reliability of the AES67 network. Despite there is no limitation by Powersoft amplifiers in receiving all the Dolby Atmos streams, planning the stream usage is a good practice.

To sum up, the key parameters that we need to replicate in ArmoníaPlus for a correct AES67 flow communication are:

1. PTP Domain number
2. Destination multicast IP
3. RTP Destination UDP Ports

4 – A+ DOLBY ATMOS CONNECT - CONFIGURATIONS AND FLOW PATCHING

With the addition of the Dolby Atmos Connect patching window in ArmoníaPlus, is now possible to create and manage all the streams related to the Dolby Atmos technology without the need to use third-party software or external web pages to push the Session Description Protocol (SDP) data in the network.

To patch the Dolby Atmos streams we only need the key parameters set inside the Dolby Audio processor. The encoding format, and the packet setup, are managed automatically.

Notice that the Dolby Atmos Connect patching window is not available on virtual/offline devices.

Once the synchronization in ArmoníaPlus is on and the amplifiers are online we need to access the AES67 setting page of the DSP+ and A+ devices:

1. After selecting the arrow function double-click the device to enter the DSP configurations.
2. Access the Options tab and click edit on the AES67 settings.

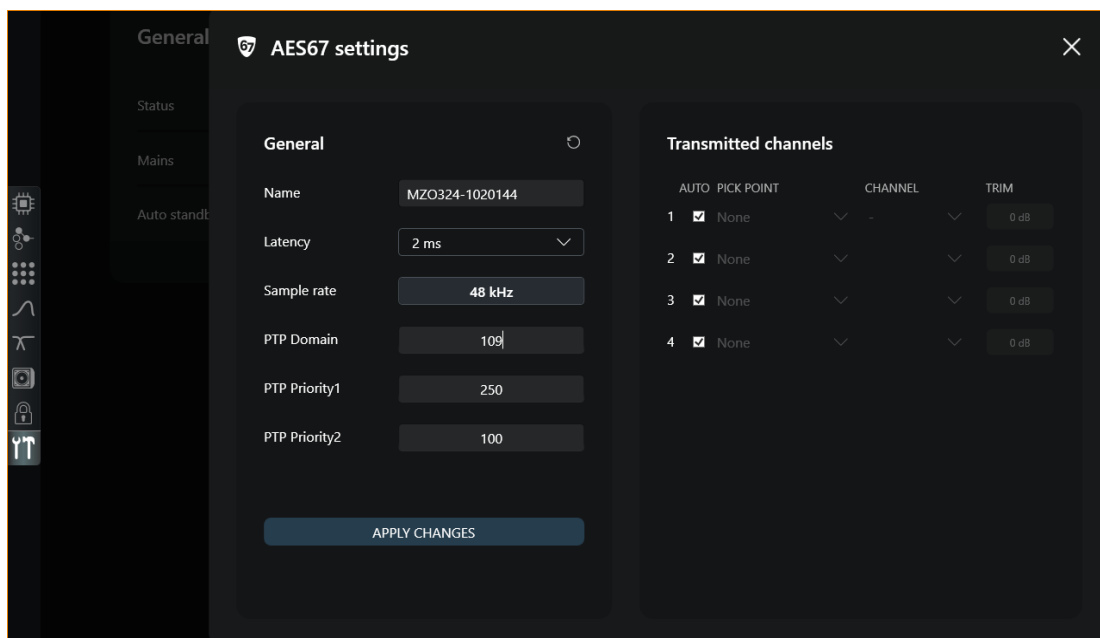


Figure 5 AES67 settings window

3. Match the **PTP Domain** set in the Dolby Audio processor – the Powersoft factory default PTP Domain is zero (0).
4. Check the Priority 1 and Priority 2 values. Ensure that the AES67 transmitter is elected as the clock master. The factory default values for Powersoft devices are 250 (Priority 1) and 100 (Priority 2). Verify that these values are higher (lower priority) than those set in the Dolby processor.
5. Click on the APPLY CHANGES button to make the changes effective. If the PTP domain is modified a confirmation pop-up appears since it might disrupt existing connections.

