



APPLICATION NOTES

AMPLIFIERS BACKUP STRATEGY AND START-UP TIMES

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In some applications, such as mixed public address and voice alarm systems, it is important to ensure that emergency sources will always play and have a higher priority over entertainment sources. For this purpose, this document aims to explain how an automatic source selection backup strategy can be configured in Powersoft amplifiers with onboard DSP.

Additionally, it also demonstrates how different backup strategy configurations can be set to guarantee start-up times below 10 s; something particularly relevant to applications where the amplifiers need to start passing audio quickly after recovering from a mains power failure.

Finally, a practical example will be given for the design of a cost-effective redundant system that passes audio within 10 s for Dante sources.

Backup Strategy

In Powersoft amplifiers with onboard DSP, it is possible to use the source selection block to configure what sources from analogue and Dante inputs are going into the matrix (Figure 1). The source selection can be manually done by the user or be configured for an automatic backup strategy. Up to 4 levels of redundancy are supported and the failover scheme can be based on input signal presence or Pilot tone.

This document mainly covers an automatic backup strategy based on input signal presence. A dedicated Application Note has been created to explain the use of [Pilot Tones](#).

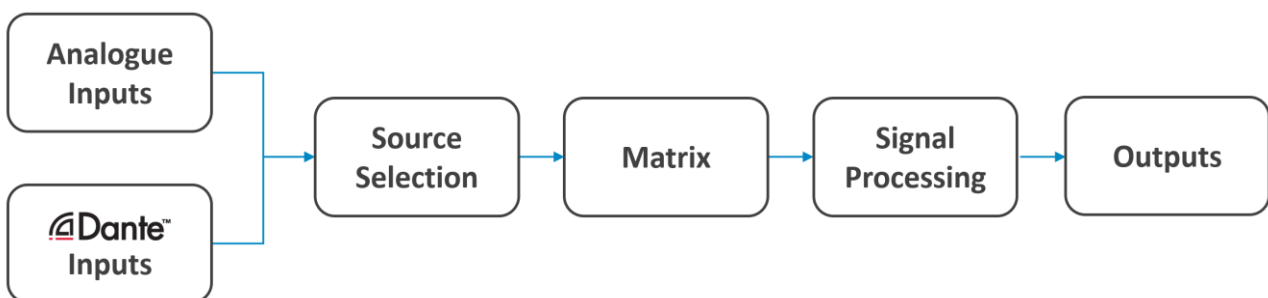




Figure 1 – DSP block diagram with the source selection in Powersoft amplifiers.

To enable a signal-based backup strategy in Powersoft amplifiers from ArmoníaPlus:

1. Double-click the amplifier in the Workspace to access its internal properties.
2. Inside the properties panel, either click on one of the inputs or click the ‘Source Selection’ icon on the window’s left-hand side. 
3. This will open the source selection and priorities window (Figure 2).
4. Still on the left-hand side of the window, it is possible to select what pre-matrix input to configure. In Figure 2 these are labelled 1 to 8 as the amplifier used in this example is an Ottocanali DSP+D.
5. Under the column ‘Source Selection Strategy’ in the centre of the screen, make sure ‘Force’ is **OFF** and select **Signal Presence** as the ‘Backup Mode’.
6. Each pre-matrix input has four priority slots available to which any of the amplifier’s analogue or Dante inputs can be assigned. Use the arrows  in each priority slot to select the source to assign to it.