Now we can go back to the workspace to subscribe the streams and perform the patching:

1. Go to the Config tab and select the Input function.
2. Select the input of the amplifier that you want to patch.
3. Click on the desired priority box and select one AES67 RX amplifier input channel.

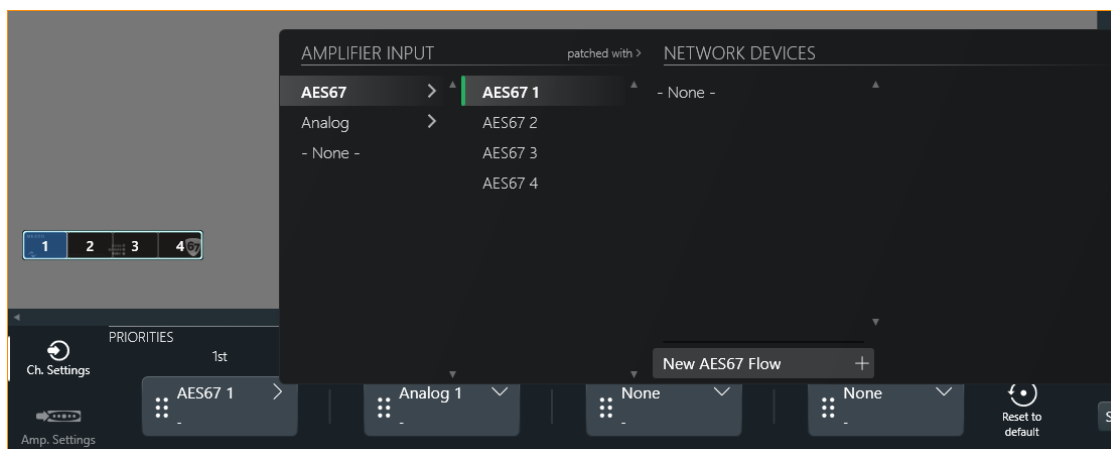


Figure 6 AES67 input patching window

4. Click on the New AES67 Flow button.

From the opened window you can access three new tabs (Figure 7) related to the AES67 patching.

Offline (SAP)

Gives the possibility to set an offline AES67 TX device – the device will have to announce itself with SAP protocol when online to be automatically patched.

SDP

Allows manual entry of SDP data.

Dolby Atmos Connect

The Dolby Atmos Connect window is shown in the figure below:

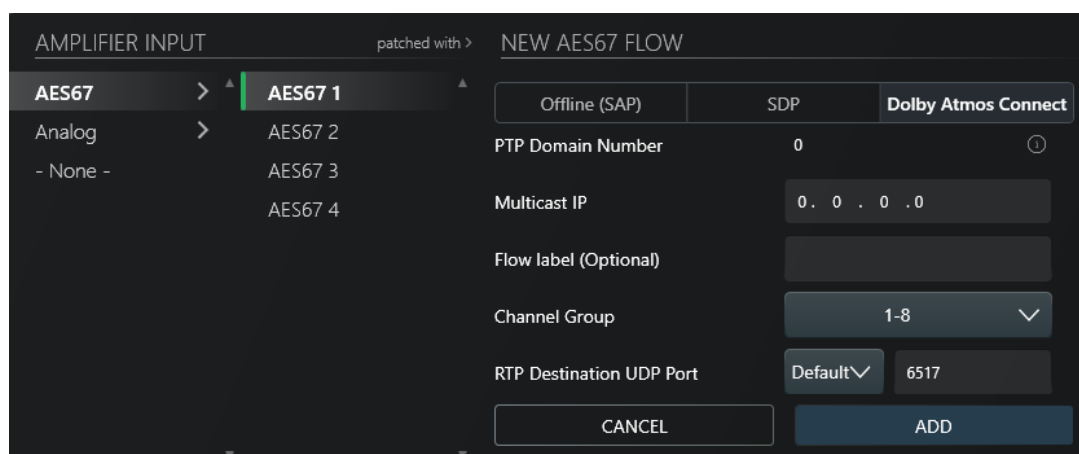
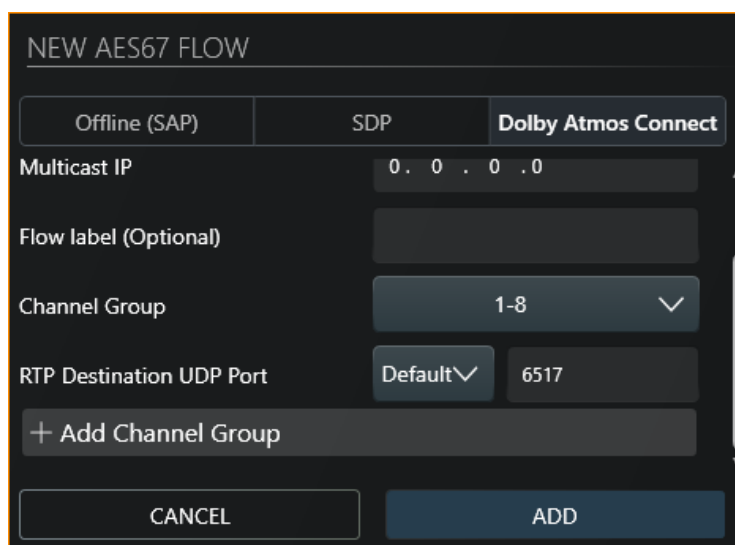