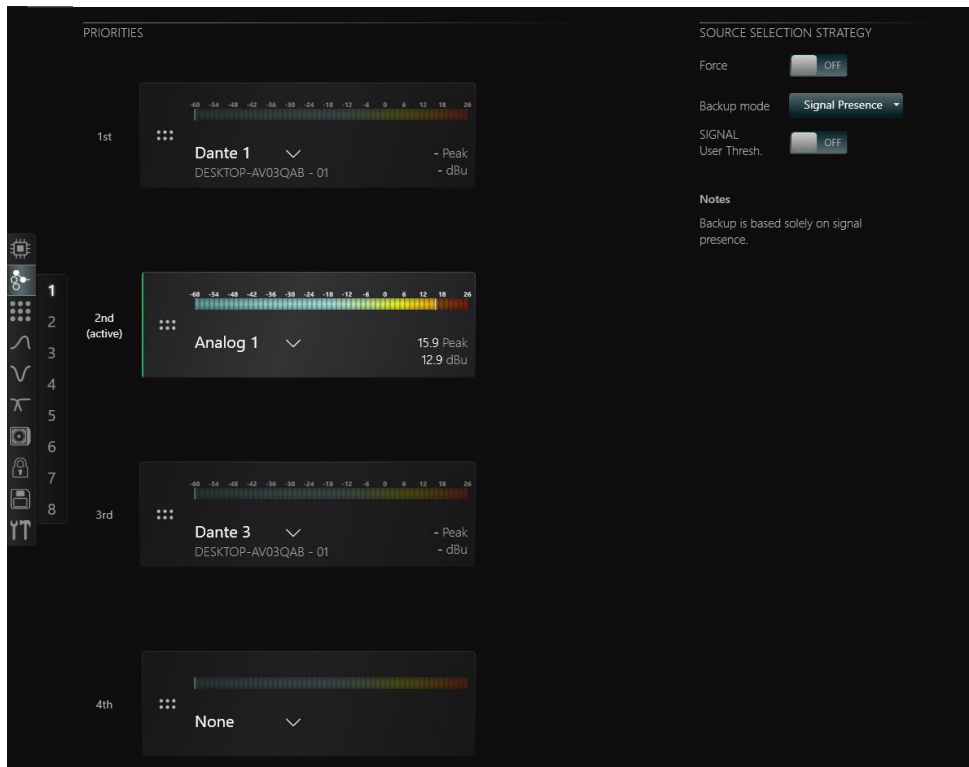


Figure 2 – Source selection and backup strategy configuration.

The backup strategy is a useful tool for creating automatic redundant systems. In the example from Figure 2, it is possible to note that 'Analog 1' (2nd Priority) is the active source going into the amplifier's matrix input 1. This is because when there is no signal present in input channel 'Dante 1', any signal playing at -60 dBu or above in 'Analog 1' activates the backup strategy and makes it the active source. Once signal is present on 'Dante 1', it will automatically be set as the active source as it has a higher priority in the queue.

The -60 dBu threshold can also be set by the user by enabling the 'SIGNAL User Threshold' toggle.

It is important to note that any analogue or Dante input channel can be assigned to the priority slots of any pre-matrix input and that the same source therefore can be assigned to multiple priority queues. For example, 'Analog 1' in the example of Figure 2 could have been assigned to all of the 8 source selectors before the matrix of the Ottocanali.

It is also possible to set the backup strategy for several amplifiers at the same time using the [Workspace in ArmoniaPlus](#). This option is available under 'Config' > 'Input'.

Start-up Times

The start-up times are here defined as the time it takes for the amplifier to start playing audio in its outputs from the moment mains power is provided to it. This start-up time is expected to be different depending on the amplifier model, and the type of source being reproduced.

The use of analogue sources is known to result in faster start-up times than when using Dante only. This difference is due to the additional time it takes for the Dante card to boot. Table 1 below details the time it takes for Powersoft amplifiers with onboard DSP to complete their start-up process and start playing analogue or Dante audio sources.



AMPLIFIER	ANALOGUE	DANTE	DANTE CARD
Quattrocanali DSP+D	≈ 5.3 s	> 23 s	Ultimo XT
Duecanali DSP+D	≈ 9.3 s	> 28 s	Brooklyn II
Mezzo Series	≈ 5.3 s	> 23 s	Ultimo XT
T Series	≈ 5.3 s	> 30 s	Ultimo XT
X Series	≈ 12.3 s	> 30 s	Brooklyn II

Table 1 – Amplifiers start-up times.