Figure 7 ArmoníaPlus Dolby Atmos Connect

Parameters available are:

- **PTP Domain Number:** Not editable from this window, it only displays the Domain number set in the AES67 settings tab.
- **Multicast IP:** The IP must be equal to the **Destination Multicast IP** set in the Dolby Audio Processor.
- **Flow Label:** This section is optional and gives the possibility to assign a friendly name to the flow. If left blank, the flow will be named with the Multicast IP.
Be aware that is not possible to create multiple flows with the same name.
- **Channel Group:** Gives the possibility to choose which stream or group of channels is associated with the flow. The grouping follows the Dolby Atmos standard.
- **RTP Destination UDP Port:** Allows to set the Destination UDP Port which must coincide with the port set inside the Dolby Audio Processor for that given stream.
The default port number varies according to the selected Channel Group, following the +1 increment rule of the Dolby Atmos standard.
Clicking on the RTP Destination drop-down menu allows you to switch to manual mode, giving the possibility to insert any number in case of custom configuration.
Remember to match for each group of channels the same setting assigned to the streams in the Dolby Audio processor.

Scrolling down the sidebar brings you to the Add Channel Group button (Figure 8), giving the possibility to add up to 8 streams (64 channels) within a single flow. The number of channel groups needed may vary according to the Auditorium design, and the channel group. Is not mandatory for them to be contiguous.



NEW AES67 FLOW

Offline (SAP) SDP **Dolby Atmos Connect**

Multicast IP 0 . 0 . 0 . 0

Flow label (Optional)

Channel Group 1-8 ▾

RTP Destination UDP Port Default ▾ 6517

+ Add Channel Group

CANCEL ADD

Figure 8 Dolby Atmos Connect - Add Channel Group

Clicking the ADD button creates the flow allowing the amplifier channel patching:

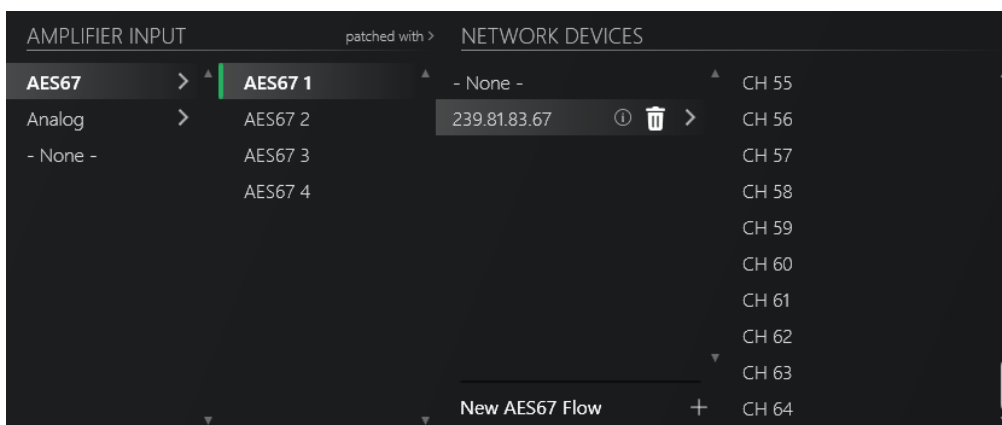


Figure 9 Added AES67 flow view

Once a flow is created cannot be edited and will be accessible from the same input page from all AES67 compliant amplifiers in the project.

NOTE – The created flows are stored within the ArmoníaPlus project file (.paw3) and will not be available when adding the amplifier to a new project. In that case, accessing the patching section will show only the Flow Label and the Channel for which the Subscription was made for a given channel.

Table 2 highlights the default schema of a flow containing all the possible Channel Groups with their relative RTP Destination UDP Port. These values must be equal both on Powersoft amplifiers and the Dolby Audio processor.

New AES67 Flow		
Streams	Channel Group	RTP Destination UDP Port
Stream 1	1-8	6517
Stream 2	9-16	6518
Stream 3	17-24	6519
Stream 4	25-32	6520
Stream 5	33-40	6521
Stream 6	41-48	6522
Stream 7	49-56	6523
Stream 8	57-64	6524
Multicast IP	239.81.83.67	(Dolby default)
PTP Domain	109	(Dolby default)

Table 2 AES67 default flow

NOTE – AES67 patching in a DSP+ (or Mezzo A+ series) amplifier can also be done through the web interface, accessible by entering the IP address assigned to the device's AoIP port into any browser.

Please note that AES67 flows created in ArmoníaPlus and those created in the web interface are not shared between the two. Therefore, it is recommended to manage AES67 flows within ArmoníaPlus to store all the system flows in a single project. Only the AES67 General Settings and the PTP settings are synchronized in ArmoníaPlus.

For additional information you can consult the Application Note: [Powersoft Amplifiers and AoIP](#)

5 – SETTING UP UNICA WITH DOLBY ATMOS CONNECT

From ArmoníaPlus 2.7.1, Powersoft guarantees the connection between Dolby processors and Unica amplifiers, supporting the same workflow described for the DSP+ and A+ amplifiers. This section outlines the caveats that must be followed and the connections for a correct system setup.

The following figures shows the connections for a Unica amplifier set in Split/Redundant mode (For additional detail on network port configuration, please refer to the application note: [Integrating Unica With other Powersoft Amplifiers](#))

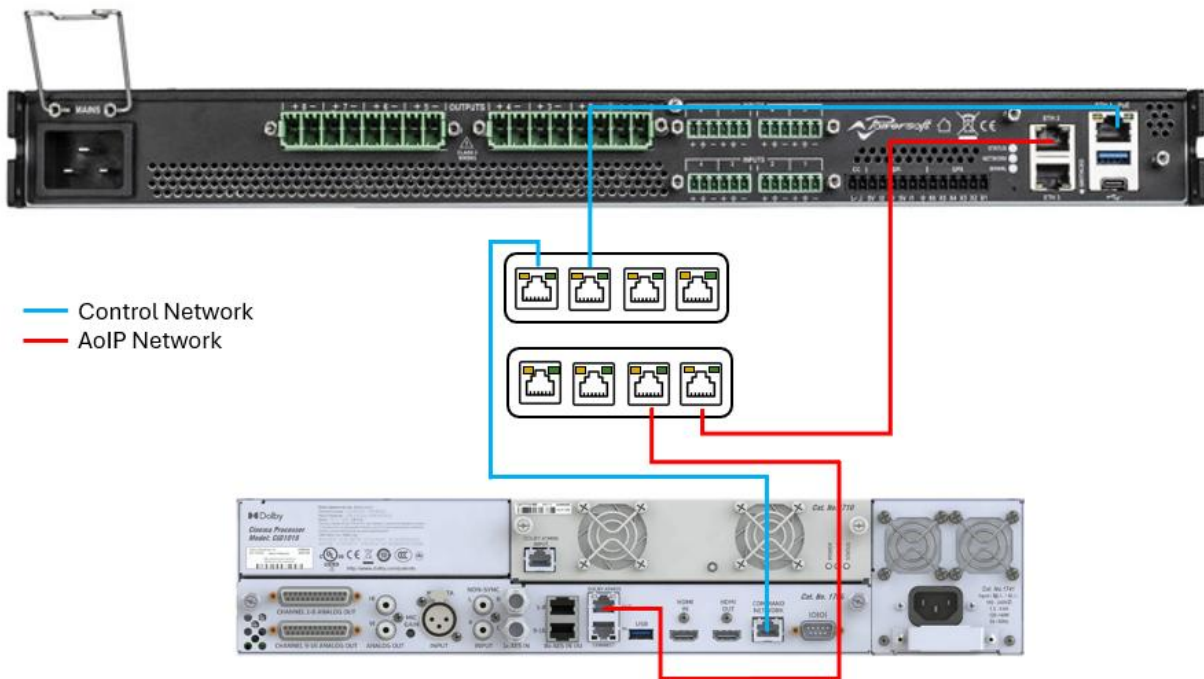


Figure 10 Connecting a Dolby CP950A to a Unica Amplifier in Split/Redundant mode

Unica amplifiers are Dante Native, allowing interoperability with AES67 devices. For such reason, the AES67 modality must be activated at device level.

NOTE – Enabling AES67 Mode will set the sampling frequency to 48 kHz and the latency to 2 ms. Once the changes are applied, the unit will be automatically rebooted.

To enable the AES67 Mode, follow the point 1 and 2 described in [Section 4](#):

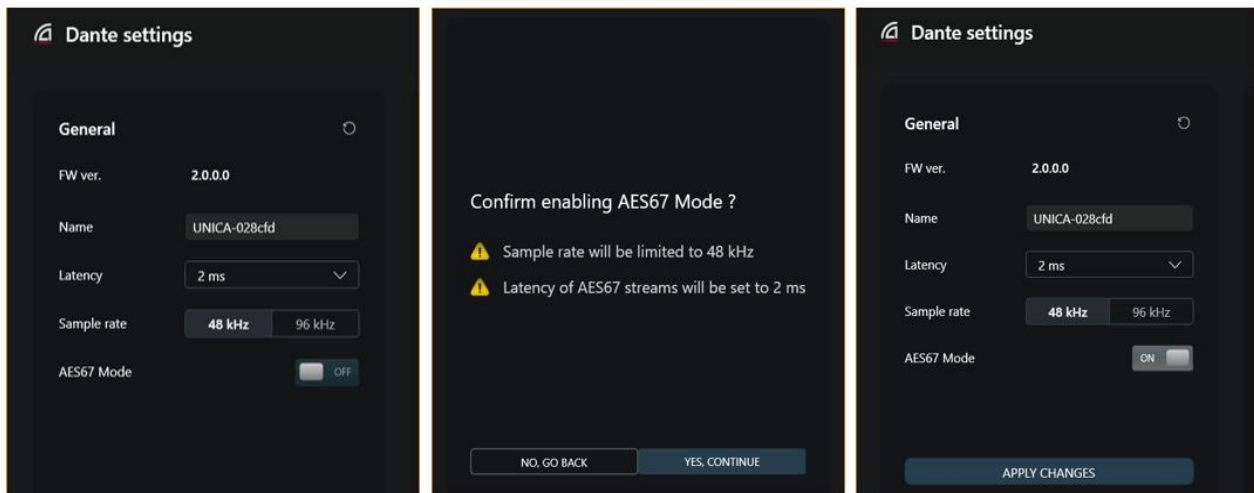


Figure 11 Step for enabling the AES67 Mode in Unica Amplifiers

A key point is that Dante devices supporting AES67 Mode use a fixed PTP V2 domain set to 0 (zero). This configuration requires setting the Dolby processor (CP950A/IMS3000) PTP Domain Number to 0 (zero) to ensure compatibility.