It is important to note that Table 1 presents the lowest possible start-up times for amplifiers playing Dante sources. Variability may be expected from the interaction with other devices in the network, clock synchronisation, and Dante patching. For this reason, the Dante start-up times may be a few seconds longer in more complex networks, e.g. with more nodes and devices, heavier network traffic, and/or other types of data (video, security, etc.).

System Configuration also Allowing Dante Sources to Pass Audio within 10 s

In many applications, it is necessary to guarantee that the amplifier start-up process time stays below a certain amount. For example, it may be required that a voice alarm system be designed in such a manner that in case of a mains power failure, the amplifier is able to start playing audio within a predefined amount of time once power is restored.

From Table 1, it can be seen that quick start-ups are easily achieved with Powersoft amplifiers when using analogue sources. However, in applications where start-up requirements are stringent and mainly Dante is used for audio transport, the numbers presented in Table 1 may not be acceptable as is. In such applications, it is recommended to use a Dante-to-analogue converter or Dante break-out box (“BoB”). There are several such devices in the market and many of which are powered over ethernet (PoE). As the BoB is an inexpensive product drawing very little power, it is simple to power one of these devices in each equipment location where there are amplifiers that need to receive network audio. It is typically enough to share this audio across amplifiers if the loudspeaker time alignment and processing is done within the amplifiers.

Figure 3 below shows an example of how a system consisting of four amplifiers could be set up using a Dante-to-analogue backup. This system will:

- Provide a start-up time below 10 seconds.
- Provide a backup to the Dante source that is only converted to analogue in the equipment rack.
- Require only one central UPS and no backup power supply in the equipment room. The amplifiers do not require a dedicated UPS, meaning that less power is necessary to drive the system. Backup power supplies are only necessary for the network switch feeding the redundant Dante-to-analogue network, and eventually for a PoE injector (only in applications where a PoE switch is not available).
- Allow that the main Dante source and its redundant Dante-to-analogue are kept in separate networks.



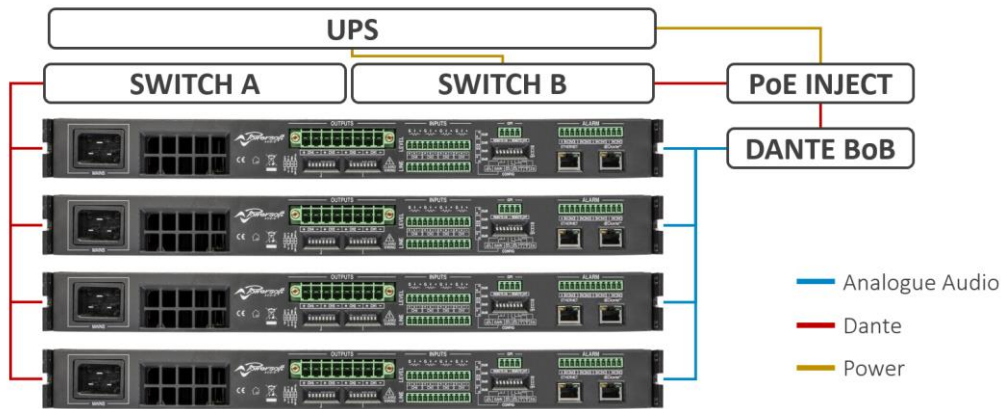


Figure 3 – Example application of a system with a 10-second start-up time with Dante on the source side.

The system in the example above (or other system configurations) can be set to operate in several different scenarios using the appropriate source selection backup strategy for the application. Figure 4 below shows only a few examples of how the backup strategy could be used to guarantee quick start-up times below 10 s.

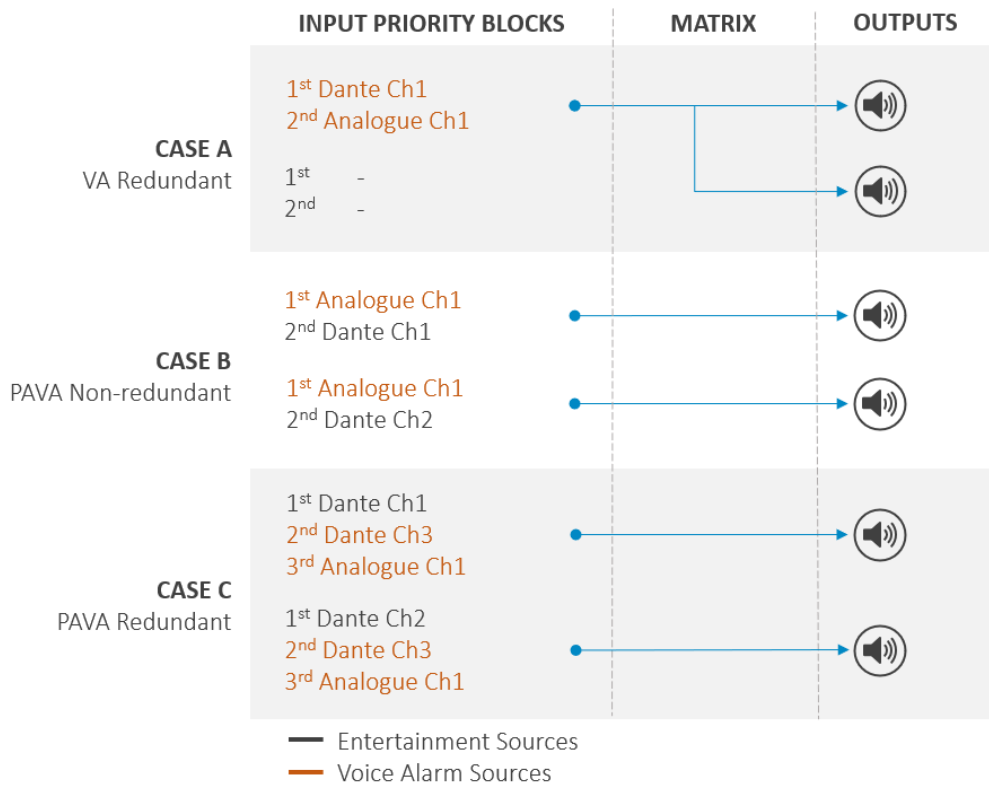


Figure 4 – Examples of different concepts using the backup strategy in Powersoft amplifiers.

- **CASE A:** ‘Analogue Ch1’ provides redundancy to ‘Dante Ch1’, where both could be playing a voice alarm emergency message. If Dante Ch1 is lost, ‘Analogue Ch1’ automatically becomes the active source. In case of a power failure, after power is restored, ‘Analogue Ch1’ is initially assigned the role of active source. After the Dante boot process is finished, ‘Dante Ch1’ automatically becomes the active source.

Note that only one priority queue is necessary as the inputs can be shared to all outputs via the matrix.



- **CASE B:** 'Analogue Ch1' contains a voice alarm message, whilst 'Dante Ch1' and 'Dante Ch2' are entertainment sources. Under an alarm condition, when the emergency message starts playing, it will automatically take the role of active source over Dante. Note that although individual Dante sources are sent to the matrix and the amplifier's outputs, the voice alarm message is common to all outputs.
- **CASE C:** 'Dante Ch1' and 'Dante Ch2' are entertainment sources. 'Dante Ch3' is a voice alarm message and Analogue Ch1' contains a voice alarm message, whilst 'Analogue Ch1' provides it redundancy.

Please note that case examples B and C are providing different approaches for the order of the source selection priorities. In case B, the voice alarm message has the highest priority, whilst in case C it is the entertainment sources. In summary, for case C to work in voice alarm conditions, the entertainment sources must be muted. Alternatively, if it is not possible to mute these sources, an approach similar to case B is recommended.



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