Remember to never join multiple auditorium networks that use the same PTP Domain.

For the Unica [Multicast Address](#), we recommend matching the prefix with the [Dolby Destination Multicast IP](#).

The Dante devices RTP Multicast Address Prefix defaults to 239.69.XXX.XXX, which can be modified within the Dante Controller if there is a need to transmit to or receive from a specific multicast subnet range.

When subscribing a Dante device to a non-Dante Tx flow, it's essential that the multicast address prefix set for the receiver matches the Tx flow's prefix. If they don't match, the subscription may seem successful, but no audio will actually be transmitted.

After completing these operations, the procedure for subscribing to the streams and performing the patching remains exactly the same as described in [Section 4](#). The only difference is that the stream will be listed under the Dante tag.

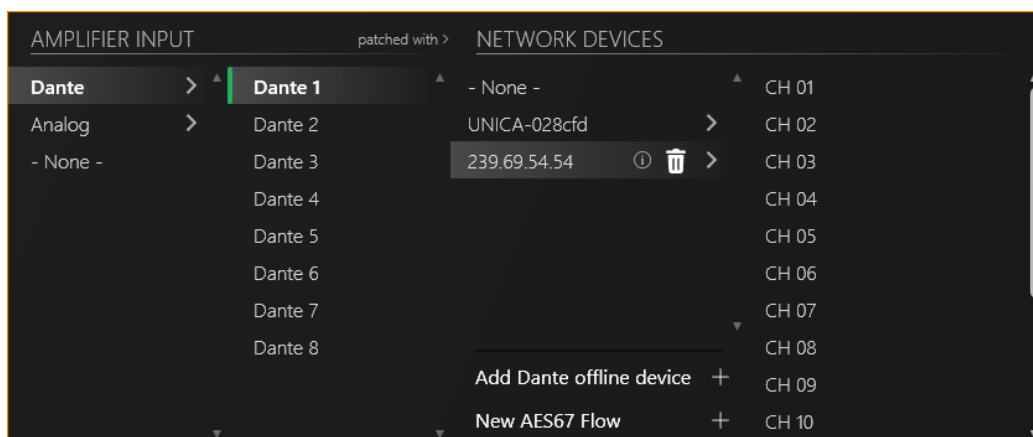


Figure 12 Unica example of a Dolby Atmos stream

Powersoft Amplifiers AoIP compatibility table summary

		Dante Rx	AES67 Rx	Dolby Atmos Connect (CP950A/IMS3000)
Unica Series	5K4	✓	✓	✓
	9k4	✓	✓	✓
	12k4	✓	✓	✓
	16k4	✓	✓	✓
	1k8	✓	✓	✓
	2k8	✓	✓	✓
	4k8	✓	✓	✓
	8k8	✓	✓	✓
Duecanali Series	6404 DSP+D	✓	✓	
	4804 DSP+D	✓	✓	
	1604 DSP+D	✓	✓	
	804 DSP+D	✓	✓	
	6404 DSP+		✓	✓
	4804 DSP+		✓	✓
	1604 DSP+		✓	✓
	804 DSP+		✓	✓
Quattrocanali Series	8804 DSP+D	✓	✓	
	4804 DSP+D	✓	✓	
	2404 DSP+D	✓	✓	
	1204 DSP+D	✓	✓	
	8804 DSP+		✓	✓
	4804 DSP+		✓	✓
	2404 DSP+		✓	✓
	1204 DSP+		✓	✓
Mezzo Series	604 AD	✓	✓	
	602 AD	✓	✓	
	324 AD	✓	✓	
	322 AD	✓	✓	
	604 A+		✓	✓
	602 A+		✓	✓
	324 A+		✓	✓
	322 A+		✓	✓

Table 3 Dolby Atmos Connect compatibility

Document Title: INTEGRATING DSP+ AMPLIFIERS IN A DOLBY ATMOS SYSTEM

Reference: DO000329.00 REV.02

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